

# Energy Design Update®

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## INDUSTRY NEWS

### “Thirty Percent Solution” Defeated In Minneapolis

A broadly supported proposal to raise the stringency of the International Energy Conservation Code (IECC) went down to defeat at a code meeting in Minneapolis on September 22. Nicknamed the “Thirty Percent Solution,” the proposal consisted of 21 code changes that would have reduced energy consumption in new homes by 30%.

The dramatic vote occurred at the International Code Council’s Final Action Hearings at the Minnesota Convention Center, where code officials from around the

country gathered to weigh in on proposed changes to the 2009 International Energy Conservation Code (IECC) and the 2009 International Residential Code (IRC).

#### A Wide Range of Supporters

Supporters of the Thirty Percent Solution, formally known as code change proposal EC14, banded together as the Energy Efficient Codes Coalition (EECC). The proposal was endorsed by the US Department of Energy, the US Conference of Mayors, the American Council for an Energy Efficient Economy (ACEE), Architecture 2030, the Natural Resources Defense Council, and the New Buildings Institute, among others.

Harry Misuriello, a visiting fellow at ACEEE, attended the hearings in Minneapolis. “My role was to organize our coalition’s set of witnesses for the vote,” Misuriello told *EDU*. “Our witnesses included coalition people, some energy consultants, building code officials, and home builders. We had a representative from the New Mexico governor who came with a letter of support. We had speakers representing NASEO, the National Association of State Energy Officials. We had people from state energy offices, from the Edison Electric Institute, from the Alliance to Save Energy, from the Midwest Energy Efficiency Alliance – speaking on behalf of all the other regional energy efficiency groups. We had the Sierra Club, and we had affordable housing advocates. So we had a wide range of witnesses.”

#### Cost-Effective Measures

The 30% reduction goal was chosen because it is both achievable and affordable; the measures required to implement the goal are cost-effective, well understood, and readily available. Among the measures included in The Thirty Percent Solution:

- Lower maximum U-factors and solar heat gain coefficient (SHGC) values for windows in climate zones 1, 2, and 3;

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 **Wolters Kluwer**  
Law & Business

- Higher minimum ceiling R-values in all climate zones except climate zone 1;
- Higher minimum wall R-values in all climate zones;
- Higher minimum floor R-values in climate zones 7 and 8;
- Higher minimum basement wall R-values in climate zones 2, 3, 6, 7, and 8;
- New air barrier requirements for walls behind showers and tubs, walls behind fireplaces, attic kneewalls, skylight shaft walls, walls adjoining porch roofs, and staircase walls;
- A requirement specifying air barrier details for insulated floors over unheated garages;
- A requirement for air barrier inspections; and
- A requirement (with some exceptions) for ducts to be located within a building's thermal envelope.

### Into the Wee Hours

Although many of the voters in Minneapolis understood the momentous importance of "Thirty Percent Solution," its downfall occurred in an obscure setting and was barely noted by the national media. The EC14 hearing, which began on September 21, stretched past midnight. At 1:15 a.m. on September 22, the exhausted building officials who remained in the room finally cast their votes.

One witness to the drama was Chris Mathis, the president of Mathis Consulting Company in Burnsville, North Carolina. "It happened early morning in a near-empty conference room in Minneapolis, without fanfare, by a group of 143 building officials working on our model energy code," Mathis wrote later. "While I am sure that most of our nation's building officials are fully supportive of improved building energy efficiency, most of them were not in the room when this vote took place."

### "Costly and Unachievable"

The fight to defeat the Thirty Percent Solution was spearheaded by the National Association of Home

Builders (NAHB), with added support from Icynene Incorporated and Pilkington Glass. According to an Alliance to Save Energy press release, "The principal opponents argued that now isn't the time to adopt The Thirty Percent Solution, which they said is too costly to homeowners, technologically unachievable, and burdensome to code officials."

For decades, the NAHB has consistently opposed energy-efficiency improvements to building codes. (Ironically, after the hearings were over, the NAHB announced that the defeat of the Thirty Percent Solution was "a victory for cost-effective energy efficiency solutions.") Icynene's opposition to the proposal was based on fears that its open-cell spray foam insulation, which has an R-value of only 3.6 per inch, will lose market share to closed-cell spray foam if energy codes are tightened. The opposition of Pilkington Glass was based on fears that lower minimum SHGC requirements for windows will favor glass with a sputtered (soft-coat) low-e coating, a product manufactured by its chief rival, Cardinal Glass, but not by Pilkington.

### Undermined Again

Most proponents of the Thirty Percent Solution were motivated by concern over global climate change and energy security. "In my closing remarks, I pointed out that the issues could not be more stark," said Misuriello. "The opponents to this measure were all from industry, while the people on our side were all public-policy folks who believed this measure to be in the best interests of the country. I urged those who would be voting to look at this issue broadly – not look at it as a narrow turf battle between building product manufacturers. That message *almost* got across."

In order to pass, the Thirty Percent Solution needed approval from two-thirds of the voters present. With 52 voters opposed and 91 voters (63.6%) in favor, the

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proposal went down to defeat. Michael DeWein, the technical director of the Building Codes Assistance Project in Mechanicville, New York, was in the room during the voting. “It was pretty close,” DeWein told *EDU*. “My guess is that if there were a few more people in the room it would have passed.”

Mathis was saddened by the vote. “I have traveled around the country talking to building code officials and I am at a loss to explain how their passion for better, more energy-efficient buildings can be so undermined,” he wrote.

In the wake of the defeat of the Thirty Percent Solution, the measure’s supporters have vowed to bring the issue to individual states. “By my count, there are eight or nine state jurisdictions that are going the ‘thirty-percent’ route on their own,” said Misuriello. “I don’t think that is good news for the ICC, an organization whose customers have decided to craft their own products. A number of the witnesses at the Minneapolis hearing argued, ‘Please help us stay in the I-code family on energy-code requirements.’ ”

### Small Victories

Weary delegates awoke early on Monday morning to return to the convention center for more voting on proposed changes to the IECC and IRC. In the wake of the defeat of the Thirty Percent Solution, energy-efficiency proponents lobbied in favor of a series of more limited proposals; in essence, the individual measures that made up the Thirty Percent “package” were each considered separately.

As Monday’s voting progressed, it became clear that a partial victory could be snatched from the jaws of defeat. Voters considered each the 21 measures included in the Thirty Percent Solution, approving

11 measures in full and two measures in part. Among the measures that passed:

- A new requirement that any duct system that is not located within a building’s thermal envelope must be tested for leakage (see Table 1);
- A new requirement calling for either compliance with a thermal bypass checklist inspection or blower-door testing;
- An elimination of the performance-path tradeoff that allows lower building envelope specifications in exchange for high-efficiency HVAC equipment;
- New requirements for high-efficiency lighting;
- Modest increases in the minimum R-value requirements for walls, floors, and basement walls in some climate zones; and
- Modest decreases in the maximum SHGC and U-factor requirements for windows in some climate zones.

### Eliminating Equipment-Versus-Envelope Tradeoffs

According to Misuriello, the IECC and IRC have been significantly improved. “I think that one of the biggest accomplishments was reducing tradeoffs between envelope measures and mechanical measures,” said Misuriello. “In states where there is a significant use of the performance path, this change will go a long way toward strengthening our buildings.”

The problem with equipment-versus-envelope tradeoffs is that builders in areas of the country where high-efficiency furnaces are common are given a free ride to lower the specifications of a home’s envelope, at least when they follow the performance path of the energy code.

