



**MINISTRY
ENVIRONMENTAL AFFAIRS**

INTERNAL MEMO

Date:	11 January 2018	File no:	EDMS
To:	Director-General: Environmental Affairs	From:	MINISTRY
		Contacts	012 399 8752
Subject	CONVERTING WASTE TYRE INTO DIESEL – BUSINESS PLAN		

Dear Director General

Please find attached correspondence pertaining to the above-mentioned subject, addressed to Minister from Evergreen Energy (Pty) Ltd, Mr Ebrahim Seedat, for direct disposal.

Kindly provide our office with the copy of the response for our records.

Regards,


MS BOITUMELO SOBAYENI

DIRECTOR: OPERATIONAL SUPPORT

DATE: 2018.01.11

Subject: Fwd: Converting waste tyre into diesel
Date: Friday 22 December 2017 at 6:39:24 AM South Africa Standard Time
From: Gail Ramutshila
To: Lincoln Seoloane, Dinkwetse Mooketsi
CC: Boitumelo Sobayeni
Attachments: 1_Business plan.docx, ATT00001.htm

Ms Gail Ramutshila
Ministry of Environmental Affairs
Tel: +27 (0) 12 399 8744
Cel: +27 (0) 82 893 2547

Sent from my iPhone

Begin forwarded message:

From: "brahim seedat" <seedat.ebrahim@webmail.co.za>
To: "Claude Nadasen" <CNadasen@environment.gov.za>
Cc: "Gail Ramutshila" <GRamutshila@environment.gov.za>, "thapelo mapuma" <mapumathapelo@gmail.com>
Subject: Converting waste tyre into diesel

Good day

Could you please forward this business plan to the Minister.

We await the Ministers feedback

Kind Regards
Ebrahim Seedat

From: Claude Nadasen [<mailto:CNadasen@environment.gov.za>]
Sent: Thursday, November 16, 2017 10:43 AM
To: ebrahim seedat
Cc: seedat.eb@gmail.com; Paul Daphne
Subject: Re: Minister Edna Molewa confirmation

Good morning Sir

Thank you for your message. Let me clarify that the Minister does not have a Facebook account. The picture is indeed that of the Minister but know as well that the picture could have been

downloaded by any fraudster from the Internet/departmental website. Please send all correspondence to the following email addresses;

- 1) CNadasen@environment.gov.za,
- 2) GRamutshila@environment.gov.za
- 3) PDaphne@environment.gov.za

Thank you

Claude Nadasen
Private Secretary to the Minister
Ministry of Environmental Affairs
Tel: 012 – 399 8769
Cell: 082 376 7164



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Please consider the environment before you print this email. Only print if it is essential. A message from the Department of Environmental Affairs.

Please consider the environment before you print this email. Only print if it is essential. A message from the Department of Environmental Affairs.

Subject: Re: Converting waste tyre into diesel

Date: Thursday 11 January 2018 at 9:00:05 AM South Africa Standard Time

From: Dinkwetse Mooketsi

To: seedat.ebrahim@webmail.co.za

Dear Mr Seedat

On behalf of the Minister of Environmental Affairs, Dr B E E Molewa, MP, I acknowledge receipt of your correspondence in the above regard.

The content has been noted and will be referred to the relevant branch for appropriate attention.

Regards,

Dinkwetse Mooketsi

Office of the Minister

Department of Environmental Affairs

Tel: 012-399 8752

E-mail: dmooketsi@environment.gov.za

BUSINESS PLAN

100% Recycling of Waste Tyres



Evergreen Energy (Pty) Ltd

Ebrahim Seedat & George Mapuma

Middelburg

Mpumalanga

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1. Executive Summary

In South Africa, currently around 7 million vehicles are in operation, it is estimated that 28 million tyres will enter the receiving environment every year for re-treading or as waste tyres. (State of the Environment Report of SA 2005 – 2010).

Tyres are **non-degradable** therefore they could potentially stick around indefinitely. Tyres are not **desired at landfills**, due to their large volumes and 75% void space. Tyres can trap methane gases, causing them to become buoyant, or bubble to the surface. This 'bubbling' effect can damage landfill liners that have been installed to help keep landfill contaminants from polluting local surface and ground water. Tyre stockpiles create a great health and safety risk. **Tyre fires** can occur easily, burning for months, creating **substantial pollution** in the air and ground. Recycling helps to reduce the number of tyres in storage. An additional health risk, tyre piles provide harbourage for vermin and a breeding ground for mosquitoes that may **carry diseases**. Illegal dumping of scrap tyres pollutes ravines, woods, and empty lots; which has led governments to pass legislation for proper disposal of tyres

Internationally waste tyres are **100% recycled** by a process of pyrolysis. Pyrolysis is a process of thermal breakdown of a substance in the absence of oxygen and is very different to incineration or gasification. By employing the use of a pyrolysis reactor around 10 tons of waste tyres can be thermally reduced forming three basic components: carbon black, steel radials and oil/gas. From a single tyre, approximately **45%-55% fuel oil, 10%-15% steel wire, 30%-35% carbon black and 8%-10% flammable gas** are produced. The gases produced using pyrolysis is processed through a commercial grade condenser to recover high grade **pyrolysis oil**.

