The University of Alabama
Go Green MB&A Presentation FY2011

June 7, 2012
Presented by: Mike Anderson & Tom Gugert
Simplifying GHG sources into scopes
All expressed as metric tons of carbon dioxide

Scope 1: Emissions from the direct activities of the campus
Scope 2: Emissions from utility production not at the institution
Scope 3: Indirect emissions including transportation, waste disposal, etc.

This slide courtesy of CA-CP
Developing peer group
Go-Green Measurement, Benchmarking and Analysis

Go-Green Peer Institutions
- Clemson University
- George Mason University
- Southern Methodist University
- Texas A&M University
- The University of Dayton
- University of Arkansas
- Virginia Commonwealth University

Go-Green Measurement and Analysis Members
- Sightlines has approximately 55 Members
- Approximately two-thirds are private
- Approximately one-third are public
- Approximately two-thirds have signed the ACUPCC
- Approximately forty percent are Charter Signatories

Peer Group Based On
- Size
- Technical Complexity
- Climate Zone
Go Green: Core Concepts
Impact of daily actions and strategic initiatives

- Younger buildings = More energy efficient
- Space becoming more efficient
- Lower carbon footprint

Detailed project list:
Choosing the right projects
Space Profile
Understanding your space profile

Campus is less crowded than peers:
• More residential = Less commuters
• Lower space utilization

Campus is complex:
• Spaces will require more energy
• Systems will be more expensive to upgrade
Understanding your space profile
Buildings larger than peers, database average

**Building Intensity**

- **Institutions Ordered By: Density Factor**

**Average Building Size**

- **GSF**
- **Alabama**
- **Peers**
- **Database Average**
Alabama has more younger space than peers

Dichotomy between buildings under 10 and over 10 years old

GSF by Renovation Age Category

<table>
<thead>
<tr>
<th>Age Category</th>
<th>Alabama</th>
<th>Peer Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 10 Years</td>
<td>49%</td>
<td>27%</td>
</tr>
<tr>
<td>10 to 25 Years</td>
<td>25%</td>
<td>23%</td>
</tr>
<tr>
<td>25 to 50 Years</td>
<td>19%</td>
<td>32%</td>
</tr>
<tr>
<td>Over 50 Years</td>
<td>7%</td>
<td>18%</td>
</tr>
</tbody>
</table>
Alabama has more younger space than peers

Dichotomy between buildings under 10 and over 10 years old

Alabama Building Profile by Renovation Age

- Under 10 yrs. (72 buildings)
- Over 10 yrs. (219 buildings)

Average Building Size (GSF)

Technical Complexity (1-5)
Alabama reaches closer to target
74% of buildings under 25 years old, stewardship program vital moving forward
Alabama has seen different funding mix

Higher percentage envelope projects vs. mechanical

Peer Total Project Spending
By Package, FY03-11

Alabama Total Project Spending
By Package, FY03-11

Average annual investment: $4.00/GSF

Average annual investment: $3.35/GSF
## Important implications of your space profile

Connecting the physical profile of campus to your carbon inventory

### Avg. Bldg Size (GSF)

<table>
<thead>
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<th>Peer Average</th>
<th>Alabama</th>
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<tbody>
<tr>
<td>Avg. Bldg Size</td>
<td>40,900</td>
<td>47,300</td>
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</table>

- Larger buildings =
  - More energy efficient

### Weighted Reno. Age

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<td>Weighted Reno. Age</td>
<td>30.40</td>
<td>18.20</td>
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- Younger Buildings =
  - Efficient systems

### FY11 Backlog $/GSF

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<tr>
<td>FY11 Backlog</td>
<td>$54.55</td>
<td>$42.14</td>
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</table>

- Accumulated Backlog =
  - More flexible life cycle need

### FY11 Spending $/GSF

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<td>FY11 Spending</td>
<td>$4.96</td>
<td>$4.21</td>
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</table>

- Capital spending =
  - Improving physical assets
Carbon Emissions
Two different ways to benchmark GHG emissions

GHG Emissions per Student

- Stresses efficient use of space.

GHG Emissions per 1,000 GSF

- Stresses intensity of operations.

\[
\frac{\text{Gross GHG Emissions}}{\text{Total Student FTE}}
\]

\[
\frac{\text{Gross GHG Emissions}}{\text{Total GSF in Footprint}} \times 1,000
\]
Understanding “Performance Portfolios”

- **Lower Density-Lower Intensity**
  - Lower density institution with lower technical demands (selective liberal arts)

- **Higher Density-Lower Intensity**
  - Higher density institution with lower technical demands (liberal arts/comprehensive)

- **Lower Density-Higher Intensity**
  - Typical research institution with higher technical demands

- **Higher Density-Higher Intensity**
  - Typical commuter-driven institution with higher technical demands

GHG / Student FTE

GHG / 1,000 GSF
Moving in the right direction
How will Alabama make progress?

