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Zero Net Energy Building Award:
Our new benchmark is net-plus



2013 Sustainable Green Pages Inside

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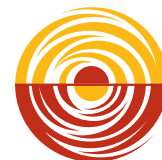
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On the cover

NESEA's 2013 Zero Net Energy Building Award went to the Bosarge Family Education Center at the Coastal Maine Botanical Gardens. Despite the challenging climate, Maclay Architects, in collaboration with Scott Simons Architects and builder Bensonwood, achieved net-plus energy. Looks like plus is the new zero: all but one of the top five entrants got there. Story starts on page 8.

About NESEA and *BuildingEnergy Magazine*

The Northeast Sustainable Energy Association (NESEA) is the region's leading organization of professionals working in sustainable energy, whole systems thinking, and clean technology. We advance the adoption of sustainable energy practices in the built environment through this magazine (distributed to NESEA members), our annual BuildingEnergy conference and trade show, professional workshops, our annual Green Buildings Open House, and more. A *Building Energy* subscription is \$55/year, which includes NESEA membership.

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Introducing BE365. Where Do You Fit In?

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For almost 40 years, NESEA has connected leaders in sustainable building to each other and to the ideas that increase sustainability in the built environment. Until recently, most of this has happened at BuildingEnergy—our flagship conference, held each March in Boston. Now, thanks to a very active membership, we are learning to make the magic of the three-day conference happen year-round.

This year NESEA is launching several new programs that fall under the umbrella of what we're calling "BE365." They include the BuildingEnergy Masters Series

(see page 20), BE NYC (page 24), BuildingEnergy Pro Tours (page 28), BuildingEnergy How-tos and Product Trainings, and BuildingEnergy Peer Networks, to name a few. All are member initiated and member driven. And all will benefit from your involvement in curating the content that matters and connecting our community to new partners and audiences.

Meanwhile, we've realized that a huge opportunity exists in the glut of excellent content—ideas, information, data—that is proposed for the conference each year. This is content that we can't use because we either don't have a place for it or don't have a process for evaluating it for use elsewhere. To make good use of it, we need to develop our potential leaders—people who can help evaluate it and distribute it in efficient ways. In this way, we will fulfill the promise of a growing,

	WHO	WHAT
 Elder	Provides guidance based on experience and accrued wisdom.	Acts in advisory capacity to ensure continuity with established guiding principles over time.
 Leader <i>NESEA ritual</i>	Takes responsibility for guiding and managing member-driven projects.	Coordinates member projects and ensures that goals are met and action takes place.
 Regular	Familiar participant with meaningful connections to other members.	Participates online and in person and contributes useful information and ideas to discussions.
 Novice <i>NESEA ritual</i>	Learning the ropes and being introduced to community life.	Offers to become involved and to connect with communities of practice.
 Visitor	Testing the waters and tasting the secret sauce.	NESEA provides experiences that connect the visitor with ideas and with other members.

sustainable, member-driven and staff-supported organization to make important connections every day of the year.

How do we develop these leaders?

To use a construction analogy, ultimately, we need to build a social scaffolding (see the chart above) by which every member of our community, from the visitor to the elder, can see how and where he or she fits in. Once this structure exists, members can take on roles aligned with their personal capacities—from

continued on page 47



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Money and Other Hurdles: We're on It



As this is my first appearance in *BuildingEnergy Magazine* as board chair, let me start by saying that I am thrilled to be engaged with NESEA. My involvement in NESEA has grown steadily over the years: from attending the BuildingEnergy conference to speaking at it to serving on the conference planning committee to serving on the board of directors and finally as board chair.

Earlier this year, I was also inspired to make the ultimate commitment to NESEA: I became a Lifetime Member. I did it very publicly, during the BE conference, as a means of thanking the organization that has given me so much. I challenged others—and I challenge you now—to join me in this commitment. Thank you John Abrams (“double lifetime member”!) and Jonathan Wright, who accepted the challenge.

Over time, I've also encouraged my staff at Conservation Services Group (CSG), where I am program director, to get involved with NESEA for its phenomenal professional development opportunities. In fact, Matt Root of CSG is serving as vice chair of BE14—a substantial investment of CSG's time and resources, but one that I know will more than pay off!

Clearly, I value NESEA, and as board chair I will do my best to help strengthen and guide it during my term. Which brings me to the hurdles we face as an organization.

Like many of the best-run nonprofits, we are trying to do too much with a small, somewhat junior staff. If we are to expand our programs, we need to reliably earn sufficient revenue not only to hire more staff, but also to attract and retain top talent. To address these issues, we are taking steps to diversify our programming (I direct you to Jennifer Marrapese's letter on page 5) and our revenue streams. We're offering new conferences in more locations, robust online programs, and peer-to-peer networks and communities of practice, all of which add value for NESEA members.

We are addressing fundraising and development capacity at the board level first—meeting one-on-one with board members to hear how NESEA has benefited their career and practice and asking them to share these stories with others in their networks who might also benefit. This is a new effort, and we don't know yet how effective it will be.

NESEA's effectiveness also depends on leadership development. As Jennifer explains on page 5, we are already working on creating a process that will ensure we are mentoring members for roles of increasing responsibility. This ongoing, resource-intensive campaign will send positive ripples throughout the Northeast and beyond. It will help more people find their path within the organization, to both lend their talents and benefit—as I have—from the professional growth that comes from doing so.

Caitriona Cooke
Chair, NESEA Board of Directors
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Zero Net Energy Building Award

This year, our community advanced the benchmark to net-plus

By Sally Pick

The Zero Net Energy Building Award (ZNEBA) program reached new heights this year, its seventh. A record 11 entrants (out of 13) met our energy criteria, but further, 4 of the judges' top 5 picks, profiled below, are net energy producers. That includes the winning entry, the Bosarge Family Education Center—which, remarkably, is net energy positive for the year despite Maine's chilly winters.

These sustainable buildings are built or retrofitted to require as little energy as possible and then offset that energy with renewables, typically a modest array of solar photovoltaics (PV), that generate clean electricity. Each took a unique path to zero net or net-plus energy. Here are their stories.

Systems details, such as insulation types and amounts, window U-factors, brand names, mechanical systems, and kilowatts of PV for these and other entrants are available at NESEA.org (go to Programs).

Winner The Bosarge Family Education Center

Maclay Architects

Net-plus on the Maine coast

The Bosarge Family Education Center at the Coastal Maine Botanical Gardens, in Boothbay, is Maine's first net-zero institutional building. It's the attractive, replicable work of [Maclay Architects](#) of Waitsfield, VT,



The winner: Triple-pane argon-filled windows allow loads of light and garden views into the Bosarge Center's spacious classroom. See page 50 for a cutaway view of wall, roof, and floor systems.

in collaboration with [Scott Simons Architects](#) of Portland, ME, and builder [Bensonwood](#) of Walpole, NH. Their joint attainment of not just net zero, but net-plus, in such a cold climate, and with a panelized system, was duly recognized by the judges. "The building's impressive airtightness levels," they wrote, "are a testament to the builder, . . . the design team, and the process. It also brings great hope to the industry, which has relied mostly on custom, site-built and intensively resourced structures in order to achieve such energy performance levels."

The botanical gardens set a number of challenging goals for the project. Ed and Marie Bosarge, the major donors for the center, specified that the building meet several measures of sustainability: it had to be net zero, qualify as LEED Platinum certified, and offer visitors the

opportunity to learn about sustainable building practices. It also had to provide an attractive entry to the gardens. All this on a very tight timeline, from late

The attainment of not just net zero, but net-plus, in such a cold climate, and with a panelized system, was duly recognized by the judges.

fall of 2010 through spring of 2011. "It was incredibly important that the construction be done by the tourist season in June," according to architect Bill Maclay.

With these challenges in mind,

the center selected Bensonwood builders because of their experience constructing custom high-performance structures with a panelized system. The builders worked with the project team to focus on the energy efficiency of the building first and “have it in harmony with building aesthetics,”

transparent feel. Windows connect the entryway and classroom with the gardens behind the building, and skylights and windows allow natural light into all upstairs offices. “Daylighting is just lovely in the classroom spaces,” says Andy Shapiro of Energy Balance, the project’s energy

per square foot of exterior surface area.

