



# Turning End-of-Life Tires into Clean Energy: Solving a Critical Waste Challenge in Northern Peru

**Key Concepts-** End-of-Life Tires, Pyrolytic oil, Recovered carbon black, Tire waste management, Pyrolysis plant, Alternative fuels

## The Growing Tire Waste Problem No One Wants to Talk About

Every year, thousands of end-of-life tires accumulate across Peru's transportation, mining, and agricultural sectors. These used tires, known as ELT (End-of-Life Tires), represent a significant environmental challenge due to their large volume, slow degradation, and potential environmental risks when improperly managed.

For companies operating in northern Peru, the challenge is even greater. The region has historically lacked sufficient formal infrastructure for tire recovery and valorization, forcing businesses to store large quantities of waste tires, transport them long distances to treatment facilities in other regions, or rely on informal disposal practices.

These alternatives generate additional costs and expose companies to compliance risks under some regulatory requirements, which establishes Extended Producer Responsibility obligations for tire management. Failure to demonstrate proper traceability and environmental compliance can result in regulatory observations, financial penalties, and reputational damage.

## Transforming a Problematic Waste Stream into Valuable Resources

ECOPIRO is a cleantech company that specializes in the formal valorization of end-of-life tires through advanced pyrolysis technology. The company provides businesses with a complete and traceable waste management solution, including collection, treatment, certification, and environmental documentation. Through its process, tires that would otherwise become an environmental liability are converted into valuable products with industrial applications.

By combining circular economy principles with resource recovery technologies, ECOPIRO transforms a problematic waste material into useful products, preventing disposal and promoting resource efficiency. Its process eliminates the need for hazardous solvents, reducing risks associated with chemical processing. By recovering energy embedded within discarded tires, ECOPIRO reduces the demand for virgin fossil resources and contributes to lowering the carbon footprint associated with industrial fuel consumption.

Equally important, the process incorporates pollution prevention measures directly into the system design, ensuring cleaner emissions management and safer operation. Through these innovations, ECOPIRO demonstrates how environmental challenges can be transformed into sustainable business opportunities.

**Rubber polymers → alkanes + alkenes + aromatics + light gases + solid carbon**

During the pyrolysis, some intermediate hydrocarbon fractions rearrange to form aromatic compounds in the pyrolytic oil, such as benzene, toluene, xylene, limonene, and other aromatics, which contribute significantly to its energy value. Carbonization / carbon black formation: the heaviest and least volatile organic fraction does not fully vaporize and instead forms a carbon-rich solid residue known as recovered carbon black or pyrolytic char, composed mainly of carbon along with ash and tire-derived minerals.



Component name	Description
Pyrolysis plant	Facility where waste materials such as rubber are thermally decomposed in the absence of oxygen, producing pyrolytic oil, carbon black, light gases, and other valuable by-products. It enables waste valorization and supports a circular economy by converting end-of-life tires into usable resources.
Recovered carbon black and steel storage	Carbon black will be stored in big bags for later commercialization, while the steel will be compacted to reduce its volume.
Pyrolytic oil storage area	Concrete-floored area with a corrugated metal roof, where 1 m <sup>3</sup> HDPE IBC tanks will be installed.
Tire cutting area	Waterproofed, roofed concrete-floored area where a semi-automatic tire cutting machine and an air compressor will be installed.
Water storage pond	Storage of recirculating water for cooling the pyrolysis plant

**EMISSIONS**

- Pyrolysis**
- Open burning**
- Landfills**
- Emissions reduction vs. open burning**
- Emissions per processed tire**

**IN THAILAND**

- generates approximately **17.93 - 18.43** kilotonnes (kt) CO<sub>2</sub> eq./year
- generates **184.05 - 189.02** kt CO<sub>2</sub> eq./year
- generates methane emissions equivalent to **78.87 - 92.43** kt CO<sub>2</sub> eq./year

Therefore, pyrolysis reduces approximately **90%** of CO<sub>2</sub> equivalent emissions compared to open burning of waste tires.\*

