JANUARY: 2011

Pre - Project Report

For

Power Generation from Scrap Tires by

ANJALI EXIM – SURAT

(A Waste to Energy Project)

Prepared & Submitted by:

ECO – ENERGY SOLUTIONS

365/A-4, Saket Society, B/H. Swaminarayan Temple,
Sector No. 23, Gandhinagar: 382023 – Gujarat (India)
E-mail: md.ecoenergy@gmail.com, Contact: +91 982 509 2184.
www.ecoenergysolutions.co.in

LIST OF ANNEXURES

Technology:

Pyrolysis involves heating organic materials without oxygen to break them down to simpler organic compounds. When organic wastes (e.g., waste tires) are the feedstock, products of the process include char or carbon char, oil, and gas. For example, pyrolysis can convert wood to charcoal and a low-Btu gas.

Gasification of organics occurs at operating conditions between the complete absence of oxygen and stoichiometric (i.e., sufficient oxygen to complete the oxidation reaction). Gasification involves drying and pyrolyzing a feedstock, and oxidizing the solid char to heat the reaction and provide carbon monoxide (CO) to the gas. In the early 1980s, the waste industry saw gasification as promising. Gasification processes maximized the effect of carbon-hydrogen ratios. Furthermore, the product gas was suitable for use in existing boilers / Gas Generators for Electricity Generation.

Liquefaction is the thermochemical conversion of an organic solid into a petroleum-like liquid. Liquefaction typically involves the production of a liquid composed of heavy molecular compounds from a pyrolytic gas stream. The liquid has properties similar, but not identical, to those of petroleum-based fuels. Essentially, liquefaction is manipulation of the pyrolysis process in order to produce a liquid with characteristics similar to petroleum-based liquids (e.g., fuel oils).

Pyrolysis

Pyrolysis processes may operate as either batch feed or continuous feed systems. Batch feed systems process a single charge of feedstock at a time. After required residence time in the batch thermal reactor, solid products and residue are removed. Conversely, in continuous feed systems, feedstock is conveyed through the thermal reactor at a uniform rate, and solid products and residue are continuously discharged.

Pyrolysis relies on the addition of heat to break chemical bonds, providing a mechanism by which organics decompose and vaporize. Most projects operate within a temperature range of 250° - 500°C, although some report operating at up to 900°C. At temperatures above approximately 250°C, shredded tires release increasing amounts of liquid oil products and gases. Above 400°C, depending on the process employed, the yield of oil and solid tire-derived char may decrease relative to gas production.

A typical commercial operation is described below.

1. Tires delivered to a site are weighed. Tires are introduced to systems whole or else halved, chopped, or shredded; Magnetic separation is often used to remove ferrous metals from size-reduced tires.

2. The feedstock is typically dried and preheated, using tire-derived gas. Oxygen is purged through a combination of the pyrolysis gas preheater and an inert gas system employing nitrogen.

3. Temperature and residence time in the reactor are two key pyrolysis reactor design criteria. Maintaining a positive pressure in the reactor ensures that leaks do not introduce oxygen from the air.

4. The liquid stage, tire-derived oil, is condensed and cooled. Light and heavy oil fractions may be handled separately. A separator removes any remaining water vapor. The product is filtered. The characteristics of tire-derived oil are mentioned below.

5. Solid tire-derived char is cooled, typically using a water-cooled stage. The product may be sized and screened to remove fiber. A magnetic separation stage captures magnetic materials remaining in the char. washing the char and further size reducing it produces the carbon black product. The characteristics of tire-derived char and carbon black are mentioned below.

6. Tire-derived gas maintains operating pressure in the system and provides heat to the system. Vented gases pass through a pollution control train, which may include a gas flare. The characteristics of tire-derived gas are mentioned below.

7. Gas can further treated for power generation. It is passes through venturi scrubber to remove particulate matter from gas and then it is passes through water cooled condenser which can help us to bring down the temperature of tire-derived gas and cracking of tar from it. Further it is passes through various filters containing wood waste and saw dust waste to remove %moisture from gas and finally cleaned through fabric filter.
Now our Gas is ultra clean and can directly feed to Gas Driven Generating Set. But for continuous operation of generator we proposed low pressure vessel for the storage of gas. Through this storage power generation can be done for 24 hours irrespective of gas production rate through pyrolysis of waste tires.

7. Steel shreds are baled for shipment. Separated fibers, when recovery is practical, are baled for shipment. Often, however, fibers are disposed as waste.

OPERATING CONDITIONS AND PRODUCTS

This section of the report summarizes the operating data for tire pyrolysis projects, and describes the products of their operations. The section presents operating pressures and temperatures for various processes and the predominant products reclaimed by the process. Where data were available, we report historic periods of operation, including startup and shutdown schedules. The section summarizes operating schedules for planned facilities. The section includes a summary of the requirements for startup, shutdown, maintenance, and estimated availability.

