Eco Global Fuels releases its technology with Natural Gas using unique energy efficient loop with projected ROI

50MW Natural Gas Electric @ $0.04kWh power producing Hydrogen with Enviro-oxygen

The electrical power required **50 MW** Natural gas turbine electrical power generation will generate **1,200MW** per *day* for the **Hydroxy Electrolysis System** to produce **5,028 Tonne of Hydrogen per annum** with **40,224 Tonne of Enviro-oxygen per annum.**

(H_2O) + {580kJ/ input/ Mole}
{including H_2 + O_2 Separation} **> (H_2) + [O] a by-product}.**
+ {343kJ/Loss/Mole

{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}.

To produce **5,0280 Tonne of Hydrogen per annum** plus **40,224 Tonne of Enviro-oxygen per annum** requires **90,500 Tonne of water per annum**, which includes Reverse Osmosis losses **(**Reverse Osmosis filtration cost **$1 million).**

Construction costs;

Natural gas turbine electrical power generation = {$50 Million}

Hydroxy Electrolysis System construction costs = {$35 Million}
Hydroxy gas separation = {$16 Million}
Storage and pipeline = {$4 Million}
Contingencies = {$3 Million}.

Total construction cost current = {US$108 Million}.

Total construction cost 2 years = {US$109 Million}.

Total construction cost 3 years = {US$110 Million}.

Total construction cost 4 years = {US$111 Million}.

Total construction cost 5 years = {US$112 Million}.

The endothermic heat input for the catalytic reaction to produce carbon monoxide can be supplied from the hydroxy electrolysis process equating to 780kJ heat losses for the production of 6 hydrogen atoms.

The calculations below establish the necessary molecules for the production of carbon monoxide utilizing the necessary hydrogen to cause an endothermic reaction producing carbon monoxide:

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THE NECESSARY HYDROGEN ATOMS FOR THE PRODUCTION VIA CATALYST TO BE DEVELOPED BY THE CSIRO OF 3 MOLES OF CARBON MONOXIDE

3(CO_2) + 3(H_2) **> 3(H_2O) + 3(CO) + {711kJ/hr heat input}.**

CO_2 100kg) + H_2 4.55kg **> H_2O 40.9 kg + CO 63.64 kg + {1.6GJ/hr heat input}.**

THE CALCULATIONS BELOW ARE TAKEN FROM THE ETHANOL CATALYST.

The calculations below are based on the necessary energy for the **conversion of 100kg CO_2 into CO for the feed stock input to the Ethanol Synthesis Catalyst:**

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:T

Solanol Compounds	H_1	C_1	Atomic Weight	%	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
Propanols	8	3	60	7.7	5.68	6.82	11.4	191	53	0.75
Butanols	10	4	74	1.6	0.90	1	2.5	45	13	0.14
Pentanols	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				**100**	**74.95**		**US$55**	**2395**	**665**	**11.31**
2 Year Total							**US$80**			
3 Year Total							**US$100**			
4 Year Total							**US$120**			
5 Year Total							**US$150**			

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THE CALCULATIONS BELOW EQUATE TO THE NECESSARY NATURAL GAS REQUIRED FOR THE PRODUCTION OF 1 KWH

Natural Gas

38.3 MJ = 717gr = M^3
Cost of per 1.055 GJ Natural gas = US$4.5
Cost of Natural gas turbine generated electricity kWh = US$0.04

CH_4 68 grams per hour = 3.6 MJ = 1 kWh
CH_4 68 grams per hour @ turbine 80% losses = CH_4 272 grams per hour
CH_4 272 grams per hour = 14.4 MJ = 1 kWh @ 20% turbine Eff
CH_4 136 grams per hour = 7.2 MJ = 1 kWh @ 60% turbine Eff

CH_4 136 grams per hour for total combusted with O_2 544 grams a by-product per hour, which will conservatively estimated will inc the efficiency of the turbine electricity production which approximately will produce to 60%:

Therefore: $\frac{920MJ/hour}{7.2MJ}$ = 127

127 x CH_4 136 grams per hour = CH_4 17.22kg
920MJ or 256kWh @ 60% Natural gas turbine efficiency = 154kWh.

