

Developing Sustainable Waste Programs

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Introductions



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Agenda

- ▶ Develop a framework for a sustainable waste program
- ▶ Discuss best practices for a waste management plan
- ▶ Explore sustainable waste practices

Sustainability Background

What is environmental sustainability?

- ▶ *Sustainability* is reducing impacts on the environment and natural resources, such as, air quality, waste, water, energy, global climate and other areas.
- ▶ In recent years, sustainability has become a key component of **Environmental, Social and Governance (ESG) programs** of public and private companies.
- ▶ ESG programs can govern a variety of company concerns, including, executive pay, human rights, corporate ethics, diversity, climate change, employee safety, waste management and others.



Sustainable Waste Management - Where do you start?

Sustainable waste management starts with **analyzing a manufactured product's life cycle** and **identifying ALL regulated and unregulated wastes**, which may include:

- ▶ Materials Extraction
- ▶ Manufacturing
- ▶ Distribution
- ▶ Usage
- ▶ End-of-Life



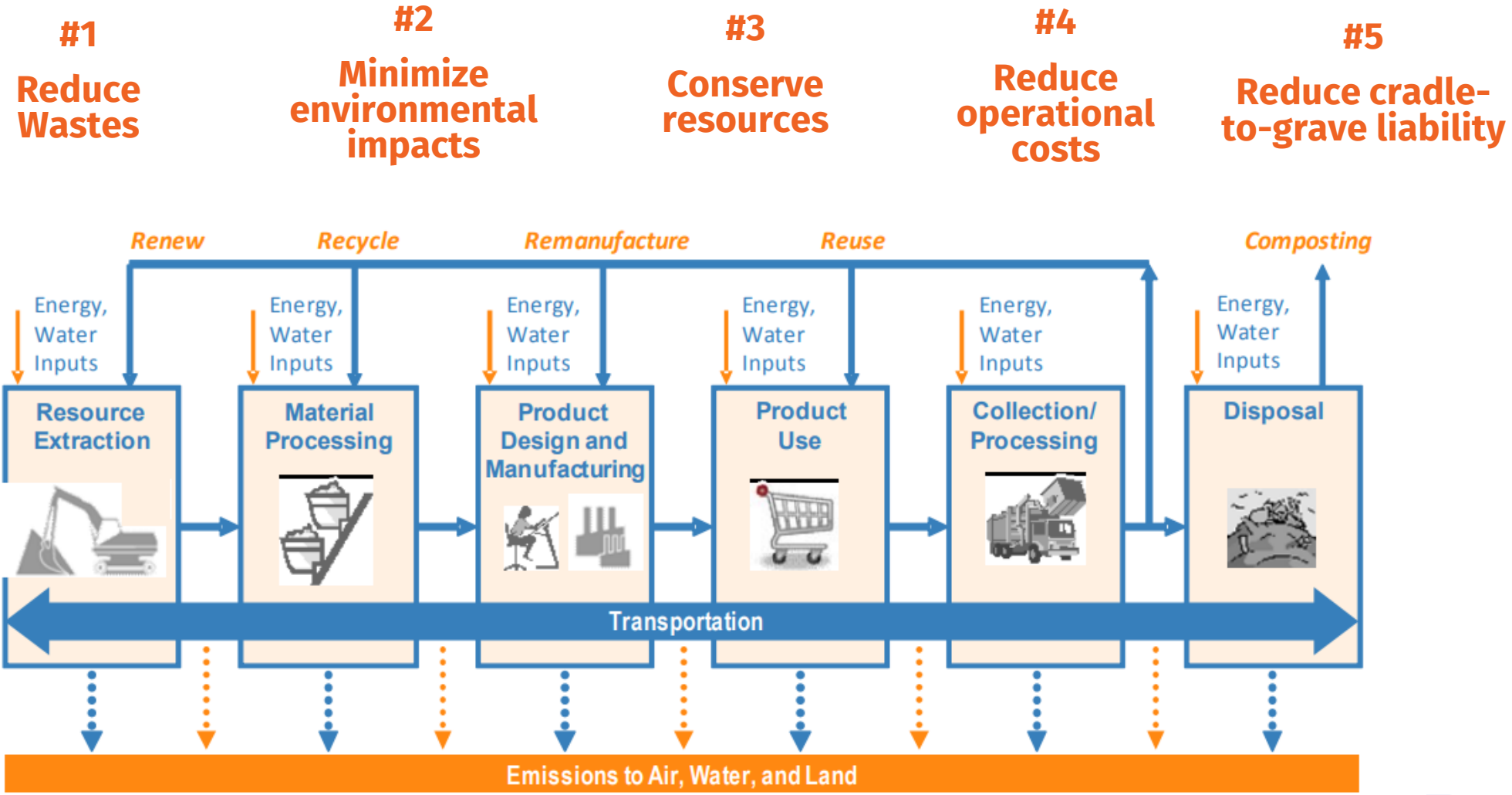
Sustainable Waste Management Hierarchy

U.S. EPA developed a waste management hierarchy to establish a priority in approaches to managing waste materials. The hierarchy ranks the various management strategies from most to least environmentally preferred.

The hierarchy places emphasis on **reducing, reusing and recycling as key to sustainable materials management**. These strategies also reduce greenhouse gas emissions that contribute to climate change.



Key Benefits of Sustainable Waste Practices



What is a Sustainable Waste Management Plan?

