The Bullitt Center: 
Energy Efficiency in Action

Emerging Technologies Showcase
March 26, 2014

Presented by:
Allan Montpellier, PE, LEED AP
PAE

Welcome. Today’s webinar is being recorded and will be posted at:
- www.E3Tnw.org
- www.ConduitNW.org
GoToWebinar Logistics

- Minimize or maximize control panel
- Phone lines are muted
- Please use question field to ask questions during Q & A or if you have any technical issues

NOTE: Today’s presentation is being recorded and will be available at [http://e3tnw.org/Webinars](http://e3tnw.org/Webinars) within 48 hours
"Our desire is to open a wedge into the future so that we, and others, can see what is possible in a contemporary office building."

Denis Hayes
Bullitt Foundation, President
LIVING BUILDING CHALLENGE™ 2.0
A VISIONARY PATH TO A RESTORATIVE FUTURE
www.ilbi.org
100% of the building’s energy use supplied by on-site renewable energy on an annual basis.
GOAL
NET ZERO ENERGY

MOTIVATOR
BEHAVIOR & AWARENESS

ENABLER
HIGH PERFORMANCE BUILDING
Typical Office Floor
Building Section

15th Avenue

Courtesy: Miller Hull
How do we achieve a net zero energy building?
Building Energy Use Metrics

Fuel Efficiency

MPG

Energy Performance Rating

EUI (kBtu/sf/yr)

EPA Fuel Economy Estimates

CITY MPG 18

Expected range for most drivers 15 to 21 mpg

HIGHWAY MPG 25

Expected range for most drivers 21 to 29 mpg

Estimated Annual Fuel Cost $2,039

based on 15,000 miles at $2.20 per gallon

Combined Fuel Economy This Vehicle 21

Combined Fuel Economy All SUVs

Your actual mileage will vary depending on how you drive and maintain your vehicle.
United States Photovoltaic Solar Resource: Flat Plate Tilted at Latitude
Solar Income
From Horizontal Surfaces

<table>
<thead>
<tr>
<th>City</th>
<th>kBtu/sf/yr</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seattle</td>
<td>384</td>
</tr>
<tr>
<td>Portland</td>
<td>408</td>
</tr>
<tr>
<td>San Francisco</td>
<td>544</td>
</tr>
<tr>
<td>San Jose</td>
<td>574</td>
</tr>
<tr>
<td>Los Angeles</td>
<td>579</td>
</tr>
<tr>
<td>Phoenix</td>
<td>664</td>
</tr>
<tr>
<td>New York</td>
<td>454</td>
</tr>
</tbody>
</table>
# Net Zero Energy

**Sunpower 425W - SPR-425E-WHT-D**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of modules</td>
<td>570</td>
</tr>
<tr>
<td>Unit Nom. Power</td>
<td>425 W</td>
</tr>
<tr>
<td>Peak System Output</td>
<td>227 kW</td>
</tr>
<tr>
<td>Produced Energy</td>
<td>242,000 KWH/yr</td>
</tr>
<tr>
<td>Panel Efficiency (STC)</td>
<td>19.7%</td>
</tr>
<tr>
<td>System Efficiency</td>
<td>~16%</td>
</tr>
</tbody>
</table>
Net Zero Energy - PV

Scheme II

Scheme 2 - TILTED ROOF ARRAY (15 deg tilt @ Back):
ROOF (5 deg West) = 7,258sf = 123,000 kWh/yr
ROOF (15 deg Southeast) = 4,240sf = 73,000 kWh/yr
SOUTHEAST WALL = 750sf = 9,000 kWh/yr
SOUTH WALL = 4,015sf = 50,000 kWh/yr (3,500kWh/yr/row)

255,000 kWh/yr (+9K v. BASE)
Scheme 3 - TILTED ROOF ARRAY (25 deg tilt @ Back):