Supporters for proposal EC91 – the proposal to eliminate the tradeoffs – argued, “In many northern states,

**Table I—Approved Changes to the 2009 IECC and 2009 IRC**

Proposal	Description
EC18	In the IRC and IECC, the maximum window U-factor is reduced to 0.55 in zones 2 and 3
EC22	In the IRC, the maximum SHGC is reduced to 0.35 in zones 1, 2, and 3
EC26	In the IECC, the maximum window SHGC is reduced to 0.30 in zones 1, 2, and 3
EC28	In the IRC and IECC, the minimum R-values for walls in zones 5 and 6 is increased from R-19 to R-20
EC33	The minimum R-value of basement wall insulation in zones 6, 7, and 8 is increased from R-10 to R-15
EC35	In the IECC only, minimum R-value requirement for floor insulation in zones 7 and 8 is increased from R-30 to R-38
EC36	In the IRC and IECC, R-5 basement wall insulation is required in the northern portion of zone 3 (north of the “warm humid” line)
EC64	Building envelope airtightness must be verified by one of two methods: a blower-door test showing air leakage below 7 ac/h @ 50 pa [a low bar], or compliance with a thermal bypass checklist inspection
EC71	All ductwork not completely within a building’s conditioned space must be tested for leakage (see <i>EDU</i> , November 2007)
EC84	In the IECC and IRC, a new requirement for 50% of lamps in permanently installed fixtures to be CFLs or T-8 linear fluorescent lamps; either screw-base lamps or pin-base lamps are acceptable
EC91	In the performance path of the IECC, the tradeoff allowing reduced building envelope specifications in exchange for high-efficiency HVAC equipment is eliminated; the standard reference house must henceforth assume the use of the same HVAC equipment as the proposed design, rather than equipment barely meeting federal minimum appliance standards

furnace efficiencies above 90% AFUE are the norm, yet the performance path gives trade-off credit based on a 78% AFUE federal minimum furnace level established many years ago that may no longer even be available in that market."

### Bringing Ductwork Into the Envelope

DeWein was happy to see the passage of EC71, the duct tightness measure. "The new ductwork requirements represent a huge change," DeWein told *EDU*. "My hope is that the design community will finally be making space in their designs for ductwork."

Todd Taylor, the manager of residential building energy code R&D at the Pacific Northwest National Laboratory in Richland, Washington, agreed with DeWein. "We believe this measure [EC71] will save more energy than any individual change ever before made in the code," said Taylor.

### Half Empty or Half Full?

After the dust settled in Minneapolis, reactions varied. "We moved the bar a little bit," Mathis told *EDU*. "We got some of the stuff in there. The disappointment for me isn't that the group of proposals didn't pass; the thing that is frustrating is that after thirty years of training and experience on what it takes to make buildings slightly more energy efficient, we should realize that thirty percent isn't that much. It's low-hanging fruit;

it's easy. This is stuff we learned how to do in 1978 – a little bit more insulation, a little bit better windows, and paying a little bit more attention to air leakage and duct leakage. What's frustrating is the active unwillingness of people to embrace these steps as necessary, as patriotic, as important to the national economy."

Misuriello sees the glass as half full. "In terms of approaching our goal, I think we made substantial progress," said Misuriello. "Right now we are looking at the actual measures that got through to update our analysis of expected energy savings. No matter how the exact number comes out – whether it is 16.3 percent or 18.2 percent or whatever it is – this should be the largest energy-efficiency increase ever seen in this code. So I think the results are significant."

Of course, even the passage of stringent new code measures does not guarantee that homes will be built to code. "I think this is a significantly better energy code," said DeWein. "Hats off to the organizers, across the board. Not to discount everybody's fine work, but now comes the real work of getting the technology in the buildings and teaching builders and code officials. As we all know, code compliance is awful almost everywhere. The gap between the current compliance level and 100 percent compliance is huge. We could probably get to the 30 percent energy savings point just by improving compliance."

## NEWS BRIEFS

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### Tax Credits For Renewable Energy Equipment Are Extended

WASHINGTON, DC – When President Bush signed the controversial \$700 billion bill to bail out financial institutions, solar equipment manufacturers cheered. The jubilation was sparked not by the rescue of Wall Street firms, but by attachments to the main bill extending tax credits for renewable energy equipment. Hidden in the bail-out bill's fine print were the following provisions:

- An extension of the tax credit for builders of new energy-efficient homes through the end of 2009.
- An eight-year extension (through 2016) of the tax credit for 30% of the installed cost of residential, commercial, and utility-owned photovoltaic and solar thermal equipment; while this tax credit had previously been capped at \$2,000, the cap has now been eliminated.
- A new homeowner tax credit for 30% of the installed cost of residential wind turbines of 100 kilowatts or less, up to a maximum tax credit of \$4,000, guaranteed through the end of 2016.

- A new homeowner tax credit for 10% of the installed cost for some geothermal heat pumps, up to a maximum tax credit of \$2,000.
- An extension of the homeowner tax credit for residential energy-efficiency retrofit measures, including added insulation, new windows and doors, and efficient air conditioners, through the end of 2009.
- A new tax credit (capped at \$300) for some biomass stoves.

The bill is posted online at <http://thomas.loc.gov/cgi-bin/query/z?c110:H.R.1424.eas>.

### Eric Doub's Home Achieves Net Zero Energy

BOULDER, CO – *EDU* salutes Eric Doub and Catherine Childs, whose Boulder home (see *EDU*, September 2005) has become the third house in the country to demonstrate 12 consecutive months of net-zero-energy performance. Doub and Childs eliminated their natural gas appliances in the summer of 2007. From September 1, 2007 to August 31, 2008, the Doub/Childs house used 1,165 kWh less



electricity than was produced by the home's 8.7-kW photovoltaic array. The first two net-zero-energy homes in the US were the Habitat for Humanity house in Wheat Ridge, Colorado (see *EDU*, February 2007) and the home of André Rambaud in North Hancock, Massachusetts (see *EDU*, June 2007).

### **Zero Energy Challenge In Massachusetts**

LEXINGTON, MA – Four electric utilities will award \$50,000 in prizes in a contest to determine the Massachusetts single-family home with the best HERS Index. The contest, dubbed the Zero Energy Challenge, is sponsored by the National Grid, NSTAR, Unitil, and Western Mass Electric. All homes must be completed by December 10, 2009. The contest currently has six entrants: Bread and Roses Housing (Lawrence, Massachusetts), G&G Realty Trust (Newburyport), Transformations Incorporated (Townsend), Rural Development Incorporated (Greenfield), Mark Sevier (Sudbury), and Bick Corsa (Montague). For more information, visit [www.zechallenge.com](http://www.zechallenge.com).

### **US Court Prevents Albuquerque From Raising Minimum Appliance Efficiency Standards**

SANTA FE, NM – On October 3, a federal district court granted a preliminary injunction to stop the city of Albuquerque from enforcing minimum energy-efficiency standards for residential heating and cooling equipment installed in the city. The judge invalidated the city ordinance, which calls for new furnaces to have a minimum efficiency of 90% AFUE and new residential air conditioners to have a minimum efficiency of 14 SEER, because it “infringes on an area preempted by federal law.” A date for a final hearing on the case will be set in November.

### **NYSERDA Funds Wood-Fueled Appliance Research**

ALBANY, NY – The New York State Energy Research and Development Authority (NYSERDA) has announced \$1.6 million in grants to fund nine research projects aimed at evaluating and improving wood-fueled appliances, including residential and commercial wood stoves, pellet stoves, wood boilers, and grass-pellet burners. According to the Environment News Service, the grants will fund R&D projects on gasification boilers and grass-pellet appliances, research on the feasibility of small-scale wood boilers, and a study of particulate emissions from wood-burning appliances.

