AMERICAN NUCLEAR SOCIETY AT UTPB

NUCLEAR TIMES

Volume 1, Issue 1

Spring 2011

$2.37 GAS FROM AIR

By Matthew Smith

It is often that we hear of energy research projects that are called "World Changing" or "A thing of the Future", but how often is one readily available. Presenting **Project Green Freedom™**, from The University of Texas Permian Basin and Los Alamos National Laboratory, a new alternative energy research project that creates energy that isn't all that alternative.

Project Green Freedom™ uses a unique electrochemical system to "strip" Carbon Dioxide (CO_2) from the very air that we breath and turns that carbon dioxide into a range of carbon fuels, like gasoline or jet fuel. This gasoline or jet fuel would be highly pure. If diesel was made during this process it would quickly replace "low sulfur" diesel because Green Freedom™ diesel would be zero sulfur diesel. The gasoline or jet fuel produced by this cycle would be able to run the very cars, trucks and planes that we use today, so there is no need to develop a new engine type. Also, Project Green Freedom™ is a zero carbon process, meaning that it does not increase the amount of pollution currently in the atmosphere, due to the fact that the very pollutants that vehicles put into the atmosphere will eventually become that very fuel running the vehicles!

Pumping Zero-Carbon-Footprint Gas

The next, and in some cases, most important question is will Green Freedom™ be cost efficient? Due to new research that has taken place at Los Alamos National Lab the answer to that question is yes. When research first began on Green Freedom™ in order for the process to break even, gas at the pump would have to cost $5.00 per gallon.

Now, with a new, more

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Inside this issue:

Replace Fossil Fuels:

- Diminishing resource
- Dramatically increasing energy demand
- Rising prices!
- Energy-based economy
- Nuclear fuel is **100 million** times energy dense than fossil fuels!!!
- 24/7 supply

NUCLEAR TECHNOLOGY PRIMER

By Tyler Mints

After a span of 30 years in which very few new nuclear power plants were built, several are now in the building process and it is expected that 4-6 new units will come on line by 2018. These new plants are spawning from applications to build 24 new reactors made since mid-2007. The reason for this new growth is policy changes from the late 1990's in the American government that helps pave the way for new, safer plants.

Four of the newest designs that have been approved for production are the AP600, AP1000, ABWR, and System 80. The AP600

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DID YOU KNOW: NUCLEAR POWER IS BACK

By Eleonora Witzky

After a perceived catastrophe backlash from nuclear power plants accidents in the 1960s, public opinion on nuclear power has been steadily improving over the last twenty years to over 70% approval today. Experts cite environmental concerns and a tight international energy market as key factors in this change.

There are several potential infrastructure issues related to nuclear renaissance. Many nuclear engineering programs in US universities have been removed. This is partially due to a cut in funding from the Department of Energy for the programs. This and the fact there are few students in these programs, leads to a shortage of nuclear engineers. On average, 550 nuclear power jobs need to be filled each year, while in 2007, only 165 new people entered the field.

Another potential problem is the loss of capability in the US, to manufacture new nuclear plants. Since the seventies, the number of shops which manufacture nuclear quality goods and services severely diminished from 600 to 100, today.

New Generation Nuclear Power Plant

A third problem is the slow implementation of the energy policy act of 2005. Although the implementation of the plan was swift by congressional standards, there was still a delay of two to three years.

In addition, the original monetary ceiling for the loan guarantees was 18 billion dollars. An average nuclear power plant costs four and a half to five billion dollars. The original guarantee would only cover roughly three and a half new power plants! Additional debate has begun arguing whether or not to raise the ceiling. Independent energy generators depend on these loan guarantees to make the cost-benefit case for nuclear power plant construction.

US successful replacement of fossil fuels as our base-load (24/7) energy supply is critical to our future economy.

