



An Overview of Toxics Use Reduction Planning



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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:**

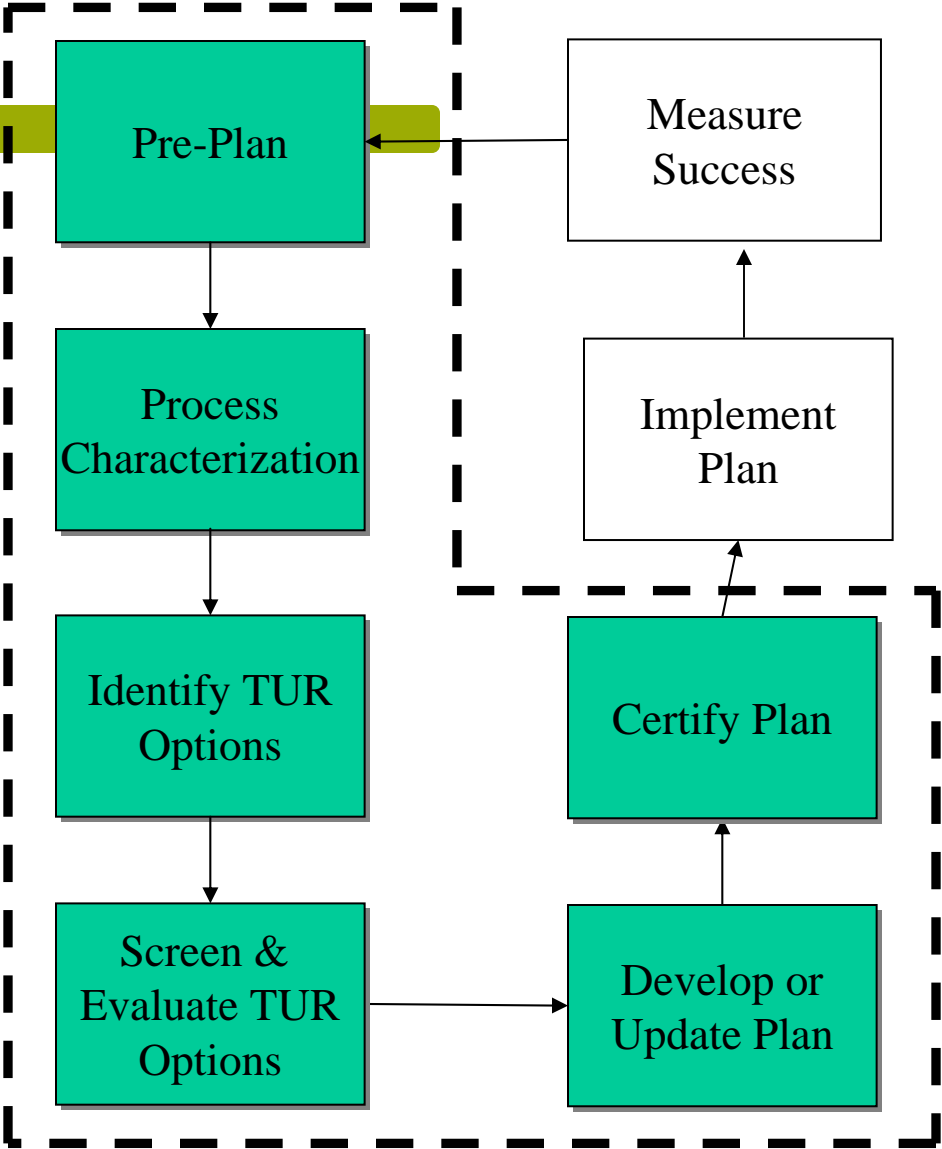
- Facilitate TUR team meetings
- Oversee data collection
- Lead discussions on potential TUR projects
- Ensure TUR implementation wherever possible