### **California Commission Calls For New Homes To Be Net-Zero-Energy By 2020**

SACRAMENTO, CA – A plan adopted by the California Public Utilities Commission (CPUC)

calls for new homes to be net-zero-energy by 2020. “Squeezing greater efficiency out of our current uses of electric power is our best and least costly source of additional supplies, allowing California to grow and prosper,” said Commissioner John Bohn. The CPUC’s “Long-Term Energy Efficiency Strategic Plan” has the support of the California Energy Commission. A report in the *San Francisco Chronicle* points out one problem with implementing the plan: “Many of the key steps are outside the utility commission’s legal jurisdiction.” To read the plan, visit [www.cpuc.ca.gov/PUC/energy/electric/Energy+Efficiency](http://www.cpuc.ca.gov/PUC/energy/electric/Energy+Efficiency).

### **New York Gas Utility Announces Energy Efficiency Program**

SYRACUSE, NY – A New York utility, National Grid, has announced a \$4.89 million energy-efficiency program targeting natural gas customers. According to *Central New York Business News*, the program will offer incentives for the purchase of high-efficiency gas furnaces, boilers, water heaters, and Energy Star windows. The program will also offer low-income customers free insulation upgrades, free air-sealing, and free replacement of inefficient space-heating appliances. National Grid has obtained approval to fund the program with a utility bill surcharge amounting to about \$6.85 per customer per year.

### **Lennox’s SunSource: A Residential AC Unit With A PV Module**

DALLAS, TX – A new residential air conditioner from Lennox Industries, the SunSource, comes with a 190-watt photovoltaic (PV) module. The PV module is designed for remote mounting on a pole or a home’s roof. Since the SunSource air conditioner draws about 2,500 watts, the PV module is incapable of powering the compressor; rather, it merely reduces the air conditioner’s total watt draw by about 190 watts or less when the sun is shining. According to Bill Cunningham, the cooling product manager for Lennox, the PV module will provide about 8% of the electricity needed to operate the SunSource when the sun is shining. Cunningham estimates that the typical upcharge for the SunSource (compared to a Lennox air conditioner without the PV feature) will be between \$3,000 and \$4,000.

### **Tennessee Developer Announces Partnership With ORNL**

OAK RIDGE, TN – A Knoxville real-estate developer, Schaad Companies, has begun construction of four energy-efficient homes at an Oak Ridge subdivision called Crossroads at Wolf Creek. Designed to consume 50% less energy than code-minimum

homes, the homes will include structural insulated panels, attic radiant barriers, liquid-applied water-resistant barriers, and rooftop photovoltaic arrays. Under the terms of an agreement called the Zero Energy Building Research Alliance (ZEBRAAlliance), Schaad has pledged to leave the four homes unoccupied for 30 months after construction has been completed, in order to allow researchers from Oak Ridge National Laboratory (ORNL) to monitor the performance of the buildings. "We commend Schaad for its leadership among Tennessee builders in joining the DOE Building America program's Builders Challenge," said Johnny Moore, ORNL's assistant manager for Science. "This project will accelerate DOE's progress toward its goal of zero energy homes." Once the monitoring period is complete, each of the 2,800-square-foot homes will be put on the market for about \$300,000. For more information, visit [www.zebralliance.com](http://www.zebralliance.com).

### **New Study Warns Of South-Africa-Style Electricity Crisis In US**

DENVER, CO – A new study by the NextGen Energy Council concludes that the US faces a significant risk of power brownouts and blackouts as early as next summer. The study, "Lights Out in 2009?," warns, "If particularly vulnerable regions, like the Western US, experience unusually hot temperatures for prolonged periods of time in 2009, the potential for local brownouts or blackouts is high, with significant risk that local disruptions could cascade into regional outages that could cost the economy tens of billions of dollars." According to the report, US baseload generation capacity reserve margins "have declined precipitously to 17 percent in 2007, from 30 to 40 percent in the early 1990s." The study's authors contend that maintaining a 15% reserve margin will require US utilities to invest in 120 gigawatts of new generation capacity by 2016. The study cites the example of South Africa, where "a years-long electric power crisis is escalating, as rolling brownouts and blackouts harm the economy (mining production has decreased 10 percent), and no solution is seen for five years." The study, "Lights Out in 2009?," is posted online at [www.nextgenenergy.org/Portals/NextGen/studies/Nextgen\\_Lights\\_Out\\_Study.pdf](http://www.nextgenenergy.org/Portals/NextGen/studies/Nextgen_Lights_Out_Study.pdf).

### **Chicago's Greenest Citizen**

CHICAGO, IL – After the *Chicago Tribune* set out to identify the Chicago resident with the smallest carbon footprint, reporters narrowed their search down to a dozen candidates before choosing Ken Dunn, 65, as Chicago's greenest human. A Peace Corps alumnus, Dunn is the son of Mennonite farmers from

Partridge, Kansas. Among Dunn's virtues: he heats his home with a wood-burning furnace, he rides his bicycle year round, he grows his own vegetables, and he hangs his laundry on a clothesline. According to Zeke Hausfather, chief energy scientist at Climate Culture, "It would definitely make a huge difference if we all became Ken."

### **Boulder Considers New Energy-Efficiency Requirements For Residential Additions**

BOULDER, CO – The Boulder Planning Board is considering new code measures requiring residential additions to meet energy-efficiency standards that increase in stringency as the addition gets larger, according to the *Daily Camera*. "Because Boulder homes and businesses are responsible for 76 percent of Boulder's greenhouse gas emissions, increasing the current standards for energy efficiency in new construction is critical to see the reductions we are striving to achieve with our Climate Action Plan," said Beth Powell, an employee in Boulder's Environmental Affairs Office.

### **New York City Will Fine Stores That Air Condition Sidewalks**

NEW YORK, NY – The New York City Council is considering a new ordinance making it illegal for retail stores to lure pedestrians indoors by opening their doors to air condition the sidewalks on hot days. The proposed legislation is expected to pass. "The only group that should be opposing this sensible legislation is OPEC," said Eric Goldstein, a Natural Resources Defense Council lawyer. The *New York Times* cited calculations by Steven Winter Associates, which estimated that a 5,000-square-foot store would pay \$380 in additional electricity bills if it left its doors open while the air conditioning was running.

### **Japanese Government Announces New Residential PV Incentives**

TOKYO, JAPAN – The Japanese government has launched a new incentive program for the installation of residential photovoltaic systems, according to Reuters News Service. The government is offering rebates of 10% of the installed cost of PV systems – a \$1,887 rebate for the typical \$18,870 system. In June 2008, the Japanese government announced a target of increasing the capacity of residential PV systems by a factor of ten between now and 2020.

### **Maine's Wood Pellet Retailers Urge Customers To Be Patient**

BANGOR, ME – The demand for wood pellets in Maine continues to exceed supply. The *Bangor Daily*

*News* reported, "In the last several weeks, a number of pellet fuel distributors in Greater Bangor have been running out of pellets within a day or two of shipments." Bruce Linkletter of Maine Wood Pellets Company in Athens, Maine, said that his plant is "struggling to keep up." According to Urban Dyer, warehouse manager at Dysart's in Hermon, customers have been buying wood pellets in bulk all summer long. "We were selling 60 or 70 tons a day and it didn't take long for them to disappear," Dyer said.

### Bedroom Fans May Lower SIDS Risk

CHICAGO, IL – Babies who sleep in a room with a fan have a 72% lower risk of sudden infant death syndrome (SIDS) than babies who sleep in a room without a fan, according to a study published in *The Archives of Pediatrics and Adolescent Medicine*. The research did not consider the effects of fresh-air ventilation; rather, it studied the effect of fans that merely stir up indoor air. One of the study's authors is Dr. De-Kun Li, a reproductive and perinatal epidemiologist at Kaiser Permanente's division of research in Oakland, California. Interviewed by the *New York Times*, Li said, "If parents wanted to do more to reduce the baby's SIDS risk, they can add a fan."

