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Bridging the Gap - Sustainable Business Decision Making Using Total Cost Assessment

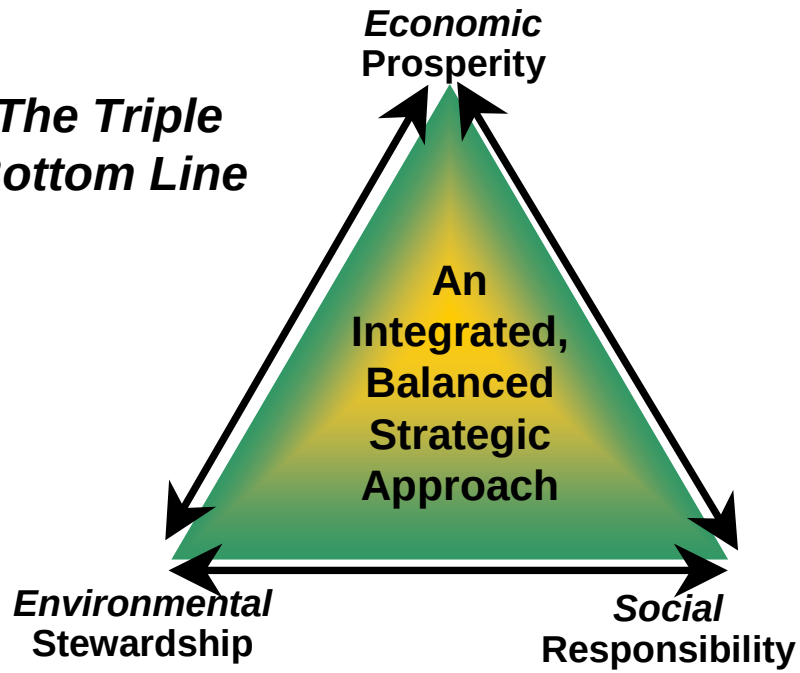
InLCA-LCM 2002

May 6, 2002

Addressing sustainable development is a difficult challenge - in part due to its perceived vagueness.