<table>
<thead>
<tr>
<th>Surface</th>
<th>Size</th>
<th>Energy (kWh/yr)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Roof (5 deg West)</td>
<td>7,258sf</td>
<td>123,000</td>
</tr>
<tr>
<td>Roof (25 deg Southeast)</td>
<td>4,514sf</td>
<td>80,000</td>
</tr>
<tr>
<td>Southeast Wall</td>
<td>750sf</td>
<td>9,000</td>
</tr>
<tr>
<td>South Wall</td>
<td>4,015sf</td>
<td>50,000 (3,500kWh/yr/row)</td>
</tr>
</tbody>
</table>

Total: 262,000 kWh/yr (+18K v. BASE)
Comparison of PV Orientations in Seattle

Bullitt Center PV Orientation & Tilt vs. South-Facing at 5 Tilt Angles
Net Zero Energy in Seattle

Energy Use + Solar Budget

- **Average Building (Energy Star Score = 50)**
- **Seattle Energy Code Building**
- **LEED Platinum Building (19 Energy Credits)**
- **PV Budget**
- **Proposed Building**

<table>
<thead>
<tr>
<th>Component</th>
<th>Average Building</th>
<th>Seattle Energy Code Building</th>
<th>LEED Platinum Building</th>
<th>PV Budget</th>
<th>Proposed Building</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lights</td>
<td>92</td>
<td>52</td>
<td>32</td>
<td>83% Savings</td>
<td></td>
</tr>
<tr>
<td>Space Heating</td>
<td>230,000 kWh</td>
<td>229,000 kWh</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Space Cooling</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pumps &amp; Aux</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Elevator</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vent Fans</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Domestic Hot Water</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PV Roof</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IT Server</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

92% Savings

Net Zero Energy in Seattle
Bullitt Center

PV Area

EUI 92
64,000 SF of PV
Net Zero Energy in Seattle

Energy Use + Solar Budget

<table>
<thead>
<tr>
<th>Energy Consumption (kBtu/sf/year)</th>
<th>Average Building (Energy Star Score = 50)</th>
<th>Seattle Energy Code Building</th>
<th>LEED Platinum Building (19 Energy Credits)</th>
<th>PV Budget</th>
<th>Proposed Building</th>
</tr>
</thead>
<tbody>
<tr>
<td>PV ROOF</td>
<td>92</td>
<td>52</td>
<td>32</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DOMEST HOT WATER</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ELEVATOR</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>VENT FANS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PUMPS &amp; AUX</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SPACE COOLING</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SPACE HEATING</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PLUG LOADS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IT SERVER</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LIGHTS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

83% Savings
Bullitt Center
PV Area

EUI 52
45,000 SF of PV
Bullitt Center

PV Area

EUI 32
26,000 SF of PV
Net Zero Energy in Seattle

Energy Use + Solar Budget

- Average Building (Energy Star Score = 50)
- Seattle Energy Code Building
- LEED Platinum Building (19 Energy Credits)
- PV Budget
- Proposed Building

- PV ROOF
- DOMEST HOT WATER
- ELEVATOR
- VENT FANS
- PUMPS & AUX
- SPACE COOLING
- SPACE HEATING
- PLUG LOADS
- IT SERVER
- LIGHTS

- 92 kBtu/sf/year
- 52 kBtu/sf/year
- 32 kBtu/sf/year
- 230,000 kWh

83% Savings
Bullitt Center
PV Area

EUI 16
14,000 SF of PV
Net Zero Energy in Seattle

Energy Use + Solar Budget

Average Building (Energy Star Score = 50)

Seattle Energy Code Building

LEED Platinum Building (19 Energy Credits)

PV Budget

Proposed Building

83% Savings

Net Zero Energy in Seattle

Energy Use + Solar Budget

Average Building (Energy Star Score = 50)

Seattle Energy Code Building

LEED Platinum Building (19 Energy Credits)

