



# THE GRAPEVINE

ACEEE Summer Study at Asilomar, California

Friday, August 23, 2002

## CHP: Cooling, Heating, and Powering the Buildings of Tomorrow

by Neal Elliott



**ACEEE Industry Program Director  
Neal Elliott**

Today, combined heat and power (CHP) systems generate about 9% of the electricity used in the United States. The industrial sector accounts for most of the generation, though a significant number of institutions, especially colleges and universities, also use CHP to manage their energy needs. We have seen less penetration of CHP into the commercial buildings sector. However, a number of

prominent examples, such as the Sears Tower in Chicago, have implemented the technology successfully. While more CHP potential exists in the industrial sector, the buildings sector represents an important growth market for this family of technologies.

Recent technology innovations are making CHP a much more attractive option for buildings. Much has been written about advances in fuel cells and micro-turbines, but such mundane, prime-mover technologies as gas engines have also undergone a transformation. They now offer lower costs, greater reliability, and improved emissions, making them the generation technology of choice today for systems under 2 MW. Related technologies—such as thermally activated cooling, improved sensors and controls, and advanced heat exchangers—have allowed for better use of the heat from prime-mover technologies.

Key to successful deployment is the development of design practices and tools that can cost-effectively

## The System Solution is Nonstandard

by Harvey Sachs



**ACEEE Buildings Program Director  
Harvey Sachs**

The era of major efficiency gains from new performance standards and market transformation programs for products like furnaces and air conditioners will ultimately run its course. While some large opportunities remain, it's time to celebrate what manufacturers, advocates, and government have accomplished and begin looking at the relationship between total building performance and individual equipment efficiency ratings.

From this perspective, our metrics for furnaces and boilers (AFUE) and central air conditioners (SEER) are no longer adequate. SEER, being based on a hypothetical average climate—such as St. Louis, Missouri—is a poor guide for Arizona or Georgia. AFUE assumes that the electricity used for the air handler, draft inducer, and controls is small and relatively constant. T'ain't so for modern, high-efficiency furnaces. More importantly, any unit will give lousy performance when installed incorrectly in a leaky envelope. Duct problems alone can account for more energy waste than the difference between a SEER 10 and a SEER 13 central air conditioner—especially when it's 95°F outside.

Our goal is less heating and cooling energy (and power) per building per year, and equipment standards are just pieces of the puzzle. It is easier to give incentives for a specific SEER or AFUE than to mea-

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**Don't like the news? Make some of your own!**

Mover and shaker Alan Meier of LBNL speaks to a reporter from the *Wall Street Journal* about zone heating.



**Les is More**

Les Lambert and spouse, Karen Shepard, enjoy Thursday's display presentations before returning to Oregon to continue his campaign for State Representative. "I was so angered by the Senate energy debate that I decided to run for office," says Lambert. Good luck, Les!



Former editor of *The Grapevine* Ann Kelly (top) jokingly reads the newsletter upside-down, as current editor Mary James (bottom) slaves away at *The Grapevine* headquarters.



Mithra Moezzi keeps close track of the human factors at work at the display presentations on Thursday. What an inspirational week!



LBNL's heat island expert Hashem Akbari tries to extract a low-albedo caffeinated beverage from an empty container at the Fred Farr Forum.

# Kids' Corner



**James York** was sorry not to see the 800-lb sunfish that used to be at the Monterey Bay Aquarium, but understands why it was missing. "It was set free in the ocean because it was so big," says James. James certainly seemed to be making the most of his free time here at Asilomar. "I enjoyed playing pool and ping-pong. I went swimming in the pool but, when I didn't wear my wet suit, it was pretty cold."



**Leigh and Matthew McDonald** waxed enthusiastic over Asilomar's idyllic setting. "It's so close to nature," says Matthew. "Deer will walk into your backyard." They also were fans of their liberation from housework. "You don't have to help set the table," says Leigh. "I like the Lazy Susan," Matthew says. And they both enjoyed the perspective on their Dad's work that their second-floor room afforded them. "We video-taped him from the window."

Angelic **Halley Rainer**, with angel-in-training **Joe**, is a veteran Summer Study participant. "This is my third time," says Halley. "I enjoyed touching the starfish, sea cucumber, stingrays, and other sea creatures at the Monterey Bay Aquarium. I also really enjoyed watching the jellyfish."



