



COOLING THE EARTH ONE HOUSE AT A TIME

a community forum on actions you can take at home

WEDNESDAY, OCTOBER 7, 2009

Co-sponsored by the Valley Climate Action Center and the City of Davis Climate Action Team

Moderator:

Don Saylor, Mayor Pro Tempore, City of Davis.

Presenters:

Steve Brennan is an engineer with the Davis Energy Group. He received his B.S. in civil engineering and an M.S. in mechanical engineering from California State University, Chico in 1994 and 1996 respectively. Early in his career, Steve worked on the GM EV1 and various other electric and hybrid electric vehicles. Since joining Davis Energy Group in the summer of 2001, Mr. Brennan has been actively investigating advanced residential heating, ventilation and cooling and domestic hot water systems. He also teaches contractors about new cooling technologies and how to bring them to the marketplace. In 2008, he became a LEED Accredited Professional and is currently managing Davis Energy Groups's LEED commissioning activities.

Jonathan Woolley is an associate research engineer for the Western Cooling Efficiency Center at UC Davis. He holds an M.S. in mechanical engineering from UC Davis where he focused his research renewable energy technologies, alternative transportation fuels, the intersection between science and policy, and strategies for living sustainably. Mr. Woolley's current research focus is on advanced cooling and ventilation strategies for commercial and multifamily residential buildings, the interactions between energy efficiency technologies, and efficient space cooling strategies suited for California climates. His special research interest lies in application of passive strategies for cooling spaces.

Benjamin Koyle is a research engineer for the California Lighting Technology Center at UC Davis. Mr. Koyle graduated from Cal Poly, Pomona in 1996 with a degree in Electrical Engineering. While at Cal Poly, he took some lighting classes and decided to make lighting his career. He attended Rensselaer Polytechnic Institute and graduated with a M.S. in Lighting. Mr. Koyle spent five years working for Lutron Electronics as an engineer and then five years at SYLVANIA. While at SYLVANIA, he taught Illuminating engineering at the University of New Hampshire. Mr. Koyle's interests include teaching, photosensors, and lighting controls.

Liz Merry is the sole proprietor of Verve Solar Consulting. She has been educating people about the solar industry since 2001, when she first organized a group of homeowners to install Photo Voltaic (PV) systems as a group in Davis. Since 2006, Ms. Merry has taught more than 1,800 students about the solar industry through many course sponsors, including Solar Electric Power Association, Renewable Energy World, Solar Living Institute, UC Berkeley Extension, and PG&E among others.

Paul Navazio, Paul Navazio is the current Assistant City Manager for the City of Davis. He joined the City staff in 2004, in the capacity of Finance Director and City Treasurer. Prior to coming to Davis, Paul served as the Budget Manager for the cities of Berkeley and Oakland. Paul currently serves as President of the Fiscal Officers' Department of the League of CA Cities, and has been recently appointed to represent the League on the Board of the California Statewide Communities Development Authority (CSCDA) which is working on implementing an AB811-style energy efficiency program on a statewide basis.

Summary:

Don Saylor, City of Davis, Mayor Pro Tempore, opened the forum by recognizing that climate change is a global crisis that we need to collectively address. He noted that the City of Davis has taken a leadership role through the Climate Action Team and the work of Mitch Sears, Sustainability Program Manager, and his office to meet the aggressive goals the City of Davis has set to reduce their carbon footprint.



Mr. Saylor informed the audience that this particular forum held on October 7, 2009 was geared at exploring actions, including low, medium and high cost home improvements, which residents could take to reduce their greenhouse gas emissions as well as to inform residents about the potential for emerging financing mechanism which may soon be available through the City to help defray the costs of improvements.

Five experts from the community and UC Davis, known for their leadership in energy technologies as well as a representative from the City of Davis presented at the forum. Mr. Saylor noted how fortunate the community is to have leaders in their field, who are setting standards for the state and nation in energy efficiency and green power, share their knowledge and expertise with the community.

Steve Brennan, Davis Energy Group, spoke about improving the home energy efficiency for the building “envelope” (the building structure), including use of various insulation types (e.g., blown cellulose, spray foam, and fiberglass padding) as well as the importance of sealing air ducts and replacing inefficient water heaters. Attic insulation should be at least 12 inches deep. Fiberglass padding can easily be installed, is relatively inexpensive and is effective, particularly if each crack and crevice is covered. When installing insulation padding in the attic, it is critical to protect the tops of the recessed light cans which may stick up from the ceiling into the attic with cages. Place the insulation padding above the cage to reduce fire hazard! Blown cellulose and foams (including soy-based foams) can be used to insulate walls. They are more expensive and require a contractor, but can be extremely effective. Depending upon the year a home was built in Davis it might or might not have insulation in the walls.

