

Bituminous Geomembranes: Sustainable Products for Road Construction and Maintenance

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Abstract : Greenhouse gasses (GHG) role in the atmosphere has been well known since the 19th century; however, researchers have begun to relate them to climate changes only in the second half of the following century. From this moment, scientists started to correlate the presence of GHG such as CO₂ with the global warming phenomena. This has raised the awareness not only of those who were experts in this field but also of public opinion, which is becoming more and more sensitive to environmental pollution and sustainability issues. Nowadays the reduction of GHG emissions is one of the principal objectives of EU nations. The target is an 80% reduction of emissions in 2050 and to reach the important goal of carbon neutrality. Road sector is responsible for an important amount of those emissions (about 20%). The most part is due to traffic, but a good contribution is also given directly or indirectly from road construction and maintenance. Raw material choice and reuse of post-consumer plastic rather than a cleverer design of roads have an important contribution to reducing carbon footprint. Bituminous membranes can be successfully used as reinforcement systems in asphalt layers to improve road pavement performance against cracking. Composite materials coupling membranes with grids and/or fabrics should be able to combine improved tensile properties of the reinforcement with stress absorbing and waterproofing effects of membranes. Polyglass, with its brand dedicated to road construction and maintenance called Polystrada, has done more than this. The company's target was not only to focus sustainability on the final application but also to implement a greener mentality from the cradle to the grave. Starting from production, Polyglass has made important improvements finalized to increase efficiency and minimize waste. The installation of a trigeneration plant and the usage of selected production scraps inside the products as well as the reduction of emissions into the environment, are one of the main efforts of the company to reduce impact during final product build-up. Moreover, the benefit given by installing Polystrada products brings a significant improvement in road lifetime. This has an impact not only on the number of maintenance or renewal that needs to be done (build less) but also on traffic density due to works and road deviation in case of operations. During the end of the life of a road, Polystrada products can be 100% recycled and milled with classical systems used without changing the normal maintenance procedures. In this work, all these contributions were quantified in terms of CO₂ emission thanks to an LCA analysis. The data obtained were compared with a classical system or a standard production of a membrane. What it is possible to see is that the usage of Polyglass products for street maintenance and building gives a significant reduction of emissions in case of membrane installation under the road wearing course.

Keywords : CO₂ emission, LCA, maintenance, sustainability

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