### Near-Zero-Energy Homes In Washington State

ISSAQUAH, WA – A Washington builder, Howland Homes, has broken ground in Issaquah on a 10-unit townhouse development designed to be close to net-zero-energy (see "News Briefs," *EDU*, May 2007 and November 2007). Dubbed the ZHome project, the buildings will have 11-inch-thick cellulose-filled double-stud walls, ground-source heat pumps, rooftop photovoltaic arrays, and real-time energy monitors with living-room displays. Aaron Adelstein, executive director of the Built Green program of King and Snohomish counties, claims that the ZHome development is "the first multi-unit, zero-energy project in the country." Energy consultants from the Washington State University Extension Energy Program are acting as the project's technical advisors. Refreshingly, exaggerated claims have been eliminated from the proj-

ect's Web site, which notes, "Photovoltaic panels are the least cost-effective component of the project, costing about \$35,000 per unit, for about 33% of the total energy budget." The Web site accurately points out, "The wild card in getting to zero net carbon/zero net energy is the residents. Studies show that energy use in the same home with different families can vary dramatically. Ultimately, achieving this benchmark will be in the residents' hands." Construction is expected to be complete by October 2009; the homes will be put on the market for "a little above \$400,000" per unit. For more information, visit [www.z-home.org](http://www.z-home.org).

### Subsidized Home Energy Audits Available In North Carolina

DURHAM, NC – The North Carolina Cooperative Extension Service, in collaboration with the North Carolina Energy Office, is offering subsidized energy audits (including blower-door testing) to Durham County residents as part of its E-Conservation Program. Homeowners will be charged only \$100 for a two- to four-hour audit, which usually costs \$500. For more information, contact Deborah McGiffin at (919) 560-0521, or [dmcgiffin@co.durham.nc.us](mailto:dmcgiffin@co.durham.nc.us).

### Quote Without Comment

"Across the nation, the realization is taking hold that rising energy prices are less a momentary blip than a change with lasting consequences. The shift to costlier fuel is threatening to slow the decades-old migration away from cities, while exacerbating the housing downturn by diminishing the appeal of larger homes set far from urban jobs. ... Some now proclaim the unfolding demise of suburbia. 'Many low-density suburbs and McMansion subdivisions, including some that are lovely and affluent today, may become what inner cities became in the 1960s and '70s – slums characterized by poverty, crime and decay,' declared Christopher B. Leinberger, an urban land use expert, in a recent essay in *The Atlantic Monthly*." ["Fuel Prices Shift Math for Life in Far Suburbs" by Peter Goodman, *New York Times*, June 25, 2008]

## RESEARCH AND IDEAS

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### Finding Leaks With A Theatrical Fog Machine

The typical blower-door test is conducted to determine a number – for example, infiltration airflow (in cfm) at a pressure difference of 50 pascals. Although the blower-door number provides useful information, it doesn't tell a contractor where leaks are located.

Once a house is depressurized, however, air leaks can be located by walking from room to room feeling for drafts, or by waving a smoke pencil near likely problem areas. In recent years, these traditional techniques for locating air leaks have, in many cases, been

overtaken by a more dramatic method: the use of a theatrical fog machine.

A fog machine is a portable electrical appliance that produces smoke-like fog for dances, Halloween parties, or theatrical events. A fog machine includes a heating element that vaporizes “fog juice,” a solution of water and glycol or water and glycerin. Fog machines are widely available at prices ranging from \$25 to \$900.

### Creating Reference Holes

Unlike a conventional blower-door test, which requires a house to be depressurized, a fog test requires a house to be pressurized. The test is usually performed after the house has been insulated, but before the drywall has been hung.

With the fog machine located indoors, two or three windows in rooms distant from the fog machine are cracked open. Observers are stationed outdoors. The fog machine is turned on; once the observers see fog escaping from the deliberately cracked windows – the so-called “reference holes” – the windows are shut and the test begins. The observers then look for escaping fog, which can show up almost anywhere: for example, at the mudsill, at the eaves, or around windows (see Figure 1).

Henri Fennell, a building envelope consultant and president of Foam-Tech in North Thetford, Vermont, is widely credited with developing a useful protocol for performing the fog machine test. In fact, Fennell’s protocol has been submitted to ASTM as a proposed standard. “The test requires reference holes at the extremities of the area being tested,” Fennell told *EDU*. “If you put the fog machine in the south end of the building



Figure 1. When theatrical fog is introduced into a pressurized building, it’s usually easy to spot any air leakage locations. [Photo credit: Dale Caldwell]

and the leak is on the north side, it can take a long time for the fog to get there unless you leave deliberate holes open until fog comes out of each hole. Then you close the windows and look for fog.”

The smaller the building, the easier it is to test. “For a residential test, we can fill the whole building with fog,” Fennell explained. “But with a large commercial building we can’t do that. So we ‘bag’ an area with polyethylene – for example, after the first window is installed – and test a smaller area. If we aren’t getting any fog flow, we poke a hole in the bag with a knife. When we see the fog come out, we patch the hole with duct tape.”

### Convincing The Skeptical

The fog test provides valuable information, is simple to conduct, and quickly convinces skeptical onlookers. “It’s qualitative, not quantitative,” said Fennell. “Anyone who sees the fog coming out gets it right away. The test doesn’t require a college degree to interpret it.”

One fog-test fan is Marc Rosenbaum, an energy consultant and founder of Energysmiths in Meriden, New Hampshire. “My experience is that if you have a blower-door specification for new construction – so many cfm at 50 pascals – and the test comes in 10 percent more than the specification, the builder will usually ask, ‘Why isn’t that good enough?’ – especially if you are fairly far along in the construction process,” Rosenbaum recently told *EDU*. “But when you use a fog machine, and you have fog blowing out of a hole in the building, I’ve never had anyone point to it and say, ‘Why isn’t that good enough?’ ”

### All You Need Is A Window Fan

In a small building, a fog test can even be performed without a blower door. “All it takes is a window fan,” said Fennell. “Just be sure you have a positive pressure, and go out into the front yard and look at the house. The big holes show up very easily.”

In a very large space or a very leaky building, however, a window fan will be less effective. “If you need to create a pressure difference across a boundary, it’s easier to do when the envelope is tight,” Fennell noted.

### Ducts, Too

Gary Nelson is the president of The Energy Conservatory, which manufactures the Minneapolis Duct Blaster. According to Nelson, fog machines are increasingly used for duct testing.

“You tape up all the registers and you pressurize the ducts,” Nelson told *EDU*. “Then you introduce fog



into the Duct Blaster – you aim the fog nozzle at the fan blades, without letting the fog get drawn into the vent holes in the motor, and you watch where the fog pours out. Sometimes you may be working with an HVAC contractor who says, ‘This is a good duct system. This is the way we have always done it. This is normal.’ Well, when you show them the fog coming out of the leaks, they shut up really fast.”

### Buying A Fog Machine

One of the virtues of the fog test is that the necessary equipment is inexpensive. Several years ago, The Energy Conservatory sold a fog machine model for \$350. As prices (and profit margins) for fog machines began dropping, however, the company decided it wasn’t worth selling fog machines anymore. A recent Web search showed that a 400-watt fog machine can be purchased for as little as \$24.95.

As with any tool, you get what you pay for. Marc Rosenbaum uses a Rosco fog machine that cost him about \$400. Fennell also favors Rosco machines (see Figure 2). “The most common problem with most fog machines is that they gum up,” said Fennell. “You have to follow the manufacturer’s instructions



Figure 2. The Rosco 1900 fog machine retails for about \$800.

for maintenance. As long as you flush them out between uses with distilled water, they will last a long time.”

Fog machine testing almost always yields valuable information. But according to Rosenbaum, there’s another reason to bring a fog machine to your next blower-door test: “It’s a lot of fun.”

