EcoGlobalFuels

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E G F provides solutions to two key energy problems:

- The need for renewable transport fuels
  - Sequestering CO2 emissions

THE TEAM

Ross Spiros
Australian, inventor
Owner and Director: R & D Company

Roger Green
Eco Global Fuels Principal Investor.
Owner: Exclusive Global license IP
CEO: Eco Global Fuels PTY LTD (Australia)
CEO: Eco Global Fuels USA LLC (USA)

Offices in New York City and Sydney Australia

Presentation Overview

- Overview of technology and its unique features: I.P.
- Independent Validation report
- Comparisons Conventional Hydrogen competition
- Cost efficiency, Low maintenance, Economically Scalable
- CO2 sequestering and iron fertilization
- Marketplace, ROI, sequestering, carbon credits
- Technology applications using 60 -100 MW utilizing PV, off peak electricity and natural gas producing hydrogen, oxygen and solanol
- Prototype investment and budget

  Investment into Eco Global Fuels

EGF production of Ethanol is unique because

It is the only process
that can convert electricity economically
into renewable fuels (Ethanol)
and at the same time
dramatically reduce CO2 emissions

- Carbon neutral, safe, renewable, sustainable
- It is a 24 hour base load energy producer (electricity and fuel)
- Uses existing infrastructure
- Win-win for all industries (Gov.coal.oil)
- Major environmental/public/planetary benefits
- Achievable and scalable
- The time is right
- Produces an exceptional ROI

PRODUCING SOLANOL

The above combines into producing the cheapest Hydrogen, Oxygen and “Solanol”

Without using FOOD,
And is completely carbon neutral, renewable…

and REMOVES CO2 from the atmosphere andfrom coal/oil power stations and gas fields

A WIN-WIN FOR ALL

PRODUCING SOLANOL

We can use a renewable energy source for DC input such as:

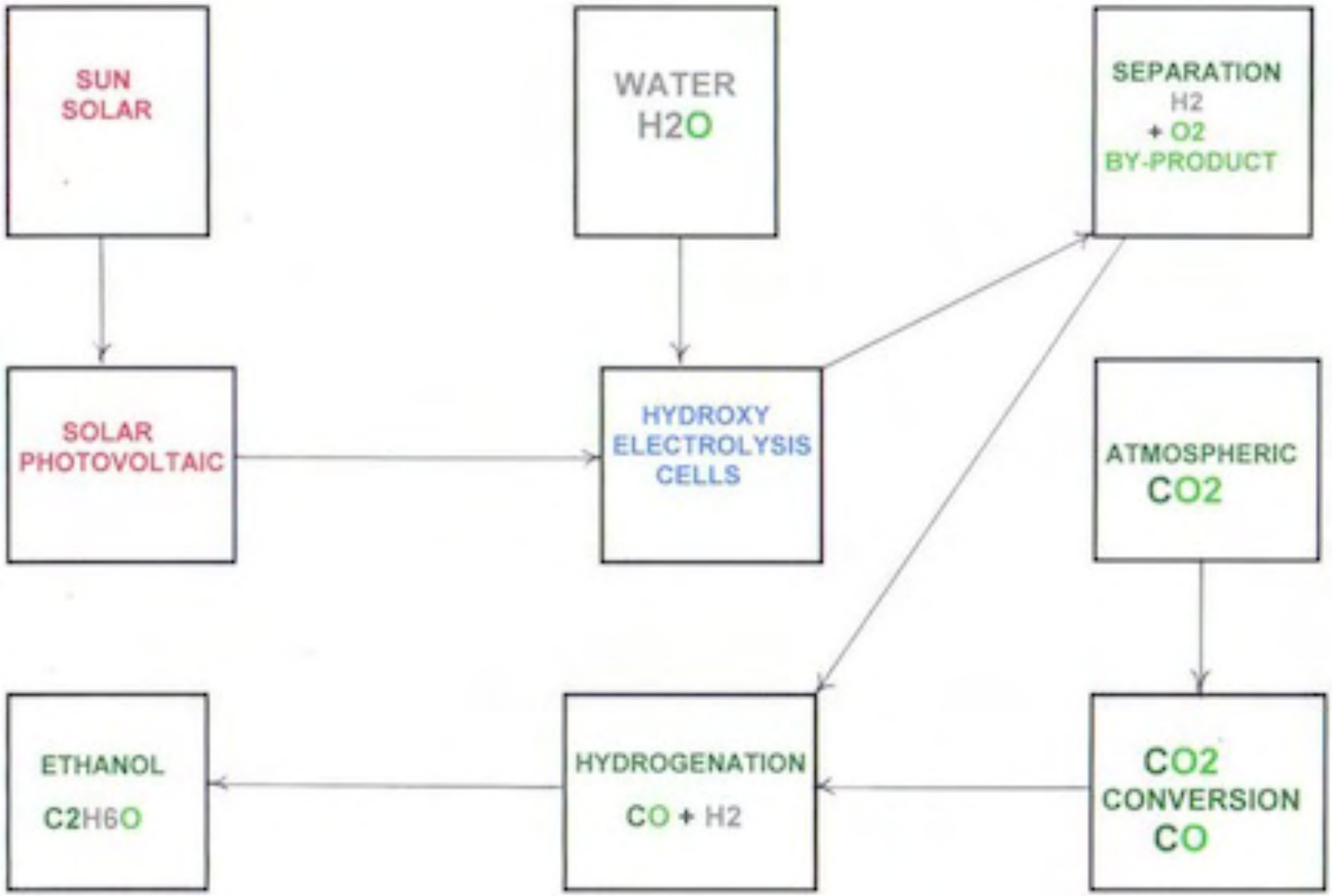
- Solar, Geothermal, Wind, Hydro. (near future/cold fusion)

We can adapt to any source of DC input:

- Off peak waste electricity from coal power stations
- Natural Gas turbine generators

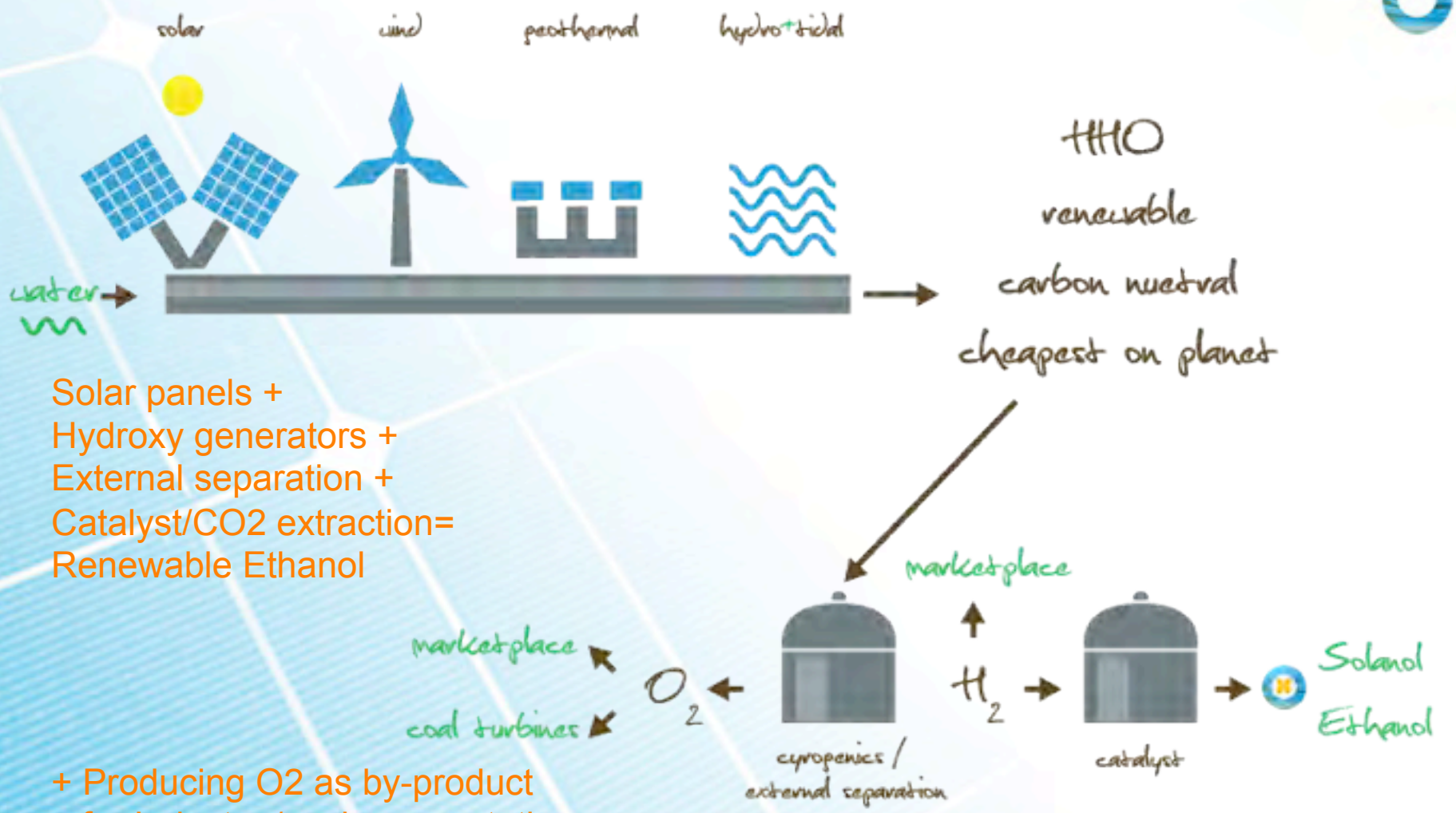
Overview:

- Hydroxy generators producing the cheapest Hydrogen in the world
- By-products O2 and iron
- Unique and proven Ethanol Catalyst
- We absorb CO2 normally vented (coal, gas, gas fields)
- Massive CO2 sequestering via iron to algae to bio char process



One possible scenario

SOLANOL PRODUCTION ...



