Sightlines Sustainability Solutions
Boston College

Presented by Dan Willman & Jon King
Boston College’s Go-Green Peers

Go-Green Peer Institutions
- American University
- Babson College
- Bentley University
- Emerson College
- Loyola University Maryland
- Occidental College
- Rensselaer Polytechnic Institute
- Tufts University
- University of Vermont
- Wesleyan University

Go-Green Measurement and Analysis Members
- Sightlines has approximately 50 Go-Green Members
- Approximately two-thirds are private
- Approximately one-third are public
- Approximately two-thirds have signed the ACUPCC
- Approximately forty percent are Charter Signatories

*New to peer group

Peer Group Based On:
- Technical Complexity
- Building Size
- Age
- Energy Consumption/GSF
Typical GHG Emissions by Scope

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

Collected carbon emissions at Boston College

**Institutional Data:** Total campus GSF & student, faculty, and staff FTE numbers

### Scope 1 – Direct GHGs
- On-Campus Stationary (Oil#6 (FY06-FY10), Oil #2 (FY06-14), Natural Gas (FY06-14).
- Vehicle Fleet - gasoline/diesel
- Refrigerants
- Fertilizer

### Scope 2 – Upstream GHGs
- Purchased Electricity

### Scope 3 – Indirect GHGs
- Faculty/Staff/Student Commuting
- Directly Financed Air and Ground Travel
- Study Abroad Travel
- Solid Waste
- Wastewater
- Transmission & Distribution Losses
Growing Campus Incurs More Emissions

Emissions have decreased despite campus growth

Change in Emissions vs. Change in Campus Size and Population
Indexed to FY06

FY07-FY14 change: +8%
FY07-FY14 change: +4%
FY07-FY14 change: -11%

% Change

-15% -10% -5% 0% 5% 10% 15%

FY07 FY08 FY09 FY10 FY11 FY12 FY13

Gross Emissions  Campus GSF  Campus Population
Scope 1 Emissions Review
Energy Consumption vs. Peers

Taken from FY14 ROPA presentation; vs. Regional Peers

Regional Peers: Brandeis University, Brown University, Bryant University, Emerson College, Northeastern University, Tuft University – Medford, UMASS – Lowell, Wellesley College

Regional Peers Highlighted
Energy Consumption vs. Regional Peers

Taken from FY14 ROPA analysis; BC’s fossil fuel has increased since FY12
Scope 1 Fossil Fuel Consumption & Emissions

Converting to 100% Natural Gas

- MMBTU
- Heating Degree Days

Fossil Fuel Consumption
Heating Degree Days

FY06, FY07, FY08, FY09, FY10, FY11, FY12, FY13, FY14
Emissions for Commonly Used Scope 1 Fuels

BC consumes mostly natural gas and oil #2

MTCDE of Commonly Used Fossil Fuels

% of Fuel Burned

<1%

9%

91%

Natural Gas

Distillate Oil #1-4

Propane

Coal

Residual Oil #5-6

Natural Gas

Distillate Oil #1-4

Propane

Coal
Changes in Fuel Mix

Natural Gas has become main fuel commodity
Stationary Emissions over time

17% decrease in stationary emissions since FY06
Scope 1 Stationary Emissions Higher Than Peers
Other Scope 1 De Minimus Sources

Fleet Fuel, Refrigerants, Fertilizer

Fleet Fuel MTCDE

Refrigerants MTCDE

Fertilizer MTCDE
Scope 1 Emissions vs. Peers

Scope 1 Emissions (per 1,000 GSF)

Institutions Ordered By: Total BTU/GSF

Average 3.6995
Scope 2 Emissions
Scope 2 eGRID Fuel Mix and Emissions Sources

eGRID emissions updated by the EPA in 2012

Carbon Intensity by Grid Region

[Bar chart showing carbon intensity by grid region with specific intensity values for different regions labeled.]
Scope 2 Purchased Electricity and Emissions

Scope 2 decreasing since FY08

[Bar chart showing electricity consumption from FY06 to FY14 with a trend line for cooling degree days]
Scope 2 Emissions vs. Peers

Scope 2 emissions lower than peer campuses

**Scope 2 Emissions (per 1,000 GSF)**

<table>
<thead>
<tr>
<th>Institution</th>
<th>Purchased Chilled Water MTCDE / 1,000 GSF</th>
<th>Purchased Steam MTCDE / 1,000 GSF</th>
<th>Purchased Electricity MTCDE / 1,000 GSF</th>
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**Average**: 5.26