A Mitsubishi air-source heat pump efficiently heats and cools the space, solar panels generate hot water, and daylight dimming and cutoff controls adjust the high-efficiency lighting throughout the building. To offset electrical use for heating, cooling, and



The building offers a welcoming gateway to the center’s classroom space and the botanical gardens beyond, while achieving the zero net energy and LEED Platinum goals set by the major donors.



On one wall of the inviting entrance, an educational display showcases the building’s energy features.

according to Hans Porschitz of Bensonwood. Site work began in October.

Over the winter, Bensonwood designed and built most of the panelized structures at their indoor manufacturing facility, including support structures, flooring systems, interior partitions, and insulated exterior walls and roof panels. They arrived at the site with these completed structures in mid-January. With lightning speed, they had enclosed the building by the end of February, applying an approach that they refer to as “montage building.” This assembly technique, more common in Germany, Austria, and Sweden, made it possible to build in midwinter, saved significant construction time, and limited the project’s impact on the gardens.

The center achieved excellent energy efficiency in Maine’s cold climate despite extensive fenestration that gives the building an almost

consultant. “Lighting is what people interact with on a daily basis.”

With so much glass, how does the center use so little energy and even generate significantly more than it consumes? To start with, heat loss is limited by triple-pane, argon-filled windows with U-factors as impressive as 0.16, and the skylights, 0.27 and 0.154 (the lower the U-factor, the more energy efficient the window). It’s also a very tight building (see the cutaway diagram on page 50). The panelized system’s dense-packed cellulose insulates the roof cavity to an R-value of 60 and the walls to R-40 (nearly 12 inches of cellulose). The slab perimeter, edge joint, and subslab were insulated to R-20 with expanded polystyrene (EPS). Tight sealing on assembly left the building with a modest air leakage rate of 0.115 CFM50 (cubic feet per minute of airflow with a building pressurized to 50 pascals of pressure with a blower door)

lighting, there are 135 rooftop and 102 ground-mounted PV panels. In the year that the center tracked the system for the ZNEBA application, the building exported just shy of 8,000 kilowatt hours (kWh) more than it imported.

The ZNEBA judges chose the project not only for its energy performance, but also for its impact on the public. Every summer, tens of thousands visit the gardens and interact with a beautiful building. They may be surprised to learn that it generates more energy than it consumes. A truth wall reveals the dense-packed cellulose in the walls, and signage on an education wall and throughout the building explains the green features. The education wall’s touchscreen computer display shows the modest energy draw and substantial electric production.

Also important, the design and high-performance montage building technique can be replicated by other



Top Four Runners-up

Putney School Field House

Maclay Architects

Pursuing net zero campuswide

The Putney School's field house, also designed by Maclay Architects, is a third-time runner-up (see the fall 2011 issue for more project details). The nearly 17,000-square-foot building now has a third year of documented zero net energy performance. In fact, it generates more energy than it consumes: in the latest fiscal year, the PV array provided a positive cash flow of \$2,900 from net metering. But for the Putney School, the field house was only the beginning.

Following the completion of the building, the school hired Maclay Architects to develop a strategic master plan for the entire campus,

including an energy plan, with an eye toward a carbon neutral campus. At the core of the planning team were the same firms involved with the field house: [Maclay Architects](#), [Energy Balance energy consultants](#), [Kohler & Lewis mechanical engineers](#), and [DEW Construction Corp.](#), which provided cost estimates for energy upgrades. In keeping with the school's tradition of hands-on learning opportunities, students joined faculty and staff in

Strategic energy planning positions administrators to take advantage of grants and incentives.

The center's second-floor offices are just as airy as the public spaces.

architects and builders. As Bill Maclay says, "Spreading the knowledge is critical." The botanical gardens shared this goal, and the new center will no doubt help introduce these concepts to more Maine architects.

design sessions for the plan.

The planners examined every building on campus to identify deferred maintenance and capacity for energy

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The Putney School Field House, at 17,000 square feet, now has three years of documented zero net energy use under its belt.



Triple-glazed, low U-factor skylights and windows allow natural light into the gym.

reduction. They ultimately proposed a two-pronged approach: Buildings at the center of the campus will shift to wood pellet boilers with mini district heating systems. On the periphery, the school will use a zero net energy strategy, applying high-performance upgrades to building envelopes, switching heating systems to electric air-source heat pumps, and offsetting energy use with PV.

“Begin where you can, at the scale you can,” states the energy section of the plan. One example of that: the school recently replaced an administrative building’s old oil boiler with a wood-pellet boiler; as other planned improvements, such as more insulation and air sealing, bring down the building’s heat load, the excess heat will be piped to nearby buildings, transforming the boiler into a mini district heating system.

This kind of strategic energy planning allows the school to make incremental upgrades that work for the long term. It also positions administrators to take advantage of any grants and incentives that may become available. With a plan in hand, they can

readily show funders how a new project fits into their specific strategies and overall energy vision.

Bill Maclay views the Putney School master energy plan as a lesson in turning a zero net energy project for one building into an opportunity to inspire change for a larger community. “This isn’t about zero net energy buildings,” he says. “It’s about zero net energy communities, towns, and cities.”

Coons Family Residence

Trudeau and Associates, architects

A sustainable new life for a vacant 19th-century house

When Paul and Joanne Coons, self-described “energy nuts,” found their dream home, it had been vacant for 10 years. The windows of the Clifton Park, NY, house were covered with chicken wire—the previous owners had raised turkeys inside.

Instead of seeing a derelict building, the Coonses saw an opportunity

to return a house to its original 1830s Greek Revival stature. They had renovated a historic house before, adding efficiency measures piecemeal. Working with [Trudeau and Associates](#) and [PlumbExcell Engineering](#), they would gut this house, make it as efficient as possible, and source sustainable building materials while honoring its historic character.

The windows were covered with chicken wire—the previous owners had raised turkeys inside.

The Coonses acted as the general contractors for the project and developed many of the ideas themselves, with guidance from two books: *Builder’s Guide to Cold Climates*, by Joseph Lstiburek, and *Prescriptions for a Healthy House*, by Paula Baker-Laporte, Erica Elliot, and John Banta. They came to the project as



The Coons residence, an 1830s Greek Revival, had been vacant for 10 years before being both restored to its former stature and brought into the 21st century. The PV system—sited in the backyard to preserve the character of the house—powers the house and two electric cars.

environmental professionals, Joanne as a high school environmental science teacher and Paul as the recently retired director of a state environmental health and safety program. The couple found the Internet invaluable. They also picked up concepts from the BuildingEnergy conference and other NESEA events.

The Coonses meshed energy efficiency goals with historic preservation using features such as Allied Window's Magnetic One Lite interior storm windows, which fit seamlessly over the existing ones. They sited the PV and solar hot-water panels apart from the house, reinstalled wood siding, and rebuilt the porch to maintain its Greek Revival style.

When they first moved in, they were getting mold in the house from opening the windows on summer nights to bring in cool air, which also let in moisture. Now they run their heat-recovery ventilator (HRV) year-round

and a whole-house dehumidifier during humid weather. Even with all-electric heating, an HRV, a whole-house dehumidifier, an induction range, and other electric appliances, an 8.4 kW PV system gives them enough excess power to charge their two electric cars.

A number of other organizations have recognized the project. For breathing new life into a historic building, the Coonses received the 2011 Town of Clifton Park Historic Preservation Award. After Steven Winter Associates talked them into applying, they qualified for LEED Platinum certification because of their extensive use of green building strategies and materials. As a result, the New York State Energy Research and Development Authority paid for certification costs. Lastly, the house received the National Association of Home Builders' top rating, Emerald, for high efficiency.

The Coonses aren't resting on



In the Coonses' kitchen, magnetic interior storm windows blend in seamlessly—a meshing of the project's energy and preservation goals.

their laurels, however: "We're ready for another one! It's like a puzzle. It's fun and creative."

Nakuset Way

Kraus Fitch Architects Inc.

Net-plus at a competitive price

The owners of Nakuset Way, in Princeton, MA, were inspired by the PV they saw on the homes at Coppersmith Way, an energy-efficient development a few towns over in Townsend. The development's builder, [Transformations Inc.](#), became theirs as well. "They had been wanting to go solar for years," says R. Carter Scott of Transformations. In keeping with their vision, they named their new home after the Native American word *nakuset*, meaning "sun" or "sun spirit."