Solar panels +
Hydroxy generators +
External separation +
Catalyst/CO2 extraction=
Renewable Ethanol

+ Producing O2 as by-product
for Industry /coal power stations

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water

- Local water supply
- Bore water
- Sea water
- Filtered with reverse osmosis (R.O)
- Pressure is min for R.O
- e.g. 600 psi salt water
- 100-200 psi normal water for R O
- Very cost effective.
- Min costs for filtering, pumping, equipment and maintenance
- 1000 litres of water costs $2 (Australia)
- 1 litre water makes 1860 litres hydroxy gas
- 18 litres of water needed to produce:
- 1 kg Hydrogen and 8 kg Oxygen

Costs:

- 0.036 cents per hour per 18 litres to produce 1 kg H2 and 8 kg O2

- Quotes available for local construction of R.O

Hydroxy Generators

- Patentable I.P
- Unique Design.
- Validated flow rate and durability
- Measured degradation
- Turns water into Hydroxy gas
- Locally manufactured
- Easy construction
- Cost efficient mild steel
- Using 6 mm gauge plate increases production and lifespan
- 200 H.G. needed for prototype
- $2000 per H.G. current price
- Scale up reduces to $500 per unit

- Budget will include electrical and computer system to run
- Quotes available for local construction

- 300 kWh prototype need 200 H.G
- 10 MW needs 6700 H.G
- 50 MW needs 33,000

- Powered by renewable DC input e.g. photoV
- Powered by off-peak electricity
- Powered by natural gas turbine generators

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

- 20 M prototype development
- Easily scaled up for 10-50-100-5000 MW

Ethanol Synthesis Catalyst Chamber

Catalyst Chamber
Takes in H2 and CO and compresses to 1500 psi (10.45 MPA) to produce all of the solanol alcohols such as Ethanol, Methanol, Butanol etc

Carbon Monoxide
CO is produced from CO2, by using a catalytic reaction
Concentrated CO2 is pumped into a catalytic chamber with H2
CO2 + H2 > H2O + CO

CO2 Sources
Major source is from Natural Gas fields
Pure CO2 is available from cement, lime, iron, steel, ammonia, and bio-fuels production,
Natural CO2 from Land/Ocean

Coal powered stations
require further filtering- however:
Our pure oxygen can provide the mechanism for a "Pure Oxygen Burn", which utilizes emissions and creates concentrated CO2 (which we use for Solanol)
which can be further converted into useful products, such as iron fertilization sequestering

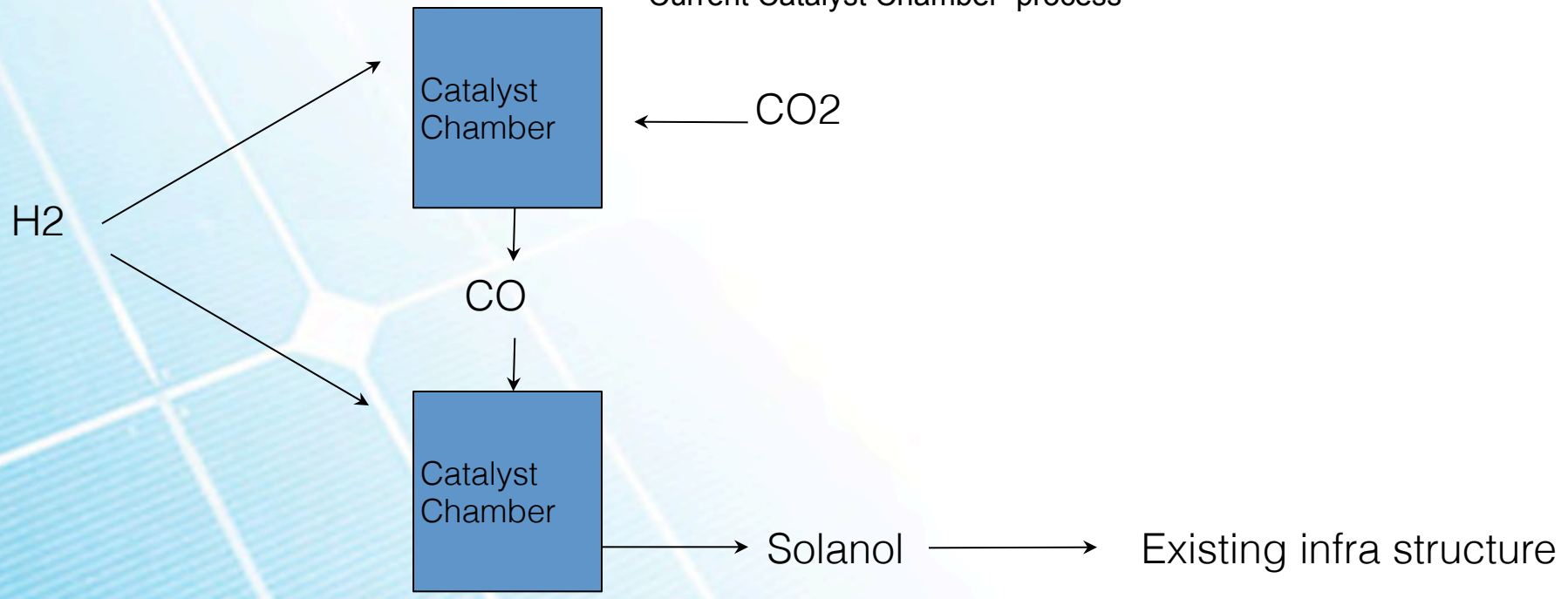
Imagine:
A coal or gas plant, utilizing our pure oxygen, forming pure CO2 that is catalyzed with hydrogen into the production of Solanol, with the totality of the CO2 emissions sequestered by iron fertilization

Ethanol Synthesis Catalyst Chamber

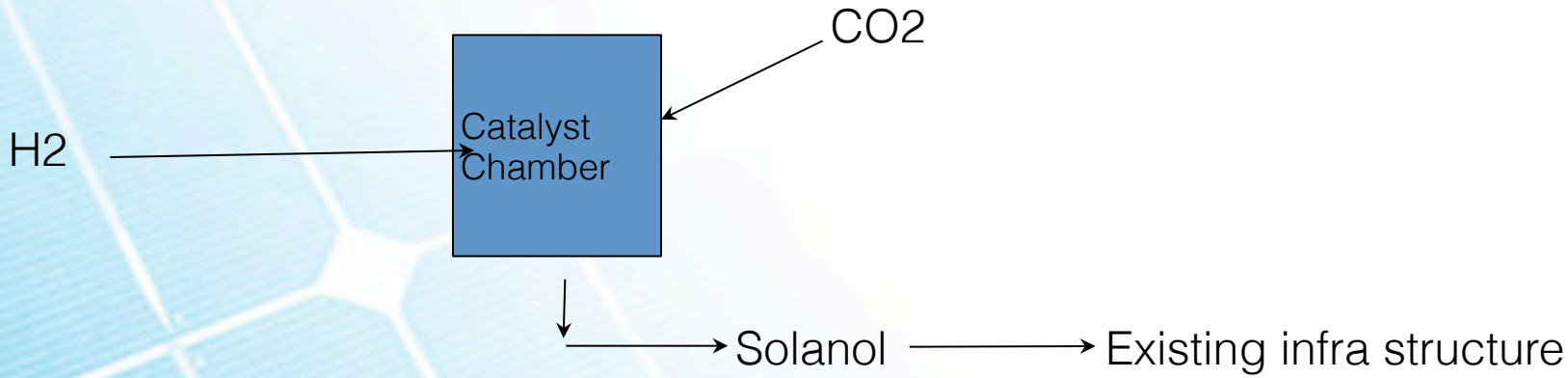
Advanced Catalyst Chamber

H2 and a direct input of CO2 into one catalyst chamber to be developed by CSIRO

Current Catalyst Chamber process



Advanced Catalyst Chamber process

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BIG ANNOUNCEMENT

ECO GLOBAL FUELS

Independent testing/validation

COMPLETED

Official proof of concept

Sign-off Report

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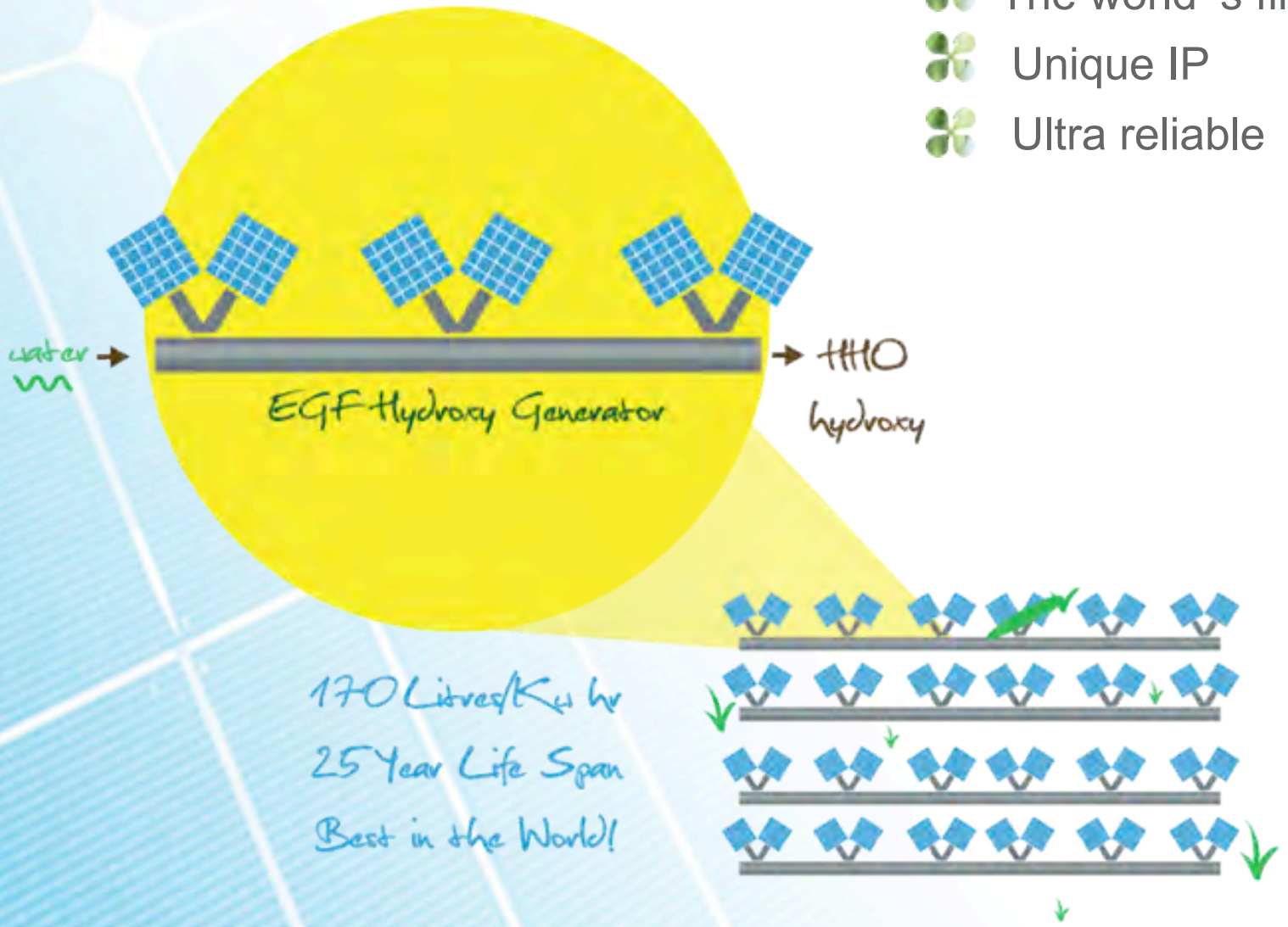
EGF HYDROXY GENERATORS

