REMOVAL OF THE CARBON DIOXIDE CONTAMINANT IN THE ATMOSPHERE

Breakthrough research:
The Eco Global Fuels renewable energy technology produces the necessary **iron oxide** to increase algae growth!

This means not only do we produce renewable transport fuels- and now- **100% C02 sequestering**!

Recent research just completed by our team, has revealed that the Eco Global Fuels (EGF) renewable energy technology- not only creates carbon neutral ethanol, but with our free by product from our unique IP hydroxyl process - **iron oxide** - and using the validated results from our test trials at Macquarie university, we have proven that our EGF process makes enough iron oxide to be able to be used in sequestering CO2 by promoting algae growth

Iron oxide is a by-product of the hydroxy electrolysis process, and with our calculations below, we have proven that sequestering all CO2 from a 60 MW turbine is achievable (which means we can apply this to any scale, using any power supply for example photovoltaic, gas /coal turbines, off peak electricity etc.).

Because it is a by product- it is free to be utilized into various methodologies (making them economical)

Technologies and industries which benefit from Increasing the growth of algae:
Ocean fertilization
Algae based bio fuels
Algae based fertilizers
Algae products (supplements, cosmetics)
Sewage treatment
Produces freshwater
Food production
Pharmaceuticals

EGF will implement an on-going program with the ***incentive*** of carbon neutral Solanol fuel production to fund the iron fertilization program, utilizing the free by-product of iron oxide produced by the hydroxy gas for the manufacture of carbon neutral Solanol. No other methodology can provide these two factors: free iron oxide and the economical incentive to implement.

We believe we have the answer of sequestration of all the carbon dioxide produced by the combustion of fossil fuels and at the same time the ability to produce carbon neutral Solanol transport fuel

Please note, in the “Virgin Earth Challenge” competition, the majority of finalists have based their findings on the utilization of biomass for carbon dioxide sequestration.

Iron fertilization (we can produce iron oxide at no cost) and the production of algae is the most cost-efficient and reliable production of biomass for the absorption of carbon dioxide and in addition it is top of the food chain and represents 80% of this food chain.

Due to the vast quantities of carbon dioxide generated in the production of electrical power, we have formulated into our methodology, a process known as ocean fertilization, which can efficiently sequester vast amounts of CO2.

Ocean Fertilization is used in our calculations below, as it has the most potential on a larger scale to deal with massive amounts of CO2 sequestering. However, there are many other processes such as bio fuels that increased algae grow can be utilized. We have also used off peak electricity produced by a coal power station- with precise information of inputs/outputs provide by a Czech based power company whom have become interested in our technology.

Ocean Fertilization Definition
This is the process of distributing iron oxide into the ocean, which encourages the growth of algae, which sequesters CO2 from the atmosphere.

Coal turbine –Co2 sequestering by EGF
Recent information supplied to us by a potential licensee that operates a 178MW coal fired power station. The intent is to utilize their off-peak waste electricity to produce carbon neutral Solanol fuel to replace their dependence on importing all their transport fuels. Our calculation below are based on a 60 MW turbine

What is ocean fertilization?

This is the process of distributing iron oxide into the ocean, which encourages the growth of algae, which sequesters CO2 from the atmosphere. The good news is we have free iron oxide from our hydroxyl electrolysis process, equivalent to the level necessary to sequester all the CO2 produced by a 60 MW turbine. We produce the necessary iron oxide as a by-produce of the hydroxy electrolysis process, required for iron fertilization of the ocean, to sequester all carbon dioxide emissions.

Ref:

0.5 Tonne Iron oxide 100 km^2 ocean 350 Tonne CO_2 absorbed

OCEAN FERTILIZATION as an Environmental Solution

Conclusion: as you read through our proof, you will realize that EGF is the only method that can deliver renewable fuels and at the same time dramatically create massive sequestering of CO2 using ocean fertilization due to its ability to produce the required IORN OXIDE for this process

The horrific global production of carbon dioxide can only be neutralized by iron fertilization as a necessary futuristic remedy to the sequestration of carbon dioxide

Iron fertilization of the oceans is a proven concept and if utilised can sequester carbon dioxide from the atmosphere.

Below are different examples researched and these examples will be summarized and our examples will be calculated on the items under consideration below:

1. Tonnages of iron oxide necessary.
2. Tonnages of algae produced.
3. Square kilometers of ocean necessary.
4. Tonnages of carbon dioxide absorbed and sequested.
5. Tonnages of oxygen produced via the photosynthesis process – this is an important aspect
6. Tonnages of sodium hydroxide also released into the oceans improving the pH in the oceans.
7. Also increases the volume of marine life (increase in fish stocks globally) due to the increase of algae being top of the food chain.

