Fixing Desalinization

with the Cavitation Engine

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Executive Summary

Fixing Desalinization with the Cavitation Engine

Fixing what is most broken in the current context of Desalinization, could reasonably begin with the power needs of Desalination plants.

Assume an average Desalinization plant requires over 15,000 kilowatt hours of electricity a day for operation. The Cavitation Energy Systems ***solution*** can allow a Desalinization Plant to ***create it's own Electric power - from the waste product of it's own desalinization***!

Consider an Electric Power Generation plant using Cavitation Energy, adjacent to the desalinization plant, running on "brine" as the primary fuel source – this obviously ELIMINATING the environmental problem associated with Brine Disposal in Desalinization Plants.

Each desalinization plant in existence already has a significant Electric Energy grid supplying it's power. With the CES Cavitation Engines being run by the power available at the plant, a daily energy need by the desalinization plant of an example 15,000 KW Hours, could be "powered" by the CES Cavitation engine drawing less than 1000 KW hours from the existing electrical grid, and then generating more than 16,000 KW hours for the plant in the same day.

In fact, many times this amount of electricity could be produced from the starting power with the "Brine" as the explosive source in the Cavitation engine(s). Each Desalinization Plant could become an impressive Electrical Power generation location, when combined with the Cavitation Engines.

The Cavitation Engine needs one unit of electrical energy to combust the brine – this accomplished via cavitation implosions and resultant coulombic explosions, generating 18 times this initial unit of input power. The 1000KW Hour input to Cavitation Engine in our example, delivers more than the "average use" 15,000 **KW Hour needs**, of a typical Desalinization Plant.

Coulombic explosions have been floated in front of high school and college Chemistry classes for over half a century. You probably witnessed a teacher tossing a tiny piece of Sodium into water during your schooling and saw the fantastic explosion that resulted. As amazing as this was, it remained no more than a party trick because no one could figure out a way to keep these explosions going continuously, and to harness them. Now as Desalinization plants have become critically needed for water all over the world, the 2 serious problems they cause desperately need to be fixed. The brine effluent must not be just dumped into the oceans and allowed to cause dead zones – and the electrical costs of running

these plants limits where they can be afforded. As it happens, the Cavitation Engine fixes both these major problems.

In the Cavitation Engine, the Brine effluent is changed from concentrated saltwater into an oxy hydrogen and sodium ion plasma. It does NOT need to be allowed to revert back to water after the Coulombic Explosions in the Cavitation Engine.

What exhaust is left after the coulombic explosions, is essentially gaseous oxygen and hydrogen, with the remaining trace minerals left in a powdered form including the valuable Lithium which should be seen as another profit center along with the power generation.

Dreams of a utopian future have driven billions of dollars of research into fusion power. Like an infinitely valuable mineral with unlimited energy potential, development of the Cavitation Engine has produced a virtual "Unobtanium". It harnesses the explosive union of atomic nuclei that fuels stars and that liberates colossal quantities of energy.

Science author Charles Seife wrote: "Fusion is as close as science gets to something for nothing. It offers a theoretically clean, perfectly free, inexhaustible source of energy that nothing else offers". As soon as the theory was born — that you could make atoms stick together and get energy — scientists knew they had to make it work. Einstein's equation $E=mc^2$ established the foundation for fusion power. It suggested that a minuscule amount of mass — say, the mass lost when the nuclei of two hydrogen atoms collide and fuse — could be converted into a massive amount of energy, if those collisions were harnessed on a vast scale.

Today our mission is to discuss the huge leap Cavitation Energy Systems and Florida Atlantic University have taken, towards this Utopian Goal of "Getting Something, for Nothing".

As you read about what Cavitation Energy systems is developing, one major epiphany should stand out…the manner in which "Cavitation Energy" has become the 'key" to unlocking Fusion, after 60 years of a modern day "Quest for Fire".

As you watch our prototype demonstrations and read through the certifications of power generation measurement by Florida Atlantic University, it will become clear that the long-desired method of harnessing Coulombic Explosions and "proton to proton fusion", is finally being realized with our Cavitation Engine.

The fact that our Cavitation Engine runs optimally on the brine effluent from desalinization plants, brings us to a new ERA in which we can make Electrical Energy and money from effluent, potentially a trillion-dollar new industry.

Introduction

CES AND DESALINATION TECHNOLOGIES

A desalination process essentially separates sea water or brackish water into two parts – one with such a low concentration of salt as to be essentially fresh water, and the other with a much higher concentration than the original feed water, usually referred to as brine concentrate or simply as "concentrate". Typically a reverse osmosis plant will produce a Brine concentrate varying from 50 to 75 Grams/Litre, or roughly twice as much salt concentration as found in seawater.