Anjali Exim the Developer of waste pyrolysis systems describes the following products of pyrolysis and gas cleaning:

1. Solids (i.e., tire-derived char or tire- derived carbon black & steel + fiber),
2. Synthesis gas,
3. Liquid (furnace oil, fuel oil, blended LDO, or Naphtha)

Typically however, the tire pyrolysis industry describes the products it produces as a solid (either tire-derived char or tire-derived carbon black), a liquid (oil, often including a naphtha fraction), a gas, steel, and fibers. Wastes from the processes are as below.

Operating Conditions

Temperature and Pressure

We stated that reactor temperature is one key determinant of overall system performance. Projects may be compared on the basis of reported steady-state operating temperature in the pyrolysis vessel. The range of operating temperatures for the facility reporting full-scale pyrolysis projects is 250° - 500°C.

To a large extent, reactor temperature determines the yield of solid, gas, and liquid pyrolysis products. Over the range of 250° - 500°C, the production of gas increases from 0 - 6 percent by weight, while the quantity of oil and solid fractions are inversely related. Between approximately 400° and 600°C, the mass fraction of the products is relatively stable. Between 500° and 800°C, gas production increases from 6 - 31 percent, while over the same range, solid and oil fractions are inversely related. Thus, at higher temperatures, more of the organic content of the tires is converted to the gaseous or liquid phase.

Following Table presents operating temperature and pressure data and reports the corresponding product yields for pyrolysis system.

Sr.No.	Operating Temperature	Operating Pressure	Production Variation
1	500°C	Ambient	42% Oil
			52% Solid
			6% Gas
2	600°C	Ambient	50% Oil
			40% Solid
			10% Gas
3	700°C	Ambient	47% Oil
			38% Solid
			15% Gas
4	800°C	Ambient	40% Oil
			29% Solid
			31% Gas

Safety

As shown above the pyrolysis system is working on ambient pressure so it is safe to operate compare to high pressure blasting and other issues.

Energy Requirements

Anjali Exim reports that the pyrolysis process produces an excess of energy. Anjali Exim indicates that the combustion of tire-derived gas provides sufficient heat to drive the reaction. The use of supplemental fuel – Scrap wood - is limited to the startup period. The electrical usage of systems is estimated to 12.8 kWh/ton of feedstock, based on survey responses.

The heat required to sustain the pyrolysis reaction appears to be between approximately 630 and 1,025 Btu/lb of feedstock, based on survey responses.

Heating Rate

For a given temperature, the heating rate (°C/minute) has a minor effect on the yield. In general, the faster the feedstock is heated to a given temperature, the less tire-derived char and the more oil and gas that is produced. Under these conditions, higher gas yields are achieved at lower temperatures. Also, at each heating rate, as temperature is increased, the greater the production of benzene, pentane-2, and methanol fractions, and the less the production of pentane-1 and ethanol fractions.

At a given temperature, the heating value of the gas increases with the heating rate. The surface area of the solid product increases as heating rate or temperature increases.

By-Products after Pyrolysis

- **Oil**

The mean ultimate analysis of pyrolytic oils is reported in following table. Also, the mean heating value of oil is also provided. The ultimate analysis indicates an oil product well within the range of that of a fuel oil refined from crude oil. As per given below comparison.

Sr.No.	Parameter	Units	Tire Derived Oil	Fuel Oil Refined from Crude Oil
1	Flash Point, min	°C	65	60
2	Pour Point, max	°C	6	-----
3	Water and Sediments, max	% By volume	0.50	1.00
4	Ash, max	% By volume	0.099	0.1
Viscosity				
5	Minimum	mm2/g	3.1	5.8
6	Maximum	mm2/g	6.3	26.4

- **Char and Carbon Black**

A solid product termed tire-derived char or tire-derived carbon char is produced by most Pyrolysis processes that use tires or other solid organic feedstock. The solid product can be further processed to enhance specific characteristics and to meet specifications for carbon black, or can be marketed directly, Virgin carbon black can reportedly be produced more economically and with better quality control than carbon black from tire char.

The proximate and ultimate analyses of tire-derived char and tire-derived carbon black are provided in Table. The mean concentrations of chlorine and the moisture content of the solid product are also indicated. The data in the table include the mean heating value for the solid product, which is within the heating value range of coal. However, the mean sulfur content (i.e., 2.36 percent) would not permit its substitution for a low sulfur coal (typically less than 1 percent sulfur).

