Promoting Sustainability Through BioPreferred Purchasing

Joint Services Environmental Management (JSEM) Conference and Exposition
May 5-8, 2008

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The NDCEE is operated by: Concurrent Technologies Corporation
1. REPORT DATE  
MAY 2008

2. REPORT TYPE

3. DATES COVERED
00-00-2008 to 00-00-2008

4. TITLE AND SUBTITLE
Promoting Sustainability Through BioPreferred Purchasing

5a. CONTRACT NUMBER

5b. GRANT NUMBER

5c. PROGRAM ELEMENT NUMBER

5d. PROJECT NUMBER

5e. TASK NUMBER

5f. WORK UNIT NUMBER

6. AUTHOR(S)

7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)
National Defense Center for Energy and Environment, Operated by Concurrent Technologies Corporation, 100 CTC Drive, Johnstown, PA, 15904

8. PERFORMING ORGANIZATION REPORT NUMBER

9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)

10. SPONSOR/MONITOR’S ACRONYM(S)

11. SPONSOR/MONITOR’S REPORT NUMBER(S)

12. DISTRIBUTION/AVAILABILITY STATEMENT
Approved for public release; distribution unlimited

13. SUPPLEMENTARY NOTES

14. ABSTRACT

15. SUBJECT TERMS

16. SECURITY CLASSIFICATION OF:
   a. REPORT  
   unclassified
   b. ABSTRACT  
   unclassified
   c. THIS PAGE  
   unclassified

17. LIMITATION OF ABSTRACT  
Same as Report (SAR)

18. NUMBER OF PAGES  
17

19a. NAME OF RESPONSIBLE PERSON

Standard Form 298 (Rev. 8-98)  
Prepared by ANSI Std Z39-18
Overview

- Life Cycle Assessment (LCA) as an approach to defining or evaluating trade-offs for sustainability

- BEES as an LCA tool for sustainability in BioPreferred Procurement
What is Sustainable?

YOU Decide!!!

National Defense Center for Energy and Environment
Life-Cycle Assessment (LCA)

- LCA supports decision making for Sustainability

![Diagram showing the intersection of Social, Environmental, and Mission aspects]
Evaluating Trade-Offs

- Ozone depletion
- Eutrophication
- Tropospheric ozone formation
- Human particulate effects
- Human carcinogenic effects
- Fossil fuel depletion
- Land use
- Human non-carcinogenic effects
- Acidification
- Ecotoxicity
- Human particulate effects
- Life cycle cost

Design 1

Design 2

Design 3

Design 4

Design 5

Design 6
LCA for BioPreferred Procurement

- Decision Support for Procurement Officers in Evaluating Alternatives
  - Bio-Content Testing
    - Iowa State University
      - ASTM D6866-04
  - Life-Cycle Assessment
    - National Institute of Standards and Technology (NIST)
      - Building for Environmental and Economic Sustainability (BEES)
        » Using existing industry standards
Framework – Evaluating Alternatives
Life Cycle Assessment

INPUTS:

- raw material acquisition
- material processing
- manufacturing
- use

OUTPUTS:

- Products, Services, Water Effluents, Air Emissions, Waste, Other Outputs
- recycle
- remanufacture
- reuse
- waste management

Labor, materials, energy, fuel, personnel, investments, other inputs
Life Cycle Cost Analysis

- An economic evaluation tool for estimating the total cost of acquisition and ownership of a system over its full life, including the cost of acquisition, installation, operation, support, decommissioning, and disposal.
The BEES Model

- BEES = Building for Environmental and Economic Sustainability

- Developed by National Institute of Standards and Technology (NIST)
  - Systematic methodology for selecting building projects
  - Methodology now applied to evaluate biobased materials

- Based on Consensus Standards
  - Life-Cycle Costing (ASTM E917)
  - Environmental Life-Cycle Assessment (ISO 14040)
  - Multi-Attribute Decision Analysis (ASTM E1765)
  - Evaluating and Reporting Environmental Performance of Biobased Products (ASTM D 7075)
The BEES Model

Global Warming
Acidification
Eutrophication
Fossil Fuel Depletion
Indoor Air Quality
Habitat Alteration
Water Intake
Criteria Air Pollutants

Environmental Performance Score

Cancer
Noncancer

Human Health
Smog
Ozone Depletion
Ecological Toxicity

Economic Performance Score

First Cost
Future Costs
BEES Results

Environmental Performance

- Acidification
- Crit. Air Pollutants
- Ecological Toxicity
- Eutrophication
- Fossil Fuel Depletion
- Global Warming
- Habitat Alteration
- Human Health
- Indoor Air
- Ozone Depletion

Score

pts/unit

4,000
3,000
2,000
1,000
0

Economic Performance

- First Cost
- Future Cost

Present Value Cost

PV $/unit

8,000.00
6,000.00
4,000.00
2,000.00
0

First Cost
Future Cost
Anecdotal Case-Procurement Perspective

Product X  Product Y

Bar chart showing comparisons between Product X and Product Y across various categories such as Addiction Potential, Global Warming Potential, Eutrophication Potential, Fossil Fuel Depletion, Criteria Pollutants, and Human Health.
Anecdotal Case

Environmental Performance

Economic Performance

Global Warming by Life-Cycle Stage
Summary

- LCA is a powerful decision making tool
- BEES is an LCA tool that can help federal procurement officers make better decisions.
- It is difficult to accurately forecast life cycle impact
- There are usually trade-offs between different alternatives
Questions

Evaluating the Environmental Impact, Cost, and Performance of Biobased Alternatives
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This work was funded through the United States Department of Commerce, National Institute of Standards and Technology and conducted under contract W74V8H-04-D-0005 Task 0488. The views, opinions, and/or findings contained in this paper are those of the author(s) and should not be construed as an official Department of the Army position, policy, or decision unless so designated by other official documentation.