They worked with Kraus Fitch Architects to design a historic-

When It's Efficient, It's Resilient

As one past ZNEBA winner demonstrates, efficient buildings protect themselves and their inhabitants

By Joel Gordes

Consider the Montague, MA, home that won the 2010 Zero Net Energy Building Award. During the first week of February 2011, temperatures in the area dropped as low as zero. In-depth instrumentation of this home—thanks to quick thinking by NESEA member Mike Duclos—quantified its livability, with temperatures between the mid-50s and 70 degrees despite its having no electric power or backup heat for an entire week.

Up to now, people have built energy-efficient homes primarily for environmental reasons and/or to reduce energy bills. But with the incredible storms of the last few years, we have realized that the electric grid is more vulnerable to extended outages than we previously imagined—and that another advantage to energy excellence, not widely articulated, is resilience (and thereby safety).

Back in 1981, Hanover Insurance, based in Worcester, MA, started offering a 10 percent premium reduction to homes that were active or passive solar, energy efficient, or underground. The justification for this was the National Fire Protection Association finding that the conventional heating systems of more efficient structures fired less, thus reducing the chance of fire—and the risk of loss to the insurer.

Since then, others have delved into more ways in which efficiency creates resilience. Here are just a few examples:

- Low-e glass may reduce fire damage
- Insulation and a light-colored roof can reduce heat wave-related deaths
- Adequate attic insulation reduces the likelihood of destructive and costly ice dams
- The more insulation, the longer a home stays warm if power is lost in winter
- Thermal comfort prevents home abandonment
- Insulated pipes do not freeze
- With efficient lighting and appliances, smaller backup generators can suffice
- That means fewer potentially dangerous trips for gasoline, which may not even be available
- And possibly lower insurance premiums for the owners

Joel Gordes is an independent energy consultant. His energy career spans nearly four decades; he has extensive experience in energy efficiency and has designed or aided in the design of over 200 passive solar homes. A strong advocate for energy and environmental security for greater resiliency, he has been involved in policy to further those aims. He lives in West Hartford, CT.

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Moving the Marketplace to ZNEB

What's it like to build a zero net energy building? To live in one? What sold you on net zero, and how do we get others on board?

The Passive House zero net energy home of Paul and Diane Honig, built by NESEA member Jamie Wolf of Wolfworks, won the 2012 Connecticut Zero Energy Challenge. You can find their answers to these questions and learn more about the project online:

Go to . . .

YouTube

Search for P8TMc4K-8G0. You can see the house and meet Jamie, the Honigs, and others involved in the project.

ctzeroenergychallenge.com

You'll find the Honig home under Participants (2012).

The Honig's blog

Go to connecticutpassivehouse.blogspot.com, where they've been documenting the process since the "patch of dirt" stage.

nesea.org/magazine_be

We've posted the links.



Built by Transformations Inc., superinsulated Nakuset Way consumed just 5,331 kWh of electricity during the year of monitoring. The PV's excess could power a car for 32,000 miles.

looking saltbox that also met the husband's engineering interest in superinsulating building techniques. The above-grade walls are insulated to R-60—beyond the typical R-40 seen in highly insulated buildings—as the home owners thought they would see

Retail construction cost: around \$140 per square foot, excluding site work.

a payback over the 30-year mortgage. The double-studded walls have 1.5 inches of foil-faced polyisocyanurate rigid foam insulation on the exterior of the sheathing, 3 inches of closed-cell foam insulation on the inside of the sheathing, and 9 inches of open-cell foam in the remaining wall cavity.

Despite running all of its mechanicals on electricity, the nearly 4,000-square-foot home consumed only 5,331 kWh during the year it was

monitored for the contest. Its 14.4 kW PV system generated 10,536 kWh more than it consumed, which could charge an electric vehicle for roughly 32,000 miles, according to Scott. Scott designs his "energy-positive homes" with an eye toward reducing CO2 emissions associated with driving as well.

The owners got all of this for a retail construction cost of around \$140 per square foot, excluding site work. Scott is committed to promoting widespread adoption of zero net energy and net-plus homes by making them affordable—as demonstrated by the six ZNEBA entries he was involved with. (His work has been recognized by NESEA—see the story on page 19.)

The Cave Residence

Coldham & Hartman Architects


Power for house, car, and community

Kyle Cave jokes that he and Carolyn Cave wanted solar panels, so they needed a new house—trees beyond their property boundaries heavily



and pervasive daylighting via high-efficiency windows. Their PV array could easily meet their consumption. Instead of installing solar hot-water panels on the roof, the Caves chose to cover the entire roof with a 21.6 kW PV array, which powers an efficient heat-pump hot-water heater.

Determined to accommodate their cat's love of the outdoors while maintaining the home's airtight design, Carolyn tracked down a blower-door-tested, magnetically sealed cat door (made by Freedom Pet Pass). "I wasn't going to build a super-efficient house and poke a big hole in it," she says.

The PV array generates a large surplus of clean energy. In the year reported for the ZNEBA submission, this beautiful, welcoming home exported 19,634 kWh to the grid above what it imported. As is the case with other runners-up, the Caves use their surplus to charge their electric car, a Wheego, their primary source of local transportation since July 2011. In addition, says Carolyn, "We give away a huge amount of energy credits to charitable organizations." 

Sally Pick of SJP Environmental Consulting, LLC, offers home owners a friendly, unbiased perspective on saving energy and using renewables. She advises on cost-effective ways to reduce energy bills and energy losses, helps with navigating the maze of resources and incentives, and makes referrals to qualified energy contractors.

"How low can we go?" The Cave family found out with all-electric mechanicals, tight construction, and pervasive daylighting via high-performance windows. The PV generates a 19,000 kWh surplus.

shaded their previous home.

About four years ago, they heard global warming expert Bill McKibben speak and became more aware of the urgency of climate change. This informed their plans for building a new home in Hadley, MA. According to Carolyn, the initial goal was "how low can we go" with the energy demand. "When we first started, we didn't really know the extent to which zero net energy was possible."

In developing their ideas, they first visited Wisdom Way Solar Village, a cluster of near-net-zero homes in nearby Greenfield. They then spoke with several architects and selected Bruce Coldham of [Coldham & Hartman Architects](#) because he had the most experience with zero net energy

building at the time. It was "loads of fun to work with him," says Carolyn. They learned most of the zero net energy concepts that they applied to their plans from Bruce and also benefited from seeing other efficient homes on NESEA's Green Buildings Open House tour. The home was constructed by [Wright Builders](#). As their plans progressed, they realized that they could build a home with extremely low energy demands and, at the same time, add more PV modules by expanding their south-facing roof beyond the initial plan.

Applying a design model similar to other top entries, the Caves drove down their energy use with efficient, all-electric mechanicals, tightly insulated and air-sealed construction,



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New from NESEA: Zero Net Energy Database

Information will break down the barriers to sustainable building

By Jennifer Marrapese

What are the primary barriers to widespread adoption of net-zero buildings? According to industry leaders, there are three: lack of access to examples of successful projects; lack of widespread technical knowledge with respect to completing these projects; and perceptions that such buildings are not cost-effective.

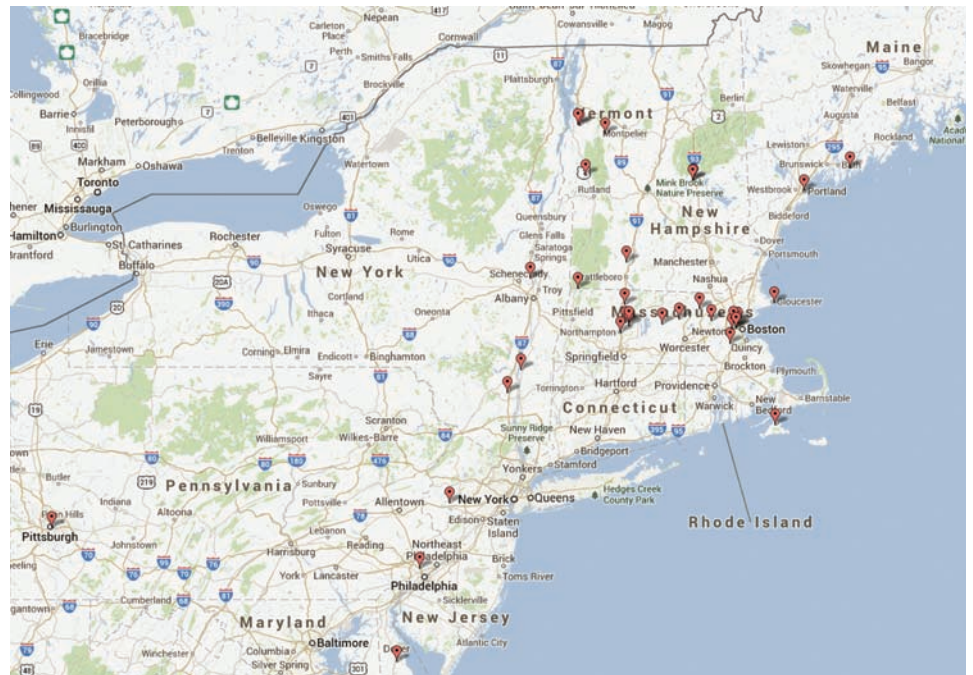
Thanks to a grant from the Boston-based Barr Foundation (www.barrfoundation.org), NESEA is going to start removing these barriers by creating a database of zero net energy and zero net energy-capable homes in the Northeast.