- **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



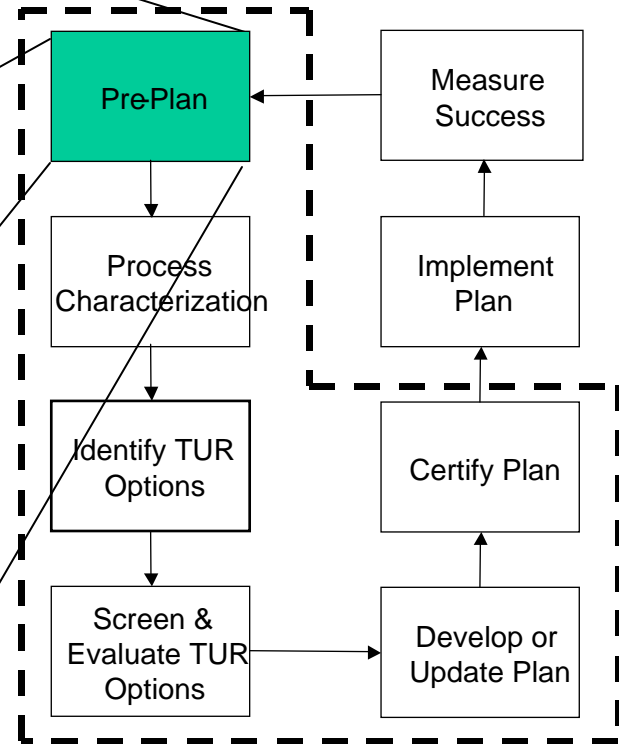
The TUR Planning Cycle





Pre-Planning

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



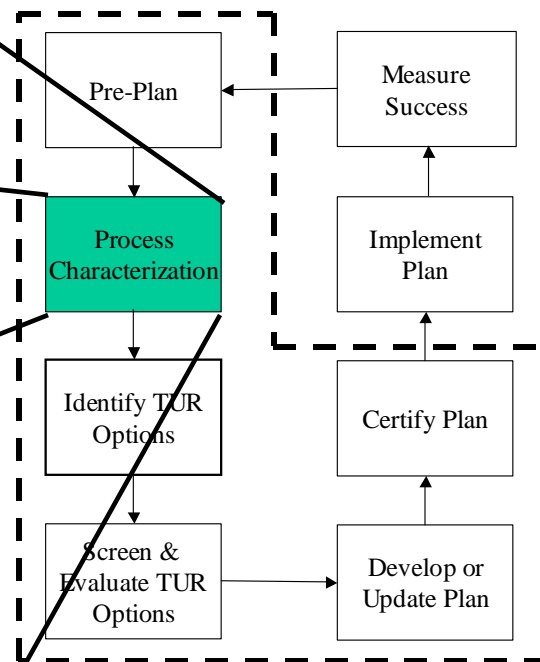


