

Executive Summary

This technological watch report of the Innovation Circle in Materials, Aerospace Technology and Nanotechnologies (CIMTAN), relates the potential ways for valorising rubber and end-of-life tyres (EOL-tyres) by material recycling or energy recovery.

The state of art of the technologies and applications to recover, to recycle and to exploit the value of waste tyres has been analysed in this document, co-financed by FEDER funds. The companies that at the moment manage the refuse collection of the end-of-life tyres generated in Spain are also listed.

2004 statistic data shown that, within Spain are produced about 230.000 tons per year of used tyres that should be managed correctly. In 2001, the Spanish National Used Tyres Program has foreseen the adoption of ecological procedures for recycling and for maximising the benefits from scrap tyres. By Royal Decree 1619/2005, manufacturers and tyres' importers are supposed to manage the EOL-tyres in order to achieve a correct environmental treatment of scrap tyres.

Proper procedures for EOL-tyres valorisation should be those permitting the direct recycling of materials with a limited used of natural resources.

Applications and technologies to valorise rubber and EOL-tyres by material recycling and energetic recovery are multiples. The ideal procedure, in order to eliminate the historical accumulation of EOL-tyres, would be to combine several technologies.

Energetic recovery is one of the possibilities to reduce used tyres accumulation, giving use to the grinded EOL-tyres as a substitution fuel. EOL-tyres are used as a secondary non-fossil fuel in cement kiln and power plants, electricity generation plants and paper or pulp mills. Pyrolysis combines the benefits of energy recovery and material recycling obtaining carbon materials, oil and steel.

An interesting possibility could be the use of mixed factories, i.e. kiln cement and pyrolysis.

EOL-tyres could be eliminated in **material recycling** by recovering of constituent parts/materials and using mechanical treatments for reducing size. EOL-tyres can be reused in several applications as: thermal and acoustic isolation, in plays areas, sports fills and athletics tracks and engineering uses (road and no-road). It is conclude that most of the

EOL-tyres can be eliminated in roads construction by incorporating rubber particles or EOL-tyres powder in modified asphalts.

This application implies raw materials saving and technical road properties improvement, being an ecological issue with no potential pollution risk.