Bruntland Commission

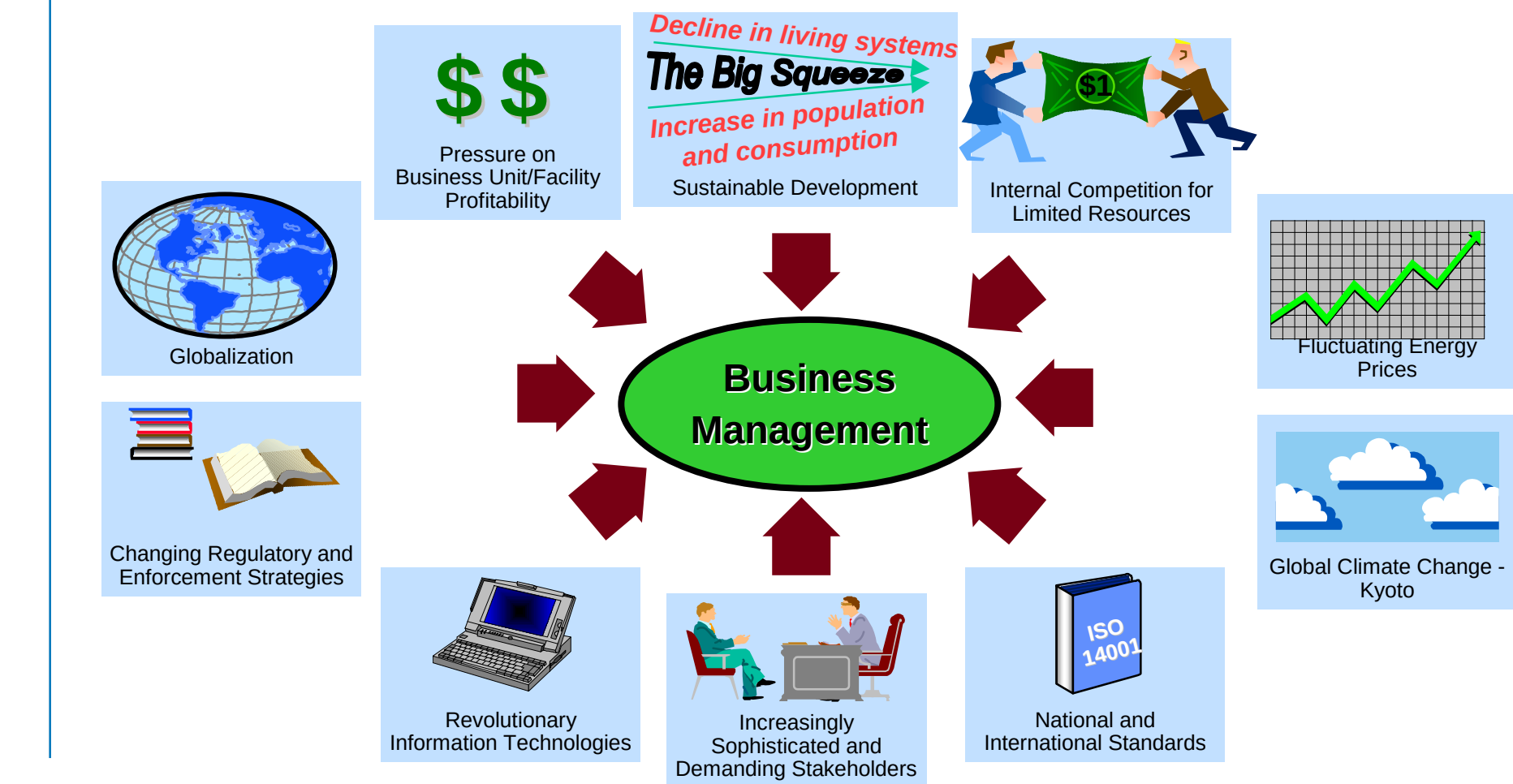
The Triple Bottom Line



International Institute of Sustainable Development

Adopting business strategies and activities that meet the needs of the enterprise and its stakeholders today while protecting, sustaining and enhancing the human and natural resources that will be needed in the future.

This is complicated by the need to address the common forces affecting companies worldwide



Amoco Petroleum

- Estimated environmental costs as 3% of their nonfeedstock operating costs.
- Environmental costs were at least 22%
- Largest components
  - Waste treatment
  - Maintenance of env. related equipment
  - Costs to meet env. related product specifications

Ditz et al. (1995) *Green Ledgers: Case Studies in Corporate Environmental Accounting*, WRI.

Dupont

- For one Dupont pesticide, environmental costs represented 19% of the total manufacturing costs
- Largest components
  - General overhead – taxes, training legal fees
  - Depreciation and operation of pollution control equipment

Ditz et al. (1995) *Green Ledgers: Case Studies in Corporate Environmental Accounting*, WRI.

Novartis

- Environmental costs of one Novartis additive were 19% of manufacturing costs
- Largest cost items
  - Operation and depreciation of wastewater treatment and solvent recovery equipment (15%)
  - Line managers spent up to 25% of their time on environmental considerations

Ditz et al. (1995) *Green Ledgers: Case Studies in Corporate Environmental Accounting*, WRI.

Total Cost Assessment (TCA)

TCA Tool: A methodology that evaluates the total life cycle costs for products and manufacturing processes as an aid to internal decision making that:

- Captures direct and indirect costs
- Quantifies contingent and future liabilities
- Identifies intangible costs and costs of externalities and incorporates these costs in a semi-quantitative but transparent approach
- Applies to all sizes of manufacturing - scalable
- Is specific to location (US, Europe, Asia, etc.)
- Is credible to internal stakeholders
- Allows the temporal nature of the costs to be considered

Costs that the TCA methodology strives to incorporate:

Cost Distinctions

Direct (Type I)	capital, labor, materials, waste disposal
Indirect (Type II)	non allocated corporate & facility costs (reporting costs, regulatory costs, monitoring costs)
Future & Contingent Liability (Type III)	potential fines, penalties and future liabilities (non-compliance, remediation, personal injury, property damage, industrial accident costs)
Intangible Internal (Type IV)	costs borne by company (customer acceptance, worker morale, union relations, community relations)
External (Type V)	costs borne by society (housing costs, degradation of habitat)

Type I: Direct Costs

- Capital Investments
- Labor
- Raw materials
- Waste disposal
- Recurring and non-recurring costs capital, and O&M costs

Type II: Indirect Costs

- Overhead costs - indirect costs not allocated to the product or process.
- May include both recurring and non-recurring costs

Type III: Future and Contingent Liability Costs

- Fines and penalties
- Forced clean-up
- Personal injury liabilities
- Property damage liabilities

