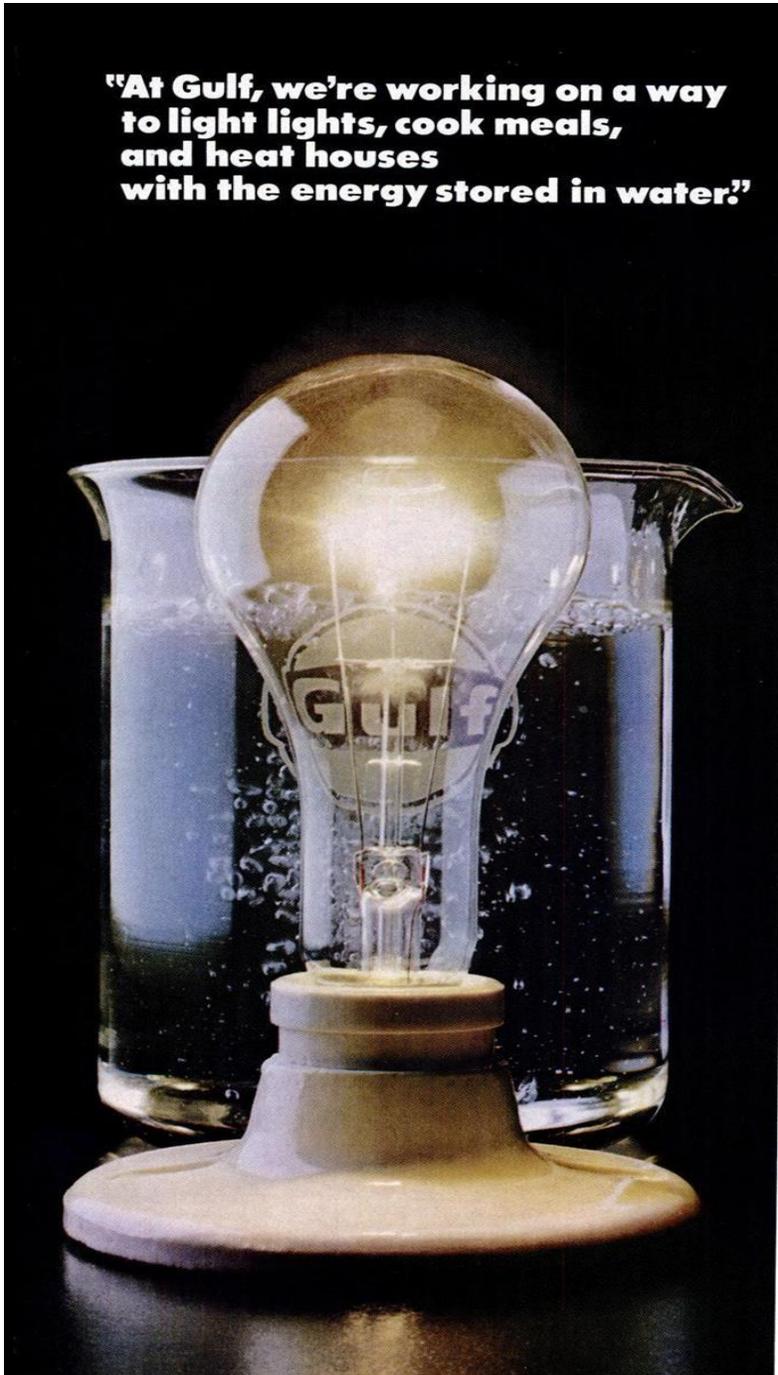


Thermochemical water-splitting not unknown to scientists from Gulf. Dr. John Norman from *General Atomic Company* is telling us of the hope for energy in water. It is ironic that an oil company is discovering the thermosplitting process initiated at 1600F, a temperature readily available in internal combustion engines that would clean up their act and make all internal combustion engines cheaper to operate, and more enduring. The article says it is expensive to extract hydrogen at 1600F, but in a motor, we have this temperature as very common, and the obtained atomic H and O are now activated to catalyze the combustion reaction.

**"At Gulf, we're working on a way to light lights, cook meals, and heat houses with the energy stored in water!"**



"You probably remember from grade-school science that water is two parts hydrogen and one part oxygen," says Dr. John Norman.