In South Africa there is about **77148 tons of waste tyre** already collected and stored at depots around the provinces and there is a potential supplier 177124 tons of tyre annually. The problem in South Africa is that there are insufficient landfills to dispose these waste tyres and the cost of building new landfills is very expensive. Therefore the **pyrolysis technology will be a solution to 100% recycles** the waste tyre, reducing the need for landfills.

In light of the waste recycling opportunity, **Envirogreen energy (Pty) Ltd** was created on the November 2017 to become the first recycler of waste tyres in Mpumalanga province of South Africa. The company has two directors Ebrahim Seedat and George Mapuma. Envirogreen energy (Pty) Ltd is a BEE company and aims to focus on the recycling of waste tyres stored at depots in Mpumalanga province.

The plan is to purchase a 10Ton batch pyrolysis plant and 6 Ton diesel process plant. At full capacity 96T of diesel will be produced per month, 75Tons of carbon black and 60tons of scrap metal. **The metal will be sold to scrap dealers; the diesel to transporting company** and carbon black can be processed into briquettes and sold as a source of burning fuel like coal. The capital required to start this business is about **9 Million**. The return of investment will be recovered within a **2.3 years**. The long term strategy is to look at recycling plastic waste, oil waste and any other solid waste. Our business strategy is focus on recycling the tyre in an environmental friendly manner, produce quality products, sell at price below market value and meet the customer requirements, The Company will only operate if we are able to acquire **funding for this project**.

2. Project Background

In South Africa, currently around 7 million vehicles are in operation. Should each vehicle have a minimum of 4 tyres each and require replacement of one set per year, then at 28 million tyres will enter the receiving environment as either tyres for re-treading or tyres as waste. (State of the Environment Report of SA 2005 – 2010).

Tyres are non-degradable therefore they could potentially stick around indefinitely. Tyres are not desired at landfills, due to their large volumes and 75% void space. Tyres can trap methane gases, causing them to become buoyant, or bubble to the surface. This 'bubbling' effect can damage landfill liners that have been installed to help keep landfill contaminants from polluting local surface and ground water. Tyre stockpiles create a great health and safety risk. Tyre fires can occur easily, burning for months, creating substantial pollution in the air and ground. Recycling helps to reduce the number of tyres in storage. An additional health risk, tyre piles provide harbourage for vermin and a breeding ground for mosquitoes that may carry diseases. Illegal dumping of scrap tyres pollutes ravines, woods, and empty lots; which has led governments to pass legislation for proper disposal of tyres

REDISA a non-profit organization was responsible to initiate the collection of waste tyres and setup storage area around the provinces in South Africa. Table 1 below shows the stats for tyres in South Africa. Note REDISA has since being liquidated however the tyres are still at the depots.

Table 1: TyresStats

Province	Waste Tyres Collected (Tons)	Potential Supply of waste (Tons)	Recyclers In SA	Depots
Mpumalanga	7525	17262	0	2
Kwa Zulu Natal	13848	24705	1	8
Gauteng	25571	40077	5	6
Free state	3521	10925	0	3
western cape	10175	18112	1	3
Limpopo	2987	18678	0	3
Northern Cape	354	8015	0	2
Eastern cape	7676	11917	0	2
Free State	3521	10925	0	3
North west	1970	16508	0	2
	77148	177124	7	34

