

Pioneers for Clean Energy in Arizona

Arizona PIRG Education Fund
Summer 2009

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Acknowledgments

The authors thank Jeff Schlegel and Beth Nelson with the Southwest Energy Efficiency Project (SWEET), David Berry with Western Resource Advocates (WRA), Sandy Bahr with the Grand Canyon of the Sierra Club, and Tim Hogan with Arizona Center for Law in the Public Interest for their insights and collaboration on energy efficiency in Arizona.

The Arizona PIRG Education Fund thanks the Edwards Mother Earth Foundation for making this report possible.

The authors bear responsibility for any factual errors. The views expressed in this report are those of the authors and do not necessarily reflect the views of our funders or those who provided editorial review.

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With public debate around important issues often dominated by special interests pursuing their own narrow agendas, the Arizona PIRG Education Fund offers an independent voice that works on behalf of the public interest. The Arizona PIRG Education Fund, a 501(c)(3) organization, works to protect consumers and promote good government. We investigate problems, craft solutions, educate the public, and offer Arizonans meaningful opportunities for civic participation.

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Introduction

Energy efficiency is the quickest, cheapest and cleanest way for Arizona to meet its growing energy needs. Although the magnitude of the economic situation in Arizona and across the nation is daunting, increasing energy efficiency offers an immediate, proven and important step consumers, businesses and government can take to save money, stimulate the local economy, create jobs and other services, and protect public health.

Businesses, residences and local governments across Arizona are making strides to increase their energy efficiency. Our daily demand for electricity is high — from TVs to dishwashers to refrigerators to charging cell phones — we’re constantly “plugged in.” And with our energy demand expected to increase as our population grows in the future, the timing to increase energy efficiency could not be better.

Although many products are now more energy efficient, the state’s electricity consumption continues to grow and the overall energy resource mix remains dominated by coal, nuclear and natural gas.

Arizona has set a Renewable Energy Standard (RES) of 15 percent by 2025 to begin the shift to cleaner energy; however, Arizona does not have an Energy Efficiency Standard (EES). The Arizona Corporation Commission (ACC) is currently considering an EES.

The benefits of increasing energy efficiency include more stabilized prices, greater reliability and a reduction in need for transmission, distribution and

other infrastructure system costs. Increasing energy efficiency does not expose customers or utilities to fluctuating fossil fuel, natural gas and other such prices. Investments in energy efficiency yield high returns and can be implemented in a short time frame and customized to specific consumer needs.

When energy supply costs are reduced, bills are lowered for customers. The resulting energy savings more than offset the cost of energy efficiency measures, and businesses and consumers save money which can be used to benefit local economies.

The consequences of continuing down a dirty and dangerous energy path include increased air pollution, unsustainable water use from operating coal and nuclear plants, escalating asthma rates, and higher and unpredictable electric bills. In addition, traditional fossil fuel plants are very costly to build and take many years to produce consumable electricity whereas energy efficiency measures can be implemented immediately.

The Western Governors Association statement, “... it is feasible to reduce electricity use 20 percent from projected levels in 2020, and do so cost effectively, through full deployment of best practice policies and programs” demonstrates the viability of energy efficiency.

Smart investments coupled with mirroring successful aspects of Arizona’s Renewable Energy Standard, such as yearly ramp-ups, benchmarks and evaluation for an EES, will ensure that energy efficiency is a sound investment for ratepayers.

Energy Efficiency Options

Most businesses, consumers and local governments spend more money than is necessary buying energy. While electricity expenditures are not the largest portion of most budgets, they can take up a significant percentage of expenditures.

The problem of overspending on energy can be solved first by identifying and isolating areas where too much money is being spent on wasted energy, and then by instituting conservation measures or efficiency upgrades that curb that energy consumption and overspending on energy bills. Those who have made it a priority to track energy expenditures and implement cost savings have found great success in reducing their electricity bills.

The Government Can Lead By Example

At the state and local level, public buildings provide an opportunity for government to lead by example. From the transit center in Tempe to the Applied Research and Development building at Northern Arizona University, efforts to make buildings more energy efficient also provide excellent opportunities for public education and information on how we can change construction practices to save energy and money while reducing waste and pollution. By increasing awareness within a community and bridging the gap between technology and implementation, these buildings provide working examples of the benefits of green buildings.

A number of Arizona municipalities are energy efficiency champions and have implemented beyond-code standards, including Apache Junction, Buckeye, Marana, Pima County, Scottsdale, and Tucson. These programs exceed the minimum efficiency requirements in local building codes and are designed as voluntary Green Building programs or other sets of higher code development, such as Leadership in Energy and Environmental Design (LEED).

The LEED Green Building Rating System awards points to buildings that meet criteria focused on sustainable sites, water efficiency, energy and atmosphere, materials and resources, indoor envi-

ronmental quality, and innovation and design (a detailed description of LEED can be found at the end of this report).

Future Residential Construction

Although this report doesn't focus on residential construction, it is worth noting that much of Arizona's electricity use and, therefore, emissions of greenhouse gases and other pollutants, is related to houses that have yet to be built. By 2030, an estimated 50 percent of the buildings in our state will have been built after 2000.

While some communities have stepped up to implement stronger and more efficient building codes or programs, this trend is spotty at best. As a high growth state, Arizona is a crucial place to address this issue, highlighting the significance of individual builders that are seeking ways to make their products more efficient.

Reducing Energy Costs

Fortunately, there are many options available to reduce energy costs, some through utility programs referenced later in this report, to increase energy reliability and decrease pollution, including:

1. Development and expansion of utility programs for demand side management of energy usage;
2. Retrofit buildings to make them more energy efficient, including upgrading appliances, air conditioning and heating/ventilation systems; and
3. Adoption and implementation of energy efficient building codes with minimum efficiency standards for public and private buildings.

For most Arizonans, the greatest energy savings can come from efficiency improvements in air conditioning and lighting. Installing multiple efficiency measures at one time—including energy efficient

lighting, air conditioners and other equipment—can increase the benefits of energy efficiency programs.

There remain enormous opportunities to achieve dramatic cost savings, energy efficiency gains and pollution reductions by putting in place new policies and taking advantage of rebates and incentive programs which make implementation of these options even more cost-effective. Those who have implemented energy efficient options have demonstrated their success and can guide others to become energy leaders.

We encourage readers to e-mail additional energy efficiency opportunities and success stories to energyefficientarizona@arizonapirg.org.

Energy Efficiency Case Studies

While inefficiency and energy waste are still the norm, there are a number of examples in Arizona of well-designed buildings and cost-effective retrofit projects. These projects have a team of energy pioneers behind them, pushing the envelope in energy efficiency and modern building science. It is important to learn lessons and take advantage of the experience gained from these projects to ensure a successful energy efficient future.