"Here at General Atomic Company, a subsidiary 50% owned by Gulf Oil, a project is under way to

"There are 326 million cubic miles of water on earth, and hydrogen in every drop—a natural energy resource that won't run out."



extract hydrogen from water for use as a fuel: for heating, cooking, or anything that now uses petroleum or natural gas.

"The extraction process is called thermochemical water-splitting. We know it works because we've done it. But it takes high temperatures — about 1600° F — so it's rather expensive.

"It may be the turn of the century before it becomes commercial. But it's an attractive idea. Hydrogen from a gallon of water has about half as much energy as there is in a gallon of gasoline.

"Hydrogen can be made into a liquid or gaseous fuel. It can be transmitted long distances more cheaply than electricity. And when hydrogen burns, it's converted back into water. Very tidy."

At Gulf, our first priority is to get all the oil and natural gas we can out of resources right here in America. But we're working on a lot of other ideas, too. Thermochemical water-splitting is one of them. We are also working on underground coal gasification, solar research, liquefied coal and other synthetic fuels, geothermal energy, and other alternative energy sources.

Basically the business we are in is energy for tomorrow.



**Gulf people:  
energy for tomorrow.**

Gulf Oil Corporation

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## This is the article:

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“The extraction process is called thermochemical water-splitting. We know it works because we have done it. But it takes high temperature—about 1600° F – rather expensive.”

“It may be the turn of the century before it becomes commercial. But it’s an attractive idea. Hydrogen from a gallon of water has about half as much energy as there is in a gallon of gasoline.”

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### **Nature of Operations**

Lean Fuels Corporation is an environmental company in the field of research and development into alternative sources of renewable and sustainable energy. At this time management believes the current situation in the world provides the best opportunity for Lean fuels Corp. to change the focus from R&D, and become an operating company to commercialize our products. We will concentrate on our two main technologies. Engine technology to increase fuel efficiency and to decrease greenhouse gas (GHG) emissions; and alternative fuel sources produced from sweet sorghum. The technologies are used in conjunction with each other.

### **Auto Technology**

Lean fuels Corp. has patent pending technologies to improve fuel consumption of vehicles, which will reduce CO<sub>2</sub> and GHG emissions up to 50%. We have many independent studies, tests and expert opinions to confirm these findings. Our goal is to sell our units to the existing after-market of vehicles, primarily for the government fleets of cars, trucks and buses. The return on investment to the consumer for total costs of production, distribution and installation will be achieved within 6 months in improved fuel consumption. The system pays for itself in a short time, and can provide LFC a recurring revenue.

Our advantage over other alternative technologies is that we are considered a flexible fuel technology. We can use almost every fuel source; regular gasoline, straight cut gasoline (75 octane), ethanol, and AQUAHOL (Ethanol/H<sub>2</sub>O). Our goal is to use AQUAHOL as the most economical fuel source. As MTBE is being banned from use, our technologies are a viable solution

to produce the octane. The system is based on thermo-chemical splitting (1) hydrogen dioxide starting at 816°C (1,600° F) into its activated molecular components H + O to increase the octane within the combustion chamber. It is an internal Hydrogen-Octane Catalyst (HOC). Essentially, we are using the heat & pressure of the engine to produce the octane. Under load where more octane is needed the combustion temperature may exceed 3000° F, At that temperature about half of the water is dissociated and activated. LFC is working to improve the % of dissociation through metal catalysis.

Normal Engine: regular gasoline + air » E + CO<sub>2</sub> + CO + HC + NO<sub>x</sub> + H<sub>2</sub>O

LFC System: flexible fuel + air + HOC » E + CO<sub>2</sub> + H<sub>2</sub>O

We burn a cleaner fuel to substantially reduce HC, NO<sub>x</sub>, and CO<sub>2</sub> emissions. Our system qualifies as an immediate solution to pollution, and it can be implemented today on almost every type of vehicle including tractors, marine engines and generator sets. Our system is suitable for over 80% of the world's more than 300 million vehicles. The international KYOTO Accord which became effective February 16, 2005 only requires an overall CO<sub>2</sub> reduction of 6%. LFC offers almost 10 times the hurdle rate of KYOTO, which will translate into valuable trade credits.

