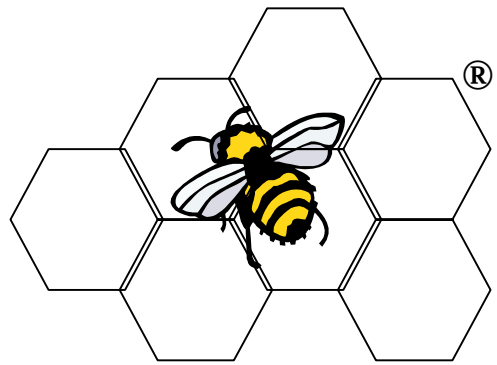
What Makes a Product Green?

Building for Environmental and Economic Sustainability (BEES®)

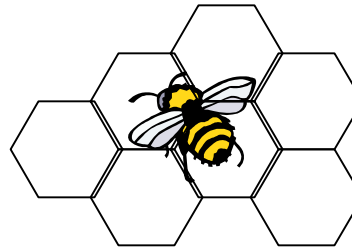


Bobbie Lippiatt

U.S. Department of Commerce

National Institute of Standards and Technology (NIST)

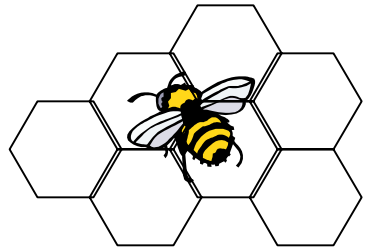
NIST: National Institute of Standards and Technology



- Since 1901, non-regulatory federal agency within U.S. Commerce Department's Technology Administration

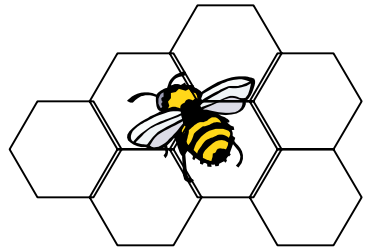
- NIST develops and promotes measurements, standards, and technology

BEES Sponsors



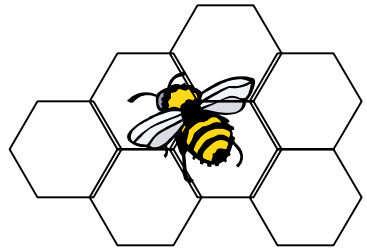
- *NIST Building & Fire Research Laboratory*
- *U.S. EPA Environmentally Preferable Purchasing Program*
- *U.S. Department of Agriculture*

BEES 3.0



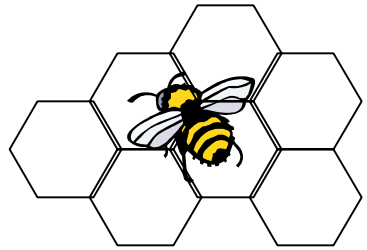
- *Model*
- *Data*
- *Software*

BEES Model

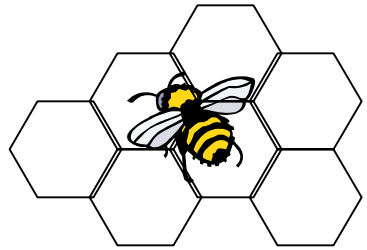


- ***Takes Life-Cycle Approach***
- ***Based on Consensus Standards***
  - *Life-Cycle Costing (ASTM E917)*
  - *Building Element Classification (ASTM E1557)*
  - *Environmental Life-Cycle Assessment (ISO 14040)*
  - *Multi-Attribute Decision Analysis (ASTM E1765)*

BEES Model: Environmental Impacts



- Global Warming
- Acid Rain
- Eutrophication
- Fossil Fuel Depletion
- Indoor Air Quality
- Habitat Alteration
- Smog
- Ozone Depletion
- Ecological Toxicity
- Human Health
- Criteria Air Pollutants
- Water Intake



