

Turning tyres into gas for energy and new, valuable materials

April 4 2013, by Alexander Hellemans



Europe's tyre waste production is 3 million tonnes per year. Currently 65% to 70% of used tyres end up in landfills. Not only are they causing environmental damage, but a loss of added value in the form of new products that recycling can generate. One of the approaches for recycling tyres is now being investigated in a EU funded project called [TyGRE](#).

Tyres offer [recycling](#) potentials because they have a better heating value than [biomass](#) or [coal](#), and they contain a high content of volatile gasses. They can therefore be an interesting source of [synthetic fuels](#), also called synfuels, according to Sabrina Portofina, a [researcher](#) at the [Italian national agency for new technologies, energy and sustainable economic](#)

[development](#), ENEA, in Portici, near Naples. As part of the project, she is conducting an experiment to analyse a thermal process to recuperate synthesis gas, also called syngas, and solid materials from the [tyre](#) scrap.

The research project consists of two components. First, it investigates the pyrolysis of the tyre material to extract the volatile [gasses](#) that form the syngas. Second, it is looking into the use of the formed char to produce other materials, most importantly, silicon carbide, a material used in the manufacture of ceramic materials and in electronic applications.

The first stage of the experimental process set up at ENEA consists of a heat treatment of the tyre scrap. This process involves injecting the scrap, together with steam, in a reactor and in heating it up to almost 1,000 degrees Celsius. Although the heating requires energy, it will be recovered by the energy contained in the produced syngas; a mixture of mainly hydrogen, carbon monoxide and dioxide, and methane. This gas can be used as a fuel—having a similar heating capacity to natural gas—but also as a starter material for the production of other by-products.

Such by-products are what add the most value to the recycling process. They are viewed as a "must." Solid carbon is collected after the gasification as a basis for the productions of these by-products. "To increase the added value of the gasification we decided to include the production of products such as silicon carbide," says Portofino. The carbon would react with silicon oxide at high temperature to form the silicon carbide.

Recycling tyres to create fuels only is not promising, but having silicon carbide as an added by-product is a good choice, according to Valerie Shulman, Secretary General of the [European Tyre Recycling Association](#) , ETRA. "Silicon carbide is one of the materials of the future, it is used

in metallurgy, in ceramics, and in a variety other products. It is quite expensive to produce but you can get from 1,200 to 3,000 Euro a tonne," she tells youris.com.

Some experts are sceptical regarding the cost effectiveness of this process, however. "I think the cost is too high, and you have to use a granulate that is expensive," comments Juan Antonio Tejela Otero, an engineer and sales manager at Renecal, a tyre recycling company in Guardo, in the Palencia province of Spain.

A prototype plant is now under construction at the ENEA facilities in Trisaia in Southern Italy. It is expected to be in operation at the end of March. It will process about 30 kg of tyre waste per hour. Operating the prototype will establish how sustainable the TyGRE recycling scheme will be. Portofino concludes: "We will then be able to do the energy balance of the whole process."

Provided by Youris.com

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