## NEW PRODUCTS

### Retrofit Motors That Mimic ECMs

Electronically commutated motors (ECM) are much more efficient than permanent split capacitor (PSC) motors, especially at low speeds (see *EDU*, August 1995). An ECM is a variable-speed permanent magnet brushless DC motor paired with a programmable control. ECMs were originally developed by General Electric, which trademarked the term “electronically commutated motor.” Regal Beloit, a motor manufacturer in Beloit, Wisconsin, now holds the license to manufacture ECMs.

Compared to a conventional furnace, a furnace with an ECM-equipped blower can save significant amounts of electricity, especially in homes with electronic air filters or ventilation protocols that require the furnace fan to run continuously. “When GE introduced the ECM, the key development was not the motor but the control mechanism,” explains John Proctor, a well-known air conditioning consultant and the president of Proctor Engineering Group in San Rafael, California. “GE worked with the furnace manufacturers to develop controls that provide a constant cfm under varying conditions.”

Unfortunately, most residential furnaces and air handlers are sold with inefficient PSC blower motors. Until recently, anyone interested in purchasing a furnace with an ECM-equipped blower had few choices, since the option was available only in top-of-the line models with an upcharge of \$1,000 or more.

Now, however, two motor manufacturers have developed ECM-mimicking motors designed for retrofit installation in almost any residential furnace or air handler. One of the two new motors, the Evergreen IM, is manufactured by Regal Beloit, the current manufacturer of ECMs. The other motor, the Concept 3 from McMillan Electric, was developed in consultation with John Proctor.

Although neither motor provides one of the touted (but questionable) benefits of an ECM – the ability to maintain a constant airflow under changing conditions – they promise to be easy to install, energy efficient, and significantly cheaper than a replacement ECM. Anyone who wants a furnace with ECM-like performance can now purchase an inexpensive fur-

nance and replace the manufacturer's inefficient PSC motor with a new retrofit motor.

### The Evergreen IM Motor

Regal Beloit's Evergreen IM is a dual-voltage (120 and 240 volt) motor that is compatible with virtually all residential furnaces and air handlers (see Figure 3). The Evergreen IM is a variable-speed, permanent magnet brushless DC motor – the same type of motor used in furnaces equipped with an ECM. "This is not new technology," said Christopher Mohalley, master ECM trainer at Regal Beloit. "The only difference between the Evergreen and an ECM is in the computer – we've changed the program so that it can be applied to a retrofit system."

ECM-equipped blowers are programmed to provide a constant airflow in spite of changing circumstances – for example, to handle an increasingly dirty filter. "Variable-speed ECMs are programmed by the HVAC manufacturer," explained Mohalley. "They are 'taught' at the factory by Carrier or Lennox or whoever. With a retrofit motor, we don't know which furnace it's being put into, so we had to make the motor more generic. As static pressure goes up, the Evergreen will produce less airflow. We are not promoting it as a constant-airflow motor, because it isn't one."

For those interested in energy efficiency, however, the constant-airflow feature of an ECM is relatively unimportant. The way that an ECM maintains a constant airflow is by increasing the motor's horsepower output (and watt draw) in response to rising static pressure; this feature increases, rather than decreases, energy use. Moreover, according to one recent study



Figure 3. The Evergreen IM is an energy-efficient variable-speed motor that can be installed as a replacement for the factory-installed motor in most residential furnaces.

("Central Air Conditioning in Wisconsin," Energy Center of Wisconsin, 2008), many small air conditioners are set up with too much airflow; lower airflows, therefore, have the potential to improve efficiency.

### Choose Your Horsepower

The installer of an Evergreen IM motor can choose its horsepower output. "There are two Evergreen models – a ½-horsepower and a 1-horsepower model," said Mohalley. "You can configure either motor at three different horsepower levels. For example, if you are replacing a 1/3-horsepower motor, you would use the ½-horsepower model, and configure it to run at 1/3 horsepower."

Brushless DC motors are inherently more efficient than PSC motors. "The Evergreen motor runs at 80% efficiency compared to 60% efficiency for a PSC motor," claimed Mohalley. "So it's always going to be more efficient than a PSC. When it comes to controlling the Evergreen, the only way to use less energy is to run the motor slower. The good thing is, when you slow down the motor, its efficiency doesn't drop."

The Evergreen motor's biggest efficiency benefit will occur in homes where the furnace fan runs around the clock. "When used in 'constant fan' mode, at low speed, the motor draws 100 watts or less – maybe 95 watts," said Mohalley. "And the airflow is very quiet."

Regal Beloit declined to provide *EDU* with information on the price of the Evergreen IM.

### The Concept 3 Motor

John Proctor has worked with McMillan Electric, a motor manufacturer in Woodville, Wisconsin, to develop an ECM-mimicking retrofit motor called the Concept 3 (see Figure 4). The Concept 3 is inexpensive, energy-efficient, and compatible with most residential furnaces and air handlers.

Like the Evergreen IM, the Concept 3 is a permanent magnet brushless DC motor. According to Proctor, the motor comes with complete instructions and is easy to install. "First you measure the watt draw of the old motor," said Proctor. "Then you measure the static pressure in the supply plenum with the old motor running. PSC motors are usually set up with a cooling speed and a heating speed. In 95 percent of standard furnaces, there are four speed taps coming off the motor: high speed, medium high speed, medium speed, and low speed. The cooling speed is usually high speed, while the heating speed is usually medium high or medium.

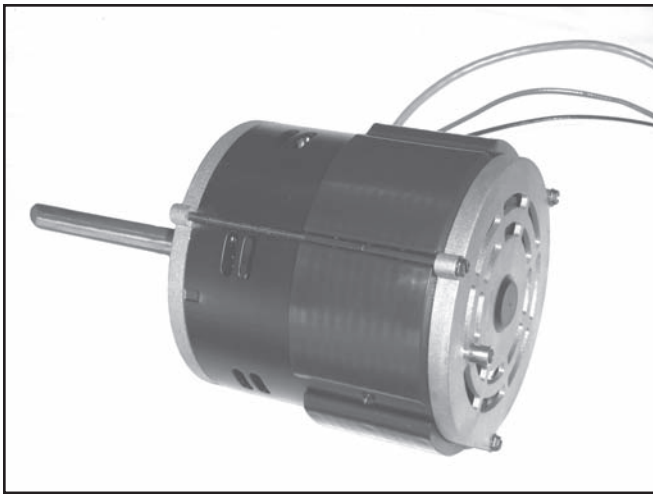


Figure 4. The sophisticated controls for the Concept 3 motor optimize the energy performance of a home's HVAC system.

"The speed of the Concept 3 motor is infinitely variable. Once the new motor is installed, you adjust the motor speed to get the same airflow as the original motor. The adjustment is based on the static pressure in the supply plenum – you adjust the motor to achieve the same static pressure. What the adjustment does is change the horsepower output of the motor. It's a one-time adjustment. At that point you measure the new watt draw to verify the energy savings."

Proctor warns installers to avoid the temptation to increase airflow. "Our research now shows that increasing airflow is often not a good idea," said Proctor. "So it's best to go with what you've got." Like the Evergreen IM, the Concept 3 is not a constant-airflow motor. Proctor explained, "There is no feedback, so if restrictions happen in the duct system or filter, the static pressure goes up, airflow goes down, and the watt draw will remain the same."