Analysis Parameters

No Weighting

Environmental vs. Economic Performance Weights

Environmental Performance (%): 50 vs. Economic Performance (%): 50

Environmental Impact Category Weights

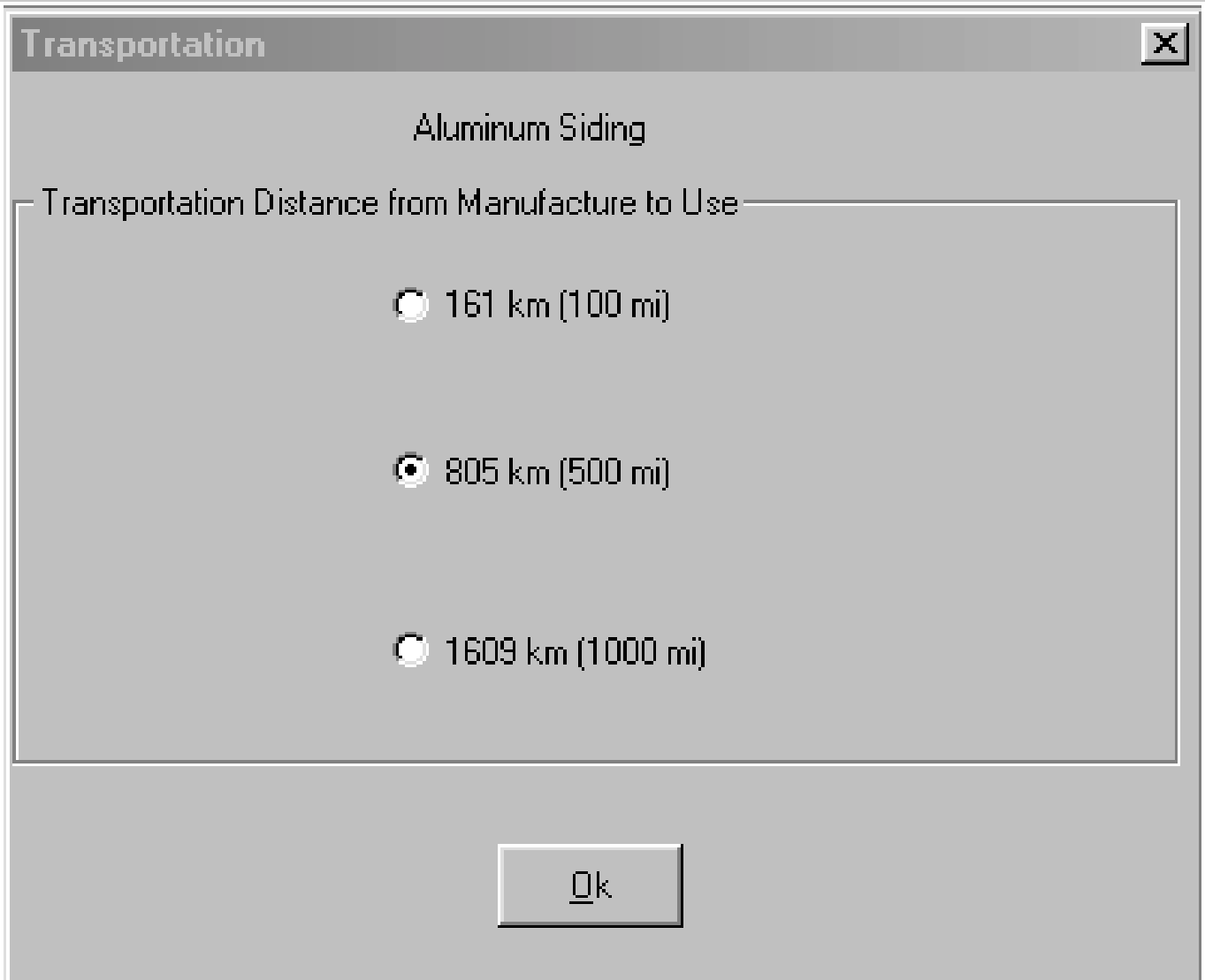
- (•) User-Defined — Set
- ( ) EPA Scientific Advisory Board
- ( ) Harvard University
- ( ) Equal Weights

View Weights

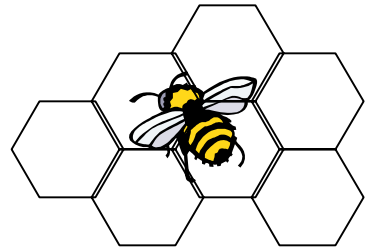
Discount Rate (%): (Excluding Inflation) 3.9