NESEA is well equipped for this task. Our members have played critical roles in nearly every zero net energy building in the region. Some are even building them at the same cost as standard new construction.

Once we have a critical mass of projects in the database, we will review the performance metrics and major systems of each entry and then share, via a white paper, the best/most common practices for net-zero homes. We will circulate this white paper broadly: through our e-newsletters, at nesea.org, right here in *BuildingEnergy Magazine*, and via a workshop at the 2014 or 2015 BuildingEnergy conference.

Get your Northeast project in the database

Later this year, we will be turning to NESEA members for help with populating this new database. But right now, we are simply creating a list. Do you have a Northeast (CT, DE, ME, MA, NH, NJ, NY, PA, RI, VT) project in your



Shown here are the locations of Zero Net Energy Building Award entrants to date—just some of the zero net and zero net-capable buildings you'll find in NESEA's new database. It's made possible by a grant from the Boston-based Barr Foundation.

portfolio that's zero net energy or zero net energy-capable (accompanied by at least a year's worth of energy usage data)? If so, and you'd like us to contact you when the database is ready, please email database coordinator Kelsey Hobson at khobson@nesea.org.

Nice incentives for submissions

Courtesy of the Barr Foundation, we're offering two cash incentives to encourage more practitioners to participate in this project.

\$1,000 drawing

Anyone who submits a zero net energy building located in one of the 10 Northeast states—or updates an entry previously submitted for the Zero Net Energy Building Award with additional performance data—will be entered into

a lottery to win \$1,000 or a two-day pass to BuildingEnergy14 (a \$1,300 value).

\$1,000 to learn and build in Mass.

Up to 20 practitioners will receive as much as \$1,000 for taking Marc Rosenbaum's BuildingEnergy Masters Series course, Zero Net Energy Homes, and subsequently submitting a Massachusetts-based project to the database. Reimbursement will be made as follows:

- \$320 upon evidence that you have been contracted (or have contracted someone) to build/design a net-zero home or small commercial building
- \$480 upon submitting an entry for NESEA's Zero Net Energy Building Award (excluding the full year of energy

continued on page 47

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Public Impact Award: R. Carter Scott

This NESEA member is rapidly moving net zero into the mainstream

By Sally Pick



R. Carter Scott, owner and president of Transformations Inc., is at the forefront of creating a sustainable, affordable new norm for both custom and standard production homes. For his commitment and broad influence, NESEA has honored Scott with its first-ever Public Impact Award. The award was presented at the 2013 BuildingEnergy conference.

The typical Transformations Inc. net zero home has a retail construction cost of \$125 to \$150 per square foot.

Scott's Townsend, MA, firm has built more than 30 net zero or net-plus buildings, has 11 more in progress, and has more than 100 in the pipeline. Scott entered three buildings in this

year's Zero Net Energy Building Awards (ZNEBA) contest and had a hand in three others (see www.NESEA.org, under Programs, for more project details). And his buildings are affordable: the typical Transformations Inc. net-zero home has a retail construction cost of \$125 to \$150 per square foot.

Over the last eight years, Transformations Inc. has made incremental but steady energy improvements to the homes they build. In 2005, they achieved the equivalent of a Home Energy Rating System (HERS) rating of 50—that's 50 percent more efficient than a standard new house of the same size. They continued to push for a tighter envelope. In 2008, motivated by the prize money and publicity offered to ZNEBA winners, Scott built a home with 12-inch, double-studded, superinsulated walls and photovoltaics (PV), dropping the HERS rating to -4 while keeping the home affordable and marketable.


He now seals up all his buildings to HERS 40 and installs PV to bring the energy use to net zero or net-plus. Surplus energy is often devoted to charging electric vehicles, further reducing the home owners' impact on the climate.

According to Scott, three game changers related to PV made it economical to get to net zero and beyond. In 2009, the federal government lifted the cap on tax credits for PV, allowing PV owners to take a full 30 percent credit. In addition, market competition among PV manufacturers

has driven down prices significantly. Finally, in some states PV owners can sell their solar-generated power in a market for solar renewable energy certificates (SRECs).

Carter Scott's firm has built more than 30 net zero or net-plus buildings, has 11 more in progress, and has more than 100 in the pipeline.

To further drive the market, Scott is working with a lender to make it possible to mortgage the full cost of these high-performing homes.

Rather than be proprietary about the successful formula he has developed, Scott has been teaching other builders how to get to net zero. But he's not losing business by sharing his concepts. Rather, he says, "The more I've been public with information, the more business has come my way." 

Sally Pick of SJP Environmental Consulting, LLC, offers home owners a friendly, unbiased perspective on saving energy and using renewables. She advises on cost-effective ways to reduce energy bills and energy losses, helps with navigating the maze of resources and incentives, and makes referrals to qualified energy contractors.

Deep Knowledge Transfer, Online

The BuildingEnergy Masters Series is realizing the potential of digital education to move us forward, fast

By Brian Hayden

Mastering a new skill is hard. It happens one student and one skill at a time. Can it be done online? Yes. In the year since we started NESEA's BuildingEnergy Masters Series, we've seen some extraordinary things take place in our small online classes—things that would be impossible to do in a seminar or webinar.

To help you visualize what's now possible in digital education—to unwind the toxic mental model that webinars and YouTube have created in your brain—this article offers a window into one class: Marc Rosenbaum's Zero Net Energy Homes. Through it, 60 people learned how to design net zero homes, including all the energy modeling. Before the class, they couldn't do that.



Grads of BE Masters Series instructor Marc Rosenbaum's online course, Zero Net Energy Homes, are seen here winning Zero Net Energy Jeopardy at BE13.

Through this class, 60 people learned how to design net zero homes, including all the energy modeling.

In short, the Masters Series has the potential to rapidly build our community's capacity to have an impact on the world.

Case study: Robert Lewis designs a zero net energy home

Robert Lewis at Bakker & Lewis Architects in Shavertown, PA, has long been a leader in sustainable design and always makes the annual pilgrimage

to the BuildingEnergy conference. Rob wanted to become expert at modeling the energy of a building, to do more "what-if" analysis and make more confident design choices. Here's a look at how Rob acquired this new skill and what he's done with it so far.

Step 1: A master, Marc Rosenbaum, lays out the path for Rob

The week 1 syllabus for Marc Rosenbaum's 10-week Zero Net Energy Homes course includes four videos, a handful of reading assignments, some Excel tools for running calculations, and homework that requires running calculations with the tools provided. Each week of the course builds a new set of skills and culminates in a complete energy model and design of a zero net energy home.

Step 2: Rob does the work and puts himself out there

Rob watched the videos, did the reading, and ran all the calculations. It was hard. He submitted his homework assignments. They weren't always perfect. Marc reviewed them and offered suggestions for getting it right, which was exactly what Rob went on to do.

Step 3: Rob puts it all to work in a home design

Finally, Rob broke in his new skills on a capstone project (see page 21). Marc reviewed the calculations and the design and collaborated with Rob on the finished product. The results are beautiful—a clear demonstration that Rob learned to do more confident energy modeling on his building designs.

Call to action: What else should we do?

A class like this is hard and takes a lot of time. Does that mean we should make it easier? No way! The world is full of easy. How many Robert Lewises do we need before the scale tips in favor of sustainability on every proj-

What's happening in the BE Masters Series wouldn't have been possible five years ago. Today, the tools for creating and delivering online courses are better and cheaper.

ect? I believe the NESEA community is full of Robert Lewises. In fact, of the 100 people who have registered for the Zero Net Energy Homes course so far, 60 have completed the capstone project—that's a high proportion for an online course.

