



# Polytechnic University of Puerto Rico

## Civil and Environmental Engineering Department

### Environmental Engineering Senior Project Design II

#### SP-14



# Scrap Tires in Puerto Rico

## Abstract

Scrap tires are considered a solid waste that is currently overpopulating storage facilities; tire shops, and illegal dumping sites in Puerto Rico. These tires present unusual disposal problems due to their physical and chemical characteristics. Characteristics that make a new tire desirable, such as durability and performance, make it difficult to dispose. Tire production uses a series of techniques that incorporates different raw materials (metals, rubber, carbon black), which make the tire immune to biodegradation. These characteristics have consequences on the type of disposal they may have. Environmental impacts are a fact due to the classification of a scrap tire as a special solid waste. The following proposed facility will treat scrap tires and all its components. Scrap tires are mainly composed of synthetic rubber, natural rubber, metals, and small fractions of specific fibers and textiles. Increasing amounts of scrap tires in Puerto Rico must be addressed. This Facility will provide a designed alternative that will help reduce the high number of scrap tires in the island.

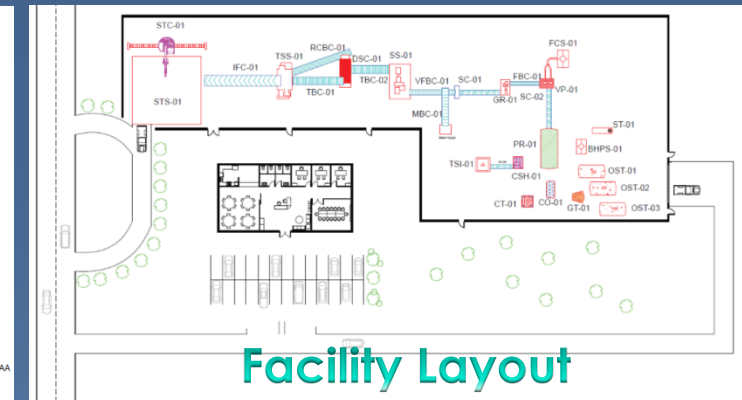
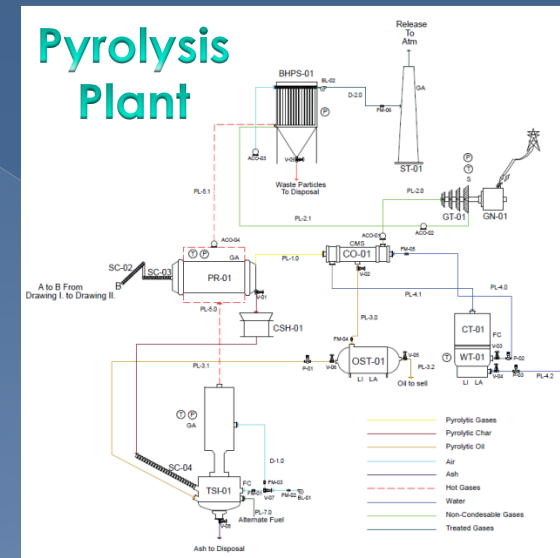
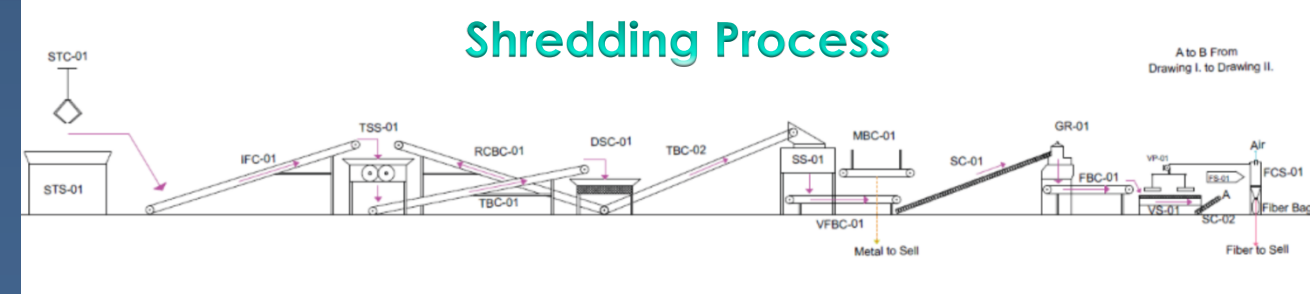
## Objectives

The main objective of RIC is to contribute to the solution of scrap tires in Puerto Rico. To gain a better perspective of the problem, the work group seeks to analyze the environmental impact generated by scrap tires. Identifying the environmental impacts of scrap tires will help reduce negative consequences on local neighborhoods and communities. Propose and implement an alternative solution to minimize the population of scrap tires on the island, is a goal we intend to meet. The objective is to analyze existing alternatives that will transform scrap tires. Developing a design using technologies for transformation and processing of scrap tire is one of our objectives. This design will provide the necessary elements to help reduce the amount of scrap tires in Puerto Rico without considering the option of exportation.

## Conclusion

Scrap tires in Puerto Rico are a solid waste that is currently exported because of the absence of a proper facility to treat such tires. The described facility in this report has the capacity to treat scrap tires, a rubber based object that is considered a great heat conductor. As part of the facilities objectives, the technologies chosen to treat scrap tires will have the capacity to treat a significant amount of scrap tires with low environmental impacts. Minimum waste generation characterizes the facility as a clean source reduction alternative. After a detailed evaluation of the available alternatives needed to characterize a facility that will help reduce the amount of scrap tires in Puerto Rico, RIC can conclude that the option of a pyrolysis system with the addition a small incineration system that will provide the necessary heat for the pyrolysis reactor is the best alternative. The facility provides all the necessary equipment's for both technologies to operate smoothly. With these technologies, the facilities will generate a series of liquid, gas and solid fuels that can be used to run the facility or for designated markets. This facility meets with the main objectives of the project while providing new innovative technologies that will drive the industry into the future.

## Final Design



## Motivation and Justification

The automobile is the main method of transport in Puerto Rico. Ninety percent of the population in the island uses it as their main method of transportation. The number of registered vehicles on the island averages to about three million. This considerable amount of automobiles in the island is the main generation source of approximately 4.7 million scrap tires annually. When scrap tires are not properly managed, they become solid waste pollutants that are usually discarded in clandestine landfills. August 31, 1996 law No.171, better known as The Act of Handling Tires, banned the disposal of whole tires in Sanitary Landfill Systems. For this reason many discard scrap tires end up in clandestine landfills. This project will contribute with the solution of the problem of scrap tires and generate positive economy with new market and employments opportunities. In the near future the proposed project will help reduce the amounts of scrap tires in the island while giving back to island that has generated them. With great people and innovated ideas, such projects can be accomplished to make the island a better place.



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