- The world's first
- Unique IP
- Ultra reliable



ECO GLOBAL FUELS

- Unique IP
- Patentable
- Ultra reliable
- Low cost to manufacture
- Cheapest hydrogen in the world!
- Durable, robust, safe
- 10-25 year span!
- Similar life span to solar panels
- 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

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Validation Report

- Over 1 month non stop testing
- Macquarie University Sign-off
- Proven, worlds first ....
- Ultra reliability design
- Min. maintenance
- Low cost manufacturing
- Economically scaleable
- safe

Validation Report

- Unique Hydroxy Generators IP
- Turns cheap mild steel into hydrogen !
- 0.30 cents = 426 gms of mild steel = 34 days
- 10 years durability
- Uses no noble metals (e.g expensive nickel)
- No internal diaphragm

unlike conventional electrolysis ....

- relies on internal separation- high cost maintenance
- high cost construction- not economical

Validation Report

- Our unique Hydroxy Generator, 3 meters long with 150 mm dia. tested with:
- 1.6 mm mild steel plates
- 35 amps and 18 volts= 630 watts
- 40 psi (270 kpa) pressure
- Temperatures average 30 c (room temp)
- continuous 787 hours test/validated

Validation Report

PROVES

Degradation rate

- 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

Validation Report

PROVES

Degradation rate

- 1.6 mm electrode plates last 10 years (signed off)
- Increasing plate gauge and energy input.....
- 6 mm electrode plates at higher amps and volts @ 80 amps @ 20 volts = 1.6 Kw
- increasing efficiency to
- 270-300 litres per kWh (current 243 litres kWh)
- = Worlds first Cost Efficient Technology

Validation Report

Flow rate confirmation

- 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
- Reliable, low maintenance, safe
- Cost effective

Hydroxy Generators

- Average 2.5 metres x 150 mm dia
- Construction mild steel with unique installation
- Cheap electrolyte - replaced every 5 years
- Current price $2000 each
- Scale up= average $500 each or less
- Prototype needs 200 H.G.'s
- Basic water filtering- reverse osmosis-low cost- mains pressure-minimal water usage
- Energy input: renewable or cheap waste electricity
- 1 **litre** of water produces **1860** litres of hydroxy gas

Hydroxy Generators

LOW MAINTENANCE

very 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

Hydroxy Generators

- Iron from degradation (plate size 1.5 mm)
- Produces a pure iron
- 1 H.G. produces 5 kg per year
- 200 H.G prod. 1000 kg (1 tonne)
- 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**

Hydroxy Generators
Iron Fertilization

- Iron from degradation (plate size 3 mm)
- Produces a pure iron
- 1 H.G. produces 14 kg per year
- 33,000 H.G required for 60 MW
- 60 MW prod. 462 tonnes of pure iron per year
- Value= $200 per tonne
- **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 gms per kwh x 60,000 kilo watt hrs = 67 kilograms
- Algae growth cycles in 48 hrs requires 1.4 tonnes of iron oxide
- 67kg x 48 = 3.2 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

Iron fertilization sequestering

- Based on 60 MW Natural Gas electricity input, we produce:
- 1.12 gms iron oxide per kwh x 60,000 kilo watt hrs = 67 kilograms iron oxide
- Algae growth cycles in 48 hrs requires 1.4 tonnes of iron oxide
- 67 x 48 = 3.2 tonnes !
- Which gives us the ability to utilize the excess1.8 tonnes per cycle, for sequestering existing CO2 from atmosphere

- Using Photo Voltaic for power input:
- 60 MW input
- Sequestering 3.23 tonnes of iron oxide in 48 hrs
- Which gives us the excess ability to utilize and sequester 3.2 tonnes which has the benefit of taking out existing CO2 from atmosphere

Technologies and industries which benefit from increasing the growth of algae:

- Iron oxide is a by-product of the hydroxy electrolysis process and with our calculations above, 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 in various methodologies (making them more economical)
- Ocean fertilization for Algae growth and Ocean Gardens
- Algae based bio fuels
- Algae based fertilizers
- Algae products (supplements, cosmetics)
- Sewage treatment
- Produces freshwater
- Food production
- Pharmaceuticals
- OUR FOCUS WILL BE ON PRODUCING BIO-CHAR FROM ALGAE for total sequestration of CO2

COMPARISON 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 cents X 70 kWh = **$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

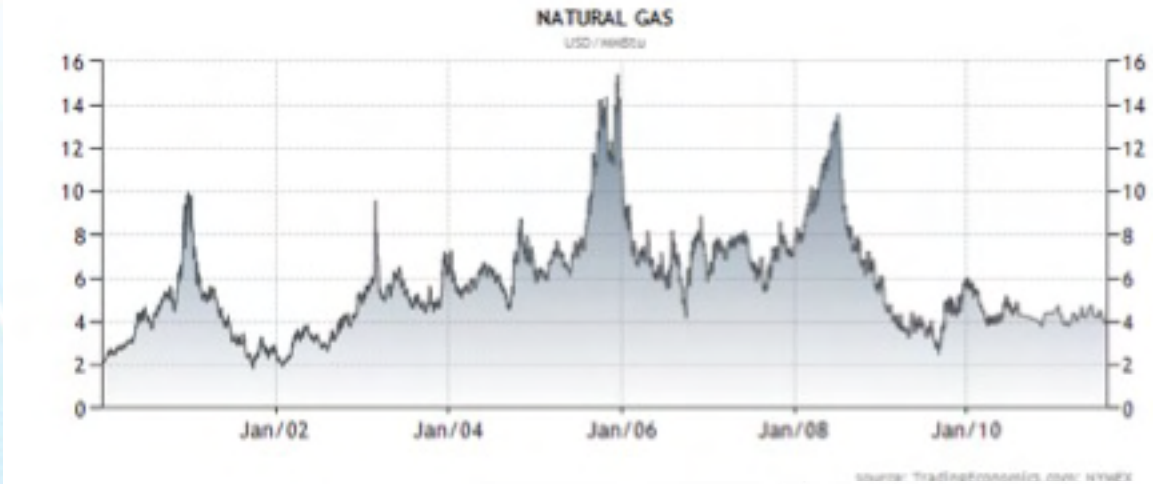
- E.G.F. produces **no CO2**
- Gains Carbon credits
- Produces O2 as by-product that can be used also in pure O coal powered Stations and sold for industry
- We use CO2 in Ethanol production
- basic costs are stable: water and steel
- Produces by product iron that is used in major sequestering

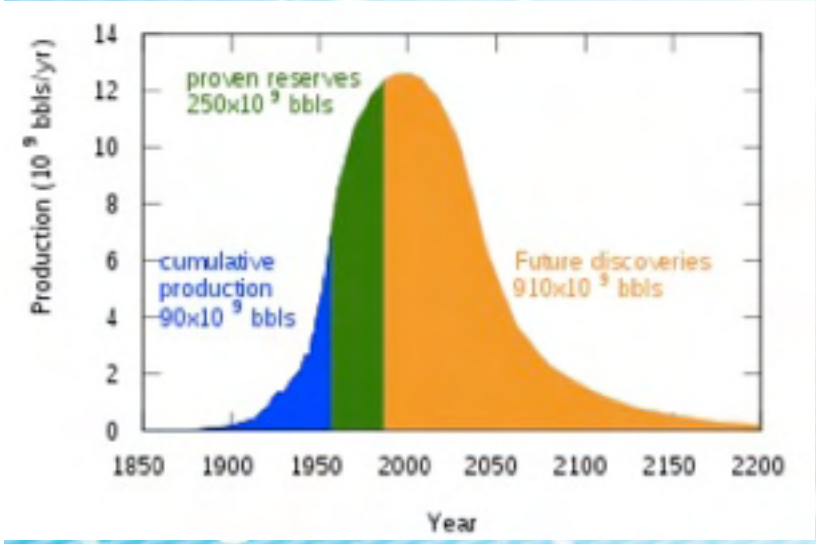
COMPARISON

- 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
- refer to charts

Projected costings

Projected costings





CRYOGENICS

Converts hydroxy into pure hydrogen & oxygen

Catalyst:

Converts CO_2 to CO

$CO_2 + H_2 = H_2O + CO$

Converts CO into Ethanol

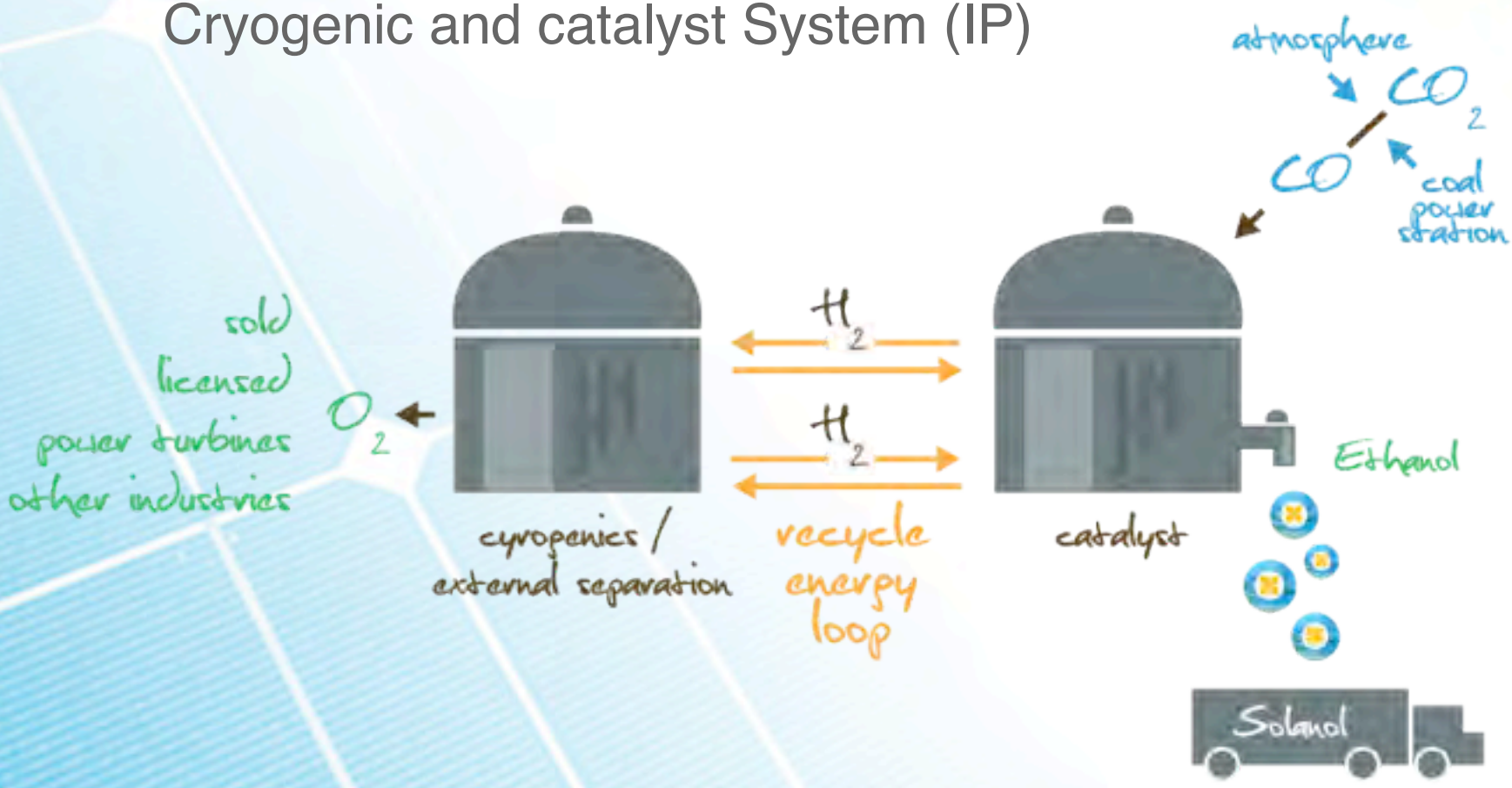
$CO + H_2$ + Catalyst

= Methanol, Ethanol, Butanol's etc

= 'Solanol'

UNIQUE LOOPED ENERGY EFFICIENT

Cryogenic and catalyst System (IP)



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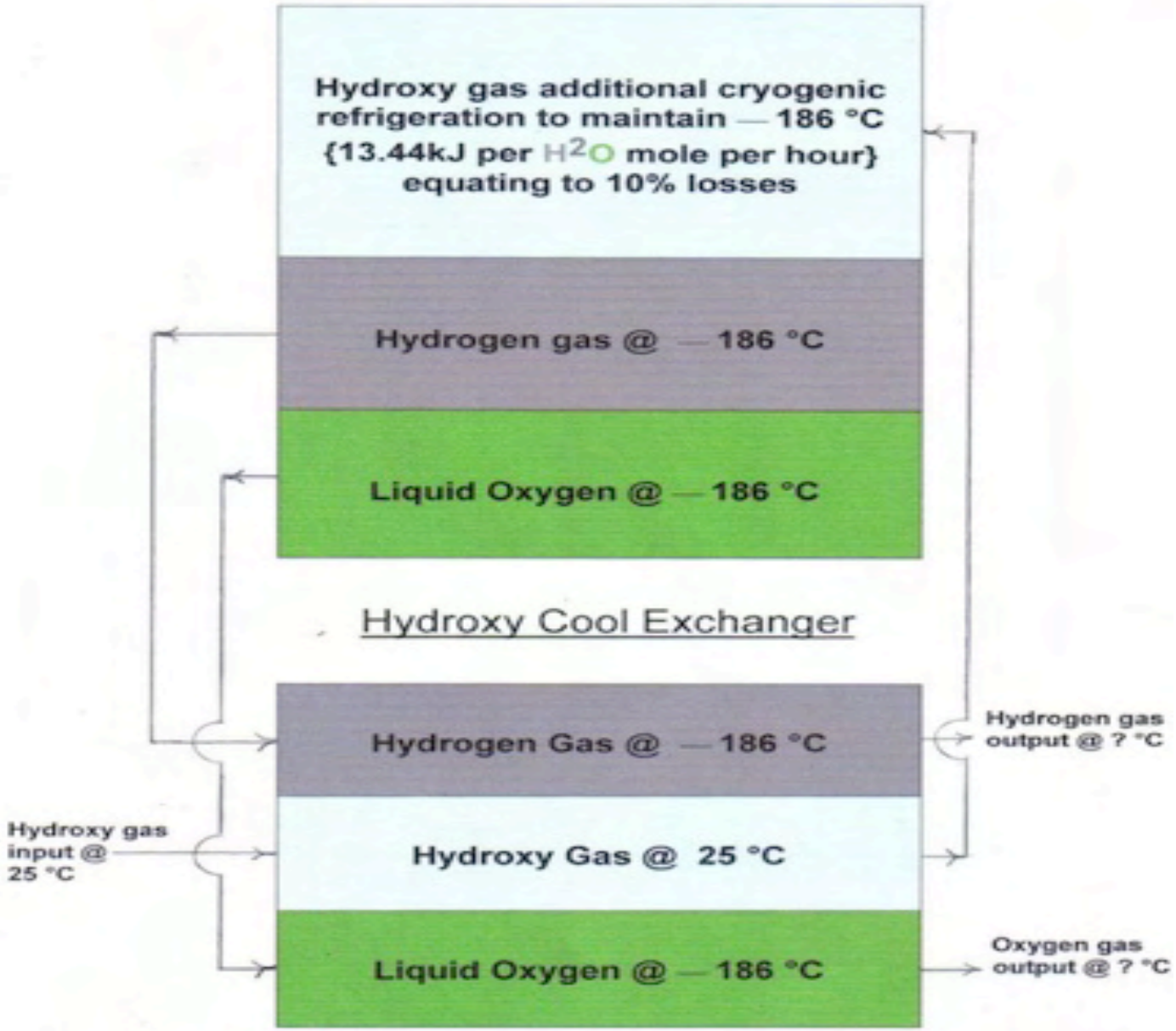
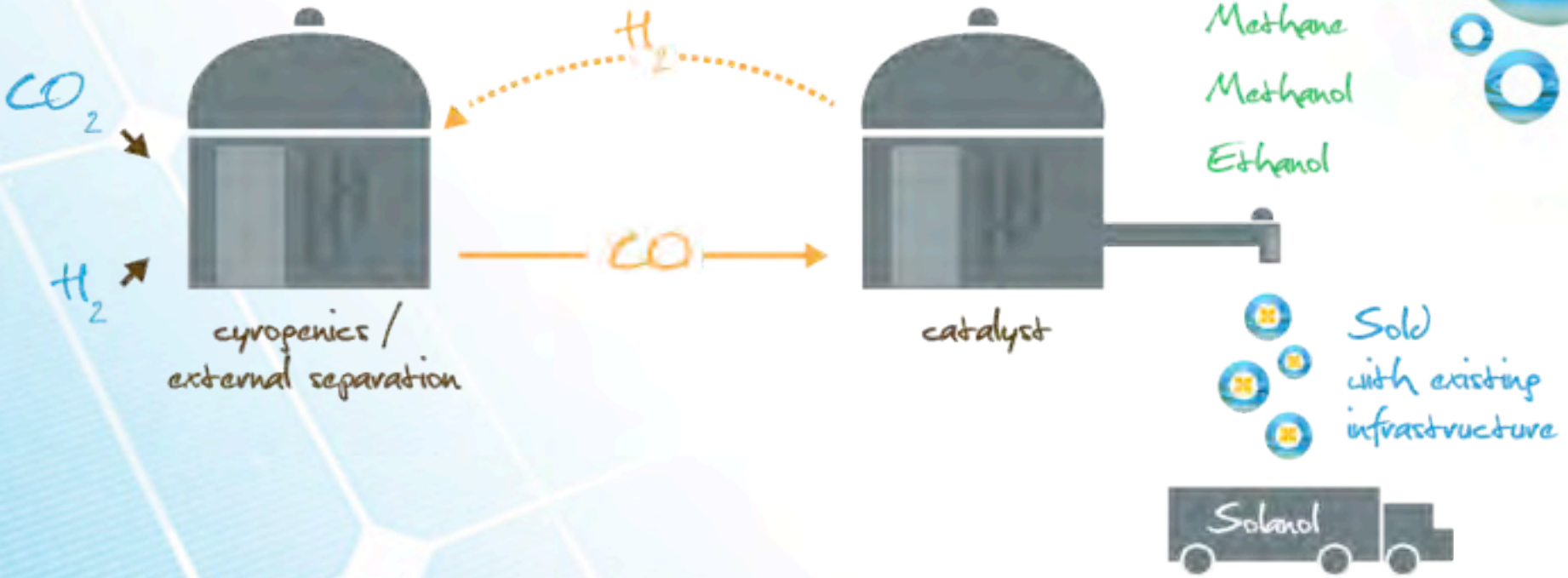
Hydroxy Cryogenic Separation Flow Diagram





$$CO_2 + H_2 + \text{⚡} = H_2O + CO$$

$$CO + H_2 + \text{⚡} = \text{Ethanol}$$

CO_2 from atmosphere, gas fields, coal power stations:

EGF greenhouse gas reducer

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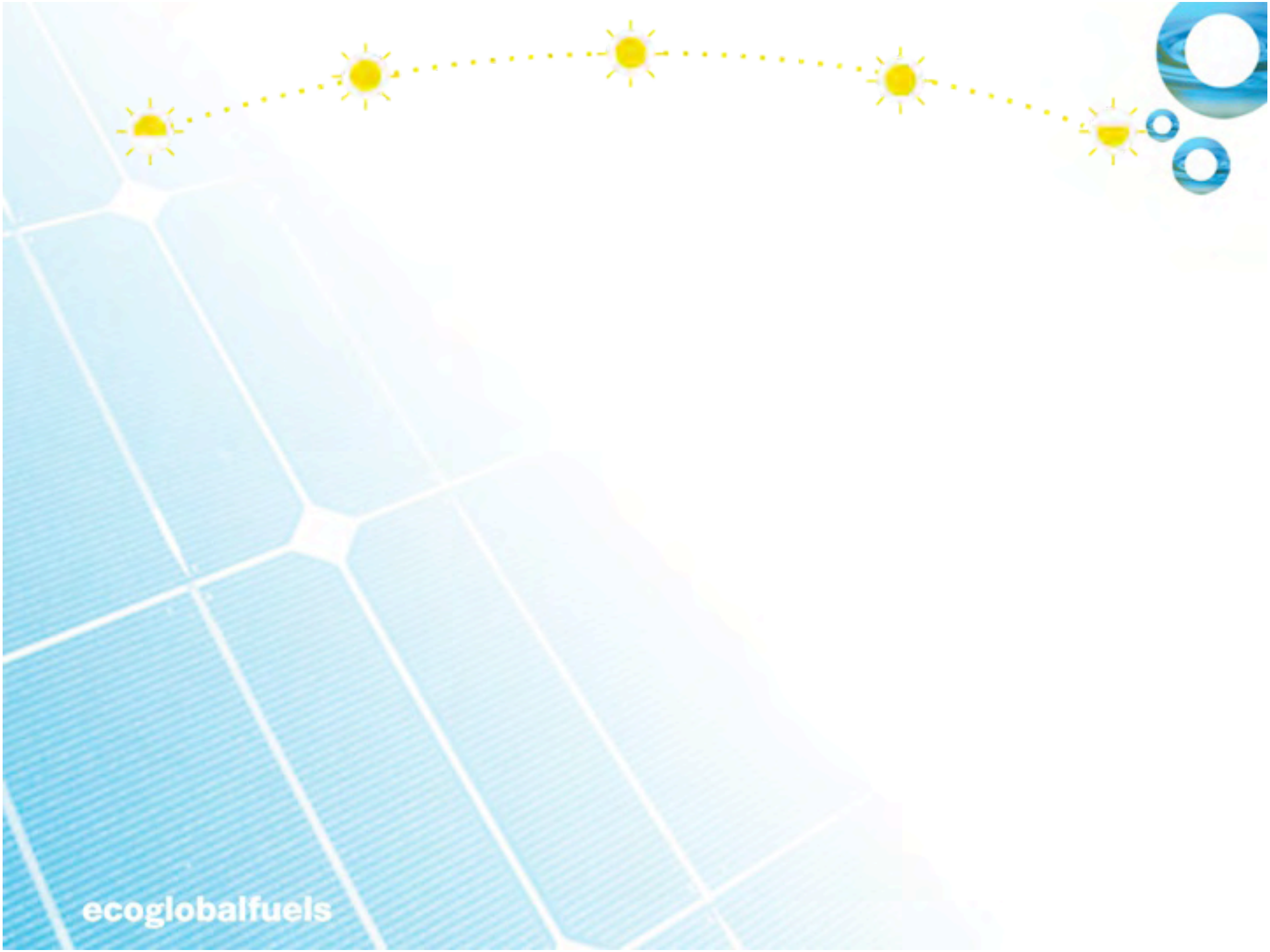
ABOUT ETHANOL

Burns cleanly
Exhaust emissions reduced up to 92 %
Increased efficiency of 16% in loaded vehicles
23.44 MJ per litre- Ethanol caloric value/ octane
34.6 MJ per litre- Petrol caloric value/ octane
Used by 90 % of cars and trucks in Brazil
Suited to hybrid car market because carbon neutral
Easily blended with petrol
Uses existing infrastructure unlike other alternative fuels
Cost competitive

Governments all over the world are demanding ethanol production to replace fossil fuel imports and domestic use