### **Sweet Sorghum Projects**

Lean fuels Corp. has developed methods to reduce de-forestation by using sweet sorghum as an agriculture alternative to hardwood lumber for wood and pulp & paper. We have independent feasibility studies to confirm these findings. The additional benefits include grain for flour or animal feed, and sucrose for ethanol production. We intend to build an ethanol plant with each project to produce the fuel for our auto technology, and for sale as a commodity. The bio-mass will be sold for either energy, wood, and/or paper. The grain will be sold for animal feed or flour.

We will demonstrate the application of our technologies through organized farming co-operatives. Our goal is to use sweet sorghum in large scale plantations, and we intend to proceed in a three step scale up program to minimize the risks for each project.

Phase I: Feasibility study, (1-3 months)

Phase II: Pilot project, (3-18 months)

Phase III: Full scale operation, (2-5 years)

At full production each project will generate employment for hundreds of people, and a long term renewable, sustainable industry for the economy. We will implement the following arrangement:

Local company / organization / co-operative or government will invest 25%-50% of the project costs in a joint venture with LFC. We can access the United Nations development Program for the feasibility study, and then the World Bank for project funding for another 25%-50% in the form of a GEF grant, and IFC equity position. LFC is already qualified with the World Bank for such grants. We are interested in projects for the developing countries of the world to create employment and a sustainable industry.

## Current Situation of the Environment

The United Nations officially determined that climate change caused by global warming is the most important concern for the world. Fact Sheet #25 from the United Nations Environment Program (UNEP) states that the burning of fossil fuels and de-forestation are the largest contributors to GHG emissions that cause global warming.

On February 16, 2005 the KYOTO Accord was officially in force as it was ratified to over 55% with the signing of Russia in December of 2004. It is now an enforceable international law mandating the reduction of GHG emissions below 1990 levels for over 140 countries. This is the breakeven level just to maintain the status quo of climate change on the planet. Eventually, the world would require over 25% reduction levels.

In March of 2005 the Millennium Eco-Assessment Report, the world's first independent four year audit of the Earth's eco-systems by 1,300 leading scientists from 95 countries determined that 60% of the systems which support all life on the planet Earth are on the verge of collapsing within 50 years due to man-made environmental problems. This will have catastrophic effects to humans as a species. An example is the cod fisheries off the grand banks where there was once an unlimited supply of cod fish, today there are almost none. A domino effect may trigger the next mass extinction. Source: [www.millenniumassessment.org](http://www.millenniumassessment.org)

## FACTS

Source data from the Intergovernmental Panel on Climate Change (IPCC).

Man has been burning fossil fuels for over 125 years.

Pollution is caused by the emissions of burning fossil fuels.

Pollution causes lung disease, cancers, and kills millions of people.

Fossil fuels are the biggest contributor to greenhouse gases.

There are alternatives to fossil fuels such as wind, solar, hydrogen, geo-thermal, ethanol, etc.

De-forestation is the second biggest contributor to climate change.

Greenhouse gases are causing global warming.

Global warming will cause natural disasters to increase in number and intensity; hurricanes, tornadoes, floods, droughts, forest fires, infectious diseases, smog, etc.

The economic costs of natural disasters cost billions of dollars annually.

Global warming will cause the northern permafrost and peat bogs to melt, which will release hundreds of billions of tons of carbon dioxide (CO<sub>2</sub>) and methane (CH<sub>4</sub>) into the atmosphere. This will be more than 70 years of global emissions all at once.

Global warming will cause the arctic ice sheets to melt, which will cause sea levels to rise as much as 1 meter causing flooding of coastlines around the world and sink low lying islands.

Global warming will affect the Thermohaline Circulation (THC) which regulates world climate.

Global warming will cause mass extinction of many species on Earth perhaps even man.

Reducing greenhouse gas emissions will reduce the effects of climate change.

LFC's technologies have the solution for the two biggest contributors to climate change; the

burning of fossil fuels, and de-forestation.

## **Background**

### **The Founder**

Nino de Santis is a Canadian born citizen from Montreal, Canada and is a former senior advisor to the United Nations Long Beach California USA chapter for “new and environmentally sound and sustainable technologies” on Earth day international. He is a patent holder of several environmental technologies that can reduce GHG emissions. Primarily the Hydrogen-Octane Catalyst (HOC), and AQUAHOL fuel system produced from Sweet Sorghum hydrous ethanol.

