

Brentwood Apartments |
Edmonton, Alberta, Canada
Photo: David Dodge

Zero Energy is Feasible for All Building Types and Climates

Zero energy (ZE) buildings can be found across a wide range of building types. In the early days, most ZE projects were smaller education and office buildings. Today, ZE building types include hospitals, restaurants, and even a ski resort.

Zero energy buildings transcend climate zones, with projects occurring in 44 U.S. states and four Canadian provinces. By focusing on super-tight, well-insulated envelopes, passive systems, and careful operations, ZE buildings are achieving success in all climate zones, including the lower 48's coldest and most extreme climate zone (CZ 7).

ZE Buildings Are in Line With Other Green Buildings

Added costs for zero energy have fallen dramatically. In new construction projects, added costs for ZE have dropped from roughly 20% of the project budget to 0% to 5% in the last 10 years depending on



market and building types. There are dozens of very detailed case studies of ZE buildings, including many that were able to deliver a ZE building at no additional cost.¹

ZE Buildings Are the Market's Best Energy Performers

Nearly all zero energy project teams take an efficiency-first approach and deliver high performance, super-efficient buildings. Across the United States and Canada, ZE buildings typically consume less than half the energy of their peers, with site energy use intensity (EUI) typically in the range of 15-30 kBtu per square foot per year (kBtu/sf/yr).

¹ PG&E Case Studies pge.com/en_US/residential/save-energy-money/savings-programs/zero-net-energy-program/zero-net-energy-program.page

The Benefits of ZE Investments Go Way Beyond Energy

Lenders are increasingly rewarding development projects with attractive debt terms. A [2018 study](#) conducted by Stok found that the 10-year net present benefit from deep green buildings was about \$24,000. Developers and owners have consistently found that ZE buildings command higher rents, enhance tenant retention, reduce risk, and improve the bottom line in a competitive market.

ZE buildings are more resilient than conventional buildings due to high-performance envelopes, daylighting systems, natural ventilation, and other passive features. Zero energy buildings can often be occupied even if the power goes out and the energy generation systems remains functional. Operating a business during a power outage provides a competitive edge beyond compare.

KEY STRATEGIES TO DESIGNING, BUILDING, AND OPERATING A ZE BUILDING

1

MAKE A ZE COMMITMENT

Establish ZE as a key project objective and ensure that this goal is explicit in all project documents (RFQs and RFPs).

2

INTEGRATE THE DESIGN PROCESS

A successful ZE outcome requires a design team that is committed to the fundamentals of the integrated design process before design starts.

3

SET PERFORMANCE TARGETS

A ZE building necessitates the establishment of performance targets and requirements through every phase of the design process in order to verify the impact of key design decisions.

4

SIGNIFICANTLY REDUCE LOADS

The most critical factor in creating a ZE building is the maximum reduction of all building loads through the use of passive design strategies and highly efficient technologies.

5

OPTIMIZE OPERATIONS AND MEASURE RESULTS

Ensure low-energy building operation by implementing monitoring and verification strategies, management of plug loads, and engaging tenants in energy-efficient behavior through the use of tenant guidelines, green purchasing policies (e.g., for appliances), and/or green leases. The increased attention to operations requires a sustained focus and building management staff expertise, but it is a critical aspect of achieving ZE performance.



Denis Hayes, President and CEO of the Bullitt Foundation in front of its ZE headquarters in Seattle, WA Photo: Seattle Magazine

PROJECT PROFILE

BULLITT CENTER

SEATTLE, WA

The Bullitt Center is a six-story, 50,000-square-foot building in Seattle, Washington, that serves as a new model for the way urban buildings are designed, built, and operated. The rooftop solar panels generate more energy than the building uses. Rainwater is captured and wastewater is treated on-site, making the project zero water as well as zero energy.

- Energy efficiency 83% greater than a typical Seattle office building
- 242 kW photovoltaic array
- Ground-source geothermal heat exchange system
- Radiant floor heating and cooling system
- Retractable external blinds to block heat before it can warm the building

MEASURED ENERGY PERFORMANCE:

SITE ENERGY USE

9.7 kBtu/sf/yr

RENEWABLE GENERATION

16.6 kBtu/sf/yr

NET EUI

-6.9 kBtu/sf/yr

RESOURCES

To access NBI's collection of ZE resources, including case studies, research, and tools and guides for getting your project to ZE, visit gettingtozeroforum.org.



New Buildings Institute (NBI) is a nonprofit organization driving better energy performance in commercial buildings. We work collaboratively with industry market players—governments, utilities, energy efficiency advocates and building professionals—to promote advanced design practices, innovative technologies, public policies and programs that improve energy efficiency. We also develop and offer guidance and tools to support the design and construction of energy efficient buildings.

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