

CASE STUDY



Concrete Comfort in the Desert

Utilities agency headquarters chooses concrete to achieve environmental honors in a harsh desert climate

In Chino, Calif., where temperatures can vary as much as 100 degrees Fahrenheit in a single day, maintaining thermal comfort is a serious challenge. To beat the oppressive desert heat during the day and the windswept cold at night without excessive energy costs or impact on the environment, the Inland Empire Utilities Agency (IEUA) extensively utilized concrete in constructing its new headquarters. In 2004, the building achieved LEED-NC Platinum certification, the highest environmental standard offered by the United States Green Building Council (USGBC). IEUA headquarters is one of only 15 buildings that have achieved this honor. Concrete helped IEUA meet the following sustainable development objectives:

- Superior energy performance
- Use of recycled content
- Use of locally sourced materials
- Reduced urban heat island effect

With rapid depletion of the world's finite natural resources a worldwide concern, construction and utilization of the Inland Empire Utilities Agency structure will leave a minimal footprint on the environment due to innovative concrete solutions in its sustainable design.



Superior energy performance

Structures built with concrete are naturally energy efficient because of concrete's high thermal mass. Compared to other materials, such as wood and steel, concrete structures buffer daily temperature fluctuations. In addition, heating, ventilating and air-conditioning systems of insulated concrete structures can be designed with smaller-capacity equipment, saving money and resources. As a result of their use of multiple energy efficient technologies, including concrete, the IEUA expects to save more than \$800,000 each year in energy costs alone.

Recycled content

Cement can be produced by incorporating recycled industrial byproducts into the portland cement manufacturing process to minimize dependence on virgin raw materials. Recycled content gives environmentally-conscious builders the ability to further reduce the impact of a concrete structure. For its headquarters, the IEUA used a concrete mix that incorporated fly ash, a recovered byproduct of coal burning power plants. Structures that include recycled materials such as fly ash have the same superior energy performance and durability as those constructed with a virgin mix, but reduce the overall impact on the environment.

Locally sourced materials

A unique benefit of using concrete in construction is its ability to be locally sourced, unlike other building materials that need to be shipped long distances. The shorter the distance needed to haul building materials, the more energy and fuel is conserved and the less pollution is emitted. Concrete construction helped the IEUA earn LEED platinum certification because it utilized building materials available locally. When evaluating buildings for LEED certification, the USGBC looks closely at the finite resources consumed by its construction including those utilized to transport building materials. USGBC awards points toward LEED certification to buildings that utilize materials sourced within a 500 mile radius. The manufacturing process of portland cement, the binding element of concrete, is not tied to a certain region of the country and the materials involved in the process are readily available across North America. Consequently, the IEUA was able to obtain construction materials locally, minimizing transportation costs, energy consumption, and emissions.

Reduced urban heat island effect

Dark roofing materials and parking lots that are prevalent in commercially developed regions convert sunlight to heat and raise the temperature of the surrounding areas, creating an urban heat island. Light colored materials like concrete reflect more solar energy than darker materials. The IEUA made it a key objective to minimize the urban heat island effect, which can be particularly devastating in harsh desert climates. At the Inland Empire Utilities Agency, all of the concrete installed on site is a natural color, keeping the ambient temperature low. The building itself is constructed with a tilt-up concrete system and many of the surrounding hardscapes include naturally colored concrete and pervious concrete pavements, minimizing heat absorption.

The Inland Empire Utilities Agency headquarters is a solid example of the many applications for concrete that can create environmentally sound benefits in the design and development of a structure. Concrete allows the IEUA headquarters to operate with maximum energy efficiency in an often severe climate. The use of recycled content in the concrete mix and locally sourced materials also reduce the building's footprint, and helping the IEUA become nationally recognized as an environmentally responsible organization. The IEUA's decision to think concrete not only conserved valuable resources during the construction process, but will be evident in the Agency's more comfortable workplace and significant energy savings over time.

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