INTERNATIONAL VIEW: PEACE

The internationally recognized symbol for peace was originally designed for the British nuclear disarmament movement by Gerald Holtom in 1958. Holtom, an artist and designer, made it for a march from Trafalgar Square, London to the Atomic Weapons Research Establishment at Aldermaston in England, supported by the Campaign for Nuclear Disarmament (CND).

> *"probably the most powerful, memorable and adaptable image ever designed for a secular cause"*

The symbol is a combination of the semaphore signals for the letters "N" and "D," standing for "nuclear disarmament". In semaphore the letter "N" is formed by a person holding two flags in an upside-down "V," and the letter "D" is formed by holding one flag pointed straight up and the other pointed straight down. Superimposing these two signs forms the shape of the centre of the peace symbol.

An account of CND's early history described it as "a visual adhesive to bind the [Aldermaston] March and later the whole Campaign together ... probably the most powerful, memorable and adaptable image ever designed for a secular cause."

OTHER ENERGY SOURCES: WIND

Wind is a form of solar energy originating from the uneven heating of the earths atmosphere and the earths rotation. The terms wind energy or wind power describe the process by which the wind is used to generate mechanical power or electricity using a wind turbine.

Generation of commercial electrical power requires hundreds of wind turbines commonly called a wind farm.

West Texas is home to the largest wind farms in the world e.g. Roscoe and Horse Hollow wind farms, boasting 700MW generation capacity.

Wind Farm

However, wind power is dependant on the wind speed being within operation limits—too fast or too slow makes the wind unusable. Transmission from the usually remote generation farms also posses a challenge for this green energy source due to inherent power loss.

UTPB: ME-NUCLEAR STUDENT SPOTLIGHT

Jaime grew up in Presidio, Texas. He graduated from the public high school by the same name in 2003. As most of his classmates, he was ready to raise a family. Earning a living was therefore his main priority. After technical school, he got a job in the Natural Gas sector and then Wind Energy.

Reflecting on those events he said, "luckily the family thing did not work out" and he began to reconsider his plans. Returning to school became an option. He was offered a scholarship with the new High Temperature, Teaching, and Test Reactor (HT^3R) Program at UTPB to pursue the Nuclear Track. That he did!

Jaime is now a senior in the Nuclear Track about to graduate in May, 2011. He has interned in several nuclear -related companies around the US including the Nuclear Regulatory Commission (NRC) in Washington, DC, and Waste Isolation Pilot Plant (WIPP) in Carlsbad, NM.

Jaime at Nuclear Regulatory Commission (NRC)

His advise to persons debating the ME-Nuclear option is, " the program is tough. But, I did not give up." Now he has many opportunities opening to him ranging from the NRC, WIPP, international nuclear power plant constructors e.g. Westinghouse and GE, to service companies like the National Enrichment Facility (NEF) in Eunice, NM.

"I chose nuclear because it offers job security", he said. The nuclear sector is poised for explosive growth to fill the non-fossil fuel demand of our near and distant future.

LOCAL: NUCLEAR CORRIDOR FORMING

Nuclear endeavors began in West Texas—New Mexico with nuclear weapon development at Los Alamos National Laboratories (LANL), NM, during World War II. While LANL has broadened its research scope beyond weapons the area has also diversified in the nuclear sector. West Texas and East New Mexico now has four varied nuclear facilities spanning research (LANL), fuel preparation (National Enrichment Facility, NEF), and spent fuel disposal (Waste Isolation Pilot Plant, WIPP, and Waste Control Specialists, WCS). High Temperature, Teaching, and Test Reactor (HT3R) will add a fifth.

> *"West Texas and East New Mexico now has four varied nuclear facilities spanning* ***research, fuel preparation, and spent fuel disposal****. HT3R will add…"*

Andrews County is also investigating building nuclear power reactor which will further enhance the West Texas-New Mexico nuclear corridor.

Experts project we are witnessing a transition from an oil and gas energy world center to a nuclear energy world center. Such a nuclear corridor will support the growing nuclear industry in the US.

These observations beg the question, how can one personally maximize benefit from this corridor. Positioning your skill base to be part of this nuclear sector will fit the bill.