With 68.88kg of oxygen by-product from the hydroxy electrolysis process will fully combust the output of the Catalyst reaction, 17.22kg of Natural gas.

This will produce approximately, with turbine generating losses of 40% 154kWh.
920MJ/hour or 256kWh @ 60% Natural gas turbine efficiency = **154kWh.**

This will greatly improve the energy produced in the form of electricity from a gas turbine generating system at high efficiency due to the **higher temperatures** with minimal changes to the turbine configuration when burning with oxygen input only, for the total combustion of natural gas, which should increase the overall efficiency from 20% to 60%.

The utilization of Natural gas turbine electrical power generation, producing **154kWh** from the Ethanol Synthesis Catalyst conversion into Methane 920MJ/hour.
Equates to **154kWh**, which equates to @ 60% Natural gas turbine efficiency 9201MJ or 17.22kg Natural gas requiring 68.88 kg O_2 for per hour total combustion.

Input Formula is based on the kWh necessary for the production of CO 63.64kg per hour:
Therefore O_2 required for the manufacture of carbon dioxide for the catalytic production of carbon monoxide required by the ethanol catalyst @ **CO 63.64 kg**:

100kg CO_2 > CO 63.64kg with H_2 11.31kg Ethanol Synthesis Catalyst conversion into Methane
920MJ or 17.22kg per hour > 47.36kg CO_2 +
Natural gas 17.7kg > CO_2 48.67 + 3.97kg = CO_2 100kg to produces **> CO 63.64 kg**

CH_4 17.7kg + CH_4 17.22kg ethanol catalyst output = CH_4 34.92kg per hour
CH_4 34.92kg > O_2 **139.68kg** per hour > CO_2 96.03kg.
CO_2 96.03kg + CO_2 3.97kg ethanol catalyst output = CO_2 100**kg per hour**

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THE CALCULATIONS BELOW SHOW THE NECESSARY HYDROGEN TO BE PRODUCED FOR THE DISASSOCIATION OF CARBON DIOXIDE AND FOR THE PRODUCTION OF HYDROGEN FOR FEEDSTOCK TO THE ETHANOL CATALYST

H_2 4.55kg for endothermic reaction producing CO from CO_2:
+ H_2 11.31kg for Ethanol Synthesis Catalyst reaction = H_2 15.86kg

{1,587kW/h or 5.7GJ} + {H_2O 176.8 kg} = {H_2 17.46kg, 194,259 Lph}.
+ {O_2 **139.68 kg**, 97,130 Lph}.
+ {**3.4 GJ heat loss**}.

The surplus H_2 1.6kg can be looped back and converted back to electricity when the H_2 is combined with the Natural gas turbine gas input:

H_2 17.46kg — H_2 15.86kg	= H_2 1.6kg per hour.
H_2 141.8MJ per kg x H_2 1.6kg	= 227MJ
227MJ x @ 60% H_2 + Natural gas turbine	= **136MJ or 38kWh**

{1,587kW/h or 5.7GJ} + {H_2O 176.8 kg} = {H_2 17.46kg, 194,259 Lph}.
{— 38kWh @ 60% H_2 + Natural gas turbine} + {O_2 139.68 kg, 97,130 Lph}.
+ {**3.4 GJ heat loss**}.

{1,549kW/h or 5.6GJ} + {H_2O 176.8 kg} = {H_2 17.46kg, 194,259 Lph}.
+ {O_2 139.68 kg, 97,130 Lph}.
+ {**3.4 GJ heat loss**}.

CATALYST. THIS INFORMATION IS FROM THE NECESSARY COMPRESSION FOR THE CATALYTIC REACTION TO BE MAINTAINED PRODUCING THE ABOVE COMPOUNDS

Additionally the oven that compresses the CO 63.64kg H_2 11.31 kg and holds the 1500psi or 10.45MPa or 102 Atm:

(CO 63.64kg + 9.48 kg H_2)	**= 73.12 kg**
H_2 11.31kg	**= 125,835itre**
CO 63.64kg	**= 35,355 Litre**
Total	**= 160,000Lph**

160,000 Lph = **300kWh Ethanol Catalyst Pumping power.**
{1,549kW/h or 5.6GJ} + {H_2O 176.8 kg} = {H_2 17.46kg, 194,259 Lph}.
{+ 300kWh Ethanol Catalyst Pumping power} + {O_2 139.68 kg, 97,130 Lph}.
+ {**3.4 GJ heat loss**}.