What's happening in the BE Masters Series wouldn't have been possible five years ago. Tools for creating and delivering online courses are now better and cheaper. They can facilitate deep learning about products and techniques and help transfer critical skills across companies, professions, and generations. *How can we as an organization take advantage of them?*

Experts: Do you know something important? Thoughtful use of education technology can amplify your teaching and expertise.

Practitioners: What skills might take your career or your business to the next level? NESEA is a place where transformational skills can be acquired any time during the year.

The instructor says . . .

"My mental model comparing the workshop format with the online format is that the workshop is a menu, and the online course is a meal. **It's a how-to experience that lifts the student to a significantly higher level**



of practice. We've incorporated a final project in which students are asked to design a zero net energy house, submitting plans and elevations, a wall section, an HVAC plan, R-value calculations, and an annual energy model. The calculations are done in a series of simple calculators I put together in Excel. The student feedback has been overwhelming. They are so excited to be able to assess how their choices affect performance, with quantitative tools to answer their what-if questions."

— Marc Rosenbaum

The student says . . .

"Designing zero net energy homes is the way to go if we want to be stewards of the environment. **Marc's course helps designers gain new skills and understanding that they can't get by attending a seminar or**



listening to a webinar. Watching Marc's videos, reading the assignments, and doing the homework using his spreadsheet calculators provided direct experience in energy modeling. Only years of practice, however, gives one mastery and intuitive understanding of how buildings perform. We are all learning from each other, so I am grateful that Marc has shared his knowledge and experience with us."

— Robert Lewis

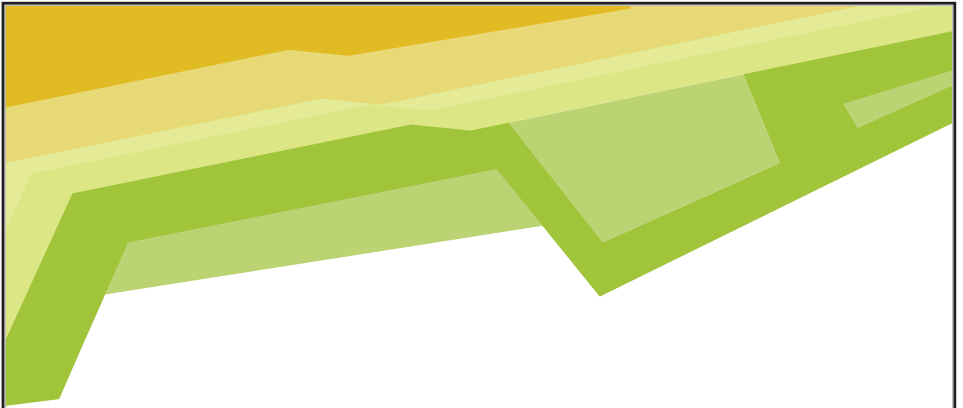


Step 3: Rob Lewis's capstone project demonstrated his new energy modeling skills.

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NESEA leadership: This is a chance to go deeper than was possible five years ago. Education technology can help us transmit our best ideas beyond the existing community to the entire world. The best part? We can measure it!

Solution providers: Manufacturers, distributors, and vendors in the NESEA community: education technology can enhance your experience as an exhibitor and help educate the high-performance building community.

Master teachers, hungry learners, and organizations with aligned missions: this is our call for your participation and collaboration in the years ahead. I want you to have trouble sleeping because your minds are racing with ideas. Let's engage as a community to leverage education technology.

Let's get busy! Throw your ideas and questions at Brian Hayden, brian@cammpus.org or 888-552-5719. Or go to www.nesea.org/learning365, where you'll find other contacts and links as they become available. 

Through his work at HeatSpring Learning Institute, NESEA member Brian Hayden helps authors and experts teach online. He helped develop Cammpus, a software that allows experts to develop and teach advanced material, interact with students, and verify learning in online and blended programs (the BE Masters Series runs on Cammpus). He is also a member of the Interstate Renewable Energy Council Standards Committee and teaches entrepreneurship at the University of Michigan.

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Hurricane Sandy: Point Taken

As cleanup efforts continue, fast-growing BuildingEnergy NYC is all about resilience

By F. L. Andrew Padian

Six months before Hurricane Sandy, whose storm surge hit New York City on October 29, 2012, the decision was made to center NESEA's 2012 Building-Energy conference on resilience. As BE approached, we all became more and more impressed with the smattering of resilience sessions and how they made the conference much more timely.

Sandy had really hit a lot of New York City hard, taking out entire neighborhoods, like Breezy Point, where fires spread from house to house even as water surged around their foundations. In Manhattan, which wasn't hit nearly as hard as the outer boroughs, surge waters washed cars down the street at Peter Cooper Village, and water climbed onto the West Side



The water flowing into the Brooklyn Battery smelled like oil. Of course it did: many of our buildings heat with oil, and the tanks are in the basements.

highway, filling basements and in some places rising to more than three feet deep on the first floor. A major tunnel between Manhattan and Brooklyn, the Brooklyn Battery, filled with water.

Live news reports said the water flowing into the tunnel smelled like oil. Of course it did: many of our buildings heat with oil, some of them with residual no. 6 oil, and the tanks are in the basements. My own home in Hell's Kitchen was not affected, but my office was closed for a week.

Some numbers from the mayor's office: 43 deaths, 6,500 patients evacuated from hospitals and nursing homes, nearly 90,000 buildings in the inundation zone, 1.1 million city children unable to attend school for a week, close to 2 million people without power, 11 million travelers affected daily, and \$19 billion in damage. Concerning damages, when a building

is vacant for three months for repairs, cash flow stops, and complementary insurance policies typically don't pay for everything. We never thought that the ocean, the Hudson or the East Rivers, or any other adjoining body of water would rise to the levels that Sandy brought.

This was a storm surge, a disruption of major services, an economic disaster, and an environmental disaster all in one.

BE NYC 2012: a timely first

The Friday before Sandy hit, 30 of us met at my office to plan a one-day BE NYC Multifamily Conference to address

43 deaths | 6,500 patients evacuated from hospitals and nursing homes | nearly 90,000 buildings in the inundation zone | 1.1 million children

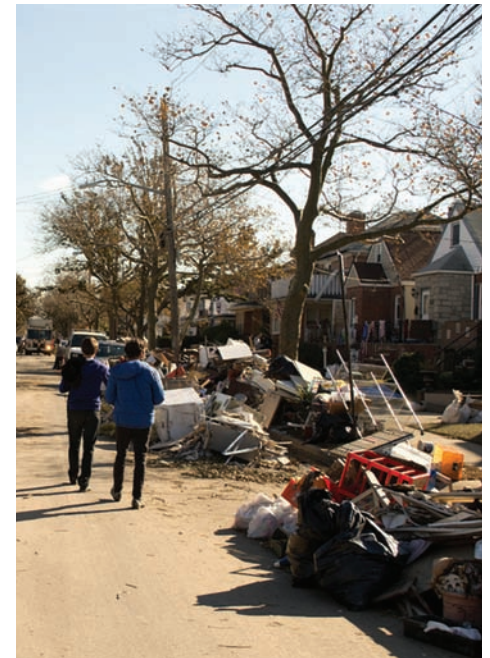
what building owners and operators need to know about technology, training, and financing to make their buildings safe, durable, affordable, comfortable, sustainable, energy efficient, and even resilient. On Saturday, December 1, just 35 days later, a committee from the multifamily sector in NYC, about 25 GreenHomeNYC volunteers, and the

a new moniker for NESEA and BE: BE NYC, or “be nice.”

Today, my company, the Community Preservation Corporation, is working with the New York City Department of Housing Preservation and Development and other city, state, and federal agencies to bring much-needed monies to apartment buildings affected by

For 2013, a bigger, more diverse conference

Buoyed by the success of BE NYC, and having a bit of NYC moxie, we immediately went out to double the size of the conference. With a local committee of professionals who own, manage, build, retrofit, and rehab commercial, insti-



NESEA staff brought 170 people to that conference. Building owners came to hear what other building owners were doing, rave reviews ensued, and we had

For BE NYC 2013, our goal is to reach out to more building types and expand the typical NESEA audience to include the most important practitioners: building owners and managers.