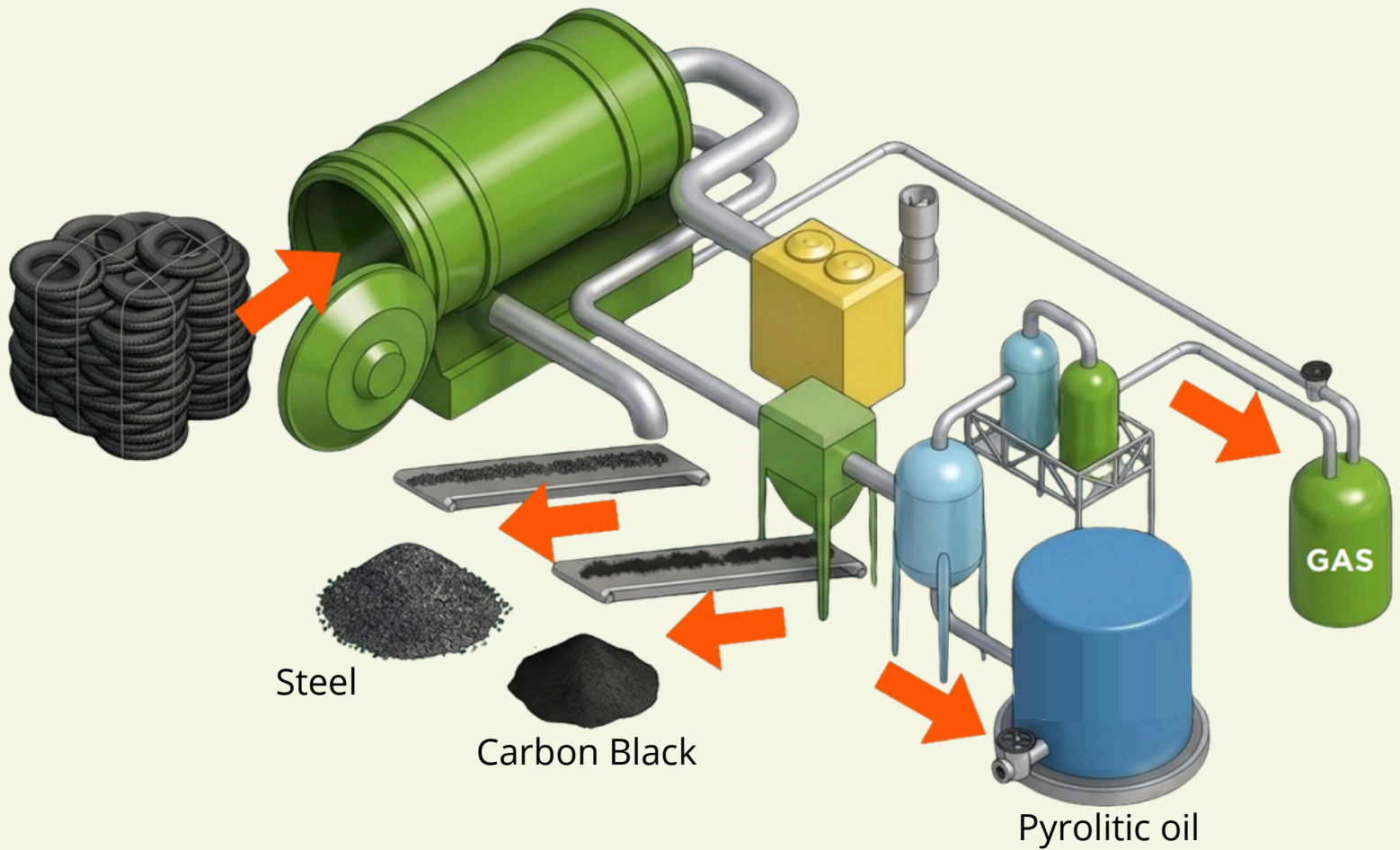
**2,442** kg of CO<sub>2</sub> eq. /year

**IN COLOMBIA**

- generates approximately **25.27** kilotonnes (kt) CO<sub>2</sub> eq./year
- generates **257.40** kt CO<sub>2</sub> eq./year
- generates methane emissions equivalent to **117.93** kt CO<sub>2</sub> eq./year

Therefore, pyrolysis reduces approximately **80%** of CO<sub>2</sub> equivalent emissions compared to open burning of waste tires.\*

**230** kg of CO<sub>2</sub> eq. /year



At the core of ECOPIRO's innovation is a pyrolysis process specifically designed to recover value from end-of-life tires. Through controlled thermal decomposition in the absence of oxygen, waste tires are transformed into valuable outputs, including pyrolytic oil with significant energy potential. Unlike traditional disposal methods, pyrolysis allows the recovery of embedded energy and materials while minimizing environmental impacts.

A key advantage of ECOPIRO's process is its adherence to Green Chemistry principles. The technology converts a problematic waste stream into useful products without the use of toxic solvents, reducing environmental burdens while creating new economic opportunities.

The facility incorporates an integrated gas treatment system featuring a central chimney connected to washing and cooling stages that help optimize emissions and prevent the release of dense particulate matter and other critical pollutants. This design contributes to cleaner operations and improved environmental performance throughout the valorization process.

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