Physical Property of Carbon Derived Char / Carbon Black

Sr. No.	Parameters	Unit	Mean Value
1	Specific Gravity		1.7
2	Bulk Density	lb/ft	32.4
Particle Size			
3	Measured	micron	40-50
4	Effective	micron	0.05-0.1
Surface Area			
5	BET	m/g	40
6	CTAB	m/g	85
7	Void Volume	ml/100g	85.5
8	Iodine Index	mg/g	153.8
9	Pellet hardness	g/pellet	23
10	Toluene Discoloration		90

- **Gas**

Little information is available on the composition of Pyrolytic gas. Because most systems consume some of the gas for energy and flare the excess, it is likely that little attention has been paid by Anjali Exim to characterize the composition of the gas. The ultimate analysis value of a single pyrolytic gas product is reported in Table. Also, the heating value of the gas is provided. The carbon content of the tire-derived gas is higher than that expected for most natural gas (i.e., 85.76 percent vs. approximately 70 - 75 percent), whereas the hydrogen content is lower (14.24 vs. 23 percent).

Gas Composition		MOLE %
Hydrogen	H—d2˜	19.87%
Nitrogen	N—d2˜	3.65%
Oxygen	O—d2˜	0.71%
Carbon monoxide	CO	3.27%
Carbon dioxide	CO—d2˜	5.24%
Methane	CH—d4	35.70%
Ethylene	C—d2˜H—d4	9.69%
Ethane	C—d2˜H—d6	8.61%
Propylene	C—d3˜H—d6	5.34%
Propane	C—d3˜H—d8	1.81%
Isobutylene	C—d4˜H—d8	4.26%
Trans-butene	C—d4˜H—d8	0.40%
Cis-butene	C—d4˜H—d8	0.29%
Butane	C—d4˜H—d1	0.66%
Isobutene	C—d4˜H—d1	0.23%
1,3 Butadiene		0.33%

- **Steel**

Steel scrap extracted from the feedstock of the tire PGL process contains carbon and fiber contaminants but is usually considered a fairly clean scrap iron ready to be marketed.

Company profile:

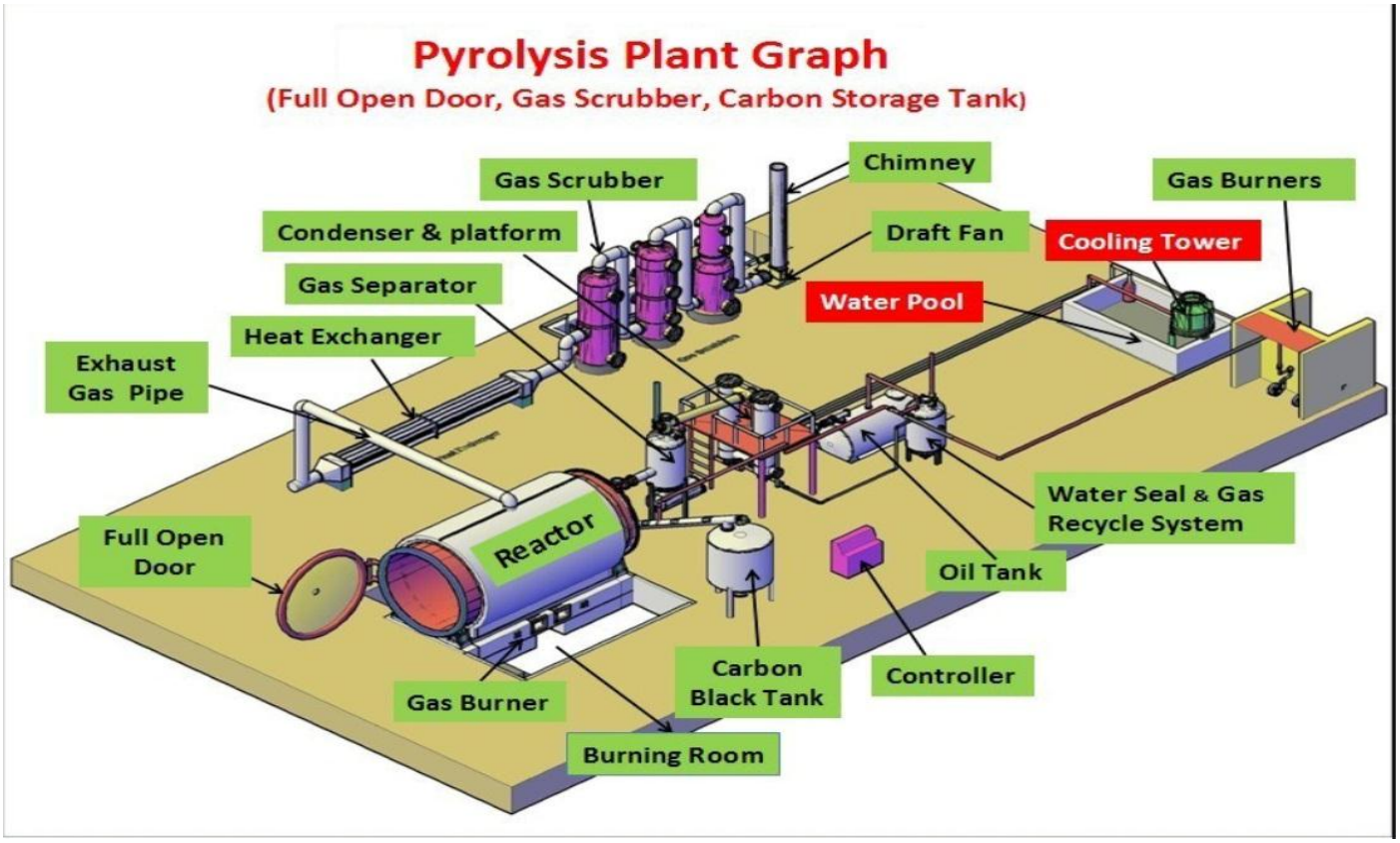
Anjali Exim with its unique renewable technology has come up with a concept of setting new standard in renewable energy, which includes using of waste tires as a raw material and producing Power Generation. (i.e. 250 Kwe Continues per Machine) Other By-Products obtain during the process is green fuel oil, carbon black & scrap steel. With global warming issues and GHG emmitions by direct combustion / burning of scrap tires/rubber, it has now become necessary to resolve the issue by its Proper solution like tire pyrolysis. Through tire pyrolysis we can recover Syngas to produce electricity in such a way that it is environment friendly. This is a unique technology and can change energy market scenario in a big way.