This report does not represent an exhaustive list of energy efficiency projects that have been implemented or are in process in Arizona. Rather, it is a compilation of energy efficiency examples in the state from business, academia and government.

Whether the projects had multi-million or several thousand-dollar budgets, the payback period is relatively short and the financial and environmental benefits are apparent.

The information in the energy efficiency case studies was compiled through direct conversations and/or gathered through Web site searches, and were current at the time of printing.

It is also worth noting that the Arizona Corporation Commission (ACC) is currently conducting Energy Efficiency Workshops for interested stakeholders and utilities under its jurisdiction to determine how to best increase energy efficiency. By increasing effective and efficient energy efficiency programs in Arizona to at least 20 percent by 2020, we will see a significant rise in the number of energy efficiency buildings and will be on the way to an Energy Efficient Arizona.

Arizona State University (ASU) BioDesign Institute

Summary:

This project was constructed in order to create a next generation research facility. According to its Web site, ASU BioDesign Institute is located on the eastern edge of ASU's Tempe campus. ASU's

BioDesign Institute consists of two broad, four-story brick-and-glass-faced buildings (Building A and Building B), which were opened in 2005 and 2006. The 13-acre site will ultimately include another pair of rectilinear buildings linked to its predecessors in an L-shaped plan. The buildings themselves earned separate Gold and Platinum LEED certifications. The facilities feature large expanses of glass with a central atrium skylight running the length of both buildings, allowing natural light to infuse all four levels. An exterior shading system on south and west sides of the buildings control unwanted heat from the desert sun.

Specific features that contribute to the building's efficiency include:

- The top portion of the interior shade system is automatically controlled to maximize daylighting.
- A reflective roof membrane and paving materials mitigate the Phoenix area's urban heat island effect.
- Office occupancy sensors automatically control artificial lighting, reducing lighting energy demand and associated cooling loads. These strategies reduce energy use by 29 percent.
- Ozone-friendly refrigerants were used to help mitigate atmospheric ozone depletion.
- An innovative, variable-volume exhaust system was designed in place of a conventional, constant-volume system, reducing energy demand associated with meeting laboratory ventilation requirements in the desert.
- A 167-kilowatt rooftop photovoltaic (PV) array brings Building B's total energy offset to 58.39 percent over the base case; prior to the PV installation, that reduction totaled 52.4 percent. The difference helped Building B cross the threshold from LEED Gold to Platinum.

Non-Energy Benefits:

In addition to energy efficiency benefits, environmentally friendly features range in scale from siting and urban planning to interior finishes:

- A 5,000-gallon irrigation water cistern collects air conditioning condensate water, which eliminates the use of potable water in landscape irrigation. Rainwater from the roof and paving are routed directly via pipes to the drought-resistant, native desert landscaping.
- Low-flow lavatories, kitchen sinks, showers and waterless urinals use 30 percent less water than conventional fixtures.
- The project exceeded LEED criteria for using 15 percent recycled materials, including aluminum ceiling panels, recycled-content carpet and rubber stairwell flooring.
- A construction waste management plan reduced landfill construction waste by more than 60 percent.
- The facility entry is near the new light-rail station that opened in December 2008.



Mark Botschir, GreenSource Image Gallery

Arizona State University (ASU) BioDesign Institute. For additional images, please visit http://greensource.construction.com/projects/0801_ArizonaStateUniversity/1.asp

Recognition for the Project:

Building B is the first building in Arizona to have earned the LEED Platinum distinction; Building A, received LEED Gold certification.

ASU Polytechnic Interdisciplinary Science & Technology Building (ISTB) III

Summary:

ASU Polytechnic ISTB III is a new, state-of-the-art, 40,000 square-foot research laboratory and office building, which cost \$12 million and was completed in 2006. This signature campus building was designed to meet LEED-NC Silver requirements, but earned Gold certification due to the efforts of its committed owner and exceptional project team.

Specific features that contribute to the building's efficiency include:

- Landscape and roof design that reduce the heat island effect.
- Optimized energy performance.
- Light pollution reduction.

Non-Energy Benefits:

- Local and regional materials which avoid additional transportation costs and pollution.

- Twenty-five percent of construction material is recycled content.
- Twenty percent of construction materials were manufactured regionally.
- Seventy-five percent of construction waste was diverted from landfills.
- Thirty percent reduction in water use through efficient plumbing fixtures.
- Fifty percent reduction in landscape water usage through efficient landscape technology and material selection.
- Infrastructure to support alternative transportation, such as bicycle storage and changing rooms.
- On-site retention of storm water.
- Healthy, nontoxic materials used to improve indoor air quality.

Recognition for the Project:

- LEED - Gold
- Salt River Project (SRP) Sustainable Award: 2008
- American Institute of Architects (AIA)/ Western Mountain Region Honor Award: 2006
- American Institute of Architects (AIA)/ Arizona Citation Award: 2006
- American Institute of Architects (AIA)/ Arizona-The Kemper Goodwin Award: 2006
- Valley Forward Association, Environmental Excellence Award: 2006



ASU Polytechnic Interdisciplinary Science & Technology Building (ISTB) III. For more images, please visit http://uabf.asu.edu/leed_istb3.

Armory Park: John Wesley Miller, Tucson

Summary:

John Wesley Miller, a Tucson-based home builder and solar pioneer, is a national leader in green building practices. Miller works collaboratively with local utilities, building departments, and universities to develop energy-saving products, technologies, and policies. He is one of four builders selected by the U.S. Department of Energy to develop Net Zero Energy Homes, which use photovoltaic generation to offset utility-supplied power.

A prominent urban infill development is the 14-acre Armory Park del Sol, located in downtown Tucson, which includes 99 single-family solar homes designed to blend in with surrounding neighborhoods. New technology and construction methods incorporated into these homes include dual-pane windows, efficient ducting and ventilation, and highly efficient heat pumps, among other measures. Additionally, the thermal mass of the concrete construction regulates interior temperatures. On average, Armory Park del Sol homes use less than half the energy of a typical regional home, and the two Net Zero Energy Homes produce more energy than they consume.

Recognition for the Project:

- Outstanding Green Advocate by the National Association of Home Builders, 2002

Images of the Project:

For images and more information, please visit www.johnwesleymillercompanies.com.

Chino Valley Agribusiness & Science Technology Center at Yavapai College

Summary:

The college undertook this project with the objective of significantly minimizing environmental impact while incorporating a 'building as teacher' philosophy. The building's aesthetic is related to the agricultural and ranching roots of the surrounding rural community. The cupolas that provide natural ventilation for many of the spaces reference a historical milking barn that used such a strategy in its own design.

