



# Clearwater Signals

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## Why Green Counts

The “bottom-line” historically has been the driving force on construction projects, resulting in rather characterless, “plain box” buildings that met code at the lowest possible cost. Attributes such as energy efficiency, health and safety, and water conservation were items of minor concern. Benign neglect was, in fact, the norm when it came to the relationship between buildings and the people who occupied them. Then along came mold, air emissions, energy crises, water shortages, and other “environmental” issues related to building design and use. These issues were then raised to a national level of consciousness through high-profile lawsuits and insurance companies.

Economic, environmental, societal, and technological forces are now creating a new paradigm, winning hearts and minds in the name of *green buildings*. The U.S. Green Building Council (USGBC) is leading the way for better building performance in the context of its occupants, with the Leadership in Energy and Environmental Design (LEED) rating system being the engine behind this market revolution.

Some LEED critics say the system is based more on design than functional criteria because the rating system pertains only to new buildings. However, the USGBC is developing a rating system for existing buildings, known as LEED-EB. In essence, LEED-EB will shift the green building paradigm from design to performance.

How will this outgrowth affect the green building market? It appears that the primary “movers and shakers” of green building projects will move beyond developers and architects to include building owners and managers, thereby expanding the potential market from thousands of buildings to literally millions. That’s exponential growth, not only monetarily but also in the productivity and health of our civilization. A lofty thought, perhaps, but one that can come into being through the unbiased evaluation of green building design and use criteria. As implied in the feature article of this *Clearwater Signals* issue, it is gratifying to have our chemical-free water treatment technology be an integral part of the big picture.

## Green DPR/ABD Office Building Is Silver

### • Pulsed Power Part of the Picture •

DPR Construction, Inc. and its insurance brokerage partner, ABD Insurance and Financial Services, recently achieved a monumental goal: getting their Sacramento office building certified under the U.S. Green Building Council (USGBC). The USGBC certifies buildings using its Leadership in Energy and Environmental Design (LEED) program.

Based on accepted energy and environmental principles and a corresponding “point” system, LEED certifies buildings at four levels: Certified (26-32 points); Certified Silver (33-38 points); Certified Gold (39-51 points); and Certified Platinum (52-69 points), with 69 being the maximum number of points achievable.

According to Peggy Fischer, a DPR official who managed the LEED certification process, the USGBC notified DPR/ABD on January 28, 2004, that their office building was awarded a LEED Silver Certification. This recognition is difficult to reach, as reflected by the fact that the DPR/ABD facility is the first privately owned LEED-certified project in California’s Central Valley.

The DPR/ABD office building uses a wide range of environmentally sustainable, energy-savings, and water-savings techniques and technology. Examples include waterless urinals, open cubicles for executives, and advanced air-conditioning coils. Innovation credits were earned by: an active education program, a transportation management plan, and the chemical-free Dolphin Water Treatment System. (The Dolphin System™ was installed on a Mammoth-packaged HVAC system, as shown in photo on following page.) The essential strategy behind these choices was to ease the building’s impact on the environment, cut operational costs, and safeguard employee health and productivity.

• **Economics.** The good economic sense of going green is not always readily



The DPR/ABD Office Building in Sacramento.

apparent. The DPR/ABD office building cost \$6.2 million to build, which is about \$84 thousand more than conventional methods would have cost. However, using green technologies is expected to save at least \$435 thousand in building expenses, including energy, over the next decade.

Craig Greenaugh, DPR’s director of sustainable construction, noted other research he conducted regarding the economic impact of green buildings. “If your employees love their building and are more productive, that’s where the big money is.” Studies also show that lighting, clean air, and sound control can improve morale and reduce sick days by 15% to 40%. Besides open cubicles, each floor has four small conference rooms at the corners, placed there to block the least amount of light.

• **Water Savings.** Outside in the garden and lawn, water use for landscaping was cut by a projected 112,000 gallons a year, or 50 percent, largely by using drip irrigation and reducing the amount of lawn. The Dolphin System can also contribute to water savings, since the

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# The Environmentally Sustainable Red Bluff Peaker Power Plant

• Sixteen Dolphins All in a Row •

Sixteen, completely independent engine generators are installed at this peaker power plant in Red Bluff, California. The plant is designed to provide just the increment of electrical energy that the California electrical grid needs. Each engine/generator is rated at 2.8 MW of power and can come up to full power in less than 30 minutes. The redundancy of the setup means that if there is a problem or maintenance required on one unit, the other 15 could still operate at full efficiency. Also, the efficiency of the system is unchanged at each incremental power step. The efficiency of each unit is greater than a single cycle gas turbine and actually approaches a combined cycle gas turbine.



Red Bluff: One of 16 Dolphin Units.

was to circulate cooling water through the turbines, then through a large dry radiator with a 20 HP fan blowing air. The dry radiator had no emissions, a large parasitic load, and was ineffective at cooling the turbines in the hot, dry California summer.