Sandy. I've seen basements completely submerged—mechanicals, collectibles, everything, gone. In buildings built on slab or with full basements, the city's Rapid Repair Unit has replaced boilers that were covered with water—with the same low-efficiency units, in the same place they were before (yes, I need some more things to complain about). Accommodations for the next storm or power outage or whatever, including locating mechanicals on upper floors, are now becoming ingrained in our work. In June of this year, the city released a 455-page report on the impact and reaction to Sandy that recommends a long-term investment of 19.5 billion to protect the city in the future.

tutional, multifamily, and even small buildings throughout the NYC metropolitan area, our goal was to reach out to more building types and expand the typical NESEA audience to include the most important practitioners: building owners and managers. We discussed having a track specifically on resilience, but it lost out to tracks about buildings—because each of six planned tracks fully addressed resilience, and case studies abounded.

In the NESEA community, we're constantly honing our skills. Decades ago, when people suggested that we consider health and safety in our analysis (we were tightening buildings), many of us guffawed and confi-

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dently claimed to be fully prepared. We weren't. Now, the ones who trained us in health and safety then are among the leading experts in resilience—because it's about staying alive in our buildings. Resilience, this new tool in our sustainability toolbox, requires us, again, to learn a whole slew of new things and to look at buildings in another and more detailed “whole building” format.

Let's hope the lesson of Sandy is learned and remembered. The power failure that gripped much of the Northeast 10 years ago, causing cooling losses and total mass transportation failure for a few days in some regions, has been forgotten by many. Sandy's relief and repair effort, like Katrina's, will take years, and preparations for the next event may take longer. It appears, however, that we have begun. 

New York City resident F. L. Andrew Padian is vice president for energy initiatives for the Community Preservation Corporation (CPC), a not-for-profit affordable-housing mortgage lender. There, he is working to implement the Green Financing Initiative (GFI), working with CPC staff and building owners across New York State. He is also, among other things, board president of GreenHomeNYC and vice chair of the NESEA board. He has 30 years of experience in the unique building science of multifamilies and has performed detailed energy analysis on hundreds of buildings nationwide. He created the first national model for training and certification of building managers and maintenance staff of multifamily buildings for energy efficiency; over 2,000 participants have taken the extensive one- to five-day training.



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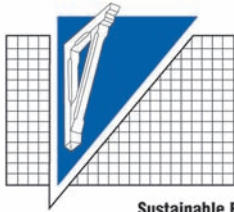
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Green Buildings Open House in Transition

GBOH takes its natural place as a consumer-focused event, while BuildingEnergy Pro Tours ramps up

By Jennifer Marrapese

We at NESEA HQ have been taking a close look at our Green Buildings Open House. In some ways, our organization has outgrown the 17-year-old program, and in some ways—due to its success—it's outgrown us. The tour is not going away, but NESEA will support it in a less intensive way. That frees up resources for a distinct new program that better serves our members, one focused on high-performance buildings and transfer of knowledge among professionals: BuildingEnergy Pro Tours.

GBOH works: we've got the data

NESEA's annual Green Buildings Open House (GBOH) started in 1995 as a free consumer education program. It was aligned with, but run independently of, the American Solar Energy Society's National Solar Tour. NESEA invited home or building owners who had deployed energy-efficiency or

GBOH attracts primarily consumers and home owners with an interest in, but not specialized knowledge of, energy efficiency and renewable energy.

renewable-energy measures to list their properties in our database. To help promote all these hosts sites,



Andrew Padian (in the hat) leads a site visit during a full-day BE13 workshop. Such first-hand experiences are the stuff of BE Pro Tours.

NESEA shipped GBOH lawn signs, this magazine, and other literature to each host, contacted local press outlets, and sent out emails. We also made the host database searchable on our website. We helped tour organizers coordinate their efforts and mailed sign-in forms to each host so that, with their help, we could track just how many people were taking the tour.

For years, we collected stories about how the program inspired attendees to build or retrofit their home for sustainability and inspired NESEA members to shift their practice toward high-performance building. But we were never able to quantify the extent to which GBOH motivated people to

change their behavior. Until last year, that is.

A 2012 grant from the National Grid Foundation allowed us to survey past and new GBOH visitors and hosts. We learned that the program does in fact further NESEA's mission to advance the adoption of sustainable energy practices in the built environment. We also learned that it attracts primarily consumers and home owners with an interest in, but not specialized knowledge of, energy efficiency and renewable energy. Among the survey findings:

- 96 percent of GBOH participants made some energy efficiency improvements as a result of going on the tour.

- 82 percent of past attendees reported taking energy efficiency measures or installing a high-performance system in their building since the tour. More than half of these were greatly influenced by GBOH to do so.
- Energy-efficiency measures taken by attendees included installing low-flow shower heads, completing an energy



Another Pro Tours-style site visit, this one to the East End Community School in Portland, ME.

audit, air sealing, replacing incandescent lightbulbs with CFLs or LEDs. High performance systems installed included PV, high-efficiency HVAC systems, and high-efficiency hot-water systems.

- Several weeks after GBOH, 64 percent of first-time attendees who responded had already taken at least one of these actions: air sealing their attic, basement, sidewalls, windows, or floors; installing a high-efficiency heating system and/or expanding duct work for energy-efficient systems. And nearly two-thirds of these attendees reported that they were heavily influenced by GBOH to do so.

A New Tour Is Born

BE Pro Tours offer an exclusive, intensive learning opportunity

By Paul Eldrenkamp

Here are the learning experiences that have most influenced my career as a building contractor:

- A two-day workshop with Joe Lstiburek in 1987
- A one-day workshop with Marc Rosenbaum in 2006
- A nine-day Passive House training course with Katrin Klingenberg in 2008
- A two-week of tour high-performance buildings in Austria and Germany with Tom Hartman, Chris Benedict, and Andy Shapiro in 2011

That last item—the tour with Tom, Chris, and Andy—was not only highly educational, but also phenomenally fun. We saw some great buildings, and also some buildings that aspired to greatness but fell a little short for one reason or another. We were able to meet with project teams, but also with end users, the people who actually lived or worked in these buildings. We visited the mechanical rooms, scooted into low-ceilinged attics, scrutinized interior and exterior finishes, played with lighting controls, and generally made nuisances of ourselves. But polite and appreciative nuisances. (Only once were we yelled at—for climbing a ladder to a roof.)

Waiting for our flight home, one of us (I forget who) observed that we all knew of buildings in the NESEA region that would compare very favorably with any of the fascinating, intriguing buildings and systems we had just encountered. Although we didn't know it at the time, it was at that very moment that BE Pro Tours was hatched. In 2012, NESEA launched a pilot program.

Andy Shapiro, who lives in Montpelier, VT, eventually put together a really interesting collection of eight buildings for the first weekend-long BE Pro Tour. Held this past August, the tour was a chance to see diverse standard-setting projects—and interact with some of the region's leading high-performance building practitioners.

If you're interested in designing, constructing, or engineering high-performance buildings, there's no substitute for visiting actual projects completed by people who have similar aspirations. You can see firsthand what works and what doesn't. You can talk with people intimately involved in the projects and get invaluable lessons on expensive mistakes to avoid. More important, you can see things that really work that you never would have thought to try if left to your own devices, and you can see them up-close and personal, at full scale and in great detail. It's these aspects that made our European tour—and now NESEA's new BE Pro Tours—so uniquely educational and inspiring.

Paul Eldrenkamp is founder and owner of Byggmeister Inc., a 25-year-old design-build remodeling company based in Newton, MA, with a particular focus on reducing household energy use. He was chair of BuildingEnergy13 and serves on NESEA's board of directors and on Massachusetts Governor Deval Patrick's Zero Net Energy Building Advisory Council.



BE13 attendees get an in-progress look at the Fraunhofer Center for Sustainable Energy Systems' renovation and deep energy retrofit of a historic Boston building.

A new, less hands-on approach

We were of course thrilled to learn that GBOH is so effective. The problem is, with 400 host sites participating from around the Northeast, GBOH has grown to attract more than 10,000 participants annually, requiring the Herculean efforts of a full-time staff person. With this in mind—and with our new survey data in hand—we went on to scrutinize GBOH as a program, asking just how it relates to our mission and our practice. Here's what we learned:

- It has grown beyond the scope of our ability to coordinate it for maximum effect.
- It has also outgrown the single Saturday traditionally allotted for the tour.
- While GBOH supports NESEA's mission, its consumer-education focus and

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lack of specific criteria for the featured buildings means that it does not align with the developing BuildingEnergy brand.

