Analysis of Steam Zoning With Exhaust – Smoke Stack and Water Swirled Into Gas Turbine Technology – Draft – Work in Progress New Tech Hot Gas To Electricity Patent Ap 20170306843 Filed: February 27, 2017 first action March 4, 2019 WWW.gasturbineandersen.com

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#### **Electrical Generation New Tech Save Fuel**

- 1. Who? Engineer ASME GTTC IGTI STLE 10 years Three patents
- What? The new technology has been developed with water into a 2. flow of hot gas in a swirling pattern most recently with a focus on internal combustion engines, fired boiler stacks and, water swirled into gas turbines combined cycles for more fuel efficiency. Beyond more fuel efficiency there is pollution control of PM 2.5 and PM 10 particulate in coal firing etc.. The work in new combined cycle gas turbines prior to this is my two patents is to at the end of the power turbine through blades and/or a mechanism to put water droplets into the hot thrust gas of 350 - 500 C going to steam in concentrated volume. This Technology is to have droplets of water mixed into the hot part of the gas turbine with the droplets of water traveling in a curved pattern after the combustion section.
- 3. When Now !

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Hot Gas

Electrical generator connected to the extractive turbine that is turned by engine exhaust / furnace stack gas mixed with water droplets with little steaming, moved to optional shape and position to rotate the extractive turbine. Plus 5% benefit from fuel in !

> Donut - Tire Shaped Near Instantaneous water droplet to steam mass / volume / space

A washer shape of water droplets in a hot gas of an internal combustion engine or fired boiler or other source The new technology has been developed with water into a flow of hot gas in a swirling pattern most recently with a focus on internal combustion engines, fired boiler stacks and, water swirled into gas turbines combined cycles for more fuel efficiency. US Patent Ap # 20170306843 Len Andersen 800-428-4801



Hot Stack (Flue) – Exhaust Gas NOx, SOx Particulates  $\sim 200 \text{ C}$ 

#### Current Prior to New Tech Exhaust – Smoke Stack and Combined Cycle Gas Turbine Electrical Generation



### Gas Turbine Rain Ingested Sectioned



#### Analysis of Rain Into A Gas Turbine

Section A - A Top 25 % rain drop free Middle half - 10 % rain drops Lower 25 % - 25 % rain drops



Section B - B Combustor "flame" with water droplet mixing in and 10 % rain drops uniformly distributed across the section



Section C - C rain drops mostly steam increasing the volume of thrust gas / thrust energy out of combustor



The water swirled into gas turbine shown indicating the shifted rapid near instantaneous water droplets to steam from combustion section to after turbine section per the presentation technology. Benefit minus erosion.



Cross Section rain drops mostly steam increasing the volume of thrust gas / thrust energy out of combustor

Cross Section At End of turbine section water droplets mostly Steam Created by Patented Apparatus



## Water Swirled In Before End Of Main Shaft Patented Alternative





## Combined Gas Turbine Issued Patents Steam Expansion Chamber



### The System Water Into Turbine (Hot End) Part of A Gas Turbine Engine Schematic!



## Plus Lower Cost Electricity

The most obvious advantage is more electricity out per unit of fuel (coal, diesel, Jet A) in. The less obvious advantage is the efficiency of smaller of electrical power generation plant. About the same for One to Five Hundred Mega Watt, therefore more plants result in less loss on electrical distribution. Less expensive faster start and shut down than combined cycle steam turbine units ! The tech has aircraft, train, ship benefit.

#### Lower cost airplane orientated Water Swirled into Gas Turbine Patent 9,376,933 !

17 Mar 2016 Edward Ellis <Ellis@leasonellis.com>

<u>Gas Turbine Thrust Fuel Efficiency Enhancement System Water (Volatile)</u> <u>Introduction Arrangement Method and Means 9,376,933</u>

Additional thrust fuel efficiency is provided for a gas turbine system that includes a first member(s) (e.g., a support for a rotating main shaft) that is attached to a stationary casing. The rotating main shaft is attached to the first member through a bearing. A second member is associated with a rotating member, such as a motor or other rotating part of the main or other shaft. The first member has a flow path in it for the liquid (e.g. water and/or other volatile liquid) and has an opening (nozzle) for discharging the liquid. The second member has a liquid impinging member for generating a liquid spray, droplet, mist optimally, which vaporizes with hot combustion gases that flow exteriorly along the main shaft. In this form vaporization is quick and is less erosive. The volume of thrust gases is increased advantageously and likewise engine boost increases. Gas Turbine With Water Made Spray by on Main Shaft mist maker!



### **Decision Factors**

- 1. Cost of getting additional electricity and/or travel against cost. Pollution reduction up factor coal etc. burn. Five ten % more per unit fuel latest.
- 2. New Combine Cycle Gas Turbine 17 % gas -21 % liquid up in fuel to electricity or mechanical energy output compared to combined cycle now in use before latest Pending patent ( third ). This would reduce carbon dioxide emissions by 17 21 % with additional emissions reduction with having less distance from electrical generation to electrical consumption.
- 3. Low capital cost combined cycle units, smaller and in greater numbers. Natural gas fields availabilities expands that possibility.
- 4. The efficiency of gas turbine electrical generator units 1 to 400 MW is nearly the same which would greatly reduce electrical distribution losses. Lower start up and shut down cost than other combines cycles !
- 5. Pursuant to patent allowed 17 March use in ships, trains combined cycle gas turbines systems and aircraft +30 % happening.
- 6. Lighter per KW capacity than some internal combustion systems.

## **Gas Turbine Engineer - Owner Leonard M Andersen / Resume**

#### **Engineer +20 years of experience in Gas Turbines etc.,**

Presented "New Tech Combined Cycle Gas Turbines (CCGT) - Analysis of Water Swirled Into Gas Turbine Technology" Power Energy at ASME Power & Energy Conference 2017 and One patent pending in Steam Zoning With Exhaust – Smoke Stack and Water Swirled Into Gas Turbine Technology

Two patents Gas Turbine Combined Cycle Technology

**One Lubrication** 

**Two Petroleum Extraction** 

Five in Welding !

#### **Professional Experience**

Gas Turbine Engineer - Welding Inspector - Engineer Metropolitan Area Canada , Norway Russia Houston Attended many gas turbine Turbo Expo's including last in Norway and will attend one in Phoenix and ASME GTCC meetings.

Journalist World Petroleum Congress ( www.22wpc.com ) Istanbul June 2017 Global TV etc Exposure! Engineer / Welding Inspector CWI / Construction Project Manager Employed October 2000 to May 2014 New York City Department of Transportation 2000 to 2014

Education

Turbo Expo Etc. Gas Turbine Short Courses

Education – Many short courses in gas turbine tech

Registered Representative (Stock Broker) Course resulting in passing SEC Tests Security Training Corporation

BSChE Chemical Engineering Degree, University of Arizona, Tucson, Arizona

## Water Swirled Into Gas Turbine Technology – Thank You For Your Attention

Leonard M. Andersen Gas Turbine Engineer –BSChE AWS CWI

(Certified Welding Inspector)

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Looking For Interaction On Internal Combustion / Smoke Stack and Gas Turbine Technology / New Tech Hot Gas To Electricity Patent Ap 20170306843 Filed: February 27, 2017 first action March 4, 2019