### **History of the Invention**

1940's - During World War II the United States air force commissioned the engineering firm of TRW to create an engine booster for their Mustang and Thunderbolt fighter planes. An engine injector was invented by Dr. Norman Waag to boost the octane using H<sub>2</sub>O, which gave the American fighters more power and was instrumental in winning the air war. This marks our place in 20th century history.

1950's to 1970's - After the war Dr. Waag commercialized the invention in the auto racing industry. During this time he sold over 100,000 units. The system provided more power, but also cleaned the engine, improved fuel consumption, and reduced CO<sub>2</sub> emissions. When nitro was introduced (at the cost of extreme pollution) the injector became less popular in the racing industry. Dr. Waag retired to Florida with the invention in the mid 1970's.

### **Milestones**

1977 During the oil crisis, Nino de Santis entered into a contract with Dr. Waag, and apprenticed with him over the next few years to commercialize the invention as a fuel enhancer for regular vehicles. This formed the basis of the LFC Corporation.

1979 On May 9th Nino de Santis presented the system on the national news across American TV stations NBC, ABC and CBS. Our system was put on the police department in Hollywood Florida, PEPSI-Cola, and Marriott Hotel trucks. The increase in MPG was between 26.6% to 40%. The EPA also confirmed a lab test which achieved a 25.2% increased MPG in a smaller engine.

1980 - 1987 The Quaker State franchisee Ross Oil of Florida became the first distributor for a partial injection system. From the publicity the company sold over 10,000 units. Nino de Santis opened an operating plant to market the injection system in addition to tires for commercial trucks in Florida. LFC moved to Los Angeles California to market the technology in the alternative fuels market, and entered several trade shows to demonstrate the system. In 1987 the first global environmental accord is signed in Montreal, Canada called the “Montreal Protocol” to ban CFC's to reduce ozone depletion.

1991 The company entered the 3rd Annual I&E Expo and InvenTech Trade Show for alternative technologies, and won 1st prize for the best ecological invention award beating out all other competitors including solar, electric, hydrogen cars, and major companies such as Nissan, Ford and GM. After this a Price Waterhouse feasibility study was commissioned, which concluded that the technology would become feasible once environmental laws were passed. The company returned to Florida for new emissions tests, and passed the tests positively.

1993 Nino de Santis was enlisted by the United Nations as a senior advisor on Earth day International in Los Angeles, CA for new environmental, sustainable and renewable technologies. After a demonstration he traveled to Thailand, and entered into a partnership with the KOSA MITSUI Group, a major shareholder of the Toyota Corporation.

1994 Research into sweet sorghum to produce alcohol, pulp & paper and wood fibre was started with the co-operation of the United Nations commodities division in Geneva, Switzerland. Nino de Santis attended the 9th session of the UN intergovernmental negotiating committee for a framework convention on climate change in Geneva, where an action plan was designed to form an agricultural energy co-operative among 91 countries. The company presented an ethanol production plan to produce AQUAHOL fuel for the state of Hawaii.

1995-1996 Nino de Santis returned to Montreal, Canada and formed a Quebec based research and development trust called "ENVIRO-LFC in Trust" to lobby the Canadian government for an environmental law. In 1995 the Canadian government passed the "Alternative Fuels Act" for all crown fleets of vehicles to switch to alternative fuels. In 1996 The Montreal Protocol is ratified and put into force by 168 countries officially banning CFC's to reduce ozone depletion.

1997 The KYOTO Accord opens for signature in KYOTO Japan by over 160 countries. Nino de Santis received a nomination for the Canadian Entrepreneur of the Year by the Bank of Montreal.

1998 Canada signed the KYOTO Accord. New car tests were done in Montreal by CARQUEST CANADA Ltd., which confirmed the reduction of emissions of NOx by 90%, and HC by 50% on a 1996 Neon.