Homes without insulation should be insulated --with contractor help-- by boring holes in the walls at both the top and bottom and inserting the foam. An even higher cost, more labor intensive option is wrapping a home externally and then adding stucco. This reduces the likely leakage that occurs when existing insulation in the walls has settled and/or complete disbursement of the foam insulation is inhibited by cross bars in the wall frame.

Condensing water heaters can be 10% more efficient than traditional tank water heaters. When combined with a solar thermal water (pre)heater, 92% efficiencies can be obtained. Several new water heaters are now commercially available, including on-demand tankless units.

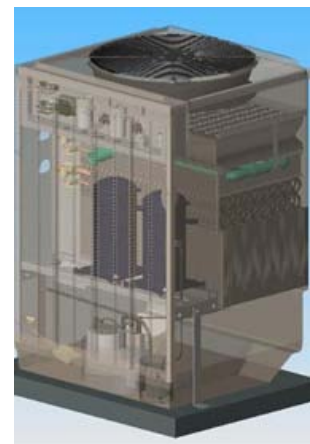
Jonathan Woolley, UC Davis Western Cooling Efficiency Center, described low to high cost strategies a home owner could take to reduce the cooling and heating demands on a home by starting on the



outside. He noted that the first step is to manage the “radiant energy” from the sun (which is greater during the summer months and lower during cloudy/rainy days and during the winter). Simple things can be done to shade the house from the sun’s rays. Planting trees (being mindful of solar/PV panel needs), building a trellis and growing drought tolerant vines or plants near the house, and installing awnings or window coverings (including ones that are retractable so as to capture more light/heat during cloudy or winter days when there is less sun).

Inside the home fans can be installed that circulate the hot air as it rises, mixing with the cooler air at the floor level.

We are fortunate, Mr. Woolley, noted in Davis to have the evening “Delta breeze” most summer nights, and can open our windows to allow the cool air inside which delays the need to turn on the AC during the day. On those days the Delta isn’t flowing or the house is particularly hot, a whole house fan can be used in the evening to vent the hot air outside, by pulling cooler night air inside. Several models exist, including those with leak protective top casings and automatic on/off switches based on a manually selected temperature setting. Mr. Woolley noted that a whole house fan run on low for a longer period of time is more efficient than at a higher speed for a shorter time period. He also ironically pointed out that studies indicate the use of thermostats actually reduces energy efficiency due to operator error as the fact that some users tend to over set the system so that it cools/heats at a more aggressive temperature than is necessary or they forget to reset the system when they are on vacation and/or the unit is not needed.



Mr. Woolley claimed that “if you have ducts, you have leaks.” He indicated that air duct sealing is a very effective immediate step a resident can take to improve the energy efficiency of a home. Sealing can be as easy as using duct tape to tape up the gaps in insulation, ensuring that the padding around the ducts is even without gaps, and sealing (with silicon jell),

tightening and/or reconnecting connections between duct sections which have come loose. More costly, but effective strategies include products like Aeroseal (by Carrier Corp), installed by a contractor, who sprays a substance into the ducts that then expands and blocks up the cracks and holes.

If all of the above cooling strategies have been used and/or it is time to replace your air conditioning (AC) or both your AC and heating (usually described as Heating Ventilation and Air Conditioning (HVAC)) unit, several new cooling technologies are on the market. Mr. Woolley noted when searching for an efficient AC unit the Seasonal Energy Efficiency Ratio (SEER) and Energy Efficiency Ratio (EER) ratings are important to look at. SEER and EER indicate how many BTU's per hour are used for each watt of power a unit draws. EER is used for room air conditioners, SEER for central air conditioners. These ratings are posted on an Energy Guide Label, which must be attached on a visible place on all new air conditioners. Many air conditioner manufacturers are voluntary participants in the EnergyStar® labeling program. EnergyStar-labeled appliances mean that they have high EER and SEER ratings.

Mr. Woolley noted that the EER was the more appropriate rating to look at for the Yolo County climate. EER for an air conditioner is calculated with its British Thermal Units (BTU) rating over its wattage. For instance, if a 10,000-BTU air conditioner consumes 900 watts, its EER is 11 (10,000 BTU/900 watts). A higher EER means that the air conditioner is more efficient. AC units such as mini-splits that are compressor based and water cooled are efficient options. Next generation AC units are evaporative coolers (not like previous technologies which became rusted and moldy), but sealed units made of durable plastic. Improvements on these in the future will include indirect AC units like OASys with cool dry air and an efficient heat exchange cycle.

Benjamin Koyle, UC Davis California Lighting Technology Center, presented the top ten things someone could do to increase lighting efficiency in their home.