[Diagram showing a scatter plot with data points for GHG emissions per student FTE, with categories for lower and higher intensity and density, and comparison between Alabama 2004, 2011, and peer institutions.]
Longitudinal emissions vs. peers
Growth in FY11 emissions with additional GSF

40% growth in campus space, 37% growth in emissions
Total FY11 Gross Emissions: 209,138 MTCDE

Proportional growth of sources with scope 3 decreasing slightly

* Other category represents agriculture and wastewater emissions- 0.1%
Total FY11 Gross Emissions: 209,138 MTCDE
Proportional growth of sources with scope 3 decreasing slightly

**FY04 Carbon Emissions by Type**
- On-Campus Stationary: 11%
- Fleet: 1.0%
- Refrigerants: 0.0%
- Solid Waste: 5%
- Air Travel: 10%
- Commuting: 7%
- Purch. Electric: 60%
- Scope 2 T&D: 6%
- Other: 0%

**FY11 Carbon Emissions by Type**
- On-Campus Stationary: 11%
- Fleet: 2.0%
- Refrigerants: 1.6%
- Solid Waste: 2%
- Commuting: 7%
- Purch. Electric: 59%
- Air Travel: 11%
- Scope 2 T&D: 6%
- Other: 0%

* Other category represents agriculture and wastewater emissions- 0.1%
Electricity Efficiency by function

Campus Electricity Usage

-E&G buildings coming online are more complex and serve various programmatic needs
-Housing buildings tend to have simpler mechanical systems and less need for complex air changes
Electricity Efficiency by function

Campus Electricity Usage

- E&G buildings coming online are more complex and serve various programmatic needs
- Housing buildings tend to have simpler mechanical systems and less need for complex air changes
Comparing Alabama’s grid to other US regions

MTCDE by Grid Operator

T&D Losses  MTCDE/1M kWh

Alabama  Peers
Factors that influence electricity emissions

Regional carbon intensity vs. peers

- Regional Grid Carbon Intensity
- Purchased electricity consumption
- Purchased electricity Emissions

Carbon intensity of purchased electricity higher than peers
Factors that influence electricity emissions

Purchased electricity consumption vs. peers

- Regional Grid Carbon Intensity
- Purchased electricity consumption
- Purchased electricity Emissions

Consuming less electricity than peers
Factors that influence electricity emissions

Purchased electricity consumption vs. peers

- Regional Grid Carbon Intensity
- Purchased electricity consumption
- Purchased electricity Emissions

Graph: Purchased Electricity Consumption

- Peer Averages
- The University of Alabama (Tuscaloosa) - Composite

Consuming less electricity than peers
Effect of electricity consumption and intensity

Implications of grid and consumption offset with emissions output

Scope 2

Regional Grid Carbon Intensity

Purchased electricity consumption

Purchased electricity Emissions

Slightly lower carbon emissions than peers
Effect of electricity consumption and intensity

Implications of grid and consumption offset with emissions output

Slightly lower carbon emissions than peers
Low carbon fuel mix

MTCDE of Commonly Used Fossil Fuels

On-Campus Fuel Mix

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<tr>
<td>Coal</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>Residual Oil</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>Distillate Oil</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>Propane</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>Natural Gas</td>
<td>100%</td>
<td>100%</td>
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Stationary emissions higher than peers

Scope 1
Total utility usage vs. GHGs

Sustainably operated campus compared to peers

Alabama “Greenness” vs. Peers:
- Consumes less total energy
- Has a more intense carbon grid
- Has a less dense campus community

*Still produces lower utility emissions per student
Other GHG factors in profile

Accounts for 28% of total GHG emissions in FY2011

**Other Historical GHG Factors**

- DF Air Travel
- Commuting
- T&D Losses
- Study Abroad
- Fleet Vehicles
- Solid Waste
- Refrigerants

MTCDE
Campus commuting profile

Commuting profile defined by shorter trip distance and drive alone habits

**Major Impacts for Commuting Emissions**

**How Many?**

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Note: Information from Alabama 2010 commuting survey
Campus commuting profile

Commuting profile defined by shorter trip distance and drive alone habits

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<td>Peer Average</td>
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*Note: Information from Alabama 2010 commuting survey*
Campus commuting profile

Commuting profile defined by shorter trip distance and drive alone habits

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Campus commuting profile
Commuting profile defined by shorter trip distance and drive alone habits

Major Impacts for Commuting Emissions

How Many?
% of Users Commuting
- Alabama: 56%
- Peer Average: 61%

How Far?
Average One-Way Trip
- Alabama: 4.5 Miles
- Peer Average: 7.7 Miles

What Mode?
% Drive Alone
- Alabama: 87%
- Peer Average: 78%

Note: Information from Alabama 2010 commuting survey
Campus commuting emission
Student and employee commuting GHGs lowest and highest of peer group

Alabama vs. Peers
% Commuting – Less
How Far – Shorter Distance
Mode – Same (Drive Alone)

Alabama vs. Peers
% Commuting – Same
How Far – Longer Distance
Mode – Same (Drive Alone)
Waste reduction strategies

Waste management is the intersection of policy, infrastructure and engagement

**Policy:**
- Purchasing

**Infrastructure:**
- Bins & Signage

**Engagement:**
- Awareness & Personal Decisions

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Total Material Waste & Diversion Rates

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GHG Reductions
Producing less waste in FY11, recycling similar to peers
Perception vs. Performance

The University of Alabama

“Green” Schools
- George Mason University
- Oregon State University
- Rensselaer Polytechnic Institute
- University of Oregon
- University of Vermont

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<th>“Green” Schools Avg.</th>
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<td>BTU/GSF</td>
<td>83,020</td>
<td>132,800</td>
</tr>
<tr>
<td>GHG(MTCDE)/GSF(1,000)</td>
<td>16.3</td>
<td>15.6</td>
</tr>
<tr>
<td>GHG(MTCDE)/Student</td>
<td>7.1</td>
<td>6.2</td>
</tr>
<tr>
<td>Waste Pounds/Student</td>
<td>308</td>
<td>360</td>
</tr>
<tr>
<td>Gallons of Water/Student</td>
<td>8,800</td>
<td>8,500</td>
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*“Green” Schools selected from Sierra Club Top 100 Green Schools.*
The University of Alabama

Questions and Discussion