- ▶ Once all wastes are identified, a typical Waste Management Plan **summarizes applicable regulatory requirements** for a facility's generation and disposal of its regulated and unregulated waste materials
- ▶ The WMP also **identifies the procedures for the proper management and disposal of a facility's wastes**, including, hazardous wastes, solid wastes, universal wastes, recyclable materials, wastewater and others.
- ▶ A **Sustainable** Waste Management Plan also **includes sustainability objectives and practices** of the company in the areas of waste generation, such as, landfill diversion, source reduction, recycling, conservation, beneficial re-uses and other sustainable measures.



Waste Management Plan

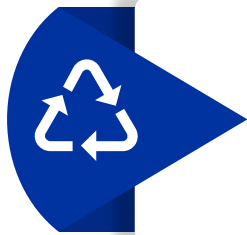
A Key Tool

Put Simply, All Waste Generators Must...

- ▶ **Identify** all discarded materials at the facility
- ▶ **Classify** discarded materials as non-hazardous, hazardous, acute hazardous waste, universal waste or used oil
 - Waste determination!
- ▶ **Count** how much hazardous waste or acute hazardous waste is generated each calendar month
- ▶ Comply with the requirements applicable to the respective waste **generator classification** (e.g., Very Small, Small, Large)
- ▶ Comply with any additional **more stringent state waste regulations**



Key Regulatory Requirements to Include



Waste Generation

- Waste Determination
- Waste Characterization
- Generator Status Determination
- Recordkeeping
- Training
- Waste Minimization
- Sustainability
- Recycling



Waste Accumulation

- Container and Tank Mgmt.
- Accumulation Area Mgmt.
- Inspections
- Emergency Preparedness
- Contingency Planning
- Universal Waste
- Used Oil
- Special Waste
- Solid Waste



Waste Shipment

- Prepare for Transport
- DOT Requirements
- Vendor Management
- Landfill Diversion
- Manifest
- Bills of Lading Recordkeeping

