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AN INVESTIGATION OF

AVAILABLE DESERT LAND IN THE USA AS AN ENERGY FARM TO REDUCE THE DEPENDENCE ON FOREIGN OIL AS A STRATEGIC PROJECT

Presented by

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1. Introducing the Author

I would like to introduce myself; I am a researcher working as a lecturer in Faculty of Engineering at Mataria, University of Helwan, Cairo, Egypt.

I had started a research programme at 1995 that was concerning about synthesizing bio-fuels from jojoba raw oil. At 2003 there were two types of bio-fuels were synthesized from jojoba raw oil in the laboratory. The first one is novel volatile that is suitable for fueling the spark ignition engines. Such fuel can be termed as jojoba bio-gasoline while, the second one is suitable for fueling the compression ignition engines. That can be termed as jojoba bio-diesel.

Knowing that, the novel jojoba bio-gasoline is not known worldwide.

Noting that, the jojoba bio-gasoline can be used as missiles fuel or fuel additive.

While the bi-product can be termed as waxy cream from synthesizing of the two types of bio-fuels are about 20% of the total amounts of reactants can be used in cosmetic industries and was successfully tested by local and commercial hair care centers.

At 2005 award from the British Council in Egypt to partially contribute to the research of the Ph.D. of the author "Performance, Abnormal Combustion and Emissions of Jojoba Bio-Gasoline and its Blends with Gasoline in Spark Ignition Engine". *Presented by Her Britannic Majesty's Ambassador**, Sir Derek Plumbly**, at the British Embassy, Cairo.*

Thus, I will be thankful if your Excellency directs us to the proper way of investing these novel and promising fuels and other products for mutual benefits.

From that, I would like to explain a more detailed report about the benefits of different products from the jojoba seeds if **Your Excellency** interested in cooperation between us.

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2. Introduction

The cost of producing petroleum oil and gas has risen about 53% the past two years, and the trend is expected to continue this year. Those same costs have climbed 67% since 2000, but most of the increase has come since the end of 2004, according to an analysis by Cambridge Energy Research Associates. If current trends continue, 2007 is shaping up to be a year of further increases.

On the other hand, there are several studies that contradict the idea of bio-fuels. Specialist in genetics and bio-chemistry, Professor Mae-Wan-Ho of the University of Hong-Kong, explains that: "*bio-fuels have been presented and considered erroneously as 'neutral in carbon', as if they did not contribute to the green house effect; when they are burnt, the carbon dioxide that the plants absorb when they develop in the fields, is returned to the atmosphere. Thus the costs of the CO_2 emissions are ignored as also is the emission of energy from fertilizers and pesticides used in the harvests, the use of agricultural machinery, the processing and refining, the transport and the infrastructure for distribution.*"

For the researcher, the extra energy costs and of the carbon emissions are even greater when the bio-fuels are produced in one country and exported to another.

About ethanol, production, Mae-Wan-Ho explains that: *"it was taken into consideration the enormous liberation of carbon from the organic soil provoked by the intensive sugar cane culture which substitutes forests and pasture lands that, if they were regenerated, would save more than seven tons of CO_2 per hectare per year than what bio-ethanol saves."* Besides this, each liter of ethanol produced consumes about four litters of water which represents a risk greater scarcity of natural water sources and aquifers (groundwater).

In U.S. it would be necessary, however to use 121% of the total of agricultural land to substitute the actual demand for fossil fuels in that country.

The expansion of bio-fuels production puts at risk food sovereignty and can deeply aggravate the problem of world hunger. In Mexico, for example, the increase of corn exports to sustain the ethanol market in the U.S. caused an increase of 400% in the price of the product, which is the population's main food source. Also, as another example, the quantity of grains that is required to fill the tank of a pick-up would be sufficient to feed a person for a year.

It will be discerned that among the non-edible oil feedstock, Jojoba and jatropha rank high in terms of productivity. Comparing the productivity figures of jojoba with jatropha, it will be seen that the productivity of both plants is comparable despite a marginal difference of less than 4% in favour of jatropha. However, the very serious effect of jatropha oil is that it is very toxic and tumour promoter as indicated by Haas and Mittlebach. They stated that the nutritional as well as the technical applications of Jatropha are restricted due to plant toxicity. The seed oil contains phorbol esters which are known to cause a large number of biological effects such as tumour promotion and inflammation. Haas and Mittlebach described the work done to reduce the toxicity. However, they concluded that a detoxification of only 50% was achievable. They have also concluded that the total detoxification necessary for nutritional and technical applications of Jatropha could not be achieved. From the foregoing, it will be noticed that the 50% detoxification shall add a sensible cost to the jatropha bio-fuel produced. Nevertheless, the remaining toxicity of 50% is very serious since the bio-fuel resulting from jatropha will be handled by people and burnt in engines. Consequently, tumor promotion, claimed to be cancer from experiments on mice, either by direct contact or through atmospheric air pollution can prove to entail catastrophic consequences to producers and end users. In addition, the fact that Jatropha should be cultivated in isolated areas for safety reasons entails an additional transportation cost to the jatropha bio-fuel produced. On the contrary, jojoba is very safe with its many proven pharmaceutical and cosmetic applications.

3. Transportation Sector

The transportation sector is responsible for more than 22% of all oil products consumed worldwide. The consumption of oil by the transport sector is increasing dramatically compared with the different sectors that are consuming oil such as industrial sector, resident and commercial and electric power as shown in **Figure (1)**.

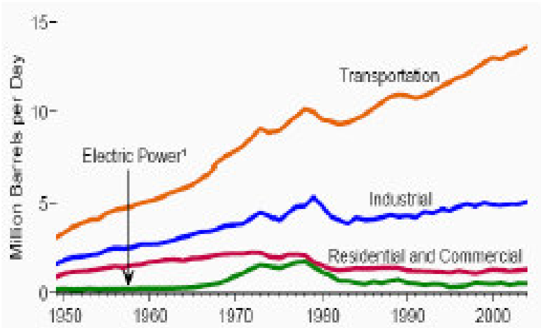

Figure (1) The consumption of oil by different sectors.

Today there are approximately 800 million vehicles on the road worldwide. By some estimates, this number is projected to grow to 1.2 billion vehicles by 2020. Along with this growth in the size of the vehicle fleet, there is also substantial growth in the demand for fuel because people want to go more places. As a result, growth in worldwide oil demand is expected to increase by at least 3 percent per year. With this in mind, if by some miracle it were possible to increase the fuel economy of the entire worldwide fleet of vehicles by 25 percent overnight, it would still take only six or seven years for fuel consumption to return to and surpass current levels.

Consider what is happening in the U.S. today. With the price of gasoline around $2.50 per gallon, the focus on fuel economy of cars and light trucks is receiving ever-increasing scrutiny. Fortunately, the automobile industry is in a very strong position to meet any shifting consumer demands for fuel economical vehicles or vehicles that operate on non-petroleum based fuels.

In addition, new models are increasingly available with highly fuel-efficient technologies like cylinder deactivation, variable valve timing, continuously variable transmissions and more. Ongoing advancements by automobile industry engineers will lead to even greater fuel economy gains. Furthermore, advanced technology and alternative fuel vehicles, including hybrid-electric, E-85 flexible fuel, fuel cell, hydrogen internal combustion and clean diesel vehicles, offer the current and future promise of significant increases in fuel efficiency or petroleum displacement, without sacrificing consumer expectations for safety, performance, comfort and utility. So, American consumers currently are, and should continue to be, well served in terms of the vehicles that provide outstanding fuel economy or alternatives to gasoline.

But as with the world market noted earlier, U.S. gasoline consumption is a function of much more than just vehicle fuel economy. The number of miles driven by Americans has risen dramatically over the last few decades. And the size of the vehicle fleet on American roads has also increased substantially – resulting in increases in U.S. gasoline demand despite impressive improvements in vehicle fuel economy. Any attempts to address concerns about U.S. dependence on oil cannot succeed by focusing only on one component of gasoline demand. Vehicle fuel economy has increased – and it will continue to do so as new and improved technologies find their way into the market – but that factor alone will not help slow the growing demand for gasoline in the U.S. transportation sector.

Since 60% of the fuel consumed by transportation sector is gasoline as shown in **Figure (2)**. However, nowadays only alcohols and ethers are used as an alternative and octane boosters of gasoline while, there is no volatile alternative of gasoline synthesized from vegetable oils.

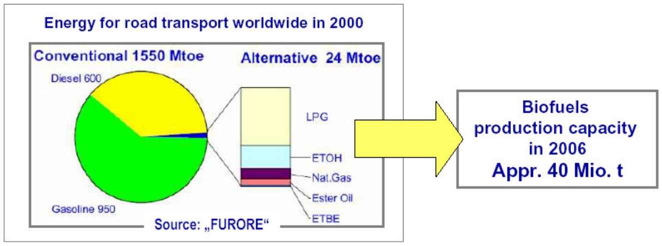

Figure (2) The quantities of fuel used in transportation sector.

4. The Availability of the United States of America for Launching the Strategic Project

4.1 What is current U.S. oil consumption, and how much of that is imported?

In 2004, the United States consumed 20.7 million barrels of petroleum products per day (about 7.5 billion barrels per year). A barrel contains 42 gallons, so total petroleum consumption in 2004 was about 318 billion gallons. Roughly 60% (~190 billion gallons) of petroleum consumed was imported, with about 13% (~40 billion gallons) coming from Persian Gulf countries. The United States primarily imports crude oil but also imports petroleum products including finished motor gasoline, aviation fuel, and fuel oil. The United States imported about 15 billion gallons of finished motor gasoline and gasoline-blending components in 2004.

4.2 How many gallons of gasoline come from a barrel of oil?

Crude oil is a complex mixture of hydrocarbons (chemical compounds containing only hydrogen and carbon atoms) with different physical and chemical properties. Refineries separate crude oil into its hydrocarbon components, which are used to create a variety of refined petroleum products including gasoline, diesel, heating oil, jet fuel, and other products. Due to the lower densities of many petroleum products, a 42-gallon barrel of crude oil can generate roughly 44 gallons of petroleum products. About 20 gallons of gasoline and 7 gallons of diesel are produced from each barrel of crude oil.

4.3 How much desert land is contained in the US?

The United States contains three subtropical desert areas there are **Chihuahuan Desert**, **Sonoran Desert** and **Mojave Desert** with total area of 825,000 km^2 (196.4 million acre) therefore, such desert land is waste in the United States.

4.4 What type of plants is suitable for the US deserts land?

The reasons for choosing the Jojoba plant for plantation in the US beside its safety of use were as follows:

1. The shrub can be grown in virtually un-arable land -typically the deserts available in the US, leaving the fertile lands available for food production.
2. The plant's resistance to salinity of water and land is quite high .It can resist water salinity up to 10000 ppm. Thus well water can be used for watering leaving the rivers water available for food production. It can also grow on sewage treated water.
3. The water needed for plant growth in the first two years of plant age is 300-350 mm; rain water can thus be the main source of water for plant growth. Such watering needs are only one-thirds the needs of clover and one-

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half the needs of cotton. After the initial period of plant growth, the plant should not need surface watering since it can get its water from the ground because the jojoba roots can go deep in the ground to a depth of between 15 and 25 M.

4. The optimum latitude for plant growth is 23 to 35 North which is quite suitable to the US (30^o North).

5. The optimum temperature for plant growth is 20 to 27C; but it could be grown at temperatures up to 50C. However, the plant cannot survive temperatures below -5C. Such temperature requirements are largely compatible with the US weather.

6. The plant resists dryness and bad weather.

7. It needs only small amounts of fertilizers.

8. The shrub resists plant diseases and insects.

9. The plant resists a wide range of PH, e.g. from 5 to 8.

10. The plant lifetime is quite long since it can reach 150 to 200 years.

11. The Jojoba shrub produces seeds as shown in **Figure (3)** after four years of cultivation. Each shrub then produces 600 grams of seeds but the production increases till the plant is ten years old where the production of each shrub is 1.5 kg. Thus each acre (4200 sq. M) which accommodates 900-1000 shrubs can produce about 540-600 kg of seeds when the plant is four years old; but the production increases gradually till it reaches 1350-1500 kg when the plant is ten years old.

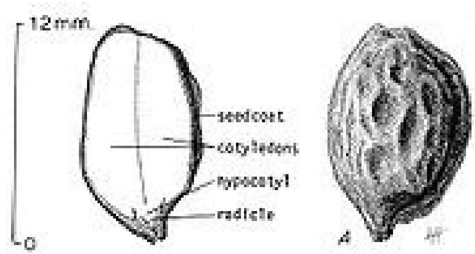

Figure (3) Jojoba Seed.

12. Jojoba seeds contain at least 50% of its weight as oil, so an acre can produce 270-300 kg of oil after four years but will increase to 675-750 kg of oil after 10 years of cultivation.

13. The Jojoba oil produced does not contain any sulpher. Thus, upon combustion, no sulpher oxides are produced and thereby no sulphuric acid is formed; that significantly reduces engine wear. This point has also a very favourable environmental impact since it will reduce the existing environmental damage caused by acid rains. Also the plant is Carbon dioxide neutral which reduces significantly the greenhouse effect.

14. The residue from raw oil extraction can be used as solid fuel in boilers, furnaces and power generating plants.

From the foregoing facts, it can be concluded that vast areas of the US deserts can be used for jojoba cultivation and thereby used as an "energy farm" leaving the fertile land available for food production.

4.5 What are biofuels and how much does the United States produce?

Biofuels are liquid, solid, or gaseous fuels derived from renewable biological sources. Biomass can be burned directly for thermal energy or converted to other high-value energy sources including ethanol, biodiesel, methanol, hydrogen, or methane. Currently, ethanol from corn grain and biodiesel are the only biofuels produced in the United States on an industrial scale.

4.5.1 Ethanol

Most of the 4 billion gallons of ethanol produced in 2005 came from 13% of the U.S. corn crop (1.43 billion bushels of corn grain). This represents a 17% increase from the 3.4 billion gallons produced in 2004. Ethanol is widely used as a fuel additive. The oxygen contained in ethanol improves gasoline combustibility. E10 (10% ethanol and 90% gasoline blend) is available from gas stations all over the United States E85 (85%

ethanol and 15% gasoline blend) is available mainly in corn-producing states. E85 can be used as a substitute for gasoline in vehicles that have been modified to use this biofuel.