{1,849kW/h or 6.7GJ} + {H_2O 176.8 kg} = {H_2 17.46kg, 194,259 Lph}.
+ {O_2 139.68 kg, 97,130 Lph}.
+ {**3.4 GJ heat loss**}.

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This reduction in input power is due to the electrical energy generated via Natural gas turbine by the Natural gas output of the ethanol catalyst looped energy equates to **154kWh:**

{1,849kW/h or 6.7GJ**} + {**H_2O 176.8 kg**}** **= {**H_2 17.46kg, 194,259 Lph**}.**

{— 154kWh Natural gas turbine electrical power**}** **+ {**O_2 139.68 kg, 97,130 Lph**}.**

+ {3.4 GJ heat loss}.

{1,695kW/h or 6.1GJ**} + {**H_2O 176.8 kg**}** **= {**H_2 17.46kg, 194,259 Lph**}.**

+ {O_2 139.68 kg, 97,130 Lph**}.**

+ {3.4 GJ heat loss}.

The greatly improved energy produced in the form of electricity from a gas turbine generating system at high efficiency due to the **higher temperatures** obtained when burning with oxygen input only, for the total combustion of natural gas, which should increase the overall efficiency from 20% to 60%:

{1,695kW/h or 6.1GJ**}x 40% turbine generating losses**

80% turbine generating normal losses **= 848kWh**

{848kWh or 3.1GJ**} + {**H_2O 176.8 kg**}** **= {**H_2 17.46kg, 194,259 Lph**}.**

+ {O_2 139.68 kg, 97,130 Lph**}.**

+ {3.4 GJ heat loss}.

Therefore the scaling up of the carbon neutral refinery equates to increased ROI:

{50,000kW/h or 180 GJ**} + {**H_2O 5.81 Tonne**}** **= {**H_2 574kg, 6 million Lph**}**
+ {O_2 4,589 kg, 3 millionLph**}**

+ {112 GJ heat loss}.

The above power input can reliably produce the necessary hydrogen and oxygen to produce:

50,000 kW/h
848 kWh (input electrical power) = 59

Input Formula is based on the kWh necessary for the production of CO 63.64kg per hour now 59 times larger due to the 50MW power supplied:

US$55 profit per hour x 59 = US$1,623 profit per hour.

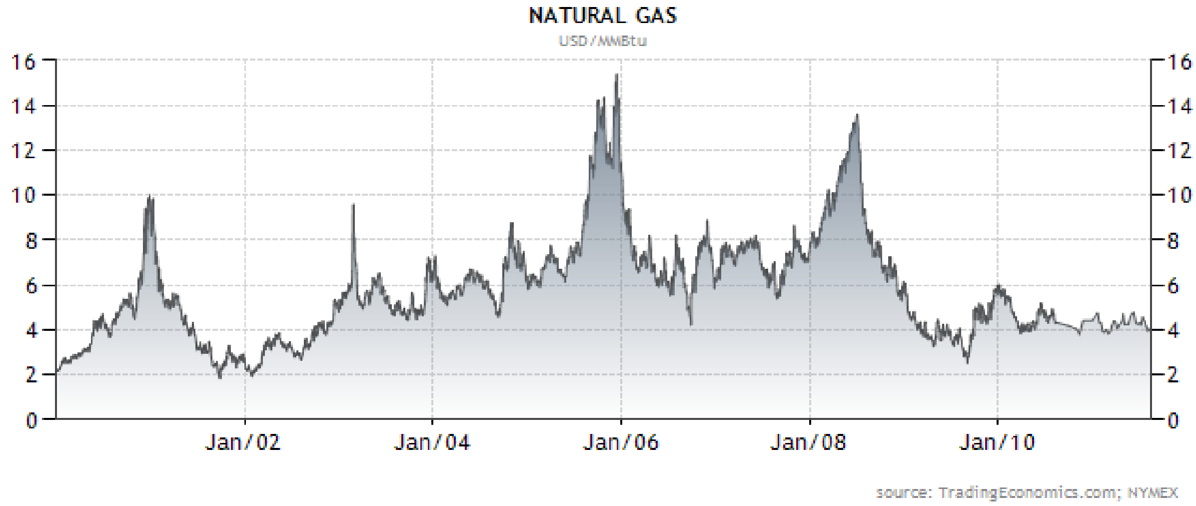
Solanol compound commodities per annum = US$28.4 million