To improve the cooling and prevent de-rating of the installation, 16 Evapco fluid coolers replaced the 16 20-HP radiators. Each Evapco fluid cooler uses only 8.5 HP and provides the cooling that the radiators could not. When the station is under full load, the Evapco units save over 0.13 megawatt of power.

Water treatment of the units is performed using the Dolphin System. Each tower has a 4-inch PVC Dolphin connected on the water circulation loop. The Dolphin controls biological activity and eliminates scaling, all without the use of any chemicals. Because of environmental

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Evapco Fluid Coolers at Red Bluff.

Each internal combustion motor operates on natural gas with twin turbines for air compression. When the air is compressed it gets warm. If the turbine temperature exceeds 109° F, then the power output of the generator must be de-rated.

The plant is located in environmentally cognizant, northern California. The exhaust of each engine is injected with urea, then passes through a catalytic converter to reduce NOX emissions. The original design for cooling the turbines



Entrance to Red Bluff Peaker Power Plant.

## DPR/ABD Office Building

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The DPR Dolphin Installation Team.

water released via cooling system blowdown can be “recycled” or used for landscaping purposes in most cases.

• **Energy Savings.** The building’s improved energy efficiency was accomplished by, among other things, using an air-conditioning system in which the refrigerant coils are not only finned (the usual method), but are also sprayed with water. The Dolphin System for cooling tower water treatment is estimated to save a minimum of 5% in energy costs due to the system’s capability to eliminate biofilm. Overall, such measures make the heating and air-conditioning system 34% more efficient than the minimum required in the state’s building code.

• **Again, It’s the Economy.** “The DPR/ABD building will make inroads in showing the benefits of this kind of project to developers and tenants,” according to Brian Sehnert, a senior architect with the Sacramento Municipal Utility District (SMUD) and leading advocate of the regional green-building movement. Developers typically figure only how much the “up-front, first cost” of construction will be. (Sometimes green buildings are pricier up front, largely because of the need to use recycled materials. Recently, however, “green” costs have become competitive and, in some cases, less expensive than conventional methods.) The other way of analyzing cost is by the life cycle of a building, just as DPR/ABD did. Governments or big companies that supply their own funding are more likely to use that analysis. In California, for example, two of the biggest certified green projects are owned by Ford Motor Company and Toyota Motor Sales.

*[Note: For more information on this project, contact Peggy Fischer of DPR at 916-568-3434 or peggyf@dprinc.com.]*

# How New Jersey's Howell Elementary Schools Broke New Ground

• Construction Costs Cut by 10%, Energy Demand by 60% •



**Howell Township Elementary School.**

Two Howell Township Elementary Schools are redefining the way public facility designers—and taxpayers—think about green building projects. Compared to similar schools in the region, these schools were built for less cost, use 100% outside air (no air recirculation being required), use 60% less energy than ASHRAE Code Requirements, and cost 75% less to operate on an annual basis. The “rule of thumb” has been that, although green buildings lead to less operating costs in the long run, a premium is usually paid on up-front or “first” costs.

However, these Howell School systems have broken new ground in more ways than one: (a) the projects came in *under budget*, with up-front construction costs reduced by approximately \$500,000; (b) the lower operating costs enable the schools to gain HVAC rebates from the state of New Jersey (i.e., \$800,000 for all three new schools, when including the newest project, the Howell Township Middle School, in “Smart Start” rebates); and (c) chemical-free water treatment further solidifies the environmentally sustainable aspects of the buildings, leading to better student performance. For example, the facilities’ use of 100% outside air, chemical-free water treatment design, photovoltaic systems, energy-efficient windows, and optimal lighting are important factors behind these schools’ absenteeism rates being 60% lower than the district average. The Prisco Group (the project architects) asserts that the 100% outside air HVAC systems with three levels of filtration provide a “clean room” environment, minimizing the risk of “sick building syndrome” and related effects.

• **Breathing Easy.** The key to the schools’ mechanical systems is the ability to use

100% outside air efficiently. Typical systems require some air recirculation in the mistaken belief that that this technique is necessary to keep energy costs low (i.e., all outside air must be cooled down to comfortable levels). The Howell Schools’ mechanical systems use an indirect evaporative cooler (IDEC) manufactured by ADA of Illinois to cool the incoming outside air for very little cost or energy. The exhaust air of the building is sprayed with water, cooling the exhaust air to about 63° F. This cool air is used in an air-to-air heat exchanger to cool the outside-provided air for the building. Since the two air streams (i.e., inside and outside) do not intermingle, the cooling of the incoming air is done without adding any moisture to it. This arrangement and a direct evaporative chiller allow the buildings to operate without any mechanical refrigeration, with the outside or ambient temperature up to about 75°F. Two 45-ton chillers (with one of the chillers serving in a back-up capacity) and 900 ton-hours (10.8 million Btu) of active thermal storage are used for warmer days to operate the building comfortably. The active thermal storage allows for the downsizing of the chillers and for the chillers to operate in the evening when less expensive electrical rates are available.

• **The Innovative Edge.** While these system *components* are not in themselves “brand new,” what is new is that Lentz Engineering has *designed the mechanical system around the IDEC*. The IDEC accommodates much smaller and less expensive chiller systems (because the air is pre-cooled). This reduction in chiller system size more than offsets the added cost of the thermal storage and evaporative cooling equipment.

