An Overview of Toxics Use Reduction Planning
Objectives

After this module, you will be able to…

• Describe the central role of planning in achieving TUR

• Explain how TUR Planning practices can improve process efficiency

• List the six TUR techniques, and discuss examples of how they can be implemented
What is Toxics Use Reduction?

Toxics Use Reduction Act Definition:
In-plant changes … that reduce, avoid, or eliminate the use of toxic or hazardous substances or generation of hazardous byproducts …
Definition of TUR: Key Points (continued)

- Reduce overall risks to workers, consumers, and the environment
Incentives for TUR

- Identifies potential cost savings
- Provides a systematic materials tracking program
- Identifies process or chemical inefficiencies
TUR Actors

- TUR Planners
- TUR Team
- Employees
- Management
Role and Responsibilities of the TUR Planner

• **Roles:**
  - Facilitate TUR team meetings
  - Oversee data collection
  - Lead discussions on potential TUR projects
  - Ensure TUR implementation wherever possible

• **Responsibilities:**
  - Review plan for completeness
  - Certify plan
  - Promote the goals of the TUR Act by;
    - Protecting the environment and public health through TUR
    - Maintaining competitive standing of your business in MA through TUR and effective management
The TUR Planning Cycle

- Pre-Plan
- Process Characterization
- Identify TUR Options
- Screen & Evaluate TUR Options
- Certify Plan
- Develop or Update Plan
- Implement Plan
- Measure Success
Pre-Planning

- Management Policy
- Employee notification and Involvement
- Forming a Team
- Scope Development
Employee notification

• Solicit comments and suggestions from employees on toxics use reduction options
Process Characterization

- Process flow diagram
- Purpose of the chemicals
- Define product & Unit of Product
- Define Production Units
- Materials Accounting
Why Do Process Characterization?

- Provides basic "unit of analysis" for TUR
- Helps to identify TUR opportunities
- Pinpoints where wastes originate
- Helps determine true costs of toxics
What’s Involved with Process Characterization?

STEP 1: Process mapping

STEP 2: Production Unit Info

STEP 3: Materials accounting

QUANTITATIVE

QUALITATIVE
Process Flow Diagram

- The Process Flow Diagram provides:
  - Clear concept of all the relevant components and flows of a process
  - All the input/output points, including raw materials, product, \textit{and non-product output.}
  - Means of discussing the process with TUR Team
Example: Process Flow Diagram

- Inputs
- Facility
- Outputs
- Wastes
Unit of Product

• A measure that reflects the level of production associated with the use of the toxic or the generation of the toxic as a byproduct

• Toxics use reduction must be normalized against the level of production

• Select a measure of facility productivity that closely reflects activities involving toxics
TUR Materials Accounting

A procedure for identifying and quantifying the toxic substances used, manufactured, and emitted at a facility.
Use of Data in TUR Planning

• Quantification of toxics use in production processes:
  – Focuses planning efforts
  – Serves as a base-line for future TUR evaluations
  – May highlight inefficiencies
  – May indicate reuse and/or recycle possibilities
Options Identification

Generate options using:
- 6 TUR techniques
- Brainstorming
- Employee/team inputs
- Vendors, trade journals, industry experts, etc.
For *each* toxic in *each* production unit,

**Identify**

- Brainstorm TUR Options
  - Use 6 TUR techniques
  - Generate lots of ideas

**Screen**

- Eliminate TUR Options
  - Technically or economically infeasible
  - Not TUR

**Evaluate**

- Evaluate remaining TUR Options
  - Technical evaluation
  - Economic evaluation
The Six TUR Techniques

1. Input Substitution
2. Product Reformulation
3. Production Unit Redesign/Modification
4. Production Unit Modernization
5. Improved Operations and Maintenance
6. Recycling which is integral to the process
Input Substitution

• Replace chemical w/ less hazardous option
  – May not reduce waste but waste is less hazardous
  – Drop-in substitutes don’t require process changes
  – Some options may require equipment or product modifications

• Requires careful analysis

• Potential effect on quality
Product Reformulation

• Involves product design and formulation stage
• Typically results in less toxic chemical use in both process and final product
• Meet consumer demand for environmentally conscious products
• Comply with product content regulations
Production Unit Redesign or Modification

• Involves altering process used to make product
• New way to manufacture
• New equipment
• New procedures
Production Unit Modernization

• Involves upgrading
  – outdated equipment
  – inefficient methods

• Requires capital investment
Improved Operation and Maintenance

- Cost effective
- May involve:
  - Changing operating procedures
  - Operator training
  - Preventive maintenance programs
  - Improving inventory management and control
In Process Recycling

- “Closed-loop” recycling and reuse
- Reduces annual amount purchased and discharged
- Often a cost-effective and economically feasible option
Evaluate TUR Options

- Screening
- Technical evaluation
- Economic evaluation
- Worker health and safety evaluation
Screening TUR Options

Screen and eliminate

- Does it reduce toxics?
- Does it reduce toxics exposures?
- Does it reduce non-product output?
- Technically feasible?
- Economically feasible?
Technical Screening

What is “technically infeasible?”

- Equipment:
  - Not available
  - Cannot be developed
- Inadequate worker skills
- Product quality would be unacceptable
- Insufficient space
Economic Screening

*What is “economically infeasible?”*

– Does not meet investment criteria
  - Payback period too long
  - Upfront investment too high
Technical Evaluation

- Availability
- Applicability
- Effects on product quality
- “Off-the-shelf” technology
Economic Evaluation

- Direct costs or savings
- Hidden costs or savings
- Future liability
- Non-monetized
  - Costs – e.g. bad publicity
  - Benefits – e.g. good will
- Revenue sources
Conventional cost accounting often does not account for many indirect costs or hidden costs associated with toxics use, be sure to include:

- Conventional Costs (Prevention, Treatment, and Remediation)
- Purchase Costs of Materials that become Waste or Emissions – “non-product outputs”
- Purchase Costs of Natural Resources (energy, water, raw materials)
- External Costs
Financial Analysis

• **PURPOSE:** To determine whether an investment adds economic value to a company

• **METHOD:** Calculate cash flows over the life of a project and apply measure(s) of profitability

• **PROCESS:**
  – Collect incremental cost information
  – Determine cash flows
  – Apply measures of profitability
  – Interpret Results
Why Health and Safety in TUR Planning?

- Traditionally environmental protection and worker health and safety are separate issues
- TUR Act was specifically designed to focus on USE of chemical by workers
Develop TUR Plan

- Choose options for implementation
- Project toxics use reductions
- Develop implementation schedule
TUR Plan Certification

TUR Plan must include:

- Facility-wide Information
- Production Unit Information
- Statements of Certification

Diagram:
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