The enviro-oxygen in this closed loop combustion of Natural gas produces all the necessary carbon dioxide output from the Natural gas combustion turbine generating system to facilitate the necessary carbon dioxide to be catalytically converted into carbon monoxide for the total input requirements of the ethanol catalyst for the production of Solanol.

The benign non-polluting nature of a Solanol carbon neutral refinery that will initially use normally vented carbon dioxide, as the feed stock to create a carbon neutral fuel matrix. The normally vented carbon dioxide from the Natural gas turbine generating system is utilised to produce Solanol fuel in a closed looped system and when combusted via the emissions, the same absorbed carbon dioxide is released into the atmosphere and does not increase the carbon dioxide levels, which does not attract any “carbon tax”.

The calculations below determine the equivalent cost of oxygen which is paid by the reduction in tariff due to the facility of producing a pure carbon dioxide output when combusting Natural gas as a fuel source.

Enviro-oxygen 40,224 Tonne @ $300 Tonne	**= {US$12 Million per annum}.**
Total cost	**= — {$12 Million per annum}.**
Total SOLANOL profit	**= {$3.3 Million per annum}.**



Additionally, Natural gas cost per GJ has only doubled in the last 10 years which is marginal when compared to petroleum products.

Cost of Natural gas increases by approx $0.2 per annum = **$2 in 10 years to $4.50 per GJ currently.**
The conversion of Natural gas to electricity is calculated below:

Cost of Natural gas increases by approx $0.002 per annum = **$0.02 in 5 years to 0.048 kWh**

50,000 kWh x **0.04 Current**	**= $2,000 per hour**
50,000 kWh x **0.042 2 Year**	**= $2,100 per hour**
50,000 kWh x **0.044 3 Year**	**= $2,200 per hour**
50,000 kWh x **0.046 4 Year**	**= $2,300 per hour**
50,000 kWh x **0.048 5 Year**	**= $2,400 per hour**

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Discounted

50,000 kWh x **0.0275 Current** **= $1,375 per hour**
50,000 kWh x **0.0303 2 Year** **= $1,515 per hour**
50,000 kWh x **0.0331 3 Year** **= $1,655 per hour**
50,000 kWh x **0.0359 4 Year** **= $1,795 per hour**
50,000 kWh x **0.0387 5 Year** **= $1,935 per hour**

<u>Running costs</u>
{I.17kW/h or 4.5 MJ**}** **+** **{**H_2O130.31 grams**}** **= {**H_2 12.87 grams, 162 Lph**}.**
+ {O_2 102.32 grams,81 Lph**}.**
+ {2.5MJ Loss**}.**

Therefore cost of per {H_2/1kg/hr **+** O_2/8kg/hr**}**
{<u>1000 grams</u>**}**
{H2 18 grams**}** **= {**55.55**}.**
{55.55**}** **x** **{**I.17kW/h**}** **= {**65 kW/h**}.**

{65 kW/h**}** **= {**H^2/1kg/hr **+** O_2/8kg/hr**}.**
H_2O130.31 grams x 55.55 **=** H_2O 7.23kg

(Reverse Osmosis filtration cost **$0.02 million**)
Requiring twice the volume **=** H_2O 15 kg
AU Current cost $2 012 = 1000
AU Current cost per kg = $0.002012 per kg

{Water @ $0.002012 per kg x 15**}** **= {**$0.03/hr**}**
{Water $0.03/hr**}** **= {**$H_2$/1kg/hr **+** O_2/8kg/hr**}.**