Anjali Exim has a huge team of experienced and expert recycling, consulting and marketing professionals that work hard for obtaining renewable energy from the waste. Our professionals have worked in different countries. We are also working in the sector of laser systems, solar Panel, and textile plus construction business.

Contact:
ANJALI EXIM
Mr.Rajani Patel (CMD)
520,527, Poddar Arcade, Khand Bazaar,
Varachha Road, Near Railway station. Surat-395006, Gujarat, India
info@anjaliexim.com
www.anjaliexim.com

Features of the plant

- 100% waste tire recycling is achieved (no churn left after the process).
- No chemical ingredients are used in process (environment friendly).
- During and after the process; no soil, water or air pollution is observed.
- Creates economically valuable products out of waste (all of the products are industrial raw materials that have a market value).
- The most cost-effective waste tire recycling technology in the world.
- Raw material (waste tire) is cheap and easy to provide.
- Each recycled ton of tire preserves 10 tons of CO2 that is a major greenhouse gas.
- The process can be applied to all rubber based materials.
- The system creates an alternative source of energy to replace petroleum products and natural gas.
- System gives the opportunity to governments and local administrations to deal with the waste tire problem to a great extent.
- System prevents the spread of diseases caused by waste tires.
- We deliver plants with capacities of 10 ton /day and its multiples.
- The process of Pyrolysis has duration of 4 to 12 hours, depending on the amount and type of tire (car tire, truck tire, etc.). During the process different vacuum values are applied in pre-determined temperatures and in different phases different gases are obtained and the condensed gas is stored as fuel-oil in tanks.



Role of Eco Energy Solutions for Preparation of Feasibility Report

We are a group of professionally managed organization specializing in making the Renewable Energies reach the common mass especially in Rural Areas. To achieve this we design, assemble, manufacture and market all such products. Our continued research in this area has enabled us to meet changing demands.