CALCULTIONS
using 60 MW off peak power
to demonstrate the ability to produce economical
SOLANOL
with
100 % CO2 Sequestering

The amount of air consumed by each furnace per turbo-generator output 60 MW electrical 60 M^3/sec at full load @ 30% efficiency.

60 M^3/sec at full load.
5 **= 12 M^3/sec Enviro-oxygen**

12 M^3/sec Enviro-oxygen
4 coal burners **= 3 M^3/sec Enviro-oxygen**

The utilization of a pure concentrated carbon dioxide stream produced from a turbo-generator with an output of 60 MWh requiring 61.7 Tonne O_2 per hour producing 66 Tonne of CO_2 per hour or 15.43 Tonne O_2 per coal burner per hour producing 16.5 Tonne of CO_2 per hour per coal burner/furnace.

1.1 kg CO_2 per 0.83kg coal per 1kWh requires 1kg O_2 for per hour for total combustion.

Emissions of CO2 by human activities are currently more than **130 times** greater than the quantity emitted by volcanoes, amounting to about **27 billion tonne per year. This has saturated the oceans and their ability to absorb the added CO_2 in the atmosphere.**

Coal-fired power stations produce 18 billion tonne of CO_2 flue gases annually and can be sequestered utilizing 10% of the world's oceans. The amount of CO_2 produced by the burning of fossil fuels equates to a staggering 27 billion tonnes per year. Obviously, a further 5% of the world's oceans must be also subjected to *iron fertilisation* to sequest the balance and any increase of CO_2 emissions due to human activity in the future.

Carbon dioxide - Wikipedia, the free encyclopedia

As can be concluded with the ROI utilizing the iron oxide for the production of algae to sequest carbon dioxide and earning carbon credits is a much more lucrative ROI compared with the sale of the iron oxide for the production of steel.

Carbon credit - Wikipedia, the free encyclopedia

The 2009 average is 387.35 ppm. For the past decade (2001-2010) the average annual increase is 2.04 ppm per year. Annual data for 2010 was posted September 8, 2011, by the National Oceanic and Atmospheric Administration in the US.

Global warming - Wikipedia, the free encyclopedia

Earth's average surface temperature increased by about 0.8 °C (1.4 °F) with about two thirds of the increase occurring over just the last three decades.

The increase of concentration from pre-industrial concentrations of 280 ppm has again doubled in just the last 33 years.

Carbon dioxide in Earth's atmosphere - Wikipedia, the free encyclopedia

In just the last 33 years:

CO_2 2.04 ppm per year x 33 years = CO_2 67.37 ppm

0.8 °C increase global temperature
In just the last 33 years = 0.0243 °C increase per year

CO_2 2.04 ppm = 0.0243 °C increase per year

Nevertheless, the increase in temperature in real terms has increased because of the total increase in CO_2 level not to 67.37 ppm but, the actual recorded level of CO_2 107.35 ppm increase = 0.8 °C increase global temperature.

CO_2 387.35 ppm — CO_2 280 ppm = CO_2 107.35 ppm increase = 0.8 °C increase global temperature.

Therefore:

0.8 °C increase global temperature
CO_2 107.35 ppm increase = 0.0075 °C increase per 1ppm.

CO2 Now | CO2 Home

SAN FRANCISCO—A mantra that has driven global negotiations on carbon dioxide emissions for years has been that policy-makers must prevent warming of more than **two degrees Celsius** to prevent apocalyptic climate outcomes. And, two degrees has been a point of no return, a limit directly or indirectly agreed to by negotiators at international climate talks.

James Hansen, director of the NASA Goddard Institute for Space Studies in New York, whose data since the 1980s has been central to setting that benchmark, said today that two degrees is too much.

2 °C — 0.8 °C increase global temperature = 1.2 °C

1.2 °C
0.0075 °C = CO_2 160 ppm increase

Current CO_2 387.35 ppm + CO_2 160 ppm increase = CO_2 **547.35 ppm point of no return.**

2-Degree Global Warming Limit Is Called a "Prescription for Disaster" | Observations, Scientific American Blog Network

To determine the amount of removal of carbon dioxide from the atmosphere to reverse the temperature increase per annum (ipa)

The current MAC University validation is based on efficiency derived utilizing lower amps on the denigration of the electrodes *producing iron*

{I.17kW/h or 4.2 MJ**} + {**H_2O130.31 grams**}** = **{**H_2 12.87 grams, 138 Lph**}.**
+ {O_2 102.32 grams,69 Lph**}.**
+ {2.5MJ Loss}.

