

Designing for sustainability

Sole property of
Jane Ahrens, AIA, LEED AP, NCARB
Director of Sustainability, Gresham, Smith &
Partners

What use is a house if you
haven't got a tolerable
planet to put it on?

- Henry David Thoreau

The History

- ◉ Nothing new, but was forgotten in the 60's, 70's and 80's.
 - Cheap energy
 - Frontier spirit
- ◉ Shelter vs. monumental architecture
- ◉ Limits are a hard pill to swallow and we are the first generation to have to face this.
- ◉ Our profession has seriously reconsidered our methods.

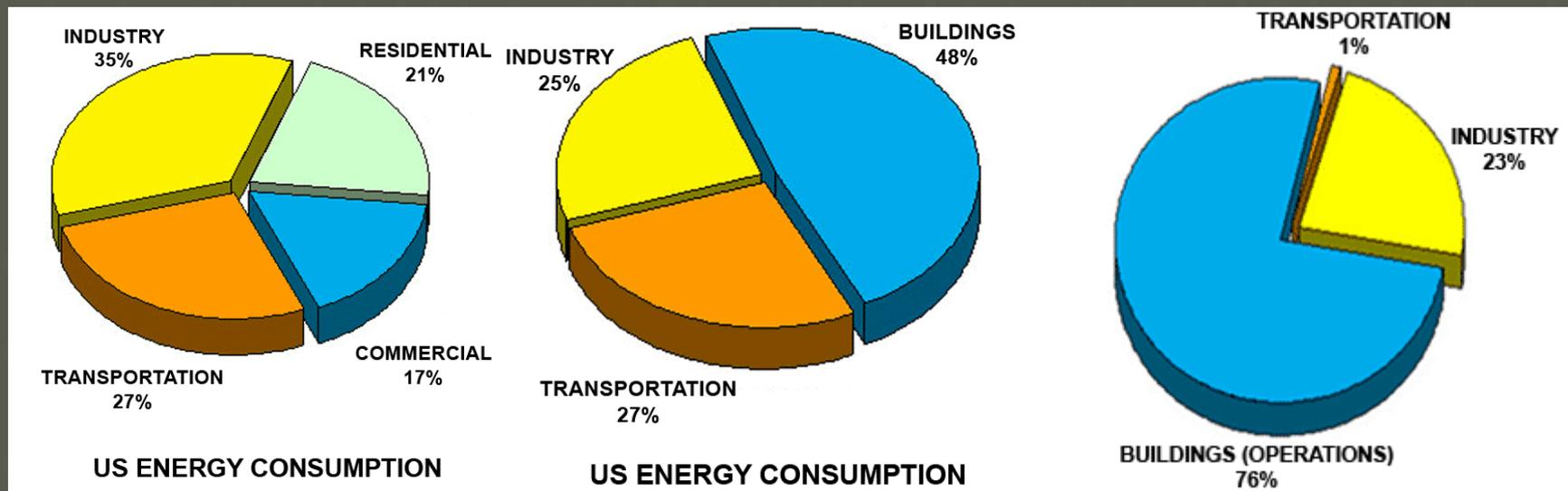
The Plan

- The building community is the only professional group that has presented a real plan to address the issue of greenhouse gas emissions.

- AIA **2030** Commitment



A New Perspective



US **Electricity** Consumption

- Growing concern for energy consumption and GHG emissions has increased interest in green building programs.

Source: www.architecture2030.org

The Execution

- ① Designing buildings to address limits on resources is not hard and is required by our profession through our code of ethics.
- ① Use a known and respected standard green building rating system.
- ① BREEAM, CASBEE, LEED, Green Globes

Choosing Building Materials

- ◉ There is no such thing as a sustainable material – context is everything
- ◉ Cost & Performance
- ◉ LCA
 - Regionally Available materials
 - High recycled content
- ◉ Add to a healthy indoor environmental quality

Embodied Energy		
Material	MJ /kg	MJ/m ³
Aggregate	0.10	150
Straw bale	0.24	31
Soil-cement	0.42	819
Stone (local)	0.79	2030
Concrete block	0.94	2350
Concrete (30 Mpa)	1.3	3180
Concrete precast	2.0	2780
Lumber	2.5	1380
Brick	2.5	5170

Embodied Energy		
Material	MJ /kg	MJ/m ³
Cellulose insulation	3.3	112
Gypsum wallboard	6.1	5890
Particle board	8.0	4400
Aluminum (recycled)	8.1	21870
Steel (recycled)	8.9	37210
Shingles (asphalt)	9.0	4930
Plywood	10.4	5720
Mineral wool insulation	14.6	139
Glass	15.9	37550
Fiberglass insulation	30.3	970

Embodied Energy		
Material	MJ/kg	MJ/m ³
Steel	32.0	251200
Zinc	51.0	371280
Brass	62.0	519560
PVC	70.0	93620
Copper	70.6	631164
Paint	93.3	117500
Linoleum	116	150930
Polystyrene Insulation	117	3770
Carpet (synthetic)	148	84900
Aluminum	227	515700

Source: www.canadianarchitect.com

Wood in Sustainable Buildings

◎ Pros

- Cost
- Renewable material
- No man-made chemicals to off gas
- Low embodied energy (depending on distance to project)

◎ Cons

- Cost
- Maintenance
- Harvest practices / forest certification

Wood in LEED Buildings

◉ Commercial Buildings

- Evaluate site location vs. certified forest location
- Evaluate wood opportunities with cost of construction
 - Finishes, millwork, doors
- Minimize or maximize wood use based on analysis

◉ Residential Buildings

- Cost of certified wood
- Evaluate site location vs. certified forest location

Wood in LEED Buildings

- ◉ A sustainable action that always comes down to cost
- ◉ Best as part of an overall organizational sustainability plan
 - Don't look at LEED in isolation
 - Don't look at specific points in isolation.