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## ORCF Facts ...

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### Special points of interest:

ORCF Emissions Profiles are cleaner than traditional coal-based industries.

Fuels made at ORCF are environmentally superior to petroleum-based fuels.

ORCF life-cycle greenhouse gas emissions are less than petroleum-based fuels.

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# Let's Talk About the Facts.... Ohio River Clean Fuels L.L.C.

Provided by Ohio River Clean Fuels, L.L.C.

## Getting Beyond the Rhetoric

You undoubtedly have read or heard conflicting statements made about Ohio River Clean Fuels plant (ORCF). Some special interest groups continue to repeat many incorrect statements. This newsletter is provided to address this rhetoric and discuss the environmentally advanced nature of the ORCF plant and the products that will be produced.

It is well known that our country is in the midst of a very serious threat to our economy and security since we are so heavily dependent on foreign sources of crude oil. At current prices for crude oil, it is reported we are now sending over \$700 billion dollars each year to foreign countries to purchase crude and very close to that amount just to secure this supply. We are import-



ing over 65% of our requirements for oil to produce transportation fuels such as gasoline, diesel fuel and jet fuel. If our country expects to enjoy continued economic growth and maintain our security, we are not heading in the right direction. Transportation fuels are used to move our people and manufactured goods as well as to help build our infrastructure and secure our nation.

Baard Energy, L.L.C. is a family-owned company operated by John and Kathie Baardson. For over 20

years, their companies have developed many types of alternative energy projects in the United States. These include wood-fired plants in Michigan and Pennsylvania, large natural gas cogeneration facilities in Michigan, Arizona and Canada, and ethanol plants in Ohio and Nebraska. With the ORCF plant, their company has continued to reapply their experience and reinvest to help our nation provide safe and environmentally clean forms of energy.

For the past four years, Baard Energy has worked on the design and development of an advanced and proven form of conversion technology that can produce environmentally superior forms of transportation fuels using domestic sources of coal and biomass.

## Let's Talk About the Facts....

### Facts About Emerging Forms of Alternative Energy

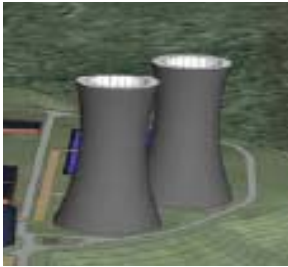
One of the most important reasons for our nation's phenomenal growth has been our ability to provide cheap and abundant forms of energy. Today, there is a great deal of work being done to find alternative forms of energy to produce electricity, such as wind and solar. But what do we do about crude oil? Crude oil is not only important to produce transportation fuels such as gasoline, diesel and jet fuels, but it is the primary feedstock to synthesize thousands of chemicals that

we use every day, such as plastics, medicine and fertilizers, just to name a few. Our country is highly dependent upon crude oil for many of the basic things we need to continue our way of life. The real problem is that of all forms of energy that we use, crude oil is the one form of energy where we are most dependent on imports. For the production of electricity, wind turbines can provide a limited amount of help yet still could play a very important role in diversifying our overall electrical

energy supply. Similarly, Solar energy also has great potential to diversify electrical energy production. Nevertheless, wind and solar energy cannot be practically harnessed to make liquid transportation fuels for trucks, planes or locomotives. One of our greatest potentials for reducing the imports of foreign oil is to use advanced gasification of coal and biomass to produce liquid transportation fuels. This is the purpose of the Ohio River Clean Fuels plant.

## Let's Talk About the Facts...

### Facts About Water Usage



Natural draft (hyperbolic) cooling towers will be used at ORCF to cool and evaporate water after use for non-contact cooling in the ORCF plant.

The ORCF plant will utilize just over 20 million gallons per day of water from the Ohio River. Over 80% of the water used is needed for cooling the various high-temperature components of the processes and is referred to as non-contact cooling water. This water will never be contaminated by any industrial process. Just over 70% of the water we use will be evaporated in cooling towers.