Employee notification

- 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



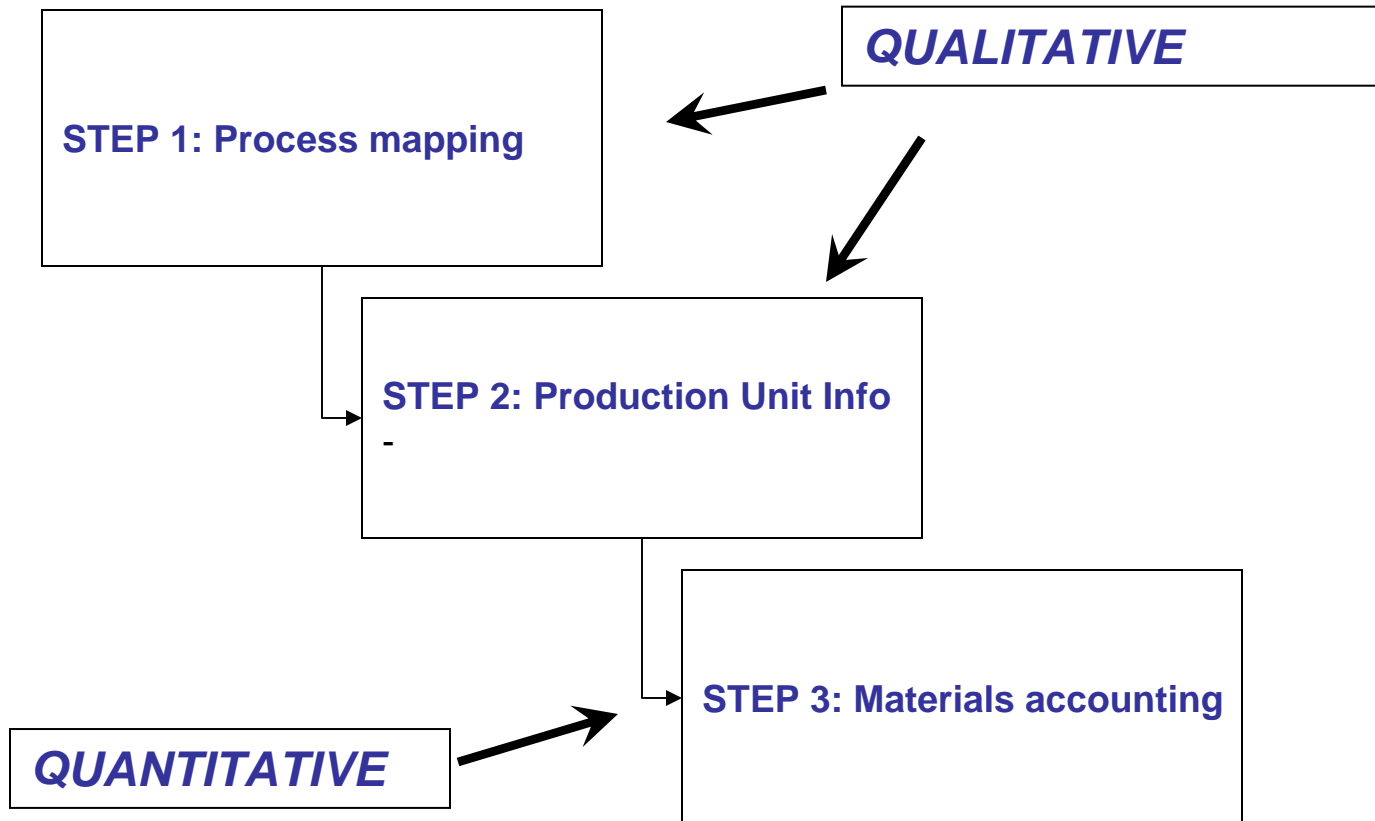


Why Do Process Characterization?

- 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?



