

CIRCULAR ECONOMY BUSINESS CASE STUDIES IN SOUTHEAST ASIA



Chandra Asri Group

- 📍 Indonesia
- 💧 Petrochemical
- 🌐 www.chandra-asri.com
- ★ Analysis period: 2018-2023

Recycling Plastic Waste into Road Asphalt

Business Spotlight

PT Chandra Asri Pacific Tbk (Chandra Asri Group), the leading energy, chemicals and infrastructure solutions company in South East Asia, addresses the plastic waste crisis by recycling plastic waste into road asphalt. The innovative roads, paved with a 5%–6% mixture of high-density polyethylene (HDPE) plastic waste within the asphalt, exhibit 40% greater stability than conventional paving, according to the research of the Ministry of Public Works and Public Housing (PUPR). This approach enhances material circularity and efficiency, recycling plastic waste for the creation of more durable road infrastructure. For Chandra Asri Group, plastic asphalt roads are part of a sustainability initiative focused on reshaping public perceptions of plastic waste and promoting responsible waste management. Future plans include expanding the use of plastic asphalt roads across Indonesia, further reducing plastic waste, and raising public awareness about value creation through waste recycling. Chandra Asri Group continues to seek new partnerships and innovations to achieve its sustainability goals.

Keywords

Plastic waste, Asphalt, Circularity

Innovation

End-of-life management, Resource circularity, Resource efficiency



Context and baseline

According to data from the Government of Indonesia's Ministry of Environment and Forestry, plastic waste accounted for 18.7% of the 70 million metric tonnes of total waste generated in 2023.¹ The United Nations Environment Programme (UNEP) estimates that one-third of mismanaged plastic waste ends up in the oceans², and low plastic recycling rates worsen the situation.³

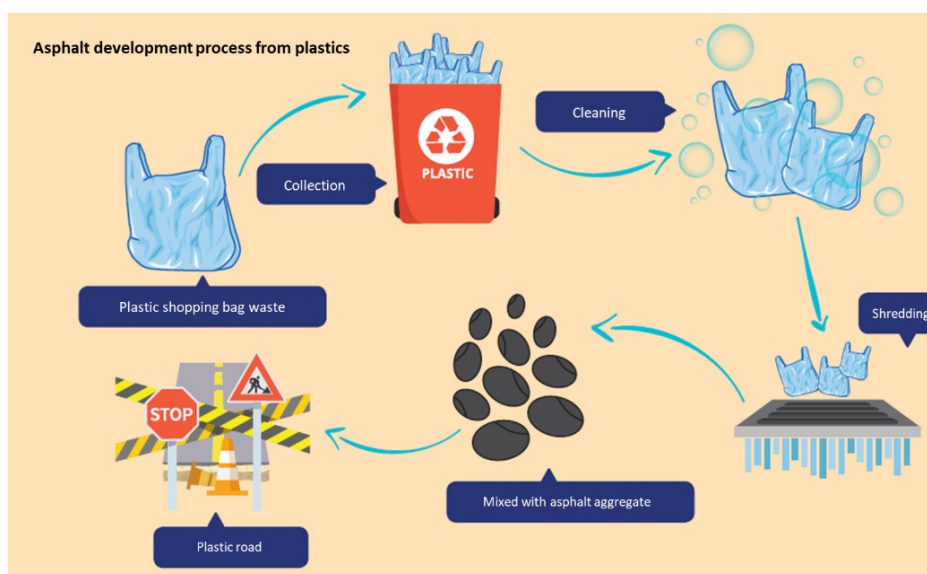
Established in 2011, Chandra Asri Group is a joint venture between Tri Polyta Indonesia (TPI) and Chandra Asri (CA), and is now operating the largest integrated petrochemical plant in Indonesia. Chandra Asri Group uses the naphtha cracker to produce raw materials for upstream and midstream petrochemical products, including plastics. In 2018, the company initiated the use of plastic waste in asphalt roads within their factory as part of their circular economy efforts. In support of the government's target to reduce 70% of ocean-bound plastic waste by 2025, Chandra Asri Group incorporates shredded high-density polyethylene (HDPE) plastic bags into asphalt mixtures. Road construction is carried out in collaboration with several stakeholders, from government to private companies across West and Central Java and Banten. The company also initiated a community-based project, the Integrated Waste Management Facility – Self-Managed Waste Processing Facility (IPST ASARI), to produce pyrolysis oil from plastic waste.