REGIONAL: FOUR-YEAR ENGINEERING SCHOOLS

UTPB received approval for a four-year Mechanical Engineering (ME) Program in Fall 2009. This program contained both Classical and Nuclear Tracks. Growth plans of that engineering program have Petroleum and Chemical Engineering as the follow-up stages.

Student population growth in the ME Program has been very strong with a 40 student freshmen class in Fall 2009. There are a 100 plus students in the Engineering Program today.

Compared to other four -year engineering schools within Texas, UTPB offers a most favorable cost-benefit option. Class sizes are significantly smaller than some other schools. Local students benefit even further by living at home while attending university.

Engineering at UTPB

A small senior class is graduating this Spring. These students had completed their sophomore year when the upper level classes were authorized.

AMERICAN NUCLEAR SOCIETY AT UTPB

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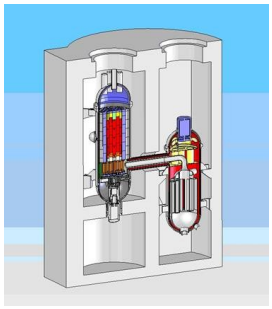
Nuclear energy is our future.



We are on the Web!
tiny.cc/ANSatUTPB

American Nuclear Society (ANS) at UTPB is a student interest group at UTPB focused on nuclear energy being the most viable base-load energy future for the United States. Close connections exist with the High Temperature, Teaching, and Test Reactor (HT^3R) Program.

The HT^3R Energy Research Program is an important national energy security asset that will help lead the US and world to an energy-sufficient future! As the name implies, it's purpose is to:

1. ***Provide a pipeline of highly trained engineers and scientist; and***
2. ***Establish with Los Alamos National Laboratory (LANL), a Generation IV (Gen IV) development and test reactor center.***

HT^3R is supported by the Minority Serving Institution (MSI) Office of the US Nuclear Regulatory Commission (NRC).

NUCLEAR TECHNOLOGY PRIMER

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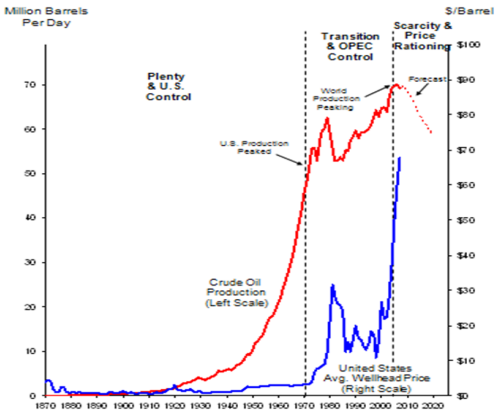
and AP1000 are two designs submitted by the Westinghouse Electric Company. The 600 is relatively small and has several safety features that are typical of a Generation III reactor and can generate up to 600MWe. The 1000 is the newer and larger scale version of the 600 and produces close to double the energy output at 1100MWe. The ABWR, or Advanced Boiling Water Reactor, was designed by GE Nuclear Energy. The design is a combination of designs from Europe, Japan, and the U.S. Its energy output is roughly the same as the AP1000 and includes several safety enhancements such as protection against over-pressurizing the containment and a combustion engine as an alternative AC power source. The System 80 is also a product of Westinghouse. It is based on improvement to the standard CE System 80 and a balance-of-plant design developed by Duke Power Co. This new design has a safety depressurization system for the reactor as well as the previously discussed combustion engine for alternative power.



World Oil Production (red) and Price (blue) showing oil shortage and high price future (Groppe, 2009).

$2.37 GAS

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cost effective chemical process in place, the cost is **$2.37/gallon**, cheaper than the prices we are currently paying now at the pump.

With this new technology on the horizon, the final question is when? Current estimates show that The University of Texas Permian Basin and Los Alamos National Lab plan on having a fully functioning plant running by 2018. A small pilot plant is hoped to be built in West Texas within the next few years.