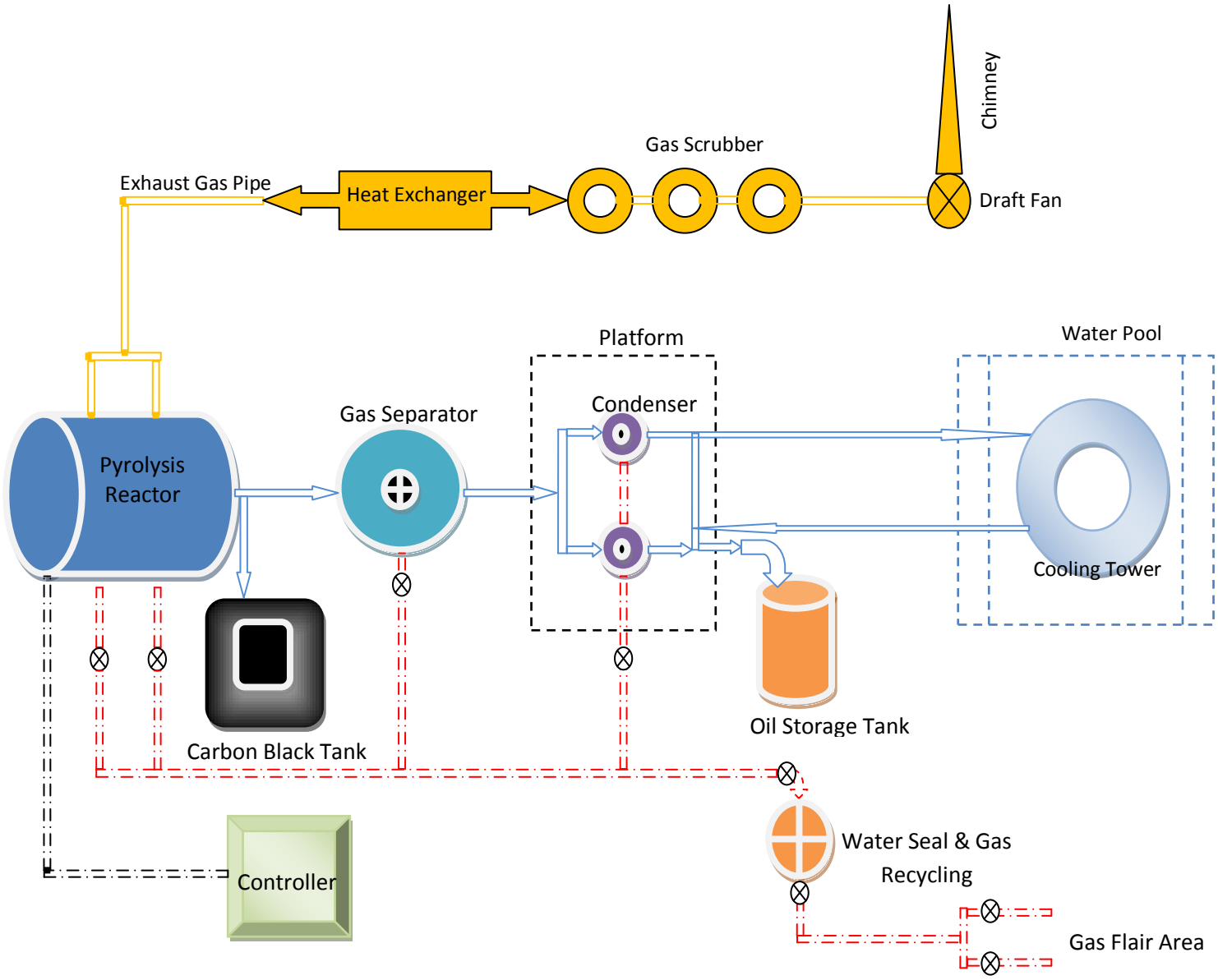
The project submitted to GEDA/ MNRE for Waste Tire Pyrolysis based Power plant has been conceived by us and will be installed, commissioned and handed over to the User by us on a turnkey basis. We will also be providing after sales services.

Our Focused Technologies are,

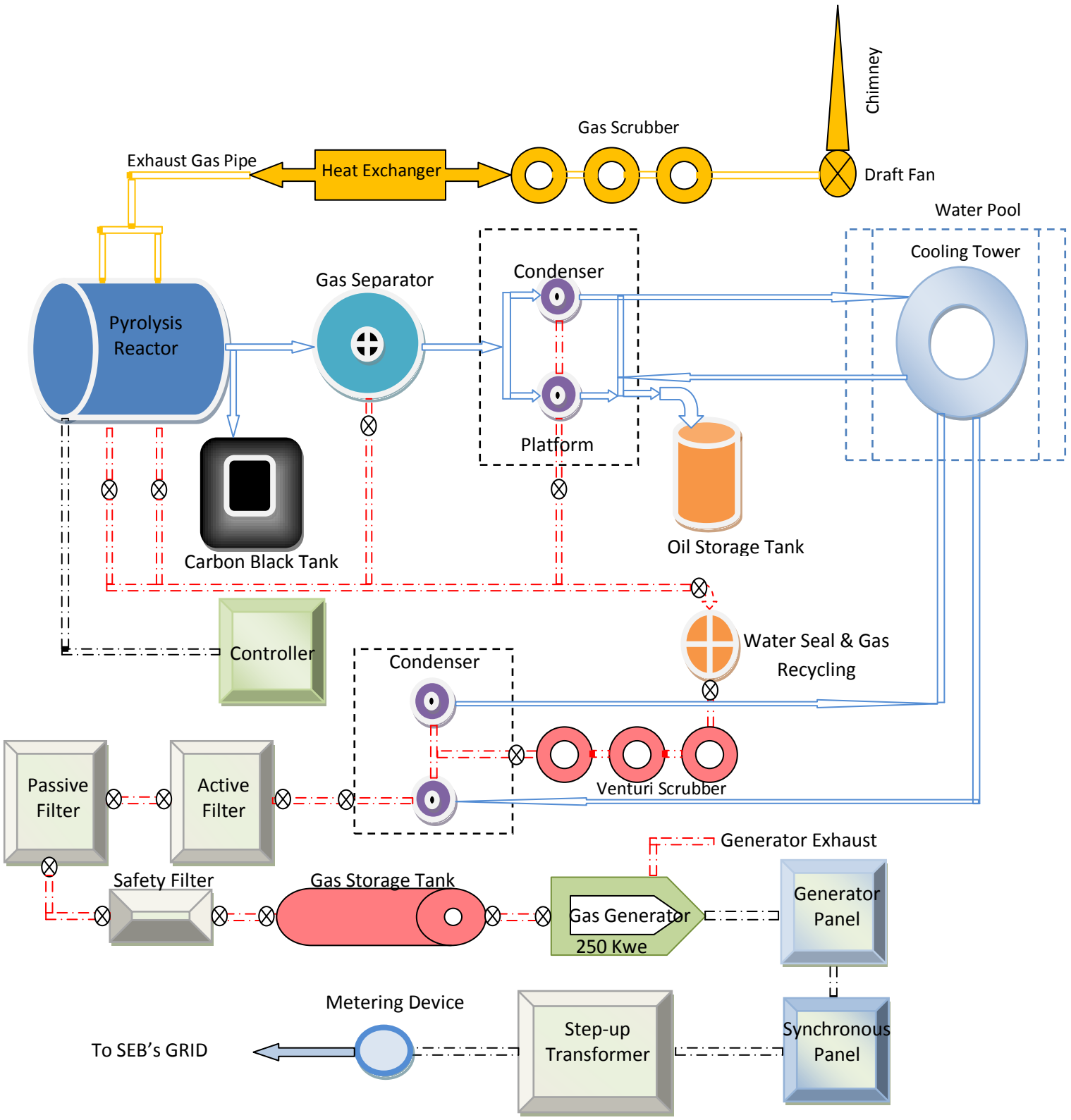
- Biomass Gasification based Energy Generation.
- Power Generation through Waste Tire Pyrolysis.
- Solar Power Generation (PV & Thermal Methods)
- Wind Power Generation (Vertical & Low Speed Wind Turbines)
- Flowing Water Power Generation.
- Tidal waves/currents energy Generation.
- Biogas (Methanation based) CHP Concepts.
- Artificial Algae Cultivation methods for Bio Fuels Productions
- Every day wastes Solution (Municipal solid / Liquid wastes)
- CDM Project Development as per Guidelines by UNFCCC

