Who We Are
Frick Park Environmental Center
Through an integrated sustainable design process, the building has achieved an annual energy intensity of 97 kBtu/sq. ft. compared to that of a conventional lab building of 199 kBtu/sq. ft. per year.
Tracking Energy by End Use

Annual Energy Consumption
Dartmouth Life Sciences Building

- AREA LIGHTS
- HOT WATER
- VENT. FANS
- SPACE HEAT
- Heat Rejection
- Pumps & Aux.
- Space Cool

Annual Energy Consumption (MMBTU)

ASHRAE 90.1-2004 APP-G
CURRENT DESIGN (100% SCHEMATIC DESIGN)
### Energy Analysis Data

#### Tracking Energy by End Use

**ELECTRIC**

<table>
<thead>
<tr>
<th></th>
<th>Electricity for lighting</th>
<th>Electricity for ventilation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Metrics</td>
<td>Model</td>
</tr>
<tr>
<td>Design load (W/gsf)</td>
<td>0.52</td>
<td>0.86</td>
</tr>
<tr>
<td>Peak demand (W/gsf)</td>
<td>0.42</td>
<td>0.52</td>
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<tr>
<td>Peak demand (kW)</td>
<td>70.72</td>
<td>88.29</td>
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<tr>
<td>Annual consumption (kWh/yr)</td>
<td>218,153.52</td>
<td>365,400.00</td>
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<tr>
<td>Annual Use Index (kWh/gsf/yr) Goal</td>
<td>1.28</td>
<td>2.14</td>
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<tr>
<td>Annual Use Index (Site BTU/gsf/yr) Goal</td>
<td>4,378.47</td>
<td>7,300.00</td>
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<tr>
<td>Annual Use Index (kWh/gsf/yr) LABS 21</td>
<td>2.51 to 3.32</td>
<td>4.48 to 6.88</td>
</tr>
<tr>
<td>Annual Use index (Site BTU/gsf/yr) LABS 21</td>
<td>8,564.12</td>
<td>15,285.76</td>
</tr>
</tbody>
</table>
Progress of Design

Metrics

| Metric                      | Complement | Service | Building
<table>
<thead>
<tr>
<th></th>
<th></th>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Net Max Heat Flux</td>
<td>5.96</td>
<td>3.08</td>
<td>3.08</td>
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<tr>
<td>Total annual heat Flux</td>
<td>2.16</td>
<td>2.69</td>
<td>2.69</td>
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<tr>
<td>Total annual deh. Heat Flux</td>
<td>16.75</td>
<td>93.38</td>
<td>83.38</td>
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<tr>
<td>Total Annual HVAC Load</td>
<td>123.56</td>
<td>546.56</td>
<td>546.56</td>
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<tr>
<td>Total Annual HVAC Load (cool)</td>
<td>4.04</td>
<td>2.14</td>
<td>2.14</td>
</tr>
<tr>
<td>Total Annual HVAC Load (heat)</td>
<td>1.00</td>
<td>2.50</td>
<td>2.50</td>
</tr>
<tr>
<td>Total HVAC Load (cool)</td>
<td>123.56</td>
<td>546.56</td>
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<td>2.14</td>
<td>2.14</td>
</tr>
</tbody>
</table>

MEP Design Decisions

Energy Analysis

atelier ten
Progress of Design

Annual Site Energy
Dartmouth Life Sciences

ASHRAE 90.1-2004 - Baseline Design
Proposed Design

97kBTU/sqft
280kWh/sqm

44.6%
Environmental Concept
Carbon Footprinting
Biomass Energy

Energy Consumption for Cooling Generation

- Electricity from Biomass CHP: 94%
- Electricity from PV: 3%
- Solar Thermal: 3%
Carbon Emissions

Gardens By The Bay
Annual Carbon Evaluation

Annual Carbon Consumption Or Offset
[kg CO₂ / Year]

Power Generation

2,050 tons CO₂

Power Consumption

1,770 tons CO₂

Excess
280 tons CO₂

Total Cooling Power

Outlet Water Pumps
Desiccant Cooling Tower
Desiccant Regen. Fans
Chilled Water Pumps
Heat Rejection Pumps
Electric Generators

atelier ten
Tufts University Science and Engineering Complex
Payette

- New building attachment to Anderson Hall
- Integrated teaching and research center featuring state-of-the-art laboratories
- The facility will be a model for sustainability standards for mechanical, electrical and plumbing systems
- Anticipated exemplary performance for optimizing exemplary performance

LOCATION: MEDFORD, MASSACHUSETTS
AREA: 70,000 SQ FT (4 STORIES)
LEED NC GOLD TARGET
Tufts University Science and Engineering Complex
Schematic Design Daylighting

• The target illuminance on the work surface should be 300-400 lux
• Fin and Plank design perform relatively the same with respect to controlling illuminance into the office spaces
Tufts University Science and Engineering Complex

ANNUAL UTILITY COST
6646 TUFTS UNIVERSITY SCIENCE AND ENGINEERING CENTER

- Yellow: Electricity
- Red: Natural Gas

54.4%

ASHRAE 90.1-2007 Baseline Design
Proposed Design
Tufts University Science and Engineering Complex