<u>Maintenance costs of tube hydroxy generators & production cost equates to US$0.007 per kWh;</u>
{$0.007 per kWh**}** **x** **{**65 kW/h**}** **= {**$0.46/hr**}**
{$0.46/hr**}** **+** **{**$0.03/hr**}** **= {**$0.49/hr**}**
{H_2/1kg/hr} **= {US$0.49/hr}**
{H_2 574 /kg/hr} x {$0.49/hr}** **= {US$281/hr}
5,000 Tonne of Hydrogen per annum **= {US$2.46 million per annum}.**

The recent trials have been successful and proven reliable where 500 grams of steel was consumed/converted to an oxide over a 10 cell tube hydroxy generator. . The current cost of steel is $0.52 per kilogram, which equates to $0.26 per hydroxy cell configuration over a 34 day period 24/7. The steel consumed/converted to an oxide can easily be recycled to produce high grade steel again. The lifespan has been verified by Macquarie University at 10 years. To place the cells alone after 10 years which consist of mild steel only and polymer insulation equates to:
Ongoing photovoltaic, hydroxy generators & water costs = $0.4 Million annum

Maintenance costs **= — {$3 Million annum}.**
Labor running costs etc **= — {$3 Million annum}.**
<u>Total overheads</u> **<u>= — {$6 Million annum}.</u>**

Current) {$16.4 Million per annum}
— {US$6 Million per annum}** **= {$10.4 Million per annum}.
<u>{100 x $10.4 Million}</u>
{US$118 Million} **= {9% ROI}.**

The current return on investment is based on efficiencies derived utilizing lower amps.
Projected higher amps efficiencies are as follows:

{9% ROI} x 1.2 Projected increase in hydroxy flow rate= 11% ROI}

2 Year {$28 Million per annum}
— {US$6 Million per annum} = {$22 Million per annum}.
{100 x US$22 Million}
{US$119 Million} = {19% ROI}.

The current return on investment is based on efficiencies derived utilizing lower amps.
Projected higher amps efficiencies are as follows:

{19% ROI} x 1.2 Projected increase in hydroxy flow rate = {22% ROI}

3 Year) {$37.2 Million per annum}
— {US$6 Million per annum} = {$31.2 Million per annum}.

{100 x US$31.2 Million}
{US$120 Million} = {26% ROI}.

The current return on investment is based on efficiencies derived utilizing lower amps.
Projected higher amps efficiencies are as follows:

{26% ROI} x 1.2 Projected increase in hydroxy flow rate = {31% ROI}

4 Year {$46.3 Million per annum}
— {US$6 Million per annum} = {$40.3 Million per annum}.

{100 x US$40.3 Million}
{US$121 Million} = {33% ROI}.

The current return on investment is based on efficiencies derived utilizing lower amps.
Projected higher amps efficiencies are as follows:

{33% ROI} x 1.2 Projected increase in hydroxy flow rate = {40% ROI}

5 Year {$60.5. Million per annum}
— {US$6 Million per annum} = {$54.5 Million per annum}.

{100 x US$54.5 Million}
{US$122 Million} = {45% ROI}.

The current return on investment is based on efficiencies derived utilizing lower amps.
Projected higher amps efficiencies are as follows:

{45% ROI} x 1.2 Projected increase in hydroxy flow rate = {54% ROI}
Also, when the scaling up process reaches 100MW/h the ROI will also again increase due to economies of scale up to **60% ROI.**

The reason why the production of Solanol commodities is attractive is due to the fact that fossil based fuels have slowly increased over the years due to the fact we reached Hubbert's peak in the year 2000 which is