Deep overhangs that suggest the covered porches of old farmhouses protect the windows from the harsh high-desert sun. On the interior, the exposed ceilings and trusses again refer to the agricultural roots of the area while displaying the systems and construction of the building. This project was completed in 2004 and was a \$3.3 million investment. Fifteen individuals were involved in the programming, design and construction of this project.

The award-winning "green" facility minimizes environmental impact and takes advantage of the site upon which it is built with xeriscape landscaping, rainwater harvesting, solar water heating, a geothermal heat pump system, an energy management control system and other features. The building reduces energy use by more than 50 percent below ASHRAE 90.1-1999 standards, which was the current code to which buildings were built to at the time of completion.

Specific features that contribute to the building's efficiency include:

- Natural daylight harvesting used throughout the building.
- Continuous limit dimming controls with indirect fixtures.
- Deep overhangs which protect windows from

- harsh high-desert sun and reduce solar heat gain.
- Solar hot water heating, which reduces energy consumption.
- Geothermal heat pump system.
- Comprehensive energy management control system.
- Roof cupolas provide natural ventilation.
- A 2.4kw photovoltaic array.

Non-Energy Benefits:

- Sustainable Site.
- Native vegetation restored areas disturbed by construction.
- Over-excavation and masonry debris were retained on site and integrated into the landscape design.
- Materials and Resources.
- Regionally /locally produced materials reduced energy use in transportation—nearly 50 percent of the materials used were manufactured within a 200-mile radius of the site.
- A majority of the wood used in the project is certified by the Forestry Stewardship Council.
- All adhesives, paint and interior products are low-emitting materials.
- Locally manufactured post-tensioned masonry provides a durable interior and exterior finish, as well as thermal mass and insulation.
- Project achieved a 50 percent construction waste-recycling goal.
- Water Efficiency.
- Harvested rainwater and xeriscape landscaping reduces water use.
- Storm water runoff collects in engineered wetlands.

Recognition for the Project:

- LEED NC Silver Certified
- APS Energy Award: 2005
- School Construction News, May / June 2005: Rural College Boasts LEED Silver Certification
- American Institute of Architects (AIA) Arizona Energy Award: 2005
- Southwest Contractor Magazine: Best of 2004 Green Building Under \$5 million
- American Institute of Architects (AIA) Arizona Client of the Year Award: 2003



Yavapai College

Chino Valley Agribusiness & Science Technology Center at Yavapai College. Find more images and information at <http://www.yc.edu/content/cas/chinovalley/>.

City of Scottsdale

Summary:

The city of Scottsdale has been a cutting-edge leader in the development and implementation of green building incentives. In 1998, Scottsdale introduced the first Green Building Program in Arizona—10 years before any other jurisdiction. Additionally, in 2005, Scottsdale became the first U.S. city to require that all new or major renovated city buildings meet LEED Gold standards.

The city accelerated its green building participation by integrating the Green Building Program into the building plan review, permit and inspection process. A green building qualification meeting is held prior to applying for building permits. This meeting streamlines the plan review process by addressing not only green building but potential building code compliance issues. Green building inspection cards are issued at the time of building permit issuance and posted at the job site for building inspector sign-off during the various stages of inspections. As a means of continued education, participating builders are required to attend at least one of the many free green building lectures offered throughout the year.

Scottsdale continues to update its residential Green Building Rating Checklist to reflect national building code changes, construction industry trends, and evolving federal, state and municipal policy. The latest update includes a change that increases

City of Scottsdale Granite Reef Senior Center

Summary:

The 37,500 square-foot building is a showcase of sustainable design.

Specific features that contribute to the building's efficiency include:

- **Green Building Certification:** Gold level certification is being acquired through LEED.
- **Site, building orientation and shading:** Site design reduces the urban heat island effect by use of light colors, pervious materials and shading. The building is oriented to minimize summer solar heat gain with an Energy Star® roof coating. Solid wall planes and landscape materials are arranged to protect the interior spaces from harsh east and west sun. North facing windows above the roof provide diffuse light deep within the building's interior. Shade structures protect the building's entrances and windows from direct summer sun. Thermal lag resulting from interior mass of masonry bearing walls help maintain consistent, comfortable indoor temperatures.
- **Energy Efficiency:**
 - Highly energy-efficient building envelope (super insulated wall, door and window systems);
 - Shaded windows and entrances;
 - High-performance central plant provides optimal thermal comfort by cooling, heating and ventilating the building. Use of daylighting reduces indoor electrical lighting loads. Energy efficient lighting reduces indoor heat load.
- **Renewable Energy:** A 40-kilowatt solar electric (photovoltaic) system provides 15 to 100 percent of required energy depending on time of year. The photovoltaic system was provided through a partnership with Salt River Project (SRP). The south building entry canopy features an integrated solar electric system that provides shade while generating power. The solar electric system generates enough electricity to power 6 to 8 homes, the equivalent of reducing 59,000 pounds of CO2 emissions from a power plant in a year.



TreeHugger.com

City of Scottsdale Granite Reef Senior Center

a building's energy performance at least 30 percent above the 2006 International Energy Conservation Code.

Non-Energy Benefits:

Scottsdale's Green Building Program encourages a whole-systems approach, taking the following factors into consideration: energy, site use, indoor air quality, building materials, solid waste, and water. The program is completely voluntary, but provides incentives for participation including development process assistance, expedited permitting, recognition on the city's green building Web site, and marketing material.

Scottsdale's Green Building Program criterion has incrementally made its way into city's building code amendments. With the adoption of the 2006 building codes in September 2007, the following green building related amendments were adopted:

- 1) All residential and commercial buildings must exceed the 2006 IECC by 15 percent;
- 2) All bathroom and kitchen exhaust fans shall be exhausted directly to the outdoors;
- 3) Water heaters located more than 20 feet away from the farthest fixture in residential buildings must have a demand-controlled hot water recirculation pump.

Non-Energy Benefits:

Water Efficiency

- Fifty percent reduction of potable water use for irrigation
- Use of high-efficiency landscape irrigation technology and strategies
- Thirty percent reduction of indoor water use
- Use of high-efficiency plumbing fixtures (urinals and faucets) exceeds minimum code requirements
- Use of low-emitting and inert materials reduces indoor exposure to formaldehyde and other volatile organic compounds (VOC's) commonly found in building materials and finishes
- Daylighting: Exterior and interior glazing strategies provide daylighting to improve indoor environmental quality

Regional and Resource-Efficient Materials

- Seventy-five percent of the building materials and products were manufactured regionally, and of those materials, over half were manufactured and/or extracted from local sources.
- Twenty-four percent of the building's materials contain recycled content from post-consumer and post-industrial sources.
- Wood products are from sustainably managed forests and certified by the Forest Stewardship Council (FSC) that assures minimum environmental impact.
- Over 1,500 tons (75 percent) of the waste generated by the construction was diverted from conventional landfills to recycling plants.