Key WMP Component: Waste Determinations

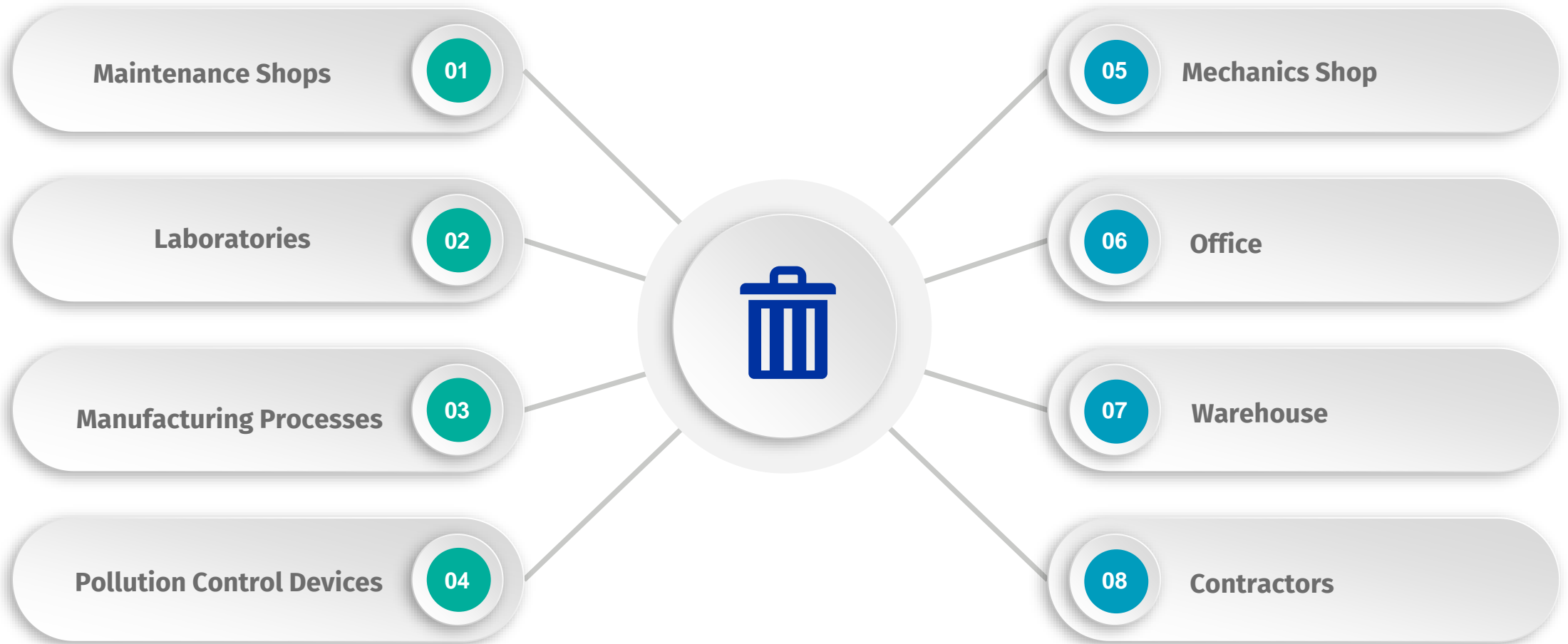
Waste Determination – Key Steps

40 CFR 262.11

▶ Key Steps in Waste Determination:

- Is it a “solid waste”?
 - Determine if waste is excluded from regulation
 - Determine if waste is listed hazardous waste
 - Determine if waste is characteristic hazardous waste
 - If determined to be hazardous, determine if other exclusions or alternative restrictions pertain to management of specific waste
- ▶ Determination must be **accurate**
- ▶ Must be made at the **point of generation** and any time waste changes

Where to find solid waste?



Other Waste Generating Activities: Non-Hazardous

- ▶ Garbage (a.k.a., municipal solid waste)
- ▶ Paper and packaging refuse
- ▶ Sludges from waste treatment plants, water supply treatment plants, or pollution control facilities
- ▶ Industrial wastes determined to be non-hazardous
- ▶ Treated industrial wastewater (no longer hazardous)

Key WMP Component: Documenting Generator Status

Federal Generator Status Determination



- ▶ The quantity of **hazardous waste** generated each month
- ▶ The quantity of **acute hazardous waste** generated each month (**count separately**)
- ▶ The quantity of **acute hazardous waste spill residue** generated each month

Generator Category	Quantity of non-acute hazardous waste generated in a calendar month	Quantity of acute hazardous waste generated in a calendar month	Quantity of residues from a cleanup of acute hazardous waste generated in a calendar month
LQG	>2,200 lbs	Any amount	Any amount
LQG	Any amount	>2.2 lbs	Any amount
LQG	Any amount	Any amount	>220 lbs
SQG	>220 lbs, <2,200 lbs	≤2.2 lbs	≤220 lbs
VSQG	≤220 lbs	≤2.2 lbs	≤220 lbs