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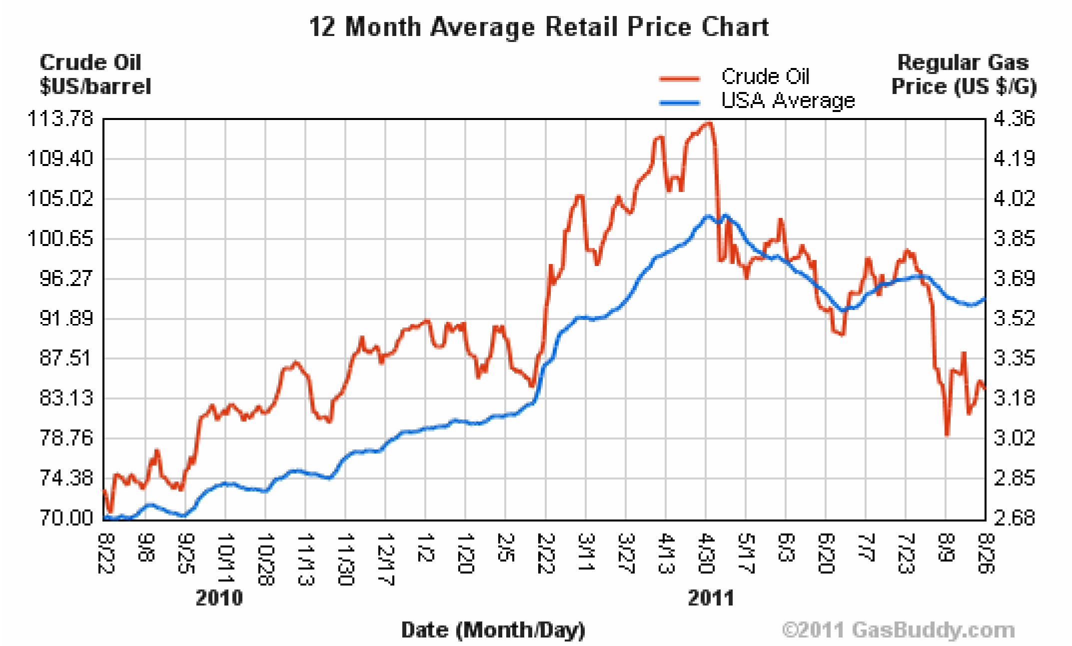
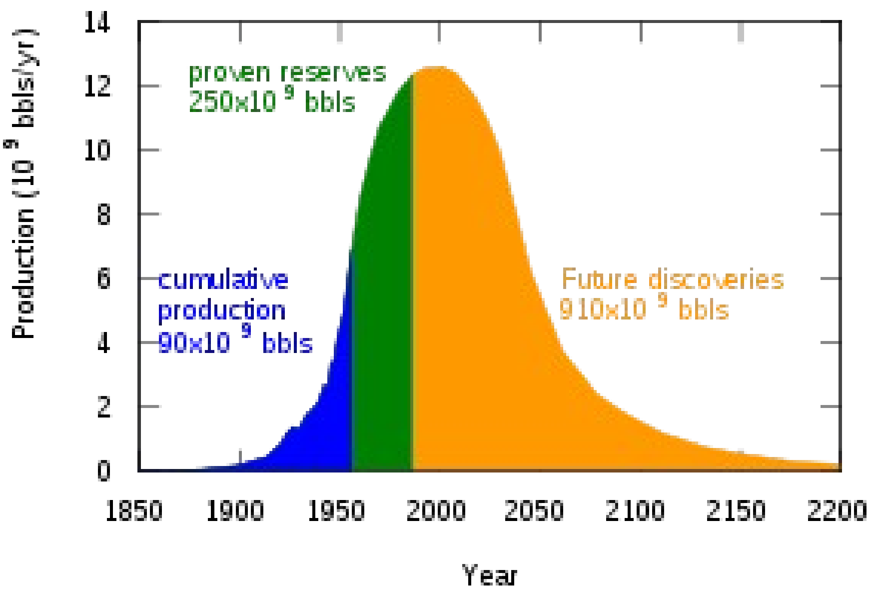
the peak production rate of crude oil around the world and now being 2011 the production rate is starting to reduce and consequently due to supply and demand the price of oil per barrel is now US$97.00.





Also, as you can see with the graph above the only direction the cost of fossil fuels can go is up, of course, the fossil fuel community will try and convert coal into oil because currently we have 700 years in coal reserves around the world, but obviously the production of oil from coal will be completely detrimental to the atmosphere and fortunately the cost of production of Solanol commodities will be at least 50% cheaper. This will protect nature and substantially reduce carbon dioxide emissions in the atmosphere.