**Institutions Ordered By: Total BTU/GSF**

**Scope 2 Emissions (per Student)**

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<tr>
<th>Institution</th>
<th>Purchased Chilled Water MTCDE / FTE Student</th>
<th>Purchased Steam MTCDE / FTE Student</th>
<th>Purchased Electricity MTCDE / FTE Student</th>
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**Average**: 2.21

**Institutions Ordered By: Density Factor**
Utility Emissions are increasing

Utility Emissions

MTCDE

FY06 FY07 FY08 FY09 FY10 FY11 FY12 FY13 FY14
Utility Emissions vs. Peers

23% decrease in utility emissions since FY06
Total Utility Emissions vs. Peers

Utility Emission similar to peer levels

**Total Utility Emissions (per 1,000 GSF)**

© Sightlines 2001-2015

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<th>Institution</th>
<th>Total Utility Emissions (per 1,000 GSF)</th>
<th>Average 9.02</th>
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Institutions Ordered By: Tech Rating

**Total Utility Emissions (per Student)**

© Sightlines 2001-2015

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<th>Institution</th>
<th>Total Utility Emissions (per Student)</th>
<th>Average 4.28</th>
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Institutions Ordered By: Tech Rating
Scope 3 Emissions
Scope 3 Sources

Study abroad and other air travel constitute most of Scope 3 profile.
Commuting Emissions over time

In MTCDE

Years: FY06, FY07, FY08, FY09, FY10, FY11, FY12, FY13, FY14

- Faculty/Staff
- Student

Graph shows emissions data from FY06 to FY14, with separate bars for Faculty/Staff and Student emissions.
Commuting emissions less than peers
Campus Travel

Composed of Study Abroad and Directly Financed Travel

Distance Traveled

MTCDE’s Produced

- Miles in Millions
- Directly Financed Travel Miles
- Study Abroad Miles
- Directly Financed Travel MTCDE
- Study Abroad MTCDE
Air travel emissions close to peer average
Other Scope 3 Sources

Wastewater and Solid Waste

Waste Stream

Water Consumed

Tons

Gallons in Millions

FY06 FY07 FY08 FY09 FY10 FY11 FY12 FY13 FY14

Solid Waste Recycled Composted
Scope 3 Emissions vs Peers

Scope 3 Emissions (per Campus User)

Peer Averages
© Sightlines 2001-2015

Boston College

27% Decrease since FY06

2006 2007 2008 2009 2010 2011 2012 2013 2014

2006 2007 2008 2009 2010 2011 2012 2013 2014

Scope 2 T&D Losses MTCDE / Campus User
Solid Waste MTCDE / Campus User
Paper MTCDE / Campus User
Air Travel MTCDE / Campus User
Wastewater MTCDE / Campus User
Average (1.4242)
Your Average (1.52)
Commuting MTCDE / Campus User
Summary
Summary Emissions by Scope

Total Scope 1 MTCDE:
- FY06: 25,000
- FY10: 30,000
- FY14: 35,000

Total Scope 2 MTCDE:
- FY06: 30,000
- FY10: 35,000
- FY14: 30,000

Total Scope 3 MTCDE:
- FY06: 25,000
- FY10: 20,000
- FY14: 15,000
Historical Campus Carbon Emissions

Emissions have decreased since FY08; Total - 74,422 MTCDE

Longitudinal Gross Emissions

FY14 Carbon Emissions by Type

- Stationary Combustion: 35%
- Purchased Electricity: 36%
- Air Travel: 16%
- Commuting: 9%
- T&D Losses: 2%
- Other Scope 1 & 3: 2%
- Refrigerants and Chemicals: <1%
Total All Scopes Normalized

Both GSF and Per Student

Gross Emissions (per 1,000 GSF)

Gross Emissions (per Student)

Institutions Ordered By: Total BTU/GSF

Average 12.82

Average 5.99
Gross Emissions vs. Peers

16% decrease since FY06
Stationary fuel consumption has mirrored current weather trends. To further reduce emissions, BC’s project selection must target inefficient areas of campus and outdated infrastructure.

Scope 2 emissions have decreased since FY08 as Boston College has added space and experienced higher cooling needs. Campus location within a clean grid helps keep electric emissions low.

Scope 3 is largely impacted by travel sponsored by the campus. This could be an opportunity to provide student and faculty the option to buy offsets to help improve overall emissions.