

TYREtech

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Abstract. The numbers of vehicles hitting the roads is increasing every day and so is the number of tyres. TYREtech will recycle the worn out tyres in a unique technique. Tyres are designed to endure some of the harshest conditions possible. This has compelled governments, Councils, Dealers and the public to accept disposal charges in an effort to offset the costs of landfill or reprocessing. There are millions of tyres discarded globally every year. Significant recycling opportunities exist for investing to earn constant dividends. Land filling or burning tyres have limited prospects as environmental authorities are acknowledging the need for greener alternatives for this waste product. TYREtech proposes a unique solution which blends recycling of waste tyres and using hoarders as a supply chain man power. From 1000kg of tyres – 450ltr of fuel oil, 150ltr of petroleum gas, 75 kg steel, and 250 kg carbon can be recovered without using external power benefiting both the economy and the environment.

Keywords: Tyres, Landfills, Recycling, Carbon black, Fuel oil, Butyl Rubber, Carbon Credits.

1. Introduction

More than 33 million vehicles have been added to Indian roads in the last three years; one can only imagine the number of tyres that will be discarded. One way to put an end to the menace would be landfills but tyres are not desired at landfills, due to their large volumes and 75% void space, which quickly consume valuable space[1]. 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. Fires involving tyres can occur undoubtedly, burning for months, creating substantial pollution in the air and ground. An additional health risk, tyre piles can harbor vermin and provide a breeding ground for mosquitoes. Illegal dumping of scrap tyres pollutes ravines, woods, deserts, and empty lots[1]. Due to heavy metals and other pollutants in tyres there is a potential risk for the leaching (leachate) of toxins into the groundwater when placed on wet soils. Surveys claims that 10% of tyres currently go to landfill, 4% are recycled and the remaining 86% are illegally grooved, dumped in the veld, burned for steel contained by the tyres or are stockpiled [4]. Approximately, one tyre is discarded per person per year. In the UK, The Environmental Protection Agency (EPA) has launched an initiative to encourage businesses to recycle tyres. It is estimated that 100,000 used tyres will be removed from UK’s vehicles each day, amounting to 40,000 tons of waste rubber each year. Under the scheme, the EPA and the Waste and Resources Action Program (WRAP) plan to create guidelines for the collection, transportation, storage, recycling and reuse of the rubber tyres. Each reprocessed ton of tyre preserves 10 tons of CO₂, which is a foremost greenhouse gas [2].

London News reported on 10th June 2010 “Garages and Tyre dealers are being warned that they could face significant fines or custodial sentences if they are unsuccessful to recycle their used tyres correctly. The warning has been issued by the Tyre Recovery Association following the recent prosecution of nine individuals who were fined nearly £75,000 for illegally dumping rubbish which included used tyres.” So what could they have done or, more importantly, what can an individual do with an old tyre?

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2. Proposed Solution

A typical passenger car tyre contains 24-28 percent of Carbon black, 40-48 percent of natural rubber (NR) and 36-24 percent of synthetic rubber, which can be recovered and used [4]. Currently, India fabricates 90,000 metric tons (MT) of reclaimed rubber, which is sold at Rs 25-30/kg but does not produce Carbon black, Butyl Rubber and oil from used tyres. Current tyre production stands at 11.75 lakh MT for the year 2009-10. With the projected growth of 50 percent, you can easily approximate the potential of the opportunity. From 1000kg of tyres – 450ltr of fuel oil, 150ltr of petroleum gas, 75 kg steel, and 250 kg carbon can be recovered. No external power source will be required as the gases produced by the process will be used to fuel the plant. Scavengers (rag pickers) will be trained to develop a supply chain network both in terms of the raw material and the end product. The Indian Rubber Board, which is a cash rich organization, can offer incentives of various kinds to the recyclers to start and expand the business. TYREtech aims at putting an end to this menace by recycling tyres into green fuel oil, carbon, steel and gas. There will be no pollution. The plants would be fueled by the gases produced in the process itself.

INPUT MATERIAL	QUANTITY	OUTPUT
WASTE TYRE	1000Kg	- 450Ltr of Industrial Fuel - 150kg of Petroleum gas - 75Kg of Steel - 300kg of Black Carbon

Fig. 1: Waste Tyre recycling results

TYREtech will train locals how to accumulate discarded tyres and spread awareness about their ill-effects. A uniform module for training the scavengers, in different parts of India will be developed. The key is to communicate this information to the local community in a simple and succinct manner. TYREtech can help them understand supply chain management and simultaneously earn a livelihood. TYREtech plants will be setup in rural areas where it can provide employment opportunities as well. The long term goal would be to promote recycling as a part of the regular student curriculum. Recycling benefits both the economy and the environment[1].