PV Budget

Proposed Building

83% Savings
Net Zero Energy

Energy Use | Solar Budget

- **Solar Energy Production**
- **Energy Surplus**
- **Building Energy Use**
- **Energy Deficit**

![Graph showing energy use and solar budget over a year. The graph displays the energy surplus during the summer months and energy deficit during the winter months, demonstrating the net zero energy goal.]
Net Zero Energy

Energy Consumption

Typical Building

Proposed Building

Total Savings 83%
Proposed Building Energy Use

EUI = 16
Living Skin

GLAZING
- Triple Pane
- Low-e
- Optimized for Daylighting

WINDOWS
- Operable
- Motorized
- Controlled by BMS
- Night Flush

SHADING
- External
- Motorized
- Blinds
- Controlled by BMS

INfiltrATION
- Tight Envelope
- Construction
- Pressure Tests
  0.19 CFM at 75 Pa
# Envelope Comparison

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Roof</td>
<td>R-20ci</td>
<td>R-30ci</td>
<td>R-38ci</td>
<td>R-38ci</td>
<td>R-38ci</td>
<td>R-40ci</td>
<td>No change</td>
</tr>
<tr>
<td>Wall (Steel Framed)</td>
<td>U-0.064 R\text{effective}\sim 15.6</td>
<td>U-0.062 R\text{effective}\sim 16.1</td>
<td>U-0.055 R\text{effective}\sim 18.2</td>
<td>U-0.055 R\text{effective}\sim 18.2</td>
<td>U-0.040 R\text{effective}\sim 25.0</td>
<td>U-0.047 R\text{effective}\sim 21.3</td>
<td>U-0.064 R\text{effective}\sim 26.6</td>
</tr>
<tr>
<td>Fenestration Area</td>
<td>40%max</td>
<td>45%max</td>
<td>40%max</td>
<td>40%max*</td>
<td>25-35%</td>
<td>40%</td>
<td>No change</td>
</tr>
<tr>
<td><strong>Fenestration U-Value</strong></td>
<td><strong>U-0.50^{fixed} U-0.55^{oper}</strong></td>
<td>U-0.40</td>
<td>U-0.38</td>
<td>U-0.34^{fixed} U-0.36^{oper}</td>
<td>U-0.25 North</td>
<td>U-0.25 U\text{fixed} U-0.30^{oper}</td>
<td>No change</td>
</tr>
<tr>
<td><strong>Average R-Value (Calculated)</strong></td>
<td>4.9</td>
<td>6.3</td>
<td>6.8</td>
<td>7.2</td>
<td>12.1</td>
<td>9.6</td>
<td>10.0</td>
</tr>
<tr>
<td><strong>Infiltration</strong></td>
<td>NR</td>
<td>NR</td>
<td>0.40cfm/SF @75Pa</td>
<td>0.40cfm/SF @75Pa</td>
<td>Better than Code</td>
<td>0.25cfm/SF @75Pa</td>
<td>0.19cfm/SF @75Pa</td>
</tr>
</tbody>
</table>
Daylighting

- Optimized for Daylighting

- Taller floors increase daylight penetration

- External Motorized Blinds

- Glare Control

- Daylighting control of powered lights
Net Zero Energy – Lighting

Lighting Codes

daylighting
Net Zero Energy – Lighting

Proposed Plan – with height departure

Typical

12′-6” floor to floor

14′-2” floor to floor

38% of the floor area has daylight levels below 2%
Net Zero Energy – Lighting

6th Floor Without Skylights
Net Zero Energy – Lighting

6th Floor With Skylights
Regenerative Elevator

"Irresistible" stair encourages less elevator use

Elevator lobby is de-emphasized

KONE Regenerative Elevator

ARCHITECTURE

ELEVATOR

STAIR
“Irresistible” Stair
High Efficiency HVAC Systems

GEOTHERMAL HP
- Uses the Earth as a heat source and sink
- Heat Pump Technology

NATURAL VENTILATION
- Motorized Operable Windows
- Day and Night Flush

RADIANT FLOORS
- Hydronic Radiant Floors Used for Heating and Cooling
- Heat Recovery used for Building Ventilation System
Climate allows for less mechanical cooling if tenant is on board.

