



Cal Poly's goal is to create a beautifully concise home tuned to the climate, detailed for modern living, proportioned and sized to travel across the country pulled by a single truck; to reduce our household's footprint on the land and make the most effective use of space and resources. Simple. Fundamental. Elegant.

Indoor Air Quality

Comprehensive Assessment

The house is designed to link the indoor and outdoor spaces as a means to achieving occupant comfort. Large glazed areas are used to maintain a visual connection with the outside and provide daylighting whenever possible. Every space in the house has an operable window and it is intended that the primary means to maintain indoor air quality should be to open a window. During the summer and winter months when the outdoor environment is too hot or cold or so humid that natural ventilation is uncomfortable or energy inefficient, mechanical ventilation is possible. An energy recovery ventilator (ERV) unit is used to minimize the heating and cooling loads associated with introducing outdoor air into the house. The ERV transfers both sensible and latent heat between the intake and exhaust air streams, thereby reducing heating and cooling requirements.

Since uncontrolled airflow through the building envelope is undesirable, best practices were followed during the construction of the house to minimize infiltration. Caulking and other sealants were used between building envelope components and between the envelope and any penetrations. Due to the tight construction of the house, infiltration cannot be relied upon to maintain adequate indoor air quality and mechanical ventilation is necessary.

A CO₂ sensor is located near the house thermostat and the ERV is automatically controlled based on CO₂ levels in the space. Although high levels of CO₂ itself are not harmful, concentrations of CO₂ are correlated with human bioeffluents and odors, which makes CO₂ a good indicator of indoor air quality. There is also a manual override so that the occupant has control over the mechanical ventilation.

During operation of the ERV, air is taken from the bathroom, transferred through the ERV and exhausted to the outside. Outside air is brought in through the ERV and then introduced to the indoor air handling unit at the return plenum. The fresh air is then well mixed with the house return air before being supplied to the occupied space. Supply air is transferred to the occupied space through a single duct. The interior space is open and there are no internal doors to separate spaces, allowing the air within the space to become well mixed. The supply air is introduced through registers at the ceiling level and mixes with the room air before circulating to the occupied zone. Return air is taken from the bedroom area and ducted back to the indoor unit. The return air and the outdoor air are filtered to remove any particulates from the air stream.

The supply duct is oversized to reduce the velocity of the air and avoid excessive noise in the occupied space. In addition, the supply and return plenums are lined to reduce noise transmissions from the indoor air handling unit to the occupied space.

The Solar CalPoly team strived to use only environmentally preferable products in the construction of the house. These products have a reduced impact on the environment and the human health of the building occupants. Construction materials with low or no volatile organic compounds (VOC's) were used throughout in order to minimize indoor pollutant sources.

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