DEMONSTRATED LEADERSHIP IN ELECTRIFICATION DESIGN
2019 NESEA BuildingEnergy NYC
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LEGACY

Demonstrated Leadership in Electrification Design
NEW YORK CITY: LOCAL LAW 97

BR+A’s commitment to sustainability precedes the creation of LL97

5+ years of experience in ZNE design

80 x 50
80% carbon reduction by 2050

2024-2029 limits will affect the 20% most carbon-intensive buildings

2030-2034 limits will affect the 75% most carbon-intensive buildings
WHY ELECTRIFICATION?

Campuses, cities and countries are targeting carbon neutrality

Net zero codes and existing building energy regulations are going into effect

Clients are asking us ‘how do we cost effectively achieve these goals?’
FLEXIBILITY

We offer flexible solutions that adapt to your project and your budget.

Our focus is on the Triple Bottom Line:

**Profit:** The traditional measure of corporate profit

**People:** Measures how socially responsible an organization has been throughout its operations

**Planet:** How environmentally responsible a firm has been

Designs range from least cost buildings to world-class innovations

1Investopedia; Triple Bottom Line (TBL)
BEST IN CLASS ENGINEERING

13 Offices
40+ Years
400+ Employees
1000+ Successful projects

BR+A is leading the industry, with millions of square feet of net zero buildings in operation, construction and design.
WHAT IS NET ZERO?

A Net Zero building generates as much renewable energy as it consumes, on an annual basis.

There are four metrics to measure energy performance: site, source, cost, and carbon.

Four classes of net zero: A, B, C, and D.
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ZNE METRICS

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ZNE BUILDINGS BY TYPE

- Education: 37%
- Office: 19%
- Multifamily: 16%
- Other: 14%
- Public Assembly: 8%
- Mercantile: 2%
- Public Order and Safety: 2%
- Warehouse and Storage: 1%

Education Breakdown:

- K-12 School: 50%
- Higher Education: 35%
- General Education: 15%

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BUILDING SIZE BY ZNE STATUS

<table>
<thead>
<tr>
<th>Size Group</th>
<th>ZE - Verified</th>
<th>ZE - Emerging</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 - 5k sf</td>
<td>31%</td>
<td>12%</td>
</tr>
<tr>
<td>5k - 10k sf</td>
<td>25%</td>
<td>21%</td>
</tr>
<tr>
<td>10k - 25k sf</td>
<td>25%</td>
<td>17%</td>
</tr>
<tr>
<td>25k - 50k sf</td>
<td>4%</td>
<td>9%</td>
</tr>
<tr>
<td>50k - 100k sf</td>
<td>12%</td>
<td>17%</td>
</tr>
<tr>
<td>Over 100k sf</td>
<td>1%</td>
<td>18%</td>
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</tbody>
</table>

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ZNE CODES

NATIONAL
IECC 2021
ZNE Appendix (residential)
IECC 2030 / ASHRAE 90.1-2031 = Approaching ZNE

CALIFORNIA
Title 24-2019
(residential ZNE)
Zero Code
(commercial proposed)

MASSACHUSETTS
Net Zero Carbon Stretch Code
Start 2022??
Fully implemented 2030??
Boston + Cambridge
ZNE zoning regulations
being developed

WASHINGTON DC
Appendix Z
(voluntary compliance path)

- No statewide code or home rule
- Less energy efficient than 90.1-2007
- IECC 90.1-2007 or equivalent
- Between IECC 90.1-2007 and 90.1-2010
- IECC 90.1-2010 or equivalent
- Between IECC 90.1-2010 and 90.1-2013
- IECC 90.1-2013 or equivalent
- IECC 90.1-2013 or better
EXISTING BUILDINGS

California
Goal to achieve ZNE for 50% of existing buildings

Massachusetts
Boston + Cambridge
ZNE zoning regulations being developed

New York
New York City
Local Law 97 (2024/2030 CO₂ Limits)

Washington DC
Carbon Neutral by 2050
ZNE: S, M, L, XL

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SMALL: Harvard University, ARTLAB

*Triple Glazing*
*Solar Array*
*VRF Fan Coil Units*
MEDIUM: Bristol Community College, John J. Sbrega Health & Science Building

Net Zero
Only 1% Construction Cost
Premium
First verified zero net energy lab in the U.S.
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HIGH PERFORMANCE

- Chiller: (2) at 160 tons each
- Boiler: (2) at 3,750 MSH each
- Electrical Transformer: 1,000 kVA
- 70,000 cfm peak exhaust rate
- (2) AHUs with Run-Around Loop Heat Recovery and (1) AHU with Enthalpy Wheel Energy Recovery
- (3) Air Handling Units with 70,000 cfm total capacity
- Lighting: 1 W/sf
- Plug-Loads: 6-8 W/sf
- 1 cfm/sf minimum
- 72-74°F
- Air from AHU is used for cooling
- (2) Ducted Fume Hoods

ZERO NET ENERGY

- 28,000 cfm peak exhaust rate
- 20,000 cfm total capacity
- Ground Source Heat Pumps (2) at 50 tons each (1) at 30 tons
- Electrical Transformer: 1,000 kVA
- Enthalpy Wheel Energy Recovery
- Air Quality Monitoring
- (2) Air Handling Units with 20,000 cfm total capacity
- Natural Ventilation in non-lab areas
- Lighting: 0.6 W/sf
- Plug-Loads: 5 W/sf
- 68-76°F
- Fan-Draft Units provide Supplemental Cooling
- (1) Ducted Fume Hoods
- Air Source Heat Pumps (2) at 66 tons each
- (1) Filtered Fume Hoods
- (28) 50' Deep Closed-Loop Wells
- 0.87 cfm/sf occupied
- 0.33 cfm/sf unoccupied

BRA
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LARGE: Chelsea Soldiers’ Home, Community Living Center

250,000 SF Healthcare Facility

Provides housing and care for veterans

145 closed loop geothermal wells 500 ft deep

Triple Glazing

0.5MW Solar Array
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EXTRA LARGE: Boston University, Data Science Center

350,000 SF
Solar Array
DOAS AHUs (Dual Wheel)
Fan Powered Boxes + Chilled Beams
Triple Glazed + Fixed Exterior Shades
Electric Boilers (Peak + Back-up)
Heat Pump VFD Scroll + Screw Chillers w/ Buffer Tanks
Geothermal
100% ELECTRIC
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**Total Energy Wheel:** humidity & temperature transferred to exhaust airstream

- 81°F, 17 lb/lb, 75%
- 68°F, 11 lb/lb, 76%
- 75°F, 9 lb/lb, 50%

**Passive Desiccant Wheel:** humidity transferred to exhaust airstream, temp transferred to supply airstream

- Outdoor Air: 85°F, 19 lb/lb, 73%
- Exhaust Air: 74°F, 13 lb/lb, 74%
- Return Air: 55°F, 9 lb/lb, 96%
- Supply Air: 65°F, 7 lb/lb, 55%
THANK YOU!

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