



Integra X Builders (IXB)

Decarbonization in Chicago High-Rise Multifamily Construction

410 N. Elizabeth Street | 33-Story, 372,716 SF Multifamily Tower | Chicago, IL

An aerial photograph of the Chicago skyline, showing a dense urban landscape with numerous skyscrapers and lower-rise buildings. The image is overlaid with a semi-transparent dark grey layer, which serves as a background for the text. The text is in white and teal colors, providing high contrast against the dark background. The overall tone is professional and informative.

THE CHALLENGE

Chicago Is a Heating-Dominant Climate and Electrification Alone Doesn't Address Decarbonization

ASHRAE Climate Zone 5A. Conventional Chicago high-rises burn gas for heat and hot water, run cooling towers, and post an EUI in the low-to-mid 30s. Swapping gas boilers for electric resistance raises utility costs and merely shifts emissions it doesn't cut them.

THE STRATEGY

Three Systems, Engineered as One

A convergence of performance-based technologies, sized and sequenced together rather than specified in isolation.



Geothermal Exchange

65-bore vertical ground loop (850 ft each) serving 100% of heating, cooling, DHW, and pool loads at a seasonal heating COP of 4.7.



Triple-Glazed Envelope

Directionally optimized SHGC (0.25 south / 0.35 north) at U-0.28 assembly — a 50.6% window-to-wall ratio with no thermal compromise.



Electrified Plant + Recovery

Fully electric heat-pump mechanical plant with exhaust-air thermal recovery supplying ~12% of annual GLHX heating load.

Geothermal at Scale

The maximum bore count the site could accommodate; sized with 10-year hourly simulation for long-term ground temperature stability.

65

BORES, 850 FT EACH

10.5 mi

TOTAL BORE LENGTH

4.7

SEASONAL HEATING COP

88%

OF HEATING LOAD SERVED BY GEO



Exhaust-Air Thermal Recovery

MAUs handling 34,675 CFM supply / 30,875 CFM exhaust recover waste heat into the condenser water loop before it's lost.

1,089,177

kBtu/yr recovered — ~12% of total GLHX heating load

The Envelope as a Thermal Asset

At 50.6% window-to-wall ratio, triple glazing with directional SHGC reduces the heating load by 19% for a 4% increase in cooling load.

Metric	Double IGU (Basis of Design)	Triple Glazing (Proposed)
Assembly U-Value	U-0.347	U-0.280
SHGC (South / N,E,W)	0.25 uniform	0.25 / 0.35 directional
Annual Space Heating	3,203,698 kBtu	2,600,495 kBtu (-19%)
Annual Space Cooling	4,334,769 kBtu	4,488,703 kBtu (+4%)
Building EUI	17.6 kBtu/sf-yr	17.0 kBtu/sf-yr

PERFORMANCE ANALYSIS

410 N. Elizabeth to Market Baseline

17.0

EUI (KBTU/SF-YR)

vs. 34.3 market baseline

50%

TOTAL ENERGY REDUCTION

12.78M → 6.34M kBtu/yr

\$82,926

ANNUAL UTILITY SAVINGS

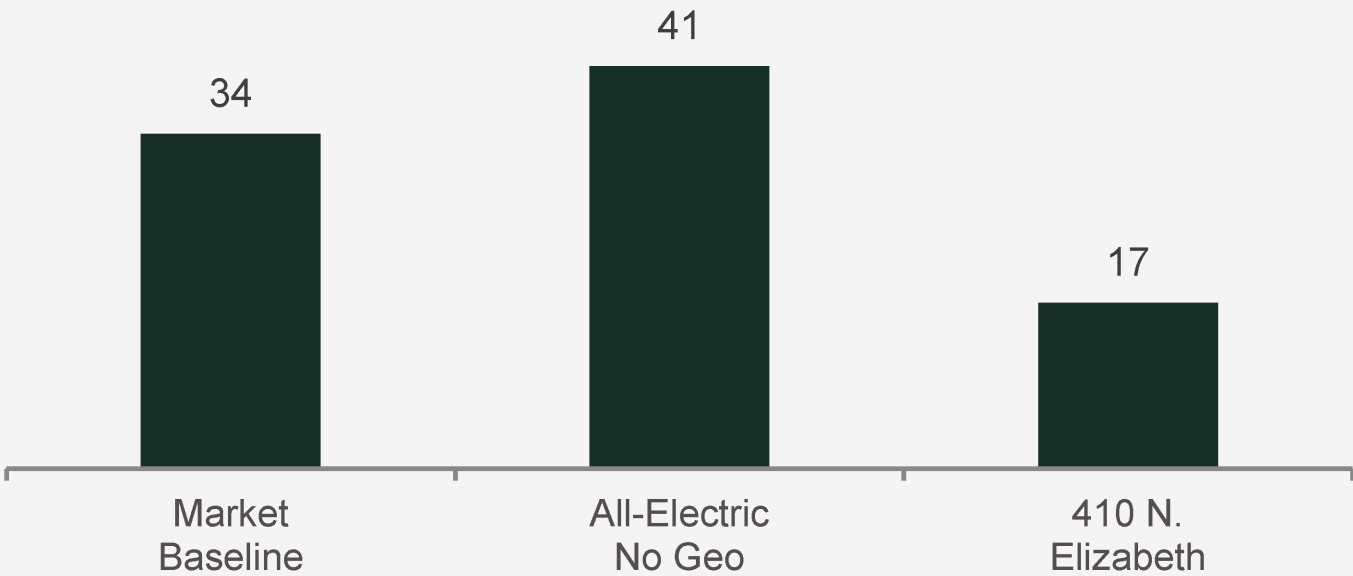
\$303,898 vs. \$386,824/yr

887 MT

CO₂E PER YEAR

45% below all-electric baseline

EUI: Market vs. Proposed (kBtu/sf-yr)