Tenants are required to stay within specific energy budgets.

BMS Dashboard provides real time and historical energy use data.
Cooling Degree Days
Base 65°F

- Seattle: 169
- Portland: 354
- San Francisco: 133
- San Jose: 523
- Los Angeles: 607
- Phoenix: 4039
- New York: 1382
Climate
Seattle, WA

Total Hours at 5° Temperature Ranges (7AM-10PM)
ASHRAE Comfort Chart

Data based on ISO 7730 and ASHRAE STD 55.

- Upper Recommended Humidity Limit: 0.012 humidity ratio
- Dew Point Temperature, °F
- Operative Temperature, °F

- 1.0 Clo
- 0.5 Clo
- No Recommended Lower Humidity Limit
- PMV Limits
- 10% RH

- 0.002
- 0.004
- 0.006
- 0.008
- 0.010
- 0.012
- 0.014
- 0.016

- 10
- 20
- 30
- 40
- 50
- 60
- 70
- 80
- 90
- 100
## Climate Consultant

### DESIGN STRATEGIES: JANUARY through DECEMBER

<table>
<thead>
<tr>
<th>Percentage</th>
<th>Strategy</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.7%</td>
<td>Comfort</td>
<td>323 hrs</td>
</tr>
<tr>
<td>10.4%</td>
<td>Sun Shading</td>
<td>911 hrs</td>
</tr>
<tr>
<td>2.1%</td>
<td>High Thermal Mass</td>
<td>182 hrs</td>
</tr>
<tr>
<td>0.3%</td>
<td>High Thermal Mass/Night Flushing</td>
<td>22 hrs</td>
</tr>
<tr>
<td>5.0%</td>
<td>Direct Evaporative Cooling</td>
<td>0 hrs</td>
</tr>
<tr>
<td>1.6%</td>
<td>Natural Ventilation Cooling</td>
<td>136 hrs</td>
</tr>
<tr>
<td>15.1%</td>
<td>Internal Heat Gain</td>
<td>1319 hrs</td>
</tr>
<tr>
<td>8.0%</td>
<td>Passive Solar Direct Gain Low Mass</td>
<td>0 hrs</td>
</tr>
<tr>
<td>9.0%</td>
<td>Passive Solar Direct Gain High Mass</td>
<td>0 hrs</td>
</tr>
<tr>
<td>10.0%</td>
<td>Humidification</td>
<td>0 hrs</td>
</tr>
<tr>
<td>11.0%</td>
<td>Wind Protection</td>
<td>0 hrs</td>
</tr>
<tr>
<td>12.0%</td>
<td>Conventional Air Conditioning</td>
<td>0 hrs</td>
</tr>
<tr>
<td>78.2%</td>
<td>Conventional Heating</td>
<td>6848 hrs</td>
</tr>
</tbody>
</table>

100.0% Composite of Selected Strategies
Occupants

Lease Requirements

- Energy Requirements
- Water Requirements
- Materials Requirements
- Thermal Requirements
Reducing Plug Loads