- 1) When incandescent bulbs burn out, replace them with compact fluorescent lights (CFL). CFLs have the potential energy savings of 75% that of traditional incandescent bulbs and longer life times (5-10% longer). New CFLs are being marketed that are dimmable and with "better" light quality (in the red zones so skin tones seem more natural).
- 2) Add occupancy sensors, particularly useful in bathrooms, bedrooms, the kitchen, laundry room and porch area. New models are out that include a night light when off and are programmable (e.g., sensor turns light off after set number of minutes when the light was manually turned on, or sensor automatically turns the light on with motion and off after a set time frame, etc.).
- 3) Torchiere lights can now be purchased with CFL lights. These are much more efficient than traditional torchieres which also proved to be a fire hazard as the halogen light bulb temperatures can be extremely hot.
- 4) CFL downlights now exist that are dimmable with good light quality and are sold in pronged versions which reduce the "snap back" that can happen when installing CFL downlights that use a traditional socket setting. With prong sockets a new/different owner can't easily replace the CFL bulb with an inefficient incandescent bulb.

- 5) Tubular skylights provide natural daylight sun into a house and have a small footprint compared to a typical skylight. They block against high intensity mid day sun, adding ambient light into a room with or without windows.
- 6) Holiday lights are now sold with LEDs and can be used with timers so they can be set for a prescribed time. Use of LED holiday lights can save up to 25% in electricity costs compared to traditional lights.
- 7) Porch lights which tend to be left on all night should use a CFL if possible depending upon the fixture (or replace the fixture so that a CFL can be used). Timers can be added and/or the use of an occupancy sensor. Many porch lights now come with a mini energy efficient LED night light that stays on at dark and also may include an occupancy sensor. The night light remains on until the occupancy sensor senses motion, at which point the main light is turned on.
- 8) When replacing overhead ambient fluorescent light bulbs, installing T8 tubes and replacing ballasts –installed by a contractor—can save from 20-50%. Many options for T8 fluorescent lights are available at electric outlet stores.
- 9) If using incandescent bulbs, keeping them slightly dimmed (even a fraction) can save on bulb life up to 5 fold. 25% dimming will result in thousands more hours of bulb life.
- 10) Sensor plugs and power strips also save energy. Power strips can be used for computer monitors, printers, fax machines, kitchen appliances, etc. and when the power strip is switched off reduces the “stand by” power these home electronics use when not in use. These products draw power 24 hours a day, often without the knowledge of the consumer and while not providing a direct service. Standby power consumption or “phantom load” accounts for 10% or more of home electricity consumption.



As a self-described solar product “agnostic” and educator, **Liz Merry**, Verve Solar Consulting, informed the audience that there are three things that need to be thought through when considering installation of solar thermal or PV. First, location, location, location! To be effective, solar systems require at least 200 square feet of south facing, unobstructed, stable daily sun.



In calculating whether the payback for installing solar is worth it or not, an owner should evaluate their annual use and payments from their energy bill. If energy use frequently puts the owner in the Tier 3



cost category then solar is a “no brainer” and makes economic sense. With rebates now offered at both the state and federal levels and the price of energy increasing, solar has become more affordable. Closely calculating the use, estimating the panel size needed, with the sun hours available and measuring it against current utility costs with added rebate benefits will help determine if solar is a viable option for a home. Estimations can be done on

line using calculators such as those available at solar-estimate.org or at In My Back Yard at nrel.gov/eis/imby/about.html.

The final recommendation when evaluating installation of solar is to find a knowledgeable, licensed installer. Sources for finding appropriately trained professionals can be found at gocaliforniasolar.gov/

The City of Davis has 4.5% of its owner occupied residents with solar installations, a high percentage for the U.S. Ms. Merry estimated that “saturation” for the community would be around 5,000-6,000 installations. She advised when reroofing and if the roof meets the above requirements to have a professional install brackets for a solar panel even if you, yourself aren’t going to install solar as it would allow future owners to install solar without replacing the entire roof. For more information on California’s solar initiative see: californiasolarstatistics.ca.gov/reports/10-14-2009/Dashboard.html

Paul Navazio, City of Davis, Finance Director, described exciting new financing mechanisms being tried in communities in California to help defray the costs of making energy efficiency improvements and installing solar and renewable energy in a home. Communities such as Berkeley and Palm Desert as well as counties such as [Sonoma County](#) are utilizing California Assembly Bill ([AB 811](#)) as a mechanism to provide loans to home owners for these improvements with the financing pay back remaining with the home (if an owner sells) and paid back over time, helping to defray the initial upfront costs. The City of Davis recently sent out a Request for Proposals (RFP) in search of applicants to implement this program and will be working through the various issues (such as size, scale and scope) depending upon responses to the RFP. There are statewide efforts to provide public financing for pilot projects and the City of Davis is also exploring participating in a pilot.



The forum was broadcast live.