Hazard free:
Completely bio-gradable and will not effect the environment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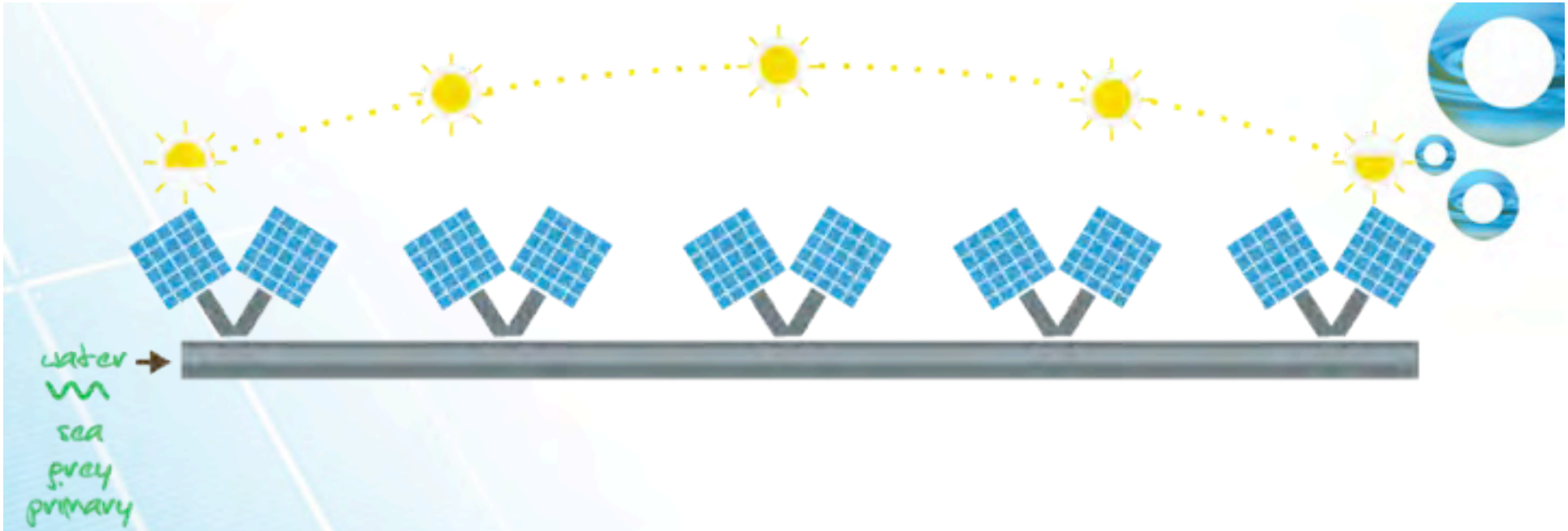
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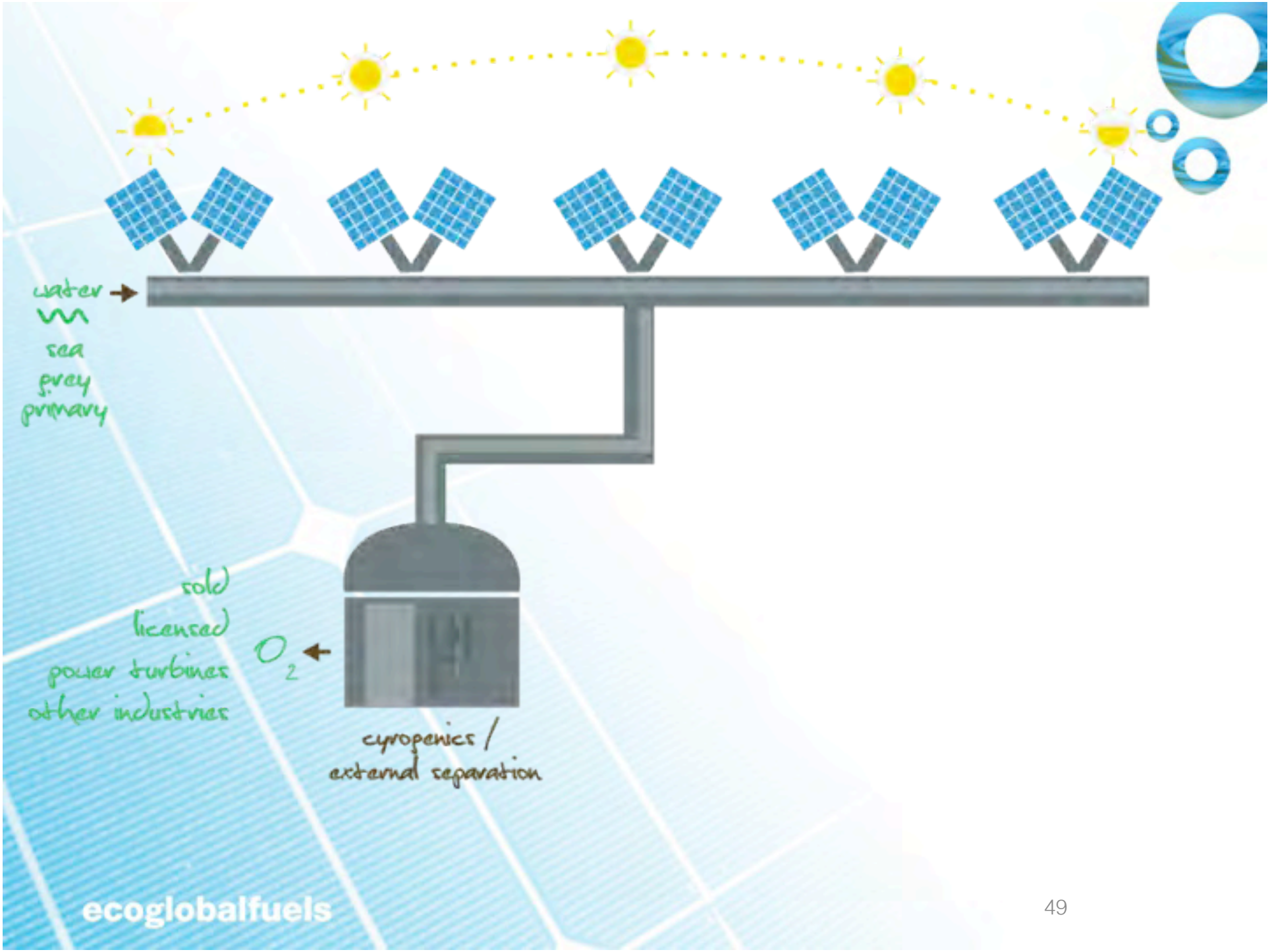
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O_2
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external separation
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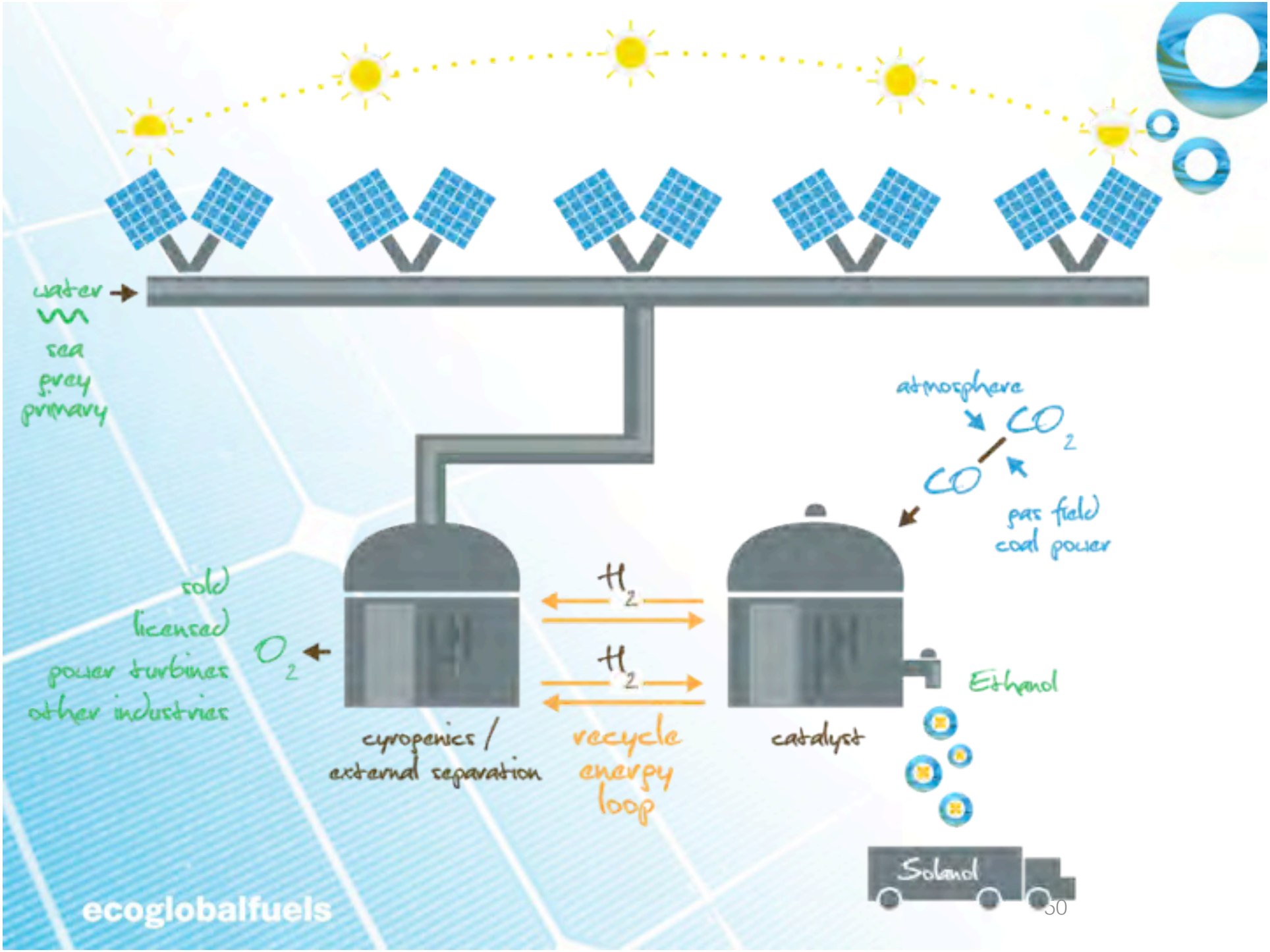
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cryogenics /
external separation
recycle
energy
loop
catalyst
Ethanol
Soland
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EGF SOLANOL SOLUTION....

the new era in environmentally sustainable energy

Because we produce pure oxygen as a by-product of our hydroxy production from water....

We can inject pure oxygen into the coal/oil/gas rather than using AIR - which contains impurities and high amounts of NITROGEN

We will use pure oxygen, which creates a pure CO2 stream for the production of SOLANOL

Which means the iron produced as a by product can be utilized for growing algae for sequestering all CO2 EMISSIONS

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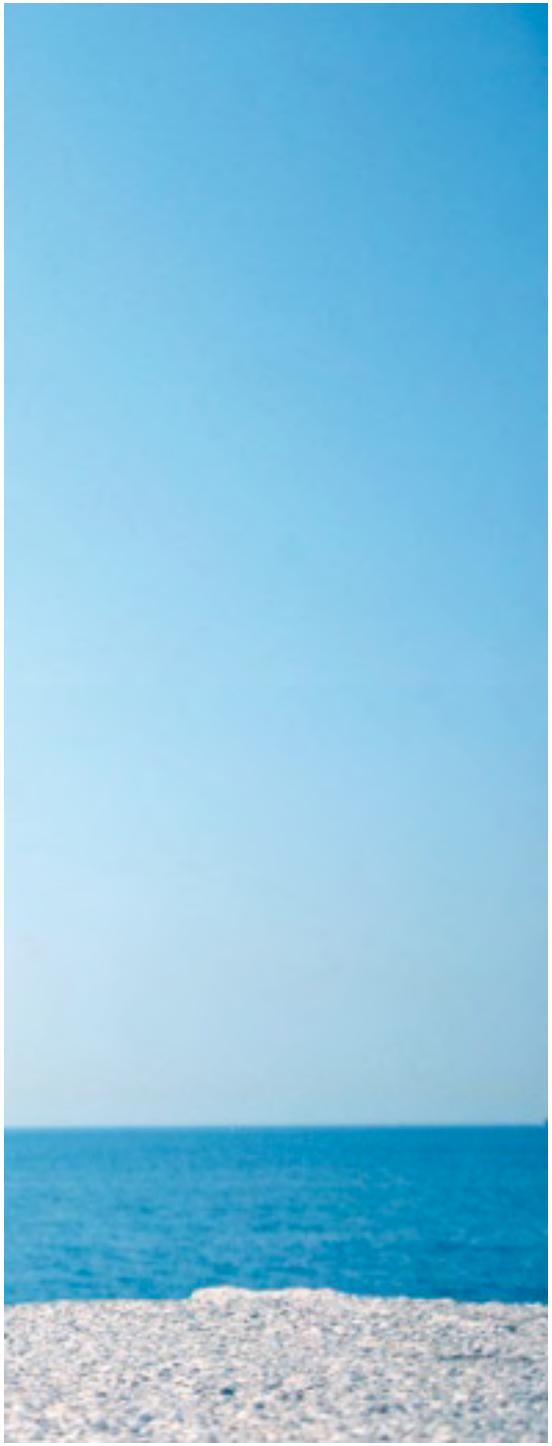
CO2 Sources

- Atmosphere; increased CO2 causes greenhouse effect
- Gas fields- massive emissions of relatively pure CO2
- 1000's of coal stations, Over 370 in the USA
- Other polluting industries have concentrated source of CO2:
- Cement prod. Lime prod. Iron/steel prod.
- Ammonia prod. make CO2
- Bio-Fuels make CO2 in their 'cycle'

- **EGF will focus on the pure CO2 stream from a Oxy-Fired Natural Gas Turbine**
- **Efficient, readily available, commercially cost effective with the use of our by-product oxygen**
- **Our oxygen increases turbine efficiency by 30 %**

All needing to reduce CO2 emissions and Carbon Taxes



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 by-products:
the cheapest pure renewable oxygen and pure iron

PURE CO2 STREAM

One hydroxy generator creates:
81 Litres of oxygen per KW-hr

Because of our unique, cheap production of OXYGEN,
We can produce a pure CO2 stream for the production of Solanol.

SEQUESTERING

Our Iron by-product is used in algae growth which produces CO2 at night which can be utilised in Possible Future technologies which can use

PURE CO2 CONVERTED INTO STABLE CARBON PRODUCTS :

- **Olefins-plastics**
- **Formaldehyde, paints etc**
- **Carbon black - e.g. car and truck tires**
- **Carbon fertilizers**
- **Carbon graphite**

Algae during its daytime cycle produces O2 that oxygenates the atmosphere

Keeps the carbon / CO2 on the ground and not in the atmosphere

National market requires 718 million tons of EGF O2 annually for all industries

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

Sequestering by producing BIO-CHAR

- 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

Sequestering by producing BIO-CHAR

The picture below shows the parabolic reflector of the Odeillo-Font-Romeau Solar Furnace in France. 63 flat mirrors automatically track the sun and concentrate the light on a reflector. The reflector then concentrates the rays to produce 1000 kilowatts and a temperature of 600 degrees centigrade. This is one of many methods that can be utilised to produce BIO-CHAR.