34.2 Amps x 18 Volts = 0.616 kWh

426.6 gr steel was converted to iron = 426.6 gr iron

426.6 gr iron = 787 hours

The calculations below are based on efficiencies derived utilizing higher amps on the denigration of the electrodes producing *iron* are as follows:

{I.17kW/h or 4.2 MJ**} + {**H_2O153 grams**}** = **{**H_2 17 grams, 190 Lph**}.**
+ {O_2 136 grams, 95.5Lph**}.**
+ {1.75MJ Loss**}.**

The new upgraded hydroxy cell configuration for the creation of iron a by-product of the hydroxy electrolysis process configuration of 12 cells equates to 20% more iron produced utilizing higher amps described below:

85 Amps x 21.6 Volts = 1.84 kWh per hydroxy tube

85 Amps
34.2 Amps = 2.5 Times more

2.5 x 426.6 gr iron x 20% = 1,272 gr iron per hour

1,272 gr iron
787hours = 1.6 gr iron per hour

AU$0.52 per kilogram of Steel
1.6 gr iron kWh = AU$0.0008 kWh

AU$0.0008 kWh x 60,000 kWh = AU$48 kWh

1.6 gr iron per hour x 60,000 kW x 24 x 365 = 840 Tonne per annum

The iron denigration of the cells due to the electrical activity in the production of hydroxy gas can be converted into iron oxide by exposing it to the atmosphere. This will produce 30% more weight due to the oxygen component Fe_20_3, the calculations below determine the overall weight.

1,272 gr iron
787hours = 1.6 gr iron per hour

1.6 gr iron per hour x 30% = 2.08 gr iron oxide

4.5 Tonne Iron oxide 900 km^2 ocean 66 Tonne CO_2 absorbed in 1hour

2.08 gr iron oxide per 1kWh x 60,000kWh x 48 hours = 6 Tonne Iron oxide

AU$0.0008 kWh x 60,000 kWh = AU$48 per hour @ no cost

The above calculations illustrate an obvious over supply of the necessary iron oxide that can be easily be produced via the denigration of the steel electrodes during the hydroxy electrolysis process as a byproduct at no cost. This iron oxide can be utilised for iron fertilization for the production of algae to sequest all the carbon dioxide produced by fossil fuel combustion and over time reverse the increase global temperature.

CO_2 27 billion T ipa > CO_2 2.04 ppm increase ipa > 0.0153 °C increase pa > Fe_20_3 39 million T pa

Therefore, Fe_20_3 (iron oxide) 39 million T pa removes the existing problem, a further distribution in the oceans or Fe_20_3 39 million Tonne per annum of iron fertilization will reduce the global temperature by 0.0153 °C per year. Over time the global temperature can be brought back to normal. Further calculations can be supplied, if necessary, to validate our assumptions.

http://www-formal.stanford.edu/jmc/progress/iron.txt

By spreading and/or utilising the global circulating currents, just half a tonne of iron oxide across 100 square kilometres of ocean, the oceanographers had stimulated enough plant growth to soak up some 350,000 kilograms of carbon dioxide from the seawater. If performed on a grand scale, iron fertilization of ocean water could absorb billions of tonnes of carbon dioxide from the air, enough to slow the rate of greenhouse warming, according to some rough estimates.

0.5 Tonne Iron oxide 100 km^2 ocean 350 Tonne CO_2 absorbed

Iron fertilization - Wikipedia, the free encyclopedia:

The potential of iron fertilization as a geoengineering technique to tackle global warming is illustrated by the following figures. If phytoplankton converted all the nitrate and phosphate present in the surface mixed layer across the entire Antarctic circumpolar current into organic carbon, the resulting carbon dioxide deficit could be compensated by uptake from the atmosphere amounting to about 0.8 to 1.4 gigatonnes of carbon per year. This quantity is comparable in magnitude to annual anthropogenic fossil fuels combustion of approximately 6 gigatonnes. It should be noted that the Antarctic circumpolar current region is only one of several in which iron fertilization could be conducted—the Galapagos islands area being another potentially suitable location (it can be done anywhere)
Estimated averages calculated for the iron fertilization of the oceans in two days:

0.5 Tonne Iron oxide 100 km^2 ocean 350 Tonne CO_2 absorbed in 48 hours

0.5 Tonne Iron oxide 100 km^2 ocean 7.3 Tonne CO_2 absorbed in 1 hour

1.1 kg CO_2 per 0.83kg coal per 1kWh requires 1kg O_2 for per hour for total combustion:

66 Tonne CO_2 per 50 Tonne coal per 60 MWh 60 Tonne O_2 for per hour for total combustion:

Therefore, the calculations below reflect the necessary criteria for the growth of algae over two days as described in the link below:

"Lifespans differ for each species of algae, with an average life expectancy ranging from a few days to a year or two.