A commercial industry based on converting cellulosic biomass to ethanol does not yet exist in the United States; however, the technology is ready to be deployed in pilot or demonstration facilities. Iogen Corporation, a biotechnology company in Canada, operates the largest demonstration facility, which annually produces about one million gallons of cellulosic ethanol from wheat straw.

4.5.2 Biodiesel

Biodiesel is a biologically derived diesel fuel substitute created by chemically reacting vegetable oils or animal fats with alcohol. Most biodiesel in the United States comes from soybean oil or restaurant greases. Biodiesel is readily used by vehicles with diesel engines. In 2005, about 75 million gallons of biodiesel were produced, tripling the 25 million gallons produced in 2004.

4.6 How much ethanol can we get from an acre of bio-energy crops?

Currently, perennial grass and woody crops have an average yield of about 5 dry tons per acre. Ethanol yield from a dry ton of biomass is about 67 gallons, so today we can obtain roughly 335 gallons of ethanol from an acre of bio-energy crops. If average biomass yields of about 10 to 15 dry tons per acre and ethanol yields of 80 to 100 gallons per dry ton of biomass could be achieved, an acre of bio-energy crops could generate 800 to 1500 gallons of ethanol.

4.7 Can one gallon of ethanol displace one gallon of gasoline?

Ethanol has about 70% the energy content of gasoline per unit volume, so for every gallon of gasoline consumed, 1.4 gallons of ethanol would be needed to displace it. Ethanol, however, has a higher octane rating than gasoline — about 113 for ethanol compared to 87 for regular gasoline. The higher the octane rating, the better a fuel is at preventing engine "knocking" caused by inefficient fuel combustion. In other words, the higher-octane fuel provides better performance because it is used more efficiently to generate power rather than heat. If engines were optimized to take advantage of the higher octane rating of ethanol, they could achieve fuel economy more similar to that of gasoline engines.

4.8 Can ethanol be used in colder northern U.S. climates?

Due to ethanol's lower vapor pressure, engine ignition is more difficult in colder weather for vehicles running on fuels with high ethanol content. During winter months, gasoline is added to E85 (85% ethanol and 15% gasoline blend) to make E70 (70% ethanol and 30% gasoline), which has a vapor pressure that improves starting in cold weather. Although current practice is to "blend-down" E85, the cold-start issue is a technologically solvable engineering problem for vehicle manufacturers.

4.9 How much jojoba oil can be produced in the United States' deserts?

According to the available desert land in the US which is 196.4 million acre the productivity from such area is 127.7-147.3 million tons (40.3-46.5 billion gallons) of jojoba raw oil after ten years of cultivation.

4.10 How much novel jojoba bio-gasoline, ethanol and jojoba bio-diesel can we get from an acre of jojoba energy farm?

After ten years of cultivation of jojoba shrubs the productivity of one acre is 650-750 kg of jojoba raw oil and 650-750 kg of biomass so, the total amount of jojoba bio-gasoline and ethanol together is 185-210 gallon per acre. And, the total amount of jojoba bio-diesel is 125-132 gallon per acre.

4.11 Can one gallon of novel jojoba bio-gasoline displace one gallon of gasoline?

Novel Jojoba Bio-Gasoline has about 108.7% the energy content of gasoline per unit volume, so for every gallon of gasoline consumed, 0.97 gallons of bio-gasoline would be needed to displace it. Novel Jojoba Bio-Gasoline, however, has a higher octane rating than gasoline — about 160 for bio-gasoline compared to 87 for regular gasoline. The higher the octane rating, the better a fuel is at preventing engine "knocking" caused by inefficient fuel combustion. In other words, the higher-octane fuel provides better performance because it is used more efficiently to generate power rather than heat. If engines were optimized to take advantage of the higher octane rating of bio-gasoline, they could achieve fuel economy more than to that of gasoline engines.

4.12 Can novel jojoba bio-gasoline be used in colder northern U.S. climates?

Due to novel jojoba bio-gasoline's higher volatility, engine ignition is easier in colder weather for vehicles running on fuels with high bio-gasoline content. Thus there is no need of blending of jojoba bio-gasoline with gasoline to improve the start ability.

4.13 What are the levels of gasoline and diesel consumption?

In 2004, the United States consumed about 140 billion gallons of gasoline, more than any other country. Consumption averages about 380 million gallons of gasoline per day in 2004 and is reaching 400 million gallons per day in 2006. The 3.4 billion gallons of ethanol produced in 2004 represent about 2% of gasoline consumption. The 75 million gallons of biodiesel produced in 2005 represent a tiny fraction of roughly 40 billion gallons of diesel used each year for on-road transportation.

4.14 What are the future levels of gasoline and diesel consumption?

In 2004, the United States consumed about 140 billion gallons of gasoline, more than any other country. Consumption averages about 380 million gallons of gasoline per day in 2004 and is reaching 400 million gallons per day in 2006. The 39.3 billion gallons of novel jojoba bio-gasoline and ethanol which, will be produced in 2019 represent about 22% of gasoline consumption. The 25 billion gallons of biodiesel which will be produced in 2019 represent 62.5% of 40 billion gallons of diesel used in 2005 each year for on-road transportation.

4.15 How can we create an origin of the strategic project?

The following feasibility study assumes that the effective and beneficiary origin of such project can be 10,000 acres which is chosen for jojoba plantation and facilitated with jojoba seeds pressing station, ethanol station, methanol station and a station of treatment of jojoba for producing different types of bio-fuels from jojoba oil. Such stations are based on the double production of the jojoba oil from that amount of cultivated land after 10 years of plantation to give the project the motivation of enlargement by maximizing the income and decreasing the cost which can be estimated to be 20,000,000 USD for the unit of 10,000 acres approximately.

5. Feasibility Study of the Origin of the Strategic Project

5.1 Introduction

Worldwide population growth and industrial expansion has led to a seven-fold increase in petroleum oil consumption in the last 50 years. The **IEA** (International Energy Agency) projects a further 33% increase by 2020, with developing nations accounting for most of the increase. Food production depends on petroleum oil to run farm machinery and to make fertilizers. Most forms of transport depend on petroleum oil. Petroleum oil is the feedstock for products as diverse as plastics, clothing and building materials. No other energy source can match the versatility, convenience and low cost of petroleum oil. The world's endowment of petroleum oil is finite and non-renewable. Therefore production must reach a peak and then decline. About half of the endowment has already been consumed, the half that was easiest to produce. The oil field discovery rate has been declining for 40 years despite extensive exploration with advanced technology. In 2002, the world used

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three times more petroleum oil than was discovered. There is uncertainty about the timing of the peak of oil production predictions that range from 2003 to 2020. There is no uncertainty about the fact that oil production will not meet demand in the near future. When that happens, petroleum oil prices will rise substantially and the global economy will be adversely affected. Thus mass production and mass consumption are believed to be the foundation of civilization and progress until the middle of the twentieth century. Its central assumption that both the resources needed to manufacture products and space for dumping waste were infinite supply is now understood to be an illusion.

5.1.1 Energy crisis

About 60% of all the energy used in the world today comes from burning oil and natural gas. Despite massive exploration program, very few large outfields have been found in recent years. This could well mean that most of the world's oil has been already discovered, and that, in future oil can be run out faster than anticipated. Unfortunately world's energy demand has been growing steadily over the past 50 years, and most experts believe that this trend will continue. No one can exactly tell how much the energy will cost in future and no one can exactly tell how much the energy will be needed in future. The problem about the world's future energy supplies is called the world's energy crisis.

5.1.2 Environmental impact

Fossil Fuels are converted to carbon dioxide during its utilization and thus increase the concentration of greenhouse effect on the atmosphere. The increase in carbon dioxide concentration is considered to be the leading cause of global warming.

5.2 Description of the Origin Project

5.2.1 The main idea of the origin project

This is an economic feasibility study that suggests as first of all purchasing of 10,000 acre of desert land to be an origin of energy farm. Such desert can be planted with jojoba shrubs, which are the main feed stock for producing two types of fuel in addition to bio-mass and cosmetic product. All of these farm and products will be under the name of the company as follows: **NOVEL BIO-GASOLINE NBG INC.**

5.2.2 Back ground of the origin project

The **NOVEL BIO-GASOLINE** research group had started a research programme at 1995, which is described in **Appendix (A)** and concerning about synthesizing of different types of bio-fuels from jojoba raw oil.

Thus, our group is looking for invest that research programme to make a direct contribution facing the energy crisis.

5.2.3 Origin project justifiction

Currently our group gets a great opportunity to gain economic benefits in the provision of satisfactory the demand of the market of the alternative fuels that is declared by several quotations of our products especially from EU, UK, US, India, South Africa and Brazilian companies that up to 6000MT/month of bio-diesel only except the quotations of the bio-gasoline and the waxy cream. Those quotations are according to the high quality of our products (very high cetan No. of the bio-diesel and very high octane No. of the novel bio-gasoline) and due to very active marketing action by our group.

Thus, it is necessary to have a jojoba farm that facilitated with processing laboratory for both control of our feed stock due to instability of the jojoba raw oil market and get the best economic benefits from jojoba seeds due to increase of the number and the quality of the products from one promising vegetable oil.

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5.3 Purposes of the Origin Project

In conceiving the idea, which conducting of this study were considered as consistent with the objectives of the course and development in order to perform in an organized manner. In addition to this vision such idea is also considered as a part of meeting the United States' demand of bio-fuels that are currently exist not only for future expansion of the usage of such alternative fuels but also, can be enhanced and motivated through the provision of our service through the innovation of new method that can be used to produce novel jojoba bio-gasoline, jojoba bio-diesel, waxy cream and bio-mass. Thus, the objectives are:-

5.3.1 General purposes

Analyze the feasibility, technical, economical and financial conditions of the jojoba plantation of a part of the US desert land, which leads to cultivation of the whole desert of the United States of America.

5.3.2 Specific purposees

- Verify the technical feasibility of the novel process and technology.
- Determine the amount of resources needed to implement the investment of the project.
- Demonstrate that there are adequate resources for implementation of the project.

5.4 Economical Definition of the Origin Project

This investment project is based on the idea of purchasing of desert land to be an origin of energy farm, which is included in the whole desert of the USA that not only for avoiding food production land and irrigation water but also, has a positive impact on the environment. That would get immediate effect on the production of bio-fuels in advance because there are already interesting in production and trading of bio-fuels that affecting on the world wide food prices and decreasing the world wide water scarcity. The profitability of this project is broadest indicator of the total investment, based on the expansion of the planted land by jojoba shrub especially in this case where the transformation process of the jojoba raw oil into products is neither expensive nor complicated.

5.5 Policies Definition of the Origin Project

To achieve the goal of the economic growth through the project feasibility, it is necessary to have a set of policies to develop certain elements essential to promote growth. In this sense Novel Bio-Gasoline carried out different policies for the development of this project as the following:

- Develop and implement not only the agricultural productivity of the project but also the marketing of the products through the recent scientific researches to ensure the highest return of the project.
- Develop and the implement the cooperation relations between the project and transportation manufacturer, the manufacturer of power generation units, missiles manufacturer especially in high efficiency power generation engines and cosmetics industry especially in creams of skin and hair care.
- Perform economic analysis of the incurred activities.
- Develop and implement plans of training or updating of both technical and administrative staff in order to maintain the highest degree of skill among the units that work with their professional services.

5.6 Origin Project Execution

Considering the magnitude of the project, the level of prospected investment will be considered as a project for a medium company with a future expansion in the medium term.

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This project will be conducted based on the purchasing of 10,000 acre of desert land as an origin of the energy farm to be planted with jojoba shrubs, of which 2.5 acre are occupied by processing laboratory and administrative infrastructure including the possible future extension, 0.5 acre as a yard. The previous existing main administrative and marketing center will be located outside the purchased land.

5.7 Description of the Products

5.7.1 Novel jojoba bio-gasoline

The main properties of such jojoba bio-gasoline versus normal gasoline are presented in the following table according to scientific research:

Table (1) Properties of jojoba bio-gasoline vs. gasoline.

TEST			RESULTS OF GASOLINE	RESULTS OF BIO-GASOLINE
DENSITY @ 15 C			0.7905	0.809
DENSITY @ 20 C			-	0.8012
API GRAVITY			-	43.3
KINEMATIC VISCSITY @ 40 C		cSt	-	0.9
FLASH POINT (CLOSED CUP)		C	Flash less(less than18)	Flash less(less than18)
CALORIFIC VALUE		MJ/Kg	42.5	46.19
POUR POINT		C	-40	-30
COLOUR ASTM			1.5	0.5
INORGANIC ACIDS		mgKOH/gm	NIL	NIL
OCTANE NO.			90	>100
CORROSION OF COPPER STRIP AT 100C FOR 3HR			1A	1A
WATER CONTENT		%BY MASS	NIL	NIL
CARBON CONTENT		%BY MASS	2	6.19
C% AND RESINAL		%BY WEIGHT	-	86.13
H2 %		%BY WEIGHT	-	13.86
N2 %		%BY WEIGHT		0.002
O2 %		%BY WEIGHT	-	0.001
DISTILLATION	I.B.P	C	64	65
TEMPERATURE OF	10%	VOL	64	65
TEMPERATURE OF	50%	VOL	118	65
TEMPERATURE OF	90%	VOL	167	86
	F.B.P	C	198	86

The chemical structure of that jojoba bio-gasoline according to scientific research using the NMR, IR and MASS spectrum is as shown in **Figure (4)**:

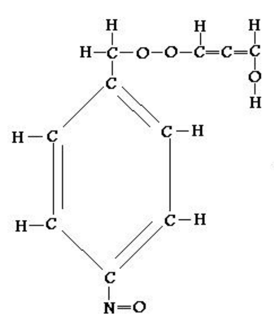

Figure (4) The Chemical Structure of the Jojoba Bio-Gasoline.

5.7.2 Jojoba bio-diesel

The main properties of such jojoba bio-diesel versus gas-oil are presented in **Table (2)** according to scientific research:

Table (2) Properties of jojoba bio-diesel vs. gas oil.

