

# A Living Laboratory

DPR CONSTRUCTION PHOENIX REGIONAL OFFICE





## The Path to Net-Zero Energy

In the ever-evolving sustainable design and construction arena, many owners and project teams are setting their sights on a goal that seemed improbable just a short time ago: creating commercial buildings that produce as much or more energy as they consume each year, known as net-zero energy buildings. While this emerging trend is still gaining traction, DPR Construction has embraced the net-zero energy challenge in far more than just theory.

DPR's award-winning Phoenix regional office is a prime example of how the company is staying on the leading edge of the sustainability charge and helping pioneer a movement that many expect will ultimately make net-zero energy the "new norm." The LEED®-NC Platinum, 16,533-sq.-ft. structure is Arizona's first net-zero energy office building (NZEB), as certified by the International Living Future Institute's Living Building Challenge<sup>SM</sup> 2.1. Producing as much or more energy than it consumes, DPR's Phoenix office is the largest building in the world with the NZEB certification; it's only the second office in the nation to receive it.

### SUSTAINABLE FEATURES

- 79 kWdc photovoltaic covered parking system
- Active/passive cooling solutions
- 82 Solatube® Units
- 87 Operable Windows
- Four Shower Towers
- 13, 8-foot diameter ISIS® Big Ass Fans®
- 87-foot long, zinc-clad solar chimney
- Utilization of rapidly renewable wood products, recycled and reused materials throughout







## Selecting the Right Site to Meet Lofty Sustainable Goals

When selecting a new site for DPR's Phoenix regional office, the overriding objective was to find an underutilized, existing building in a highly accessible redeveloping area of Phoenix, close to public transportation, that DPR could transform through cost-saving, sustainable strategies to reduce its carbon footprint and benefit the community's redevelopment efforts. In addition to showcasing the latest in sustainable and energy reduction features, the intention of the project was to demonstrate the value and impact that revitalization has on an urban environment.

The team soon identified a property that may have seemed an unlikely prospect at first glance: an older retail building, seemingly at the end of its life cycle. Beneath the surface, however, the building's potential was apparent. Most significant was its location in the heart of Phoenix's Discovery Triangle redevelopment district.

The building's overall structure was sound and contributed to DPR's goal to maintain as much of the original structure as possible. Ultimately 93.7 percent of the original shell and structure remained in place.







## The Importance of a Highly Collaborative Team

DPR brought together the entire design and construction team, including architect SmithGroupJJR, sustainability consultant DNV KEMA Energy & Sustainability, mechanical contractor Bel- Aire Mechanical, Inc., DPR project team members, and various consultants and subcontractors, very early on to help identify and select potential sites and then provide input throughout design and construction.

Assembling the right team and then fostering a highly collaborative environment were key to the project's success. Every team member was hand-selected for the design-build project based on his or her talents and demonstrated expertise delivering high-performance sustainable buildings. Innovation was highly encouraged, and pushing the limits of conventional approaches expected. The integrated team cultivated a strong sense of trust and was united in working toward a common goal.





## Modern Design Fits a Progressive Company

The building's design reflects the "workplace of the future" with DPR's hallmark open office environment rather than traditional private offices. The modern and innovative aesthetic also takes a "do more with less" approach with sustainability in both building form and function. For example, a green screen with biomass wrapping the facades creates a secure and inviting outdoor courtyard environment for employees while also providing shade for the building.

While the building's south and west elevations were largely left intact, large expanses of glass were added on the east and north facades to allow in natural lighting. Horizontal shading devices were used to minimize direct solar gain.

Inside the building, major design features include video conferencing rooms, a learning lab, a modern open kitchen and café area, and roll-up doors that lead to shaded patio areas.







## Creating a Unique Environment

Some of the other unique elements of the office include a fitness room with shower facilities, a “Zen” room with plush sofa and chair; a conical Delta Room that represents DPR’s continuous drive to push the status quo; an Innovation Room with sliding glass walls, whiteboard and bold colored reconfigurable furniture designed to inspire creativity; and a prominently located 18-ft. wine bar, used as an impromptu gathering space for meetings, celebrations and conversations.

Inspired geomorphic shapes found in nearby desert canyons are reflected in the building design. A wrapped sculptural enclosure--the Delta room--in the conference space expresses DPR’s self-perform drywall expertise, utilized on this project, while the colors reflect the desert environment just outside. Strategically placed vertical green elements throughout the interior resemble a “landscape of saguaros” while functioning as message boards and power/data towers that break up the open space.