### Improved Cooling Efficiency

The Concept 3 uses line voltage connections for power and 24-volt signal wires to the furnace terminal block for speed selection. The controls are highly sophisticated. "The highest speed is for cooling," said Proctor. "For dry climates, the Concept 3 control directs the fan to continue running at the end of the cooling cycle, at a much lower speed and watt draw, to evaporate the water off the coil, providing increased sensible efficiency. If you live in a wet climate, the 24-volt signal wires are hooked up differently so that you get a lower top speed, which provides more dehumidification in cooling mode. In a wet climate, the fan goes off at the end of the compressor cycle, allowing the coil to drain. If the thermostat is set to 'constant fan'

– in homes with constant ventilation or filtration equipment – the fan still shuts down at the end of the compressor cycle so the coil can drain, and only comes back on after a 20-minute wait.

"If you live in a climate where it is sometimes dry and sometimes wet, you need to install an indoor Thermidistat. The motor controls will then switch from dry climate programming to wet climate programming, depending on the indoor conditions."

### Lower Electricity Use

The Concept 3 motor uses significantly less electricity than a comparable PSC motor. "The Concept 3 has a much lower watt draw for the same cfm," claimed Proctor. "At the lowest speed, it draws between 60 and 100 watts. In a dry climate, the biggest energy savings come during cooling mode, because of the control which runs the motor at a very low speed at the end of the compressor cycle. The additional sensible capacity provided by that feature amounts to an energy saving of about 12 to 20 percent, in addition to the 8 percent saving attributable to the improved efficiency of the motor."

According to Proctor, the Concept 3 "is compatible with all equipment except the Carrier Infinity series, which doesn't use a standard 24-volt signal." The motor is being distributed by Energy Federation Incorporated in Westborough, Massachusetts. "The price to the contractor is less than \$200," said Proctor. "That's compared to \$800 to \$1,200 for an ECM with the control board."

For more information, contact:

Energy Federation Incorporated (EFI), 40 Washington Street, Suite 3000, Westborough, MA 01581. Tel: (800) 876-0660 or (508) 870-2277; Fax: (508) 870-9933; E-mail: [info@efi.org](mailto:info@efi.org); Web site: [www.efi.org](http://www.efi.org).

Evergreen Sales, 1946 West Cook Road, Fort Wayne, IN 46818. Tel: (866) 503-8566; Fax: (260) 416-5499; E-mail: [marketing@evergreendealer.com](mailto:marketing@evergreendealer.com); Web site: [www.evergreendealer.com](http://www.evergreendealer.com).

McMillan Electric, 400 Best Road, Woodville, WI 54028. Tel: (715) 698-7119; Fax: (715) 698-2297; Web site: [www.mcmillanelectric.com](http://www.mcmillanelectric.com).

Regal Beloit, 200 State Street, Beloit, WI 53511. Tel: (608) 364-8800; Fax: (608) 364-8818; Web site: [www.regal-beloit.com](http://www.regal-beloit.com).

## Flashing For Rainscreen Walls

Primex, the Canadian manufacturer that developed exterior trim compatible with rainscreen siding (see *EDU*, March 2008), has expanded its line of rainscreen accessories to include rigid plastic flashing. The RainBoss system consists of four types of flashing, all designed for use on walls that include a drainage gap between the siding and the sheathing:

- Above-window flashing (see Figure 5);
- Below-window flashing (see Figure 6);
- Between-floors flashing; and
- Top-of-wall venting flashing (see Figure 7).

The above-window flashing and the between-floor flashing pieces are designed to be nailed directly to the sheathing. However, the below-window and the top-of-wall flashing pieces are designed to be installed on the rainscreen strapping, rather than the sheathing. The top-of-wall flashing includes holes that vent the rainscreen cavity to the exterior, not the soffit area.

Primex describes the material used to make RainBoss flashing as a “UV-resistant polymeric material.” Like vinyl siding, RainBoss flashing comes with elongated nailing slots to allow for thermal expansion and contraction. All four types of flashing are sold in 12-foot lengths.

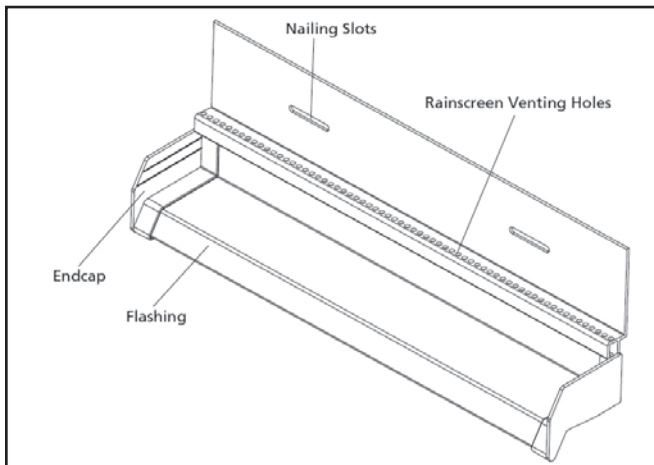


Figure 5. RainBoss above-window flashing pieces include ventilation holes to admit air to the rainscreen drainage gap.

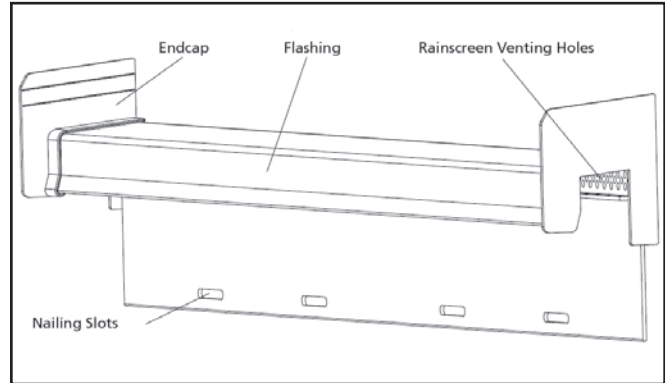


Figure 6. The below-window flashing directs water to the exterior.

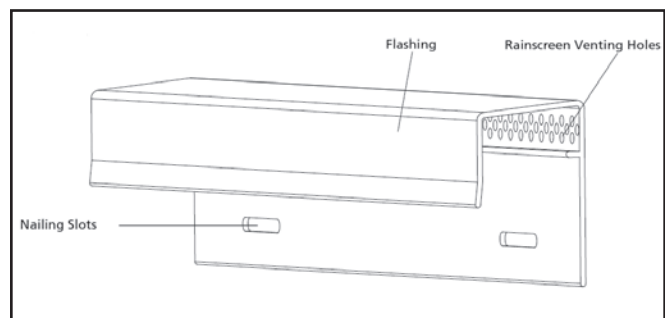


Figure 7. The top-of-wall flashing has ventilation holes at the rear.

The flashing is designed to exclude wind-driven rain from the rainscreen cavity, while still allowing ventilation. All RainBoss ventilation holes include integrated insect screens.

RainBoss siding is compatible with most types of siding; exceptions include EIFS, brick, and cultured stone.

For more information, contact: Primex, 20160 92A Avenue, Langley, BC V1M 3A4, Canada. Tel: (604) 881-7875 or (877) 881-7875; Fax: (604) 881-7835; E-mail: [sales@primex.ca](mailto:sales@primex.ca); Web site: [www.primex.ca](http://www.primex.ca).

Primex also maintains a US office at 3888 Sound Way, Bellingham, WA 98227-9754. Tel: (877) 881-7875 or (360) 332-3100; Fax: (360) 332-3200.

## Self-Supporting Rafter Vent Baffles

An entrepreneur in Florida has developed a cardboard rafter ventilation baffle that can be installed without fasteners (see Figure 8). ExcelVent baffles are held in place by friction alone.

The corrugated cardboard baffles are shipped flat. The baffles have hinged flanges on each side; these flanges are folded up by the installer before the baffle is inserted into a rafter bay. “When you fold the flanges up and insert



it in place, there is enough outward pressure that it stays put," explained Bruce Munch, the president of ExcelVent.

