

EcoGlobalFuels



Creating renewable Hydrogen



The process is:

WATER + DC + HYDROXY GENERATOR
=
Renewable Hydrogen and Oxygen

Hydroxy generators produce Hydroxy gas which is water converted into HHO, it is then separated into H₂ and O₂

A by-product is Iron oxide which is used for CO₂ sequestering via algae and biochar production



water

- 1 litre water makes 1860 litres hydroxy gas
- 18 litres of water needed to produce:
1 kg Hydrogen and 8 kg Oxygen

Hydroxy
Generators

- Patentable I.P and Unique Design.
- Validated flow rate and durability
- Measured degradation
- Turns water into Hydroxy gas
- Easy construction from cost efficient mild steel
- \$2000 per Generator is current price
- Scale up reduces to \$500 per unit

- Powered by either renewable DC input
e.g. photoV
Powered in near-future by cold fusion Ecat
technology
- Powered by off-peak electricity
- Powered by natural gas turbine generators
- Powered by main electrical supply

**1 litre of water produces 1860
litres of hydroxy gas**

Cryogenics

- Cryogenics Density Separation
- Takes hydroxy gas mix from the Hydroxy Generators and separates into H₂ and O₂
- Density separation operates on principle of
- Oxygen liquifying at - 186 C
- Hydrogen remains as a gas

- Because we liquify O₂ it is ready for transport and selling
- Costs of liquidification is 20 % cheaper than competition because we do not use air- we use pure O₂ (they use -190 C below)

- 3 kg H₂ with 24 kg O₂ liquified has been quoted
- Known Industrial process and safe

- 26 % additional power needed for cryogenics
- However, H₂ is looped back into a heat exchanger to refrigerate (cool) the incoming hydroxy gas

- Easily scaled

EGF HYDROXY GENERATORS

Unique IP and Patentable

Ultra reliable and Low cost to manufacture

Cheapest hydrogen in the world!

Durable, robust, safe

10-25 year span!

External separation (competition unreliable internal sep.)

No exotic expensive materials (as with competition)

Low maintenance- no obstruction (as with competition)

Scaleable, economically achievable (unlike competition)

FLOW RATE PROVEN independently tested

162 Litres/ KW hour hydrogen production



Hydroxy Generators

Important criteria

Material maintenance costs only:

- water filtering, pumping per hour = \$0.03
- H.G degradation steel costs: 0.006 cents per kWh
- Cryogenic separation costs: 0.0015 cents per kWh
- Hydrogen (1 kg) plus Oxygen (8 kg) requires 65 kWh (includes cryogenic separation costs)

Total H.G. maintenance / production costs:

- 65 kWh X 0.0075 cents = \$0.49
- \$0.49 + \$0.03 = \$0.52
- **\$0.52** per 1 kg of Hydrogen and 8 kg of Oxygen

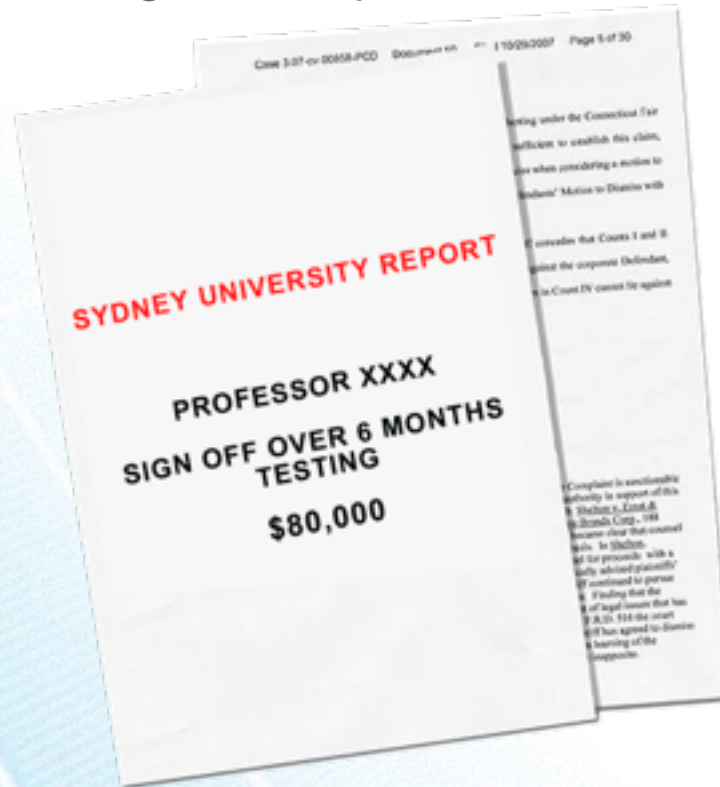
BOTTOM LINE here is it only costs us 50c to make 1kg Hydrogen

Independent testing/validation

COMPLETED

Official proof of concept

Sign-off Report



Validation Report



- Over 1 month non stop testing Macquarie University Sign-off
- Proven, worlds firstUltra reliability design
- Min. maintenance Low cost manufacturing
- Economically scaleable and safe
- Degradation rate of unique Hydroxy cells:
- Weighed before and after
- = only used **426.6** grams of mild steel
- = cost 0.30 cents of mild steel
- over 787 hours input DC 485 KW
- which produced **118, 000** litres of hydroxy gas !
- **Worlds first Cost Efficient Technology**
- Unique Hydroxy Generators input DC @ 0.62 kWh
- Producing **243 litres** of hydroxy gas per kWh which equates to:
- **162** litres of Hydrogen
- **81** litres of Oxygen

Comparisons



Conventional electrolysis

- relies on internal separation- high cost maintenance
- high cost construction- not economical
- uses noble metals- high cost of manufacture

Conventional Hydrogen Production

- Referred to as 'Steam Reforming' or 'Steam Methane Reforming'
- Natural Gas (CNG- CH₄) is passed through a catalyst reaction with an external heat source - converts steam and lighter hydro carbons such as methane into hydrogen and carbon monoxide referred to as syn gas
- Also produces CO₂ in this process
- More separation is required to get pure hydrogen
- Wholesale cost of liquid hydrogen, made the cheapest way from steam reforming, based on USA figures, shipped to large customers is approx.
- \$6.00 per kg
- along with every kg H₂ - produces 56 kg CO₂ !

