Advancing Circular Economy Business Models

Winrock helps communities and companies turn waste into value — reducing plastic waste and cutting methane emissions while also generating revenues.

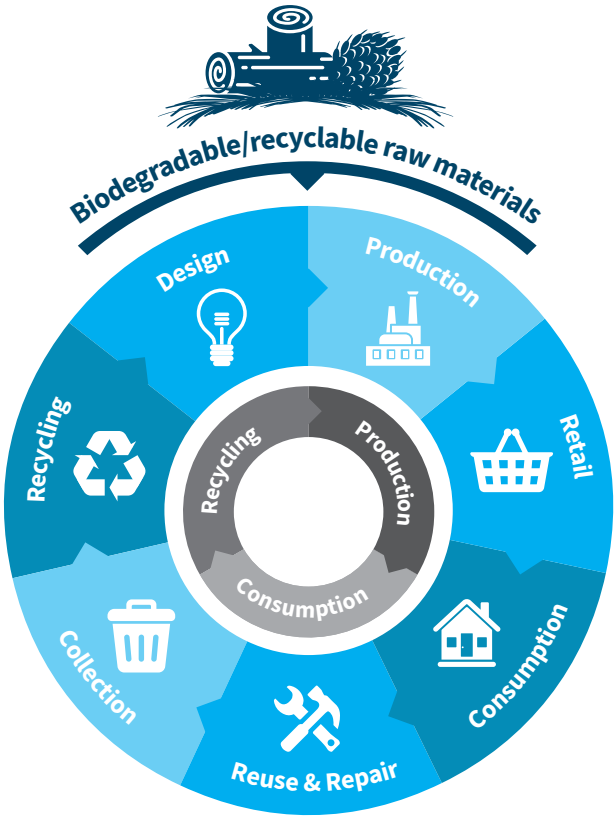
Winrock designs and scales projects to improve land-based management of solid waste and assist municipalities and businesses to avoid single-use plastics. Inappropriate solid waste management leads to overlapping challenges including ocean plastic pollution, methane emissions from organic waste, and contamination from fires and overflow at poorly managed waste dump sites. Plastic is the most persistent and harmful solid pollutant in marine ecosystems, disrupting critical biogeochemical cycles.

Single-use plastic packaging is problematic because plastic takes millions of years to break down and sheds trillions of microplastic particles into the environment. Recycling most types of plastic is difficult and expensive. In fact, only 9% of all the plastic ever produced has been recycled. Currently, more than 200 million tons of plastic are produced globally every year, enough to fill 10 million garbage trucks.

A **CIRCULAR ECONOMY** IS AN ECONOMIC SYSTEM THAT **MINIMIZES WASTE AND POLLUTION** BY REDUCING THE USE OF NON-RECYCLABLE/NON-BIODEGRADABLE MATERIALS, AND KEEPING MATERIALS AND PRODUCTS IN USE AS LONG AS POSSIBLE THROUGH REUSE, REPAIR, AND RECYCLING.

Promising alternatives to single-use packaging include plant-based, biodegradable materials and refill business models. (A refill business model is a strategy that allows customers to reuse their own containers by refilling them with products, reducing waste from single-use packaging.) To deal with mounting plastic waste, many countries are passing Extended Producer Responsibility laws, which require companies to collect and recycle the plastic packaging they distribute and/or transition to non-plastic alternatives.

Winrock is pioneering new business models which incentivize waste producers to treat and sell organic waste as high-quality compost and/or biomethane to replace fossil-based natural gas.



