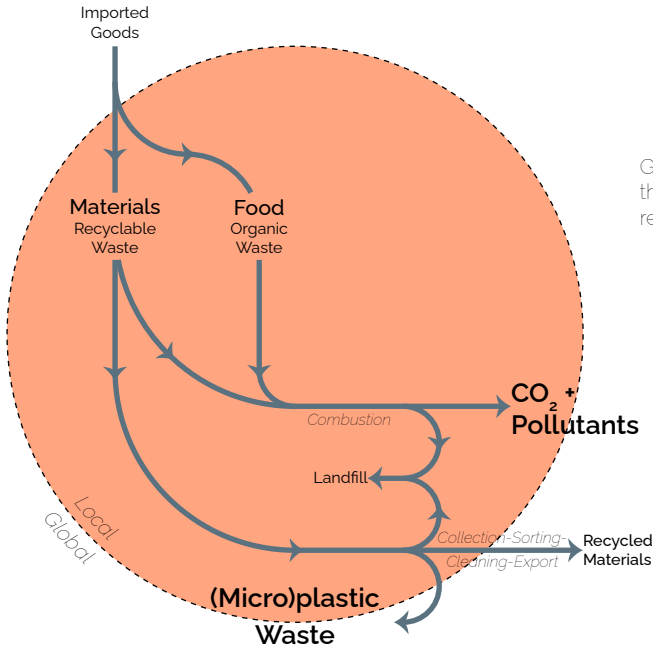


# Biomanufacturing in the Plastocene: A Roadmap for Sustainable, Self-sufficient Island Communities

The ubiquitous challenge of island communities, even with in the US, from Hawaii to Puerto Rico, to Guam, American Samoa, the CNMI and the USVI, is the dependence on external goods to meet basic needs: **food, energy, materials and medicine**. The resulting **linear economy** imports costly products and exports waste products to the local and global environment, concerningly in the form of CO<sub>2</sub> emissions and **(micro)plastic waste**. The advances of biotechnology hold the potential of a **sustainable, self-sufficient circular economy**. The vast repertoire of biomanufacturing employs benign microorganisms to transform waste into a diverse portfolio of products: plants and microbes to boost the yield of local agriculture, organic biodegradable materials to replace petrochemical ones, advanced biopharmaceuticals at the forefront of modern medicine.

## Phase 0: Linear Economy



Goods in, waste out. Without any means to recycle plastic waste into useable materials, that which cannot be combusted for energy, landfilled, or sold on global markets for recycling eventually make their way into the environment as pollutants.

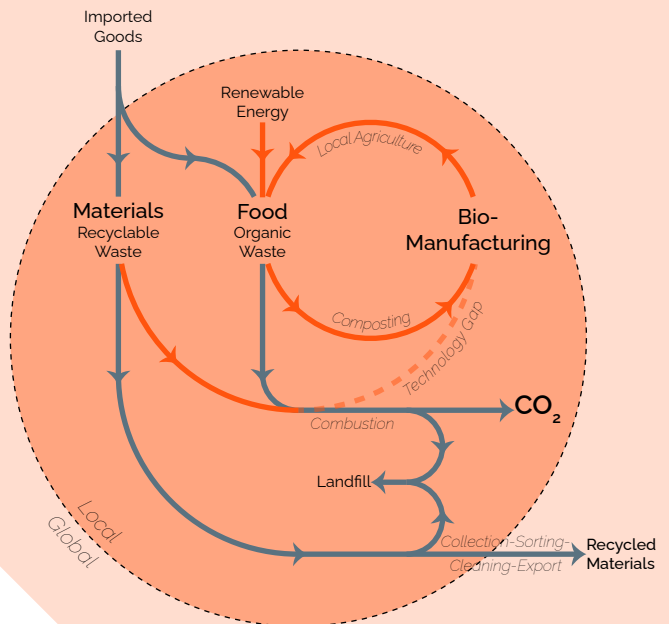
Just as food waste can be upgraded into rich compost, we must transform our abundant plastic waste stream into an organic feedstock.

These carbon and nutrient rich feedstocks are the food and fuel for microorganisms to manufacture a diverse range of products.

The first task is to produce and deploy a customized portfolio of microbial products of biotechnology to: revitalize local agriculture, enrich the soil, sustainably increasing yields, and weather the extremes and unpredictability of climate change.

But a technology gap exists:  
How do you cheaply, ubiquitously take diverse waste streams (plastic, paper, food, etc.) and robustly convert them to useful feedstocks?  
How do you do so at the low capital, decentralized, small scale of most island communities?  
To solve these challenges, we need innovative scientists and engineers at the forefront of R&D leveraging global knowledge to solve these challenges at the local community level.

## Phase 1: Quasi-Circular Economy



With a thriving, self-sufficient agricultural foundation, biomanufacturing can diversify to produce a range of biomaterials and products to meet all our basic food, energy, material and medicinal needs in a fully circular economy.

With further development our island communities may eventually become net exporters of these high-value products of biotechnology to the global community.

## Phase 2: Circular Bioeconomy