The BIO-CHAR is then used for fertilizer and other agricultural uses (including third world communities). The bio-char is not burnt and the CO2 is kept in the ground, which completes the sequestering methodology of the EGF system. Potentially it can remove the 28 billion tonnes of CO2 from the atmosphere, bringing the atmosphere back to normal.

24 hr base load energy producer

Night time generation of electricity

We can store the suns energy in a liquid fuel matrix, such as butanol, high in energy density, to be combusted at night for the production of electricity

This turns PV energy into a base load producer, never achieved before !

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 (CO_2) we pump into atmosphere each year

Enough to cover Australia in a blanket two metres thick
Each year 28 Billion Tons of CO_2 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?

Risk Management

RISK MANAGEMENT

Producing hydrogen and oxygen
Used extensively in
Chemical production
Fertilizers
Mining and mineral separations
Steel making
New hydrogen economy

Solar renewable electricity
combined with producing H2 and O2 provides a
rock solid
risk management strategy

RISK MANAGEMENT

- Oxygen is currently selling at US $300 per tonne
- EGF creates Oxygen at a ratio of 8:1
- 8 parts Oxygen to one part Hydrogen

Photovoltaic solar panels for our DC energy input

Excellent government subsides

Use of cheap arid land anywhere in the world

DRAMATICALLY improved performance efficiency

Long lasting (25 years)

Hugely reduced cost of manufacture

Because of the above it is NOW feasible to convert the SUN's energy into a liquid matrix transportation fuel

SOLANOL

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Mining and Mineral Ore Separation

A well known Professor at a Sydney based University has recently identified an application for hydrogen to extract nickel, copper and chromium from refractory ore which does not require acid leaching processes which are polluting and not always cost effective.

Mining and Mineral Ores Separation

- Huge potential for using hydrogen for the purification and separation of metal ores
- Hydrogen reaches elevated temperatures required for the hydrogenation process
- Mineral mines in Australia and in other countries left idle because of the scale of economics involved
- Our hydrogen can be utilized for cost effective mineral ores mining
- EGF hydroxy generators are portable, easy to construct and we produce the cheapest Hydrogen and Oxygen.
- The power source for mining would be mains power supply for a greater ROI.

Mining and Mineral Ores Separation

- EGF proposes to buy appropriate mines (cheaply)
- Install our hydrogen production on-site for mineral oxide ore separation
- At current market prices- produce an estimated ROI up to 21 %
- EGF proposes a safe, environmental, economical process for the following metal ores:

- Copper (Cu2O)
- Nickel (NiO)
- Chromium (CrO)

Mining and Mineral Ores Separation

Current Commodity Prices:

- Refractory Nickel ore $US 20,000 per ton
- Refractory Copper ore $US $9000 per ton
- Refractory Chromium ore $US 6400 per ton

• Different grades of mineral ores will consume:

Between one tonne of Hydrogen per tonne of mineral ores

to 10 tonnes of Hydrogen per tonnes of mineral ores

•It is estimated to produce a ROI depending on ore type and energy input required for extraction with the use of EGF Hydrogen.

RISK MANAGEMENT SUMMARY

Sale of carbon neutral electricity

Government subsides, rebates and tax concessions

Sale of hydrogen and oxygen to industry

Steel making

Mining

Chemicals

Carbon credits and sequestering

Sale of Solanol renewable fuels

Market place value

Hydrogen + Oxygen Production $H_2 + O_2$

Per Kg of Hydrogen

- H_2 = 1 Kg
- O_2 = 8 Kg
- we require 9kg water (H20)
- we need 70 kWh to produce 1kg of pure Hydrogen
- we also produce 8kg of pure Oxygen
- Enviro-Hydrogen value is US $6 per kg
- Enviro-Oxygen value is $0.30 cents per kg

Solanol 'Compounds' Production CO + H_2 Ethanol Catalyst reaction

Efficiency of 100kg CO_2 > CO 63.64 kg with H_2 11.31 kg

Ethanol Synthesis Catalyst conversion:

Solanol Compounds	H_1	C_1	AtomicWeight	%	Produced Kg	Litres STP	Wholesale Cost	MJ	kWh	H2 kg
Ethanol	6	2	46	31.8	23.38	28	25.3	694	193	3.04
Methanol	4	1	32	32.3	23.60	28.32	11.30	536	149	2.94
Methane	4	1	16	20.2	17.22	24,017	4	920	256	4.29
Propanol's	8	3	60	7.7	5.68	6.82	11.4	191	53	0.75
Butanol's	10	4	74	1.6	0.90	1	2.5	45	13	0.14
Pentanol's	12	5	88	0.2	0.20	0.24	0.5	3	2	0.15
Carbon Dioxide	0	1	44	6.2	3.97	3,955	0	0	0	0
1 Year Total current				100	74.95		US $55	2395	665	11.31
2 Year projections							US$80			
3 Year Total projections							US$100			
4 Year Total projection							US$120			
5 Year Total projections							US$150			

Marketplace Applications

- 60 MW applications
- Easily scaled to any MW eg 100-400 MW
- Either photoV, natural gas turbines, wind/ wave and waste off-peak electricity
- Producing Hydrogen, Oxygen and Solanol
- Current price and 2-3-4-5 year projections

IMPORTANT NOTES

These projections do not factor in government subsides, rebates

or grants.

Further research will validate all Government subsides this technology is entitled to.

Calculations and Projections are within +_ 10 %

Calculations and Projections are based on :

162 litres hydrogen plus 81 Oxygen flow rate per kWh (University Validation trials)

In house trial have produced 195 litres hydrogen plus 97.5 litres oxygen flow rate per kWh

Which means all calc. and projections can be modestly increased by 195/162= 1.2 = 20 % increase on ROI

NB: Calc do not include any performance increases from solanol catalytic reactions being improved by CSIRO

60 MW applications

Using PhotoV for producing H2 and O2

- H2 = 5400 tonnes per year = current $32.4 M, 35.1 M (2 yr), 37.8 M (3 yr), 40.5 M (4 yr) 43.2 M (5 yr)
- O2 = 43,200 tonnes per year = current $13 M, 14 (2yr), 15.1 (3 yr), 16.2 (4yr), 17.3 (5 yr)
- current total of H2 and O2 turnover for 1 year valve = $US 45.4 M
- Costs:
- Construction total current @$7.4 per watt : decrease as photoV goes down
- 443 M , 395 (2yr) 348 (3yr) 300 (4 yr) 253 (5 yr)
- Maintenance 6 M
- current ROI: 45.4 – 6.0 = 39.4 x 100 div by 443 = 9 %
- 2 year ROI: 49.1 – 6.0 = 43.1 x 100 div by 395 = 11 %
- 3 year ROI : 52.9- 6.0 = 46.9 x 100 div 348 = 14 %
- 4 year ROI : 56.7 -6.0 = 50.7 x 100 div by 300 = 17%
- 5 year ROI: 60.5 – 6- 54.5 x 100 div by 260 = 21 %

60 MW applications

Using photo V producing SOLANOL

- hydrogen 6000 tonnes
- oxygen 48,000 tonnes
- Solanol production based on 15.86 kg per hour of hydrogen = 64.38 litres per hour of solanol
- value = $55 = (55 divided by 64.38= 0.85 per litre)
- 563,969 litres per year x 0.85 = $ 480,000 per year (scale 1) x 39= 18.8 M
- 18.8 M – 1.2 M (the cost of natural gas to produce the pure CO2 for solanol)= **17.6 M (turnover)**
- 1536 kWh = 64.38 litres per hour of solanol derived from 100 kg CO2
- 60,000 kWh divided by 1536 = 39 x larger
- Volume of solanol per year = 22 M litres = value per current year 480,000 x 39= 18.8 M (-1.2 Nat Gas) = 17.6 M
- Solanol increases from $55 to $80 to $100 to $120 to $150
- **Current turnover 17.6 M**
- **Construction costs: current 455 M , 407 (2yr) 360 (3yr) 312 (4yr) 256 (5yr)**
- **Operational + maintenance costs 6 M**
- current ROI: 17.6 SOL - 6 = 11.6 x 100 div 455 = 3 %
- 2 year Projection ROI : 26.1 M SOL - 6 = 20.1 x 100 div 407 = 5 %
- 3 year ROI: 33 M SOL - 6 = 27 x 100 div 360 = 8 %
- 4 year ROI: 39.9 M SOL - 6 = 33.9 x 100 div 312 = 11%
- 5 year ROI: 50 M SOL - 6 = 44 x 100 div 265 = 17%

60 MW applications

Using Natural Gas Producing H2 and O2

- Hydrogen 8,600 tonnes per year @ $6000 per tonne ($6 per kg) = **$51.6 M**

Hydrogen @ 6.50 per kg (2 yr) @ 7.00 (3 yr) @ 7.50 (4 yr) @ 8.00 (5 yr)

- Oxygen 68,800 tonnes @ $300 per tonne = **$20.6 M**

Oxygen @ $325 (2 yr) @ $350 (3 yr) @ $375 (4 yr) @ $400 (5 yr)

- **Current Turnover = Total 72.2 M (20.6 + 51.6 H2 and O2)**
- Cost of Natural Gas per year **21 M** (0.04 cents per kWh)
- 38.3 MJ = 717gr = M3, Cost of per GJ/ NG = US$3.8, Cost of per 3.6MJ or kWh/ NG = US$0.0138
- Purchase retail cost of NG turbine generated electricity per kWh = US$0.04
- Current + projected NG costs: 21 M, 22.1 M (2 yr), 23.1 M (3yr), 24.2 (4yr), 25.2 (5yr)
- Construction costs: Current + projected turbines + hydroxy +ranknine +cryogenics+ storage etc :

NG turbine elec power generation (60 M) +hydroxy sys (35 M)+Rankine cycle (15 M)+ cryogen (18 M) + storage/pipeline (4 M) and contingencies (6 M)