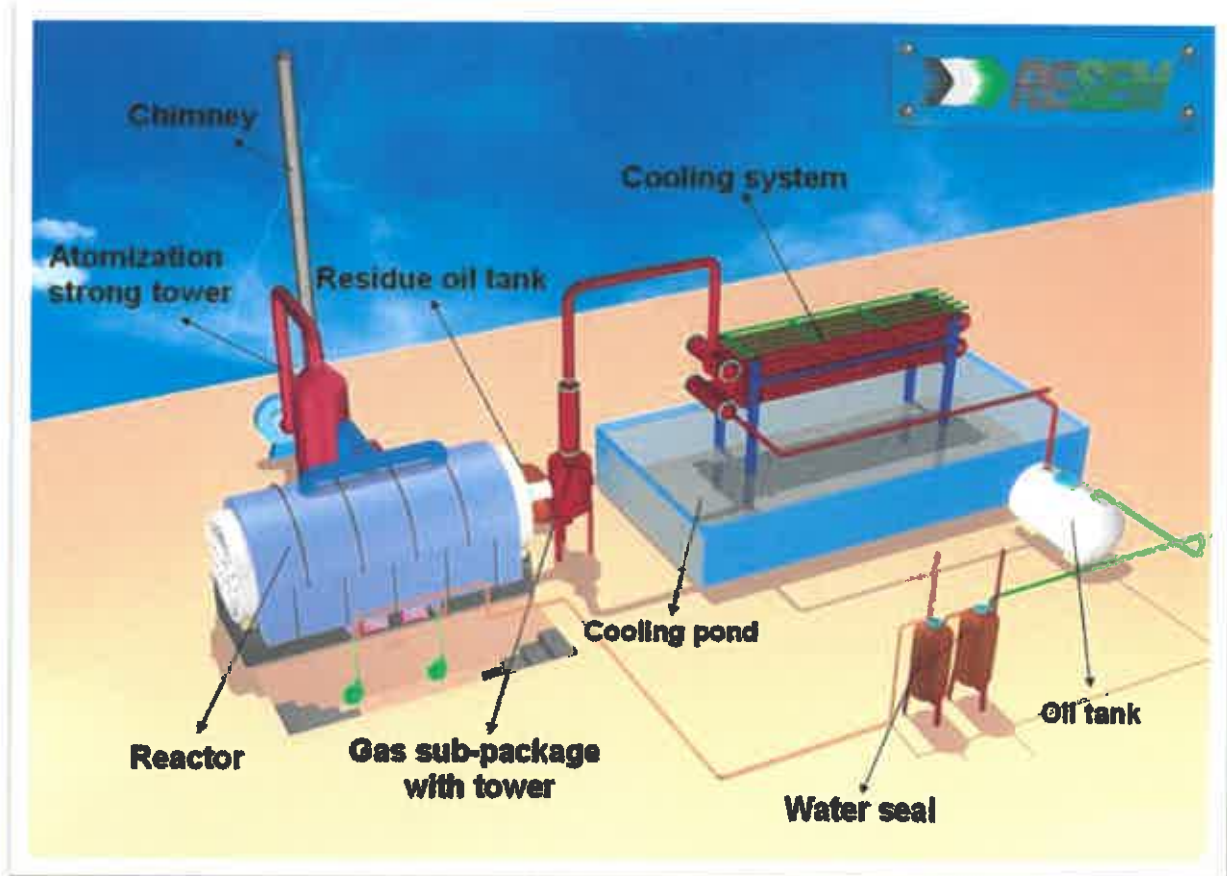
According to the stats in table 1 there are not many waste tyre recyclers in South Africa and the amount of waste tyres generated can pose a threat to the environmental. These waste tyres need to be recycled in a way that is not harmful to the environment.

3. Waste tyre recycling solution

Internationally waste tyres are **100% recycled** by a process of pyrolysis. Pyrolysis is a process of thermal breakdown of a substance in the absence of oxygen and is very different to incineration or gasification. By employing the use of a pyrolysis reactor around 10 tons of waste tyres can be thermally reduced forming three basic components: carbon black char, steel radials and oil/gas. From a single tyre, approximately **45%-55% fuel oil**, **10%-15% steel wire**, **30%-35% carbon black** and **8%-10% flammable gas** are produced. The gases produced using pyrolysis is processed through a commercial grade condenser to recover high grade **pyrolysis oil**.

The tyre pyrolysis system consists of an indirectly fired rotary kiln, steel recovery, char handling, grinding & pelletizing circuit, oil condensing system and gas cleaning system. The system is designed to operate 24 hours per day, 7 days per week.

Figure 1 : Batch Pyrolysis Plant



The pyrolysis process starts by feeding the waste tyres (10 Ton) into pyrolysis reactor by auto-feeder or manually. The reactor is heated by using coal, charcoal, fuel gas, or wood as heating materials. The reactor will be slowly heated until it reaches about 250°C-500°C. Once this temperature is reached the oil gas will be formed. The oil gas coming out from the reactor then goes to condensing system and becomes liquid oil. The gas which can't be liquefied under normal pressure will be designed to go back to combustion system through safety device. It can be recycled to heat the reactor as fuel, which will save energy for the whole working process. After finishing oil production, the temperature of the reactor will be cooled down, when the temperature falls down to 40°C, the Carbon black and steel is discharged automatically. The air discharged is scrubbed before it is released into the atmosphere. The pyrolysis oil is then processed via distillation plant to produce diesel