Overall, the project employed a variety of strategies to reduce energy while also creating a healthy environment for employees. A full 100 percent of spaces can have lights off during daylight hours and 75 percent have access to exterior views.

Some of the green materials incorporated include:

- 97 percent of wood from Forest Stewardship Council (FSC) sources;
- 32.76 percent of materials were of recycled content;
- Low or no-VOC content for all finishes; and
- Reuse of DPR's existing built-in work stations, requiring only 14 additional stations to be built.







## Major Sustainable Components to Achieve Net-Zero

At the heart of the project are the many sustainable elements that help the building both conserve energy and produce power needed to offset that demand. Every design consideration impacts the building's overall performance, and every building component was carefully selected.

There were a number of primary sustainable features in this building that were integral to achieving the net-zero energy goal. They include:

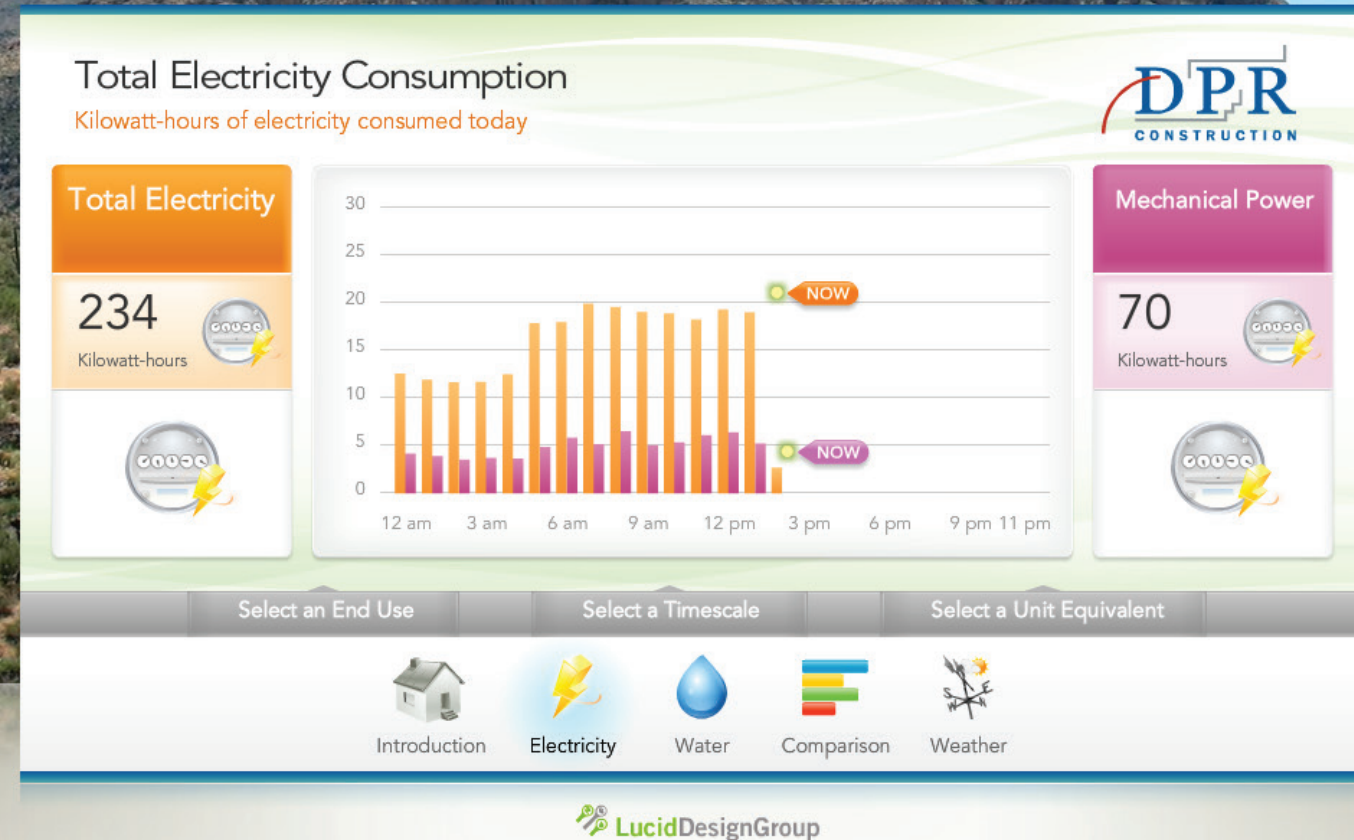
- **Solatube® Units** – The installation of 82 high-performance Solatube® daylighting systems, strategically positioned throughout the building, reduced artificial lighting usage by 90 percent.
- **LED Lighting** – Since the building's interior is lit by Solatube® units during the day, a life-cycle cost analysis showed that interior LED lighting was not cost-effective for a 10 year return. LED lighting was deemed an ideal solution, however, for exterior site lighting that is programmed at night. By selecting LED fixtures for site lighting, the team was able to reduce the size of the building's photovoltaic system.
- **Shower Towers** – Constructed using inexpensive HDPE pipe as the towers and sheet metal as the bases, these four evaporative cooling-towers work in conjunction with the solar chimney to passively cool the building. The towers sense and respond to climatic changes including wind speed and temperature.



