Integrated Design Building
Amherst, MA
Leers Weinzapfel Associates
Integrated Design Strategies

- Energy-efficient luminaries with occupancy/vacancy sensors
- Daylight responsive controls with user control
- Low-emitting materials
- Lighting and thermal controls
- Views to courtyard
- Exposed FSC-certified timber structure
- Intensive/extensive green roof with native species
- Skylight provides views and daylight access

- High performance glazing with exterior shades
- Views and daylight access
- Radiant floor heating

- "PV ready" for future
- Low-flow water-conserving fixtures
- Energy-efficient equipment:
  - High performance HVAC systems with energy recovery
  - Controls and submetering
  - Demand controlled ventilation
  - Chilled beams

- Perimeter heat for thermal control
- Bicycle racks
- Local stone hardscape
- Native species
- Bioswales
- LED site lighting
Energy Distribution

Central Plant

- Grid Electricity
- Natural Gas

Energy Use Meter

- Electricity
- Hot Water
- Cold Water

IDB

Alternate: PV Array on IDB Roof

Source Energy Profile

Site Energy Profile
60% CD Energy Model Results
LEED Modeling Methodology

ANNUAL UTILITY COST
7006 UMASS INTEGRATED DESIGN BUILDING

CD Model:

For LEED, when connected to a District Thermal Energy plant, modeling methodology Option 2 demonstrates cost savings and accounts for Central Plant efficiencies.
Site Energy Consumption accounts for metered chilled water and steam energy for building operators to compare actual building energy against the predicted energy consumption (good for M&V purposes).

These are fundamentally not apples-to-apples.

(this is the correct modeling methodology for LEED, but not a true picture of site energy consumption; it doesn’t account for the efficiency of energy generation)
60% CD Energy Model Results
Adjusted Methodology

Adjusted Graph:  EUI 40.3 kBtu/sf/yr
Baseline  EUI: 65.7 kBtu/sf/yr

Site Energy Consumption, adjusted from Steam & Chilled Water (Mbtu) to **Electricity & Natural Gas** (kWh), accounts for the efficiency of energy generation at Central Plant.

This is a better, apples-to-apples comparison.

Assumes LEED minimum (conservative!) central plant efficiencies:

- Boiler Plant efficiency: 70%
- Chilled Water COP: 4.4
60% CD Energy Model Results
Adjusted Methodology

SITE ENERGY USE CHARACTERIZATION
7006 IDB - PROPOSED BUILDING

Key Components, Proportional breakdown:

- Wall Conduction
- Roof Conduction
- Window Conduction
- Outdoor Air Heating
- Window Solar
- Light Gains
60% CD Energy Model Results
Adjusted Methodology

Load Component Breakdown

Increase in energy savings over Baseline:

- Wall Conduction: 49%
- Roof Conduction: 61%
- Window Conduction: 22%
- Outdoor Air Heating: 74%
- Window Solar: 46%
- Light Gains: 47%
Challenges, but Realities

Climate
• Zone 5, energy-intensive climate. Heating-dominated: window conduction is a primary energy driver for any building in this climate.

Orientation & Site Footprint
• Corresponds to (restricted by) North Pleasant Avenue & Arts building.

Occupancy Schedules
• Building is occupied ~ 16 hours/day & weekend occupancy.
No Glazing in Courtyard
Adjusted Methodology, Sensitivity Test

ANNUAL SITE ENERGY CONSUMPTION
7006 UMASS INTEGRATED DESIGN BUILDING

Proposed Design

(EUI 40.3 kBtu/sf/yr)

No Glazing at Courtyard
1.3% better

(EUI 39.4 kBtu/sf/yr)
No Glazing at “Tube Ends”
Adjusted Methodology, Sensitivity Test

**ANNUAL SITE ENERGY CONSUMPTION**
7006 UMASS INTEGRATED DESIGN BUILDING

<table>
<thead>
<tr>
<th>Proposed Design</th>
<th>No Glazing at “Tube Ends”</th>
</tr>
</thead>
<tbody>
<tr>
<td>(EUI 40.3 kBtu/sf/yr)</td>
<td>1.5% better (EUI 39.3 kBtu/sf/yr)</td>
</tr>
</tbody>
</table>
Daylight Visualizations
Exterior Courtyard

Equinox 7am
Daylight Visualizations
Exterior Courtyard

Equinox 8am
Daylight Visualizations
Exterior Courtyard

Equinox 9am
Daylight Visualizations
Exterior Courtyard

Equinox 10am
Daylight Visualizations
Exterior Courtyard

Equinox 11am
Daylight Visualizations
Exterior Courtyard

Equinox 12pm
Daylight Visualizations
Exterior Courtyard

Equinox 1pm
Daylight Visualizations
Exterior Courtyard

Equinox 2pm
Daylight Visualizations
Exterior Courtyard

Equinox 3pm
Daylight Visualizations
Exterior Courtyard

Equinox 4pm
Daylight Visualizations
Exterior Courtyard

Equinox 5pm
Daylight Visualizations
Exterior Courtyard

Equinox 6pm
Daylight Visualizations
Third Floor Corridor

Equinox 7am
Daylight Visualizations
Third Floor Corridor

Equinox 8am
Daylight Visualizations
Third Floor Corridor

Equinox 9am
Daylight Visualizations
Third Floor Corridor

Equinox 10am
Daylight Visualizations
Third Floor Corridor

Equinox 11am
Daylight Visualizations
Third Floor Corridor

Equinox 12pm
Daylight Visualizations
Third Floor Corridor

Equinox 1pm
Daylight Visualizations
Third Floor Corridor

Equinox 2pm
Daylight Visualizations
Third Floor Corridor

Equinox 3pm
Daylight Visualizations

Equinox 4pm
Daylight Visualizations
Third Floor Corridor

Equinox 5pm
Daylight Visualizations
Third Floor Corridor

Equinox 6pm
Daylight Visualizations
South & West Facades

Equinox 7am
Daylight Visualizations
South & West Facades

Equinox 8am
Daylight Visualizations
South & West Facades

Equinox 9am
Daylight Visualizations
South & West Facades

Equinox 10am
Daylight Visualizations
South & West Facades

Equinox 11am
Daylight Visualizations
South & West Facades

Equinox 12pm
Daylight Visualizations
South & West Facades

Equinox 1pm
Daylight Visualizations
South & West Facades

Equinox 2pm
Daylight Visualizations
South & West Facades

Equinox 3pm
Daylight Visualizations
South & West Facades

Equinox 4pm
Daylight Visualizations
South & West Facades

Equinox 5pm
Daylight Visualizations
South & West Facades