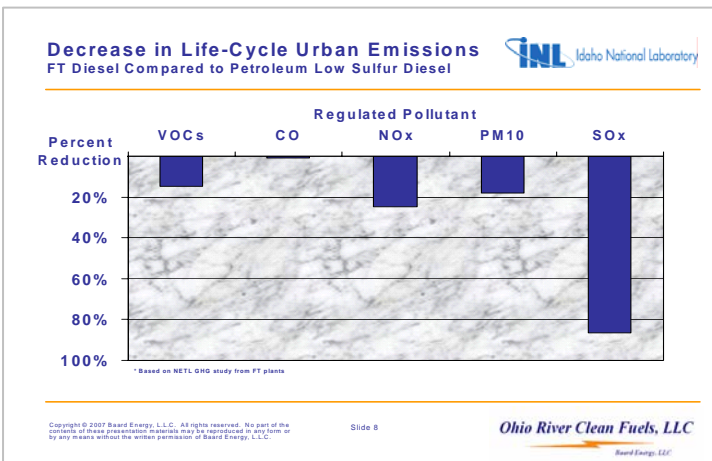
A little over 7000 gallons per day will be used by the employees (drinking water, showers and rest-rooms) and will be returned to the Wellsville waste treatment system. The rest of the water (about 30%) will be cleaned to very stringent Ohio EPA standards and returned to the Ohio River. While ORCF will use 20 million gallons each day, all of the water returned to the environment will comply with all rigorous Ohio EPA

restrictions and regulations which will protect the Ohio River. The Ohio EPA has already issued the NPDES permit (National Pollution Discharge Elimination System) to ORCF. The Ohio EPA will continue to provide regulatory oversight and approval of all of the water treatment systems in the plant once ORCF has commenced with final engineering for the plant treatment systems.

## Let's Talk About the Facts...

### Facts About Ultra-Clean Fischer-Tropsch Fuels

**“Fuels made in the FT process are well known by engineers and scientists to be environmentally superior to petroleum-based fuels...”**



**“FT Fuels reduce sulfur emissions by over 80%...”**

**“FT fuels have repeatedly shown to reduce nitrogen oxide emissions by over 20%.”**

Special interest groups that argue against the ORCF plant are incorrect when claiming that Fischer-Tropsch fuels are dirty. Let's discuss the facts. What these groups fail to explain is that they are referring to the plants (not the fuels) that were built in the 1960's using technologies which are outdated by today's standards and technologies that are available. Fuels made in the FT process are well known by engineers and scientists to be environmentally superior to petroleum-based fuels

when you compare the regulated emissions that are released from the vehicle during use. Regulated emissions are those emissions that cause soot, sulfur emissions, and other chemicals that are well-known to negatively affect human health. FT fuels have repeatedly been shown to reduce nitrogen oxide emissions by over 20%. These are the emissions that lead to smog in our cities which aggravate those suffering from various lung diseases. FT fuels reduce sulfur emissions

by over 80% because the sulfur is removed at the ORCF plant. Sulfur emissions not only affect respiratory health, but are the leading cause of acid rain from vehicle use. FT fuels reduce Volatile Organic Compound (VOC) emissions by over 15%. Because VOC's are photo-chemically reactive, they also contribute to smog formation. FT fuels reduce Particulate emissions by over 15%. Particulates are released through the exhaust and are an irritant to humans with breathing problems. Finally, due to the superior chemistry of these fuels and more efficient combustion in the engine, FT fuels indeed reduce CO emissions by almost 3%. Vehicles that use FT fuels will significantly reduce the amount of pollution and smog in our environment, especially the dense urban centers. These are the facts; not clever rhetoric.

## Facts about ORCF's Carbon Footprint

For months, now, opponents of the ORCF plant have repeatedly claimed that producing and using FT fuels will emit twice the amount of carbon dioxide (CO<sub>2</sub>) than producing and using petroleum-based fuels. Compared to the FT plants that were built over 45 years ago in South Africa that may be true. But the Ohio River Clean Fuels plant is different.

The fact is that by adding up all the associated emissions: mining of the coal, transportation, production at ORCF and the emissions from using the FT fuels life-cycle greenhouse gas emissions will be reduced by over 40% compared to petroleum based fuels.

All of us are very aware of the ongoing concerns about emissions of gases that may be causing global warming. There can be no doubt that these are serious claims and any new business that is intending to build a process that may produce greenhouse gas emissions must be prepared to deal with the final outcome of any scientific

finding and regulatory constraints.