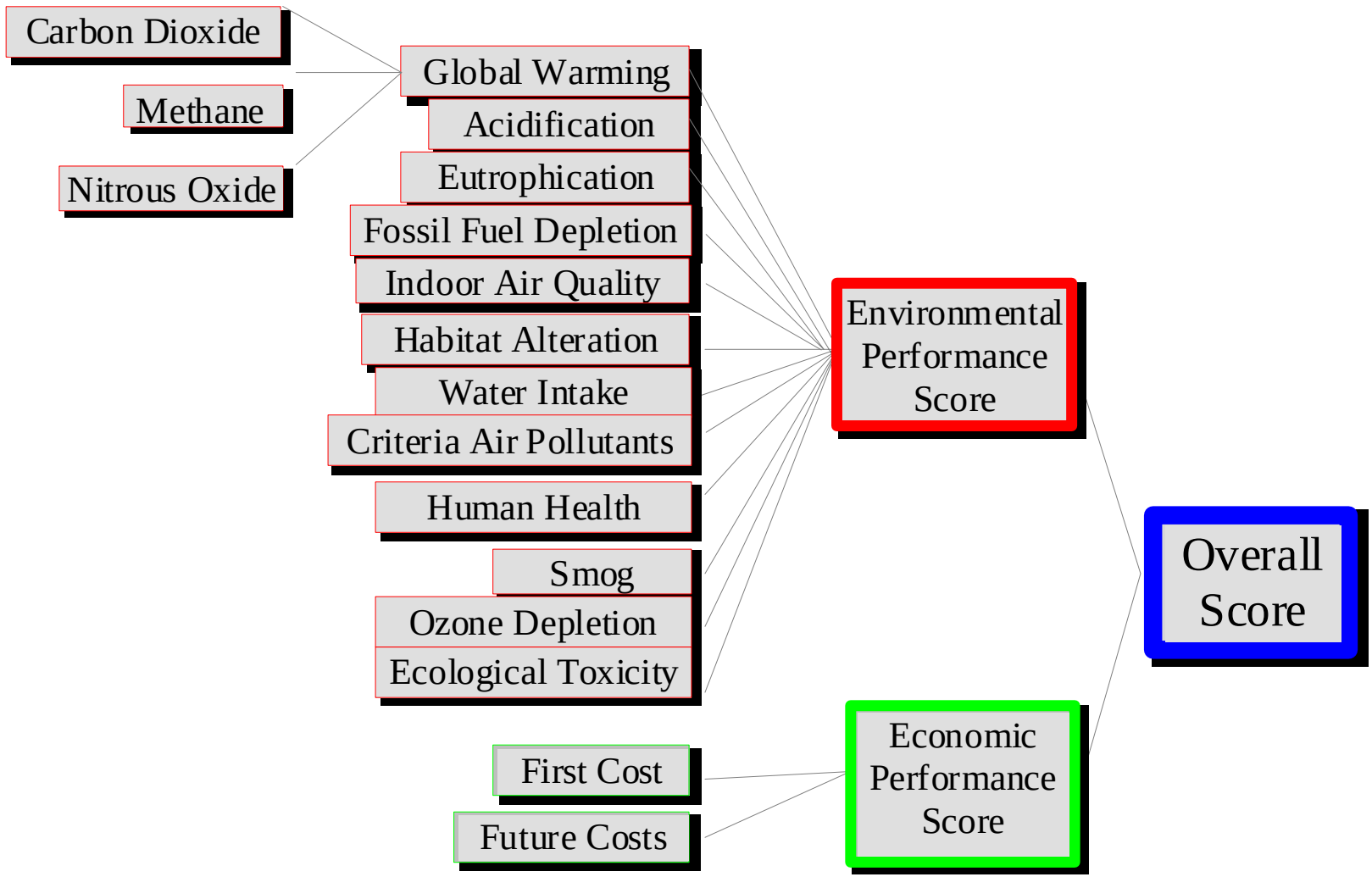
Ok Cancel Help

BEES Model: Parameters

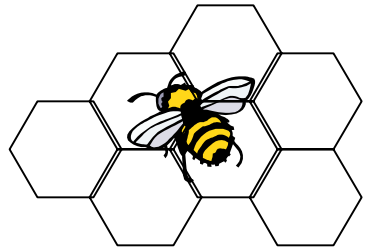


BEES 3.0 Model





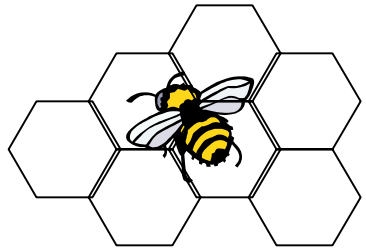
BEES Data



- **118 Generic and 80 Brand-Specific Products**
- **23 Building Elements**

- *Slab on Grade*
- *Basement Walls*
- *Beams*
- *Columns*
- *Roof Sheathing*
- *Exterior Wall Finishes*
- *Wall Insulation*
- *Framing*
- *Wall Sheathing*
- *Roof Coverings*
- *Ceiling Insulation*
- *Interior Wall Finishes*
- *Floor Coverings*
- *Parking Lot Paving*
- *Partitions*
- *Ceiling Finishes*
- *Fabricated Toilet Partitions*
- *Lockers*
- *Fixed Casework*
- *Chairs*
- *Table Tops, Shelving*
- *Soil Treatment*
- *Transformer Oil*