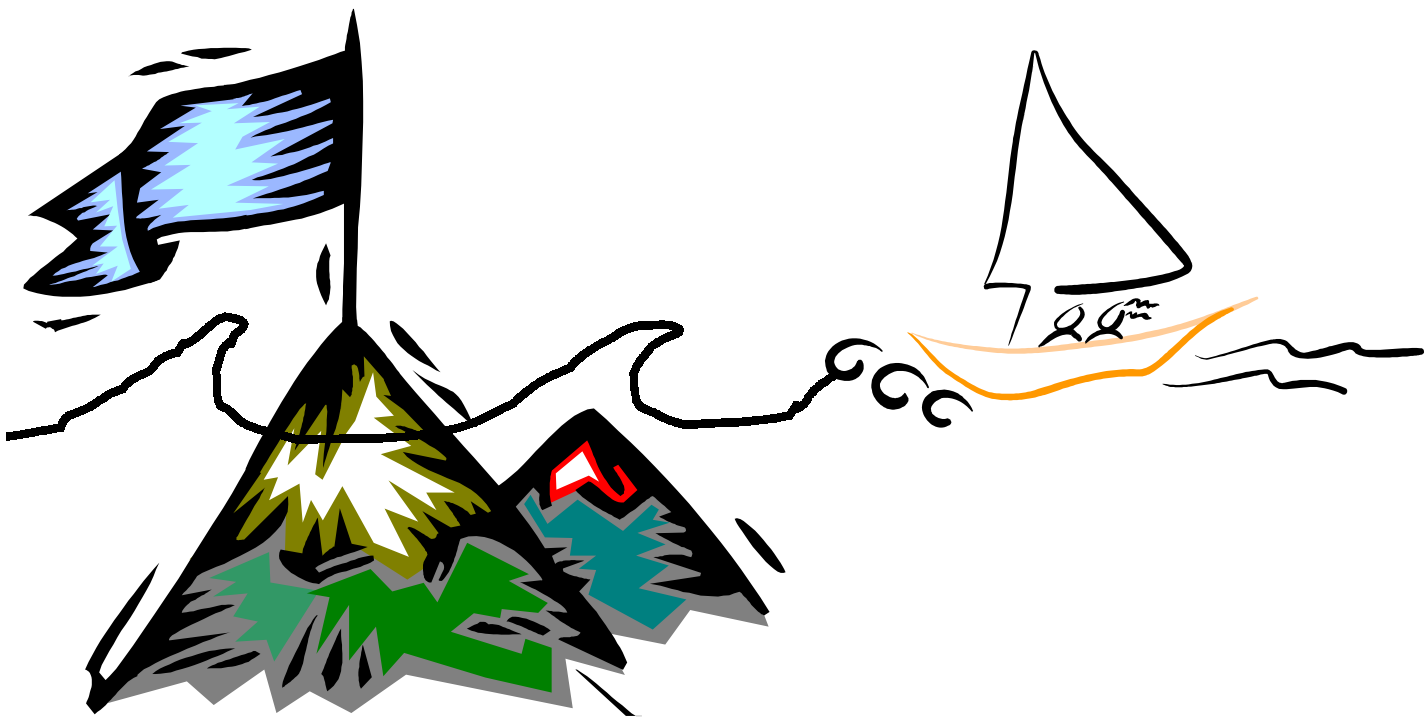
Type IV: Intangible Internal Costs (Difficult to measure costs)

- Consumer acceptance
- Customer loyalty
- Worker morale
- Union relations
- Worker wellness
- Corporate image
- Community relations

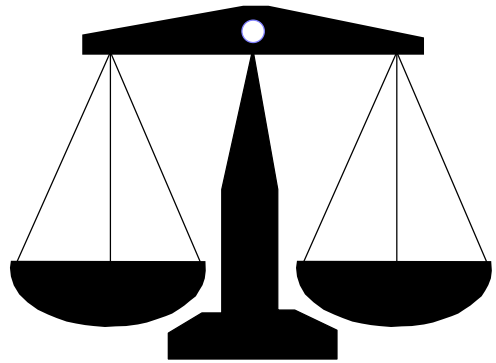
Type V: External Costs

- Costs borne by society rather than the company
- Deterioration of the environment although within compliance.