WINROCK INTERNATIONAL

SERVICE OFFERINGS

Winrock's current circular economy work includes:

Addressing methane emissions from Indonesian palm oil production *(Indonesia)*

In the past two years, the market for biomethane derived from Palm Oil Mill Effluent (POME) has emerged as a potentially profitable, scalable option. Biomethane can be used as compressed natural gas for vehicle fuel or it can be injected directly into natural gas pipelines. In 2021, with funding from the World Intellectual Property Organization (WIPO Green), Winrock created a comprehensive Technology Options Catalogue and return on investment study of POME treatment technologies and determined that the potential market for biomethane is large enough to absorb biomethane from all mills in Indonesia. In July 2025, Sinar Mas Group, a leading palm oil producer in Indonesia, issued a tender for POME biomethane projects at 20 of their 50 mills. While the leading palm oil producers may have the technical capacity to pursue POME biomethane, most mills are owned by small or medium-sized companies that are unlikely to pursue POME biomethane without coordinated promotion and technical support.

Winrock is working to increase the scale and rate of investment in proven biogas capture systems to produce usable biomethane gas from POME; the remaining nitrogen-rich slurry can then be combined with the empty fruit bunches to create high-quality organic compost which can be used on the palm plantation to substitute fertilizer derived from natural gas. Treating POME at scale is necessary for Indonesia to meet its Nationally Determined Contribution targets for methane emission reductions.

Composting empty palm fruit bunches *(Indonesia)*

Building on previous work with WIPO Green, in 2025 Winrock began partnering with a palm oil mill to pilot an on-site composting facility that uses a microbial composting accelerator to speed up aerobic digestion of a mix of empty fruit bunches and palm oil mill effluent. This industrial-scale composting pilot will reduce air pollution and fire risks while mitigating greenhouse gas emissions. The composting accelerator reduces the decomposition time to 30 days. The compost can be sold to neighboring plantations.

Reducing and recycling plastic waste at health facilities *(Vietnam)*

The government of Vietnam has a track record of adopting and scaling up successful pilot initiatives to the national level; Winrock has successfully conducted pilot initiatives spanning energy efficiency, agriculture and the environment, securing support from national-level ministries to scale them through incentives and enforcement of regulations. Winrock worked to demonstrate a business model for waste sterilization and recycling at public and private hospitals, as well as a methodology to reduce hospital consumption of single-use plastic. Once plastic waste is sterilized, hospitals can avoid the higher cost of infectious waste disposal; and they can sell the waste to a recycler. The comprehensive circular economy model also includes the adoption of green procurement processes by the hospital and minimization of single-use plastic by staff, patients and visitors. This business model can generate net-positive returns for public and private hospitals of all sizes.

Winrock's expertise includes the following past projects:

Sustainable production of commercially viable products from municipal wastes through public-private partnerships *(Nepal)*

Funded by the European Union, Winrock carried out a baseline survey covering 5,526 households and 741 institutions to assess solid waste management needs in Ilam Municipality in eastern Nepal. The project also surveyed 543 homes on willingness to pay for waste collection to develop a business model for managing the waste through a combination of household fees and revenue from recycling. The project, which supported Ilam's Green City initiative, successfully launched 11 waste management and recycling businesses and facilitated private investment into a composting facility which continues to sell compost fertilizer to nearby organic tea estates.

Capacity for Indonesian Reduction of Carbon in Land Use and Energy *(CIRCLE - Indonesia)*

Winrock provided technical assistance to 30 palm oil mills interested in implementing POME-to-electricity projects. The mills were located in nine provinces: South, Central, and West and East Kalimantan, Central Sulawesi, West and South Sumatra, Jambi, Lampung and Bangka. Winrock completed 20 biogas pre-feasibility studies, 13 biogas in-depth feasibility studies, three in-depth sustainability screenings and 15 sustainability screenings for partner mills. CIRCLE also assisted mills to screen for environmental and social impacts to identify target areas for sustainability improvements.

Within four years, two POME-to-energy projects had reached commercial operation and four projects reached financial close. Another 24 projects were found to have potential for further development; nine projects had completed in depth feasibility studies, 11 projects had completed pre-feasibility studies, and four projects had completed a preliminary assessment. The CIRCLE project organized and executed 12 POME-to-energy training sessions for Indonesian government and mill staff, and developed the first-of-its-kind POME-to-Biogas Project Development in Indonesia handbook in Bahasa Indonesia and English.

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