BEES Please Participants

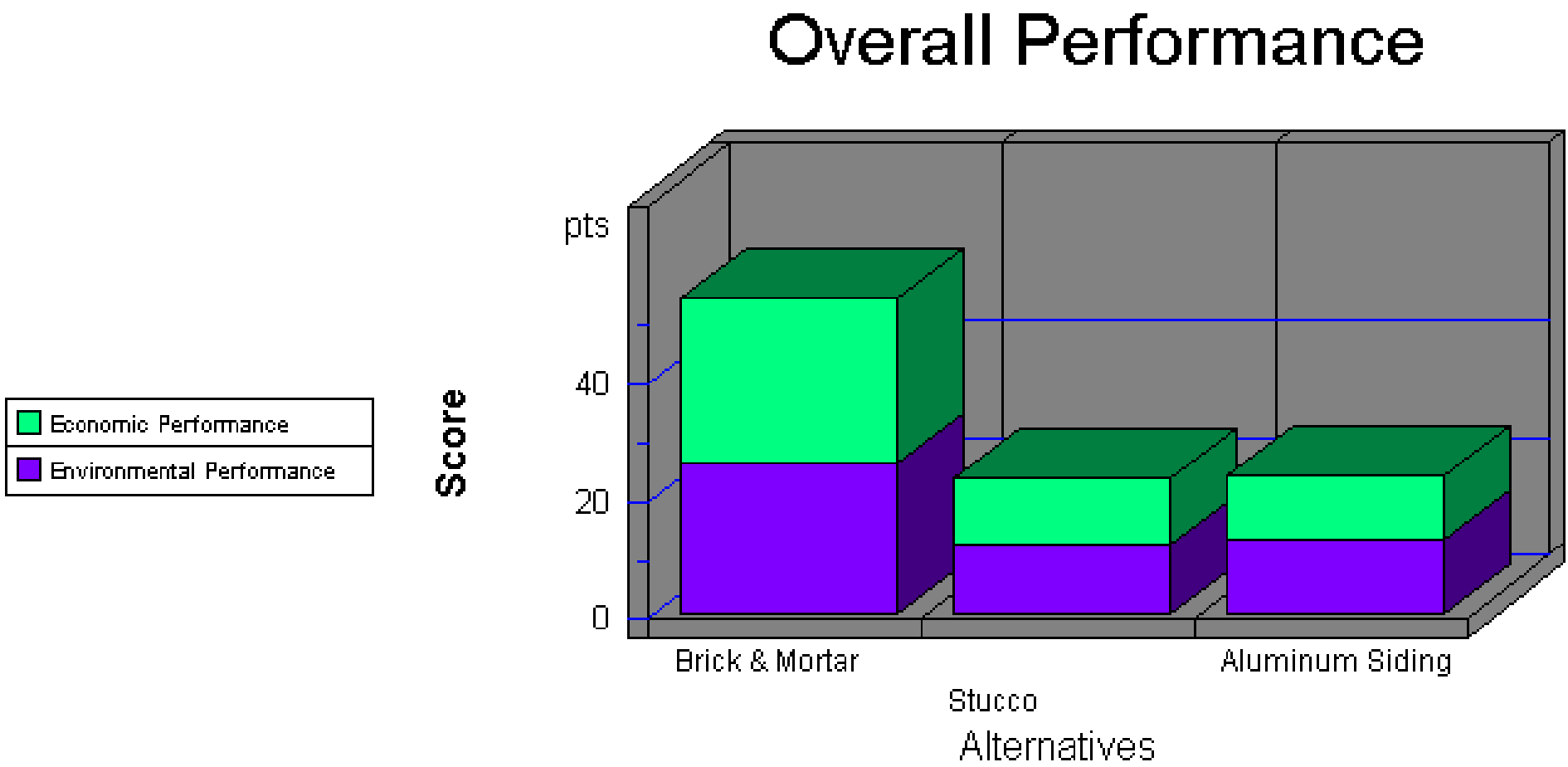


- *Asphalt Systems*
- *Cargill Dow*
- *C&A Floorcoverings*
- *Forbo*
- *Herman Miller*
- *Interface*
- *ISG Resources*
- *J&J Industries*
- *Lafarge*
- *Mohawk*
- *Natural Cork*
- *Shaw*
- *Trespa*
- *Universal Textile Technologies*