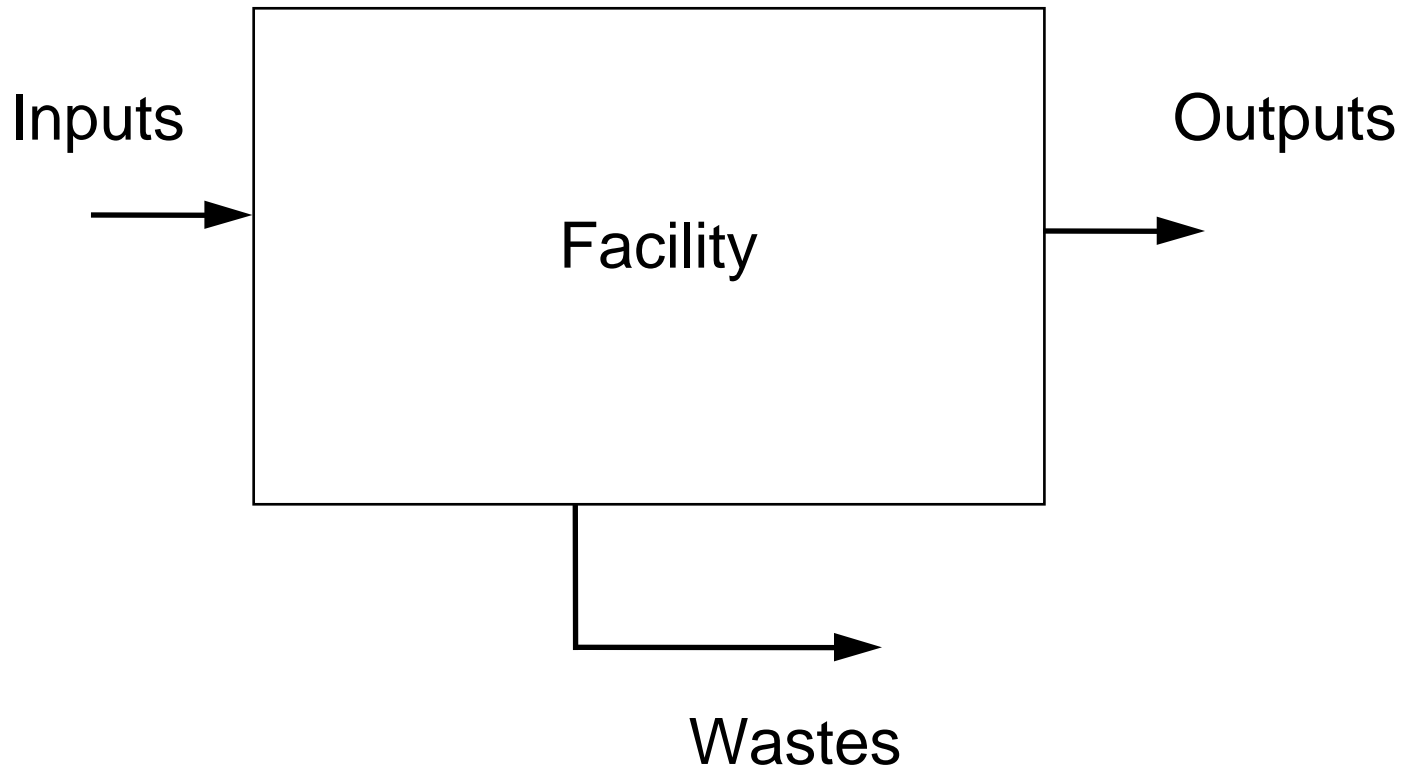


Process Flow Diagram

- 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, **and non-product output.**
 - Means of discussing the process with TUR Team



Example: Process Flow Diagram





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

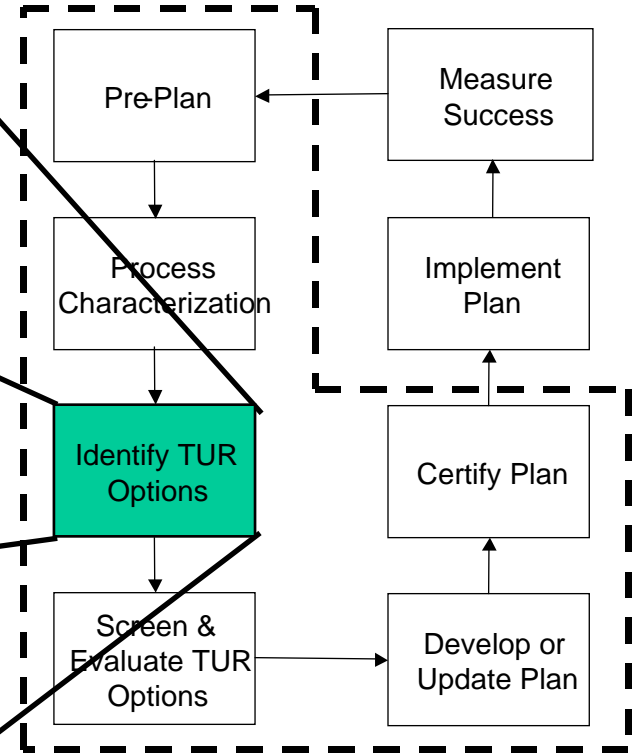
- Quantification of toxics use in production processes:
 - Focuses planning efforts
 - Serves as a base-line for future TUR evaluations
 - May highlight inefficiencies
 - May indicate reuse and/or recycle possibilities