The fact is that Baard Energy has dedicated a great amount of engineering to reduce the amount of CO<sub>2</sub> that is emitted to the atmosphere. The ORCF plant will employ advanced technologies and processes which reduce the amount of emitted CO<sub>2</sub>, such as the use of large amounts of biomass to supplement the abundance of coal. Also, the ORCF plant will be capable of capturing over 85% of the CO<sub>2</sub> produced at the plant. ORCF is developing plans to compress the CO<sub>2</sub> into liquid form and transport it to the neighboring oil fields in Eastern Ohio. The CO<sub>2</sub> will be used in a process known as Enhanced Oil Recovery (EOR). The use of CO<sub>2</sub> in oil fields has been practiced for over 30 years in Texas to improve production in wells that have lost their natural wellhead pressure. The CO<sub>2</sub> used in these fields is naturally occurring CO<sub>2</sub> that is extracted from wells in Mississippi. The Plains Gasification Project in

North Dakota has been shipping large volumes of CO<sub>2</sub> to oil fields in southern Canada for many years where CO<sub>2</sub> is a very valuable tool to increase oil-field production. These techniques of increasing oil production have never been used in Ohio since there are no naturally occurring reservoirs of CO<sub>2</sub> nor is there large production of clean CO<sub>2</sub> that can be captured. ORCF will be the first business capable of capturing and supplying the large amounts of clean CO<sub>2</sub> necessary for use in the oil fields of Ohio. This is a great way to utilize CO<sub>2</sub> as a valuable gas and at the same time, bury CO<sub>2</sub> deep within the earth for safe storage.

In addition, ORCF will be exploring the use of deep geological formations that are known to be excellent targets to permanently store CO<sub>2</sub>.

As a result of ORCF's commitment to CO<sub>2</sub> capture, Enhanced Oil Recovery and permanent deep-well storage, the entire Carbon Footprint of the ORCF plant will be far less than a plant producing petroleum-based fuels.

Baard Energy, in conjunction with the Idaho National Laboratories, one of the top United States Energy Labs, analyzed the carbon footprint of the ORCF plant and found that the fuels produced by ORCF can have up to 40% LESS greenhouse gas emissions impact than petroleum-based diesel fuel. This is an outstanding improvement compared to what is being used by our trucks and planes today.

**"The people I meet in town-hall meetings back home would rather fill their cars with fuel made from coal reserves in Southern Illinois than with fuel made from crude reserves in Saudi Arabia."**

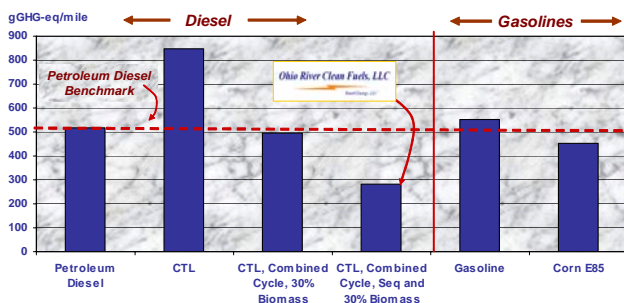
**Senator Barak Obama**

January, 2007 after proposing legislation with Senator Jim Bunning in support of Coal to Liquids.

Source: Washington Post, June 24, 2007

**"The fact is that by adding up all the associated emissions, mining of the coal, transportation, production at ORCF and the emissions by those using the FT fuel, this process will reduce the life-cycle greenhouse gas emissions by over 40%."**

**Life-Cycle GHG Emissions for Various Fuel Types**  
GREET Model Comparative Analysis



The figure above is the result of a study conducted and published by Idaho National Laboratory last year. The graph demonstrates that the fuels produced by Ohio River Clean Fuels can reduce life-cycle greenhouse gas emissions compared to ultra-low sulfur diesel produced with crude oil.