For the WannaBEES

there's always

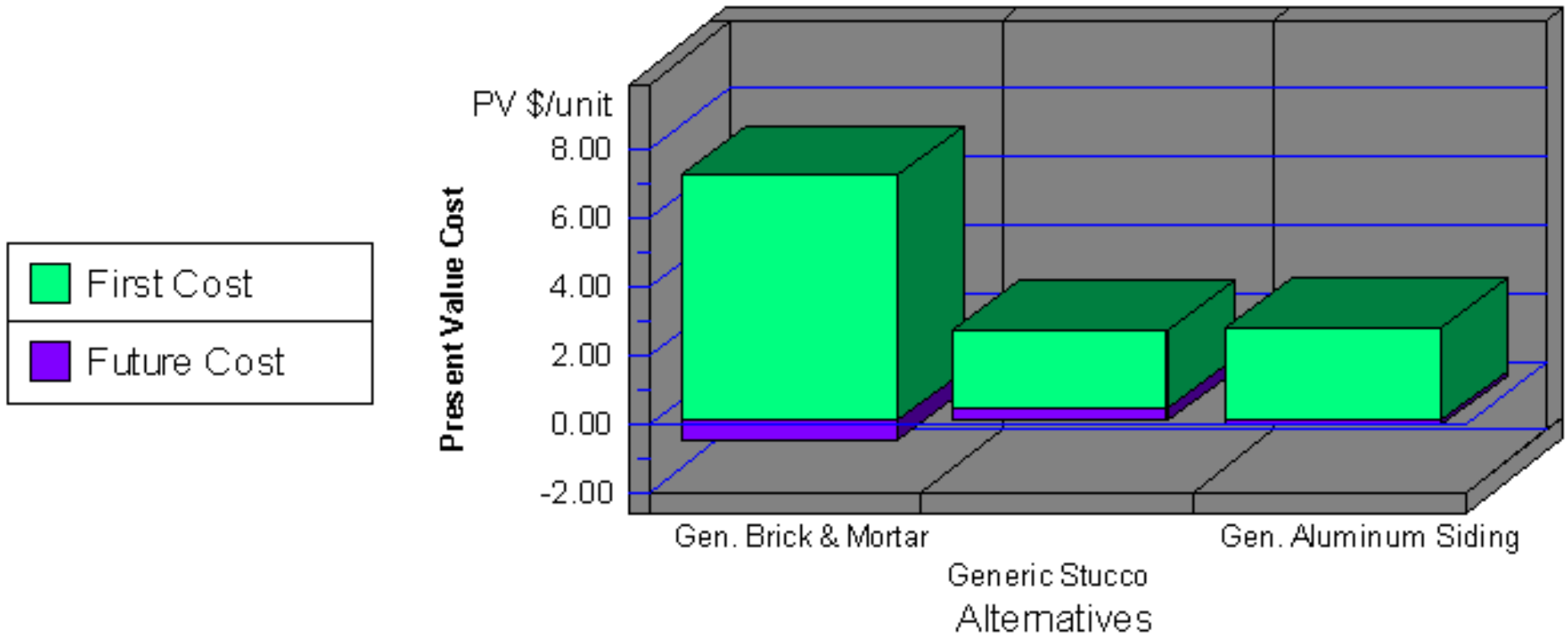
BEES Please!