3. Value Proposition

Even though recycling is a 40 year old industry in India with the oldest player being Gujarat Reclaim, the number of players nationally involved is very small. There are approximately 15-25 tyre recyclers in India, compared to 36 tyre manufacturers. The major players number only about four or five. They are mainly located in North India and Maharashtra. Prominent names include Gujarat Reclaim, ELGI Group, Balaji Group, Rishirop and Swani. Gujarat Reclaim has an annual turnover of over Rs 15 crore from its Haridwar Tyre recycling plant, with a production of 20 tons of reclaim rubber per day. However, none of the recyclers in India are full-fledged recyclers, and most of them use the Pan method for reclaiming rubber. They operate by outsourcing part of their work to each other. In fact, in India, even the tyre recycling industry is not aware of all these uses. TYREtech will recycle Waste tyres into green fuel oil and black carbon etc. which are nonexistent in India. We will use a unique supply chain for procuring the raw material – 20-30% from the scavenger network, and rest from the tyre dealers and the tyre associations across the country. Later as our capacity will increase, we will import waste tyres from other countries. Every year, California exports more than two million waste tyres in an effort to keep them out of California landfills. The key premise for this proposal is that community based waste disposal and recycling is non-existent in India. TYREtech provides a solution for effective disposal and recycling of waste tyres. TYREtech aims at training entrepreneurs and likeminded people. A uniform module for training the scavengers, in different parts of India will be developed. A supply chain network will be setup with the tyre dealers and associations. Pyrolysis can be used to reprocess the tyres into fuel gas, oils, solid residue (char), and carbon black, which can be used in tyre manufacture [1] [6]. With the right initiatives taken by the government, there is a possibility of 50-100 percent growth of this industry including export options (of the good quality reclaimed rubber). India is

currently the second largest reclaim rubber producer after China. Statistics project a mammoth potential increase of Rs1.13 billion in the industry. Countries in Middle East, Africa, Europe and other Asian countries form the export market. TYREtech will work for obtaining renewable energy from waste. This business can be replicated across various geographies because of the abundant raw material and easy training modules. The key is to communicate this information to the local community in a simple and succinct manner. In India there are many tyre associations but there are no tyre recycling associations, TYREtech will work towards establishing these.

4. Sustainability

Even the hybrid cars require four tyres apiece, and the global consumption of automobiles isn't ending anytime soon. Worldwide, about a billion tyres are sold annually, and eventually all are discarded. In India alone, we throw away 100 million tyres a year. These castoffs are a huge source of pollution—the average used tyre weighs 22.5 pounds and contains about two gallons of fuel, as well as other combustible carbon compounds. Carbon credit, formalized in the Kyoto Protocol, is a tradable certificate or license representing the right to emit one ton of carbon dioxide or other greenhouse gases with mass equivalent to one ton of carbon dioxide[2]. Operators can sell their unexploited allowance of carbon credit privately or in the open market to others who are about to exceed their allocation. It helps create a market for reducing greenhouse emissions by giving a monetary value to the cost of polluting the air. Emissions are discernible on the balance sheet alongside raw materials and other liabilities or assets [5]. As of 2007, the EPA reported that out of the 7.48 million tons of tyre materials that constituted solid waste, only 1.1 million tons of this was "reclaimed". TYREtech will begin its operations from Kanpur, Uttar Pradesh. Supply chain would be established across North India with a focus on trucking centers. Five years down the lane plants would be established in Ludhiana, Punjab and Nasik, Maharashtra, the supply chain would be spanning across India and used tyres will be imported from other countries which would generate extra profits. Now, the Indian Tyre industry (specifically) imported 39,000 tons of Carbon black and 54 percent of its Butyl Rubber requirements in 2008-09. If we could produce even a small amount of that import ourselves, we would be saving an enormous amount for the exchequer. Current tyre productions prevail at 11.75 lakh MT for the year 2008-09. With the projected growth of 50 percent, you can easily estimate the potential of the opportunity. The Indian Rubber Board, being cash rich, can offer incentives of various kinds of recyclers to start and expand their business. A pyrolysis plant producing 50 MT/day shall cost Rs 3-10 crore depending upon the source of the machines and level of automation [6]. A fully automated plant would cost about Rs12 crore. Training and supply chain management, to make sure that both the supply of old tyres is regulated and sale of by-products is maintained continuously, will cost about 50 lakhs. In Mexico, San Diego Assembly members are in support of SB 167, which allows recycle funds in the country to be used for tyre recycling projects such activities can be initiated in India [3].

5. Conclusion

The first step is to spread awareness of tyre recycling. The more people recycle, the cheaper it gets. Tyre dealers and associations are seeking legal ways to dispose used tyres; TYREtech will help them do so. At a later stage huge revenues can be generated from importing used tyres, every year, California exports more than two million waste tyres in an effort to keep them out of California landfills. The tyre derived fuel and other products have immense uses in – molded rubber industry, civil engineering projects, automobile industry, cement, and energy production. Tyre amnesty day events, in which general public can deposit a limited number of waste tyres free of charge, can be funded by Indian scrap tyre programs, helping reduce illegal dumping and improper storage of scrap tyres. Tie-ups can be made with Big Bazaars, Spencer's and Reliance Fresh for the same to help us collect used tyres from the public, with certain incentives being offered in terms of discounts.

6. References

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