## Facts About Plant Emissions

Contrary to what some have claimed will be a “filthy plant” let’s compare ORCF stack emissions to other similar processes. Gasification has been used for many decades in the oil refining industry to convert undesirable heavy liquid residuals from the distillation processes (unsellable leftovers) into more useful forms of hydrocarbons. These same technologies are capable of converting coal and biomass to produce liquid transportation fuels. After the gasification step, ORCF will use mature, proven technologies to remove the contami-

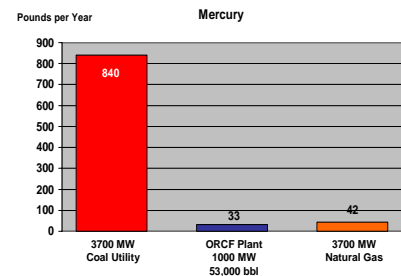
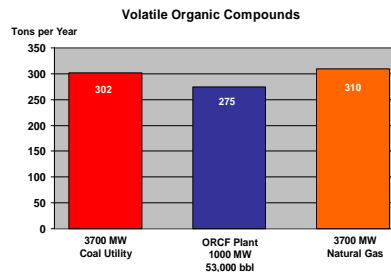
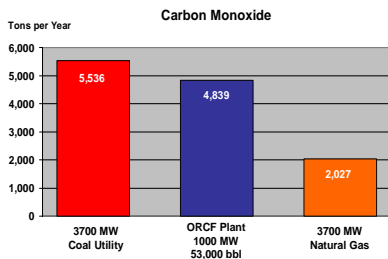
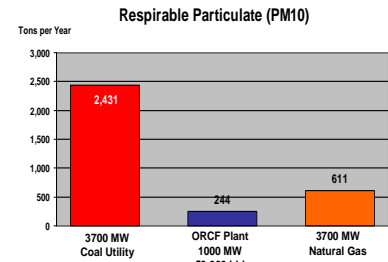
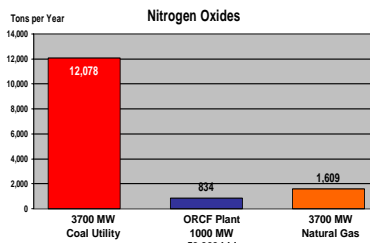
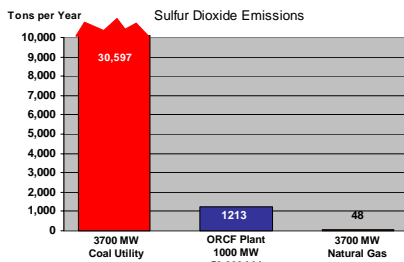
nants before they can be emitted. The ORCF plant will separate and remove sulfur and mercury which will be used in other industries. Fly ash will be recycled through the gasifiers until most of the carbon has been removed. The fly ash can then be sold to the cement industry. Finally, the gasification process will melt all of the ash component of the coals and produce a inert glass-like aggregate that can be sold to the construction industries for road building and other building materials.

Below, an interesting comparison of the regulated stack emissions from natural gas and coal utilities reveals the reason why this is known as a “Clean Coal Technology”.

The ORCF plant will convert 27,000 tons per day of coal and biomass to produce around 1000 MW of power through waste-heat recovery while producing 53,000 barrels of fuels each day. The bar graphs below compare the emissions from a conventional coal plant using the same amount of coal (equivalent to a

3700 MW coal plant). Also shown is a comparison to the emissions from a natural gas utility that produces the same amount of power as the 3700 MW coal plant. As you can see, the stack emissions from the ORCF plant are cleaner than the conventional coal plant and even comparable to the natural gas plant.

### ORCF Stack Emissions Compared to Equivalent Coal and Natural Gas Utilities Equivalent Coal Basis - 3700 MW



The bar graphs above compare the calculated emissions from a conventional coal utility (red bars) converting the same amount of coal as the ORCF plant (blue bars), producing approximately 3700 MW of electricity. Also shown are the calculated emissions expected from a natural gas plant producing the same amount of power as the coal utility or 3700 MW of electricity (orange bars). Coal emissions are based on emission factors for coal combustion in large electric utility boilers and are from EPA AP-42 Section 1.1. Efficiencies assume modern units with current Best Available Control Technologies (BACT) such as Flue-gas desulfurization, et al. For natural gas, the calculations assume emission factors for NG combustion in large electric utility boilers from EPA AP-42 Section 1.4. Control efficiencies also assume BACT.