Innovation

Starting in 2018, Chandra Asri Group initiated plastic waste recycling by converting it to asphalt. The company collaborated with the Indonesia Plastic Recycling Association (ADUPI) and the Indonesia Waste Pickers Association (IPI) to collect HDPE 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, Chandra Asri Group used two million used plastic bags weighing 3 metric tonnes into an asphalt mixture to build a road of approximately 6,370 m² in Cilegon, Banten. Research by the PUPR 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 programme was subsequently adopted by several regional governments in Java.

Another plastic recycling initiative is production of pyrolysis oil from plastic waste. IPST ASARI fostered by Chandra Asri Group is an integrated waste management facility that collects and recycles thermoplastic foil film bags from Chandra Asri Group, used for wrapping the company's resin bags used for product delivery. The recovered plastic film is processed via pyrolysis at the IPST ASARI waste processing facility to produce pyrolysis oil.⁴ The facility is operated by the local community. The initiative thus embeds the circular economy in community-based waste management initiatives.



Plastic-based asphalt development

Source: [https://www.chandra-asri.com/files/reports/SR/Sustainability%20Report%202018%20\(single%20page\).pdf](https://www.chandra-asri.com/files/reports/SR/Sustainability%20Report%202018%20(single%20page).pdf)

1 <https://sipsn.menlhk.go.id/sipsn/public/data/komposisi>

2 <https://www.unep.org/ietc/resources/policy-and-strategy/national-plastic-waste-reduction-strategic-actions-indonesia>

3 <https://www.thejakartapost.com/business/2024/05/02/taking-plastics-full-circle-creating-a-sustainable-future-in-indonesia.html>

4 <https://www.chandra-asri.com/files/Sustainability/Downloads/Chandra%20Asri%20-%20Terapkan%20Praktik%20Terbaik,%20Mencipta%20Bisnis%20Berkelanjutan.pdf>



Circular Economy impact

Recycling plastic waste into asphalt roads is an example of circular recovery and reuse of material resources (resource circularity), which is a key strategy for the circular economy transition. The mixed-in plastic waste improves the durability of the asphalt road by up to 40%, improving the lifetime of the road, and thus increasing the efficiency of the materials use in the road, indicative of resource efficiency.

The Asphalt Plastic Road initiative stands as the cornerstone of Chandra Asri Group's sustainability efforts. In 2018, Chandra Asri Group initiated trials on incorporating plastic waste into road asphalt in its own factory as part of a circular economy initiative. Chandra Asri Group manufactures these roads by blending 5%–6% plastic waste into regular asphalt.

In 2019, Chandra Asri Group partnered with Cilegon City Government to convert 126 metric tonnes of shredded HDPE plastic bags into asphalt mixtures and built a 20-km road in Cilegon. During 2020, Chandra Asri Group built 37-km roads, in Kudus, Semarang, Cilegon, and Depok, Central Java, in cooperation with the Djarum cigarette company, which allowed 66 metric tonnes of plastic waste to be recycled. The company built a 13-km road from just under 75 metric tonnes of plastic waste in 2021, collaborating with the Sinarmas property company, to cover an area in Tangerang, West Java. During 2022, Chandra Asri Group constructed 27.5 km of plastic asphalt roads, recycling 370 metric tonnes of plastic waste. By the end of 2023, Chandra Asri Group had laid down a total of 120.8 kms of plastic asphalt pavement across Java.⁵ By partnering with

government and other companies, the plastic-asphalt construction has spread to Garut District (50.2 km), Cilegon City (29.3 km), Kudus City (13.9 km), and Tangerang Regency (23.4 km). These efforts have led to preventing 1,086 metric tonnes of plastic bag waste from ending up in landfills during 2018 to 2023.⁶

Business and market impact

The Asphalt Plastic programme initiated by Chandra Asri Group, in collaboration with local governments and the private sector, has been successfully implemented in West and Central Java and Banten provinces, and these expect to benefit from reduced road maintenance costs by upgrading to plastic-asphalt roads.⁷ In 2022, the company launched its processed HDPE-based plastic flakes, CIRCLO, which has particle sizes between 4 and 9 mm, a thickness of approximately 0.07 mm, and a moisture level of less than 5%. The CIRCLO brand has set an initial phase to commercialise HDPE-based plastic flakes for wider adoption in Indonesia, especially for use as an additive in asphalt manufacturing.

