The Ultimate Design Problem:
Can a design revolution meet humanity's greatest challenge?
Total New Construction Project Statistics

- 126 total certified projects
- 1515 total registered projects
- 50 states with projects
- 12 countries with projects
- 185,263,812 gross square feet of projects
Figure III-1. Level of Green Standard and Average Green Cost Premium

<table>
<thead>
<tr>
<th>Level of Green Standard</th>
<th>Average Green Cost Premium</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level 1 – Certified</td>
<td>0.66%</td>
</tr>
<tr>
<td>Level 2 – Silver</td>
<td>2.11%</td>
</tr>
<tr>
<td>Level 3 – Gold</td>
<td>1.82%</td>
</tr>
<tr>
<td>Level 4 – Platinum</td>
<td>6.50%</td>
</tr>
<tr>
<td>Average of 33 Buildings</td>
<td>1.84%</td>
</tr>
</tbody>
</table>

Source: USGBC, Capital E Analysis
THE FUTURE OF
Earth
A PLANET CHALLENGED
FROM THE ARCTIC TO THE AMAZON
Pricewaterhouse Coopers Report on Sustainability

• An overwhelming number of companies (89%) thought that there would be more emphasis on sustainability within the next five years.

• The sustainable survey analysis cites the number one anticipated driver for increased business emphasis on sustainability as reputation.

• Companies surveyed then cited customer/consumer demand as the second most important driver that influences an increased visibility on sustainability in the company.

• These two are followed by:

  Industry Trends (39%)
  Cost Saving (36%)
  CEO/Board Commitment

Excerpted from Building Momentum | © USGBC
What would Jefferson say?
A PLAN FOR A BRIGHT FUTURE BEYOND 2050

SCIENTIFIC AMERICAN

SPECIAL ISSUE

SEPTEMBER 2005
WWW.SCIAM.COM

The human race is at a unique turning point. Will we choose to create the best of all possible worlds?

Crossroads for Planet Earth

The Population Peak • Energy Solutions
The New Face of Disease • Water and Wealth
How to Save Species • Ending Poverty
THE CLIMAX OF HUMANITY

By George Musser

Demographically and economically, our era is unique in human history. Depending on how we manage the next few decades, we could usher in environmental sustainability—or collapse.

The 21st century feels like a letdown. We were promised flying cars, space colonies and 15-hour workweeks. Robots were supposed to do our chores, except when they were organizing rebellions; children were supposed to learn about disease from history books; portable fusion reactors were supposed to be on sale at the Home Depot. Even dystopian visions of the future predicted leaps of technology and social organization that leave our era in the dust.

dioxide three times as fast as the oceans and land can absorb it; midcentury is when climatologists think global warming will really begin to bite. At the rate things are going, the world’s forests and fisheries will be exhausted even sooner.

These three concurrent, intertwined transitions—demographic, economic, environmental—are what historians of the future will remember when they look back on our age. They are transforming everything from geopolitics to the struc-
THREE WORLD-CHANGING TRANSITIONS

POPULATION GROWTH IS SLOWING...

- High projection
- Medium projection
- Low projection

<table>
<thead>
<tr>
<th>Year</th>
<th>World Population (billions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1820</td>
<td>1.5</td>
</tr>
<tr>
<td>1900</td>
<td>2.1</td>
</tr>
<tr>
<td>2000</td>
<td>6.7</td>
</tr>
<tr>
<td>2100</td>
<td>14</td>
</tr>
</tbody>
</table>
...PROSPERITY IS SPREADING...
... BUT CO₂ EMISSIONS ARE TROUBLING

---

**Annual Fossil-Fuel Emissions (gigatons of carbon)**

- **High projection**
- **Low projection**

Emissions that oceans and land currently absorb

---

**Year**

1820 1860 1900 1940 1980 2020 2060
TWO MAJOR PHASES IN THE HU
STAGES OF EVOLUTIONARY INITIATION STAGES IN THE UNFOLDING OF

AWAKENING
Unconscious Unity with Nature
Weak Sense of Self

Archaic Humans
STAGE 1: DENIAL

Hunter-Gatherer Era
Sensing Consciousness

Agrarian Era
Feeling Consciousness

STAGE 2: INNOVATION

PHASE 1: SEPARATION
SEPARATION FROM NATURE

Scientific-Industrial Era
Thinking Consciousness

STAGE 3: INITIATION

EVOLUTIONARY INITIATION
Conscious Separation
Strong Sense of Self
Stage 3: Initiation

Evolutionary Inflection

Initiation
Conscious Separation from Nature
Strong Sense of Self
Pervasive Exponential Growth
The rate of change is doubling every 10 years
Children’s Drawings

based on research in neuroscience
“We do not seek to imitate nature, but rather to find the principles she uses.”