- 139 M, 140 M (2yr), 141 (3yr), 142 (4yr), 143 (5yr)
- Operation / overheads / maintenance / labour= $6 M per year
- **Current ROI** : 51.6 (H) + 20.6 (O)= 72.2 -21 (NG) – 6 = 45.2 x 100 div 139 **= 33 %**
- 2 year projection: 55.9 M (H) + 22.2 (O)= 78.1 - 22.1 – 6 = 55.8 x 100 div 140 **= 36 %**
- 3 year projection: 60.2 M (H) + 24.1 (O) = 84.3 - 23.1 – 6 = 55.2 x 100 div 141 **= 39 %**
- 4 year projection: 64.5 M (H) + 25.8 (O) = 90.3 - 24.2 – 6 = 60.1 x 100 div 142 **= 42 %**
- 5 year projection: 68.8 M (H) + 27.5 (O)= 96.3 - 25.2 - 6 = 65.1 x 100 div 143 **= 46 %**

60 MW

Using Natural Gas Producing **Solanol**

- Producing hydrogen 9500 tonnes for solanol production and oxygen 77,000 tonnes
- Solanol production based on 15.86 kg per hour of hydrogen = 64.38 litres per hour of solanol
- value = $55 = (55 divided by 64.38= 0.85 per litre)
- 563,969 litres per year x 0.85 = $ 480,000 per year (scale 1) x 62.5= 30 M
- 969 kWh = 64.38 litres per hour of solanol derived from 100 kg CO2
- 60,000 kWh divided by 969 = 62.5 x larger
- Volume of solanol per year = 35 M litres = value per current year 480,,000 x 62.5= 35 M
- Solanol increases from $55 to $80 to $100 to $120 to $150 : Current + projected turnover 35 M) (43.8) (54.8) (65.7)
- Cost of natural gas:38.3 MJ = 717gr = M3, Cost of per GJ/ NG = US$3.8, Cost of per 3.6MJ or kWh/ NG = US$0.0138

Purchase retail cost of NG turbine generated electricity per kWh = US$0.04

- Current + projected NG costs: 21 M, 22.1 (2 yr), 23.1 (3yr), 24.2 (4yr), 25.2 (5yr)
- Construction costs: Current + projected turbines + hydroxy +ranknine +cryogenics+ Catayst + storage etc :

NG turbine elec power generation (60 M) +hydroxy sys (35 M)+Rankine cycle (16 M)+ cryogen (18 M) + catayst (10M) + storage/ pipeline (4 M) and contingencies (6 M)

- 149 M, 150 M (2yr), 151 (3yr), 152 (4yr), 153 (5yr) and Operational costs 6 M
- Current ROI : 30.1 - 21.0 – 6 = 3.1 x 100 div 149 = 2%
- 2 year: 43.8 - 22.1 - 6 = 15.7 x 100 div 150 = 11%
- 3 year: 54.8 - 23.1 -6 = 31.7 x 100 div 151 = 21 %
- 4 year: 65.7 - 24.2 - 6 = 35.5 x 100 div 152 = 24 %
- 5 year: 82.1 - 25.2 - 6 = 51 x 100 div 153 = 35 %

60 MW using Off Peak

producing H2 and O2 @ 0.0675 cents kWh

- H2 = 6300 tonnes per year = current value $37.8 M, 40.9 M (2 yr) 44.1 M (3 yr) 47.3 M (4 yr) 50.4 M (5 yr)
- O2 = 50,400 tonnes per year = current value $15.1 M, 16.3 M (2yr) 17.6 M (3 yr) 18.9 M (4yr) 20.1 (5 yr)
- current total of H2 and O2 turnover for 1 year value = 52.9 (57.2) (61.7) (66.2) (70.5)
- Construction costs: Current + projected : hydroxy +ranknine +cryogenics+ CO2 furnace (retro fit)+ storage etc :

Hydroxy sys (35 M) + Rankine cycle (16 M) + cryogen (18 M) + CO2 Furnace (10M) + storage/pipeline (4 M) and contingencies (6 M) = Total = 89 M

Projected construction costs: current 89 M, 90 M (2yr), 91 M (3yr), 92 M (4yr), 93 M (5yr)

- **IF we pay for Electricity (TARIFF)** : 60,000 x 0.0675 = 35.5 M
- Projected costs of electricity: 35.5 M current , 37 (2yr), 38.2 (3yr), 39.9 (4yr), 41.4 M (5yr)
- operational costs 6 M

ROI:

- Current ROI: 52.9 - 35.5 - 6 = 11.4 x 100 div 89 = 13 %
- 2 year ROI: 57.2 - 37 – 6 = 14.2 x 100 div 90 = 16 %
- 3 year ROI: 61.7 -38.2 – 6 = 17.5 x 100 div 91 = 19 %
- 4 year ROI: 66.2 - 39.9 – 6 = 20.3 x 100 div 92 = 22%
- 5 year ROI: 70.5 - 41.4 – 6 = 23.1 x 100 div 93 = 25 %

60 MW using Off Peak

producing Solanol @ 0.0675 cents kWh (with and without tariff ROI)

- Producing hydrogen 6500 tonnes for solanol production and oxygen 52,000 tonnes
- Solanol production based on 15.86 kg per hour of hydrogen = 64.38 litres per hour of solanol
- Value = $55 = (55 divided by 64.38= 0.85 per litre)
- 563,969 litres per year x 0.85 = $ 480,000 per year (scale 1) x 46.7 = 22.4 M
- 1287 kWh = 64.38 litres per hour of solanol derived from 100 kg CO2
- 60,000 kWh divided by 1287 = 46.7 x larger
- Volume of solanol per year = 26.4 M litres = value per current year 480,,000 x 46.7= 22.4 M
- Solanol increases from $55 to $80 to $100 to $120 to $150 : projected turnover (22.4 M) (32.7) (40.9) (49) (61.4)
- Projected costs of electricity: 35.5 M current , 37 (2yr), 38.2 (3yr), 39.9 (4yr), 41.4 M (5yr)
- Construction costs: Hydroxy sys (35 M)+Rankine cycle (15 M)+ cryogen (16 M) + CO2 Furnace (10M) + Catalyst (10M)+ storage/pipeline (4 M) and contingencies (6 M) = Total = 96 M Projected 97, 98, 99, 100
- operational costs 6 M

ROI:

- Current ROI 22.4 - 35.5 – 6 = -19.1 x 100 div 96 = with tariff (- 20 %) and without: **18 %**
- 2 year: 32.7 - 37 - 6 = -10.3 x 100 div 97= with tariff (-11%) without tariff: **28 %**
- 3 year: 40.9 – 38.2 - 6 = - 3.3 x 100 div 98 = with tariff (-4 %) without tariff: **37 %**
- 4 year: 49 – 39.9 – 6 = + 3.1 x 100 div 99 = with tariff (+3%) without tariff: **45 %**
- 5 year: 61.4 – 41.4 – 6 = 14 x 100 div 100 = with tariff (15 %) without tariff **57%**

Note: does not include carbon credits from iron fertilization, and exemptions from carbon taxes

100 + MW

Solanol production

Will increase ROI due to

Economies of Scale

Safety Testing PROTOTYPE

Construct 1 Hydroxy Generator

Upgrade the cells to 3 mm electrodes

Upgrade of cooling system to maintain 70 C

Test trials at 80 amps to increase the Hydroxy flow rate efficiency per kWh

Test trials for safety – with Test Safe Australia –a division of Work Cover

Recalculating cell degradation and production of iron by-product based on 80 amps

Trial will run for 3 months and continuous 24 hrs

Test procedures will include induced detonations to verify complete safety

Time frame over 12 months

Test Safe Australia estimate : $200,000
Scale up CAD manufacturing drawings: 20,000
B and M plastics : $10,000
Construction costs /cooling system / labour: $215,000
Macquarie University validation: 50,000
Consultants 10,000
Warehouse rent $10,000
Security $4000
Accountants fees $35,000
Administration costs: 100,000
Total 654,000

PROTOTYPE REFINERY

300 kWh - min. size to allow catalyst process to function

- 200 Hydroxy Generators
- Hydroxy Production is 50,000 litres per hour
- Hydrogen production is 3kg per hour - which produces 11 litres of solanol per hr.
- Oxygen production is 24 kg per hr.
- CO2 is produced from Natural gas utilizing 24 kg of O2
- 24 kg of O2 becomes 33 kg of CO2
- Catalytic conversion to produce 11 litres of solanol per hr requires 3 kg of H and 33 kg of CO2

BUDGET

Construction costs over 2 years

Hydroxy (3M) Cryogenics (3M) Catalyst (3M) Storage (0.1M) = 9 .1 M

Administration costs over 2 years

Government approvals /operational and safety manual (0.6 M) Legal and accountants (0.3M) Patents (1.4M) Test Safe Australia (0.5 M), Consultants (0.2M), Directors and staff/salary (0.23M) 1 car and 1 small truck (30,000), office rent and equipment (50,000) Lab equipment (60,000) security (6000) miscel bills (5000)

Options on DC INPUT for prototype construction:

PHOTOV: 300 kWh : 4.8 M Construction, plus land + store 0.2= 5M

If use mains power : 0. 2 M (3 months)

Note: can use a combination of PV and Mains

Total Option (1) mains: 12,480,000 +0.2M mains = **12.5 M**

Total Option (2) with PV 17.5 M

Government Subsides

Government has rebates for renewable
energy such as solar

Carbon reduction / emissions
Government tariff / tax $23 per tonnes for excess Carbon production and emissions (e.g. Australian Government with many other governments with similar policies))

Solanol production fits in with Government policy to reduce carbon emissions and to promote renewable energy including:
Iron fertilization incentives
Agricultural Bio-Char incentives

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

Eco Global Fuels Development Capital

- 15 M to be raised
- For construction of working prototype
- This is the template for all refineries that can be scaled up to any size and built anywhere in the world
- Witnessed by all Governments and Industries

MOVING FORWARD

Prototype refinery will mean

Complete demonstration showing the ability to produce

Solanol / Ethanol

EGF enters into
Joint Ventures and Licensing agreements
nationally and globally
producing a ROI for our investors

PRIVATE PLACEMENT OF STOCK
Equity released in Eco Global Fuels USA LLC

Enquiries
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Eco Global Fuels

A company registered in Sydney Australia and registered LLC in Delaware USA

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Banking with the Commonwealth Bank of Australia
Banking with HSBC- US

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