- Our partnership with NESEA Business Member EnergySage, which now hosts the tour's online listings, allows us to display host sites year round, and in a more comprehensive way than we can on our own.
- The GBOH sites with the most visitors have been those with passionate hosts who self-promote their tours rather than rely solely on NESEA.

What does this mean for GBOH? In the long run, we're not sure yet. But in 2013, it means we'll pull back and begin to let volunteer tour organizers and hosts run the show, with less individualized support from NESEA headquarters (we won't be devoting a full-time staff person to it). However, we'll still provide the database through Energy Sage. And we'll offer hosts the tools they need to promote and run their tours independently, along with "of-

The GBOH sites with the most visitors have been those with passionate hosts who self-promote their tours rather than rely solely on NESEA.

office hours" during which we'll answer question from both hosts and potential visitors. Despite these changes—or even because of them—we believe GBOH will be as successful as ever as a consumer education program. For details about tools and support, visit www.nesea.org/gboh/whats-new/.



Tour guide: Alex Cheimets (left) of Fraunhofer Center for Sustainable Energy Systems.

BuildingEnergy Pro Tours takes off

Our focus can now turn to Building Energy Pro Tours (BE Pro Tours, or just Pro Tours, for short). This new program was inspired in part by a trip that NESEA members Paul Eldrenkamp, Tom Hartman, Christ Benedict, and Andy Shapiro took in 2011: a two-week tour of high-performance buildings in Austria and Germany. Paul describes it as one of the best learning experiences of his career as a building contractor (see "A New Tour Is Born," page 29). Why not offer something similar back home in the Northeast?

Designed as a "field experience" complement to the BuildingEnergy conference, BE Pro Tours comprise "in the weeds" high-performance building tours and workshops led by the project teams. Attendees will be able to review performance data and ask project teams the probing questions that allow them to dramatically decrease their own learning curve. Questions like, What would you do differently next time? What worked really well? and

Upcoming BE Pro Tours

Go to nesea.org/pro-tours for the latest dates and locations.

September 16, 2013

- Western MA, with the Center for EcoTechnology

October 2013

- Western MA, Living Building Challenge applicant, Smith College Bechtel Environmental Classroom

March 2014

- A field component for an all-day BuildingEnergy conference deep energy retrofit workshop

Spring 2014

- Western MA, hosted and sponsored by Wright Builders, in conjunction with their 40th anniversary



A tour of a LEED Home Platinum apartment and office building (Rick Renner Architects) in Portland.




Portland's Pearl Place apartments.

What didn't work so well? These tours will also serve as networking opportunities, and most will provide continuing education credits.

After a successful pilot program in 2012, BE Pro Tours is growing rapidly in 2013. The goal is to create a template

that will empower NESEA members to organize BE Pro Tours throughout the Northeast, with support from their staff at HQ. By the time this issue goes to press, we will have offered our first weekend-long BE Pro Tour, in cooperation with Yestermorrow Design/Build

School in Vermont. To read about that tour's featured buildings and highlights in the words of the participants, go to www.nesea.org/pro-tours. 

Jennifer Marrapese is NESEA's executive director.



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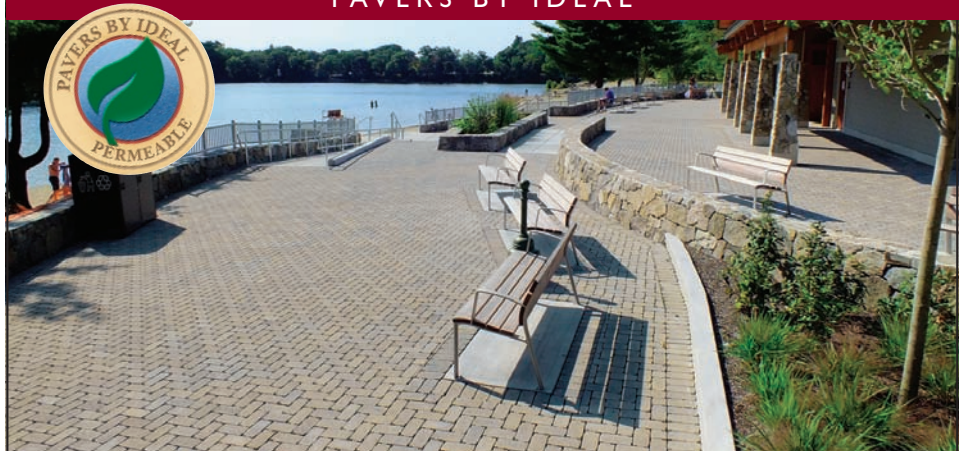


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Upgraded Envelopes, Unintended Consequences

When you're retrofitting to save energy, don't forget the structural engineer

By Jim D'Aloisio

Improving the insulation and air-barrier performance of existing building envelopes is part of reducing our overall heating and cooling energy usage. Yet there is some resistance to attempting this on older buildings. Indeed—as the occasional collapse illustrates—they may not be able to handle the consequences of the “improvements,” including increased snow load on the roof or exposure of the masonry to colder temperatures. However, we can make energy improvements without compromising the physical shell—by paying careful attention to all aspects of the performance of the building envelope, including structural integrity and environmental durability.

The work that needs to be done to existing buildings is too important to be deterred by secondary effects that can be managed. Let's consider what needs to be done—and do it!



At this New York State elementary school, a 30-year-old beam broke apart following a foot of snowfall. A newly insulated roof had prevented the melting that occurred in the past.

Thermally resistant roofs will hold more snow

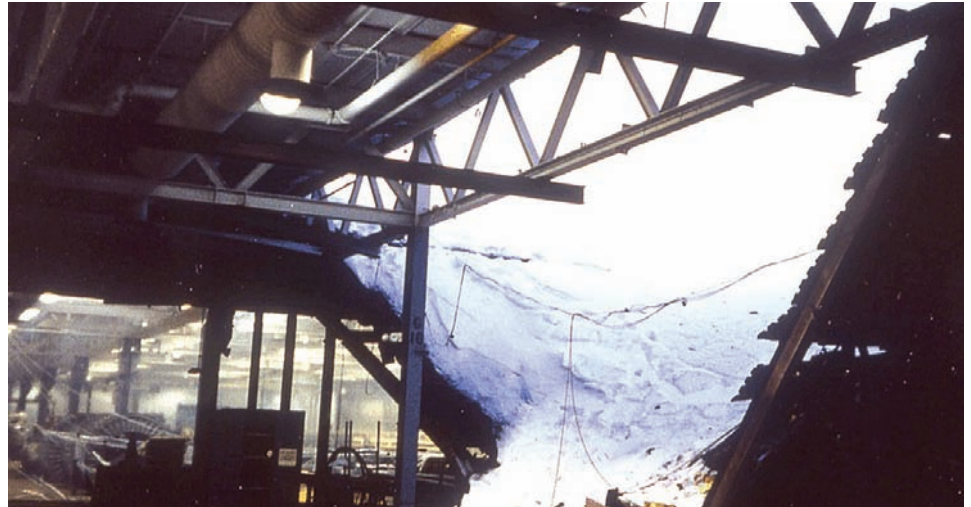
Compared to contemporary buildings that comply with modern energy codes, most buildings built decades ago had minimal insulation. Less roof insulation obviously results in warmer temperatures at the roof surface, which reduces snow accumulation. But even if the R-value of a new roof assembly matches that of the previous roof, if no continuous air barrier was provided, then convective heat loss due to exfiltration of interior air may cause the roof to warm and provide some melting. Improving a roof's energy performance may create more snow loading than it has ever experienced—

essentially, an inadvertent load test.

Case in point: At the Smith Road Elementary School in North Syracuse, NY, a Glu-Lam beam in the cafeteria roof broke apart (see photo above), dramatically and without warning, one Saturday in 1994. A foot of snow had recently fallen. The 1950s simple-span Glu-Lam beam happened to be significantly undersized for the span and design loading required at the time. Still, the fragile beam had remained in service for over 30 years. Its fundamental lack of flexural capacity was not revealed until its collapse, when a newly insulated roof prevented the snowmelt that had apparently always

occurred in previous winters. Ask any structural engineer who has performed a number of building condition surveys, observing the usually unobserved roof framing above ceilings, crawling through attics, or cutting access holes in drywall soffits: underdesigned, improperly installed or modified, and deteriorated structural elements are present in more buildings than most of us realize. Some potential problems:

- Metal plate-connected wood roof trusses can have plate installation errors, poorly selected wood members, and inadequately braced compression members.



