

Waste-Free Future: Research Questions

For the competition, your team will use the three principles of a circular economy to design a waste-free city. Below you will find some information and questions to help start your research.

Today's Linear System

Before you start to design your waste-free future city, it is important to look at two aspects of today's linear system: how we make things (like consumer products, buildings, and food) and how we handle waste and recycling.



A linear economy follows a “take-make-dispose” path. Raw materials are collected, transformed into products that are used, and then eventually discarded as waste.

Making Stuff

Pick one commonplace item – maybe a pair of pants, your phone, a fence, even the sidewalk in your neighborhood – and research how it is made:

- What natural resources or materials are needed to make it?
- Where do the resources or materials come from? Are they mined, grown, or manufactured? Are they locally available or do they need to be shipped from far away?
- What is the process for making your item?
- Does making it create any waste or pollution?



Battery Power!

Learn how today's batteries are made in Extraction to E-Waste: The Lithium-ion battery supply chain <https://ulxplorlabs.org/battery-supply-chain/>

- How does your item get to consumers?
- How long is it designed to last? Was it designed for a single use (a candy wrapper or bottle of water)? Or can it be used for a long period of time (a washing machine, phone, or car)?
- What happens to it when it's no longer useful? Is it recycled, reused, or is it thrown away?
- Does it cause pollution or contamination when it is disposed of?

After you have learned about how your item is currently being made, brainstorm with your teammates about what changes you might make to the production process to design out waste and keep your item and/or the materials it is made from in use longer.

TODAY'S TRASH

When people first learn about a circular economy, they might think it is just another way to talk about recycling. But it is more than that; it combines several strategies like reuse, sharing, repair, refurbishing, remanufacturing, and recycling.

Research how trash and recycling are currently handled in your city or town:

- What waste streams (types of trash) are typically found in trash?
- What happens after trash is collected?
- What role do the 4 R's (reduce, reuse, recycle, and rot) play in today's waste management system?
- How are current systems effectively using the 4 Rs?
- What are some innovative examples of how cities or companies are rethinking or reusing waste?

Learning More About Circular Economy

There are a lot of great resources. We recommend starting with the Ellen MacArthur Foundation. But don't stop there! Search the internet for examples of a circular economy in action. Ask questions like:

- What does it mean to design out waste?
- What is regenerative agriculture?
- How are cities using the three circular economy principles?
- What roles do engineers play in a circular economy?