The 1 ½-inch-wide flanges establish the depth of the ventilation channel, which ends up being "a little bit less than 1 ½ inch," according to Munch. Munch points out that ExcelVent ventilation channels meet the requirements of section R806.3 of the International Residential Code, which requires that "a minimum of a 1-inch space shall be provided between the insulation and the roof sheathing and at the location of the vent." Munch contends that many competing rafter baffles create ventilation spaces that are not code-compliant.

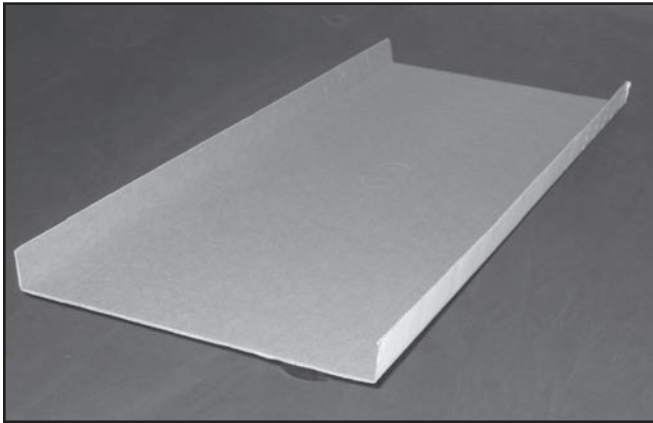


Figure 8. ExcelVent ventilation baffles are made of cardboard.

The ExcelVent baffle comes in two sizes – one for 16-inch-on-center framing, and one for 24-inch-on-center framing. Each baffle is 36 inches long. The baffles are designed to work without modification in

rafter bays that are inconsistently framed, as long as the bays are no more than ½ wider or ½ inch narrower than they should be. For bays that are much narrower, "You can cut it and crease it with the razor knife to make your own flange," said Munch.

ExcelVent provides instructions on bending a baffle to create a wind-washing dam at the bottom of a ventilation channel, near the soffit.

### Gaps For Venting Moisture?

Although ExcelVent is a useful product, its Web site includes some bad advice: "When installing vent channels into a cathedral or vaulted ceiling, allow for a 2-inch space between each vent channel to vent internal moisture." An illustration shows two baffles installed with a deliberate gap between them to allow the air around the fiberglass batts to mix freely with the air in the ventilation space. As *EDU* readers should know, ventilation baffles should be installed to limit, rather than encourage, air movement between the insulation and the ventilation channel. It's better to tape the joint between adjacent baffles, rather than leave a deliberate gap between them.

The price for a pack of 25 ExcelVent baffles designed for 24-inch-on-center framing is \$53; discounts are available when the baffles are purchased in large quantities. For more information, contact ExcelVent, 3684 Southwest Pheasant Run, Palm City, FL 34990. Tel: (800) 837-3204; E-mail: bruce@excelvent.net; Web site: [www.excelvent.net](http://www.excelvent.net).

## A Heat-Pump Water Heater From China

A Texas company called AirGenerate is distributing a Chinese-made residential heat-pump water heater (the AirTap A7) designed to be installed on top of a conventional electric or gas water heater. (For information on heat-pump water heaters from other manufacturers, see *EDU*, June 2007 and July 2008.)

According to the listed specifications of the AirTap A7 water heater, the unit is rated at 7,000 Btu/h, with a maximum water temperature of 135°F and a first-hour rating of 43 gallons. The unit draws 1,320 watts at start-up and 660 watts in operating mode. AirGenerate claims that the AirTap A7 has a coefficient of performance (COP) of 2.5 and an energy factor (EF) of 2.11.

Since it lacks a storage tank, the AirTap A7 cannot be used as a stand-alone water heater; a complete installation requires a conventional tank-type water heater in addition to the AirTap (see Figure 9).



Figure 9. The AirTap A7 is a Chinese-made heat-pump water heater distributed by a company headquartered in Houston, Texas.

The unit's exhaust air provides "free" cooling that may be appreciated by those living in hot climates.

According to AirGenerate, the unit's exhaust air may be ducted to an adjacent room (maximum duct length, 6 feet) without impairing the unit's performance. As a \$79 option – the price is a little high – AirGenerate offers a 6-foot length of 6-inch flex duct with a boot that fits over the AirTap's exhaust air louvers.

The AirTap A7 is reasonably priced at \$499 plus \$50 shipping. For more information, contact AirGenerate, 5726 Clarewood Drive, Houston, TX 77081; Tel: (713) 574-6729; Fax: (281) 520-3987; E-mail: info@airgenerate.com; Web site: [www.airgenerate.com](http://www.airgenerate.com).

## INFORMATION RESOURCES

### An AC Textbook From Andrew Ask

Andrew Ask, a mechanical engineer from Cape Coral, Florida, has written an air conditioning textbook with the awkward title of  $H_2N\emptyset$  – a group of symbols intended to remind readers of the chemical symbol for water, the word “no,” and European warning signs equipped with slashes (see Figure 10).

Published by Building Science Press,  $H_2N\emptyset$  includes a foreword by Joseph Lstiburek. Anyone familiar with Lstiburek's informal, self-consciously iconoclastic approach to building science may suspect that Andrew is Joe's long-lost cousin. For a flavor of Ask's writing style, consider his words on condensation in walls: “Interstitial condensation is the illegitimate child of all moisture-related problems. The expression comes from the Latin for ‘this building is so screwed.’ The underlying cause is the same – water vapor finds a cold surface and condenses.”

#### Writing For People Charged With Keeping Buildings Dry

Although Ask discusses residential air conditioning systems, he focuses mainly on commercial equipment. Residential designers and builders will nevertheless

learn a lot from Ask's book. He writes, “For those of you whose job it is to keep our buildings dry – owners, architects, engineers, designers, contractors, facilities managers, building scientists, manufacturers, suppliers – this book is for you, to explain how air conditioning helps or hinders your efforts.”

While Ask's main focus is air conditioning, he also provides a basic building science primer. For example, he writes:

- “It stands to reason that the lowest occupied floor must be constructed well above the adjacent ground. Notwithstanding this painfully obvious observation, we frequently see buildings level with or even below grade. Constructing a building too low is perhaps the most fatal of flaws – there is no fix.”
- “Defective (or absent) flashings at openings and penetrations are the Achilles' heel of rain water management. Flashings are one of the most difficult construction components both to design and to install. It follows that flashings are the most likely candidate for being botched or even being totally omitted.”
- “Once water vapor gets to the cool part of the wall, it will try to get into the enclosure in vapor form unless it runs up against a barrier. ... If the vapor finds a layer of polyethylene in the wall, that's where it will condense. ... If the offending barrier is within the wall construction there will be no easy fix. We have to demolish the wall from one side or the other until we reach the vapor barrier, remove it, and then restore the wall – all difficult and expensive tasks.”

#### Start With the Basics

Ask begins by providing readers with elementary information on air conditioners:

- “Off-the-rack air conditioners are designed to remove about 1.0 pound of water for each 3,000 BTU of air cooling. ... Each ton of cooling capacity is 75% sensible and 25% latent. We call this (the 75%) the ‘Sensible Heat Ratio,’ abbreviated SHR. ... Unlike

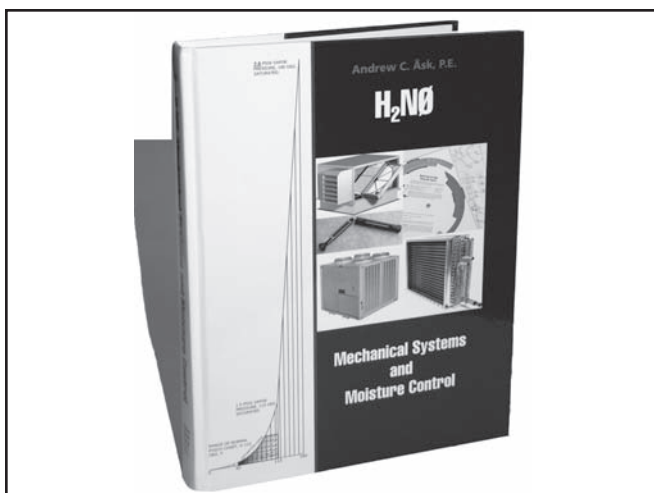


Figure 10. Andrew Ask's new book,  $H_2N\emptyset$ , approaches air conditioning system design from a building science perspective.

many consensus standards, 75% SHR was not optimized to some normal, expected state of conditions. Unitary HVAC equipment has a 75% SHR for the same reason chickens have two drumsticks – that's how they come from the factory."

