MAKING ROADS IN INDIA
RECYCLING PLASTIC WASTE

March 2025

In India the technology to make roads recycling plastic waste continues to be adopted in all States of the country. In 2024 the national press informed that nearly 40,000 kilometers of rural roads have been constructed using plastic waste. According to the Secretary of the Department of Drinking Water and Sanitation (DDWS), 13,000 kilometers have been completed using this sustainable method in the past two years alone.

Speaking with the media, the government emphasized that the innovation showcases their commitment to sustainability in the future of infrastructure development and sanitation in India, also highlighting the significant progress in greywater and plastic waste management. This initiative offers significant environmental and economic benefits by reducing pollution and generating employment.

In addition, in 2024 the Ministry of Road Transport and Highways (MoRTH) has also made it mandatory to use plastic waste in highway construction, repurposing 8 million tonnes of garbage for national highways. In fact, to address the plastic waste management issue, the Indian government has directed states and Union Territories to incorporate up to 8% plastic waste by weight into bitumen for road construction. This will include internal roads in residential and commercial areas. So far, 80 lakh tonnes of garbage have also been repurposed for constructing national highways, including the one between New Delhi and Mumbai corridor.

Plastic-infused roads not only contribute to environmental sustainability but are also more durable and cost-effective. Since both plastic and bitumen are petroleum-based, they bond effectively, enhancing the road's load-bearing capacity and longevity while providing better resistance to damage from heavy rains.

India has led the way in plastic road construction with Rajagopalan Vasudevan, Professor of Chemistry at the Thiagarajar College of Engineering, in Madurai, patenting a plastic road construction method in 2006. Rajagopalan Vasudevan, called the plastic man of India has devised a way to transform common plastic litter, not only thicker acrylics and bottles but also grocery bags and wrappers, into a partial substitute for bitumen in asphalt. He travels throughout India instructing engineers to apply his method. The college holds a patent for his technique but they often license it for free. The Central Pollution Control Board and the Indian Roads Congress, two leading government bodies, have endorsed the method.

The effective use of plastic in road construction in India began in 2015 when the Union Government instructed as mandatory the use of waste plastic with hot mixes. The Indian government announced that plastic roads would be the default method of construction for most city streets, part of an overhaul of the country's roads and highways. Urban areas with more than 500,000 people were required to construct roads using waste plastic along with hot mixes for constructing bitumen roads within 50 km of periphery. Plastic roads have been built using waste plastic in at least 11 States of the ountry. The Minister of Road Transport and Highways also initiated a highway construction using waste plastic and as of July 2021, 703 kilometres of national highways have been built using this technology.

The roads constructed using this technology are of better quality and do not require maintenance in the first five years. This technology costs less as compared to bitumen road and has no toxic gas emission. Besides being water resistant, these roads have better binding property, higher softening point and can withstand high temperatures and higher loads. Rainwater does not seep through these roads because of the plastic in the tar and these results in fewer repairs.

One of the benefits of this method is that the process is easy and does not need any new machinery. The process of the Plastic Road method consists in the following steps:

- The plastic waste is shredded into small pieces using shredding machines;
- The shredded waste is then added to the blue metal, which has already been heated to around 170 degree Celsius;
- The plastic is mixed with the heated blue metal, thereby melt with the stone;
- Then, bitumen is added and mixed with the plastic-coated stone, which would be used for road construction.

Another important advantage of this method is that urban local bodies, which are usually short of financial resources, can make money by selling the plastic waste generated by cities to road developers, signing memorandums of understanding with the road construction companies.

India has been leading the world in experimenting with plastic-roads since the early 2000s. But a growing number of countries are beginning to follow suit. From Ghana to the Netherlands, building plastic into roads and pathways is helping save carbon emissions, keep plastic from the oceans and landfill, and improves the life-expectancy of the average road. An article published in 2021 by the bbc magazine informs that the chemicals firm Dow has been implementing projects using polyethylene-rich recycled plastics in the US and Asia Pacific. The first one in the UK was built in Scotland in 2019 by the plastic road builder MacRebur, which has laid plastic roads from Slovakia to South Africa.

The MacRebur company has also found that incorporating plastic improves roads' flexibility, helping them cope better with expansion and contraction due to temperature changes, leading to fewer potholes and where potholes do happen, filling them in with waste plastic otherwise destined for landfill is a quick fix. The UK government recently announced £1.6m for research on plastic roads to help fix and prevent potholes.

Plastic road technology is gaining ground in the United Kingdom, Europe, and Asia. Several countries including South Africa,

Vietnam, Mexico, the Philippines, and the United States have recently built their first plastic roads. The MacRebur company has already paved thousands of kilometres of roads in the UK with asphalt containing plastic waste. The British company also partnered with the New York City Department of Transportation to give New York its first plastic road late last year.

With India home to one of the world's largest road networks, growing at a rate of nearly 10,000 kilometres of roads a year, the potential to put plastic waste to use is considerable. Although this technology is relatively new for India, and indeed the rest of the world, Vasudevan is confident that plastic roads will continue to gain popularity, not only for environmental reasons, but for their potential to make longer-lasting, more resilient roads.

To know more

News in indianinfrastructure.com

News in swarajymag.com

Article in Indiatimes.com

Article in conomictimes.indiatimes.com

Article in indianexpress.com

Article in whatpackaging.co.in

Article in offsetgo.earth/post

Article in bbc.com

Article in prakati.in
Article in prakati.in
Article in prakati.in

Article in rekdewan.com

Article in blogs.worldbank.org

Article in htschool.hindustantimes.com

MacRebur company website

Article in theguardian.com

Article 2016 in theguardian.com

Article in Indiatimes.com

Article in timesofindia.indiatimes.com