TEST	RESULTS OF GAS OIL	RESULTS OF BIO-DIESL
DENSITY @ 15 C	0.82-0.87	0.8662
DENSITY @ 40 C	0.8143-0.8646	0.8490
DENSITY @ 100 C	-	0.8072
API GRAVITY	41.06-31.14	31.78
KINEMATIC VISCSITY @ 40 C	1.6-7.0	19.2
FLASH POINT (CLOSED CUP) C	Min. 55	61
CALORIFIC VALUE MJ/KG	Min. 44.3	46.99
POUR POINT C	Min. 4.5	4.44
COLOUR ASTM	Max. 4	1
INORGANIC ACIDS MgKOH/GM	NIL	NIL
CETANE NO.	Min. 55	63.5
DIESEL INDEX	Min. 48	47.12
CORROSION OF COPPER STRIP AT 100C for 3hr.	Max. 1	1
WATER CONTENT %BY MASS	Max. 0.15	NIL
CARBON CONTENT %BY MASS of 10% Residual	Max. 0.1	0.05
ASH CONTENT %BY MASS	Max. 0.01	0.002
C% AND RESINAL %BY WEIGHT	87.45	86.98
H2 % %BY WEIGHT	11.3	12.99
N2 % %BY WEIGHT	-	0.005
O2 % %BY WEIGHT	-	0.002
DISTILLATION (Initial Boiling Point) C	182	89
TEMPERATURE OF 10% VOL	231	333
TEMPERATURE OF 20% VOL	252	340
TEMPERATURE OF 30% VOL	262	342
TEMPERATURE OF 40% VOL	-	348
TEMPERATURE OF 50% VOL	302	353
TEMPERATURE OF 60% VOL	-	358
TEMPERATURE OF 70% VOL	-	363
TEMPERATURE OF 80% VOL	-	366
TEMPERATURE OF 90% VOL	311	372
Final Boiling Point C	327	383
LOSS & RESIDUE %VOL	-	1
SODIUM CONTENT mg/Kg	-	4
POTASSIUM CONTENT mg/Kg	-	0.8
CALCIUM CONTENT mg/Kg	-	4
MAGNESIUM CONTENT mg/Kg	-	-

5.7.3 Jojoba waxy cream

The bi-product can be termed as waxy cream from synthesizing of the two types of bio-fuels that can be used in cosmetic industries and was successfully tested by local and commercial skin and hair care centers.

5.7.4 Jojoba cake

The solid residuals from the process of oil extraction from jojoba seeds can be termed as jojoba cake that can be used as a bio-mass in an alcohol production station.

5.8 Financial Information

5.8.1 Type of financing

The Novel Bio-Gasoline group is looking for achieving their goals which are being beneficiary to the USA nation and reduce the dependence on foreign oil by cultivation of the whole US desert land gradually with jojoba plant using such origin project as a start step. Thus, the required amount is 20,000,000.00 USD, which is sufficient for the origin project.

5.8.2 Itemized use of the fund

The Novel bio-gasoline group requires a total of 20,000,000.00$ to purchase desert land and the work will be burst.

Purchased Item	Details	Quantity in USD
Desert Land	10,000 acre	1,820,000
Infrastructure of the Land	Irrigation Pipes, Water Wells and Electricity Lines	3,620,000
Agriculture Equipments	10 Tractors and 2 Power Generators	250,000
Plantation	10,000,000 Nurslings, Expense of the Agriculture Experts and labors	1,820,000
Infrastructure of the Processing Laboratory	Administration Building, Oil Presser, Processing Plant and Alcohol Production Unit from Bio-Mass	8,000,000
Consumables	Fertilizers and Chemical Substances for Processing	2,525
Transportation Vehicles	Two 4x4 vehicles and Four Micro Buses	365,000
Extra Expenses	Expenses of the Administrative, Official Expense, Processing Expert and labors	1,600,000
Total Quantity		20,000,000

5.9 Management Background

We have a good team for covering the main points of business plan as we are one of Egyptian's pioneer status Jojoba plantation group. We know-how knowledge of Jojoba starting from propagation and seedling, cultivation and plantation, harvesting and Oil Extraction. And we will **subsequently own**, operate bio-gasoline, *bio-diesel and waxy cream* refineries; and will trade different products.

5.9.1 Representatives

Fayek Makar

He currently serves as Maintenance Engineer of power generation equipments in the National Company of Landing Services for 4 years ago. Also, Makar is working as a consultant of Mechanical work such as (HVAC, Plumbing, Swimming Bowls, Fire Fighting and irrigation systems) of CRE consulting group for 6 years ago. The work of RCE consulting group is presence in over 4 countries. Makar has mastered the science of abnormal combustion of blend of 5% of different types of bio-gasoline with 95% gasoline in spark ignition engine from the University of Helwan one of the premier Egyptian Universities. Makar is Mechanical Engineer from the same university.

Leandro Sousa

He currently serves as CEO of (In-house consultant for Metroeuropa-Engenharia e Construções S.A. Acting in Angola & Brazil) and he has more than 20 previous experience in logistics, import and export from Africa and Brazil. Leandro has graduated from Plinio Leite University, Rio de Janeiro, Brazil – started 1982, Business Administration one of the premier Brazilian Universities.

Samira Seleem

The CEO of the company who has more than 8 years experiences of polyesters and products from polyester. She worked as the coordinator of NBG and the promoter of the marketing plan. Mrs. Samira was graduated from the Department of Management, Faculty of Commerce, Ain Shams University one of the premier Egyptian Universities.

Scientist – Dr. Osayed Abu-Elyazeed

Dr. Osayed Abu-Elyazeed has more than 15 years of experiences (12 years experiences as researcher in the Mechanical Department, Faculty of Engineering, University of Helwan one of the premier Egyptian Universities. Especially works in investigations, measurements and synthesizing of bio-fuels crops such as Jojoba. He has started his service career in Research and Development in the University of Helwan, Egypt and has developed various synthesizing methods. He is doctorate in performance, abnormal combustion and emissions of spark ignition engines that fueled by different blends of bio-gasoline and gasoline. Dr. Osayed is inventing a new process that leads to produce bio-gasoline, bio-diesel and waxy cream from jojoba raw oil. Dr. Osayed also, is the mechanical consultant of APS Tekenburo B.V.

5.10 Business Plan

5.10.1 Strategic

We hope with IPO that in 12 months we can have a good starting of plantation of 10,000 acre to be able to produce the promising bio-fuels and cosmetics products. Hence, after 5 years of starting of the origin project the enlargement of the cultivated land has to take place in order to be able to cover the whole desert of the US with jojoba shrubs. Then after ten years of starting of the origin project the new stations of alcohol and new stations of jojoba oil treatment have to be built to give the project the ability of more and more enlargement.

5.10.2 Opportunity

The Nation of the United States of America has the opportunity to own a pioneer and innovated group organized well in always increasing business of the bio-fuels especially for missiles as a novel usage of such types of fuels and always developing of the desert land to get positive impact on the environment and the reducing of the dependence on foreign oil.

5.11 Opening the Origin Project

Such project can be opened depending on purchasing of all raw materials for many reasons such as:-

1- Establishing of the products in the market and obtaining the contracts of both buying of the raw materials and equipments and selling of different products.

2- Obtaining the time for building up the Methanol plant, infrastructure of the agricultural land and hence starting of production of methanol.

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5.12 Localization of the Origin Project

Aware that the location of the project requires a strategic point to ensure the economic and social development of it, the location of this will be distributed as follows:

Headquarter: USA (Not Specified)

Branch of project management: South of USA (Technical part-operational)

5.13 Engineering of the Origin Project

Engineering investment project is given as follows:

5.13.1 Methanol plant

The Methanol plant can purchased as turn key technology that plant based on the bi-products from the processing and wastes. The annual production of such plant has to be 15,000 to 20,000 MT.

5.13.2 Infrastructure of the land of plantation

The infrastructure of the desert land can be divided into three types:-

1- Irrigation pipes and nozzles

2- Irrigation wells and pumps

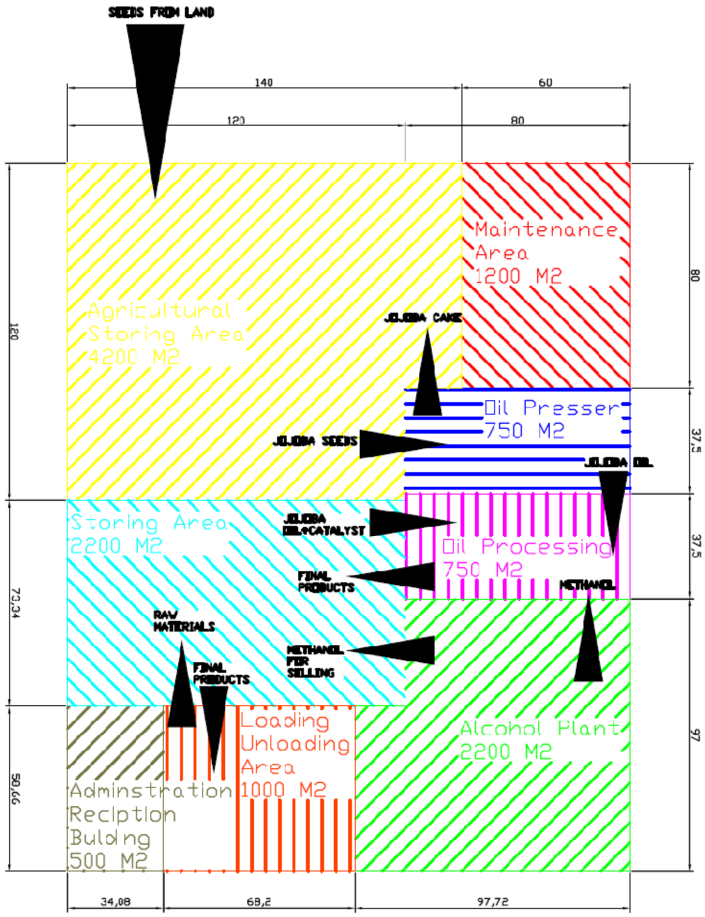
3- Electricity lines to the motors of pumps

5.13.3 Infrastructure of the processing station

The administrative infrastructure of the plant consists of the construction of a local on 3 acres (12600 M^2), this infrastructure will be divided into 8 areas, which are classified as follows:-

ADMINISTRATIVE AREA (RECEPTION)	(500 M^2)
OIL PRESSER AREA	(750 M^2)
OIL PROCESSING AREA	(750 M^2)
ALCOHOL UNIT AREA	(2200 M^2)
LOADING AND UNLOADING AREA	(1000 M^2)
MAINTENANCE AREA	(1200 M^2)
STORAGE AREA	(2200 M^2)
AGRICULTURAL STORAGE AREA	(4200 M2)

5.13.4 Flow diagram of the processing and operation area



5.13.5 Availability of raw materials

This is important in determining the size of the project, as this factor depends on the timely and adequate supply of the product.

At the very beginning of the project most of the raw materials have to be purchased. However, the amount of Methanol that is needed for processing can be got from the methanol plant which is a part of the project. Also, the catalysts can be purchased. But, the jojoba oil is purchased as the following:

1- 20 MT/Month of jojoba oil in the first quarter (3 Months).

2- 40 MT/Month of jojoba oil in the second quarter (3 Months).

3- 80 MT/Month of jojoba oil in the third quarter (3 Months).

4- 160 MT/Month of jojoba oil in the fourth quarter (3 Months).

5- 320 MT/Month of jojoba oil in the fifth quarter (3 Months).

6- 640 MT/Month of jojoba oil in the sixth quarter (3 Months) it will be constant for the next quarters up to five years.

7- The amount of raw jojoba oil will be increased annually by adding the produced oil from the cultivated land.

5.14 Economical and Financial Study

Distribution of the assets as follows:

FIXED AND VARIABLE ASSETS

FIXED ASSETS

	QUANTITY	COSTS (USD)
DESERT LAND	10,000 Acre	1820000
INFRASTRUCTURE OFTHE LAND	Pipes, Nozzles, Wells and Pumps	3620000
COSTS OF NURSLINGS	10,000,000 Nursling	1000000
BULDINGS	Reception and Laboratories	2000000
AGRICULTURAL EQUIEPMENTS	Tractors, Generators, Harvesting, Diggers and Spraying Machines	250000
METHANOL PLANT	Turn Key Plant by Third Party	4000000
PROCESSING PLANT	Oil Presser, Processing Plant	2000000
TRANSPORTATION VEHICLES	(2) Trailers, (4) Microbus and (2) 4x4 vehicles	1200000
STARTING EXTRA EXPENSES	Documentations, Licences and Lawyers	600000
10% RESERVE FOR EMERGENCY		1649000
TOTAL		18139000

VARIABLE ASSETS FOR LIFE CYCLE OF 3 MONTHS

RAW MATERIALS	120000
CONSULTANT FEES	150000
SALARY EXPENCIES	152400
ENERGY (FUEL-ELECTRICITY)	18000
MAINTAINANCE	3000
MARKETING EXPENCIES	2400
TRANSPORTATION	15000
BULDING RENT	30000
OFFICIAL EXPENCIES	12000
ACCOUNTING AND LEGAL	15000
INSURANCE	18000
EXTRA EXPENCIES	20000
10% RESERVE FOR EMERGENCY	39080
TOTAL	576880
TOTAL ASEEDS	18715880

Annual depreciation of the fixed assets as follows:

YEARLY DEPERCIATIONS OF FIXED ASSETS

PERCENTAGE OF DEPRCIATION	
5% OF DESERT LAND	91000
10% OF INFRASTRUCTURE OFTHE LAND	362000
10% OF COSTS OF NURSLINGS	100000
5% OF BULDINGS	100000
20% OF AGRICULTURAL EQUIEPMENTS	50000
10% OF METHANOL PLANT	400000
10% OF PROCESSING PLANT	200000
10% OF TRANSPORTATION VEHICLES	120000
10% OF STARTING EXTRA EXPENSES	60000
10% OF RESERVE FOR EMERGENCY	164900
TOTAL DEPERCIATION	1647900

6. Cash Flow of the Origin of the Strategic Project

Annual profit and loss projection of the twelve months of the first year as follows:

Twelve Month Profit and Loss Projection 1st year
CNC

Fiscal Year Begins July 2009 jul-09

IND %	Jul-09	% B/A	Aug-09	%	Sep-09	%	Oct-09	%	Nov-09	%	Dec-09	%	Jan-10	%	Feb-10
Revenue (Sales)															
Bio-Diese	4.500	1,0	4.500	1,0	4.500	1,0	18.000	3,2	18.000	3,2	18.000	3,2	36.000	7,6	36.000
Bio-Gasoline	5.625	1,2	5.625	1,2	5.625	1,2	22.500	4,0	22.500	4,0	22.500	4,0	45.000	9,5	45.000
Waxy Cream	6.000	1,3	6.000	1,3	6.000	1,3	24.000	4,3	24.000	4,3	24.000	4,3	48.000	10,2	48.000
Gylecrines	100	0,0	100	0,0	100	0,0	800	0,1	800	0,1	800	0,1	1.600	0,3	1.600
Methanol	455.100	96,6	455.100	96,6	455.100	96,5	447.700	73,4	447.700	70,4	447.700	70,4	432.000	91,8	432.000
Total Revenue (Sales)	471.325	100,0	471.325	100,0	471.325	100,0	513.000	100,0	513.000	100,0	513.000	100,0	563.500	100,0	563.500
Cost of Sales															
Production Wages	10.800	45,0	10.800	45,0	10.800	45,0	10.800	37,2	10.800	37,2	10.800	37,2	10.800	26,3	10.800
Catalyst & Ingredient	7.000	29,2	7.000	29,2	7.000	29,2	12.000	41,4	12.000	41,4	12.000	41,4	24.000	58,5	24.000
Transportation	5.000	20,8	5.000	20,8	5.000	20,8	5.000	17,2	5.000	17,2	5.000	17,2	5.000	12,2	5.000
Product Delivery Cost	1.200	5,0	1.200	5,0	1.200	5,0	1.200	4,1	1.200	4,1	1.200	4,1	1.200	2,9	1.200
Total Cost of Sales	24.000	100,0	24.000	100,0	24.000	100,0	29.000	100,0	29.000	100,0	29.000	100,0	41.000	100,0	41.000
Gross Profit	447.325	94,9	447.325	94,9	447.325	94,9	484.000	94,3	484.000	94,3	484.000	94,3	522.500	92,7	522.500
Expenses															
Salary expenses	40.000	17,0	40.000	17,0	40.000	17,0	40.000	17,0	40.000	17,0	40.000	17,0	40.000	17,0	40.000
Site Maintainance &	1.000	0,4	1.000	0,4	1.000	0,4	1.000	0,4	1.000	0,4	1.000	0,4	1.000	0,4	1.000
Utilities ($200/MT)/mth	26.000	11,0	26.000	11,0	26.000	11,0	26.000	11,0	26.000	11,0	26.000	11,0	26.000	11,0	26.000
Stationary & Supplies	1.000	0,4	1.000	0,4	1.000	0,4	1.000	0,4	1.000	0,4	1.000	0,4	1.000	0,4	1.000
Copy and Printing	1.000	0,4	1.000	0,4	1.000	0,4	1.000	0,4	1.000	0,4	1.000	0,4	1.000	0,4	1.000
Telephone & Internet	2.000	0,8	2.000	0,8	2.000	0,8	2.000	0,8	2.000	0,8	2.000	0,8	2.000	0,8	2.000
Insurance	6.000	2,5	6.000	2,5	6.000	2,5	6.000	2,5	6.000	2,5	6.000	2,5	6.000	2,5	6.000
Accounting and legal	5.000	2,1	5.000	2,1	5.000	2,1	5.000	2,1	5.000	2,1	5.000	2,1	5.000	2,1	5.000
Rent	10.000	4,2	10.000	4,2	10.000	4,2	10.000	4,2	10.000	4,2	10.000	4,2	10.000	4,2	10.000
Cleaning	1.000	0,4	1.000	0,4	1.000	0,4	1.000	0,4	1.000	0,4	1.000	0,4	1.000	0,4	1.000
MPF	5.000	2,1	5.000	2,1	5.000	2,1	5.000	2,1	5.000	2,1	5.000	2,1	5.000	2,1	5.000
		0,0		0,0		0,0		0,0		0,0		0,0		0,0	
		0,0		0,0		0,0		0,0		0,0		0,0		0,0	
Interest		0,0		0,0		0,0		0,0		0,0		0,0		0,0	
Depreciaton	137.325	29,1	137.325	29,1	137.325	29,1	137.325	29,1	137.325	29,1	137.325	29,1	137.325	29,1	137.325
Tax Free		0,0		0,0		0,0		0,0		0,0		0,0		0,0	
Other expenses (specify)		0,0		0,0		0,0		0,0		0,0		0,0		0,0	
Other expenses (specify)		0,0		0,0		0,0		0,0		0,0		0,0		0,0	
Misc. (unspecified)		0,0		0,0		0,0		0,0		0,0		0,0		0,0	
Total Expenses	235.325	49,9	235.325	49,9	235.325	49,9	235.325	49,9	235.325	49,9	235.325	49,9	235.325	49,9	235.325
Net Profit	212.000	45,0	212.000	45,0	212.000	45,0	248.675	48,5	248.675	48,5	248.675	48,5	287.175	51,0	287.175

	%	Mar-10	%	Apr-10	%	May-10	%	Jun-10	%	YEARLY	%
Revenue (Sales)											
Bio-Diese	7,6	36.000	7,6	7.200	1,5	7.200	1,5	7.200	1,5	197.100	3,1
Bio-Gasoline	9,5	45.000	9,5	90.000	19,1	90.000	19,1	90.000	19,1	489.375	7,6
Waxy Cream	10,2	48.000	10,2	96.000	20,4	96.000	20,4	96.000	20,4	522.000	8,1
Gylecrines	0,3	1.600	0,3	3.200	0,7	3.200	0,7	3.200	0,7	17.100	0,3
Methanol	91,8	432.900	91,8	403.300	85,6	403.300	85,6	403.300	85,6	5.217.000	81,0
Total Revenue (Sales)	100,0	563.500	100,0	599.700	100,0	599.700	100,0	599.700	100,0	6.442.575	100,0
Cost of Sales											
Production Wages	26,3	10.800	26,3	10.800	16,6	10.800	16,6	10.800	16,6	129.600	27,2
Catalyst & Ingredient	58,5	24.000	58,5	48.000	73,8	48.000	73,8	48.000	73,8	273.000	57,2
Transportation	12,2	5.000	12,2	5.000	7,7	5.000	7,7	5.000	7,7	60.000	12,6
Product Delivery Cost	2,9	1.200	2,9	1.200	1,8	1.200	1,8	1.200	1,8	14.400	3,0
Total Cost of Sales	100,0	41.000	100,0	65.000	100,0	65.000	100,0	65.000	100,0	477.000	100,0
Gross Profit	92,7	522.500	92,7	534.700	89,2	534.700	89,2	534.700	89,2	5.965.575	92,6
Expenses											
Salary expenses	17,0	40.000	17,0	40.000	17,0	40.000	17,0	40.000	17,0	480.000	7,5
Site Maintainance &	0,4	1.000	0,4	1.000	0,4	1.000	0,4	1.000	0,4	12.000	0,2
Utilities ($200/MT)/mth	11,0	26.000	11,0	26.000	11,0	26.000	11,0	26.000	11,0	312.000	4,8
Stationary & Supplies	0,4	1.000	0,4	1.000	0,4	1.000	0,4	1.000	0,4	12.000	0,2
Copy and Printing	0,4	1.000	0,4	1.000	0,4	1.000	0,4	1.000	0,4	12.000	0,2
Telephone & Internet	0,8	2.000	0,8	2.000	0,8	2.000	0,8	2.000	0,8	24.000	0,4
Insurance	2,5	6.000	2,5	6.000	2,5	6.000	2,5	6.000	2,5	72.000	1,1
Accounting and legal	2,1	5.000	2,1	5.000	2,1	5.000	2,1	5.000	2,1	60.000	0,9
Rent	4,2	10.000	4,2	10.000	4,2	10.000	4,2	10.000	4,2	120.000	1,9
Cleaning	0,4	1.000	0,4	1.000	0,4	1.000	0,4	1.000	0,4	12.000	0,2
MPF	2,1	5.000	2,1	5.000	2,1	5.000	2,1	5.000	2,1	60.000	0,9
	0,0		0,0		0,0		0,0		0,0		0,0
	0,0		0,0		0,0		0,0		0,0		0,0
Interest	0,0		0,0		0,0		0,0		0,0		0,0
Depreciaton	29,1	137.325	29,1	137.325	29,1	137.325	29,1	137.325	29,1	1.647.900	25,6
Tax Free	0,0		0,0		0,0		0,0		0,0		0,0
Other expenses (specify)	0,0		0,0		0,0		0,0		0,0		0,0
Other expenses (specify)	0,0		0,0		0,0		0,0		0,0		0,0
Misc. (unspecified)	0,0		0,0		0,0		0,0		0,0		0,0
Total Expenses	49,9	235.325	49,9	235.325	49,9	235.325	49,9	235.325	49,9	2.823.900	43,8
Net Profit	51,0	287.175	51,0	299.375	49,9	299.375	49,9	299.375	49,9	3.141.675	48,8

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Annual profit and loss projection of the twelve months of the second year as follows:

Twelve Month Profit and Loss Projection 2nd Year
CNC

Fiscal Year Begins July 2010 jul-10

	IND. %	Jul-10	% B/A	Aug-10	%	Sep-10	%	Oct-10	%	Nov-10	%	Dec-10	%	Jan-11	%	Feb-11
Revenue (Sales)																
Bio-Diesel		144 000	16,6	144.000	16,6	144.000	16,6	288.000	22,7	288.000	22,7	288.000	22,7	288.000	22,7	288.000
Bio-Gasoline		180 000	20,8	180.000	20,8	180.000	20,8	360.000	28,3	360.000	28,3	360.000	28,3	360.000	28,3	360.000
Waxy Cream		192 000	22,2	192.000	22,2	192.000	22,2	384.000	30,2	384.000	30,2	384.000	30,2	384.000	30,2	384.000
Gylecrines		6 400	0,7	6.400	0,7	6.400	0,7	12.800	1,0	12.800	1,0	12.800	1,0	12.800	1,0	12.800
Methanol		344 100	39,7	344.100	39,7	344.100	39,7	225.700	17,8	225.700	17,8	225.700	17,8	225.700	17,8	225.700
Total Revenue (Sales)		866 500	100,0	866.500	100,0	866.500	100,0	1.270.500	100,0	1.270.500	100,0	1.270.500	100,0	1.270.500	100,0	1.270.500
Cost of Sales																
Production Wages		10 800	18,9	10.800	18,9	10.800	18,9	10.800	11,1	10.800	11,1	10.800	11,1	10.800	11,1	10.800
Catayst & Ingredient		40 000	70,2	40.000	70,2	40.000	70,2	80.000	82,5	80.000	82,5	80.000	82,5	80.000	82,5	80.000
Transportation		5 000	8,8	5.000	8,8	5.000	8,8	5.000	5,2	5.000	5,2	5.000	5,2	5.000	5,2	5.000
Product Delivery Cost		1 200	2,1	1.200	2,1	1.200	2,1	1.200	1,2	1.200	1,2	1.200	1,2	1.200	1,2	1.200
Total Cost of Sales		57 000	100,0	57.000	100,0	57.000	100,0	97.000	100,0	97.000	100,0	97.000	100,0	97.000	100,0	97.000
Gross Profit		809 500	93,4	809.500	93,4	809.500	93,4	1.173.500	92,4	1.173.500	92,4	1.173.500	92,4	1.173.500	92,4	1.173.500
Expenses																
Salary expenses		40 000	17,0	40.000	17,0	40.000	17,0	40.000	17,0	40.000	17,0	40.000	17,0	40.000	17,0	40.000
Site Maintainance &		1 000	0,4	1.000	0,4	1.000	0,4	1.000	0,4	1.000	0,4	1.000	0,4	1.000	0,4	1.000
Utilities ($200/MT)/mth		26 000	11,0	26.000	11,0	26.000	11,0	26.000	11,0	26.000	11,0	26.000	11,0	26.000	11,0	26.000
Stationary & Supplies		1 000	0,4	1.000	0,4	1.000	0,4	1.000	0,4	1.000	0,4	1.000	0,4	1.000	0,4	1.000
Copy and Printing		1 000	0,4	1.000	0,4	1.000	0,4	1.000	0,4	1.000	0,4	1.000	0,4	1.000	0,4	1.000
Telephone & Internet		2 000	0,8	2.000	0,8	2.000	0,8	2.000	0,8	2.000	0,8	2.000	0,8	2.000	0,8	2.000
Insurance		6 000	2,5	6.000	2,5	6.000	2,5	6.000	2,5	6.000	2,5	6.000	2,5	6.000	2,5	6.000
Accounting and legal		5 000	2,1	5.000	2,1	5.000	2,1	5.000	2,1	5.000	2,1	5.000	2,1	5.000	2,1	5.000
Rent		10 000	4,2	10.000	4,2	10.000	4,2	10.000	4,2	10.000	4,2	10.000	4,2	10.000	4,2	10.000
Cleaning		1 000	0,4	1.000	0,4	1.000	0,4	1.000	0,4	1.000	0,4	1.000	0,4	1.000	0,4	1.000
MPT		5 000	2,1	5.000	2,1	5.000	2,1	5.000	2,1	5.000	2,1	5.000	2,1	5.000	2,1	5.000
			0,0		0,0		0,0		0,0		0,0		0,0		0,0	
			0,0		0,0		0,0		0,0		0,0		0,0		0,0	
Interest			0,0		0,0		0,0		0,0		0,0		0,0		0,0	
Depreciation		137 325	0,0	137.325	15,8	137.325	15,8	137.325	15,8	137.325	15,8	137.325	15,8	137.325	15,8	137.325
Tax Free			0,0		0,0		0,0		0,0		0,0		0,0		0,0	
Other expenses (specify)			0,0		0,0		0,0		0,0		0,0		0,0		0,0	
Other expenses (specify)			0,0		0,0		0,0		0,0		0,0		0,0		0,0	
Misc (unspecified)			0,0		0,0		0,0		0,0		0,0		0,0		0,0	
Total Expenses		235 325	27,2	235.325	27,2	235.325	27,2	235.325	27,2	235.325	27,2	235.325	27,2	235.325	27,2	235.325
Net Profit		574 175	66,3	574.175	66,3	574.175	66,3	938.175	73,8	938.175	73,8	938.175	73,8	938.175	73,8	938.175