The oil produced can be sold as heating material to cement factory, glass factory, ceramic factory, electric power factory, steel making factory and boiler factory. Also it can be used in heavy oil generator for electricity generation. It can be further processed into diesel and can be used in trucks and tractor. The metal extracted can be sold to scrap dealers or sold directly to steel manufacturing companies such as Columbus stainless (in Mpumalanga). The carbon black can be made into pellet or briquette and sold as heating material. It can be further proceed into N220, N330, N550 or N660 which is widely used in tire making industry or make carbon to color master batch and sell it to plastic industry. The light gas produced will be recycled into furnace to heat reactor instead of coal. The excess gas can be stored to heat the reactor for the next batch to follow. This reduces the power consumption

For a 10 Ton batch process it, it requires 133 tyres per day and will produce the yield as per table below.

Table 2: No of tyres and Yield Of product

	Tons
No of tyres Required per batch	10T or 133 tyres
Oil yield per day	4
C black yield per day	2.5
Steel Yield per day	2

A total of 480 000 tyres / 3 600T tyre are required per year. The potential supply for Mpumalanga province is approximately 17 000T per year which is more than sufficient. Currently there is 7525 Tons available at the depot to be processed that will last for two years.

Pyrolysis of waste tyre will resolve the waste tyre problem in South Africa by recycling 100% of the solid waste into valuable products that can be sold in the market place.

4. Our Company –Envirogreen Energy (Pty) Ltd Purpose

In light of the waste recycling opportunity, Envirogreen Energy (Pty) Ltd was created on the November 2017 to become the first recycler of waste tyres in Mpumalanga province of South Africa. The company has two directors Ebrahim Seedat and George Mapuma. Envirogreen Energy (Pty) Ltd is a BEE company and aims to focus on the recycling of waste tyres stored at depots in Mpumalanga province. The company will only operate if we are able to acquire funding for this project.

4.1 Our Vision Statement

Manage waste for a cleaner environment.

4.2 Our Mission Statement

To implement solutions to environmental crisis

4.3 Our Values

- Honesty and integrity.
- Discipline in action.
- Practical care of our environments.
- Safety and quality in everything that we do

4.4 Our Objectives

- Recycle waste tyres that are stored in the depot in Mpumalanga province in a safe and environmentally friendly manner.
- Produce alternate energy that adheres to recommended standards.
- Provide quality service to customers by meeting their requirements.
- Help the community by offering job opportunities.
- Look at ways to recycle other waste such as plastics and used oil.

4.5. Key to success

To succeed, Envirogreen Energy (Pty) Ltd believes that honesty, integrity, hard work, commitment, discipline and dedication are keys to success.

5. SWOT Analysis

A SWOT analysis was undertaken by an organization to identify its internal strengths and weaknesses, as well to identify external opportunities and threats.

5.1 Strengths:

The two directors are in the field of Chemistry (Manager and Supervisor in laboratory); this will assist in ensuring the best quality of product that can be formed and smooth operation of the business. The equipment we want to purchase is a mature in its technology and used internationally. Scrap metal can be easily sold to scrap metal dealers. We are total focussed in making this venture a success

5.2 Weakness

As a new tyre waste recycling company we don't have the required experience however we will ensure that we have the proper training by requesting the supplier to train the people to be employed including the directors of the business. The operation is relatively simple it will require strict adherence to procedures. Another weakness is that we currently don't have the capital for the venture but strongly believe that this initiative can be supported by a grant or investment.

5.3 Opportunities:

Since there are no tyre recyclers in Mpumalanga, it's a huge opportunity to become the first waste tyre recyclers. There are also opportunities to expand the business into recycling waste plastic and waste oil in the future.

5.4 Threats:

A threat that may likely confront us in the longer term will be the arrival of new recycling plants in same location where our target market exists and who may want to adopt same business model like us. The more tyres that can be recycled the better for the environment

6. Market Analysis

6.1 Market analysis

A huge amount of waste tyres are currently stored at in depots in South Africa those are ready to be recycled. Currently there are very few waste tyrecyclers in South Africa. The supply of waste tyre is going to continuously increase. Government are looking for alternate method for recycling waste tyre and are supporting this initiative. Technology is available to handle most waste in an environmentally in an environmentally safe way. Manufacturing industries are beginning to see the benefits of going for recycling materials as against going for virgin raw materials in the production of their products.

6.2 Our Target Markets

The Business focus will be to recycle the waste tyres collected and convert them into steel, oil, char and light gas.

The steel extracted will be easily sold to scrap metal dealers and possible to Columbus Stainless a stainless steel manufacturer in Middelburg. At full production capacity we will be producing 60,000kg's of steel per month.