The Feasibility Report therefore has been prepared & Submitted by us considering these aspects.

EXISTING FLOW DIAGRAM OF TYRE PYROLYSIS UNIT LOCATED AT PIPDARA – KIM – SURAT.



PROPOSED POWER GENERATION MODE FOR TYRE DERIVED GAS.



LIST OF ADDITIONAL EQUIPMENTS REQUIRED FOR POWER GENERATION THROUGH SYN.GAS.

SR.NO.	DESCRIPTION	SPECIFICATION	QUANTITY
1	GASIFIER & BURNER FOR INITIAL THERMAL APPLICATION	WBG- 60 150000 Kcal/Kg.	01
2	VENTURI SCRUBBER FOR CLEANING OF SYNTHETIC GAS	WATER RECYCLE	01
3	CONDENSER FOR TAR CRACKING FROM SYN.GAS	COUPLED WITH COOLING TOWER	01
4	ACTIVE FILTER ASSEMBLY	WOOD WASTE MEDIA FILTER	02
5	PASSIVE FILTER ASSEMBLY	SAW DUST WASTE MEDIA FILTER	02
6	SAFETY FILTER ASSEMBLY	FEBRIC 0.9 MICRON FILTER	01
7	LOW PRESSURE VESSEL	4 cm THICK 3000 CM CAPACITY	01
8	CUMMINSE NATURAL GAS BASED GENERATOR	GTA 1710 G 380 KVA	01
9	SIEMENSE MAKE SYNCHRONOUS PANEL	SYNCHRONISING AT 415 V LEVEL	01
10	VOLTAMP MAKE AIR COOLED STEP – UP TRANSFORMER	500 KVA 0.415 / 11 KV 5 TAP	01
11	SECURE MAKE METERING DEVICE	0.2 S ACCURACY CLASS	01
12	CURRENT AND POWER TRANSFORMERS FOR METER	SHANTI MAKE	01

ESTIMATION & EQUIPMENT COST.

Sr. No.	Description Of Equipment	Quantity	Estimated Equipment Cost
1	TIRE PYROLYSIS PLANT (China Make)	01 Set	₹ 50, 00, 000 = 00.
2	GASIFIER & BURNER FOR INITIAL THERMAL APPLICATION	01 Set	₹ 8, 00, 000 = 00.
3	VENTURI SCRUBBER FOR SYNTHETIC GAS	01 No.	₹ 10, 00, 000 = 00.
4	CONDENSER FOR TAR CRACKING FROM SYN.GAS	01 No.	
5	ACTIVE FILTER ASSEMBLY	02 Nos.	
6	PASSIVE FILTER ASSEMBLY	01 Nos.	
7	SAFETY FILTER ASSEMBLY	01 No.	
8	LOW PRESSURE VESSEL (LPV) for Gas Storage	01 No.	₹ 20, 00, 000 = 00.
9	CUMMINSE NATURAL GAS BASED GENERATOR	01 No.	₹ 50, 00, 000 = 00.
10	SIEMENSE MAKE SYNCHRONOUS PANEL	01 No.	₹ 10, 00, 000 = 00.
11	VOLTAMP MAKE AIR COOLED STEP – UP TRANSFORMER	01 No.	₹ 5, 00, 000 = 00.
12	SECURE MAKE METERING DEVICE	01 No.	₹ 2, 00, 000 = 00.
13	CURRENT AND POWER TRANSFORMERS FOR METER		
	Net Total		₹ 1, 55, 00, 000 = 00.
	Other Misc. Expenditures		₹ 20, 00, 000 = 00.
	TOTAL ESTIMATED PROJECT COST		**₹ 1, 75, 00, 000 = 00.**