	%	Mar-11	%	Apr-11	%	May-11	%	Jun-11	%	YEARLY	%
Revenue (Sales)											
Bio-Diesel	22,7	288.000	22,7	288.000	22,7	288.000	22,7	288.000	22,7	3.024 000	21,5
Bio-Gasoline	28,3	360.000	28,3	360.000	28,3	360.000	28,3	360.000	28,3	3.780 000	26,9
Waxy Cream	30,2	384.000	30,2	384.000	30,2	384.000	30,2	384.000	30,2	4.032 000	28,7
Gylecrines	1,0	12.800	1,0	12.800	1,0	12.800	1,0	12.800	1,0	134 400	1,0
Methanol	17,8	225.700	17,8	225.700	17,8	225.700	17,8	225.700	17,8	3.063 600	21,8
Total Revenue (Sales)	100,0	1.270.500	100,0	1.270.500	100,0	1.270.500	100,0	1.270.500	100,0	14.034 000	100,0
Cost of Sales											
Production Wages	11,1	10.800	11,1	10.800	11,1	10.800	11,1	10.800	11,1	129 600	12,4
Catayst & Ingredient	82,5	80.000	82,5	80.000	82,5	80.000	82,5	80.000	82,5	840 000	80,5
Transportation	5,2	5.000	5,2	5.000	5,2	5.000	5,2	5.000	5,2	60 000	5,7
Product Delivery Cost	1,2	1.200	1,2	1.200	1,2	1.200	1,2	1.200	1,2	14 400	1,4
Total Cost of Sales	100,0	97.000	100,0	97.000	100,0	97.000	100,0	97.000	100,0	1.044 000	100,0
Gross Profit	92,4	1.173.500	92,4	1.173.500	92,4	1.173.500	92,4	1.173.500	92,4	12.990 000	92,6
Expenses											
Salary expenses	17,0	40.000	17,0	40.000	17,0	40.000	17,0	40.000	17,0	480 000	3,4
Site Maintainance &	0,4	1.000	0,4	1.000	0,4	1.000	0,4	1.000	0,4	12 000	0,1
Utilities ($200/MT)/mth	11,0	26.000	11,0	26.000	11,0	26.000	11,0	26.000	11,0	312 000	2,2
Stationary & Supplies	0,4	1.000	0,4	1.000	0,4	1.000	0,4	1.000	0,4	12 000	0,1
Copy and Printing	0,4	1.000	0,4	1.000	0,4	1.000	0,4	1.000	0,4	12 000	0,1
Telephone & Internet	0,8	2.000	0,8	2.000	0,8	2.000	0,8	2.000	0,8	24 000	0,2
Insurance	2,5	6.000	2,5	6.000	2,5	6.000	2,5	6.000	2,5	72 000	0,5
Accounting and legal	2,1	5.000	2,1	5.000	2,1	5.000	2,1	5.000	2,1	60 000	0,4
Rent	4,2	10.000	4,2	10.000	4,2	10.000	4,2	10.000	4,2	120 000	0,9
Cleaning	0,4	1.000	0,4	1.000	0,4	1.000	0,4	1.000	0,4	12 000	0,1
MPT	2,1	5.000	2,1	5.000	2,1	5.000	2,1	5.000	2,1	60 000	0,4
	0,0		0,0		0,0		0,0		0,0		0,0
	0,0		0,0		0,0		0,0		0,0		0,0
Interest	0,0		0,0		0,0		0,0		0,0		0,0
Depreciation	15,8	137.325	15,8	137.325	15,8	137.325	15,8	137.325	15,8	1.647 900	11,7
Tax Free	0,0		0,0		0,0		0,0		0,0		0,0
Other expenses (specify)	0,0		0,0		0,0		0,0		0,0		0,0
Other expenses (specify)	0,0		0,0		0,0		0,0		0,0		0,0
Misc (unspecified)	0,0		0,0		0,0		0,0		0,0		0,0
Total Expenses	27,2	235.325	27,2	235.325	27,2	235.325	27,2	235.325	27,2	2.823 900	20,1
Net Profit	73,8	938.175	73,8	938.175	73,8	938.175	73,8	938.175	73,8	10.166 100	72,4

Annual profit and loss projection of the twelve months of the third year as follows:

Twelve Month Profit and Loss Projection 3rd year
CNC

Fiscal Year Begins July 2011 jul-11

	IND %	Jul-11	% BA	Aug 11	%	Sep-11	%	Oct-11	%	Nov 11	%	Dec-11	%	Jan-12	%	Feb-12	%
Revenue (Sales)																	
Bio-Diesel		288.000	22,7	288.000	22,7	288.000	22,7	288.000	22,7	288.000	22,7	288.000	22,7	288.000	22,7	288.000	22,7
Bio-Gasoline		360.000	28,3	360.000	28,3	360.000	28,3	360.000	28,3	360.000	28,3	360.000	28,3	360.000	28,3	360.000	28,3
Waxy Cream		384.000	30,2	384.000	30,2	384.000	30,2	384.000	30,2	384.000	30,2	384.000	30,2	384.000	30,2	384.000	30,2
Glycerines		12.800	1,0	12.800	1,0	12.800	1,0	12.800	1,0	12.800	1,0	12.800	1,0	12.800	1,0	12.800	1,0
Methanol		225.700	17,8	225.700	17,8	225.700	17,8	225.700	17,8	225.700	17,8	225.700	17,8	225.700	17,8	225.700	17,8
Total Revenue (Sales)		1.270.500	100,0	1.270.500	100,0	1.270.500	100,0	1.270.500	100,0	1.270.500	100,0	1.270.500	100,0	1.270.500	100,0	1.270.500	100,0
Cost of Sales																	
Production Wages		10.800	11,1	10.800	11,1	10.800	11,1	10.800	11,1	10.800	11,1	10.800	11,1	10.800	11,1	10.800	11,1
Catalyst & Ingredient		80.000	82,5	80.000	82,5	80.000	82,5	80.000	82,5	80.000	82,5	80.000	82,5	80.000	82,5	80.000	82,5
Transportation		5.000	5,2	5.000	5,2	5.000	5,2	5.000	5,2	5.000	5,2	5.000	5,2	5.000	5,2	5.000	5,2
Product Delivery Cost		1.200	1,2	1.200	1,2	1.200	1,2	1.200	1,2	1.200	1,2	1.200	1,2	1.200	1,2	1.200	1,2
Total Cost of Sales		97.000	100,0	97.000	100,0	97.000	100,0	97.000	100,0	97.000	100,0	97.000	100,0	97.000	100,0	97.000	100,0
Gross Profit		1.173.500	92,4	1.173.500	92,4	1.173.500	92,4	1.173.500	92,4	1.173.500	92,4	1.173.500	92,4	1.173.500	92,4	1.173.500	92,4
Expenses																	
Salary expenses		40.000	17,0	40.000	17,0	40.000	17,0	40.000	17,0	40.000	17,0	40.000	17,0	40.000	17,0	40.000	17,0
Site Maintainance &		1.000	0,4	1.000	0,4	1.000	0,4	1.000	0,4	1.000	0,4	1.000	0,4	1.000	0,4	1.000	0,4
Utilities ($200/MT/mth		26.000	11,0	26.000	11,0	26.000	11,0	26.000	11,0	26.000	11,0	26.000	11,0	26.000	11,0	26.000	11,0
Stationary & Supplies		1.000	0,4	1.000	0,4	1.000	0,4	1.000	0,4	1.000	0,4	1.000	0,4	1.000	0,4	1.000	0,4
Copy and Printing		1.000	0,4	1.000	0,4	1.000	0,4	1.000	0,4	1.000	0,4	1.000	0,4	1.000	0,4	1.000	0,4
Telephone & Internet		2.000	0,8	2.000	0,8	2.000	0,8	2.000	0,8	2.000	0,8	2.000	0,8	2.000	0,8	2.000	0,8
Insurance		6.000	2,5	6.000	2,5	6.000	2,5	6.000	2,5	6.000	2,5	6.000	2,5	6.000	2,5	6.000	2,5
Accounting and legal		5.000	2,1	5.000	2,1	5.000	2,1	5.000	2,1	5.000	2,1	5.000	2,1	5.000	2,1	5.000	2,1
Rent		10.000	4,2	10.000	4,2	10.000	4,2	10.000	4,2	10.000	4,2	10.000	4,2	10.000	4,2	10.000	4,2
Cleaning		1.000	0,4	1.000	0,4	1.000	0,4	1.000	0,4	1.000	0,4	1.000	0,4	1.000	0,4	1.000	0,4
MPF		5.000	2,1	5.000	2,1	5.000	2,1	5.000	2,1	5.000	2,1	5.000	2,1	5.000	2,1	5.000	2,1
			0,0		0,0		0,0		0,0		0,0		0,0		0,0		0,0
			0,0		0,0		0,0		0,0		0,0		0,0		0,0		0,0
Interest			0,0		0,0		0,0		0,0		0,0		0,0		0,0		0,0
Depreciation		137.325	10,8	137.325	10,8	137.325	10,8	137.325	10,8	137.325	10,8	137.325	10,8	137.325	10,8	137.325	10,8
Tax Free			0,0		0,0		0,0		0,0		0,0		0,0		0,0		0,0
Other expenses (specify)			0,0		0,0		0,0		0,0		0,0		0,0		0,0		0,0
Other expenses (specify)			0,0		0,0		0,0		0,0		0,0		0,0		0,0		0,0
Misc. (unspecified)			0,0		0,0		0,0		0,0		0,0		0,0		0,0		0,0
Total Expenses		235.325	18,5	235.325	18,5	235.325	18,5	235.325	18,5	235.325	18,5	235.325	18,5	235.325	18,5	235.325	18,5
Net Profit		938.175	73,8	938.175	73,8	938.175	73,8	938.175	73,8	938.175	73,8	938.175	73,8	938.175	73,8	938.175	73,8

	Mar-12	%	Apr-12	%	May 12	%	Jun-12	%	YEAR LY	%
Revenue (Sales)										
Bio-Diesel	288.000	22,7	288.000	22,7	288.000	22,7	288.000	22,7	3.456.000	22,7
Bio-Gasoline	360.000	28,3	360.000	28,3	360.000	28,3	360.000	28,3	4.320.000	28,3
Waxy Cream	384.000	30,2	384.000	30,2	384.000	30,2	384.000	30,2	4.608.000	30,2
Glycerines	12.800	1,0	12.800	1,0	12.800	1,0	12.800	1,0	153.600	1,0
Methanol	225.700	17,8	225.700	17,8	225.700	17,8	225.700	17,8	2.708.400	17,8
Total Revenue (Sales)	1.270.500	100,0	1.270.500	100,0	1.270.500	100,0	1.270.500	100,0	15.246.000	100,0
Cost of Sales										
Production Wages	10.800	11,1	10.800	11,1	10.800	11,1	10.800	11,1	129.600	11,1
Catalyst & Ingredient	80.000	82,5	80.000	82,5	80.000	82,5	80.000	82,5	960.000	82,5
Transportation	5.000	5,2	5.000	5,2	5.000	5,2	5.000	5,2	60.000	5,2
Product Delivery Cost	1.200	1,2	1.200	1,2	1.200	1,2	1.200	1,2	14.400	1,2
Total Cost of Sales	97.000	100,0	97.000	100,0	97.000	100,0	97.000	100,0	1.164.000	100,0
Gross Profit	1.173.500	92,4	1.173.500	92,4	1.173.500	92,4	1.173.500	92,4	14.082.000	92,4
Expenses										
Salary expenses	40.000	17,0	40.000	17,0	40.000	17,0	40.000	17,0	480.000	3,1
Site Maintainance &	1.000	0,4	1.000	0,4	1.000	0,4	1.000	0,4	12.000	0,1
Utilities ($200/MT/mth	26.000	11,0	26.000	11,0	26.000	11,0	26.000	11,0	312.000	2,0
Stationary & Supplies	1.000	0,4	1.000	0,4	1.000	0,4	1.000	0,4	12.000	0,1
Copy and Printing	1.000	0,4	1.000	0,4	1.000	0,4	1.000	0,4	12.000	0,1
Telephone & Internet	2.000	0,8	2.000	0,8	2.000	0,8	2.000	0,8	24.000	0,2
Insurance	6.000	2,5	6.000	2,5	6.000	2,5	6.000	2,5	72.000	0,5
Accounting and legal	5.000	2,1	5.000	2,1	5.000	2,1	5.000	2,1	60.000	0,4
Rent	10.000	4,2	10.000	4,2	10.000	4,2	10.000	4,2	120.000	0,8
Cleaning	1.000	0,4	1.000	0,4	1.000	0,4	1.000	0,4	12.000	0,1
MPF	5.000	2,1	5.000	2,1	5.000	2,1	5.000	2,1	60.000	0,4
		0,0		0,0		0,0		0,0		0,0
		0,0		0,0		0,0		0,0		0,0
Interest		0,0		0,0		0,0		0,0		0,0
Depreciation	137.325	10,8	137.325	10,8	137.325	10,8	137.325	10,8	1.647.900	10,8
Tax Free		0,0		0,0		0,0		0,0		0,0
Other expenses (specify)		0,0		0,0		0,0		0,0		0,0
Other expenses (specify)		0,0		0,0		0,0		0,0		0,0
Misc. (unspecified)		0,0		0,0		0,0		0,0		0,0
Total Expenses	235.325	18,5	235.325	18,5	235.325	18,5	235.325	18,5	2.823.900	18,5
Net Profit	938.175	73,8	938.175	73,8	938.175	73,8	938.175	73,8	11.258.100	73,8

Annual profit and loss projection of the twelve months of the fourth year as follows:

Twelve Month Profit and Loss Projection 4th year

CNC

Fiscal Year Begins July 2012 jul-12

	IND. %	jul-12	% B/A	Aug-12	%	Sep-12	%	Oct-12	%	Nov-12	%	Dec-12	%	Jan-13	%	Feb-13	%
Revenue (Sales)																	
Bio-Diesel		344.250	24,1	344.250	24,1	344.250	24,1	344.250	24,1	344.250	24,1	344.250	24,1	344.250	24,1	344.250	24,1
Bio-Gasoline		430.313	30,1	430.313	30,1	430.313	30,1	430.313	30,1	430.313	30,1	430.313	30,1	430.313	30,1	430.313	30,1
Waxy Cream		459.000	32,1	459.000	32,1	459.000	32,1	459.000	32,1	459.000	32,1	459.000	32,1	459.000	32,1	459.000	32,1
Glycerines		15.300	1,1	15.300	1,1	15.300	1,1	15.300	1,1	15.300	1,1	15.300	1,1	15.300	1,1	15.300	1,1
[illegible]		179.450	12,6	179.450	12,6	179.450	12,6	179.450	12,6	179.450	12,6	179.450	12,6	179.450	12,6	179.450	12,6
Total Revenue (Sales)		1.428.313	100,0	1.428.313	100,0	1.428.313	100,0	1.428.313	100,0	1.428.313	100,0	1.428.313	100,0	1.428.313	100,0	1.428.313	100,0
Cost of Sales																	
Production Wages		10.800	18,9	10.800	18,9	10.800	18,9	10.800	18,9	10.800	18,9	10.800	18,9	10.800	18,9	10.800	18,9
Catalyst & Ingredient		40.000	70,2	40.000	70,2	40.000	70,2	40.000	70,2	40.000	70,2	40.000	70,2	40.000	70,2	40.000	70,2
Transportation		5.000	8,8	5.000	8,8	5.000	8,8	5.000	8,8	5.000	8,8	5.000	8,8	5.000	8,8	5.000	8,8
Product Delivery Cost		1.200	2,1	1.200	2,1	1.200	2,1	1.200	2,1	1.200	2,1	1.200	2,1	1.200	2,1	1.200	2,1
Total Cost of Sales		57.000	100,0	57.000	100,0	57.000	100,0	57.000	100,0	57.000	100,0	57.000	100,0	57.000	100,0	57.000	100,0
Gross Profit		1.371.313	96,0	1.371.313	96,0	1.371.313	96,0	1.371.313	96,0	1.371.313	96,0	1.371.313	96,0	1.371.313	96,0	1.371.313	96,0
Expenses																	
Salary expenses		40.000	17,0	40.000	17,0	40.000	17,0	40.000	17,0	40.000	17,0	40.000	17,0	40.000	17,0	40.000	17,0
Site Maintainance &		1.000	0,4	1.000	0,4	1.000	0,4	1.000	0,4	1.000	0,4	1.000	0,4	1.000	0,4	1.000	0,4
Utilities ($200/MT/mnth		26.000	11,0	26.000	11,0	26.000	11,0	26.000	11,0	26.000	11,0	26.000	11,0	26.000	11,0	26.000	11,0
Stationary & Supplies		1.000	0,4	1.000	0,4	1.000	0,4	1.000	0,4	1.000	0,4	1.000	0,4	1.000	0,4	1.000	0,4
Copy and Printing		1.000	0,4	1.000	0,4	1.000	0,4	1.000	0,4	1.000	0,4	1.000	0,4	1.000	0,4	1.000	0,4
Telephone & Internet		2.000	0,8	2.000	0,8	2.000	0,8	2.000	0,8	2.000	0,8	2.000	0,8	2.000	0,8	2.000	0,8
Insurance		6.000	2,5	6.000	2,5	6.000	2,5	6.000	2,5	6.000	2,5	6.000	2,5	6.000	2,5	6.000	2,5
Accounting and legal		5.000	2,1	5.000	2,1	5.000	2,1	5.000	2,1	5.000	2,1	5.000	2,1	5.000	2,1	5.000	2,1
Rent		10.000	4,2	10.000	4,2	10.000	4,2	10.000	4,2	10.000	4,2	10.000	4,2	10.000	4,2	10.000	4,2
Cleaning		1.000	0,4	1.000	0,4	1.000	0,4	1.000	0,4	1.000	0,4	1.000	0,4	1.000	0,4	1.000	0,4
NPF		5.000	2,1	5.000	2,1	5.000	2,1	5.000	2,1	5.000	2,1	5.000	2,1	5.000	2,1	5.000	2,1
			0,0		0,0		0,0		0,0		0,0		0,0		0,0		0,0
			0,0		0,0		0,0		0,0		0,0		0,0		0,0		0,0
Interest			0,0		0,0		0,0		0,0		0,0		0,0		0,0		0,0
Depreciation		137.325	9,6	137.325	9,6	137.325	9,6	137.325	9,6	137.325	9,6	137.325	9,6	137.325	9,6	137.325	9,6
Tax Free			0,0		0,0		0,0		0,0		0,0		0,0		0,0		0,0
Other expenses (specify)			0,0		0,0		0,0		0,0		0,0		0,0		0,0		0,0
Other expenses (specify)			0,0		0,0		0,0		0,0		0,0		0,0		0,0		0,0
Misc. (unspecified)			0,0		0,0		0,0		0,0		0,0		0,0		0,0		0,0
Total Expenses		235.325	16,5	235.325	16,5	235.325	16,5	235.325	16,5	235.325	16,5	235.325	16,5	235.325	16,5	235.325	16,5
Net Profit		1.135.988	79,5	1.135.988	79,5	1.135.988	79,5	1.135.988	79,5	1.135.988	79,5	1.135.988	79,5	1.135.988	79,5	1.135.988	79,5

	Mar-13	%	Apr-13	%	May-13	%	Jun-13	%	YEAR LY	%
Bio-Diesel	344.250	24,1	344.250	24,1	344.250	24,1	344.250	24,1	4.131.000	24,1
Bio-Gasoline	430.313	30,1	430.313	30,1	430.313	30,1	430.313	30,1	5.163.750	30,1
Waxy Cream	459.000	32,1	459.000	32,1	459.000	32,1	459.000	32,1	5.508.000	32,1
Glycerines	15.300	1,1	15.300	1,1	15.300	1,1	15.300	1,1	183.600	1,1
[illegible]	179.450	12,6	179.450	12,6	179.450	12,6	179.450	12,6	2.153.400	12,6
Total Revenue (Sales)	1.428.313	100,0	1.428.313	100,0	1.428.313	100,0	1.428.313	100,0	17.139.750	100,0
Production Wages	10.800	18,9	10.800	18,9	10.800	18,9	10.800	18,9	129.600	18,9
Catalyst & Ingredient	40.000	70,2	40.000	70,2	40.000	70,2	40.000	70,2	480.000	70,2
Transportation	5.000	8,8	5.000	8,8	5.000	8,8	5.000	8,8	60.000	8,8
Product Delivery Cost	1.200	2,1	1.200	2,1	1.200	2,1	1.200	2,1	14.400	2,1
Total Cost of Sales	57.000	100,0	57.000	100,0	57.000	100,0	57.000	100,0	684.000	100,0
Gross Profit	1.371.313	96,0	1.371.313	96,0	1.371.313	96,0	1.371.313	96,0	16.455.750	96,0
Salary expenses	40.000	17,0	40.000	17,0	40.000	17,0	40.000	17,0	480.000	2,8
Site Maintainance &	1.000	0,4	1.000	0,4	1.000	0,4	1.000	0,4	12.000	0,1
Utilities ($200/MT/mnth	26.000	11,0	26.000	11,0	26.000	11,0	26.000	11,0	312.000	1,8
Stationary & Supplies	1.000	0,4	1.000	0,4	1.000	0,4	1.000	0,4	12.000	0,1
Copy and Printing	1.000	0,4	1.000	0,4	1.000	0,4	1.000	0,4	12.000	0,1
Telephone & Internet	2.000	0,8	2.000	0,8	2.000	0,8	2.000	0,8	24.000	0,1
Insurance	6.000	2,5	6.000	2,5	6.000	2,5	6.000	2,5	72.000	0,4
Accounting and legal	5.000	2,1	5.000	2,1	5.000	2,1	5.000	2,1	60.000	0,4
Rent	10.000	4,2	10.000	4,2	10.000	4,2	10.000	4,2	120.000	0,7
Cleaning	1.000	0,4	1.000	0,4	1.000	0,4	1.000	0,4	12.000	0,1
NPF	5.000	2,1	5.000	2,1	5.000	2,1	5.000	2,1	60.000	0,4
		0,0		0,0		0,0		0,0		0,0
		0,0		0,0		0,0		0,0		0,0
Interest		0,0		0,0		0,0		0,0		0,0
Depreciation	137.325	9,6	137.325	9,6	137.325	9,6	137.325	9,6	1.647.900	9,6
Tax Free		0,0		0,0		0,0		0,0		0,0
Other expenses (specify)		0,0		0,0		0,0		0,0		0,0
Other expenses (specify)		0,0		0,0		0,0		0,0		0,0
Misc. (unspecified)		0,0		0,0		0,0		0,0		0,0
Total Expenses	235.325	16,5	235.325	16,5	235.325	16,5	235.325	16,5	2.823.900	16,5
Net Profit	1.135.988	79,5	1.135.988	79,5	1.135.988	79,5	1.135.988	79,5	13.631.850	79,5

Annual profit and loss projection of the twelve months of the fifth year as follows:

Twelve Month Profit and Loss Projection 5th year
CNC

Fiscal Year Begins July 2013 jul-13

	IND. %	Jul-13	% B/A	Aug-13	%	Sep-13	%	Oct-13	%	Nov-13	%	Dec-13	%	Jan-14	%	Feb-14	%
Revenue (Sales)																	
Bio-Diesel		400.500	25,3	400.500	25,3	400.500	25,3	400.500	25,3	400.500	25,3	400.500	25,3	400.500	25,3	400.500	25,3
Bio-Gasoline		500.625	31,6	500.625	31,6	500.625	31,6	500.625	31,6	500.625	31,6	500.625	31,6	500.625	31,6	500.625	31,6
Waxy Cream		534.000	33,7	534.000	33,7	534.000	33,7	534.000	33,7	534.000	33,7	534.000	33,7	534.000	33,7	534.000	33,7
Glycerines		17.800	1,1	17.800	1,1	17.800	1,1	17.800	1,1	17.800	1,1	17.800	1,1	17.800	1,1	17.800	1,1
Methanol		133.200	8,4	133.200	8,4	133.200	8,4	133.200	8,4	133.200	8,4	133.200	8,4	133.200	8,4	133.200	8,4
Total Revenue		1.586.125	100,0	1.586.125	100,0	1.586.125	100,0	1.586.125	100,0	1.586.125	100,0	1.586.125	100,0	1.586.125	100,0	1.586.125	100,0
Cost of Sales																	
Production		10.800	18,9	10.800	18,9	10.800	18,9	10.800	18,9	10.800	18,9	10.800	18,9	10.800	18,9	10.800	18,9
Catalyst &		40.000	70,2	40.000	70,2	40.000	70,2	40.000	70,2	40.000	70,2	40.000	70,2	40.000	70,2	40.000	70,2
Transportation		5.000	8,8	5.000	8,8	5.000	8,8	5.000	8,8	5.000	8,8	5.000	8,8	5.000	8,8	5.000	8,8
Product Delivery		1.200	2,1	1.200	2,1	1.200	2,1	1.200	2,1	1.200	2,1	1.200	2,1	1.200	2,1	1.200	2,1
Total Cost of		57.000	100,0	57.000	100,0	57.000	100,0	57.000	100,0	57.000	100,0	57.000	100,0	57.000	100,0	57.000	100,0
Gross Profit		1.529.125	96,4	1.529.125	96,4	1.529.125	96,4	1.529.125	96,4	1.529.125	96,4	1.529.125	96,4	1.529.125	96,4	1.529.125	96,4
Expenses																	
Salary expenses		40.000	17,0	40.000	17,0	40.000	17,0	40.000	17,0	40.000	17,0	40.000	17,0	40.000	17,0	40.000	17,0
Site		1.000	0,4	1.000	0,4	1.000	0,4	1.000	0,4	1.000	0,4	1.000	0,4	1.000	0,4	1.000	0,4
Utilities		26.000	11,0	26.000	11,0	26.000	11,0	26.000	11,0	26.000	11,0	26.000	11,0	26.000	11,0	26.000	11,0
Stationary &		1.000	0,4	1.000	0,4	1.000	0,4	1.000	0,4	1.000	0,4	1.000	0,4	1.000	0,4	1.000	0,4
Copy and		1.000	0,4	1.000	0,4	1.000	0,4	1.000	0,4	1.000	0,4	1.000	0,4	1.000	0,4	1.000	0,4
Telephone &		2.000	0,8	2.000	0,8	2.000	0,8	2.000	0,8	2.000	0,8	2.000	0,8	2.000	0,8	2.000	0,8
Insurance		6.000	2,5	6.000	2,5	6.000	2,5	6.000	2,5	6.000	2,5	6.000	2,5	6.000	2,5	6.000	2,5
Accounting and		5.000	2,1	5.000	2,1	5.000	2,1	5.000	2,1	5.000	2,1	5.000	2,1	5.000	2,1	5.000	2,1
Rent		10.000	4,2	10.000	4,2	10.000	4,2	10.000	4,2	10.000	4,2	10.000	4,2	10.000	4,2	10.000	4,2
Cleaning		1.000	0,4	1.000	0,4	1.000	0,4	1.000	0,4	1.000	0,4	1.000	0,4	1.000	0,4	1.000	0,4
NPF		5.000	2,1	5.000	2,1	5.000	2,1	5.000	2,1	5.000	2,1	5.000	2,1	5.000	2,1	5.000	2,1
			0,0		0,0		0,0		0,0		0,0		0,0		0,0		0,0
			0,0		0,0		0,0		0,0		0,0		0,0		0,0		0,0
Interest			0,0		0,0		0,0		0,0		0,0		0,0		0,0		0,0
Depreciation		137.325	8,7	137.325	8,7	137.325	8,7	137.325	8,7	137.325	8,7	137.325	8,7	137.325	8,7	137.325	8,7
Tax Free			0,0		0,0		0,0		0,0		0,0		0,0		0,0		0,0
Other expenses			0,0		0,0		0,0		0,0		0,0		0,0		0,0		0,0
Other expenses			0,0		0,0		0,0		0,0		0,0		0,0		0,0		0,0
Misc.			0,0		0,0		0,0		0,0		0,0		0,0		0,0		0,0
Total Expenses		235.325	14,8	235.325	14,8	235.325	14,8	235.325	14,8	235.325	14,8	235.325	14,8	235.325	14,8	235.325	14,8
Net Profit		1.293.800	81,6	1.293.800	81,6	1.293.800	81,6	1.293.800	81,6	1.293.800	81,6	1.293.800	81,6	1.293.800	81,6	1.293.800	81,6