The oil derived from the pyrolysis process is referred to as a burning fuel. The oil will be further purified into diesel to fetch higher price. The market for the diesel will be for trucking and heavy machinery on mines and it can be used for boiler start-up. The diesel that can produce will meet ASTM standard. At full production capacity we will be producing 96 000 liters of diesel per month.

The **light gas** generated through the process will be used internally for heating purposes in order to reduce our electricity bill.

The **carbon black** has many uses. We are still investigating a market for this product. The initial plan is to briquette the carbon black and sell it locally as coal substitute. This carbon black can also be sold to farmers as fertilisers. At full production capacity we will be producing 75,000kg's of carbon black per month.

6.3 Our Competitive Advantage

The recycling industry is an emerging market in South Africa; therefore there is little or no competition in the industry at the moment.

6.4 Marketing strategy

Since we have sufficient supply of waste tyres and customers for the main products the main strategy is to produce quality products in an environmentally safe manner and focus on the customer needs.

The market can be expanded by

- Advertising in social media.
- Encourage word of mouth marketing from loyal and satisfied clients
- Join local chambers of commerce and industries with the aim of marketing our products
- Introduce our tyres waste recycling company by sending introductory letters to target market.
- Leverage on the internet to promote our business.
- Continuously look at ways of recycling other wastes.

6.5 Our Pricing and payment Strategy

The pricing strategy will be to keep the prices below the average market rate and to minimize running cost without compromising quality. We would like to fix the price with customers for a year to ensure that the business is profitable and investment pays off. Various facilities for payment will be made available for payment and the customer will be tied down to 30 days payment.

7. Financial analysis

We have tried to provide the **most accurate information** that we could based on information from the suppliers, information from the market, information from the internet and certain assumption based on the potential production outputs. **There could be certain cost that we could have not accounted for.**

7.1 Start-up Cost

The start-up is captured in table 3 below.

Table 3 : Start-up cost estimation

Description	Reason	Cost R
10T Batch pyrolysis/ 5-6T Diesel	To recycle tyres	R 2,465,000
Commissioning and training Fee	as per suppliers Requirement	R 72,500
Delivery from port China to Durban	4 Ft HQ set *5, including insurance	R 248,110
Duties at port	HS code 8419409090 its duty free	R 0
Vat	(10 % of value of item) + 14% vat	R 379,610
Delivery from port Durban to Witbank	4 Ft HQ set *5	R 150,000
Site preparations +commissioning	Structure, electrical, plumbing, foundation, labour, hiring)	R 1,800,000
Fuel storage tanks (30 000L)	For fuel storage	R 80,000
Land (water and electricity)	To be allocated by Government / else need to add to cost	R 0
Environmental study (EIA)	legal requirement	R 200,000
Petroleum manufacturing license	legal requirement for site	R 20,000
Vehicle (4T)	For moving the tyres	R 270,000
3T Forklift	For moving by products to storage area	R 120,000
100 KVA generator	For power outage	R 200,000
Balance 1000kg	Weighing of by- products	R 7,000
Plant Tools	For plant operation	R 10,000
Security system -camera	Security	R 15,000
Accounting package + PC	Quick Book	R 15,000
Office Equipment (computers, printers, table, office table, chair, telephone, internet , server, electronic)		R 60,000
Pellet for forklift	to store product	R 25,000
Working capital -amount to pay bills and staff	For three months	R 2,017,998
Promotional cost	Signage, business card, adverts	R 15,000
		R 8,170,218
		R 817,021.80
	Contingency (10%)	R 8,987,240

Note , Cost of land (not taken into consideration, we are hoping land to be allocated by the Minister.

7.1.1 Land and preparation of site

Cost of land not taken into consideration, we are hoping land to be **allocated by the Minister**. If not we would have to rent a property / buy land.

7.1.2 Engineer cost

The supplier will send their engineer for period of 30-50 for commissioning, optimising and training. We need to cover engineer's round-trip tickets, visa application fee, accommodation and lodging fee as well as his salary per day. The engineer would require the help of normal labourers and electricians / plumber when commissioning the equipment.

7.1.3 Site preparation

Once the order is placed with the supplier, the engineer will then consults with us and provide a **more detailed layout plan**. Based on the information provided by the suppliers we need to cater for the following.

- Simple structure with roof and adequate space to house the equipment (35m*25*7m) minimum requirement.
- Storage area for used tyres
- Storage area for coal /diesel
- Storage area for carbon black and scrap metal
- Area for storage of plant vehicles and tools
- Proper foundation to hold 20T
- 100m³ water storage tank
- Fencing
- Addition fuel storage tank based on production
- Facility for worker –office /kitchen and washing facility
- Electricity to be available
- Water to be available
- Engineering design cost

7.1.4 Pyrolysis /diesel processing Equipment

A 10Ton batch pyrolysis system and 5 Ton diesel process system. The equipment will be supplied with tyre auto-feeder, automatic removal of carbon black and steel pulling device. The supplier will supply all parts for the equipment. The equipment will be shipped to the port of Durban. We need to make provision for transport from the port of Durban to Middelburg / Witbank.