Desert Edge High School, Phase II, in Arizona's Agua Fria Union High School District

Summary:

The primary reasons for the project were improved education environment for students and staff, protection of the environment and return on investment.

The project is designed to be 28 percent more energy-efficient than a conventionally designed high

school. The total expansion project was a \$10.1 million investment with six individuals primarily involved in the project management, design and construction administration.

Specific features that contribute to the building's efficiency include:

- Central Plant Heating Ventilating and Air Conditioning (HVAC) system.
- Improved building envelope.
- High-performance glass.
- Motion and daylight sensors to keep artificial lighting usage at the minimum.
- Carbon dioxide (CO₂) sensors that shut off the fan coil when the rooms are unoccupied.
- Energy Star®-rated roofing system.

Non-Energy Benefits:

- Low-emitting adhesives, sealants and paints
- Sustainable water features, including drip irrigation and xeriscaping.
- A recycling program that includes the collection of paper, plastic, cardboard and glass materials with receptacles throughout the facility.
- Materials from the demolition of the former Civic Plaza were recycled.

Recognition for the Project:

- LEED Silver

Images of the Building:

Images and more information may be found at <http://southwest.construction.com/features/archive/azbestof.pdf>.

James Learning Center/ Highlands Center for Natural History, City of Prescott

Summary:

The center was designed to serve as a green-design model.

The \$1.2 million James Learning Center, which houses the Highlands Center for Natural History,



James Learning Center/ Highlands Center for Natural History. For more images, please visit www.catalystarchitecture.com/HCNH/1.html.

a nonprofit environmental education organization, is Prescott and Yavapai County's first LEED Gold certified building.

The 4,250 square-foot contemporary styled building is completely off the grid, and 70 percent of the building's heating and cooling loads is supplied passively. Forty solar panels on the roof supply the remaining energy needed for the facility.

Operable clerestory windows north and south, sized for maximum solar gain and daylight contribution (with minimal heat loss), also serve to ventilate the building when needed. A south facing interior stone wall, built from rock harvested on site, stores solar heat during the cold winter months, warming the building and stabilizing indoor temperatures. Deciduous vines trained over the lower south-facing windows allow sunlight into the building during the winter, while shading out solar gain during the summer. Reflective light shelves north and south help bounce additional daylight into the interior of the building. The project was completed in January 2007.

Non-Energy Benefits:

Waste is segregated much like household trash. Metal is cleaned and recycled. Glue-free wood is chipped into groundcover. Drywall is crunched up into gypsum landfill cover. Plants are salvaged and stored until they can be reused, as are local

rock and timber. Local vendors were used for the steel, trusses, joists, framing, and stucco to gain fossil-fuel reduction points. LEED points were added through salvaged native planting, rainwater-reliant irrigation and landforms that control erosion and drainage.

Recognition for the Project:

- LEED Gold

Maricopa Community Colleges

Summary:

With 10 colleges, two skill centers, and many smaller centers, the Maricopa Community College District (MCCD) is one of the nation's largest higher education systems. MCCD's Facilities Planning and Development Department, with a team of only three, has revolutionized energy use at MCCD. To protect teacher pay and reduce energy use, MCCD dedicated \$7 million from the \$386 million voter-approved bonds in 1994 to energy efficiency measures in existing buildings.

The MCCD adopted energy efficiency measures based on their payback period, including energy efficient windows, high efficiency air handlers, upgraded insulation, occupancy sensors for HVAC and lighting, and numerous other efficiency improvements. Additional funds were allocated to design new buildings with state-of-the-art energy efficiency features.

The Jacaranda Hall at Chandler-Gilbert Community College was the first building in the district to be LEED certified. As participants in the President's Climate Commitment, a nationwide commitment by more than 500 colleges and universities to reduce greenhouse gas emissions at college campuses, the college has committed to constructing all of its new facilities to LEED Silver certification standards.

Recognition for the Project:

Governor's Energy Conservation Award in 1999

Images of the Building:

Visit www.maricopa.edu/facilities_planning.

North Central Association at ASU Research Park

Summary:

Computerized lighting and energy models yield a 26 percent energy savings through HVAC enhancements, advanced interior lighting and the use of energy-efficient materials, such as Energy Star® Reflective Roofing and high performance glass. The ASU Research Park achieved LEED Gold certification.

Non-Energy Benefits:

A 50 percent reduction in water/sanitary sewer loads through the use of waterless urinals, dual flush water closets, desert landscaping and recaptured irrigation water.

Northern Arizona University (NAU) Applied Research & Development (ARD) Building

Summary:

The primary reason for the project was to combine the latest advancements in building sustainability and to keep NAU at the forefront of utilizing energy efficiency technologies. The building is also a living laboratory for students and environmental professionals. NAU has two other LEED Certified buildings on campus—buildings that house both the College of Engineering and the College of Business achieved a Gold rating. According to NAU, future buildings constructed on its campus will meet or exceed the LEED certified standard.

The ARD building earned 60 points out of a possible 69 from the LEED building rating system. Only two other buildings in the world have earned at least 60 points. Many individuals, particularly from Capital Assets and Services were involved in this project. The ARD building cost \$26 million to construct with about 15 percent of that cost associated with energy saving features. The university hopes to recoup these costs within 10-15 years through the building's energy savings.

Energy sources for the 59,821-squarefoot ARD building on the university's central campus include a 160-kW photovoltaic solar power system donated



Ryan Companies

North Central Association at ASU Research Park. To find out more and see additional images, please visit www.ryancompanies.com/projects/ncacasi/.

by APS, which provides at least 20 percent of the building's electricity. Automatic shade controls and venting windows help regulate the building's temperature. The design and automated systems result in a 60 percent reduction in energy use when compared to traditional buildings.

Non-Energy Benefits:

- Ninety percent of waste materials generated from the building's construction made its way to recycling rather than landfills.
- About 30 percent of the building's construction material is made from recycled components, including thousands of pairs of denim jeans used for insulation.
- Fifty-seven percent of the construction material is from local producers or manufacturers.
- Wood used in the building was certified as harvested from a renewable forest-management system, located in Arizona's White Mountains.
- There are no volatile organic compounds (VOCs) in the building's paint or carpet.
- To help regulate the building's temperature, a "green roof" on the conference unit will serve as a place to grow and maintain an indigenous vegetation cover requiring minimal irrigation.
- The ARD parking lot is the first installation in the state to use pervious concrete, allowing water to be captured in natural aquifers and used for irrigation purposes.
- Reclaimed water replaces potable water for landscaping use and flushing toilets, and water-efficient features such as low-pressure faucets and toilets reduce total water needs by 60 percent.