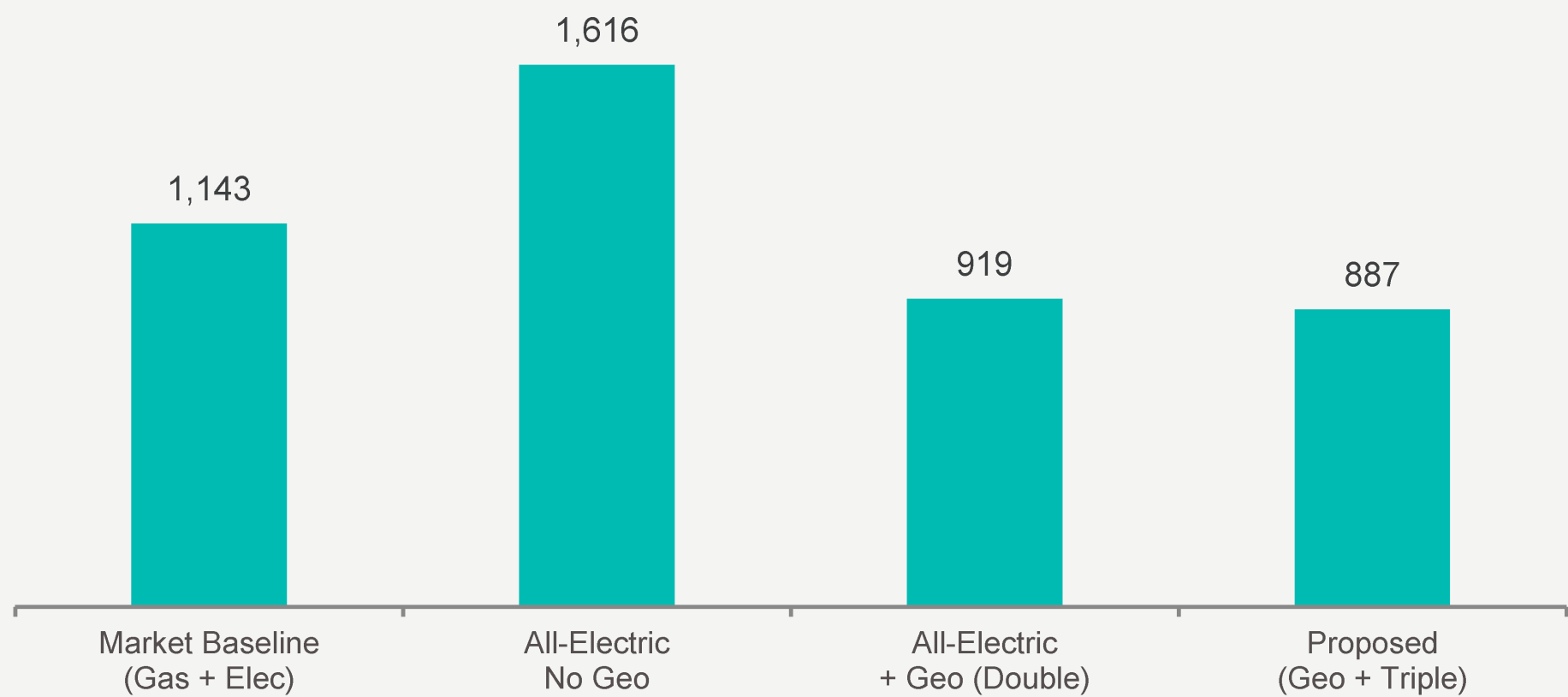


Carbon insight: an all-electric design without geothermal (41.2 EUI proxy) can emit MORE CO₂e than gas baseline; geothermal is what makes full electrification carbon-positive.

Ahead of Chicago's Regulatory Curve

Chicago's Building Energy Performance Standard (CBEPS) tightens through 2030. By eliminating on-site combustion, 410 N. Elizabeth's carbon footprint is tied only to the ComEd grid which FEJA and CEJA mandate reach 100% clean energy by 2045.

Annual CO₂e by Design Scenario (metric tons)



IRA Geothermal Tax Incentives

The system is expected to qualify under IRA Section 48A, which requires GLHX serve at least 50% of combined heating and cooling loads — met even under the most conservative load accounting.

Meaningfully improved project economics — final qualification confirmed with tax counsel during CDs.

CONCLUSION

The Future of Chicago Multifamily

410 N. Elizabeth is a market-rate tower, not a demonstration project. Every system is commercially available, modeled against real site data, and confirmed in the field.

17.0

EUI KBTU/SF-YR

887 MT

CO₂E / YR

\$303,898

ANNUAL UTILITY COST

45%

CARBON REDUCTION VS. BASELINE