• **The Pulsed Power Component.** Dolphin pulsed-power water treatment is an integral part of the IDEC. Water treatment on indirect evaporative coolers has always been its Achilles’ heel. The complex configuration of the heat exchangers makes them prone for scaling, slime, and odor problems. The presence and proper use of hazardous chemicals in an elementary school are, at best, problematic, and the oversight required for administering chemicals in these relatively small water volume systems often results in a litany of health and safety precautions. The chemical-free Dolphin System is the solution to this problem, providing consistent water treatment with a minimum of oversight required.

• **In Summary.** Nearly 70% of the nation’s educational facilities report air quality problems. Plus, in an era of rising energy costs, facility heating and cooling systems account for approximately 40% of total energy use in the U.S., or 65% of the electric demand on the nation’s power grid. Educational facilities are often a focal point of this usage because of their high occupant densities and related demands for high rates of ventilation. These are disturbing statistics, especially in consideration of the economic, environmental, and human health issues associated with them. And these are not separate issues: they are an interdependent matrix of challenges that have to be addressed. As these projects are currently under review for a Leadership in Energy and Environmental Design (LEED) Silver Award rating by the U.S. Green Building Council (USGBC), it is safe to say that the Howell Township Schools are among those paving the way for unified solutions.

[For More Information, Note: The Architect for the Howell School Projects is The Prisco Group, 57 Hamilton Avenue, Hopewell, NJ 08525. Tel: 609-803-2100 · Fax: 609-333-8933 • Email: contact Jason Kliwinski at [jkliwinski@thepriscogroup.com](mailto:jkliwinski@thepriscogroup.com). The HVAC project engineering firm is Lentz Engineering Associates, Inc., 44 Dale Road, Avon, CT 06001. Tel: 860-677-1383 · Fax: 860-676-1678 • Email: Contact Michael Sherber at [michael@sherber.com](mailto:michael@sherber.com). The IDEC manufacturer is ADA Systems, 425 North Gary Avenue, Carol Stream, IL 60188. Tel: 630-871-2663 • Fax: 603-871-2585 • Email: Contact Leon Shapiro at [lshapiro@interaccess.com](mailto:lshapiro@interaccess.com)]

## Red Bluff

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restrictions, chemicals were forbidden from being used on site. Prior to the installation of the Dolphins, all of the water in each tower was dumped daily and the total blowdown was run at over 80 gallons per minute. With the Dolphins total blowdown is reduced to less than 30 gallons per minute with additional energy savings.

The combination of Evapco fluid coolers with Dolphin water treatment systems has solved a serious problem at the Red Bluff Power station and helps ease California’s peak energy needs without any sacrifice to the environment.



## Clearwater Signals

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**NOTE:** The Dolphin System™ is covered by U.S. Patent 6,063,267 and other pending patent applications.  
The Dolphin System™ is covered by Canadian Patent 2,335,496 and other pending patent applications.

### UPCOMING • Conferences • Seminars • Trade Shows • Expositions • UPCOMING

Event	Date & Location	Points of Contact
<b>41<sup>st</sup> ASHE Annual Conference and Technical Exhibition.</b> Held in conjunction with the 18 <sup>th</sup> Congress of the International Federation of Hospital Engineers. <a href="http://www.ashe.org">www.ashe.org</a>	July 25-28, 2004 Gaylord Palms Resort & Convention Center Orlando, Florida	ASHE 75 Remittance Drive, Suite 1272 P.O. Box 75315 Chicago, IL 60675-5315 Questions: 312-422-3813 Fax: 312-422-3609 <a href="http://www.ashe.org">www.ashe.org</a>
<b>65<sup>th</sup> International Water Conference.</b> A technical forum for advancements in industrial, utility, and wastewater technology. Features include a technical program, exhibit hall, and information-sharing suites. <a href="http://www.eswp.com">www.eswp.com</a>	October 17-21, 2004 Omni William Penn Hotel Pittsburgh, Pennsylvania	Engineers Society of Western Pennsylvania 337 Fourth Avenue Pittsburgh, PA 15222 Questions: 412-261-0710 Fax: 412-261-1606 <a href="mailto:Conf@eswp.com">Conf@eswp.com</a>
<b>Greenbuild International Conference &amp; Expo.</b> A showcase for leading-edge green technologies and an educational program on energy-savings and environmentally sustainable buildings. Sponsored by the U.S. Green Building Council, this event marks the 3 <sup>rd</sup> Annual USGBC Conference. <a href="http://www.usgbc.org">www.usgbc.org</a>	November 10-12, 2004 Portland Convention Center Portland, Oregon	U.S. Green Building Council 1015 18 <sup>th</sup> Street, NW, Suite 805 Washington, DC 20036 Questions: 202-828-7422 or 312-541-0567 Fax: 202-828-5110 or 312-541-0573 <a href="mailto:info@corexpo.com">info@corexpo.com</a>

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