Note: Lower values are better

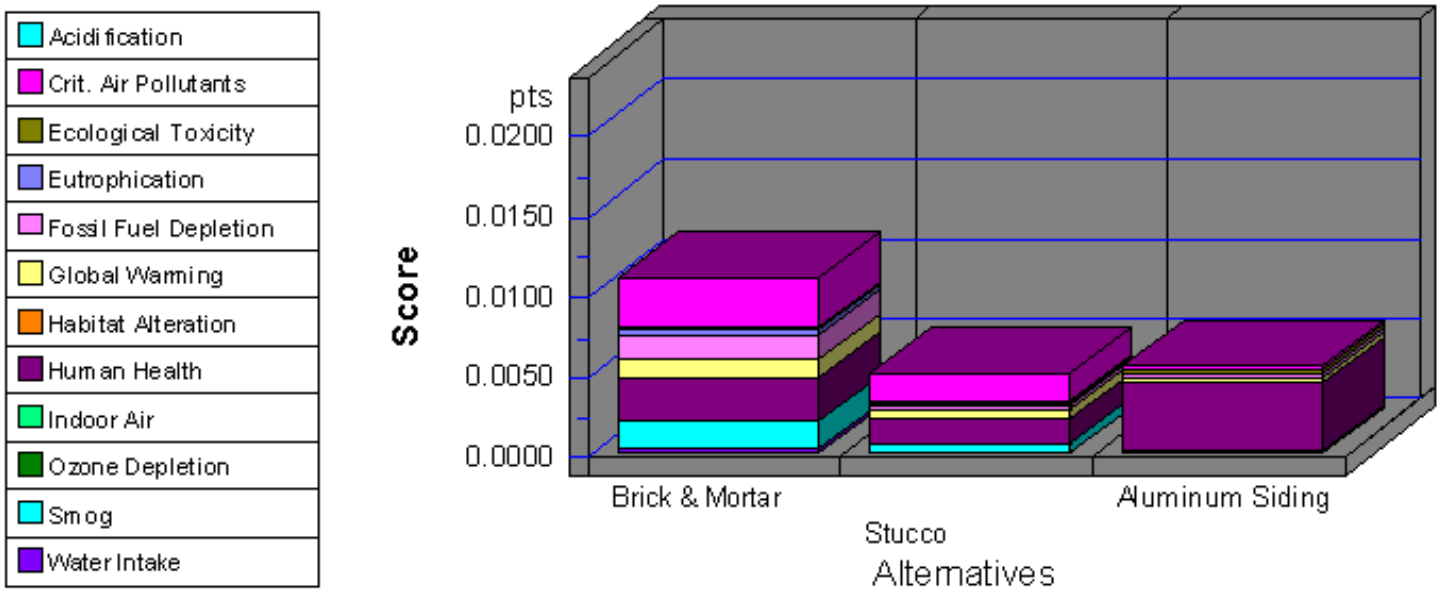
Category	Brick	Stucco	Aluminum
Economic Perform.--50%	28.0	11.2	10.9
Environ. Perform.--50%	25.6	11.9	12.6
Sum	53.6	23.1	23.5

Economic Performance



Category	Gen Brick	Gen Stucco	GenAlumnum
First Cost	7.13	2.27	2.71
Future Cost– 3.9%	-0.53	0.36	-0.15
Sum	6.60	2.63	2.56