Options Identification

Generate options using:

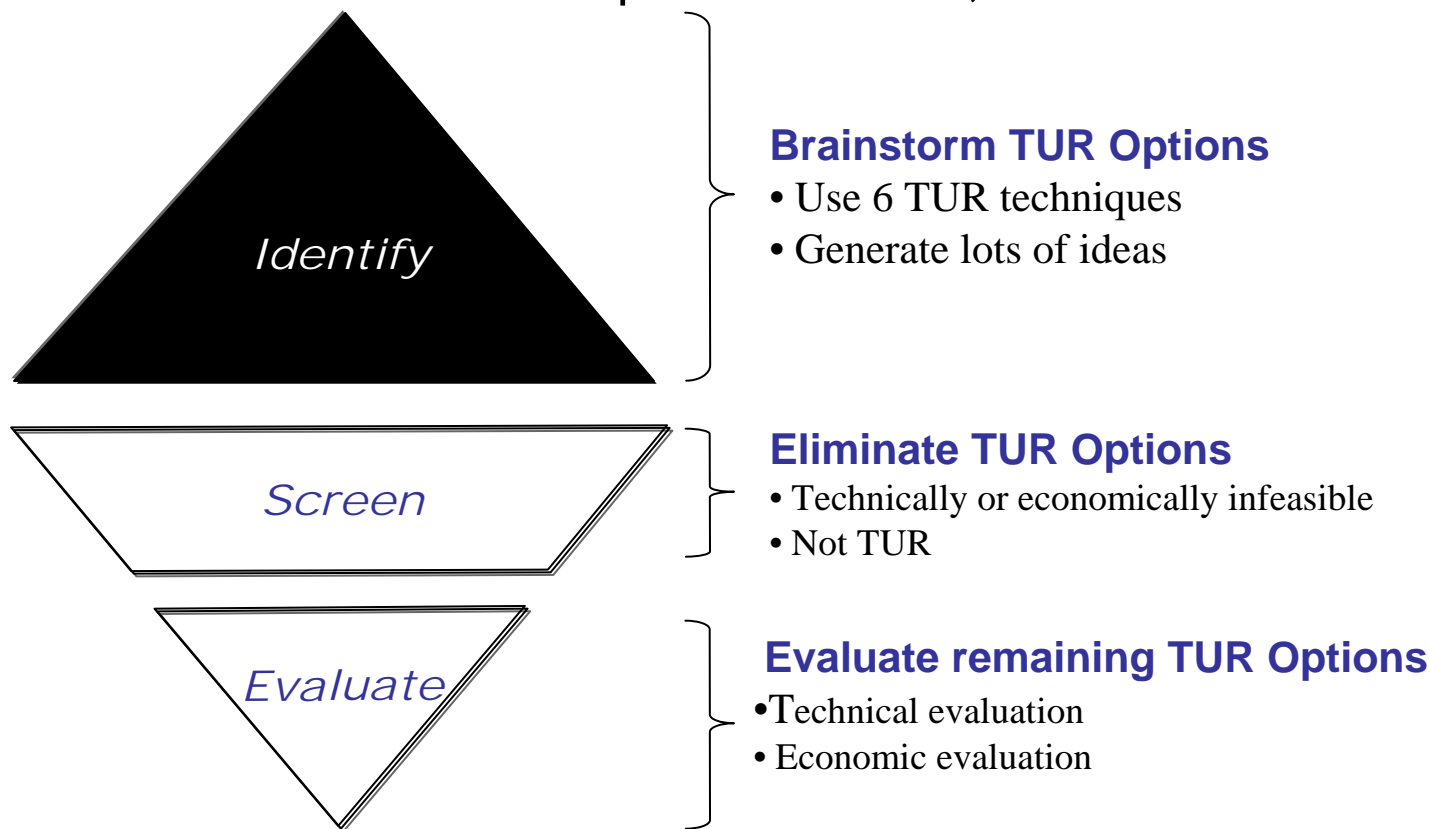
- ◆ 6 TUR techniques
- ◆ Brainstorming
- ◆ Employee/team inputs
- ◆ Vendors, trade journals, industry experts, etc.