Expose Unknown Business Risks



"Typical" Application



- Evaluation of two alternatives
- Higher cost alternative is more environmentally friendly
- Check "gut" if environmental aspects mattered
- Type III costs with high probability tip the scale.
- Move uncertain Type III costs to Type I and Type II

TCA can be applied from process-specific to plant level

- Which waste treatment process should we use?
- Which is the best remediation scenario?
- Should we use ethanol or another solvent in our process?
- Where should our EHS dollars be focused?
- Is product A or product B more likely to have EHS consequences and costs in the future?
- Which product area should we invest in and which should we divest from?
- Should our plant be located in an urban or a rural location?

Total Cost Assessment Project

AIChE Center for Waste Reduction Technologies

- 3-year effort
- Survey best practice
- Survey best available tools
- Develop industry validated methodology
- Develop tool, evolving best available
- Tool beta test by collaborators

Total Cost Assessment Project

Project Team

Arthur D. Little (ICF Consulting)
US DOE
Eastman Chemical
Georgia Pacific
Monsanto
Rohm and Haas
Business Roundtable IPPC
Bristol-Myers Squibb
Dow Chemical
Eastman Kodak
Merck
Owens Corning
Smith Kline Beecham (GSK)

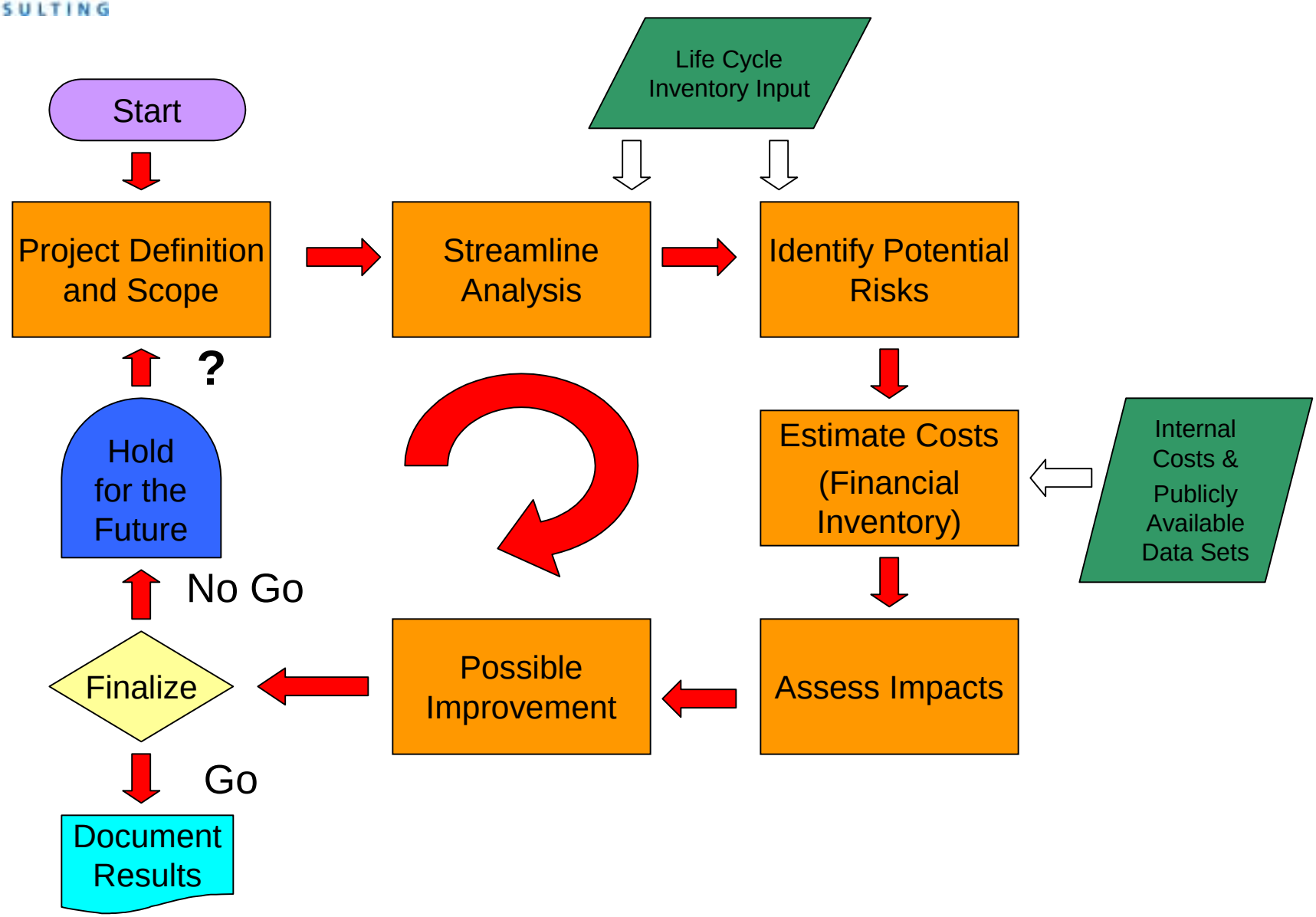
Arthur D. Little, Inc. (ICF Consulting)