”**Life Cycle of Algae | eHow.com**

http://www.ehow.com/about_5347723_life-cycle-algae.html

4.5 Tonne Iron oxide 900 km^2 ocean 66 Tonne CO_2 absorbed in 1hour

1.6 gr iron oxide per 1kWh x 60,000kWh x 48 hours
= 4.6 Tonne Iron oxide

US$0.0008 kWh x 60,000 kWh
= US$48 per hour @ no cost

Iron Ore - Monthly Price - Commodity Prices - Price Charts, Data, and News - IndexMundi

http://www.indexmundi.com/commodities/?commodity=iron-ore&months=60

According to the search above the cost of iron ore-iron- oxide is currently US$150.00 per tonne, and with additional cost of distributed, which means iron fertilization of the ocean is an expensive exercise, which would depend on pay back from carbon credits, if considered commercially.

Therefore, the obvious supply of the necessary iron oxide can easily be produced via the denigration of the steel electrodes during the hydroxy electrolysis process as a byproduct at no cost. This iron oxide can be utilised for iron fertilization for the production of algae to sequest all the carbon dioxide produced by fossil fuel combustion.

4.5 Tonne Iron oxide 900 km^2 ocean 66 Tonne CO_2 absorbed in 1hour

4.5 Tonne Iron oxide 900 km^2 ocean 3,168 Tonne CO_2 absorbed in 48 hours

4.5 Tonne Iron oxide 900 km^2 ocean 0.58 million Tonne CO_2 absorbed in 1 year

60MW@ 0.58 million Tonne CO_2 absorbed x US$8.00 = US$4.7 carbon credits per annum

The area of the World Oceans is 361 million square kilometres (139 million square miles).

Obviously, utilization of the world’s oceans in their entirety would not be possible. It is envisaged that only one tenth of the oceans can be utilised for the international iron fertilization programme.

361 million km^2 ocean
900 km^2 ocean x 10 = 40,111 times

60MW x 40,111 = 2,406,666 MW

40,111 x 0.58 million Tonne CO_2 absorbed = 23 billion Tonne CO_2 absorbed annum

Ocean - Wikipedia, the free encyclopedia

840 Tonne iron oxide x commodity price US$200
= US$168,000 per annum

Current ATM CO_2 18 billion Tonne CO_2 absorbed
x US$8.00

= US$144 billion carbon credits annum

Emissions of CO2 by human activities are currently more than 130 times greater than the quantity emitted by volcanoes, amounting to about 27 billion tonnes per year.

The above 23 billion tonnes of CO_2 sequestered utilizing 10% of the world's oceans caters for only the flue gases exhausted from coal-fired power stations. The amount of CO_2 produced by the burning of fossil fuels equates to a staggering 27 billion tonnes per year. Obviously, a further 5% of the world's oceans must be also subjected to iron fertilisation to sequest the balance and any increase of CO_2 emissions due to human activity.

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Therefore:

$$\frac{\text{0.8 °C increase global temperature}}{CO_2 \text{ 107.35 ppm increase}} = \text{0.0075 °C increase per 1ppm.}$$

2-Degree Global Warming Limit Is Called a "Prescription for Disaster" | Observations, Scientific American Blog Network

China's exceedingly high energy demand has pushed the demand for relatively cheap coal-fired power. Each week, another 2GW of coal-fired power is put online. While there are other sources of power generation available, China's ready access to domestic coal reserves means it is significantly cheaper to extract and transport than other fuel.

The amount of megawatts creating 18 billion Tonne per year of carbon dioxide by coal-fired power stations equates to 1.9 Million MW. Ten percent of the world's oceans can sequester carbon dioxide produced by 2.4 Million MW in totality.

After subtracting 1.9 Million MW electrical power produced from existing coal-fired power stations, equates to 0.5 Million MW remaining only utilizing 10% of the world's oceans.

The totality of coal-fired power stations in use in the world today equates to a staggering 510 with China constructed an incredible one coal-fired power station per week with an average size of 2,000MW.

2.4 Million MW
2,000MW

= 1,200 coal-fired power stations utilizing 10% World's Oceans.

"Give me half a tanker of iron, ***and I'll give you an ice age***" may rank as the catchiest line ever uttered by a biogeochemist. The man responsible was the late John Martin, former director of the Moss Landing Marine Laboratory, who discovered that sprinkling iron dust in the right ocean waters could trigger plankton blooms the size of a small city. In turn, the billions of cells produced might absorb enough heat-trapping carbon dioxide to cool the Earth's warming atmosphere."

WHOI : Oceanus : Fertilizing the Ocean with Iron
Algal protein gives boost to electrochemical water splitting
Environmental chemistry - Stanley E. Manahan - Google Books

COMPILED AND RESEARCHED BY

www.EcoGlobalFuels.com
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