Environmental Performance

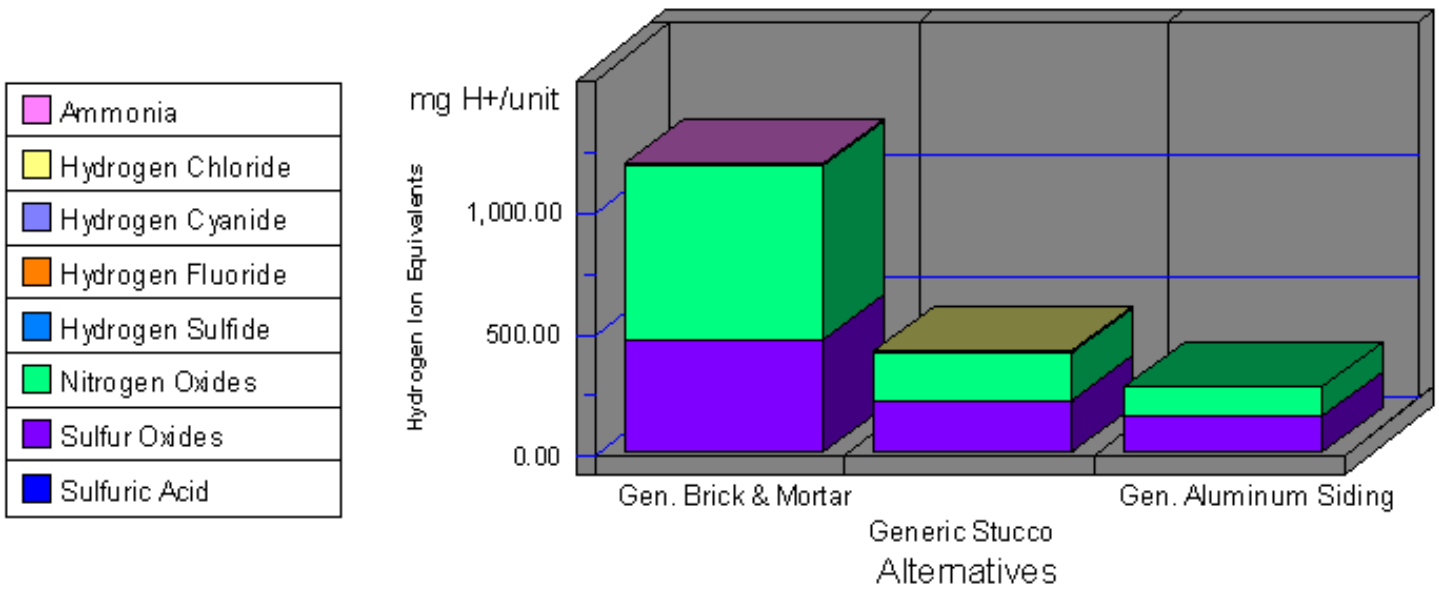


Note: Lower values are better

Category	Brick	Stucco	Aluminum
Acidification–9%	0.0000	0.0000	0.0000
Crit. Air Pollutants--8%	0.0031	0.0018	0.0001
Ecolog. Toxicity–8%	0.0001	0.0001	0.0002
Eutrophication–9%	0.0004	0.0001	0.0001
Fossil Fuel Depl.–9%	0.0015	0.0003	0.0002
Global Warming–9%	0.0011	0.0006	0.0003
Habitat Alteration–8%	0.0000	0.0000	0.0000

Category	Gen Brick	Gen Stucco	GenAlumnum
Human Health–8%	0.0028	0.0015	0.0043
Indoor Air–8%	0.0000	0.0000	0.0000
Ozone Depletion–8%	0.0000	0.0000	0.0000
Smog--8%	0.0017	0.0006	0.0002
Water Intake–8%	0.0003	0.0001	0.0000
Sum	0.0110	0.0051	0.0054

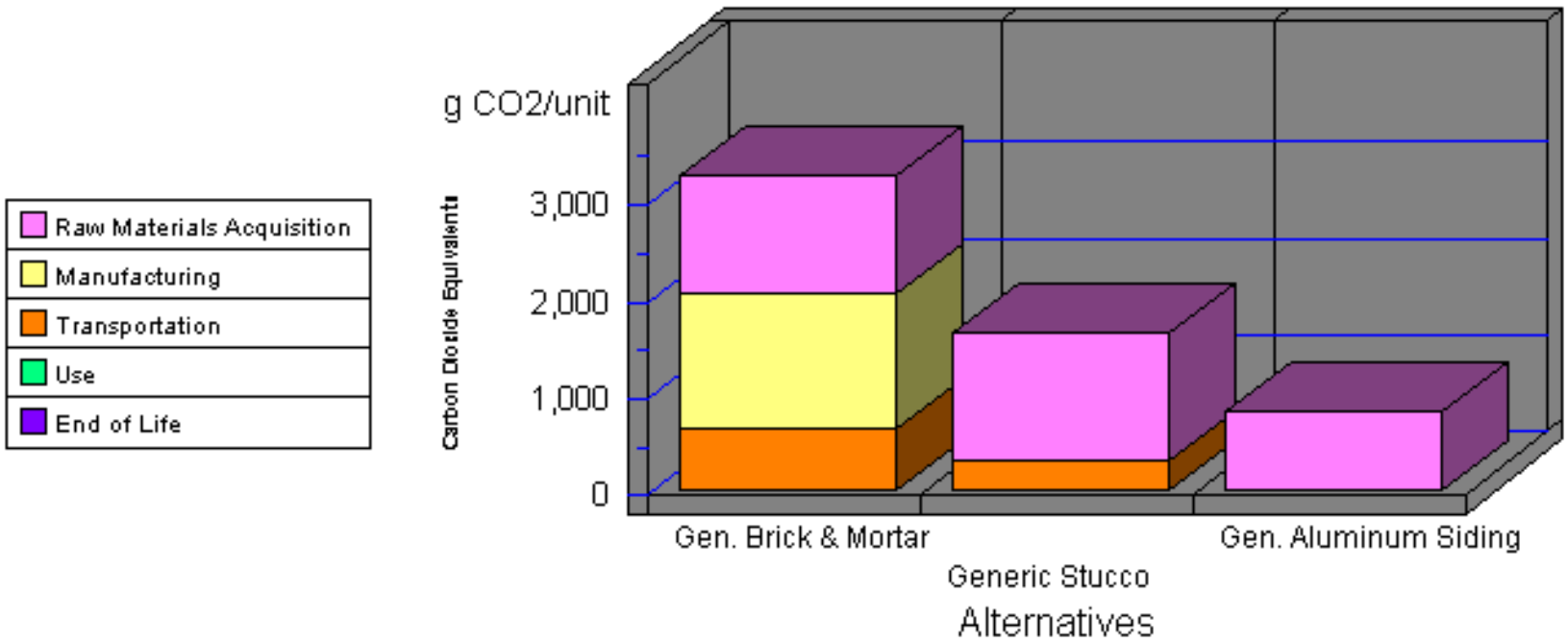
Acidification by Flow



Note: Lower values are better

Category	Gen Brick	Gen Stucco	GenAlumnum
(a) Ammonia (NH3)	2.24	0.56	0.23
(a) Hydrogen Chloride (HCl)	5.43	4.35	5.67
(a) Hydrogen Cyanide (HCN)	0.00	0.00	0.00
(a) Hydrogen Fluoride (HF)	0.31	0.33	1.28
(a) Hydrogen Sulfide (H2S)	0.30	0.08	0.03
(a) Nitrogen Oxides (NOx as NO2	709.99	195.16	114.30
(a) Sulfur Oxides (SOx as SO2)	461.45	218.42	153.93
(a) Sulfuric Acid (H2SO4)	0.00	0.00	0.00
Sum	1179.72	418.90	275.44

