



consulting

1/14/2024

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Company Name: Infinity Turbine LLC
 Product: Waste Heat to Energy Systems and Technology
 Working Fluid: Refrigerants, water, and CO2
 Machine: ORC and ROT Radial Outflow Turbine System
 Industry: Energy
 Applications: Waste heat to power, utilities, server farms, bitcoin mining, hot geothermal
 High Technology Uses: Converting waste heat to power starting at 30C.
 Machine Features: One moving part and solid state turbine technology.
 Machine Runs On: Single phase 220V power and liquid CO2.
 Other Technology: Tribo effect power, hydrodynamic cavitation hot water power and extraction. Modular block technology. Gas leverage turbine for production of fuels from liquid CO2.

PDF Version of the webpage (first pages)

<https://infinityturbine.com/consulting.html>

Need Strategy? Use our Consulting and analyst services

Infinity Turbine LLC is pleased to announce its consulting and analyst services. We present data in logical, easy to understand format with links for additional research or verification of data.

Energy: Since 1985, I have worked in the renewable energy industry as a researcher, developing sales and markets, along with many inventions and innovations. A wide breadth of subjects and project development includes some of the following subjects.

Minimum contract \$4,999. Up to 10 hours of consulting. Sold as-is and provided on a best efforts basis.

All time is documented and a summary log will be provided when requested.

Unused credit may be used for a period of six months after invoice date. Payments are non-refundable.

Consulting is provided via telephone, email, or other media as agreed to in writing (email).

Minimum billing is 30 minutes, so it is recommended to have questions, support, and consulting for at least that period of time. References available.

Our consulting services are available on a best efforts basis and are delivered with our utmost dedication. We strive to provide the best possible service and ensure that all time spent is meticulously documented. Upon request, we can furnish a summary log of our activities. Any unused credit from our services remains valid for a period of six months from the date of the invoice.

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History

Wood Energy:

From 1985 until 2008: Doing business as Global Energy, developed and sold wood energy (biomass) systems. First with selling Waterwide Gasifiers from New Zealand in 1986, and then branching off into developing and selling my own systems, including steam turbines and steam engines.

Container Kiln (Lumber and Firewood drying): In the mid 1990s, developed and marketed a shipping container lumber/firewood dry kiln system (Container Kiln), which is modular and portable.

NonConventional Fuel Tax Credit: Adapted Section 29 credits for sawmills and wood processors that use wood fired boilers. Biomass is not burned, but oxidized and the gas is burned. Saved customers millions of tax dollars.

Capstone Turbine: Bought and sold Capstone microturbine systems. Experimented with vegetable oil and other combustible liquids in the diesel (liquid fueled) versions.

Section 29 Non-Conventional Fuel Credit:

Also in the 1990's developed and assisted groups wanting to get tax credits for landfill gas, as well as wood gas under the Section 29 (non-conventional fuel) tax credit.

As a wood energy specialist, I pointed out that wood doesn't burn, but it's actually the gas released from the wood. Many companies saved (or got refunded) millions of tax dollars.

Capstone Turbine Secondary Market:

In 2001 started consulting and selling the Capstone Microturbine (micro distributed grid power generator) and currently buy and sell these turbines into the secondary market.

Gas to Liquids Starting with Ocean Ethanol LLC

In 2004 formed Ocean Ethanol LLC with an investor (John Stevens in Kona, Hawaii) to develop my invention of converting CO₂ into fuel grade ethanol, methanol, and butanol.

With a short development window, we proved we could make alcohol fuel cheaper than existing fuel prices, but investor pulled out within 6 months, since he did not see an immediate return (even though it was projected to take at least 12 months to market).

We were able to produce methanol and butanol from reversing a fuel cell (i.e. input was liquid CO₂, water, and electricity, and output was alcohol).

Catalysts were developed at PNL (Pacific Northwest Labs).

Research was also done simultaneously in Italy, and a lab was able to show we could produce butanol and methanol from liquid CO₂ by reversing a fuel cell.

As a result I was issued two patents for my Modular Fluid Handling Device I and II in my name, and I have sole ownership of patents.

It was this initial research and development into liquid CO₂, that gives us the advantage in the CO₂ extraction field.

Waste Heat to Energy:

In 2008 I started Infinity Turbine LLC to discover, promote, develop, and build waste heat to power (renewable energy) systems. For a number of years, owned and operated a machine shop in Ferndale, Washington (near Bellingham, Washington) with a large Omax waterjet, laser engraver/cutter, Haas vertical milling machine, lathe, welders, shop tools and lots of custom test equipment.

We experimented with most forms of prime movers, including the Tesla Disc Turbine, Sterling Engine, Axial Turbine, Scroll Compressors, Scroll Expanders/Compressors, and finally settled on the Radial Outflow Turbine. We employed the services of Henry Technologies in Canada to build the heat exchangers for our Organic Rankine Cycle systems, and then paired with our turbine generator builds.

The predominant challenges were pressure seals, rotational speed, and moving parts. Basically, if you have more than one moving part, the system will fail. With the interest in CO₂ as the working fluid (to reduce equipment footprint by increasing efficiency and pressure to produce rotational mechanical energy), we starting experimenting with liquid CO₂ and phase change. Ultimately, the Holy Grail of power production is to reduce the number of moving parts and seals to a minimum.

We build over 100 CO₂ closed loop botanical extractors, and have lots of experience with Carbon Dioxide.