The equipment to be purchased need to meet the following criteria

- 10 T Batch pyrolysis operation and 5-6 Ton Diesel process
- 100% recycle tyres
- Emission to meet international standard
- Diesel to meet customer requirement.
- Certification for products produced
- Safe design with warning devices

- Continuous support over the period of equipment.
- In pyrolysis business for more than 10 years.
- Minimum life span of 5 years
- System that can handle waste plastic and used oil.
- System that conforms to all safety standards
- Automated as far as possible

Based on research there are five suppliers that meet these criteria viz Doing ,Huayin, Beston, Resem and Hongri. Below is the comparison of the suppliers and their systems

PYROLYSIS PLANT

	Huayin	Hongri machinery	Doing	Beston	Resem
Consultant	Sunny Guo	Annie Du	Sunny	Zoe	Luisa
Pyrolysis Reactor size (m)	9.2 *3.3	4*1.8	2.6*6.6	2.6*6.6	2.6*6.6
Maximum ton	10T	10 to 15T	10T	10T	10T
Capacity of reactor -m ³	35	49	35	35	35
Weight of Reactor	43T	25T	25T	35T	35T
Integrated design	yes (base)	No (frame set)	No (frame set)	yes (base)	No
Thickness of reactor(mm)	16	16	16	16	16
Rotational speed (turn/min)	0.4	0.4	0.4	0.4--08	0.4
Heat shielding for reactor	thermal insulation cotton	thermal insulation cotton	hooks, fire-proof sponge, fire-resistant cement	aluminum silicate wool and refractor cement	thermal insulation cotton
Pyrolysis door size (m)	1.4	1.7	1.4-1.6	1.4	1.4
Type of welding used	submerged welding technology	submerged welding technology	submerged welding technology	submerged welding technology	submerged welding technology
Coal Required for Reactor (kg)	700	700	400	800	400
Tyre	whole/autofeeding	whole/autofeeding	whole/autofeeding	whole/manual automatic optional	whole/autofeeding
Tyre feeding machine cost(USD)	8500	0	0	0	0

Heating of reactor	directly heating system	directly heating system	directly heating system	directly heating system	directly heating system
Steel pulling	manual	manual	manual	manual	manual
Steel wire drawing machine cost (automated) (USD)	0	0	8000	5850	0
Power	15	20.7	15	30	25
Power for day	380	372.6	244	380	380
Water for cooling (m3/h)	40	100	43	54	50
Water consumption (m3/h)	2	2	2	2	2
% Fuel produced	45%	45%	45%	45%	45%
Carbon discharged	automatic	automatic	automatic	automatic	automatic
Cost for Carbon discharged (USD)	9000	0	2000	0	0
No of condenser	3	3	6	2	3
Monitoring equipment (PLC)	yes	No	yes	yes	yes
Activated carbon in de-dusting system	Not used	Not used	use water in the de-dusting system	3 layer de-dusting system	Not used
pyrolysis high cost (USD)	104200	68865	46000	53850	58000
Shipping weight	2*1 40FR + 3* 40Hq	1 40FR +3* 40FR	1 40FR +1 40Hq	1 40FR +1 40Hq	1 40FR +3* 40FR
Shipping cost	FOB	FOB	FOB	FOB	FOB
Engineer cost	50	100	100	65	100
installation material	supply	supply	supply	supply	supply
Installation time	20-50	20-50	20-50	20-50	20-50
life span	5--8	5--8	5--8	5--8	5--8
warranty	1	3	1	1	1
plastic	yes, separately	yes, no need to separate	yes (sep)	yes (sep)	yes
SA installation	yes	No	No	yes	No
water tank Required	yes	yes	yes	yes	yes

Space	40*25	35*25	45*25	30*25	30*25
Certificate for diesel and C black	yes	yes	yes	No	No
Number of batches	1	more than 1	1	1	1
Time before oil is produced	22	starts after 3hrs(take 10hrs)	22	22	16
Sub Total	121700	68865	56000	59700	58000