- ⇨ Proposed Project cost is approximate only. The actual Prices of the above equipment can be obtained at the time of purchase.
- ⇨ Land cost for Proposed Plant & its Construction cost is not included in above. It is to be evaluating on location basis & facility requirement basis.
- ⇨ Captive Electrical Consumption of the said plant is Approximately 30 Kw. The cost & Deposit Can be paid to State Electricity Board for getting 30 Kw connections is also not included in above.

Feasibility of Power Generation through Scrap Tire:

Total Investment for Project:

Sr.No.	Description	Quantity	Amount
1	TIRE PYROLYSIS PLANT (China Make)	01 Set	₹ 50, 00, 000 = 00.
2	GASIFIER & BURNER FOR INITIAL THERMAL APPLICATION	01 Set	₹ 8, 00, 000 = 00.
3	VENTURI SCRUBBER FOR SYNTHETIC GAS	01 No.	₹ 10, 00, 000 = 00.
4	CONDENSER FOR TAR CRACKING FROM SYN.GAS	01 No.	
5	ACTIVE FILTER ASSEMBLY	02 Nos.	
6	PASSIVE FILTER ASSEMBLY	01 Nos.	
7	SAFETY FILTER ASSEMBLY	01 No.	
8	LOW PRESSURE VESSEL (LPV) for Gas Storage	01 No.	₹ 20, 00, 000 = 00.
9	CUMMINSE NATURAL GAS BASED GENERATOR	01 No.	₹ 50, 00, 000 = 00.
10	SIEMENSE MAKE SYNCHRONOUS PANEL	01 No.	₹ 10, 00, 000 = 00.
11	VOLTAMP MAKE AIR COOLED STEP – UP TRANSFORMER	01 No.	₹ 5, 00, 000 = 00.
12	SECURE MAKE METERING DEVICE	01 No.	₹ 2, 00, 000 = 00.
13	CURRENT AND POWER TRANSFORMERS FOR METER		
		Net Total	₹ 1, 55, 00, 000 = 00.
14	Land Cost for Proposed Site @1500 per Sq.Mtr.	2000 Sq. Mt.	₹ 30, 00, 000 = 00.
15	Building & Construction Cost@1500 per Sq.Mtr.	1000	₹ 15, 00, 000 = 00
16	Power Evacuation Charge Paid up to SEB.	Lump sum	₹ 20, 00, 000 = 00.
17	Misc. Expenditures	Lump sum	₹ 10, 00, 000 = 00.
18	Working Capital for 1 Months	Lump sum	₹ 30, 00, 000 = 00.
		Total Project Cost	₹ 2, 60, 00, 000 = 00.

- Debt Equity ratio is 70:30 from any nationalize bank. (Approximate rate of Interest 14 %)
- Hence Debt will be **₹ 1, 82, 00, 000 = 00**. & Promoters Equity will be **₹ 78, 00, 000 = 00.**

PER BATCH EXPENDITURES:

(We consider 2 batches per day. i.e.12 hours per batch time)

1. **Interest Cost:**

   Total Debt **₹ 1, 82, 00, 000 = 00**. @ 14% Interest

⇨ Annual Payable Interest **₹ 25, 48, 000 = 00**.

⇨ Daily Payable Interest **₹ 6, 980 = 00**.

⇨ Per Batch Payable Interest **₹ 3, 490 = 00**.

2. **Feedstock Cost:**

   Currently Feedstock is available @ **₹ 6 to ₹ 7 per Kg.** We are utilizing 6 ton per batch.

⇨ 6000 Kgs. X **₹ 7 = ₹ 42, 000 = 00.** Per batch feedstock Cost.

3. **Fuel Cost:**

   Per Batch We Required Approximately 800 Kgs. Fire wood for initial startup.
   The Rate of Firewood presently we are paying is **₹ 4.50** per Kgs.

⇨ 800 Kgs. X **₹ 4.50 = ₹ 3, 600 = 00.** Fuel cost per batch.

4. **Salary & other Maintenance Cost:**

   We required Following Detailed Manpower for Operation & Maintenance Purpose.

