

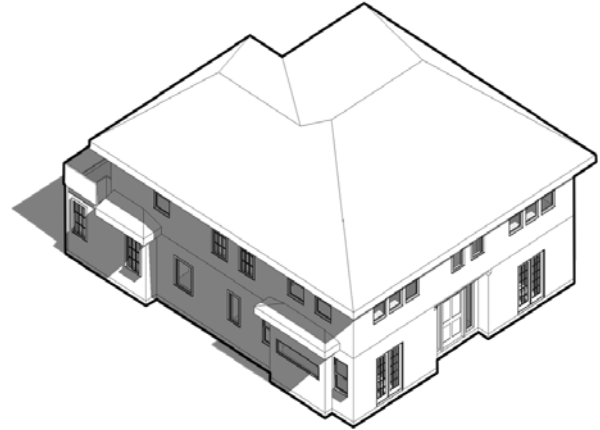


U.C. BERKELEY: NEGAWATT

THE SERRANO HOUSE

Project Summary

The Serrano House is a refurbishment of a historic single family dwelling in Los Angeles, CA, into a multi family scheme. This project gives opportunity to both increase density and conduct a deep energy retrofit (DER) that aims for zero net energy (ZNE). This aim is accomplished in two steps: (1) demand reductions using passive and semi-passive strategies; and (2) on-site renewable energy generation by deploying photovoltaic (PV) panels. In summary, this project demonstrates that it is possible to achieve ZNE cost-effectively even with minimal intervention required of historic buildings.



Relevance of Project to the Goals of the Competition

This project addresses the main goals of the competition – a meaningful, affordable, and market ready ZNE housing design. In addition, it addresses the need that retrofitting our existing housing stock and increasing density are also ways to operationalize high-performance housing. The proposed design will demonstrate how retrofitting housing to ZNE performance can be approached using passive and semi-passive strategies.

Design Strategy and Key Points

- (1) Passive and semi-passive demand reduction strategies used:
 - a. Improve envelope insulation and infiltration rates to minimize demands;
 - b. Reduce infiltration rates to better control energy loss;
 - c. Add thermal mass for night-flushing to minimize cooling demands;
 - d. Use daylight to mitigate lighting energy consumption;
 - e. Use light emitting diodes (LED) to minimize lighting energy consumption;
 - f. and use lower-energy heaters and Energy Star Haiku fans.
- (2) PV panels were deployed on the southern roof plane to meet all building energy demands

Project Data

- o **LOCATION:** Los Angeles, CA (Koreatown District)
- o **CLIMATE ZONE:** ASHRAE Zone 03B / California Zone 09
- o **TOTAL AREA:** 3,421 ft²
- o **# of BEDROOMS, BATHROOMS, and STORIES:** 3 units Total,
 - (1) 2 bedroom and 2 bathroom + (2) 1 bedroom and 1 bathroom
- o **HERS SCORE:** 0 (Inferred)
- o **ESTIMATED MONTHLY ENERGY COSTS:** \$0 per ft² | \$0 (with PV)

Technical Specifications

- o **WALL INSULATION:** R= 18.27 h·ft²·°F/Btu | U-factor= 0.057 Btu/h·ft²·°F
- o **FOUNDATION INSULATION:** R= 19.49 h·ft²·°F/Btu | U-factor= 0.052 Btu/h·ft²·°F
- o **ROOF INSULATION:** R= 33.79 h·ft²·°F/Btu | U-factor= 0.03 Btu/h·ft²·°F
- o **WINDOW SPECIFICATION:** U-Factor = 0.15 Btu/h·ft²·°F | SHGC= 0.376 | VT= 0.68
- o **HVAC SPECIFICATION:** None