DISTILLATION PLANT

	Huayin	Hongri machinery	Doing	Beston	Resem
	Sunny Guo	Annie Du	Sunny	Zoe	Luisa
Reactor size	2*5	1.4*2.7	1.4*2.8	1.6*4.4	1.4*4.4
Distillation high (negative pressure) USD	88000	93180	41000	61500	64600
Conduction oil boiler (USD)			15000		
Double vertical tubular condenser, 56 cooling pipes	yes	yes	90 pieces	yes	yes
safety valves, alarm system, anti explosion valve	yes	yes	yes	yes	yes
Automatic submerged welding technology, ultrasonic nondestructive testing, guarantee the equipment quality	yes	yes	yes	yes	yes
Ton	6	5	5	6	6
power	54	65.2	24.2	54	50
cooling	60	50	60	60	60
fuel consumption	40-50 diesel	40-50	400-500	40-50	40-50
chemical consumption (H ₂ SO ₄ / HCl and white clay)	NA	NA	normal chemical, consumption is about 15 USD per day	NA	NA

Advanced filter (White clay reactor)	15000		12000		
shipping	2*40HQ	3*40HQ	1 40FR +2 Ft GP	2*40HQ	3*40HQ
Integration reactor base	yes	No	No	yes	No
Safety features	yes	yes	yes	yes	yes
Diesel Certificate	yes	yes	yes	No	No
Yield	80	85-92	85%	80	80
Distillation time	8-9 hours	8-9 hours	6-7 hrs	8-9 hours	8-9 hours
PLC	yes	No	yes	yes	yes
water storage 100m3	100	100	100	100	100
Video	Full	partial	full	No	No
Carbon black pellet (USD)	9000	9000	9000	9000	9000
Sub Total USD	112000	102180	77000	70500	73600

COST OF PLANT

	Huayin	Hongri machinery	Doing	Beston	Resem
Pyrolysis Plant	121700	68865	56000	59700	58000
Diesel Plant	112000	102180	77000	70500	73600
Total (USD)	233700	171045	133000	130200	131600
Total @ (R3,388,650	R2,480,153	R1,928,500	R1,887,900	R1,908,200

Although we have sufficient information on the system, once the funds are made available we would like to visit the plants in China, see the plant in operation before the supplier can be selected.

7.1.5 Other Equipment

Other equipment required for operational purpose are listed below

- Weighing bridge , we are going to hire as the cost to purchase one is very high
- Fork lifts for loading tyres.
- Transport vehicles
- Balance for weighing products (scrap and carbon black)
- Pellets for storage
- Computers and software
- Security system
- Furniture

7.1.5 Manning

The plant will run 24 hours and 30 day. Based on the operation we would like to employ the number of employees as per table below. The unskilled personnel will be recruited form the local area and any skilled labour will be employed based on skill level required.

Table 4: Manning

Description	No
Director	2
Admin	1
Marketing /sales	1
Supervisor	2
Operators	6
Gardner	1
security	1
	14

The approximate start-up cost to setup the plant is **R9 million**

7.2 Income and Expenses / Profitability

Based on information from supply, market, internet and research the following are the estimated Expense and Income

Table 5 : Income and Expense

Expense				
Description	Qty	R/x	R/ day	R/ month
Fuel coal (pyrolysis) - Ton	0.7	R 1 500	R 1 050	R 32 550
Fuel coal (diesel)	0.28	R 1 500	R 420	R 13 020
Electricity (kWH), run 14hrs, (pyrolysis)	380	R 1.50	R 7 980	R 247 380
Electricity (kWH)- diesel	54	R 1.50	R 1 944	R 60 264
Make up water	4	R 10	R 40	R 1 240
chemicals -diesel	1	217	R 217	R 6 727
Salary ((pyrolysis and diesel)	14	R 550.00	R 7 700	R 238 700
Rental (weigh bridge)	1	R 167	R 167	R 5 177
Rates and taxes	1	R 70.00	R 70	R 2 170
water and lights	1	R 70.00	R 70	R 2 170
Telephone and internet	1	R 27.00	R 27	R 837
Insurance	1	R 1 000.00	R 1 000	R 31 000
Maintenance	1	200	R 200	R 6 200
Petrol (forklift. truck)	1	R 50.00	R 50	R 1 550
Transport (for items to be delivered)	1	R 334.00	R 334	R 10 354
Depreciation	1	R 1 042.00	R 1 042	R 32 302
Other	1	R 500.00	R 500	R 15 500
Total Expense			R 22 811	R 707 141
Income				
Products	kg	R/l	R/ day	R/ Month
pyrolysis oil -80% yield	3200	8.00	R 25 600	R 793 600
C black	2500	1.00	R 2 500	R 77 500
steel wire	2000	2.50	R 5 000	R 155 000
Total Income			R 33 100	R 1 026 100
Gross Operating Profit			R 10 289	R 318 959
profit for tax per year				R 3 827 508

7.3 Return of investment

Based on the Investment and the calculated profit for a year the Return of Investment was calculated as per table below

Table 6 : Income and Expense

Investment	R 8,987,240
profit per year	R3 827 508
ROI	2.3

7.4 Capital for Project

The capital will be acquired from application for a grant.