- "Room temperature is what determines when the compressor runs. Humidity has nothing to do with it. An air conditioning system controls temperature. It removes humidity incidental to the cooling process, becoming an 'accidental dehumidifier.' "
- "The air-handling unit will pressurize or depressurize building cavities due to duct leakage, resulting in the introduction of uncontrolled outside air containing unwanted humidity. Notice that there are no 'ifs' qualifying duct leakage. Ducts will leak, pressurization will occur."

Ask proceeds to delve into highly technical discussions of air conditioning theory and practice. It's likely that only air conditioning engineers and building scientists will look forward to reading a textbook that includes several pages with variations on psychrometric charts. For some *EDU* readers, however – including HVAC contractors and consultants solving moisture problems in buildings with poorly designed HVAC equipment – Ask's book deserves a place on the shelf as an available reference; in a pinch, it is likely to prove invaluable.

*H<sub>2</sub>NØ: Mechanical Systems and Moisture Control* by Andrew Ask (ISBN 978-0-9755127-9-1) is available for \$75 from Building Science Press, 70 Main Street, Westford, MA 01886. Tel: (978) 589-5100; Fax: (978) 589-5103; Web site: [www.buildingsciencepress.com](http://www.buildingsciencepress.com).

## READERS' FORUM

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### Program Approval Has Been Received

Dear Martin,

To update an item in "News Briefs" in the September issue: Columbia Gas of Ohio is past the stage of "seeking approval" for a \$24.9 million portfolio of Demand Side Management Programs. We have received approval for the programs. Program funding is tied to a separate rate case which is in progress. We expect to implement the programs in 2009.

Our residential retrofit component of the portfolio has multiple levels of furnace and other major energy conservation measure rebates. The rebate amounts are not exactly as *EDU* reported; the amounts vary depending upon an applicant's household income and the number of measures being implemented at one time. The information on incentives for new construction residential was correct.

I've been a subscriber to *EDU* since its inception at various places I have worked. It's a great publication; keep up the great work.

Jack Laverty  
Columbia Gas of Ohio  
Columbus, Ohio

### Discrepancy Spotted

Dear Martin,

I enjoyed the case study of the Riverdale NetZero Project [*EDU*, September 2008]. I noticed one discrepancy, however: on page 2, under "Energy Use

Predictions," the total energy use is projected to be 1.34 kWh/ft<sup>2</sup>. But in the table on page 3, this value is presented as energy use for only space heating. Which is it: 1.34 kWh/ft<sup>2</sup> for heating or total energy use? If it's the latter, that's a fantastic number to strive for, especially given heating demands for the region!

Eric Doub  
Ecofutures Building  
Boulder, Colorado

### Editor's Reply

*EDU* thanks Mr. Doub for catching the discrepancy. The figures in the table on page 3 are correct. On page 2, while the reported total energy use number in kWh/m<sup>2</sup> (40.73 kWh/m<sup>2</sup>) was correct, the figure in kWh/ft<sup>2</sup> was incorrectly reported. In fact, the total energy use for the Riverdale house is projected to be 3.79 kWh/ft<sup>2</sup>, not 1.34 kWh/ft<sup>2</sup>. *EDU* regrets the error.

### Enjoyed the September Issue

Dear Mr. Holladay,  
Just a quick note to congratulate you on your excellent work with *EDU*, and to let you know that the September 2008 issue was the best I have seen in a number of years. Please keep up the great work.

Hal Dobbelsteyn  
Conserve Nova Scotia  
Halifax, Nova Scotia, Canada

## BACK PAGE

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### Editorial: Reflections At A Turning Point

The news events of 2008 – the alarming new evidence of global warming, the intense public interest in the presidential race, the dramatic fluctuations in energy prices, and the unprecedented meltdown on Wall Street – have led many Americans to conclude that our country is at a turning point. The subtext of these stories is identical: we can't continue business as usual.

Every newspaper in the country has identified the housing bubble as a proximate cause of the global financial collapse. What these articles rarely report are the dismaying construction details behind the housing bubble: namely, that most of the overpriced homes built during the housing mania of the 1990s are oversized, underinsulated, leaky, and located far from public transportation.

For Wall Street brokers and residential builders alike, the party is over. The bursting of the housing bubble represents the evaporation of hundreds of billions of dollars. For anyone unlucky enough to live in a too-big house an hour away from the nearest job, it's depressing enough to find oneself saddled with an "upside-down" mortgage; the last straw, however, is the realization that the home's energy bills are twice as high as they might have been.

New home construction has been the engine of US economic growth, but a large percentage of our staggering investment in real estate has amounted to waste. For decades to come, the cheaply built McMansions in our sprawling suburbs will act as weights around the ankles of the US economy. Addressing our "problem housing" issues will require massive infusions of new capital, as troubled mortgages are written down and poorly insulated homes are tightened up.

#### Energy Champions, Take A Bow

Those of us who have spent years promoting the construction of small, affordable, energy-efficient homes may, perhaps, be permitted to take a small bow. After playing the role of countercultural cranks for decades, it's the least we deserve.

However, at a time when our country faces a daunting array of urgent tasks, and many of our fellow citizens are financially pinched, there is little value in feeling smug. Whether the current economic slump lasts for only a year or stretches for a decade or more,

Americans will increasingly need to develop local solutions to the problems of high food prices, scarce energy resources, and the urgent need for weatherization services. As one example, some local groups, following the Danish model, are now advocating the development of community-owned wind turbines. To the extent that these local solutions are successful, the result will be a stronger, more resilient economy.

#### Unleash the FTC

Local solutions, while welcome, must be accompanied by action at the federal level. The budget for the low-income weatherization program should be increased by a factor of three or four. The somnolent enforcement division of the Federal Trade Commission must be revived and unleashed, so that the marketers of "insulating" paint and sub-slab "radiant barriers," who have preyed unhindered on gullible builders for far too long, can be brought to justice, fined, and jailed.

Finally, existing US residential energy codes must be significantly strengthened. The defeat of the Thirty Percent Solution in Minneapolis, due in large measure to shameful lobbying by the National Association of Home Builders (NAHB), should serve as a wakeup call to observers on the sidelines. Intimidated by the perceived power of the NAHB, many energy-efficiency experts who are privately critical of NAHB's lobbying get a sudden attack of laryngitis whenever a reporter starts taking notes. But Minneapolis is not Palermo, and the NAHB is not the Cosa Nostra. It's time for all of us to take a stand.

– Martin Holladay

#### BOWING OUT

This issue of *EDU* is my last; after editing 82 issues of the newsletter over the past seven years, I've decided to move on. I have felt honored to follow in the wake of *EDU*'s previous editors, Joel (Ned) Nisson and Don Best, and I take leave of *EDU* with fond memories and gratitude. In particular, I'd like to thank Vicki Dean, my sharp-eyed and talented managing editor, and the intelligent and loyal readers of *EDU*, whose valuable input and feedback have kept me on my toes.

– Martin Holladay