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Plastic waste in roads: Is that the solution cities must consider?

BEATING PLASTIC POLLUTION

December 13, 2018 Arjun Rajan



A road in Bengaluru constructed out of plastic waste. Source: KK PLastic Waste Management facebook page.

#PlasticsGottaGo seems to be the rallying cry in cities across India as it is globally, and for obvious reasons too. Attempts to raise awareness about the hazards of plastic waste and its

disposal are on an overdrive as climate change and waste management become the key challenges faced by cities. Yet, not everyone thinks that an entirely plastic-free world will be feasible or even desirable.

Advertisement K Ahmed Khan, Managing Director, K.K.Plastic Waste Management Ltd asserts that that they believe in saying 'yes' to plastic but only after ensuring its eco-friendliness, one way to which is through the use of plastic waste in construction of roads.

"There are approximately 56 lakh kilometres of roads in India, and if we were to use plastic waste to relay them with around 2 tonnes of plastic waste per kilometre, we would need around 1 crore 20 lakh tonnes of plastic. But the country produces only 10 lakh tonnes of plastic every year," says Ahmed Khan. K.K Plastic Waste Management Ltd has patented a technology known as **K K Polyblend**, which is made out of plastic bags and packing material, and acts as a bitumen binder which can be used in laying roads.

Scientific studies and trends

A similar view is echoed by Dr Rajagopalan Vasudevan from the Thiagaraja College of Engineering in Madurai, who states that **plastic isn't the problem**, but the way it is handled. He believes that plastic is an inexpensive, convenient option for the poor and wanted to find a solution to the environmental challenges that it presented. **He experimented with mixing waste plastic with heated bitumen** and used it on a road inside the campus. Thiagaraja College of Engineering received a patent for this technology in 2006.

A study by the Central Pollution Control Board (CPCB) titled **Performance Evaluation of Polymer Coated Bitumen Built Road** in 2008 claimed that such roads are performing much better than regular bitumen roads under similar conditions, with better resistance toward rain, increase in strength by 100 percent, and no development of potholes in the years monitored.

The Plastic Waste Management Rules 2016 recommend local bodies to encourage the usage of plastic waste in construction of roads as per the **Indian Road Congress guidelines. Reports** have pointed to developers being mandated to use plastic waste in construction of roads within 50 kms of the periphery of any city.

Experiences of Indian states and cities

The Bruhat Bengaluru Mahanagara Palike (BBMP) had signed a Memorandum of Understanding (MOU) with us in 2004, says K Ahmed Khan. The company provided the patented technology to build over 3000 kms of roads in the city of Bengaluru. While the MOU was extended till 2013, he was dismayed that during those years only a small percentage of roads were constructed using plastic waste.

Khan states that they have been advocating with and urging the government over the past two decades, but believes that there is a lack of political will to ensure that this technology is used on a larger scale. Several reports in the past have mentioned the **low usage of plastic waste** in the entire city of Bengaluru, with some pointing to as low as **7 percent** of the roads.

S.Somashekhar, Chief Engineer – BBMP, Road Infrastructure, however says that seventy percent of the roads that he monitors (under the central zone) were using plastic waste in their construction.

The Maharashtra state government has during this year **made it mandatory** to use plastic waste in construction of roads and aims to pave around **10,000 km of road in the next 5-6 years**. The Maharashtra government is **consulting** with Professor Vasudevan in this regard.

Tamil Nadu seems to have made the largest progress in this regard, with **sources** pointing to the state having built more than 100,000 kilometres of such roads, **with cities and towns such as** Chennai, Puducherry, Wellington, Madurai and Kovilpatti having experimented with it.

Jamshedpur Utility and Services Company (JUSCO) in addition to recycling plastic waste in construction of roads, **has been advising** the municipal corporations of Ranchi, Chas and Giridh, and Jamtara Nagar Panchayat on the same.

Meghalaya, Kerala, Madhya Pradesh and Himachal Pradesh are **some of the other states** that have initiated this approach. More recently, the **Municipal Corporation of Gurugram (MCG)** has decided to construct roads from plastic waste.

Challenges and concerns

Difficulties in scaling

If this practice needs to be scaled up, so that not just a few roads but a large portion of them are built using this technology, then there need to be systems wherein a large amount of plastic is made available. It has been reported that women's groups in Madurai have been assisting in providing shredded plastic; even though they are currently facing the challenge of **receiving not enough patronage** from the government. Even in several parts of Maharashtra, women's self help groups have helped contractors **in collecting plastic waste**.

But the response hasn't been that strong in other parts of the country. This technology was adopted early on by Chennai but there were concerns over **lack of adequate shredded plastic**, as citizens weren't segregating their waste at source.

Satish Chandra (Director, Central Road Research Institute) had also mentioned in an interaction with *The Hindu* that there are currently several legislations that mandate the usage of plastic waste in road construction, but points to lack of enforcement and initiatives by municipal corporations that would ensure sufficient availability of shredded plastic.

A potential system to collect adequate plastic waste could be through implementation of extended producer responsibility (EPR) as outlined under the [Plastic Waste Management Rules 2016](#). As per the rules, the producers, importers and brand owners have the primary responsibility of creating a system wherein plastic waste generated from their products are collected back. Several Producer Responsibility Organizations (PROs) have emerged that facilitate the process of collection and recycling, where producers merely provide financial support.

But, then again, for PROs to be effective, [segregation needs to be ensured at the source](#).

Condoning Usage of Plastic

“Why should we abuse plastic, bear several of its negative effects and then try to dispose of it in the process of road construction,” asks Professor T V Ramachandra at the Centre for Ecological Studies, IISC, Bengaluru. He believes the best solution lies in not using plastic.

Nityanand Jayaraman, in [his article](#), points to how using plastic waste in roads is an ‘end-of-pipeline’ solution, and such an approach takes the focus off the mounting plastic crisis — increase in plastic production, unsustainable nature of the industry, and the toxic pollution connected with its production, use and disposal.

Micro-plastic emission

Dr Sridhar Raju, Department of Civil Engineering, BITS Hyderabad states that when plastic is mixed with bitumen, it becomes a homogeneous substance in a majority of cases and there is no leaching. It is only in certain types of High Density Polyethylene and other types of plastic (that burn at a higher temperature than 180 degree Celsius), where the material doesn’t mix well with bitumen, that there is a possibility of leaching. The [study by CPCB](#) also indicated that there was no plastic leaching among polymer coated bitumen built roads.

However, there have been other [studies](#) that have pointed to bitumen-modified polymer as a potential source of micro-plastic pollution. Dr Susy Varughese, Professor of Chemical Engineering, IIT Madras contends that over a period of time, there is the possibility of breakdown of plastic and its release into the atmosphere, soil and water (with rain). She states that there is currently a dearth of research on the subject that can help to arrive at a definite conclusion.

In the final analysis, therefore, while roads made out of plastic waste have been touted as a solution to the plastic waste crisis in the country, even at a policy and legislative level, both its acceptance as a premise and its implementation have glaring holes. Perhaps we have to wait longer — for more research as well as experiential results — for a verdict on its feasibility, as well as desirability.