2007

20” CFL-LCD
75 watts

20” CFL-LCD
75 watts

100 watts

250 watts
Reducing Plug Loads

2009

22” CFL-LCD

40 watts

22” CFL-LCD

40 watts

80 watts

160 watts
Reducing Plug Loads

2013

22” LED-LCD

14 watts

22” LED-LCD

14 watts

14 watts

42 watts
Reducing Plug Loads

2013

24” LED
18 watts

24” LED
18 watts

20 watts total

56 watts
## Product Inventory

### 2013

<table>
<thead>
<tr>
<th><strong>Equipment</strong></th>
<th><strong>QTY</strong></th>
<th><strong>W/ea</strong></th>
<th><strong>HRS / DAY</strong></th>
<th><strong>(kWh/Day)</strong></th>
<th><strong>Days/yr</strong></th>
<th><strong>kWh/yr</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Collocated Server</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IT Equipment</td>
<td>1</td>
<td>2212</td>
<td>24.00</td>
<td>53</td>
<td>365</td>
<td>19,379</td>
</tr>
<tr>
<td><strong>Kitchen</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Refrigerator</td>
<td>6.5</td>
<td>200</td>
<td>12</td>
<td>16</td>
<td>365</td>
<td>5,694</td>
</tr>
<tr>
<td>Microwave</td>
<td>6.5</td>
<td>1000</td>
<td>1.56</td>
<td>10</td>
<td>252</td>
<td>2,555</td>
</tr>
<tr>
<td>Coffee Pot</td>
<td>6.5</td>
<td>1000</td>
<td>3</td>
<td>20</td>
<td>252</td>
<td>4,914</td>
</tr>
<tr>
<td>Dishwasher</td>
<td>6.5</td>
<td>500</td>
<td>2</td>
<td>7</td>
<td>252</td>
<td>1,638</td>
</tr>
<tr>
<td><strong>Open Office</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Laptop Computer</td>
<td>35</td>
<td>40</td>
<td>8</td>
<td>11</td>
<td>252</td>
<td>2,822</td>
</tr>
<tr>
<td>PC</td>
<td>112</td>
<td>51</td>
<td>8</td>
<td>46</td>
<td>252</td>
<td>11,515</td>
</tr>
<tr>
<td>Thin Client</td>
<td>26</td>
<td>20</td>
<td>8</td>
<td>4</td>
<td>252</td>
<td>1,048</td>
</tr>
<tr>
<td>Monitor</td>
<td>286</td>
<td>25</td>
<td>8</td>
<td>57</td>
<td>252</td>
<td>14,414</td>
</tr>
<tr>
<td>Personal Misc (per person)</td>
<td>173</td>
<td>15</td>
<td>6.1</td>
<td>16</td>
<td>252</td>
<td>3,989</td>
</tr>
<tr>
<td><strong>Conference Room</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TV display or projector</td>
<td>15.0</td>
<td>110</td>
<td>8</td>
<td>13</td>
<td>252</td>
<td>3,326</td>
</tr>
<tr>
<td><strong>Copy Room</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Copier</td>
<td>8.6</td>
<td>1100</td>
<td>3.91</td>
<td>37</td>
<td>252</td>
<td>9,321</td>
</tr>
<tr>
<td><strong>Misc. Equipment</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ceiling Fan</td>
<td>31</td>
<td>290</td>
<td>1.5</td>
<td>13</td>
<td>252</td>
<td>3,398</td>
</tr>
<tr>
<td><strong>BUDGET</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Daily kWh</td>
<td>0.3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Annual KWh</td>
<td>84016</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Budget</td>
<td>84768</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>STATUS</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>APPROVED</td>
<td></td>
</tr>
</tbody>
</table>