NAU



Northern Arizona University (NAU) Applied Research & Development (ARD) Building.

Recognition for the Project:

- LEED - Platinum
- Southwest Contractor – Best Higher Education Project, Best Public Green Project
- American Concrete Institute – Architectural Merit, Sustainable Concrete Construction
- Real Estate Construction & Review Magazine – Gold Medal Building of America Award
- Holcim Foundation for Sustainable Construction – Holcim Award for Sustainable Construction
- Arizona Commercial Real Estate – Real Estate Development – Sustainability Award
- International Institute for Sustainable Laboratories – Go Beyond Award for Projects – New Construction

Papago Gateway Center

Summary:

The \$62.5 million project has been pre-certified by the U.S. Green Building Council through the LEED Core and Shell pilot program. It is projected to become the first certified core and shell project in Arizona pursuing a LEED Silver designation for its innovative core and shell design.

Sustainable elements include high-performance glass and an outer layer of photosensitive operable aluminum louvers on the east, south and west exposures. These key design features work with the building's orientation to maximize views, provide glare-free cool natural light, and at the same time, prevent unnecessary heat gain. Narrow floor plates

guarantee deep daylight penetration to allow reduction of future lighting loads.

Non-Energy Benefits:

Future tenants of the building are being given guidelines and incentives to build-out their spaces so that they will achieve LEED-CI certification for the tenant space design and construction. With financial help from the developer, a light rail station was built adjacent to the site and a green car program is being implemented, further reducing the impacts of transportation.

Recognition for the Project:

- Valley Forward Association - Environmental Excellence Award: 2008
- Arizona Masonry Guild – Excellence in Masonry Award: 2008
- Southwest Contractor - Best of 2008 Awards for Arizona - Private Green Project: 2008
- American Institute of Architects (AIA) Western Mountain Region Merit Award: 2008
- American Institute of Architects (AIA) / International Interior Design Association / CoreNet - Sustainable Leadership Award for Design and Development – Commended: 2007



City of Tempe, Arizona

Papago Gateway Center. Additional images available at www.tempe.gov/maps/DevProjectDetails.aspx?LocationID=6ed903eb-e0cc-46c2-8551-7d74fd2c9633.

Pepper-Viner Homes, Tucson

Summary:

Pepper-Viner Homes just completed construction on the demonstration High Performance Home which is bringing High Performance Building into the mainstream building industry in Southern Arizona. Pepper-Viner Homes partnered with BASF Corporation and Southwest Gas Corporation among others to test new products and procedures to prepare for building higher performing production homes in the future. According to Pepper-Viner, they use the Energy Star® label because it is a recognizable sign of quality, is measurable, requires third party verification, and outlines the schedule and direction of the project.

Non-Energy Benefits:

The High Performance Home saves 80 percent on energy as well as meeting EPA's Indoor Air Plus level while implementing water saving and reuse strategies. Some of the lessons learned are already incorporated into plans for future projects. Pepper-Viner Homes upcoming projects include 35 garden homes for a retirement campus in Green Valley which will be built with SIPS panels, and an affordable housing project in Tucson for a partnership of local non-profits.

Recognition for the Project:

The High Performance Home will achieve the LEED Emerald status.

Images of the Building:

Images of the buildings are available at www.pepperviner.com/green-building.asp.

Phoenix Convention Center

Summary:

In June 2005, the Phoenix City Council adopted a policy that, at a minimum, required all new city buildings built with 2006 Bond Funds to meet the basic LEED standard. Bond funds approved by voters in 2006 include a two percent cost to cover any basic LEED-related design and construction costs.



City of Phoenix

Phoenix Convention Center, North Building.

The Phoenix Convention Center held a ceremony announcing that the Convention Center's West Building had been awarded LEED Silver certification by the U.S. Green Building Council. The West Building, which opened in June 2006, was designed to achieve LEED Silver certification for energy use, lighting, water and material use as well as incorporating a variety of other sustainable strategies.

Phase Two of the Phoenix Convention Center expansion started in 2007 with the demolition of the North Building. The new building includes a 45,000-square-foot ballroom, two levels of meetings rooms, exhibit halls and a food court. Concurrent renovation of the existing South Building was completed in 2008. The Phoenix Convention Center was a \$600 million project. The environmental goals for the project include 25 percent savings in energy usage and 43 percent savings in water usage.

Specific features that contribute to the building's efficiency include:

- The use of mechanical and electrical equipment that dramatically reduces the building's energy consumption.
- Reduction in the heat island effect by placing 100 percent of the building's parking underground and using Energy Star® compliant roofing materials.

Non-Energy Benefits:

- High-efficiency irrigation that reduces potable water consumption for irrigation by 56 percent.



Reid Park Zoo Conservation Learning Center.

- Use of low-flow toilets, urinals and water closets which has resulted in a 42 percent water use reduction.
- The use of low volatile organic compound (VOC) paints and materials.
- A recycling program that includes the collection of paper, plastic, cardboard and glass materials with receptacles throughout the facility.
- Materials from the demolition of the former Civic Plaza were recycled and more than 50 percent of the new West Building construction materials were manufactured within 500 miles, which reduces fuel usage and bolsters growth in the local economy.

Recognition for the Project:

- LEED Silver

Pima County Green Building Rating System

Summary:

Pima County took a unique approach in developing its green building program. The Board of Supervisors created a five-year Sustainable Action Plan requiring the county to save fuel, construct green buildings, use renewable energy, buy sustainable products, practice conservation and waste reduction, and reduce water use. Their Green Building Rating System was modeled after both the U.S. Green Building Program and LEED, creating

a hybrid program tailored to the specific needs of Southern Arizona with four levels of certification: Bronze, Silver, Gold, and Emerald.

The Regional Residential Green Building Rating System is a voluntary system used by participating jurisdictions to guide builders, developers, and owners in the design and construction of energy efficient, water-conserving, healthful homes. The rating system requires measurement and verification that the residence meets the minimum levels in each category. Single family, duplex, and triplex homes no more than three stories in height may apply for certification. Renovations and remodeling are rated under the Regional Residential Green Remodeling Rating System, unless the renovation involves replacement or overhaul of all major building systems or alteration of at least 75 percent of the existing building.

For more information, please visit www.pimaxpress.com/Green.