TUR Option ID and Evaluation Process

For *each* toxic in *each* production unit,





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

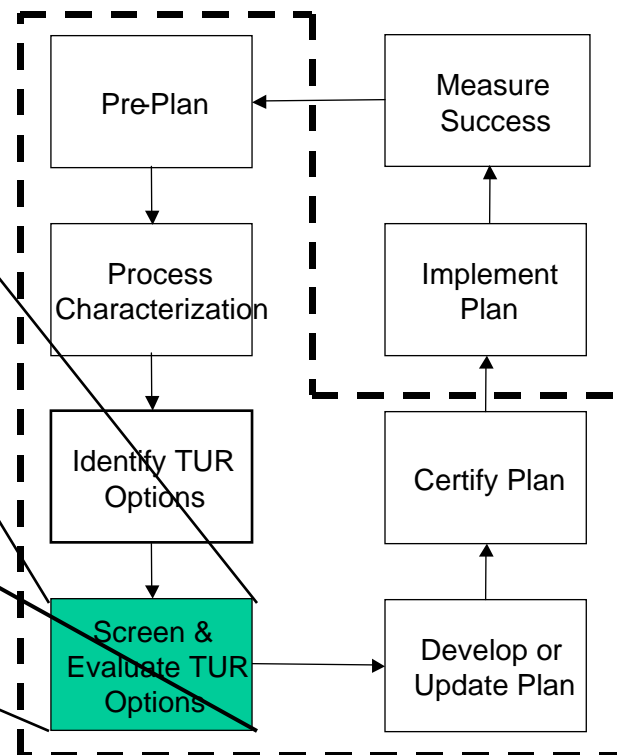


In Process Recycling

- “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



Environmental Management Accounting

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

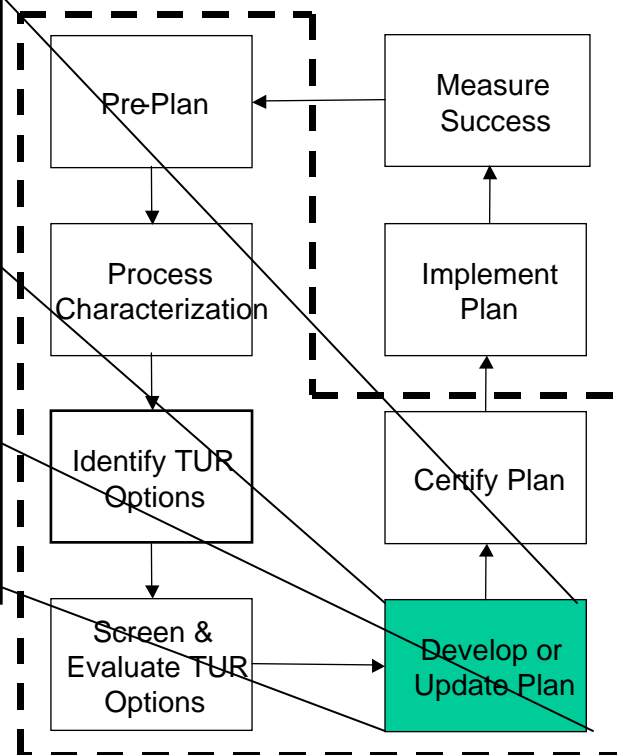


Why Health and Safety in TUR Planning?

- 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

