

- States have passed producer responsibility laws: require manufacturers of products/packaging to take responsibility for collection, recycling, reuse, or disposal of their products, including e-waste
- Producer responsibility places cost on manufacturer and consumer rather than taxpayers

### **Waste Management Hierarchy (From Most To Least Preferred):**

- Source Reduction & Reuse → Recycling/Composting → Energy Recovery → Treatment & Disposal

### **Plastics:**

#### **What Are Plastics?**

- Plastics: range of synthetic or semi-synthetic materials, use polymers as main ingredient
- Classification of plastics = degree to which chemical processes used in formation are reversible or not:
  - Thermoplastics: Do not undergo chemical change when heated, can be molded repeatedly
    - Polyethylene (PE), polypropylene (PP), polystyrene (PS), and polyvinyl chloride (PVC)
    - PE and PP = most common
  - Thermosets: Irreversible chemical reaction occurs during formation, so can melt and take shape only once. If reheated, they decompose rather than melt
    - Epoxy, melamine
- Plastic is much more difficult to recycle because it consists of a wide range of compounds and materials (PVC, PE, HDPE, etc.), some of which can be melted and reformed (thermoplastics) while others cannot (thermosets). On the other hand, paper in various forms is all made of the same stuff and can be reduced to pulp and reformed into paper.

#### **Where does plastic waste come from?**

- Majority from packaging and building/construction

#### **Where Does All The Plastic Go?**

- Of global plastic produced from 1950 to 2015:
  - 55% landfill, 30% in use, 8% incinerated, 6-7% recycled
- Of plastic no longer in use, ~9% was recycled
- 3% of global annual plastics waste entered ocean
- >80% of plastic in ocean comes from land sources
- Plastic enters rivers and ocean if poorly managed

#### **Can Plastic Waste Be Managed Sustainably?**

- Primary options for handling plastic waste: 1) Recycling, 2) Incineration or 3) Disposal in Landfill
- Impact of different methods can be assessed across multiple factors including GHG emissions, energy use, local pollution, and cost of processing
- Recycling has lowest global warming potential and energy use, usually thought of as best option from environmental perspective
- >95% of plastic in EU and >70% in US was sent to China
- Major global shift in where and how materials are being recycled/processed