Reid Park Zoo Conservation Learning Center, Tucson

Summary:

The Reid Park Zoo needed a larger facility to house its education program. The current 900 square-foot facility was too small and in disrepair. One of the primary goals of the project set forth by the Reid Park Zoo and Tucson Zoological Society was for the project to achieve LEED Platinum rating, and, in so doing, advance the message of wildlife habitat conservation and environmental awareness. The facility was also viewed as an opportunity to set the standard within the zoological community for an environmentally responsible design for zoo and aquarium facilities.

The project cost was approximately \$4 million. Photovoltaic panels were donated by Tucson Electric Power as a part of its Green Watts program. The contracting firm was selected on the strength of its experience with LEED projects and dedication to the project's goals. Reid Park Zoo was so committed to achieving LEED Platinum that it sacrificed program space to stay within budget.

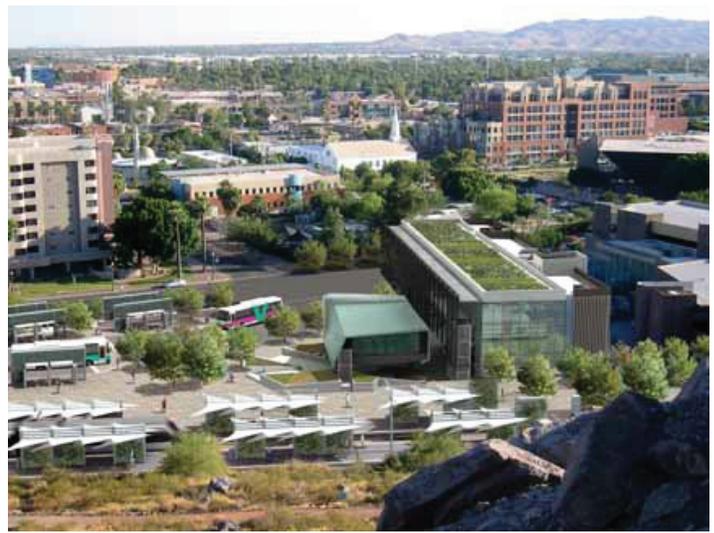
The overall building (envelope and mechanical system) is 51 percent more energy-efficient than a comparable building using standard construction techniques and materials. When the photovoltaic system, which provides 48 percent of the annual power used by the building, is added into the calculations, the building becomes 75 percent more energy-efficient.

Most of the wall construction is made from ICF (insulated concrete forms), which provides a high R-value due to the foam insulation and thermal mass. The highest practical insulation values were used for the building envelope (R-38 at roof, R-19 for walls) and openings on the east and west sides of the building were minimized. In all cases, highly efficient windows and coatings were used to minimize heat gain inside the building, while shade devices helped to block direct sunlight. Solar water heaters were used to heat water and high-efficiency heat pumps were used to condition the building. Minimal conditioning was provided for non-occupied spaces.

Non-Energy Benefits:

- Clay-based, low-fume and non-toxic paints.
- Rooftop rainwater harvesting
- Gray water irrigation from sink water
- Waterless urinals
- Pervious concrete (porous design allows stormwater to flow through and replenish groundwater supplies)
- Herman Miller sustainable furniture
- Bamboo cabinetry and corn-based fabrics
- Eco-friendly carpet
- Recycled glass countertops

The aluminum shade structure on the south side of the building was salvaged from Tucson General Hospital before it was torn down. This was done through a collaboration of the owner (University Medical Center), MAPP (a local modern architecture preservation group), the design team and the contractor. The shade structure was designed by a prominent Tucson architect and was a part of Tucson's modern architectural history. By salvaging the structure, it was kept out of the landfill and enabled the preservation of a small piece of history.



Tempe Transportation Center. Additional images are available at www.tempe.gov/greenprograms/transitcenter.htm

The bamboo used in the fencing and gates was harvested from the site, dried during construction, then cut and used on site. Those plants that were removed from the site for construction were mulched, relocated or given to the zoo animals for food (palm fronds are treats for some animals), enrichment activities (trunks and branches are fun items for large animals to “play” with) or breeding areas (Toucans like to breed in sections of palm tree trunks).

Finally, the building uses reclaimed water for irrigation and to flush toilets, further reducing the amount of potable water used for non-drinking purposes.

Recognition for the Project:

LEED Platinum

Tempe Transportation Center

Summary:

The Tempe Transportation Center is a transit plaza serving patrons of the new METRO light rail and local and regional buses on the northwestern corner of College Avenue and Veterans Way. The ground floor includes retail, a security office and a bike station (with bike repair and accessories). The second floor includes the City of Tempe transporta-

tion and light rail offices and a community / conference room. The third floor houses the transit operations center and for-lease office space. The facility opened in the summer of 2008, cost \$24.5 million and is designed to provide ultra-energy savings and qualify for platinum LEED certification.

The building features a Sonoran Desert rooftop garden that is designed to absorb sun that otherwise would heat up the building. Both floors feature large balconies with retractable windows to allow breezes to cool the building when temperatures and weather conditions are nice. Indoor cooling vents are built into the office floors to improve air quality. The eastern orientation of the building provides natural lighting, and panel-shade systems are designed to block sunlight.

Specific features that contribute to the building's efficiency include:

- Energy Star ® rated windows.
- Insulation meets current building code.
- Enhanced, ongoing energy metering and monitoring.
- Energy costs paid by tenants to encourage conservation.
- User-controlled thermostats.
- Energy Star ® rated equipment and appliances.
- Energy-efficient lighting fixtures.
- Energy-efficient bulbs.
- Skylights or other daylighting features.
- Motion sensor controls.
- Exterior light pollution reduction.
- On-site solar photovoltaics.
- Space heating and cooling.

Non-Energy Benefits:

Recycled material was used throughout the building, and a separate gray-water system inside recycles water from showers, sinks and drinking fountains to fill toilets. The toilets have two flushing switches to accommodate the different amounts of water needed for disposal.

There is zero use of CFC-based refrigerants in HVAC&R systems and zero use of HCFC refrigerants in HVAC.

State of Arizona Energy-Efficiency Programs

According to the Arizona Department of Energy's Web site, the following programs offer Arizona communities, a variety of commercial building owners, and low-income homeowners successful energy-saving options aimed at reducing utility costs:

K-12 Benchmarking Effort

The Energy Office, with cooperation from School Districts around the state, is attempting to benchmark each K-12 building. This will allow the Energy Office and each respective district to know how efficiently the school buildings in each district are performing based on EPA's Energy Star® Rating criteria.

Community Energy Program

The Community Energy Program (CEP) helps communities develop the necessary tools to engage in local energy infrastructure planning by providing them technical assistance.

Energy Efficiency and Conservation

Block Grants Available

Critical information for cities and counties in Arizona entitled to receive funds under stimulus package.