COMPARISON

EGF process with Electricity @ \$0.18 per kWh **RETAIL**



- E.G.F. process costs 70 kWh per 1 kg of Hydrogen (includes producing by-product 8 kg of oxygen)
- Retail price of electricity is \$0.18 per kWh
- (highest prices electricity used in formula below...)
- Note: Wholesale varies around the world e.g \$0.04 per kWh (next slide)
- Hydrogen: 18 cents X 70 kWh = \$12.60
- Oxygen: 40 cents per kg **retail** = \$3.20 (0.40 x 8kg)
- E.G.F. process Carbon credits = \$350 per kg Hydrogen
- FORMULA: Hydrogen \$12.60 minus Oxygen \$3.20 plus Carbon Credits
- EGF Retail cost of making Hydrogen = \$9.40 per kg
- plus added benefit of \$350 per kg of Hydrogen carbon credits



COMPARISON

EGF process with Electricity @ \$0.04 per kWh wholesale

- E.G.F. process costs 70 kWh per kg of Hydrogen
- EGF also produced by-product 8 kg oxygen
- Wholesale electricity \$0.04 per kWh
- Hydrogen: $\$0.04 \text{ cents} \times 70 \text{ kWh} = \mathbf{\$2.80}$
- Oxygen: 20 cents per kg (8 kg) wholesale = \$1.60
- E.G.F. process Carbon credits
- FORMULA:
- Hydrogen \$2.80 minus Oxygen \$1.60 plus Carbon Credits
- EGF wholesale cost of making Hydrogen =
- \$1.20 per kg Hydrogen
- Plus added benefits of carbon credits

COMPARISON

- E.G.F. produces **no CO2**
- Gains Carbon credits
- Produces O2 as by-product that can be used for industry
- basic costs are stable: water and steel
- Produces by product iron that is used in major sequestering

Conventional Hydrogen production

- Costs going up
- Major CO2 emissions
- Taxed at beginning \$23 per tonne
- Tax going up +++ over years to come
- Reliant on fossil fuels
- Fossil fuels costs going up



Hydroxy Generators and CO2 Sequestering



- Iron from degradation (plate size 1.5 mm)
- Produces a pure iron
- 1 H.G. produces 5 kg of iron oxide per year
- 200 H.G prod. 1000 kg (1 tonne) of iron oxide
- 10 MW 31 tonnes per year
- Value= \$200 per tonne per year approx.
- Fully recyclable and environmental
- Complete sequestering of CO2
- Iron fertilization growing Algae

Iron Fertilization Sequestering

- Iron is a by- product of our hydroxyl generators (we turn steel into Hydrogen)
- Produces the necessary iron oxide to increase algae growth!
- Based on 1.84 Kwh creates 1.12 gms of iron oxide per hour

Based on Natural Gas turbine 60 MW electricity input, we produce:

- $1.12 \text{ gms per kwh} \times 60,000 \text{ kilo watt hrs} = 67 \text{ kilograms}$
- Algae growth cycles in 48 hrs requires 1.4 tonnes of iron oxide
- $67\text{kg} \times 48 = 3.2 \text{ tonnes}$

Which gives us the excess ability to utilize and sequester 1.8 tonnes ($3.2-1.4=1.8$) which has the benefit of taking out existing CO₂ from atmosphere primarily created by the combusting of coal

Sequestering by producing BIO-CHAR



- The Eco Global Fuels system has the most unique, cost effective methodology in the world to sequester CO₂
- Our by-product iron is used to maximize the Algae reproduction rate
- Algae is then compressed and heated without oxygen to produce BIOCHAR
- Which places carbon back into the land
- And increases agricultural yields
- 0.8 tonnes of Iron produces:
- 1 tonne of Algae per annum
- 1 tonne of Algae sequesters:
- 1,862 tonnes of carbon dioxide per annum
- 12.5 sq. m to produce 1 tonne of Algae per annum, which indicates how easy it is to scale up



FOR EGF INVESTORS:

Cleans up the coal/gas/oil industries

Reduces green house effects

Creates massive carbon credits for EFG

Means governments can meet their Kyoto agreements without disruptive inflationary effects on their economies

Creates licensing fees and increased ROI for EGF investors

All of this from our products:

the cheapest pure renewable hydrogen, oxygen
and pure iron

MAY WE REMIND YOU ...

28 Billion tonnes is a big number

It is the amount of sediment eroded each year from all mountains

And it is the amount of carbon dioxide (CO₂) we pump into atmosphere each year

Enough to cover Australia in a blanket two metres thick

Each year 28 Billion Tons of CO₂ induces heating

Oceans now heating at a rate of 300 trillion watts

Equivalent to detonating 5 Hiroshima A-bombs every second

Every day of every year creating the greenhouse effect

Energy use is increasing exponentially

So how will we meet our future energy needs?





SOCIAL ECONOMICAL BENEFITS

High private and government support
Reduces dependence on imported oil
Reduces greenhouse emissions
Makes western economics more stable
Reduces inflation, energy costs
Kyoto agreements can be honestly met

Putting Nature Back in Balance