Generator Category Determination

40 CFR 262.13

- ▶ Generator status is determined on a monthly basis and may change from month to month
- ▶ **Key question for VSQGs & SQGs: can you prove your generator status?**
 - **Pitfalls:**
 - ◆ Relying on manifests
 - ◆ Excluding satellite accumulation containers
 - ◆ Inaccurate waste determinations

Key WMP Component: Accumulation Areas

Hazardous Waste Accumulation – 2 Types

▶ Central Accumulation Areas (CAA)

- Accumulation Time Limits - Containers
 - ◆ 90 days for LQG
 - ◆ 180 days for SQG

▶ Satellite Accumulation Area (SAA)

- Near Point of Generation
- 55-gallon limit
- Move container to CAA within 3 calendar days of reaching 55-gallon limit



Central Accumulation Area

- ▶ Do not **move** hazardous waste accumulation area
 - Formal closure is required
- ▶ Store hazardous waste in a low traffic **secured** area
- ▶ Segregate waste by **hazard** (e.g., flammable, corrosive, toxic)
- ▶ Adequate aisle space (approximately 3 feet wide) providing adequate space for responding to emergencies and inspections
- ▶ Fire suppression and spill response equipment in the vicinity
- ▶ Adequate water source for fire suppression
- ▶ Signage- No smoking
- ▶ No sign of visible spills
- ▶ No open floor drains

Example from Waste Management Plan CAA Performance Standards

3.7.8 Central Accumulation Area

3.7.8.1 Location and Signage

- ▶ Designate a specific location and identify using Hazardous Waste signs.
- ▶ Designate the central accumulation area away from high traffic.
- ▶ Locate ignitable waste storage areas at least 50 feet from the nearest property line (40 CFR 262.17(a)(1)(vi)(A)).
- ▶ Accumulations area should be cool, dry, well-ventilated, and away from combustible material, and sources of sparks or flames.

3.7.8.2 Physical Set-Up

- ▶ Ensure each storage area is properly labeled so that waste is not inadvertently stored in inappropriate areas.
- ▶ Containers holding hazardous wastes that are incompatible with wastes held nearby in other containers must be separated or protected from each other by a dike, berm, secondary containment, wall, or other divide.
- ▶ Use physical indicators showing the boundary of the area. Use tape on the floor, mobile barriers, mats, or chains to separate the hazardous waste accumulation area from other drums or pieces of equipment that may be stored nearby.

Satellite Accumulation Area

40 CFR 262.15

- ▶ Unlimited time to accumulate up to:
 - **55 gallons of hazardous waste**, or
 - **1 quart of acute hazardous waste (2.2 lbs)**
- ▶ Waste must be:
 - *At or near point of generation*
 - *Under the control of the person operating the process that generates the waste*
- ▶ Containers must be **labeled** and in **good condition** and **closed** when not adding or removing waste
- ▶ Once 55-gal/1-quart limit is exceeded, the excess waste must be **dated and moved within 3 calendar days** to the central accumulation area or shipped directly off site
- ▶ **Must meet preparedness and prevention regulations and emergency procedures**