- Research contractor
- Program collaborator
- Software Tool Development
  - Sylvatica assisted in the probabilistic portion of the tool.

How do you do a TCA study - "Workshop" approach proven to be most successful

- Workshops configured for 1-2 days
- Key business and project people needed for TCA data/analysis have only limited time for TBA type analysis (current paradigm)
- Highly disciplined process with total focus on TCA - due to limited time
- Scenarios used to clearly document key issues, data judgements and decisions

TCA Approach



Six Main Steps to TCA

- Goal Definition and Scoping
  - Identify and define project and purpose of the TCA
- Streamline the Analysis
  - Connect objectives to impact categories
  - Utilize Life Cycle Inventory data to determine the boundaries of the analysis.
- Identify Potential Risks
  - Evaluate relative importance of impact categories and feasibility of collecting cost data

Continued . . .

Six Main Steps to TCA con't

- Conduct Total Cost Inventory
  - Include all cost types. Incorporate probability, frequency and timing of occurrence for all important cost categories where relevant data are available
- Conduct Impact Assessment
  - Review costs to determine which are the most significant and assess how that information can be incorporated into the decision-making process
- Document Results
  - Document scenarios and results

Feedback to Company's main decision loop

Dow Chemical Beta Test

- Successful integration into existing corporate structure
  - Strategic Planning/Sustainability Leadership buy-in
  - Segmented TCA to Total Business Cost Assessment – TBCA Does not include Type V costs
- Two cases in Dow Pilot
  - Establish full benefits of 2005 EH&S objectives
  - Support of recent acquisition - Isobord July, 2001
- Completed a total of 22 TBCAs to date

TBCA at Dow Chemical

"Achieved the intent of developing a modeling tool for better understanding of 'fuller' costs associated with EH&S decision making."

"Typical" Application

Evaluation of Two Alternatives

- Typically higher cost alternative is more environmentally friendly
- Check their "gut" if environmental aspects mattered
- 2 Type III costs with high probability tipped the scale.
- Moved costs to Type I and Type II by business unit

Application

- Potentially new “Env. Friendly” product - where traditional cost look was break-even at best
- Used wastes as material input
- Tons generated annually especially in developing countries
- Product was in great shortage
- TCA found future reasonable benefits from the product
- Quantifying image benefits was an import part of this application

Other Applications

- Evaluate new EH&S Information Technology Investments
  - Scenarios, with timing, probabilities of occurrence, uncertainties – compute
- Water costs in the next 10 to 20 years
  - Studied both supply and waste water discharge scenarios
  - Led to water optimization effort

Creative Application

- Dow Chemical identified a competitor using a more costly production technology.
- Why would the competitor use this other technology?
- Convened a workshop to study the competitor's method.
- Discovered an incident which if occurred would prevent production expansion capacity for 6-7 years in a rapidly expanding market.
- Decided not to use the competitor's "perceived" superior technology.

Benefits

- Documents “hard” and “soft” costs
  - Retains knowledge capital
  - Passes the information on to more people
- Records assumptions about soft costs
  - Non-zero value, timing, discount rates
- Results have not been challenged – right people in the room
- Pushing “feel good” hunches into real costs and benefits

The Bottom Line That Makes the Quantitative Case for Sustainability/LCA/LCM

- Projects addressed to date were in the range of $10 to $100s millions.
- Environmental aspects were found to be on the same order of magnitude as hard costs and tipped the scale.
- Future cost savings achieved over the time horizon were in an order of magnitude higher than the original project costs

Summary

- TCA - Comprehensive Cost Estimation Methodology
- A quantitative link to sustainable development, life cycle assessment and life cycle management practices
- Industry developed and validated
- More than just another methodology - a way of bringing people together to achieve consensus to facilitate decision making that leads to overall environmental improvements.

Contact Info

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