Visions of sardines dance in the heads of John Espinoza, Chris Kinney, and Karen Herder at the Monterey Bay Aquarium.



## Not an endangered species

Three white men with beards gather for mutual support while waiting for another sumptuous meal outside of Crocker Dining Hall. Star *Grapevine* photographer Steve Greenberg is pictured on the left. Thanks for all the great photos, Steve!

## Seeking Project Coordinator

The Northwest Energy Efficiency Alliance is looking for one talented coordinator. To find out about all the duties and responsibilities of this rewarding position, visit [www.nwalliance.com](http://www.nwalliance.com).

## The System Solution is Nonstandard

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sure efficiency in design, construction, and performance. How do we, for example, market a hypothetical ENERGY STAR house that yields low energy bills without a single piece of ENERGY STAR equipment? Program design, implementation, and marketing will be challenging. This shift will be hard, but rewarding.

To support this change, we need measures that reflect how machines operate in the field, in varied climates, and in integrated systems with realistic duct pressure resistances. For the next decade, this information could have more impact on *field performance* of houses than any incremental improvements in federal standards.

We will also have to work closely with the people who deliver the goods—the contractors and remodelers. California (as it has so often) pioneered with Title 20, Title 24, and CheckMe, an interactive service to assure quality A/C installations. Do we want to move toward, for example, “TrustWorthy,” a brand for highly qualified contractors who understand systems and efficiency and can demonstrate that they provide quality performance and comfort?

The system issues have parallels in commercial buildings. We rate unitary EERs, but ignore latent heat under part loads with current (ASHRAE 62.1) ventilation requirements. We laud energy recovery ventilators without thinking about the fan energy, which at most conditions can be greater than the energy saved. Some programs give incentives for more efficient chillers without being able to consider the opportunities to downsize (and get better part-load performance) by reducing lighting, pump, and fan loads.

The systems approach requires educating people to literally think outside the box. Can we rise to the challenges?

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## Closeout Sale

Quick! Come to the bookstore at the Surf and Sand office before you leave. If you purchase the hot-off-the-press edition of *Energy-Efficient Motor Systems: A Handbook on Technology, Program and Policy Opportunities, 2nd Edition* you'll receive a free copy of *The Most Energy-Efficient Appliances 2001*.

### THE GRAPEVINE

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## CHP: Cooling, Heating, and Powering the Buildings of Tomorrow

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integrate CHP systems into buildings. DOE is supporting the development of these practices and tools and is in the process of establishing several regional centers to support deployment. The first center was established at the University of Illinois–Chicago, with others under consideration for the Northeast, Southeast, Texas, and the Northwest.

Unfortunately, building owners and developers also face many of the barriers that have limited the growth of industrial CHP. These include utility interconnection and tariff practices, federal depreciation schedules for CHP equipment, and uncertainty in obtaining air quality permits. ACEEE has been a leader in working to address these policy barriers. We were instrumental in the formation of the U.S. Combined Heat and Power Association, and I serve as the Policy Committee chair. ACEEE and the Association have been effective in keeping CHP on the political radar. The Bush Administration has recommended in its national energy policy that these hurdles be addressed. Congress has included CHP tax credits in the energy bill, and the conference committee is considering including interconnection language that ACEEE was instrumental in crafting.

A recent ACEEE study documents which states—Texas and New York are among them—are already taking actions to address these barriers. In addition, we are seeing some action on the federal level with the FERC interconnection rulemaking and the energy bill mentioned above.

However, more effort will be needed. Many states do not have interconnection provisions for CHP (and other distributed generation systems), and most states have yet to create environmental permitting provisions that recognize the efficiency benefits of CHP.

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## Now Hiring Evaluation Assistance Contractor

The New York Energy Research and Development Authority (NYSERDA) seeks to hire a contractor to assist in the evaluation of the New York Energy Smart Program. As a first step in the selection process, potential applicants must submit a Statement of Qualifications to perform the work that is described in the Request for Proposals (RFP) No. 720-02, which can be obtained from our Web site: [www.nyserda.org](http://www.nyserda.org).