The two major types of technologies used around the world for desalination can be broadly classified as either thermal or membrane. Both technologies need energy to operate and to produce fresh water.

There are 160,000 desalination plants worldwide producing 140 million cubic meters of brine per day. This translates into 6 million cubic meters of brine per hour. Typically, this brine is dumped back into the environment, where it will typically cause high mortality to marine organisms, and in some places cause significant dead zones where nothing can live, often with significant threat to all local fisheries [1]. 175 countries have desalinization plants. Saudi Arabia, UAE, Qatar and Kuwait produce 55% of the global desalination brine. [2]

When brine is injected into Cavitation Energy systems impact chambers, enormous ***Coulombic explosions*** are produced. This energy can be harnessed with the proper ***rotary expander*** to generate electricity.

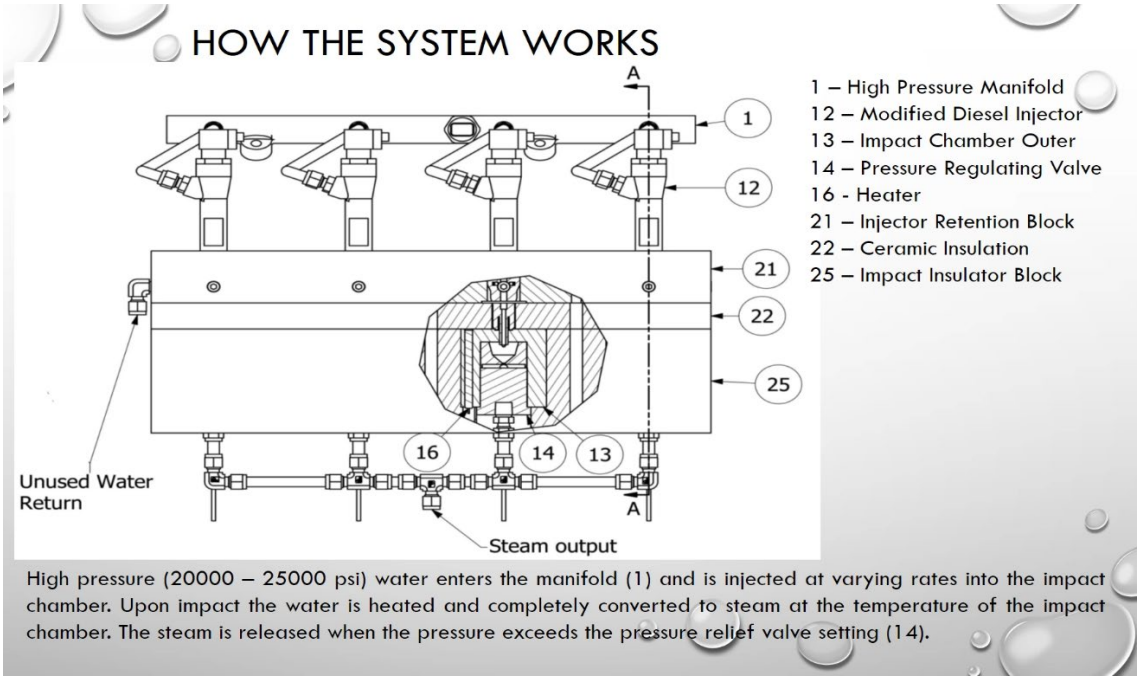
View the following video link to observe this effect: https://www.youtube.com/watch?v=qTeKs_eAi6g View the following video link to observe this effect: https://www.youtube.com/watch?t=21&v=9Qb_M-h7UAw