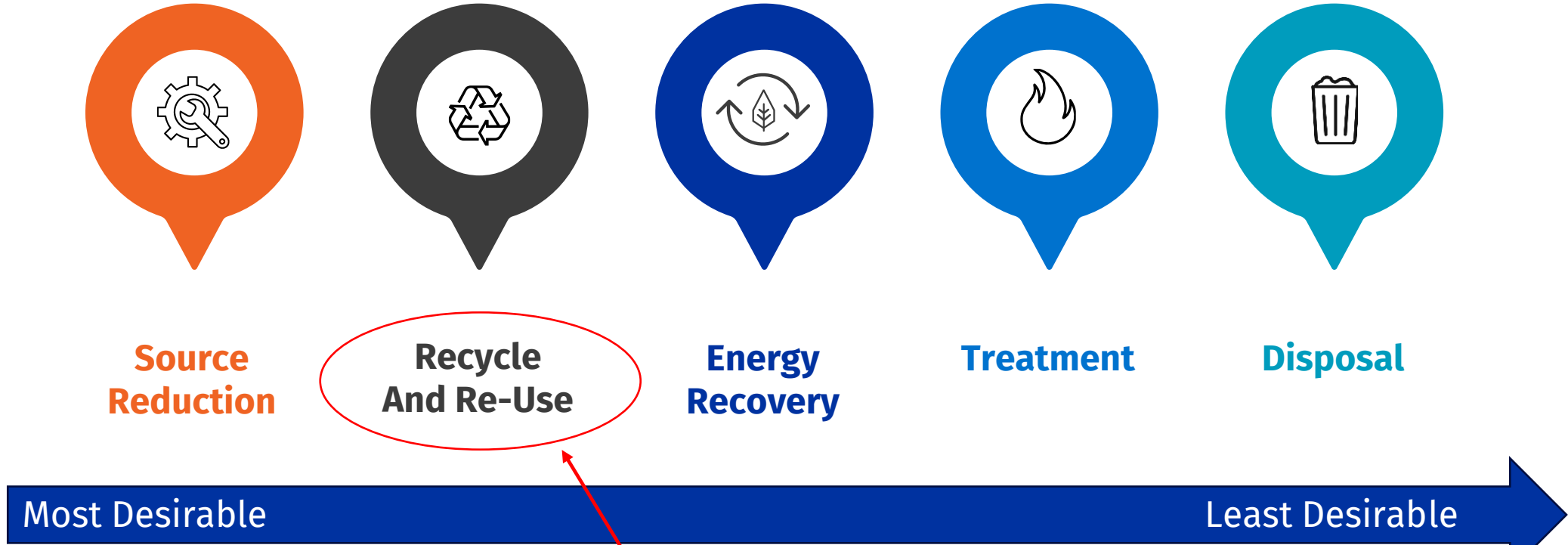
Sustainable Waste Practices

Sustainability & Waste Minimization

- ▶ A key aspect of sustainable waste management include waste minimization practices for ALL regulated and unregulated wastes.
- ▶ Waste minimization reduces operational costs and cradle-to-grave liability from the generation of hazardous wastes.
- ▶ The following minimization approaches are typical elements of a *Sustainable Waste Management Plan*:
 - Source Reduction
 - Recycling
 - Energy Recovery
 - Treatment
 - Disposal



Waste Minimization Approaches



**Recycle
And Re-Use**

Recycling and/or beneficial re-use may qualify for applicable state or federal exclusions from hazardous waste regulation

Source Reduction – Typical Approaches

- ▶ **Input Changes** - Raw material or feedstock changes to reduce, avoid or eliminate the hazardous materials that enter the production process
- ▶ **Operational Improvements** - Loss prevention, waste segregation, production scheduling, maintenance operations, and overall site management.
- ▶ **Production Process Changes** - Changes in production methods or techniques, equipment modifications, changes in operating conditions (i.e., temperature, pressure), process or plant automation, or the return of materials or their components for reuse within existing processes.
- ▶ **Product Reformulation** - Changes in design, formulation, composition, or specification of final or intermediate products.
- ▶ **Administrative Steps** - Examples include inventory control, management improvements and employee training.



Source Reduction =
Measures that stop the
generating activity at
the source BEFORE the
waste is generated!

Waste Recycling – Typical Approaches

▶ Wastewater

- Treatment System (pH adjust, neutralization, etc.)
- Water re-uses: irrigation, cooling, process water

▶ Solvent(s) Recovery

- Distillation, extraction or other

▶ Metal Reclamation

- Scrap process metal
- Empty aerosol cans, etc.

