

Validating Net Zero Performance Through Energy Modeling

This case study highlights how energy modeling helped validate net zero building performance for a funding requirement while operational data was still being collected. Through predictive modeling and technical documentation, Emerald Built Environments provided the confidence needed to support funding submissions and verify long-term performance goals.

BACKGROUND INFORMATION

■ Client Overview

United Way of Long Island is committed to strengthening communities through programs and facilities that deliver long-term social, economic, and environmental benefits. As part of a renovation project focused on sustainability and operational performance, the organization pursued grant funding that required validation of net zero energy performance.

■ Project Overview

Located in Deer Park, New York, the existing 31,000-square-foot facility recently underwent a renovation and includes office space, leased tenant space, and classroom facilities. To support grant funding requirements for net zero energy buildings, Emerald Built Environments developed an as-built whole-building energy model to benchmark building performance and validate anticipated energy outcomes.

The model evaluated building energy consumption, renewable energy generation, utility costs, and greenhouse gas emissions, providing the documentation needed to support funding applications and demonstrate a pathway toward net zero energy performance.

CHALLENGES

■ Key Challenges

The project required the team to validate net zero energy performance before complete operational data had been collected. Funding requirements demanded clear, defensible documentation demonstrating that projected renewable energy generation would offset annual building energy consumption.

The analysis also needed to provide stakeholders with confidence that modeled performance would align with actual building operations over time.

■ Client Goals

The primary goals were to:

- 1 VALIDATE** anticipated net zero building performance
- 2 SUPPORT** funding and reporting requirements
- 3 QUANTIFY** energy, cost, and emissions impacts
- 4 PROVIDE** reviewer-ready documentation
- 5 ESTABLISH** confidence in long-term operational performance



STRATEGIES RECOMMENDED

■ Strategies Implemented

Emerald developed a comprehensive whole-building energy model that evaluated building energy consumption, renewable energy production, utility costs, and greenhouse gas emissions.

The model incorporated projected operating conditions and renewable energy generation to estimate annual building performance and support required reporting metrics.

■ Innovative Approaches

The modeling process provided net zero validation while additional operational data was still being collected. This allowed the project team to move forward with funding documentation and stakeholder reporting without delaying project progress.

Emerald also translated technical modeling outputs into clear, structured documentation suitable for review and approval.



OUTCOMES

■ Results Achieved

The modeling effort successfully demonstrated projected net zero building performance and provided the documentation necessary to support funding requirements.

Performance outcomes included:

0.25 MW Installed renewable energy capacity

239 MWh Projected annual energy savings with solar integration

846 MMBtu Approximate annual natural gas savings

>\$56,000 Projected annual energy cost savings

141 Approximate metric tons of CO₂e reduced annually with renewable generation considered

\$4,480 Net positive operational performance later supported through utility data, including a reported \$4,480 utility credit after the first year of operation

■ Impact on Operations

The model provided a reliable framework for validating expected building performance and supporting stakeholder confidence in the project's sustainability goals.

■ Environmental Benefits

The completed facility later demonstrated operational performance consistent with the modeling assumptions, including net positive energy generation and a reported utility credit of approximately \$4,480 after the first year of operation.

CONCLUSION

This project demonstrates how energy modeling can provide a powerful foundation for validating ambitious sustainability goals. By combining technical expertise with clear documentation and performance analysis, Emerald Built Environments helped United Way of Long Island confidently support funding requirements and verify a pathway toward net zero performance.