Energy Savings Performance Contracting (ESPC)

Technical and program assistance to facilitate energy efficiency programs of all types including Energy Savings Performance Contracting are provided.

Residential Building Science

The Residential Building Science Program works with the building trades to adopt an integrated approach to assessing, correcting and building residential structures based on the "House as a System" framework.

Home Performance with Energy Star®

A training and certification program for professional contractors, weatherization auditors and technicians located in the Southwestern states.

Weatherization Assistance Program

The Weatherization Assistance Program (WAP) reduces energy costs for low-income families, particularly for the elderly, people with disabilities, and children, by improving the energy efficiency of their homes while ensuring their health and safety. Programs are offered statewide through contracts with local organizations.

Energy Conservation Standards for Public Buildings

The Energy Office assists state agencies to reduce energy consumption by sponsoring training for facilities staff, conducting walk-thru energy audits of facilities, and providing information on new energy-saving products and green building strategies.

Arizona Utility Energy Efficiency Programs

Arizona has seen a high growth rate in population of 3.3 percent per year on average from 2000-2006. Arizona utilities forecast that electricity demand will grow about 3.5 percent per year, compared to 2 percent for the nation on average.

Peak demand for electricity doubled in 15 years between 1990 and 2005, from 8,000 MW to 16,000 MW. Peak demand for electricity is forecasted to double over the next 20 years, from 16,000 MW to 32,000 MW. This increase requires an additional 16,000 MW of resources, equivalent to about 32 large power plants.

The state is served by two investor-owned utilities: Arizona Public Service Company (APS) and Tucson Electric Power Company (TEP). APS is the largest electric utility with over 1 million customers in 11 of the 15 counties in the state. TEP serves nearly 375,000 customers in southern Arizona. Salt River Project (SRP) is a private corporation serving nearly 930,000 customers in the Phoenix area. Thirteen electric cooperatives serve the remaining electric customers in Arizona. Natural gas is provided by Southwest Gas and UniSource Energy Services.

Electricity Demand-Side Management

Arizona Public Service (APS)

Below is a list of energy efficiency programs currently offered by APS for their residential and business customers:

- **Energy Efficiency Solutions for Business**

APS offers a variety of incentives, training, and energy information services to business customers to improve energy efficiency.

Prescriptive, custom and energy study incentives are available to business customers for both retrofit and new construction projects. Incentive levels for specific qualifying measures vary depending on business size and the technology. APS also provides incentives for the partial reimbursement of feasibility

studies, design assistance, commissioning and retro-commissioning services intended to improve the energy efficiency of a new or existing facility. Large business customers are eligible to apply for up to 50 percent of the qualifying study cost.

APS offers Energy Information Services (EIS) for medium to large business customers. With a meter upgrade, EIS creates a detailed, easy to read load profile of actual energy consumption that can be compared against a backdrop of relevant variables.

- **Energy-Efficient Air Conditioning Rebate Program**

APS offers an air conditioning rebate for residential customers to upgrade their AC units. To be eligible, AC units must meet both the SEER and EER values. This incentive is only offered for replacement equipment; new construction is not eligible.

- **Energy Star ® Homes**

APS has teamed with a number of Arizona homebuilders to create the APS Energy Star ® Homes program. APS collaborates with the homebuilders to ensure that these Energy Star ® Homes meet or exceed the stringent 2006 EPA Energy Star ® energy efficiency standards. Energy efficiency features incorporated into these homes include improved insulation, high-efficiency air conditioning systems, highly-efficient lighting fixtures and appliances, and energy-efficient Low-E windows, amongst others. Upon completion, a certified independent contractor tests the homes to ensure they are performing to the Energy Star ® standard.

- **Discounts on Energy-Efficient Lighting**

While supplies last, APS partners with local retailers to promote and offer discounts on compact fluorescent lighting.

Tucson Electric Power Company (TEP)

Below is a list of energy efficiency programs currently offered by TEP for their residential and business customers:

- **Time-of-Use Rates (TOU)**

With the TOU program, business and residential customers receive a reduced electric rate for shifting their energy use from peak periods (Monday through Friday from 9 a.m. to 5 p.m.) to off-peak hours. TEP replaces your conventional meter, free of charge, with a meter that tracks the times of day you use electricity, then calculates the kilowatt-hour rates for those periods.

- **Low-Income Weatherization Program**

The TEP Weatherization program's aim is to reduce low-income customers' energy use, reduce their electric and gas bills and improve their comfort. Program partners include the Tucson Urban League and Pima County, who have been assisting low-income residents in reducing energy use and lowering their utility bills by implementing year-round weatherization measures at no cost to eligible customers.

- **Guarantee Home Program**

TEP's Guarantee Home program utilizes a systems approach to home construction, addressing the health and safety, comfort, durability, and energy efficiency of new homes using the latest building science information. TEP has developed construction requirements that each home must meet, and all homes are inspected at least three times during construction to verify that these requirements have been met. Homeowners participating in the Guarantee Program automatically receive the lowest electric rate offered by TEP, with the potential for customers to save up to 35 percent on their electric bill.

TEP guarantees the home's heating and cooling operating costs, plus overall comfort, for up to five years, based on the typical kilowatt hour (kWh) usage for the individual homes. If the annual cost exceeds the pre-determined amount, TEP credits the difference to the homeowner. More than 50 Tucson-area builders participate in the Guarantee Home Program.

Salt River Project (SRP)

- **Appliance Recycling**

The Appliance Recycling Program provides free pickup of extra fridges and freezers. SRP mails the customer a check for \$30. Nearly 95 percent of the unit's materials are recycled.

- **Home Energy Manager**

The Home Energy Manager provides the customer with a way to see where they can save on energy costs at home. The customer receives a personalized recommendation for controlling energy costs and use customizable calculators to find ways to save energy and water. This online tool features a virtual walk through an interactive house to learn how to make each room more energy efficient.

- **Certified Homes Program**

The SRP-Certified Homes program recognizes energy-efficient subdivisions in metropolitan Phoenix that meet specific electrical energy efficiency requirements. All of the homes are required to have high-efficiency electric heat pumps and annual energy consumption must not exceed a maximum standard (based on kWh/square foot) as determined by SRP's Cost Analysis Program. Certification is determined by a point system of component trade-offs.

- **PowerWise Homes Program**

Launched in June 2005, SRP's PowerWise Homes program works to provide participating homebuilders significant market exposure; heighten consumer awareness of energy-efficient homebuilding techniques, materials, and appliances; and spur demand for energy-efficient homes. Homes built under SRP PowerWise Homes requirements will be 35 percent more efficient than the federally recognized 1995 Council of American Building Officials Model Energy Code, and use an average of 5,900 fewer kilowatts per year compared to homes built to current municipal building codes.