▶ Food Waste

- Landfill Diversion - Anaerobic digester

▶ Paper Waste - Collection and Offsite Transport

▶ Used Oil - Collection and Offsite Transport

▶ E-Wastes - Collection and Offsite Transport

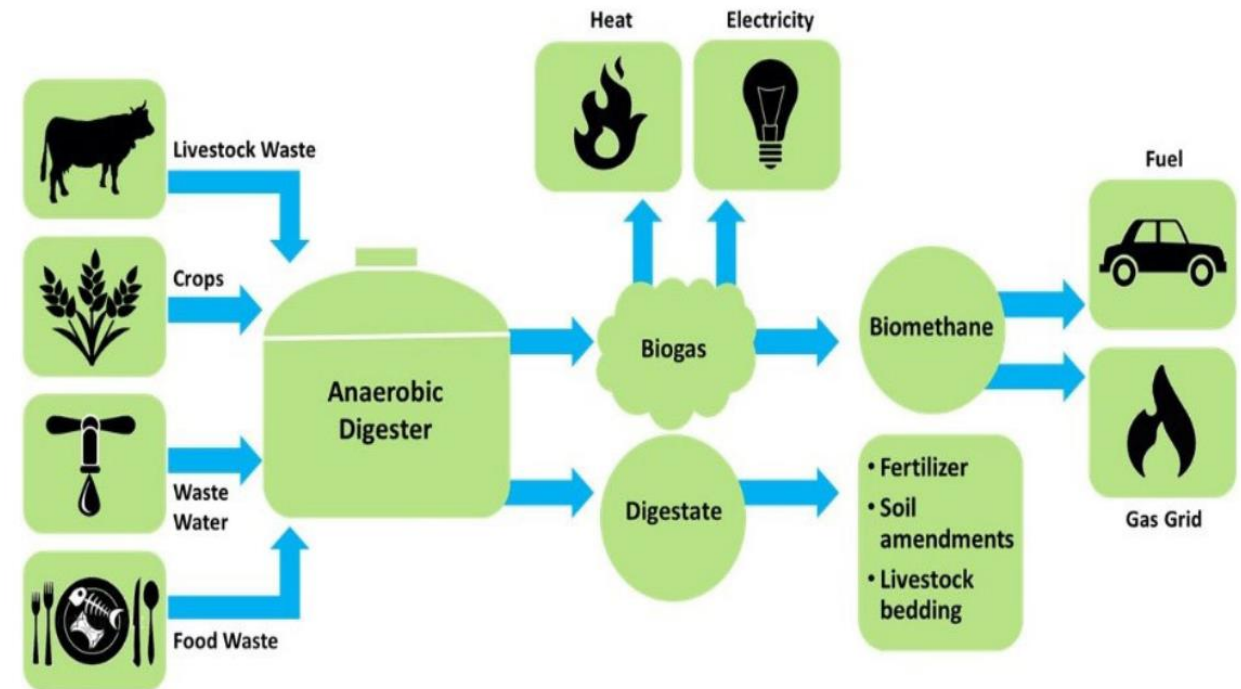


Recycling is the process of converting waste materials into new materials, or converting into another beneficial use

Energy Recovery – Typical Approaches

Energy recovery from waste is the conversion of non-recyclable waste materials into useable heat, electricity, or fuel through a variety of processes, such as:

- ▶ Fuels Blending
- ▶ Waste-to-Energy Facilities
- ▶ Gasification
- ▶ Pyrolysis
- ▶ Anaerobic Digestion
- ▶ Landfill Gas Recovery



Waste Treatment – Typical Approaches

Waste treatment means any physical, thermal, chemical or biological process that changes the characteristics of the waste in order to reduce its volume or hazardous nature, facilitate its handling or enhance recovery, such as:

- ▶ Distillation
- ▶ Adsorption
- ▶ Stripping
- ▶ Chemical stabilization
- ▶ Biological processes
- ▶ Evaporation
- ▶ Neutralization
- ▶ Phase separation (filtration, settling, centrifuges, etc.)
- ▶ Thermal or catalytic incineration (for air emissions)

Be careful not to trigger RCRA permitting for any onsite treatment of hazardous waste!!!



Disposal – Typical Approaches

Disposal of wastes should be avoided whenever possible, and only after waste minimization approaches have been reviewed and exhausted. Typical approaches for the disposal of regulated and unregulated industrial wastes include:

- ▶ Landfill
- ▶ Surface Impoundments (ponds, pits, lagoons, etc.)
- ▶ Land Application
- ▶ Underground Injection
- ▶ Surface water discharge
- ▶ POTW or sewer discharge
- ▶ Stack release / air emissions



Concluding Thoughts

Recall – RCRA is this “simple”!

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- ▶ **Count** how much hazardous waste or acute hazardous waste is generated each calendar month
- ▶ Comply with the requirements applicable to the respective waste **generator classification** (e.g., Very Small, Small, Large)
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Questions?



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