-Buckminster Fuller
What would Jefferson say?
Ecotone Publishing

- Glazing Selection
- WHO'S GREEN®
- The Philosophy of Sustainable Design
- Green dollhouse
- The Ecological Engineer
"Every living system is in decline and the rate of decline is increasing."

-The Union of Concerned Scientists
### Building Form

- **Living Building**
- **LEED® Platinum**
- **LEED® Gold**
- **LEED® Silver**
- **LEED® Certified**
- **Market**

### Energy, Pollution and External Cost to Society

<table>
<thead>
<tr>
<th>Building Form</th>
<th>Energy Consumption by the Building</th>
<th>Energy Generated by the Building</th>
<th>Pollutant (pounds)</th>
<th>Cost to Society (USD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Living Building</td>
<td>89</td>
<td>5</td>
<td>Carbon Dioxide (CO₂), Global Warming</td>
<td>$12.9 m</td>
</tr>
<tr>
<td>LEED® Platinum</td>
<td>89</td>
<td>5</td>
<td>Particulate Matter (PM2.5), Air Quality</td>
<td>$11.3 m</td>
</tr>
<tr>
<td>LEED® Gold</td>
<td>150</td>
<td>5</td>
<td>Particulate Matter (PM2.5), Air Quality</td>
<td>$10.1 m</td>
</tr>
<tr>
<td>LEED® Silver</td>
<td>200</td>
<td>5</td>
<td>Particulate Matter (PM2.5), Air Quality</td>
<td>$8.0 m</td>
</tr>
<tr>
<td>LEED® Certified</td>
<td>250</td>
<td>5</td>
<td>Particulate Matter (PM2.5), Air Quality</td>
<td>$6.8 m</td>
</tr>
<tr>
<td>Market</td>
<td>465</td>
<td>5</td>
<td>Particulate Matter (PM2.5), Air Quality</td>
<td>$5.6 m</td>
</tr>
</tbody>
</table>

### Schedules

- **Construction**
  - Additional Research
  - Design
  - Construction

### Short and Long Term Costs

All of these figures are based on cost estimates created for each conceptual building model. All costs have been adjusted from actual cost estimates to reflect a $70 million Market Building as a baseline.

The Net Present Value is included as a proxy for the time value of money. If inflation runs at 5% per year, the cost of capital is 7.5%, and the annual rate of increase is 3%.

<table>
<thead>
<tr>
<th>Building Form</th>
<th>Net Present Value (USD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Living Building</td>
<td>$118.7 m</td>
</tr>
<tr>
<td>LEED® Platinum</td>
<td>$96.6 m</td>
</tr>
<tr>
<td>LEED® Gold</td>
<td>$60.2 m</td>
</tr>
<tr>
<td>LEED® Silver</td>
<td>$39.0 m</td>
</tr>
<tr>
<td>LEED® Certified</td>
<td>$166.9 m</td>
</tr>
<tr>
<td>Market</td>
<td>$348.9 m</td>
</tr>
</tbody>
</table>
The Living Building

- Harvest all its own energy and water
- Adapted to climate and site
- Operates pollution free
- Promotes health and well-being
- Comprised of Integrated Systems
- Is Beautiful
Unlike the Packard Foundation, institutions commonly separate capital funding from operations, which frequently results in increased operating costs and reduced performance (including human health and productivity, flexibility, and durability).
Daylighting and Student Performance

Daylighting, Windows, Skylights

• 15-25% faster progress on math and reading tests
• 7-18% higher test scores

Ref:

Follow up studies verified the rigor of analysis and subsequent research continues to show positive correlation between daylighting and student performance.
breezeway: park connection
section from east showing daylit areas
Shading Control