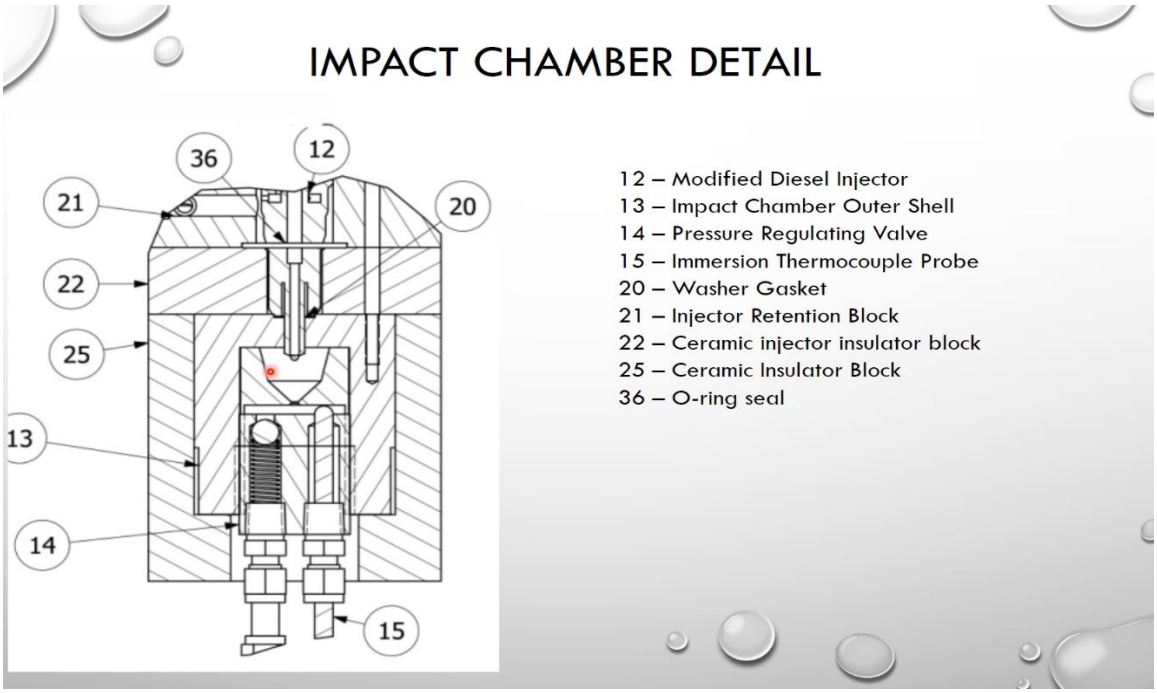
Marine coastal locations, especially in third world and developing countries, are often incapable of producing the electric power needs of their communities, and often share a similar demand for sources of fresh potable drinking water.

In past decades, heat produced either by the combustion of fossil fuels or nuclear reactors changed liquid water into a gas, which in turn was been used to create electricity. The superheated steam was used to drive power generators, derived through this isobaric heating of water in a thermodynamic process known as the Rankine or modified Carnot cycle. For centuries steam was been produced this way and the energetics of this process were well understood, which led to the dominant but expensive forms of steam-powered Electrical generation in use today.

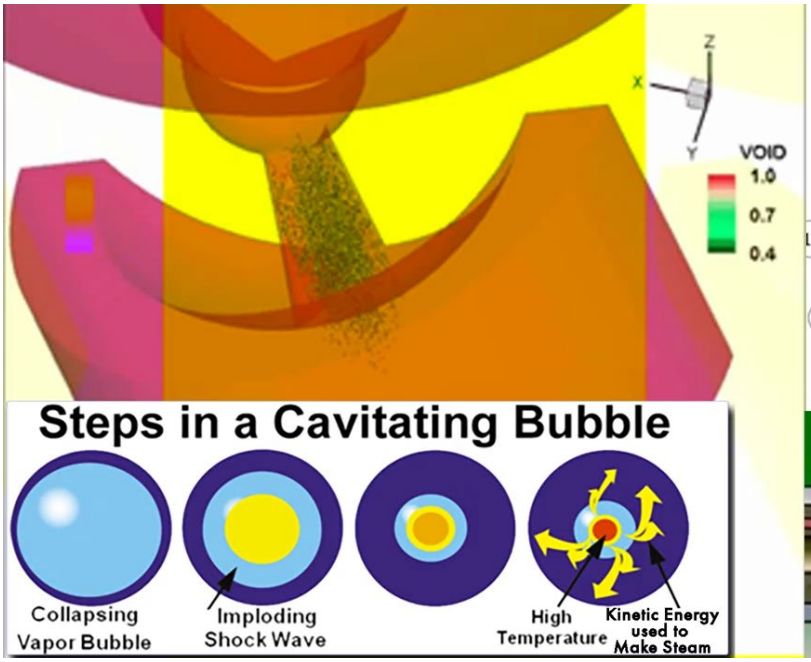
Cost, size and expense "per KW Hour of electric power produced", are all problematic in the remote local power generation examples in third world and developing countries. . Remote local power generation is a prime application for Cavitation Energy Systems technologies. Cavitation Technology allows far more power to be created, with far less investment cost, smaller footprint, and no Carbon emissions.

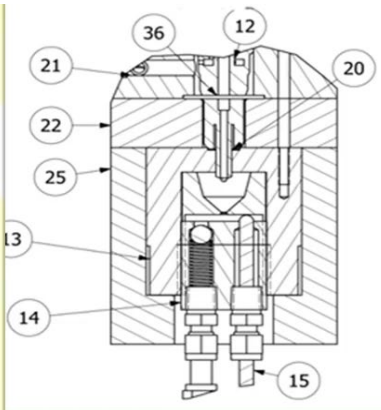
The Cavitation Energy System Cavitation Engines use conventional automotive fuel injectors to accelerate water, saturated with cavitation nano-bubbles into the unique geometry of a sealed metallic vortex impact chamber.