- **Compact Fluorescent Lightbulbs (CFLs) Discount**

The CFL program offers discounts on light bulbs at participating stores throughout Arizona.

Dixie-Escalante Rural Electric Cooperative

Dixie-Escalante offers rebates for efficient electric heat pumps, electric water heaters, or dual fuel heating and cooling to replace less efficient equipment or in new home construction. Service rebates are also available.

Navopache Electric Cooperative (NEC)

NEC offers Time-of-Use rates to members willing to change their lifestyle by using much of their electricity during off-peak times. Members receive a discounted rate during off-peak hours to encourage them to use their electricity then. A service charge is applied.

Sulphur Springs Valley Electric Cooperative (SSVEC):

SSVEC offers a residential rebate program for homes that switch to a 14 SEER or higher electric or dual fuel heat pump.

Natural Gas Demand-Side Management

Southwest Gas

• Commercial & Industrial Services

Southwest's Industrial Gas Engineers can perform a variety of equipment- and site-specific evaluations to maximize energy efficiency decisions and improvements for commercial and industrial customers. These activities include analysis of existing energy bills, analysis of electric and gas rate schedules, and simple payback and life-cycle equipment comparisons for a variety of applications.

• Residential High-Efficiency, Water Heater Rebate Program

Southwest Gas offers a \$75 rebate on qualifying natural gas water heaters that will be installed in the residences of its Arizona customers. Qualifying water heaters can be purchased at any home appliance store, or through a licensed plumber.

• Combined Heat and Power Program

These high-efficiency CHP systems, formerly known as cogeneration, produce localized, on-site power and heat from one fuel source, such as natural gas. They can vary in size from several kilowatts (kW) to several megawatts (MW) of pro-

duced electric power, and can be used in a variety of commercial, industrial and institutional applications. For a business to be eligible for funding, CHP technologies must achieve a total fuel efficiency of 60 to 70 percent or higher. This efficiency must be demonstrated during standard operations that will vary according to the type of facility where CHP is utilized.

• Commercial High-Efficiency Equipment Rebate Program

Southwest Gas commercial customers in Arizona are eligible to receive up to two rebates each on the purchase and installation of new high-efficiency natural gas water heaters, griddles, or steamers for their existing facilities. The Arizona Department of Water Resources also installs free water-saving pre-rinse spray valves at your dish-rinsing sinks.

• Arizona Low-Income Energy Conservation Program

The Southwest Gas Conservation Program can assist customers with money-saving home improvements to increase the energy efficiency of their home. Energy-saving measures are available at no cost to income-qualified customers.

Arizona Energy Building Codes

As a home rule state, mandatory building energy codes are adopted and enforced on a local level. As of June 2007, twenty-one communities in Arizona have adopted some form of the International Energy Conservation Code (IECC). You can visit the Web site of the International Code Council at www.iccsafe.org for up-to-date jurisdictional adoption information.

In 2001, Arizona enacted legislation encouraging local governments to voluntarily adopt the 2000 IECC for residential construction and ASHRAE Standard 90.1-1999 for commercial construction. The state does require that its own buildings comply with ASHRAE Standard 90.1-1999, the most recent and model standard for energy efficiency in commercial buildings. In addition, legislation adopted in 2003 requires state agencies and universities to achieve a

10 percent reduction in energy use per unit of floor area by 2008, and a 15 percent reduction by 2011.

In 2004, Phoenix adopted the 2004 IECC Supplement, its first building energy code. It has since updated to the 2006 IECC.

The city of Tucson has adopted the 2003 IECC for residential and commercial construction. In addition, since 1998 it has implemented a Sustainable Energy Standard for city-owned and financed residential, multi-family, and commercial buildings. The standard is based on an energy code that was developed for the community of Civano. Over the years, the Sustainable Energy Standard has evolved, and in 2006, the Tucson city council updated it to equal compliance with the USGBC LEED Silver certification.

U.S. Green Building Council: LEED

What is LEED?

The Leadership in Energy and Environmental Design (LEED) Green Building Rating System™ encourages and accelerates global adoption of sustainable green building and development practices through the creation and implementation of universally understood and accepted tools and performance criteria.

LEED is a third-party certification program and the nationally accepted benchmark for the design, construction and operation of high performance green buildings. LEED gives building owners and operators the tools they need to have an immediate and measurable impact on their buildings' performance. LEED promotes a whole-building approach to sustainability by recognizing performance in five key areas of human and environmental health: sustainable site development, water savings, energy efficiency, materials selection and indoor environmental quality.

Who uses LEED?

Architects, real estate professionals, facility managers, engineers, interior designers, landscape architects, construction managers, lenders and government officials all use LEED to help transform the built environment to sustainability. State and local governments across the country are adopting LEED for public-owned and public-funded buildings; there are LEED initiatives in federal agencies, including the Departments of Defense, Agriculture, Energy, and State; and LEED projects are in progress in 41 different countries, including Canada, Brazil, Mexico and India.

How is LEED Developed?

LEED Rating Systems are developed through an open, consensus-based process led by LEED committees. Each volunteer committee is composed of a diverse group of practitioners and experts representing a cross-section of the building and construction industry. The key elements of USGBC's consensus process include a balanced and transparent

committee structure, technical advisory groups that ensure scientific consistency and rigor, opportunities for stakeholder comment and review, member ballot of new rating systems, and a fair and open appeals process.

LEED Rating Systems

• New Construction

LEED for New Construction and Major Renovations is designed to guide and distinguish high-performance commercial and institutional projects.

• Existing Buildings: Operations & Maintenance

LEED for Existing Buildings: Operations & Maintenance provides a benchmark for building owners and operators to measure operations, improvements and maintenance.

• Commercial Interiors

LEED for Commercial Interiors is a benchmark for the tenant improvement market that gives the power to make sustainable choices to tenants and designers.

• Core & Shell

LEED for Core & Shell aids designers, builders, developers and new building owners in implementing sustainable design for new core and shell construction.

• Schools

LEED for Schools recognizes the unique nature of the design and construction of K-12 schools and addresses the specific needs of school spaces.

• Retail

LEED for Retail recognizes the unique nature of retail design and construction projects and addresses the specific needs of retail spaces.

• Healthcare

LEED for Healthcare promotes sustainable planning, design and construction for high-performance

healthcare facilities.

- **Homes**

LEED for Homes promotes the design and construction of high-performance green homes.

Neighborhood Development

- **Neighborhood Development**

LEED for Neighborhood Development integrates the principles of smart growth, urbanism and green building into the first national program for neighborhood design.

Arizona PIRG Education Fund

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