2000 - 2001 LFC was incorporated under the laws of the state of Florida in preparation for future operations as a commercial operating company. LFC received a letter of permit from the Jiangsu Province, China for our projects. China International United Petroleum and Chemicals Co. Ltd. (UNIPEC) agreed to supply straight cut 75 octane gasoline. LFC built a prototype car called the "Hummingbird" in Trinidad in a plant previously owned by Toyota. A local PEUGOT dealership agreed to become a distributor. Trinidad government fully endorsed our technologies. The national petroleum company PETROTRIN and CARONI agree to a partnership in Trinidad.

2002 LFC started a joint study with CASCADES and BORALEX for the application of sweet sorghum for pulp & paper and alternative wood products. A certificate of analysis confirmed a burn rate of 7,595 Btu/lb (equivalent to hardwood lumber) by BODYCOTE Materials Testing Inc.

2004 Nino de Santis assembled a group of key individuals with the experience and background to form the basis of the operating company once research is completed. The Cascades feasibility study is completed and confirms the application of sweet sorghum for chemical pulp & paper. Negotiations began with Cascades for a 10 year purchase contact.

2005 An agreement was initiated with BORALEX to become our international operating partner for sweet sorghum projects. Contracts with China were initiated with large companies in the field of alternative energy. Joint venture agreements for cross transfer of technologies of hydrogen auto technologies. Our sweet sorghum seeds were planted in various regions of Quebec, New York state and China. LFC management decided to bring the company into operations.

#### Future Outlook

Lean fuels Corp. will be listing a public stock offering this year. This will provide liquidity, and capital raising opportunities. The company will officially be organized into a commercial operating company to generate revenues within the year; finalize the CASCADES and BORALEX contracts.

CHINA is likely to become our biggest partner for our technologies in the near future. Their demand for fossil fuels increases the strain on the global supply, and China is growing at a rapid pace. Their government is looking for alternative sustainable and renewable energy sources. The Olympic games in 2008 Beijing will become their showcase to the world as the first Green Olympics, and LFC intends to be a participant with our technologies.

The next KYOTO Accord convention will meet in Montreal, Canada in November of 2005, to discuss the progress of the environment. LFC intends to present our technologies to the assembly of countries.

We do not have a competitor as of now.

And the LFC presentations

at <http://www.leanfuelscorp.net/Media/Aquahol.wmv> and <http://www.leanfuelscorp.net/pdf/LFC.wmv>

We would like to present our Mobile train and ship distillery, a great booster for the Canadian economy and green projects.

A link is more suitable here:

<http://www.wipo.int/pctdb/en/ia.jsp?IA=CA2008001083>

We also have the **TRI-BRID ENGINE USING ELECTRICITY FLEX FUELS** and the **DUAL H2O ENGINE RECYCLING SYSTEM**

<http://www.wipo.int/pctdb/en/ia.jsp?IA=CA2008001084>

And

[Http://www.wipo.int/pctdb/en/ia.jsp?IA=CA2008001016](http://www.wipo.int/pctdb/en/ia.jsp?IA=CA2008001016)

[Is water too cheap an answer?](#)

We have a small starter video at Youtube : <http://www.youtube.com/watch?v=n00fvW2b3po>

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References;

*(1) Thermal decomposition of water [edit source | edit]*

*(2) Main article: Thermochemical cycle*

*(3) Thermal decomposition, also called thermolysis, is defined as a chemical reaction whereby a chemical substance breaks up into at least two chemical substances when heated. At elevated temperatures water molecules split into their atomic components hydrogen and oxygen. For example at 2200 °C about three percent of all H<sub>2</sub>O molecules are dissociated into various combinations of hydrogen and oxygen atoms, mostly H, H<sub>2</sub>, O, O<sub>2</sub>, and OH. Other reaction products like H<sub>2</sub>O<sub>2</sub> or HO<sub>2</sub> remain minor. At the very high temperature of 3000 °C more than half of the water molecules are decomposed, but at ambient temperatures only one molecule in 100 trillion dissociates by the effect of heat. However, catalysts can accelerate the dissociation of the water molecules at lower temperatures.*

*(4) Thermal water splitting has been investigated for hydrogen production since the 1960s.[13] The high temperatures needed to obtain substantial amounts of hydrogen impose severe requirements on the materials used in any thermal water splitting device. For industrial or commercial application, the material constraints have limited the success of applications for hydrogen production from direct thermal water splitting and with few exceptions most recent developments are in the area of the catalysis and thermochemical cycles.*