	Mar-14	%	Apr-14	%	May-14	%	Jun-14	%	YEARLY	%
Bio-Diesel	400.500	25,3	400.500	25,3	400.500	25,3	400.500	25,3	4.806.000	25,3
Bio-Gasoline	500.625	31,6	500.625	31,6	500.625	31,6	500.625	31,6	6.007.500	31,6
Waxy Cream	534.000	33,7	534.000	33,7	534.000	33,7	534.000	33,7	6.408.000	33,7
Glycerines	17.800	1,1	17.800	1,1	17.800	1,1	17.800	1,1	213.600	1,1
Methanol	133.200	8,4	133.200	8,4	133.200	8,4	133.200	8,4	1.598.400	8,4
Total Revenue	1.586.125	100,0	1.586.125	100,0	1.586.125	100,0	1.586.125	100,0	19.033.500	100,0
Production	10.800	18,9	10.800	18,9	10.800	18,9	10.800	18,9	129.600	18,9
Catalyst &	40.000	70,2	40.000	70,2	40.000	70,2	40.000	70,2	480.000	70,2
Transportation	5.000	8,8	5.000	8,8	5.000	8,8	5.000	8,8	60.000	8,8
Product Delivery	1.200	2,1	1.200	2,1	1.200	2,1	1.200	2,1	14.400	2,1
Total Cost of	57.000	100,0	57.000	100,0	57.000	100,0	57.000	100,0	684.000	100,0
Gross Profit	1.529.125	96,4	1.529.125	96,4	1.529.125	96,4	1.529.125	96,4	18.349.500	96,4
Salary expenses	40.000	17,0	40.000	17,0	40.000	17,0	40.000	17,0	480.000	2,5
Site	1.000	0,4	1.000	0,4	1.000	0,4	1.000	0,4	12.000	0,1
Utilities	26.000	11,0	26.000	11,0	26.000	11,0	26.000	11,0	312.000	1,6
Stationary &	1.000	0,4	1.000	0,4	1.000	0,4	1.000	0,4	12.000	0,1
Copy and	1.000	0,4	1.000	0,4	1.000	0,4	1.000	0,4	12.000	0,1
Telephone &	2.000	0,8	2.000	0,8	2.000	0,8	2.000	0,8	24.000	0,1
Insurance	6.000	2,5	6.000	2,5	6.000	2,5	6.000	2,5	72.000	0,4
Accounting and	5.000	2,1	5.000	2,1	5.000	2,1	5.000	2,1	60.000	0,3
Rent	10.000	4,2	10.000	4,2	10.000	4,2	10.000	4,2	120.000	0,6
Cleaning	1.000	0,4	1.000	0,4	1.000	0,4	1.000	0,4	12.000	0,1
NPF	5.000	2,1	5.000	2,1	5.000	2,1	5.000	2,1	60.000	0,3
		0,0		0,0		0,0		0,0		0,0
		0,0		0,0		0,0		0,0		0,0
Interest		0,0		0,0		0,0		0,0		0,0
Depreciation	137.325	8,7	137.325	8,7	137.325	8,7	137.325	8,7	1.647.900	8,7
Tax Free		0,0		0,0		0,0		0,0		0,0
Other expenses		0,0		0,0		0,0		0,0		0,0
Other expenses		0,0		0,0		0,0		0,0		0,0
Misc.		0,0		0,0		0,0		0,0		0,0
Total Expenses	235.325	14,8	235.325	14,8	235.325	14,8	235.325	14,8	2.823.900	14,8
Net Profit	1.293.800	81,6	1.293.800	81,6	1.293.800	81,6	1.293.800	81,6	15.525.600	81,6

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Cash flow of 1-5 years of investor return and net benefits of the project as follows:-

Cash Flow Projection CNC 1-5 years	20ton/mnth Oil (purshased) 1st	40ton/mnth Oil (purshased) 2nd	80ton/mnth Oil (purshased) 3rd	160ton/mnth Oil (purshased) 4th	320ton/mnth Oil (purshased) 1st
Net Profit B/T	$ 636.000,00	$ 746.025,00	$ 861.525,00	$ 893.125,00	$ 1.722.525,00
Consultancy Fees	$ 50.000,00	$ 50.000,00	$ 50.000,00	$ 50.000,00	$ 50.000,00
	$ 586.000,00	$ 696.025,00	$ 811.525,00	$ 843.125,00	$ 1.672.525,00
Investor 30% Return	$ 175.800,00	$ 208.807,50	$ 243.457,50	$ 254.437,50	$ 501.757,50
Subtotal	$ 410.200,00	$ 487.217,50	$ 568.067,50	$ 593.687,50	$ 1.170.767,50
New Plant Construction Costs	$ 9.690.000,00		$ 5.820.000,00		$ 4.490.000,00
	-$ 9.279.800,00	$ 487.217,50	-$ 5.251.932,50	$ 593.687,50	-$ 3.319.232,50
Cumulative Cash Flow	-$ 5.248.166,00	-$ 4.760.948,50	-$ 10.012.881,00	-$ 9.419.193,50	-$ 12.738.425,00
Investor Return Cumulative	$ 299.392,5	$ 384.607,50	$ 628.065,00	$ 882.502,50	$ 1.384.260,00
Investment Funds Required	$ USD $9,690,000		USD $5,820,000		USD $4.490,000

640ton/mnth Oil (purshased) 2nd	640ton/mnth Oil (purshased) 3rd	640ton/mnth Oil (purshased) 4th	640ton/mnth Oil (purshased) 1st	640ton/mnth Oil (purshased) 2nd	640ton/mnth Oil (purshased) 3rd
$ 2.814.525,00	$ 2.814.525,00	$ 2.814.525,00	$ 2.814.525,00	$ 2.814.525,00	$ 2.814.525,00
$ 50.000,00	$ 50.000,00	$ 50.000,00	$ 50.000,00	$ 50.000,00	$ 50.000,00
$ 2.764.525,00	$ 2.764.525,00	$ 2.764.525,00	$ 2.764.525,00	$ 2.764.525,00	$ 2.764.525,00
$ 829.357,50	$ 829.357,50	$ 829.357,50	$ 829.357,50	$ 829.357,50	$ 829.357,50
$ 1.935.167,50	$ 1.935.167,50	$ 1.935.167,50	$ 1.935.167,50	$ 1.935.167,50	$ 1.935.167,50
$ 1.935.167,50	$ 1.935.167,50	$ 1.935.167,50	$ 1.935.167,50	$ 1.935.167,50	$ 1.935.167,50
-$ 10.803.258,50	-$ 8.868.091,00	-$ 6.932.923,50	-$ 4.997.756,00	-$ 3.062.588,50	-$ 1.127.421,00
$ 2.213.617,50	$ 3.042.975,00	$ 3.872.332,50	$ 4.701.690,00	$ 5.531.047,50	$ 6.360.405,00

640ton/mnth Oil (purshased) 4th	640ton/mnth Oil (purshased) and 125ton/mnth Oil (produced) 1st	2nd	3rd	4th	640ton/mnth Oil (purshased) a 1st
$ 2.814.525,00	$ 3.407.964,00	$ 3.407.964,00	$ 3.407.964,00	$ 3.407.964,00	$ 3.881.400,00
$ 50.000,00	$ 50.000,00	$ 50.000,00	$ 50.000,00	$ 50.000,00	$ 50.000,00
$ 2.764.525,00	$ 3.357.964,00	$ 3.357.964,00	$ 3.357.964,00	$ 3.357.964,00	$ 3.831.400,00
$ 829.357,50	$ 1.007.389,20	$ 1.007.389,20	$ 1.007.389,20	$ 1.007.389,20	$ 1.149.420,00
$ 1.935.167,50	$ 2.350.574,80	$ 2.350.574,80	$ 2.350.574,80	$ 2.350.574,80	$ 2.681.980,00
$ 1.935.167,50	$ 2.350.574,80	$ 2.350.574,80	$ 2.350.574,80	$ 2.350.574,80	$ 2.681.980,00
$ 807.746,50	$ 3.158.321,30	$ 5.508.896,10	$ 7.859.470,90	$ 10.210.045,70	$ 12.892.025,70
$ 7.189.762,50	$ 8.197.151,70	$ 9.204.540,90	$ 10.211.930,10	$ 11.219.319,30	$ 12.368.739,30

20,000,000 HKD (USD) payback period approx. 5yr

nd 250ton/mnth Oil (produced) 2nd	3rd	4th
$ 3.881.400,00	$ 3.881.400,00	$ 3.881.400,00
$ 50.000,00	$ 50.000,00	$ 50.000,00
$ 3.831.400,00	$ 3.831.400,00	$ 3.831.400,00
$ 1.149.420,00	$ 1.149.420,00	$ 1.149.420,00
$ 2.681.980,00	$ 2.681.980,00	$ 2.681.980,00
$ 2.681.980,00	$ 2.681.980,00	$ 2.681.980,00
$ 15.574.005,70	$ 18.255.985,70	$ 20.937.965,70
$ 13.518.159,30	$ 14.667.579,30	$ 15.816.999,30

APPENDIX (A)

Details of Research Programme

"The Research Programme and Results that Lead to Produce the New Products from Jojoba Oil"

First Stage:

First at 1995 M.Sc. research had been started by O.S.M. Abu-Elyazeed to investigate an economical method for synthesizing a bio-diesel from jojoba raw oil by using simple esterification method. The product had been termed as jojoba methyl ester JME. Also; the laminar burning velocity had been measured in such investigation by O.S.M. Abu-Elyazeed using a constant volume bomb and compared the results that had been taken of JME with that had been taken of iso-octane and gas oil.

O. S. M. Abu-Elyazeed, "Measurement of Laminar Burning Velocity of Jojoba Methyl Ester" M.Sc. Thesis, Faculty of Engineering, Mataria, University of Helwan, 2001.

At 2002 a scientific paper had been published in Engineering Research Journal, Helwan University by O.S.M. Abu-Elyazeed. Also, such paper had been taken as a reference paper in a scientific paper that had been published at 2003 in Renewable Energy by M.Y.E. Selim.

Radwan MS, Ismail MA, Elfeky SMS, Abu-Elyazeed OSM. Preparation, characteristics and laminar burning velocity of jojoba methyl ester, submitted to Engineering Research Journal, Helwan University, Egypt, October 2002.

M.Y.E. Selim [a,*], M.S. Radwan [b], S.M.S. Elfeky [b] "Combustion of jojoba methyl ester in an indirect injection diesel engine", [a] Mechanical Engineering Department, Faculty of Engineering, United Arab Emirates University, Al-Ain P.O. Box 17555, United Arab Emirates, [b] Mechanical Power Engineering Department, Faculty of Engineering, Helwan University, Cairo 11718, Egypt, Renewable Energy 28 (2003) 1401–1420.

End of the First Stage

Second Stage:

At 2004 O.S.M. Abu-Elyazeed and F.A.F. Makar investigated a novel method that could be used in synthesizing two types of fuels the first one was volatile novel fuel could be termed as jojoba bio-gasoline and the other could be termed as jojoba bio-diesel.

Therefore, the properties of jojoba bio-diesel (**one product from jojoba**)were measured according to ASTM by F.A.F. Makar as shown in **Table 1**. Such table showed that the viscosity of jojoba bio-diesel is still higher than that of gas oil but less than that of JME. Thus the viscosity has to be decreased by adding another step to the synthesizing process. But also, such table showed that agreement of the other properties of bio-diesel with that of gas oil fuel.

Table 1 Properties of jojoba bio-diesel vs. gas oil.

TEST	RESULTS OF GAS OIL	RESULTS OF BIO-DIESL
DENSITY @ 15 C	0.82-0.87	0.8662
DENSITY @ 40 C	0.8143-0.8646	0.8490
DENSITY @ 100 C	-	0.8072
API GRAVITY	41.06-31.14	31.78
KINEMATIC VISCSITY @ 40 C	1.6-7.0	19.2
FLASH POINT (CLOSED CUP) C	Min. 55	61
CALORIFIC VALUE MJ/KG	Min. 44.3	46.99
POUR POINT C	Min. 4.5	4.44
COLOUR ASTM	Max. 4	1
INORGANIC ACIDS MgKOH/GM	NIL	NIL
CETANE NO.	Min. 55	63.5
DIESEL INDEX	Min. 48	47.12
CORROSION OF COPPER STRIP AT 100C for 3hr.	Max. 1	1
WATER CONTENT %BY MASS	Max. 0.15	NIL
CARBON CONTENT %BY MASS of 10% Residual	Max. 0.1	0.05
ASH CONTENT %BY MASS	Max. 0.01	0.002
C% AND RESINAL %BY WEIGHT	87.45	86.98
H2 % %BY WEIGHT	11.3	12.99
N2 % %BY WEIGHT	-	0.005
O2 % %BY WEIGHT	-	0.002
DISTILLATION (Initial Boiling Point) C	182	89
TEMPERATURE OF 10% VOL	231	333
TEMPERATURE OF 20% VOL	252	340
TEMPERATURE OF 30% VOL	262	342
TEMPERATURE OF 40% VOL	-	348
TEMPERATURE OF 50% VOL	302	353
TEMPERATURE OF 60% VOL	-	358
TEMPERATURE OF 70% VOL	-	363
TEMPERATURE OF 80% VOL	-	366
TEMPERATURE OF 90% VOL	311	372
Final Boiling Point C	327	383
LOSS & RESIDUE %VOL	-	1
SODIUM CONTENT mg/Kg	-	4
POTASSIUM CONTENT mg/Kg	-	0.8
CALCIUM CONTENT mg/Kg	-	4
MAGNESIUM CONTENT mg/Kg	-	-

However, **Table 2** illustrated that the properties of jojoba bio-gasoline versus normal gasoline, noting that the jojoba bio-gasoline was in initial form without elimination of the waxy deposits (before De-Waxing). So that, such table explained that the ash content in that jojoba bio-gasoline is very high.

Table 2 Properties of jojoba bio-gasoline vs. gasoline.