- **Operable windows and roll-up doors** – The project incorporated 87 operable windows along the building’s east and north facades, providing access to fresh air and natural daylight. Controlled by outside climatic conditions, they open gradually to adjust to ventilation needs of the space.
- **“Big Ass Fans”** – Thirteen eight-foot-diameter Isis® Big Ass Fans® promote air circulation and are integral to the building’s cooling system. Air movement allows interior temperature set-points to be increased while still feeling comfortable for occupants.
- **Solar Chimney** - An 87 foot long solar chimney sits atop the roof of the DPR office. Through natural convection, the solar chimney encourages passive cooling by drawing air through the Shower Towers and operable windows. This pre-cooled air flows through the open office space and into the solar chimney. Utilizing salvaged zinc metal panels, DPR clad the chimney to absorb heat from the sun. This technique provides additional heating to the air within making the solar chimney making it less dense so the cooler air from below is drawn in to fill the volume which creates air flow in the space below.







- **Vampire Shut-Off Switch** – This particularly unique sustainable feature targets a reduction in energy consumption attributed to phantom loads – the energy consumed by a device even when it is turned off. This switch is designed to disconnect 90 percent of plugloads at the end of each workday. The last person exiting the building is responsible for activating this switch. Nationally, phantom loads are estimated to account for nearly six percent of the nation’s energy consumption.

- **Photovoltaics** – A key feature in net-zero energy buildings, photovoltaic systems are intended to make up the difference in energy needed to operate a building after all other measures to reduce the building’s energy consumption are exhausted. In the Phoenix office building, a 79-kilowatt photovoltaic-covered parking canopy systems was designed to generate the 135,000 kilowatthours (kWh) of estimated total annual building electrical usage. During its first year in operation, it actually exceeded that goal and generated more than 140,000 kWh of electricity.



- **Lucid Building Dashboard® System** – In the long run, the success of a net-zero energy building puts some responsibility on the shoulders of the building occupants to monitor and, if needed, modify their behavior in order to maximize building performance. The Lucid Building Dashboard® system incorporated in this project shows in real-time how the building is performing in terms of energy production versus usage. It provides a visible reminder to employees of the connection between their behavior and building performance.



DPR Construction is a unique technical builder with a passion for results. Consistently ranked in the top 50 general contractors in the country over the last 15 years, DPR is a national commercial contractor and construction manager specializing in technically challenging and sustainable projects—of all sizes and complexities—for the advanced technology, healthcare, higher education, life science and corporate office markets.

**PROJECT TEAM**

**Owner/General Contractor:** DPR Construction

**Architect:** SmithGroupJJR

**Sustainability Consultant:** DNV GL

**Structural Engineer:** PK Associates, LLC

**Mechanical Engineer:** SmithGroupJJR

**Electrical Engineer:** SmithGroupJJR

**PARTNERS**

Able Steel Contractors, Inc.

Arizona Professional Painting

Bel-Aire Mechanical, Inc.

Benson Security Systems

Carter’s, Inc.

Climatec

Dickens Quality Demolition, LLC

DRA Strategic Communications

Energy Systems Design

Kovach, Inc.

KT Fabrications

KTI Tile, Inc.

Olympic West Fire Protection Services

Progressive Roofing

Styles Brothers

Suntec Concrete

Wholesale Floors, LLC

Wilson Electric Services Corp.

WORKspaces







Atlanta, Georgia

Austin, Texas

Baltimore, Maryland

Dallas, Texas

Denver, Colorado

Houston, Texas

Newport Beach, California

Orlando, Florida

Pasadena, California

Phoenix, Arizona

Raleigh-Durham, North Carolina

Redwood City, California

Richmond, Virginia

Sacramento, California

San Diego, California

San Francisco, California

San Jose, California

Tampa, Florida

Washington, D.C.

West Palm Beach, Florida

**dpr.com**