

# MAKING SUSTAINABLE ROADS IN INDONESIA

## RECYCLING PLASTIC WASTE

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Indonesia is one of the countries which has made an investment in the implementation of plastic roads construction to address the global important problem of plastic pollution generated by plastic waste.

[According to the United Nations Environment Programme UNEP](#), Indonesia produces 3.2 million tonnes of unmanaged plastic waste a year, of which about 1.29 million tonnes end up in the sea. In addition, approximately 10 billion plastic carry bags, equal to 85,000 tonnes, are released into its local environment each year. This unmanaged plastic waste has affected Indonesian rivers and the ocean. Aiming to create an enabling environment for the implementation of two Presidential Decrees adopted by the Government of Indonesia, the [National Plastic Waste Reduction Strategic Actions for Indonesia](#) document was formulated in 2017 by the Ministry of Environment and Forestry (MoEF).

The first experience of using plastic waste to build plastic roads was born within the framework of these initiatives taken by the Government of Indonesia to reduce environmental pollution from plastics and promote their recycling through circular economy strategies.

In particular, the Ministry of Public Works and Housing encourages plastic asphalt solutions to preserve the environment as well as to create an innovative asphalt mixture for sustainable use. Inspired by the experiences carried out in India, the technology to make plastic asphalt, a mix of asphalt containing shredded plastic, which makes it resistant to deformation, was adopted. 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 devised a way to transform common plastic litter into a partial substitute for bitumen in asphalt. In 2024 the national press informed that nearly 40,000 kilometers of rural roads have been constructed using plastic waste.

[In Indonesia the Chandra Asri Group, the leading energy, chemicals and infrastructure solutions company in Southeast Asia, has taken up the challenge launched by the Ministry of Public Works and Housing](#) to address the plastic waste crisis by recycling plastic waste into road asphalt. Within their factory in Indonesia as part of their circular economy efforts, the Chandra Asri Group has begun to make a significant investment in testing technologies to produce new plastic asphalt and use it for road construction in collaboration with all interested local stakeholders.



[Starting in 2018, the Chandra Asri Group initiated plastic waste recycling by converting it to asphalt](#) and the brochure produced by the Switchasia Initiative presents all the different activities carried out in different territories of Indonesia. The company collaborated with the Indonesia Plastic Recycling Association (ADUPI) and the Indonesia Waste Pickers Association (IPI) to collect plastic bag waste from landfill. The plastic waste is screened, cleaned, shredded, and dried. The next step is a dry mixing process, in which plastic flakes and asphalt aggregate are heated and mixed. In the pilot project in 2018, the Chandra Asri Group used two million plastic bags weighing 3 metric tonnes in an asphalt mixture to build a road of approximately 6,370 m<sup>2</sup> in Cilegon, Banten. Research established that mixing 5% - 6% of plastic waste into asphalt is optimal for increasing asphalt stability by up to 40%, making roads more resistant to deformation and cracking, and thus capable of lasting longer. This project was subsequently adopted by several regional governments in Java.

By the end of 2023, the Chandra Asri Group had laid down a total of 120.8 km of plastic asphalt pavement across the country. By partnering with the Garut District Government and other companies, the plastic-asphalt construction has also spread to Garut District, where, in cooperation with the [Bakti Barito Foundation](#) contributed to the construction of 50.2 km of plastic asphalt roads. The plastic asphalt stretch was implemented from 2022 to 2023, successfully managing 431.5 tons of plastic waste from the Landfill Site. Through multi-stakeholder collaboration, this program also served as a collective step towards supporting the government's target to reduce waste by 30% and reduce ocean plastic pollution by 70% by 2025. The Indonesian Plastic Recycling Association (ADUPI) has been a strategic partner in the Garut plastic asphalt project in providing shredded plastic bag waste according to the technical standards of the Public Works Ministry.

[In an article published on their website](#), the Chandra Asri Group describes the process as follows:

- Plastic waste is taken from the final disposal site, sorted, shredded, and washed.
- Hot aggregate is mixed with processed plastic shreds to become plastic-coated aggregate.
- Plastic-coated aggregate is mixed with hot asphalt.
- The plastic asphalt mixture is ready to be used on the road.

