



POLYMIX news

POLYMER WASTES IN ASPHALT MIXES: A WAY TO INCREASE SUSTAINABILITY OF ROAD

POLYMIX LIFE+ Project NEWSLETTER- Nº4 - August 2014

POLYMIX Project comes to an end

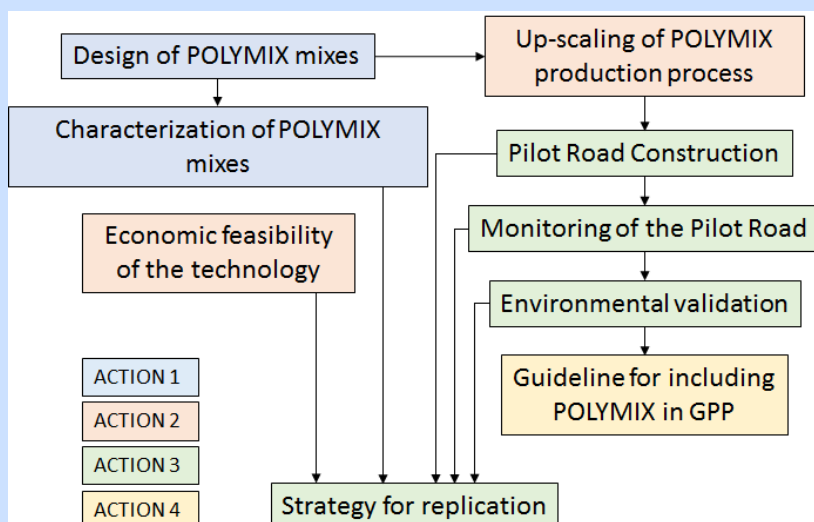
POLYMIX project main objective is the technical, environmental and economic validation of asphalt mixes modified with polymer waste. After 3 years, the project has been successfully implemented and the objective has been accomplished.

In the POLYMIX project, the addition of polymer wastes to modify asphalt mixes was proposed. In this way environmental problems associated to polymer wastes would be reduced, permitting new alternatives for its reuse. These modified mixes were expected to present better physical and mechanical properties than conventional ones. Thus, reusing these type of waste by adding them into the asphalt mixes brings not only environmental advantages, but also increases the added value of the product.

Within the framework of POLYMIX project three of the most commonly used plastic polymers: polyethylene (PE), polystyrene (PS) and polypropylene (PP), as well as rubber from End-of Life tyres (ELT) were selected for modifying asphalt mixes.

The POLYMIX project proposes the modification of the asphalt mixes by adding the polymer directly to the mixer drum (dry process). This process is simpler, does not need significant initial investment and can be carried out in virtually any asphalt plant without modifications. The technology is, therefore, easily exportable allowing the polymer waste to be reused where produced, reducing environmental and economic impacts.

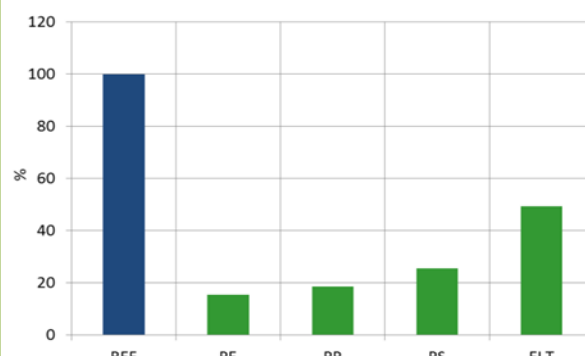
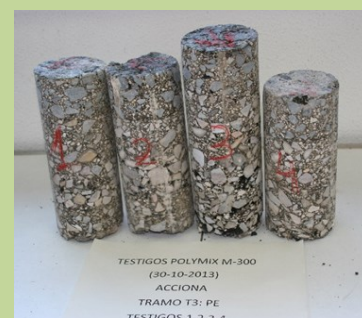
In order to achieve the proposed objective, the work was divided according to the figure (left).



Main results

POLYMIX mixes were designed and subsequently successfully implemented in a real scale road in Madrid (Acceso a Alcalá de Henares desde la M-300). The mixes were monitored during 18 months with the following results:

- ◆ POLYMIX asphalt mixes offer better rutting resistance than the reference. This results is consistent with the results obtained during the characterization and will have an impact on the durability of these new mixes.
- ◆ POLYMIX asphalt mixes don't have any influence on the final road surface properties.
- ◆ Results from the monitoring activities show a good behavior of all the trial sections (reference and POLYMIX mixes) in terms of structural capacity.
- ◆ Comparison of the environmental impact of the different asphalt mixes developed shows that, on the 4 category impact analyzed, POLYMIX mixtures present slightly better environmental performance.



Wheel track test results of the coring samples taken from the pilot road

Long-term benefits

The increment of freight traffic and harsh climatic conditions in all European countries due to the climate change is increasing the need of maintenance interventions in old EU Member States. Conventional materials lack cost-efficiency when used in high stressed roads.

One of the main features of POLYMIX, that is common for all type of polymers studied in this project, is its better resistance to plastic deformation (rutting resistance) comparing with the reference. This characteristic makes these bituminous mixes especially suitable when high extreme temperatures and high weight traffic are combined. Therefore, the use of this technology by road asset managers will result in less maintenance costs.

On the other hand, the increase in the recycling of plastic waste has the following environmental benefits :

- ♦ **Recycling of waste:** During the construction of the four trial sections, around 20 Tn of polymer waste were recycled (5Tn of polystyrene, 5Tn of polyethylene, 5Tn of End of Life Tyres and 5Tn of polypropylene).
- ♦ **Resource savings:** The volume of polymer waste used in each mixture replaced the same volume of natural aggregates. A total amount of around 60 Tn of aggregates were saved during the construction of the pilot road.
- ♦ **Emission reduction:** The recycling of plastic waste implies a reduction of the same amount of polymer waste that is sent to landfills or burned in an incineration plant. This results in emissions reductions related with these activities.



This newsletter is part of the dissemination and communication activities of the Project LIFE10ENV/ES/516 "POLYMIX"

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