8. Sustainability

One of our major goals of starting waste tyre recycling is to build a business that will **survive off its own cash flow without the need for injecting finance** from external sources once the business is officially running. The future plan will be look at recycling other waste such as **plastic and used oils.**

9. Advantages of recycling waste tyres

The advantages of pyrolysis of waste tyres are

- Solution to address the current problem associated waste tyre.
- 100% waste tyres for recycling.
- The complete process is eco-friendly
- Generates quality fuel with emission levels that satisfies international standards.
- Recover energy from waste
- Helps recycle carbon
- Safe from various diseases, which are likely to be spread from waste tyre.

10. Assistance from Minister .Department of Environmental Affairs

The following are the milestones to date are

- To secure tyres in depots in Mpumalanga province.
- Land to be allocated about 2000 -4000m²
- To provide funding for project

11. Conclusion

The pyrolysis process recycles 100% of the waste tyres into products that can be sold to generate income for the business. The pyrolysis process will reduce /eliminate the need for landfills for waste tyres and help in curbing the health problems that can occur from storage of waste tyres. The business will be self-sustainable and has the potential to expand into recycling other solid waste. We are hoping to be awarded funding required for this project.

12. Appendix

Appendix 1 - Diesel test

SGS

ORIGINAL

REF: 04/2013

SGS Oil, Gas and Chemicals
SGS-CSTC Standards Technical Services Co., Ltd
CSC Qingdao Laboratory
No. 197, Tianjin Road
Qingdao Economic Technical Development Zone
Qingdao, China

XINXIANG DOING RENEWABLE ENERGY EQUIPMENT
CO.,LTD
XINXIANG,CHINA

Analysis Report: QD13-00438.001

JOB ORDER NO.:	09CQD1900579-01	BOSS ORDER NO.:	-
CLIENT ID:	N/A	PRODUCT DESCRIPTION:	Diesel - tyre distillation oil
LOCATION:	N/A	VESSEL:	N/A
SAMPLE SOURCE:	Supplied by Client	SOURCE ID:	N/A
SAMPLE TYPE:	N/A	SAMPLE BY:	Client
SAMPLED:	-	RECEIVED:	29/04/2013
ANALYSED:	24/04/2013	COMPLETED:	24/04/2013
CONTAINER:	1xL Plastic Bottle	SAMPLE STATE:	Liquid in Plastic Bottle
SAMPLE COMMENT:	<p>WARNING: The sample(s) to which the findings recorded herein (the "Findings") relate was (were) drawn and / or provided by the Client or by a Third party acting at the Client's direction. The Findings constitute no warranty of the sample's representativeness of any goods and strictly relate to the sample(s). The Company accepts no liability with regard to the origin or source from which the sample(s) herein said to be extracted.</p> <p>*Caution: sample container submitted to us did not comply with the requirements of ASTM D8884/API MPMS Chapter 3.3, which could impact the representativeness of the sample*</p>		

PROPERTY	METHOD	RESULT	UNIT#	MIN	MAX
Flash Point by PMCC	ASTM D93-12(Procedure B)	<40	°C	-	-
Density at 15°C	ASTM D4052-11	0.9017	g/cm ³	-	-
Total Sulfur Content	ASTM D4294-10	0.520	% (m/m)	-	-
Ash Content	ASTM D482-07	<0.001	% (m/m)	-	-
Carbon Residue - Micro Method	ASTM D4830-11	<0.10	% (m/m)	-	-
Kinematic Viscosity at 40°C	ASTM D445-12	2.098	mm ² /s	-	-
Water Content	ASTM D95-05(2010)	0.05	%(V/V)	-	-
Gross Calorific Value	ASTM D4809-00(2010)	44.57	kJ/kg	-	-
Net Calorific Value	ASTM D4809-00(2010)	41.95	kJ/kg	-	-
Acid Number (Infection end-point)	ASTM D984-11a(Method A)	0.1	mg KOH/g	-	-

sgs tyre diesel oil

The results shown in this test report specifically refer to the sample(s) tested as received unless otherwise stated. All tests have been performed using the latest version of the methods indicated, unless specifically notified otherwise on the report. Precision procedures apply in the determination of the above results. Users of the data shown on this report should refer to the latest published revision of ASTM D884; IP 347 and ISO 4259 and when utilizing the test data to determine conformance with any specification or purchase requirement. This Test Report is issued under the Company's General Conditions of Service (copy available upon request or on the company website at www.sgs.com). Attention is drawn to the Exclusions of Liability, Information and Intellectual Property Rights. This report shall not be reproduced except in full, without the written approval of the laboratory.

REPORTED BY



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Chemist

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