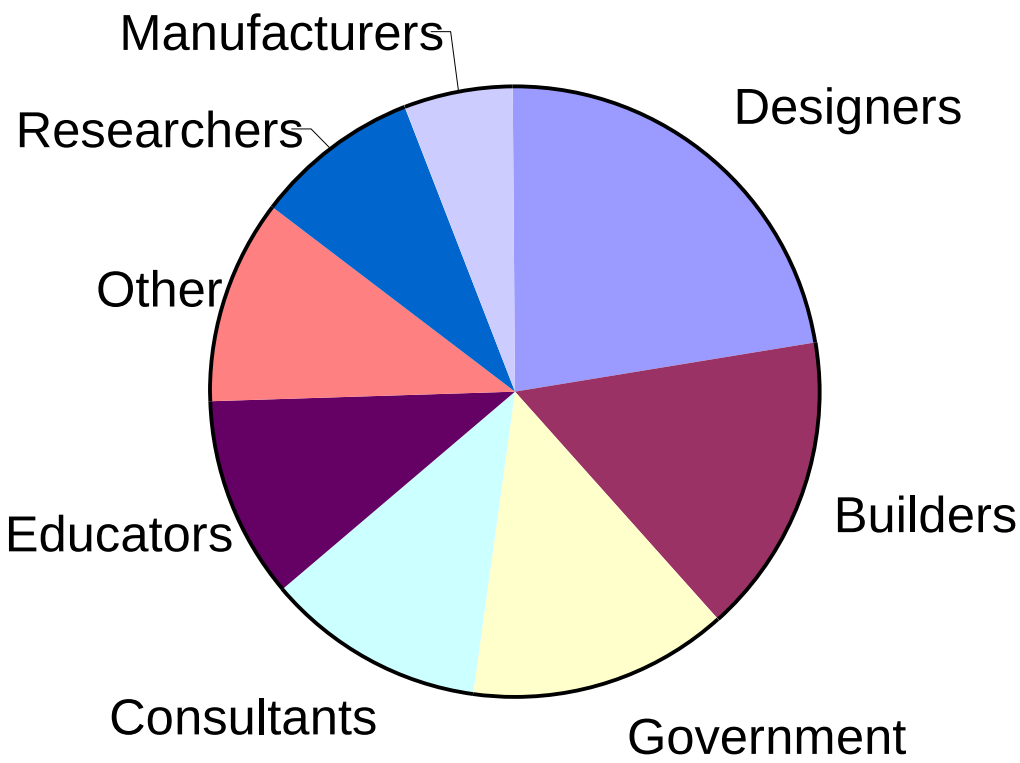
Global Warming by Life-Cycle Stage



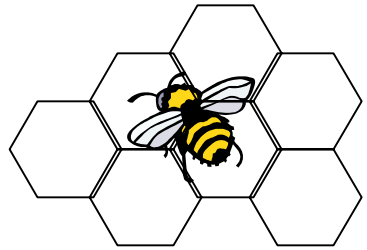
Note: Lower values are better

Category	Gen Brick	Gen Stucco	GenAlumnum
1. Raw Materials	1216	1311	821
2. Manufacturing	1392	4	0
3. Transportation	639	311	12
4. Use	0	0	0
5. End of Life	0	0	0
Sum	3247	1626	833

BEES 2.0:
9000+ users from 80 countries



More BEES News...

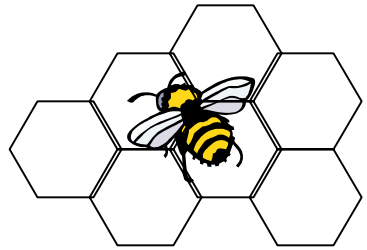


- 2002 Farm Bill using BEES
- BEES 2.0 Peer Review Report
- BEES User Preferences Report
- Evaluation of LEED using LCA

Conclusion: What Makes a Product Green?

The answers lie in the tradeoffs

For Free BEES Resources...



www.bfrl.nist.gov/oae/bees.html

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