**CHAPTER 21 Solid and Hazardous Waste**

Core Case Study: E-waste- and Exploding Problem

What is e-waste?

Where does most e-waste end up and why is that an issue?

The European Union uses a “cradle-to-grave” approach. What does this mean?

Since recycling and reuse won’t be enough to deal with the issue, what should electronic companies focus on doing to help deal with this problem?

**21-1: What Are Solid Waste and Hazardous Waste, and Why Are They Problems?**

Why is there no waste in nature?

How do humans differ from this principle?

|  |  |  |
| --- | --- | --- |
| Categories of Waste | Definition | Examples |
| 1. Solid Waste |  |  |
| 1. Industrial Solid Waste |  |  |
| 1. Municipal Solid Waste (MSW) |  |  |
| 1. Hazardous (Toxic) Waste |  |  |

Two reasons to sharply reduce the amount of solid and hazardous wastes we produce:

1.

2.

The US leads the world in producing \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. Most solid waste produced in the US is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

A desktop computer requires \_\_\_\_\_\_\_\_\_\_\_\_\_\_ different materials. 1 lb of electronics creates \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of solid and liquid wastes.

The US leads the world in trash production. Each day the average American produces \_\_\_\_\_\_\_\_\_\_lbs of MSW. The good news is that production of MSW has leveled off due to \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

Case Study: Trash Production and Recycling in NYC

Describe why trash has decreased in NYC since 1940.

**21-2: How Should We Deal with Solid Wastes?**

Dealing with Solid Wastes:

|  |  |
| --- | --- |
| Waste Management |  |
| Waste Reduction |  |
| Integrated Waste Management | First Priority:  Second Priority:  Last Priority: |

Waste Reduction is based on 3Rs

|  |  |  |
| --- | --- | --- |
| Reduce | Reuse | Recycle |
|  |  |  |

Seven strategies individuals and communities can reduce resource use, waste, and pollution:

1.

2.

3.

4.

5.

6.

7.

**21-3: Why is Reusing and Recycling Materials So Important?**

Name some examples of reuse.

Case Study: Use of Refillable Containers

Describe why using refillable containers is a good strategy.

What are the 5 major types of materials that can be recycled?

1.

2.

3.

4.

5.

Two types of recycling:

|  |  |
| --- | --- |
| Primary (closed loop) Recycling: | Secondary Recycling: |
|  |  |

Switzerland and Japan recycle \_\_\_\_\_\_\_\_ of their MSW.

The US recycles \_\_\_\_\_\_\_ of their MSW.

Approaches to dealing with recycling:

|  |  |  |
| --- | --- | --- |
| Materials Recovery Facilities | Source Separation | Fee-Per-Bag |
|  |  |  |

|  |  |  |
| --- | --- | --- |
| What is it? | Composting | What is needed to be successful? |
|  |  |

Case Study: Recycling Paper

Which type of paper is easiest to recycle?

What is the process for recycling newspaper?

Case Study: Recycling Plastics

How many different types of plastics are used?

What problems occur when plastic is thrown away?

3 reasons why we don’t recycle plastic very much:

1.

2.

3.

|  |  |  |
| --- | --- | --- |
| Advantages | Recycling | Disadvantages |
|  |  |

Science Focus: What are bioplastics?

How can we encourage reuse and recycling?

**21-4: What Are the Advantages and Disadvantages of Burning or Burying Solid Waste?**

|  |  |  |
| --- | --- | --- |
| Advantages | Burning  Solid Waste | Disadvantages |
|  |  |

Describe the process of waste to energy incinerator.

You will want to look at Figure 21-13.

Two types of Landfills:

|  |  |
| --- | --- |
| Open Dumps | Sanitary Landfills |
|  |  |

**21-5: How Should We Deal With Hazardous Waste?**

Describe the Integrated Management of Hazardous Waste Approach:

|  |  |  |
| --- | --- | --- |
| Produce Less Hazardous Waste | Convert To Less or Non- Hazardous Substances | Put in Perpetual Storage |
|  |  |  |

Case Study: What is e-waste and why is it a problem?

Ways to detoxify hazardous waste:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Physical Method | Chemical Method | Biological Method | Phytoremediation | Plasma Arc Torch |
|  |  |  |  |  |

Describe in detail the different types of Phytoremediation. Look at Figure 21-18.

Storage of Hazardous Waste:

|  |  |  |
| --- | --- | --- |
| Deep Well Disposal | Surface Impoundments | Secure Hazardous Landfills |
|  |  |  |

Case Study: Hazardous Waste Regulation in the US

Resource Conservation and Recovery Act-

What is the cradle-to-grave system?

CERCLA-

Superfund Act-

**21-6: How Can We Make the Transition to a More Sustainable Low-Waste Society?**

How have grassroots led to better waste management?

What is environmental justice and why is it important?

What is the Basel Convention?

What are POPs?