TEST			RESULTS OF GASOLINE	RESULTS OF BIO-GASOLINE
DENSITY @ 15 C			0.7905	0.809
DENSITY @ 20 C			-	0.8012
API GRAVITY			-	43.3
KINEMATIC VISCSITY @ 40 C		cSt	-	0.9
FLASH POINT (CLOSED CUP)		C	Flash less(less than18)	Flash less(less than18)
CALORIFIC VALUE		MJ/Kg	42.5	46.19
POUR POINT		C	-40	-30
COLOUR ASTM			1.5	0.5
INORGANIC ACIDS		mgKOH/gm	NIL	NIL
OCTANE NO.			90	>100
CORROSION OF COPPER STRIP AT 100C FOR 3HR			1A	1A
WATER CONTENT		%BY MASS	NIL	NIL
CARBON CONTENT		%BY MASS	2	6.19
ASH CONTENT		%BY MASS	0.1	0.5077
C% AND RESINAL		%BY WEIGHT	-	86.13
H2 %		%BY WEIGHT	-	13.86
N2 %		%BY WEIGHT		0.002
O2 %		%BY WEIGHT	-	0.001
DISTILLATION	I.B.P	C	64	65
TEMPERATURE OF	10%	VOL	64	65
TEMPERATURE OF	50%	VOL	118	65
TEMPERATURE OF	90%	VOL	167	86
	F.B.P	C	198	86
LOSS & RESIDUE		%VOL	1.8	5
SODIUM CONTENT		mg/Kg	-	1780
POTASSIUM CONTENT		mg/Kg	-	1840
CALCIUM CONTENT		mg/Kg	-	425
MAGNESIUM CONTENT		mg/Kg	-	-

M.Sc. was started by F.A.F. Makar to investigate the best method of synthesizing of jojoba bio-gasoline. And the results elucidate the effect of using blend of 5% of various bio-gasolines that were produced in different ways and normal gasoline (octane number = 90) on the knock limit, pre-ignition resistance (PIR), and performance as shown in **Figure 1**, **Figure 2** and **Figure 3**.

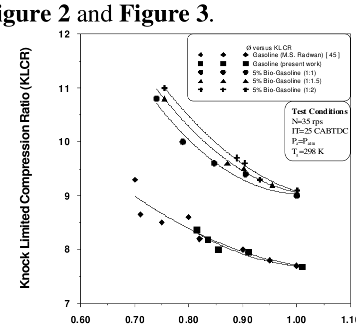


Figure 1 The Relation between Equivalence Ratio (Φ) and Knock Limited Compression Ratio.

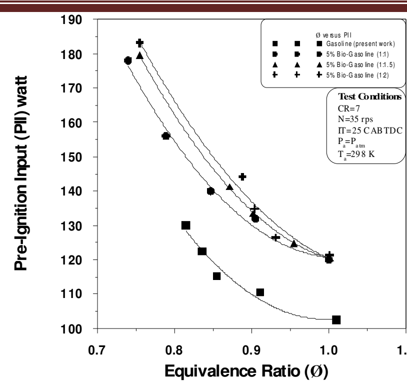


Figure 2 The Relation between Equivalence Ratio (Φ) and Pre-Ignition (PII).

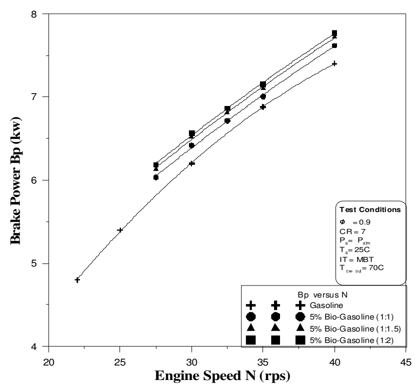


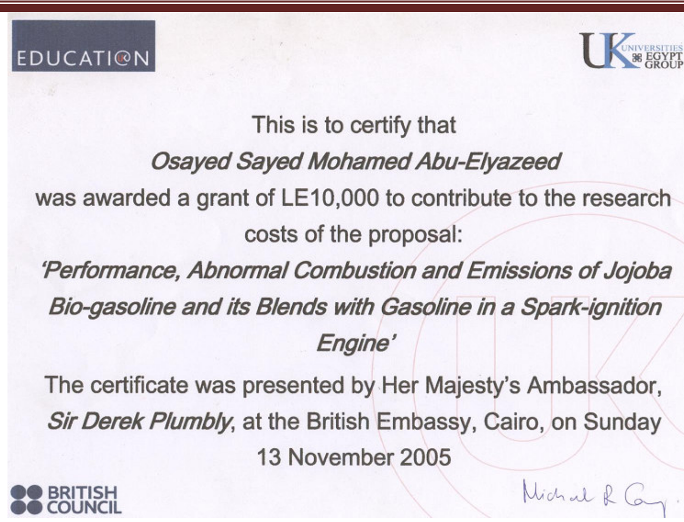
Figure 3 The Relation between Engine Speed (N) and Engine Brake Power (Bp).

It was worth noting that non-burning waxy deposits accumulated on the induction system and on the sparking plug preventing spark generation and thereby causing engine stalling.

It was noticed during initial experimentation that the temperature of the inlet manifold dropped to as low as -2C when using a blend of 5% of bio-gasoline; such effect appears to be due to a very significant evaporation rate of bio-gasoline. That impaired the smooth running of the engine. Fuel heating was applied which showed that a fuel temperature of 52C was enough to keep the engine running smoothly with a blend containing 5% bio-gasoline.

F. A. F. Makar, "Detonation and Pre-Ignition of Some New Fuels", MSc. Thesis, Faculty of Engineering at Mattaria, University of Helwan, October 2008.

At 2005 O.S.M. Abu-Elyazeed was awarded by the British council in Cairo a grant of LE.10,000 to contribute the research costs of the Ph.D. The certificate of such award is shown in **Figure 4**.



EDUCATION

UK UNIVERSITIES EGYPT GROUP

This is to certify that

Osayed Sayed Mohamed Abu-Elyazeed

was awarded a grant of LE10,000 to contribute to the research costs of the proposal:

'Performance, Abnormal Combustion and Emissions of Jojoba Bio-gasoline and its Blends with Gasoline in a Spark-ignition Engine'

The certificate was presented by Her Majesty's Ambassador, *Sir Derek Plumbly*, at the British Embassy, Cairo, on Sunday 13 November 2005

BRITISH COUNCIL

Figure 4 The Certificate from the British Council.

According to F.A.F. Makar investigation the percentage of jojoba bio-gasoline cannot be exceeded because of the increasing of the accumulation of waxy deposits in the engine by increasing the percentage of the raw jojoba bio-gasoline and thereby causing engine stalling.

Therefore, O.S.M. Abu-Elyazeed started the Ph.D. investigation with developing the jojoba bio-gasoline by elimination the waxy deposits (**another product from jojoba**). After elimination of the waxy deposits the jojoba bio-gasoline would be in the final form (**another product from jojoba**). Then the chemical composition and structure of the final form of the jojoba bio-gasoline were measured by using IR spectrum, Mass spectrum and NMR according to ASTM however, such chemical composition was $C_{10}H_8NO_4$.

And the results elucidate the effect of using blend of 5%, 10%, 25%, 50% and 100% of bio-gasoline and normal gasoline (octane number = 90) on the knock limit, pre-ignition resistance (PIR), emissions and performance as shown in **Figure 5**, **Figure 6, Figure 7**, **Figure 8, Figure 9** and **Figure 10**.

It was noticed during the initial experimentation that the temperature of the inlet manifold dropped to as low as -2C when using a blend of 5% of bio-gasoline; such effect appears to be due to a very significant evaporation rate of bio-gasoline. That was not impaired the smooth running of the engine due to wax elimination. Thus, fuel heating was not applied. But the volumetric efficiency could be increased due to the temperature drop that was increased by increasing the percentage of the jojoba bio-gasoline.

As shown in **Figure 5** and **Figure 6** the resistance of knock and pre-ignition is increased by increasing the percentage of the jojoba bio-gasoline due to very high octane number of such bio-gasoline. Thus, the very high efficiency engines such as turbo-charged or very high compression ratio engines can use such bio-gasoline without knock or pre-ignition problems.

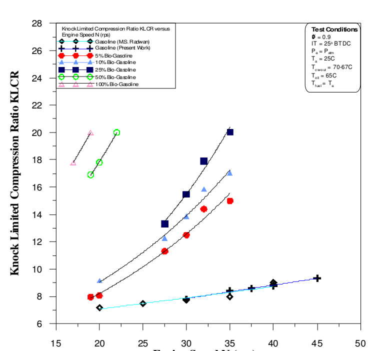


Figure 5 The Knock Limited Compression Ratio versus Engine Speed of Different Blends of Jojoba Bio-Gasoline.

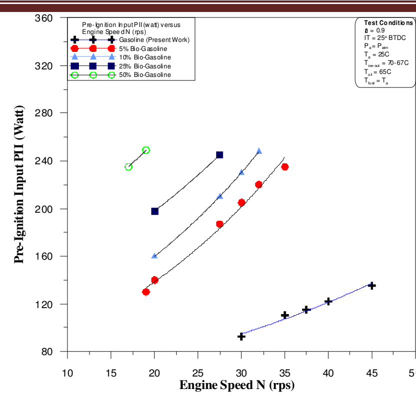


Figure 6 The Pre-Ignition Input versus Engine Speed of Different Blends of Jojoba Bio-Gasoline.

As shown in **Figure 7**, **Figure 8** and **Figure 9** the emissions from the engine that fueled by different blends of bio-gasoline and normal gasoline are less than that of normal gasoline due to high volatility and complete combustion except the NO_x emissions due to higher calorific value. But, the NO_x emissions can be decreased using lean burn engines especially by knowing that the lean limit of combustion of the 100 % bio-gasoline is φ=0.53 in carburetor engine without misfiring. In addition, that the lean limit of the gasoline carburetor engine is φ=0.8.

As shown in **Figure 10** the engine output of such engine fueled by different blends of bio-gasoline is higher than that fueled by normal gasoline due to higher calorific value of the jojoba bio-gasoline.

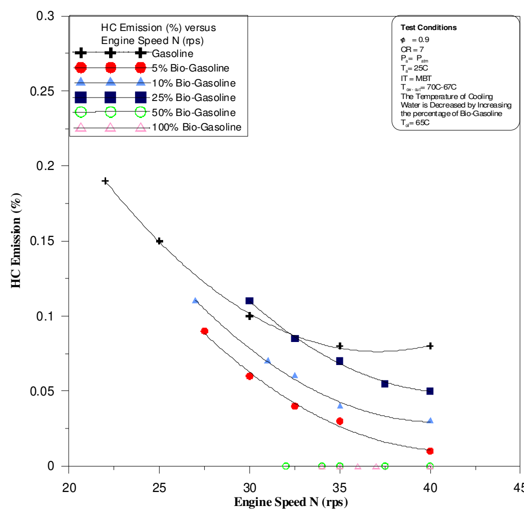


Figure 7 The Concentration of HC Emissions versus Engine Speed of Different Blends of Jojoba Bio-Gasoline.

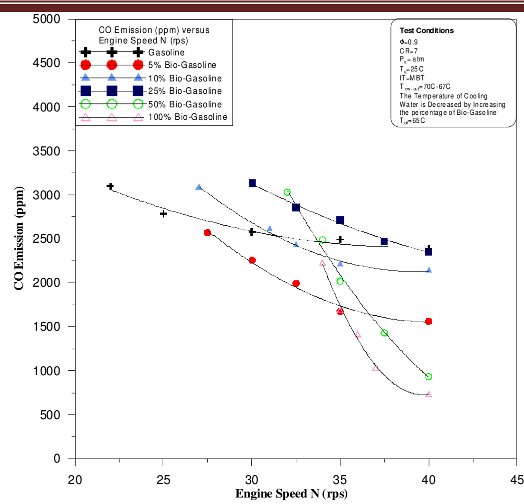


Figure 8 The Concentration of CO Emissions versus Engine Speed of Different Blends of Jojoba Bio-Gasoline.

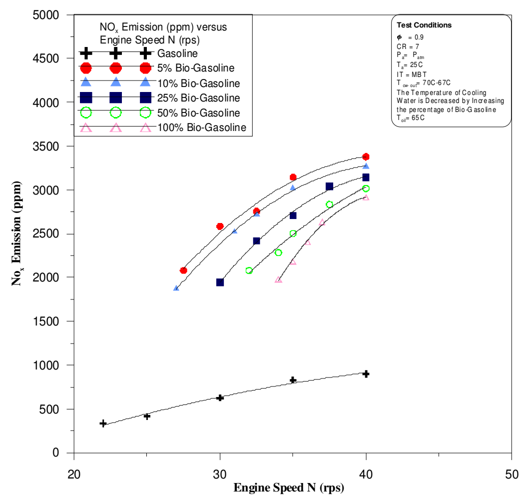


Figure 9 The Concentration of NO_x Emissions versus Engine Speed of Different Blends of Jojoba Bio-Gasoline.

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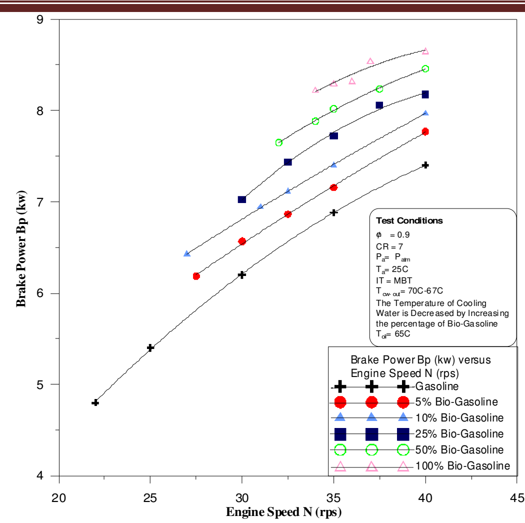

Figure 10 The Brake Output versus Engine Speed of Different Blends of Jojoba Bio-Gasoline.

O. S. M. Abu-Elyazeed, "Performance, Abnormal Combustion and Emissions of Jojoba Bio-Gasoline and its Blends with Gasoline in a Spark Ignition Engine", Ph.D. Thesis, Faculty of Engineering at Mattaria, University of Helwan, *to be bublished.*