Sr. No.	Designation	Total No.	Approximate Monthly Salary	Total Salary
1	Plant Engineer In - Charge	2	**₹ 25, 000 = 00**	**₹ 50, 000 = 00**
2	Shift Engineer	4	**₹ 18, 000 = 00**	**₹ 72, 000 = 00**
3	Skilled Technicians	4	**₹ 12, 000 = 00**	**₹ 48, 000 = 00**
4	Semi-Skilled Technicians	4	**₹ 8, 000 = 00**	**₹ 32, 000 = 00**
5	Un-Skilled Helpers	4	**₹ 6, 000 = 00**	**₹ 24, 000 = 00**
6	Plant Labors	8	**₹ 5, 000 = 00**	**₹ 40, 000 = 00**
7	Security Guards	4	**₹ 6, 000 = 00**	**₹ 24, 000 = 00**
8	Accountant	2	**₹ 10, 000 = 00**	**₹ 20, 000 = 00**
	Monthly Salary Payable	32	**Total**	**₹ 3, 10, 000 = 00**

⇨ Total Monthly Salary Payable **₹ 3, 10, 000 = 00.** Hence per Day We can pay **₹ 10, 334 = 00.**
⇨ Per Batch O & M cost Payable will be **₹ 5, 167 = 00.**

5. Electricity Consumption Cost:

We required 30 Kw connections from State Electricity Board, Hence per batch Electricity Cost can be as under.

⇨ 30 Kw X 12 Hour Usage X **₹ 7** Max. Applicable Tariff by SEB = **₹ 2, 520 = 00.**

6. Cost for Packing & Forwarding of By-products

We are considering a lump sum cost of **₹ 2, 50, 000 = 00.** Per month
⇨ Hence daily expenditure for packing and forwarding could be **₹ 8, 334 = 00.**
⇨ Per batch P & F cost will be **₹ 4, 167 = 00.**

7. Administrative & Other Cost:

We consider a lump sum cost of **₹ 1, 00, 000 = 00.** Per month for Administrative cost including Travelling & Sales Promotions.
⇨ Hence daily Administrative cost could be **₹ 3, 334 = 00.**
⇨ Per batch Administrative cost could be **₹ 1, 667 = 00.**

OVER ALL RUNNING COST PER BATCH WILL BE ₹ 62, 611 = 00.

REVENUE GENERATION PER BATCH:

1. **Income from Power Generation:**

   We are Generating Continues 250 Kwe Electricity & Fed to Grid. The T & D loss can be 6% of total energy produced. Hence net exportable unit can be 235 Kwe.

   Total per Batch Income of Electricity are as under:

- ⇨ 235 Kwe (Unit Generation/hour) X 12 Hour Operation X Buyback rate of SEB is **₹ 4 =**
- ⇨ Total **₹ 11, 280 = 00.**

2. **Income from Selling By-product Oil:**

   We can recover 35% oil from scrap tires.

- ⇨ 35% Recovery X 6000 ton tire used during a batch = 2100 Kgs.
- ⇨ Approximate Resale Rate would be **₹ 18 to ₹ 20** per Kgs.
- ⇨ Total Income from oil resale will be **₹ 18** X 2100 Kgs. = **₹ 37, 800 = 00.**

3. **Income from Selling By-Product Carbon Char/Carbon Black**:

   We can recover 30% Carbon Char / Carbon Black from scrap tires.

- ⇨ 30% Recovery X 6000 ton tire used during a batch = 1800 Kgs.
- ⇨ Approximate Resale Rate would be **₹ 8 to ₹ 10** per Kgs.
- ⇨ Total Income from oil resale will be **₹ 8** X 1800 Kgs. = **₹ 14, 400 = 00.**

4. **Income from Selling By-Product Scrap Wires:**

   We can recover 12% Scrap Wires from scrap tires.

- ⇨ 12% Recovery X 6000 ton tire used during a batch = 720 Kgs.
- ⇨ Approximate Resale Rate would be **₹ 12 to ₹ 14** per Kgs.
- ⇨ Total Income from oil resale will be **₹ 12** X 720 Kgs. = **₹ 8, 640 = 00.**

OVER ALL REVENUE GENERTED PER BATCH WILL BE ₹ 72, 120 = 00.

PAYBACK PERIOD:

- Total Revenue Generated per batch **₹ 72, 120 = 00.**
- Total Expenditures per batch **₹ 62, 611 = 00.**
- **Net Profit per batch** **₹ 09, 509 = 00.**

- **Net Profit per day** **₹ 19, 018 = 00.**
- **Net Profit per year@80% Availability** **₹ 55, 53, 256 = 00.**

- **Total Investment for the Project** **₹ 2, 60, 00, 000 = 00.**

- ✓ **HENCE PAYBACK PERIOD CAN BE WORK OUT @ 4.6 Years (Approximately)**