The Group underlines that this asphalt offers several advantages, making plastic asphalt better than conventional asphalt, such as:

- *Greater Durability.* Plastic asphalt is more durable when facing cracks and deformation because the plastic provides enough flexibility to the asphalt. Consequently, it will be sturdier for long-term use with a more cost-effective maintenance budget.
- *Reduction of Plastic Waste.* The use of plastic asphalt also helps reduce plastic waste in the environment and landfills. This innovation also supports the concept of a [circular economy](#) that extends the life of a product.
- *Higher Water Resistance.* One of the factors that damage asphalt on highways is water. Asphalt with a plastic composition is more water-resistant, reducing the possibility of rain and flood damage to roads.
- *Improved Road Stability.* In general, plastic asphalt has higher stability because it is more durable in extreme weather compared to conventional asphalt.



- *Reduced Carbon Footprint.* Compared to traditional asphalt, plastic asphalt production results in lower carbon emissions. Additionally, it reduces greenhouse gas emissions by recycling plastic waste.
- *Long-Term Cost Efficiency.* The initial production of plastic asphalt may cost more, but once it is applied on the road, the asphalt will be more long-lasting, requiring less maintenance. This will surely reduce the maintenance budget and replacement costs in the long term.

By the end of 2023, the Chandra Asri Group, in collaboration with its partners, had constructed 120.8 kilometers of roads with a mixture of plastic waste, exceeding the initial target of 100 km. These road achievements create new functions and add economic value to 1,086 tons of plastic bag waste. Furthermore, each kilometer of plastic asphalt road absorbs approximately 1.6 tons of plastic waste and provides a 40% increase in road durability.

In 2022, the company also launched its process-based plastic flakes, CIRCLO, which have particle sizes between 4 and 9 mm, a thickness of approximately 0.07 mm, and a moisture level of less than 5%. CIRCLO® is made of shredded plastic developed to empower local recyclers and merchants to produce asphalt mixture raw materials that meet standards. The Chandra Asri Group also provides technical training to asphalt mixing plants and contractors so that they can mix the shredded plastic with the asphalt properly.

According to the Ministry of Public Works, Indonesia has 48 thousand kilometers of provincial roads and 38 thousand kilometers of urban roads, making it a promising market for plastic asphalt technology. [In 2025 the Ministry of Home Affairs encouraged private companies to develop research on the reuse of plastic waste in asphalt mixtures and the potential application of plastic asphalt technology on regional roads across Indonesia.](#) The Chandra Asri Group affirmed the company's readiness to support the government, citing its experience in using post-consumer plastic waste to build 120.8 kilometers of plastic asphalt roads nationwide.

#### To know more

[Chandra-asri.com Plastic asphalt Blog](https://chandra-asri.com)

[Baktibarito.com foundation website](https://baktibarito.com)

[Brochure switch-asia.eu](https://brochure.switch-asia.eu)

[News in barito-pacific.com](https://news.in.barito-pacific.com)

[Plastic roads in upskill.study](https://plasticroads.in.upskill.study)

[Article in en.antaraneews.com](https://en.antaraneews.com)

[CIRCLO presentation in observerid.com](https://observerid.com)

[Chandra Asri presentation in baktibarito.com website](https://baktibarito.com)

[Photos antara Indonesia](https://photos.antara.id)

[Plastic roads in Indonesia Facebook.com](https://plasticroads.in.facebook.com)

[Article in magicgreen.jungkestar.org](https://magicgreen.jungkestar.org)



Plastic waste in Indonesia is turned into paving blocks, creating durable roads in local communities.



[Case study in researchgate.net](https://www.researchgate.net)

[Plastic roads in Mongabay.com](https://www.mongabay.com)

[Article on Plastic Roads in goodnewsnetwork.org](https://www.ingoodnewsnetwork.org)

[Plastic waste in road construction. World Bank publication 2023](#)

[Article in blogs.worldbank.org 2023](https://blogs.worldbank.org)

[Plastic Roads in Wikipedia.org](https://en.wikipedia.org)