Solid State Turbine:

In our CO₂ experiments, we studied the Colorado Springs notes from Nikola Tesla. I found some interesting characteristics of CO₂ as it undergoes phase changes, including a tremendous production of static (DC) electricity. To that end, we started to develop a Solid State Turbine using Tribo Effect.

I found that by using a hybrid polymer material, we could generate static electricity simply by pressure reduction of CO₂ gas. Similar electrostatic effects were seen all the way back to the origins of steam power (coined the Armstrong Effect). The electrodynamic gas two phase system not only pertains to water-steam relations but any gaseous liquid two phase components. It can also cause explosions when using CO₂ fire extinguishers, as seen in a silo explosion in Norway in 2010 and in multiple accidents when the static discharge seeded an explosion, as presented in this article.

Using phase change to our advantage may be able to be the next Holy Grail of energy production. Why ? No moving parts. Plus CO₂ goes supercritical at 89F or 30C, which allows utilization of low grade heat (as in the cloud server farms or even solar thermal parking lots).

A Solid State Turbine scales up and down easily, and could even be used by Elon Musk for his Solar City or on Tesla cars to power the thermal management system by simply putting up black colored tubes on the roof to capture solar thermal energy.

A new wave of HVAC strategy could combine low temperature solar thermal, along with ground geothermal for cooling (Organic Rankine Cycle needs both heat and cold sink). The ultimate Solid State Turbine deployment would be with a cavitation CO₂ pump, for the least amount of moving parts (one). This is the system which will power us into the next few decades.

Plasma Wing:

Some of the research for Corona Discharge also led to studying plasma generated by a static field. This may be applied to aircraft wings for wing deicing (mitigation) and even some interesting methods of increase lift, which may impact applications for silent drone propellers. You will notice static mitigation on wings by the use of static whips (on the trailing edge of most aircraft wings).

Botanical Extraction Systems:

Starting in 2015, I started Infinity Supercritical, which uses the CO₂ phase change process to extract oil from plants. It turns out that the same ORC system, can be used for plant oil extraction.

It was in the past five years with this process development that we perfected CO₂ phase change, and actually discovered the corona discharge for ourselves (shop workers were getting shocked while venting CO₂).

The CO₂ phase change systems can also be used to sterilize PPE, and recycling precious metals from lithium ion batteries (LIB), and some have even proposed it is more valuable than Gold Mining.

Hydrodynamic Cavitation Processing Systems:

Concurrent with the Modular Blocks and Extraction Systems, I developed a Spinning Disc Reactor for process intensification. Termed the Sonic Extractor, this device uses spinning discs to hydrodynamically cavitate water. It turns out that you can also cavitate CO₂ (quite easily) which allows us to use a spinning disc to phase change CO₂ from a liquid to gas, and act as a pump. This methodology is perfect for Silver Nanoparticle production, and other continuous push-button manufacturing.

Induction Magnetics:

In my quest for better and faster processing of botanicals, I have also developed a induction (touchless) mixing system based on a micro version of the Bitter Plate Magnet. This fun little project allows DIY at-home making and formulation of cosmetics and skin creams.

Counter-Rotating Turbine with One Moving Part:

Years ago I designed and 3-D printed (in metal) a one part assembly which acted as both a turbine, and a turbo-pump. This counter-rotating design takes the best of what 3-D printing has to offer, while simultaneously mitigating the inherencies of modern turbine design (seal, temperature, and moving part issues).

While this design was primarily for energy production in the ORC process, it could easily be ported to a turbofan design for drones. Imagine a drone, which was sucked up, instead of the traditional method of thrust-down.

Along with thrust-down also comes lots of noise. In this case using a Counter-Rotating Turbine, a vortex would suck up the drone, and all noise would be projected into the sky. An added benefit (other than low noise) would be a very low heat signature, since compressed and expelled exhaust are mixed together.

Phase Change Battery:

Using CO₂ (which is a energy dense working fluid) leveraging the phase change would essentially make pressure the electrolyte. This battery concept can accept multiple charging inputs including heat, electricity, and friction to store energy.

CO2 Gas Turbine:

With a cavitating disc compressor, CO₂ (instead of air) would make a very interesting high altitude gas turbine, which leverages the cold temperatures of high altitude for condensing, while making a closed-loop, energy efficient power unit, which could power electric turbofans for commercial aircraft.

Gas Leverage Turbine:

Extending CO₂ Gas Turbine concept, a industrial version could be used in harmony with CO₂ and its sonichemistry reactions to make industrial goods, such as gas-to-liquids, chemicals, and other industrial raw goods.

FileMaker PDF Algorithm Research and Development:

Infinity has been using Filemaker since 1993, and is now diving into the analyst world of deciphering data. First project is GME (Gamestock). The algorithm is based on finding stocks that are being sold short, in combination with hedge fund or other fund shorts. These lists are publicly available in Europe, but a bit harder to find in the USA. The goal is to identify good candidates which may go up in price, as a result of social media (Redditt) and industrial grade short sellers. We plan on establishing a website to promote such research at a future site called stockprepper.com

Global Container Kiln for Drying using Shipping Containers

In the early 1990's I developed the container kiln system, which uses standard shipping containers converted into conventional lumber dry kilns for the portable sawmill market, and DIY network.

The container kiln can be used for dimensional lumber, poles, timber, blocks, pallets, firewood, hemp, and heat treating wood.