**Product Inventory 2013**

<table>
<thead>
<tr>
<th><strong>Product</strong></th>
<th><strong>QTY</strong></th>
<th><strong>W/ea</strong></th>
<th><strong>HRS / DAY</strong></th>
<th><strong>(kWh/Day)</strong></th>
<th><strong>Days/yr</strong></th>
<th><strong>kWh/yr</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Collocated Server</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IT Equipment</td>
<td>1</td>
<td>2212</td>
<td>24.00</td>
<td>53</td>
<td>365</td>
<td>19,379</td>
</tr>
<tr>
<td><strong>Kitchen</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Refrigerator</td>
<td>6.5</td>
<td>200</td>
<td>12</td>
<td>16</td>
<td>365</td>
<td>5,694</td>
</tr>
<tr>
<td>Microwave</td>
<td>6.5</td>
<td>1000</td>
<td>1.56</td>
<td>10</td>
<td>252</td>
<td>2,555</td>
</tr>
<tr>
<td>Coffee Pot</td>
<td>6.5</td>
<td>1000</td>
<td>3</td>
<td>20</td>
<td>252</td>
<td>4,914</td>
</tr>
<tr>
<td>Dishwasher</td>
<td>6.5</td>
<td>500</td>
<td>2</td>
<td>7</td>
<td>252</td>
<td>1,638</td>
</tr>
<tr>
<td><strong>Open Office</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Laptop Computer</td>
<td>35</td>
<td>40</td>
<td>8</td>
<td>11</td>
<td>252</td>
<td>2,822</td>
</tr>
<tr>
<td>PC</td>
<td>112</td>
<td>51</td>
<td>8</td>
<td>46</td>
<td>252</td>
<td>11,515</td>
</tr>
<tr>
<td>Thin Client</td>
<td>26</td>
<td>20</td>
<td>8</td>
<td>4</td>
<td>252</td>
<td>1,048</td>
</tr>
<tr>
<td>Monitor</td>
<td>286</td>
<td>25</td>
<td>8</td>
<td>57</td>
<td>252</td>
<td>14,414</td>
</tr>
<tr>
<td>Personal Misc (per person)</td>
<td>173</td>
<td>15</td>
<td>6.1</td>
<td>16</td>
<td>252</td>
<td>3,989</td>
</tr>
<tr>
<td><strong>Conference Room</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TV display or projector</td>
<td>15.0</td>
<td>110</td>
<td>8</td>
<td>13</td>
<td>252</td>
<td>3,326</td>
</tr>
<tr>
<td><strong>Copy Room</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Copier</td>
<td>8.6</td>
<td>1100</td>
<td>3.91</td>
<td>37</td>
<td>252</td>
<td>9,321</td>
</tr>
<tr>
<td><strong>Misc. Equipment</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ceiling Fan</td>
<td>31</td>
<td>290</td>
<td>1.5</td>
<td>13</td>
<td>252</td>
<td>3,398</td>
</tr>
</tbody>
</table>
Tenant Involvement

THE BULLITT CENTER
BUILDING ELECTRICAL USAGE

REAL-TIME ELECTRICAL USE BREAKDOWN
A: Tenant Use Breakdown
B: Building Use Breakdown

TOTAL REAL-TIME USE: 7 kiloWatt
A: Tenant Use Breakdown
B: Building Use Breakdown

CUMULATIVE ELECTRICITY USE

INCREASE FROM BASELINE TARGET

TODAY'S ELECTRICAL USE

TOTAL ELECTRICAL USE YEAR TO DATE
C: Tenant Use Breakdown
D: Building Use Breakdown

PLUMBING
LIGHTS
IT/SERVER

H Vac
PLUG LOAD
Building Performance To Date
Bullitt Center Energy
Predicted Energy Production & Consumption 2013

ENERGY (kW hrs)

PREDICTED Energy Consumption
PREDICTED Energy Production
Bullitt Center Energy

Predicted vs. Actual Energy Production & Consumption 2013

PREDICTED Energy Consumption
ACTUAL Energy Consumption
PREDICTED Energy Production
ACTUAL Energy Production

Energy (kW hrs)
Continual Commissioning
Questions?

Contact:
Allan Montpellier, PE, LEED AP BD+C
allan.montpellier@pae-engineers.com
PAE
Next Webinars

Dates to be determined.

That’s right – two webinars on
High Performance Commercial Building Technologies

Register at www.e3tnw.org/webinars

More information about emerging technologies:

E3T database: www.e3tnw.org
E3T Program: www.bpa.gov/energy/n/emerging_technology/
Conduit: www.ConduitNW.org