Chandra Asri Group's initiatives also serve to leverage positive perceptions of the company's brand. Chandra Asri Group has received several accolades for its commitment to environmental, social, and governance (ESG) principles, including the Corporate Emissions Transparency Award 2022, TOP CSR Awards 2022, SNI Award 2022, and Innovation in Plastic Waste Technology. In 2024, Chandra Asri Group also achieved an improved ESG score from the international institutions Morgan Stanley Capital International (MSCI) and Morningstar Sustainalytics.

5 https://www.idx.co.id/StaticData/NewsAndAnnouncement/ANNOUNCEMENTSTOCK/From_EREP/202403/405cbfcd5f_b40ea7e59a.pdf

6 <https://www.chandra-asri.com/files/reports/SR/Chandra%20Asri%20Sustainability%20Report%202023.pdf>

7 <https://katadata.co.id/ekonomi-hijau/ekonomi-sirkular/662f5fde6f2ee/chandra-asri-ungkap-sederet-kelebihan-aspal-yang-dicampur-plastik>

Stakeholders

Chandra Asri Group engagement in the Asphalt Plastic Road project exemplifies their leadership in promoting circular economy practices through strategic partnerships. Their Asphalt Plastic programme has been successfully implemented on Java Island through collaborative efforts between local governments and the private sector. Initially, Chandra Asri Group partnered with the Ministry of Public Works and Housing both to adopt the Ministry's study on plastic-asphalt road durability and to receive technical assistance for implementation. The company also collaborates with the Indonesian Plastic Recycling Association along with the Indonesian Waste Pickers Association to obtain plastic waste materials. The company has engaged 12,071 scavengers during the period from 2018 to 2023.

Chandra Asri Group and several private entities such as Sinarmas Land and Djarum have also applied plastic asphalt mixtures within their own operational areas. The company also collaborates with ASECH and Jimbaran Hijau to establish the National Showcase of Asphalt Plastic Roads in Jimbaran, Bali, serving as a learning center for stakeholders to directly see and learn on how the asphalt plastic implemented and developed.

Implementation

Chandra Asri Group is committed to bringing about a balance in economic, environmental, and social interests. Chandra Asri Group contributes to reducing waste, and especially plastic waste. In the Indonesian Partnership on Plastic Waste Management. Chandra Asri Group is showcasing the company's commitment to developing sustainable solutions by creating a coalition of the private and public sectors in handling plastic waste management. Through this inclusive platform, Chandra Asri Group engages with 150 organisations across sectors to promote scalable solutions and

leverage investment in a circular economy for plastic waste. Supporting the Indonesian Government's target of reducing by 70% the plastic waste reaching the ocean by 2025, this partnership recognises that it is urgent to start tangible actions and programmes to foster a new culture in Indonesia, namely environmentally responsible waste management. Accompanied by the PUPR, Chandra Asri Group developed a solution for plastic asphalt in its factory in Cilegon. The asphalt plastic programme was then replicated by the Cilegon City Government which was also interested in using plastic asphalt to pave 10 km of Cilegon roads. Through collaboration with other local governments, such as Tegal City, Semarang City, and Garut District, Chandra Asri Group expanded plastic asphalt to different areas in West and Central Java and Banten. Plastic asphalt roads provide the evidence of Chandra Asri Group's sustainable practices in recovering value from end-of-life plastics. Besides being a part of the company's sustainability programme, this method is also considered to be an effective solution for waste management in Indonesia.

Takeaways

The Initiative of Chandra Asri Group with Asphalt Plastic Roads demonstrates the successful integration of environmental stewardship and innovation. By leveraging partnerships with local governments and the private sector, Chandra Asri Group has created the value proposition of simultaneously recovering a portion of plastic waste while improving the quality and longevity of roads, which exemplifies the ambition of the circular economy transition. The significance of the initiative lies not only in the immediate impact, but also in the potential to inspire broader adoption and scaling up of similar innovations elsewhere. It's a starting point, and so far only on a modest scale. Nevertheless, the point here is to demonstrate a viable model that can be replicated and expanded to achieve system change for plastic waste management and to encourage the advantages of the circular economy.



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