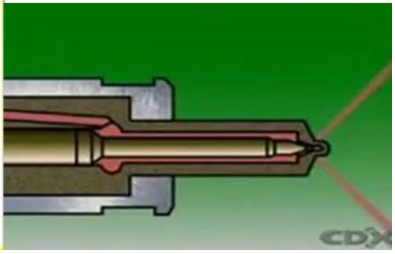




During the collision enormous hydraulic pressures collapse the bubbles within the injection volume. Cavitation bubbles have the remarkable ability to focus intense energy and forces during their collapse. The resulting heat energy contributes to the continuous creation of superheated steam inside the impact and expansion chambers, creating a Plasma where before there was water vapor.







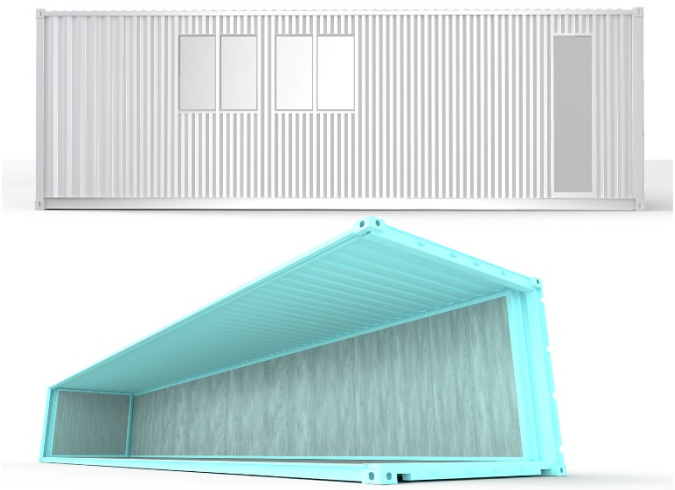
Our input energy to create the Cavitation heat catalyst in the impact chamber, required to cause the coulombic explosions from the sodium in the seawater, measures out to one unit of power input, to 18 units output.

In a desalinization plant with an average daily need of 15,000 KW Hours of power, a Cavitation Engine would use 1000 KW Hours per day, of power input from the electric grid, to generate coulombic explosion-based power of well over the 15,000 KW Hours of power required to run the plant.

The measurement data from our prototype, clearly demonstrates that the resulting heat and steam released on impact, are an energetically more efficient way of producing steam, compared to conventional Rankine isobaric cycle heating.

The Cavitation Energy System Engines can produce continuous dry or saturated steam at a wide range of pressures and temperatures. While power generation is the primary focus of CES, disposal of Brine effluent in the best manner possible is an equally important advantage to the CES system.

The electric generator driven by a multi-impact chamber Cavitation Engine, will produce power from a variety of gaseous sources including both dry and saturated steam. The system is relatively compact and can be packaged in a single steel shipping container along with the CES system.



When saltwater is injected into the impact chamber apparatus at high pressures and high temperatures, molecular separation of the oxygen and hydrogen into a plasma occurs, with molecular recombination followed by an explosion and shockwave energy being produced.

The temperatures and energies during the collapse of cavitation bubbles produce this type of molecular disassociation. Cavitation occurs within the orifice of the fuel injector nozzle when the local flow pressure drops below the vapor pressure of the liquid. Billions of cavitation bubbles are ejected from the nozzle at supersonic velocity into the vorticial impact chamber. When they collide with the impact surface they are crushed from the pressure and they generate temperatures within the bubble collapse of 18,000 degrees kelvin.

With the properly designed apparatus this combustion and SHOCKWAVE POWER can be harnessed in the production of electricity. The design of the injectors is such that all surfaces coming in contact with dissolved solutes are especially plated with non-corrosive coatings and further enable the injectors to operate with a fluid of very low viscosity.

In summary, CES steam technology has the capacity to generate low cost and extremely high yield electrical power, and at the same time, use the previously difficult to dispose of Brine Effluent from Desalinization Plants, as the fuel for the Cavitation Engine. In other words, communities desperately in need of desalinization plants for drinking water , can now have desalinization plants that are ALSO Electric Power Plants…These low investment cost CES Power Plants, built into the Desalinization plants, will run mostly on the waste brine of the Desalinization Plant, and provide mass amounts of excess electric power for the communities. Since the Cavitation Engines run on Brine Effluent, the major environmental damage caused by most Desalinization Plants is prevented in the most elegant manner imaginable.

Learn More

For the latest information about our product and services, please see the following resources:

- www.cav-energy.com

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This document defines the White Paper to be used for Cavitation Energy System projects.