An expert opinion upon the request of Marterm Isı İzolasyon San. ve Tic. A.Ş.

Goat Hair vs Polyester Fibers

Environmental Concerns for Polyester Fibers

Polyester fibres are the most produced fibres in the world. Although they have some remarkable advantages, they create also huge environmental concerns. Their environmental problems mostly come from their raw materials which are produced from petroleum.

Environmental problems caused by oil, such as gas flares, spills, destruction of wildlife and biodiversity, pollution of air, soil and drinking water, emission of NO_x, CO_2, SO_x and generated volatile organic compounds contribute to the environmental burden of fibres. Petroleum derivatives can also cause serious health problems.

Man-made fibres undergo a wide variety of processes, for example, spinning, texturizing, twisting, heat setting, interlacing, etc. Energy consumption is also a significant contributor in all of these steps. For example, 104-126 GJ energy is required to spin 1 tonne of PET fibre!

Polyester fibres are non-biodegradable and are one of the major microplastic/microfiber source. Microfibers, which are a subcategory of microplastics, raise concerns about pollution particularly in marines. Microfibers are found in terrestrial environments and in the atmosphere as well. However, main concerns are related to aquatic environments. Marine species, which are in the human food chain, can consume microfibers directly and indirectly. Microfibers can also transport hazardous process chemicals, nanomaterials, and other process substances to the aquatic environment.

Antimony and VOCs level for polyester production are also critical issues for the human health and environment.

Environmental Benefits of Goat Hair

Goats play an important socioeconomic role in many rural areas. They are capable of utilizing low-quality feeds. They produce multiple products, including edible products, such as meat and milk, and non-edible products, such as natural fibre.

Most regions of Türkiye have favourable conditions for goat breeding in terms of ecological and socio-economic structure. Goat production is important for cultivators who live in mountains and rural areas. Hair goats are predominant breed and it constitute 93-97% of the goat population in Türkiye.

Goats have efficient browsing behaviour as well as an efficient digestive system, allowing them to remain productive in difficult environmental circumstances. Goat rearing is expected to play a prominent role in responding to climate change scenarios during the next

century. The most notable environmental implications of goats' stem from their ability to graze on a wide variety of biomass sources.

Environmental benefits of goat production include keeping wildlife corridors open, preventing the spread of noxious weeds, and promoting the growth of local vegetative species through moderate grazing. Goats are also more water-efficient than large ruminants such as cattle.

Furthermore, the hair used in the panels were collected from nomadic goat breeders. Feeding of the goats was generally carried out at the pastures in or around forests. Therefore, environmental impacts of feed production which mainly come from land use, pesticide and synthetic fertilizer use were mostly eliminated.

Nomads are in low-income level in Türkiye. Converting goat hair into high value-added products can also help their economic situation.

If goat hair replaces with polyester fibres;

-Goat hair is biodegradable, using goat hair contributes to reducing microplastic pollution.

-They are produced from renewable sources and they are free from petrochemical based pollution.

-Energy consumption is very low (almost zero since the hair has not needed any spinning process in this case) in comparison to polyester fibres; since huge amount of energy is used to melt PET polymer (104-126 GJ energy is required to spin 1 tonne of PET fibre).

-Goat hair has been produced in Türkiye. Thus, transportation based environmental burden is also lower than PET.

-Goat hair usage also supports nomads economically. If so happens, education opportunity of nomad children can be improved.

In addition, use of goat hair is perfectly matched with circular economy principles. Circular economy is one of the two main future strategies of EU.

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