

PV+ LOFT

This prototypical house has the potential to be a "zero energy" or "energy plus" home. The design typology is based on both the classic New England barn and the New York loft. The footprint of the building is 24 by 42 feet, providing a compact yet spacious 2,000sf house.

This barn-like structure is very flexible; its open plan allows for a wide range of plan interpretations. Core services are located on the north wall and can be expanded so as to allow the kitchen or master bath to be enlarged.

Ventilation

The roof uses an inverted scissor truss. The angles are determined in part by optimal solar orientation, and in part to allow air to flow through the house – encouraging natural ventilation. The tall spaces created by the scissor truss can be closed off through a series of insulated panels during the cold months and evenings. Conversely, in the hot season, louvers on the north side are opened up to encourage air flow. Furthermore, air ducts run along the length of the stair bringing colder air from the basement to the upper floors. These air ducts can also be closed as needed.

Passive Solar / Daylighting Strategies

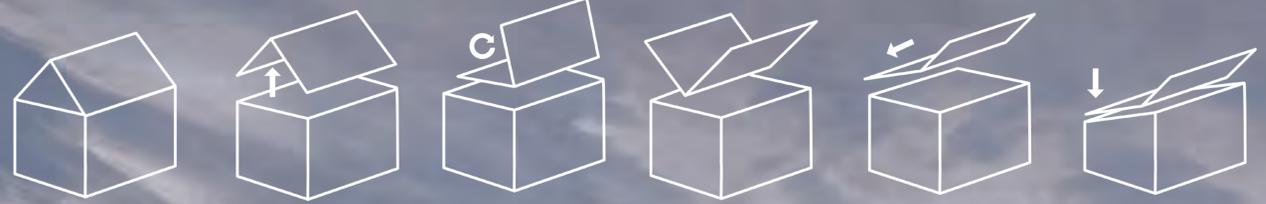
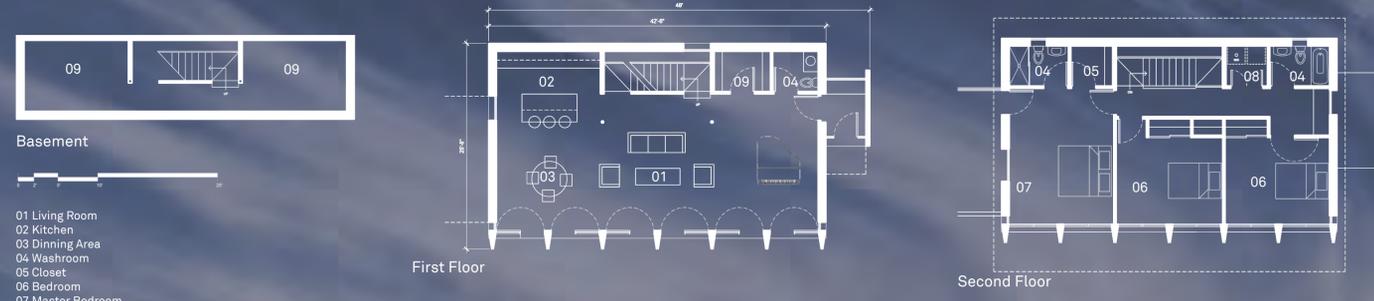
The overhangs and opening on the southern façade work together to minimize summer solar heat gain, and maximize winter sun penetration. The house is sited with deciduous trees immediately to the west, blocking the summer sun while allowing the winter light to pass through. The finishes and materials of work together to harvest additional indirect daylight. A large patio with light colored stone bounces light upward towards the underside of the south-facing eave. The underside of the eave is a reflective surface which redirects the natural daylight, but not the heat, into the south facing living space. In addition, triangular vertical fins are clad in a reflective surface. These vertical fins also unfold creating a shutter system which provides additional insulation or shade.

Active Solar / Construction Strategies

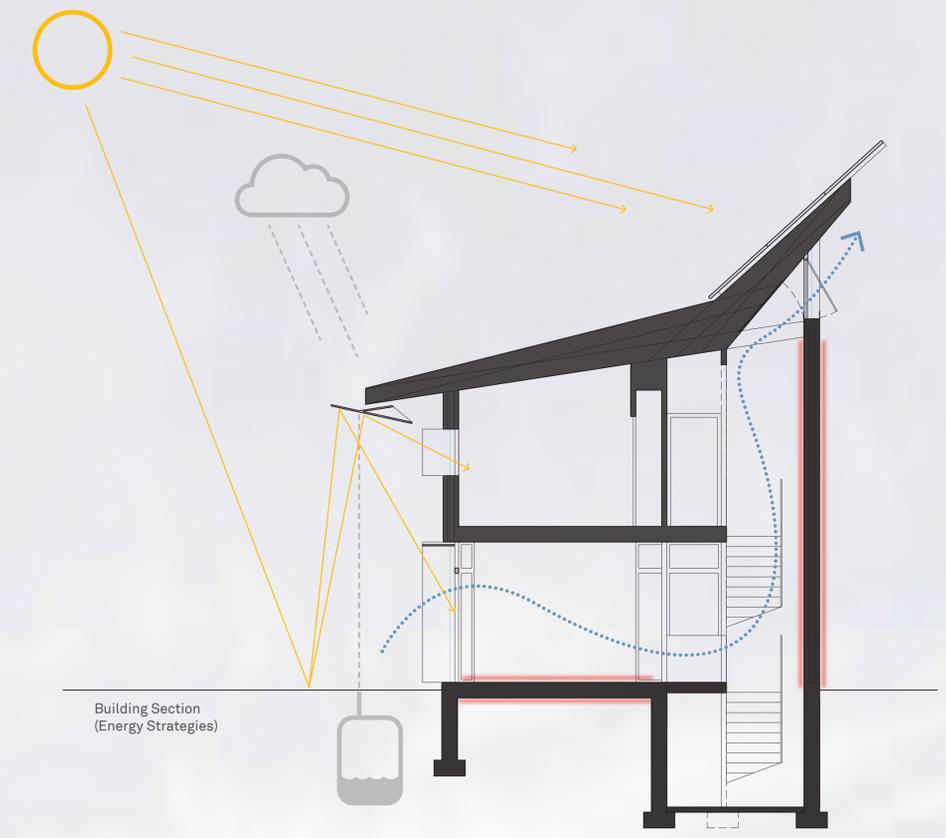
The walls are super-insulated, built with two rows of two-by-four studs separated by five inches of air space for a total sectional depth of 12 inches. The glass is triple-glazed. A twelve inch thick concrete slab serves as thermal mass for the southern half of the ground floor. The mass will gain heat through direct sunlight throughout the day, releasing the heat into the space on winter nights, or being flushed through open windows on cooler summer nights. The northern half of the home provides a small basement for mechanical systems, storage and harvesting of cool air. Roof water drains into cisterns and the driveway and other paved surfaces are semi-porous. The PV panel array is 735 square feet with each panel producing 240 megawatts.

The proposal is meant to be easy to build, highly flexible, and intended to meet the needs of a variety of family types while limiting the impact on resources and the landscape.

- 01 Living Room
- 02 Kitchen
- 03 Dining Area
- 04 Washroom
- 05 Closet
- 06 Bedroom
- 07 Master Bedroom
- 08 Laundry Room
- 09 Mechanical / Storage



Design Concept



- Photovoltaic Panels
- Rainwater Collection
- Sun Shading
- Natural Ventilation
- Concrete Floor Thermal Mass
- 12" Thick Exterior Walls

