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The missing link in the tire industry

Pneutech SAS has developed an innovative thermal power plant concept using end-of-life tires as the principal fuel

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This facility is the "missing link" in the tire supply chain. It generates energy while recycling all the industry's rubber waste, extracting valuable raw materials and reintroducing them to the production cycle.

At a time when Europe is increasingly aware of the need to promote a "closed loop" economy, the recovery of materials contained in used tires is beginning to make perfect sense.

As a fuel, tires have a higher calorific value than that of coal (35MJ/kg as against 25MJ/kg for coal). They contain more carbon and produce less ash, making them very attractive thermodynamically. They are rich in base metals, especially iron (in steel bead wires and carcasses), zinc, and rare metals such as cobalt.

Pneutech's feedstock consists of whole or crushed end-of-life tires and waste products from both tire manufacturing and elsewhere in the rubber industry. These are transformed into thermal and electrical energy and high-quality raw materials.

The company is planning a thermal power plant of this type in Strasbourg, France. With a rated power of 30 MWe, it will be capable of incinerating 300 tonnes of waste daily.

A thermal process that promotes recycling

The process uses proven combustion technology, and complies with all requirements of French and European standards for discharges to the environment.

The fuel is introduced into the furnace at 1500°C, at which temperature all the organic materials vaporise almost instantaneously. The steel in the bead strips and carcass melts rapidly into droplets which are flash-cooled by tempering. Of excellent quality, this steel commands a better price than scrap metal.

The combustion of organic materials produces gases, some of which are pollutants (nitrogen oxide, sulphur dioxide and chlorine). These are neutralised by a process enabling the sulphur to be recycled as good-quality synthetic gypsum and the chlorine as calcium chloride. The gypsum can be used to make plaster and the calcium chloride a road salt.

Cobalt improves adhesion between steel and rubber and appears in the EU critical raw materials list

Zinc and cobalt recycling

An innovative hydrometallurgical process allows valuable zinc and cobalt to be dissolved and recovered.

Cobalt and zinc oxide are used in the manufacture of radial carcass tires. Zinc oxide may comprise up to 1.3 percent of the tire volume. It is a vulcanisation accelerator, also improving dynamic and ultraviolet ageing performance.

Cobalt is a binding agent which improves adhesion between steel and rubber. It appears in the European Union's list of 14 critical raw materials. The list encourages member states to adopt strategic measures to increase the recycling efficiency of these materials and products containing them, so as to ensure continuity of supply.

Unburnt carbon (around 30 percent of the weight of the ash) is separated from the mix so that it can be pulverised to fuel the boiler.

Pneutech's development will be attractive to tire manufacturers seeking high-quality recycled materials for reintegration into the production process, thus "closing the loop".

Energy for sale

Steam is generated by the heat from tire combustion. The steam can be used locally, for example for rubber vulcanisation, or to generate low-cost electricity (€29.98 per MWh in the Strasbourg project, having accounted for the sale of recyclable materials). Subject to national regulations, the electricity will either be sold on to an energy supplier or consumed locally.

Investment opportunity

With a view to completing the financing for the Strasbourg project, Pneutech recently launched a subscription offer of €5m to industry stakeholders: manufacturers, garage operators, waste tire collectors, scrap vehicle dealers and recycling companies. In return, the company offers investors a guaranteed trade-in at profit for tires, waste from crushing and rubber waste. Prices could reach €70 per tonne for tires and from €10-70 for crushing waste.

In France, Pneutech has already received support from Recyclage Automobile, a financial fund operating in automobile recycling. Banks such as Banque Européenne du Crédit Mutuel (a subsidiary of Crédit Mutuel – Crédit Industriel et Commercial) and investment funds have also shown interest in financing the initial bank loan and subscribing to a further increase in capitalisation. The Banque Publique d'Investissement and the Agence de l'Environnement et de la Maîtrise de l'Énergie are also interested in taking a financial stake in the project.

Pneutech's engineering division is appraising several recycling projects on an international scale, providing technical support to manufacturers. ■

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