Sun-patch dynamics; Houston, Summer – clear sky
School of Nursing and Student Community Center
University of Texas Health Science Center at Houston
School of Nursing and Student Community Center
University of Texas Health Science Center at Houston
School of Nursing and Student Community Center
University of Texas Health Science Center at Houston
School of Nursing and Student Community Center
University of Texas Health Science Center at Houston
School of Nursing and Student Community Center
University of Texas Health Science Center at Houston
School of Nursing and Student Community Center
University of Texas Health Science Center at Houston
local stone
Salvaged brick
reclaimed cypress
90% recycled aluminum

east elevation
## Economic Impact

<table>
<thead>
<tr>
<th>SCHOOL OF NURSING AND STUDENT COMMUNITY CENTER</th>
<th>HARRIS COUNTY</th>
<th>TEXAS</th>
<th>UNITED STATES OF AMERICA</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>OUTPUT</strong>&lt;br&gt;Total Value of Products Shipped</td>
<td>20.1 M</td>
<td>3.6 M</td>
<td>9.1 M</td>
</tr>
<tr>
<td><strong>JOBS</strong>&lt;br&gt;Full Time Equivalent</td>
<td>196.07 JOBS</td>
<td>44.48</td>
<td>67.1</td>
</tr>
<tr>
<td><strong>INCOME</strong></td>
<td>6.8 M</td>
<td>.87 M</td>
<td>3.04 M</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>FInAL DESiGN</th>
<th>OUTPUT&lt;br&gt;Total Value of Products Shipped</th>
<th>25.39 M</th>
<th>1.16 M</th>
<th>11.4 M</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>JOBS</strong>&lt;br&gt;Full Time Equivalent</td>
<td>212.67 JOBS</td>
<td>26.59</td>
<td>77.81</td>
<td></td>
</tr>
<tr>
<td><strong>INCOME</strong></td>
<td>7.96 M</td>
<td>.4 M</td>
<td>3.82 M</td>
<td></td>
</tr>
</tbody>
</table>
people

prosperity

planet
PURPOSE: Partner the wisdom of the community with the expertise of the development team to emerge the best solutions.

Community Involvement

COMMUNITY

INFORM

EDUCATE

INVOLVE

NOISETTE COMPANY

Noisette Briefings

Treasures Process

Neighborhood Meetings

Crayons in the Hands
Community-Based Planning Process

Create a socially durable community by informing, educating, and involving the citizens.

Four Step Process:
- Get to know
- Eat and Greet
- Treasures
- Crayons in the hand
Master Plan Process

- A vision, not a plan – developer as integrator
- Creating the Noisette brand
- Role of developer as planner/zoning/community organizer/ economic development/ educator
- Establishing the self-worth of the community
NOISSETTE ROSE
Example School Project
HYPOTHEtical Evaluation
Other possible environmental goals:

- Air Quality
- Underdeveloped Land
- Water Quality
- Storm Water Management
- Public Transportation
- Vehicle Miles Driven
- Ecological Footprint
National Security: Homeland Security fuels a fear-based society
National Security: Homeland Security fuels a fear-based society

[Image: A red sign reading 'WRONG WAY']
Social Capital: *The social network and interactions which inspire trust and reciprocity among citizens.*

- “The more integrated we are with our community, the less likely we are to experience colds, heart attacks, strokes, cancer, depression, and premature death of all sorts…Over the last twenty years more than a dozen large studies…have shown that people who are socially disconnected are between 2 and 5 times more likely to die from all causes, compared with matched individuals who have close ties with family, friends and community.”
  
  – Kevin M. Leyden, PhD
Bolling Federal Building - before
Bolling Federal Building
Bolling Federal Building
Bolling Federal Building
“The best way to predict the future is to design it.”

-Buckminster Fuller
Integrated Design

When Pigs Fly
TWO MAJOR PHASES IN THE HUMAN JOURNEY
STAGES OF EVOLUTIONARY INITIATION + TRANSITION
STAGES IN THE UNFOLDING OF CIVILIZATION + CONSCIOUSNESS

AWAKENING
Unconscious Unity with Nature
Weak Sense of Self

RETURN
Conscious Unity with Nature
Strong Sense of Self

PHASE 1: SEPARATION
Separation From Nature

PHASE 2: INTEGRATION
Integration with Nature

STAGE 1: DENIAL
Archaic Humans
Sensing Consciousness

STAGE 2: INNOVATION
Hunter-Gatherer Era
Agrarian Era
Scientific-Industrial Era

STAGE 4: BOUNCE
Wisdom Civilization
Surpassing Era
Bonding Era

INITIATION
Conscious Separation from Nature
Strong Sense of Self