Deteriorated structural elements are surprisingly common. Among the potential problems are poorly selected wood members (e.g. knots), plate installation errors, and trusses with poor connection details and inadequate bracing. The roof at right collapsed due to a failed end connection.

- Open-web steel joists can be undersized for snowdrift loading, be improperly loaded between their panel points, and have weak bearing conditions. Plus, their thin steel elements are vulnerable to moisture-induced deterioration.
- Wood and steel trusses can have poor, uninspected connection details and, again, inadequate bracing.
- Conventional wood and steel framing members can have improper modifications and are subject to deterioration caused by leaking (or formerly leaking) roofs.
- Modular (i.e. preengineered) buildings are usually designed with very little reserve structural capacity. These can be extremely vulnerable to additional loading.

Leaving walls out in the cold

Like roofs, walls with minimal insulation and/or poor air barriers allow heating energy to escape during cold weather. Tightening up and insulating such walls certainly changes the heat, air, and moisture dynamics of the wall—for better or worse.

Exfiltration of interior humid air through an air-porous wall can create condensation within the wall. This can lead to facade failure due to corrosion of brick ties, the cause of which is frequently misdiagnosed as rainwater entering in through the wall or from above. Clearly, not all energy improvements are detrimental to a wall's

Improving a roof's energy performance may create more snow loading than it has ever experienced—essentially an inadvertent load test.

physical performance! But if energy tightening of walls is successful, unless insulation is added to the outside face, the exterior portions of the walls will be subject to colder temperatures. To assume that exterior masonry walls were properly designed and built to resist those temperatures is as naive as assuming all roofs can support their full snow load. How to discern when you might cause trouble?

Potentially problematic conditions can be divided into two broad categories: freeze-thaw vulnerability and lack of accommodation to differential thermal and moisture gradients.

Freeze-thaw vulnerability

The use of contemporary high-Portland mortars can be damaging to older mass wall masonry structures, because their vapor barrier properties tend to trap moisture in the mortar joints, resulting in freezing damage to the older mortar deeper within the joint. This is true of many older buildings that have been improperly repaired in recent decades. The obvious solution is to cut out all such inappropriate mortar, rake back any deteriorated mortar behind the hard exterior mortar shell, and repack the joint with higher-lime, softer mortar that allows moisture to escape. This work can add significantly to a project's budget, but it's the right thing to do to ensure a durable building, whether energy retrofitting or not.

Another potential for damage is if the wall has freeze-sensitive masonry on the interior, and the thermal gradients change after adding interior insulation. To evaluate the potential for this, my firm recommends a hygrothermal analysis (e.g. WUFI).



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Not good: a rusted brick tie.

Lack of accommodation to differential thermal and moisture gradients

In our experience this is not a very common problem, since masonry walls' outer faces can experience some thermal shrinkage without suffering much damage. Again, the mortar selection is key to good performance: high-lime mortars are more accommodating to slight movement, and so are less prone to cracking and deterioration, than contemporary high-strength mortar.

One protocol that can be appropriate is the judicious use of retrofit masonry anchors to minimize the potential for masonry to become unsecured due to planar movement. Another is as-needed cutting out and repointing of joints that experience movement, with the work being done in a planned way the first winter after the retrofit. And if the wall will no longer be able to dry to the interior, a hygrothermal analysis should again be performed.

Footings and frost heaves

In most cases, thermal retrofits of perimeter foundation walls involve adding insulation to the outside faces, as well

as sealing the sills to cut off convective losses. Such actions tend to raise the depth of ground-frost penetration in the vicinity of the building, reducing (not increasing) the risk of frost-heave damage. However, adding insulation to the inside face of a foundation wall or under a slab could drop the frost line below the footing, which might lead to frost-heave problems. Consult your local therm modeler before embarking on such improvements.

A structural sanity check

All buildings require maintenance. At the very least, a periodic visual review of the observable portions can identify minor conditions whose correction can prevent potentially expensive problems. An obvious example of this is roof drainage: one clogged downspout can cause rotting of roof edges, ice accumulation, and splash-zone scouring and foundation deterioration. Such failures are sometimes attributable to a recent rehabilitation project.

Buildings are integrated systems, whether those who work on them acknowledge the interactions or not. As I've described, envelope improvements

can indirectly affect the structural loading, performance, or durability of the building enclosure. A truly integrative approach to retrofitting will involve a systems-savvy structural engineer, or at least a team member with such sensibilities. Before embarking on a reskinning or retrofit, have such a person perform a structural condition review, or at least a structural sanity check, to look for the following issues:


- **Visually apparent deficiencies or limitations in the structural load capacity of the roof.** This may be in the form of excessive deflection of the spanning elements, any local failures such as cracks (other than normal shrinkage checks), connection or bearing distress, or any rot or rusting in wood or steel members, respectively.

Envelope improvements can indirectly affect structural loading, performance, or durability. An integrative approach will involve a systems-savvy structural engineer, or at least a team member with such sensibilities.

- **Evidence of marginal frost protection conditions,** or cracking patterns or other distress consistent with frost heaving, especially at corners and along foundation walls where the grade is at the lowest point around the building. For example, at a basement-level entry, the foundation might not have dropped down below maximum frost depth.

- **Evidence of durability issues with the facade elements.** Beyond the appearance of the joint surfaces, if the exteriors of the joints are hard and have some degree of cracking, some

areas should be removed to check the mortar deeper within the joints for hidden deterioration. Also, any deterioration of the facade anchorages or ties, and the supports for the facade, should be identified and assessed.

- **Possibility for synergy between structural needs and energy improvements.** Opportunities present themselves on a case-by-case basis. One technique worth considering—the pros and the cons—is the careful use of expanding urethane foam injected within the cavity of a brick masonry wall, which can supplement the facade anchorage as well as provide thermal conductive and convective improvements. This can be successful if the existing flashing and weep system is dysfunctional anyway, and if the intervention does not result in entrapment of vapor in a bad place within the wall. But that's a topic for a whole other article. 

James A. D'Aloisio is a principal with Klepper, Hahn & Hyatt, a 27-person structural engineering, landscape architecture, and building envelope services firm in Syracuse, NY. He is treasurer of the US Green Building Council's upstate New York chapter and a member of the ASCE's (American Society for Civil Engineers) Structural Engineering Institute (SEI) sustainability committee, where he heads the Thermal Bridging Working Group.

Peer reviewer Mark D. Webster, PE and LEED AP BD+C, is a structural engineer in the Boston-area office of Simpson Gumpertz & Heger Inc. (SGH). He has nearly 25 years of experience in the design, analysis, and investigation of concrete, steel, masonry, and wood structures. A leading authority in the field of sustainability and structural engineering practice, he is also a founding member the SEI's sustainability committee and former chair of the US Green Building Council's Materials and Resources Technical Advisory Group.



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Sports Stadiums Green Up

The big leagues compete to save energy (go, Mariners!) and educate fans

By Jessica Esposito

Professional sports stadiums and arenas resemble small cities on game days: tens of thousands of fans commute to the game, where they consume food and entertainment under high-performance lighting, buy merchandise and beer, use restrooms, and dispose of waste. These venues can draw 5 to 10 MW of electricity during a game. That's a draw equal to that of 4,000 to 8,000 homes. Efficiency measures can

The Seattle Mariners' Safeco Field boasts the lowest source energy use intensity in Major League Baseball—less than half that of the average entertainment building.

be challenging to implement, though—these aren't typical commercial energy users. The challenges go beyond sheer size. Stadiums and arenas operate at full power demand for relatively short periods and varying portions of the year, and they have a blend of outdoor areas and conditioned indoor spaces with a multitude of entry points.

Nevertheless, these venues are finding ways to shed energy waste, run their facilities more efficiently, and incorporate renewables, all while sav-



The Seattle Mariners' Safeco Field. Energy-saving upgrades to lighting and more have saved the team over \$1.75 million since 2006. A 32.76-kW double-panel solar array (both sides absorb energy) is expected to generate 40,000 kWh annually.

ing on energy costs. Of the 126 professional sports teams in the five major North American leagues (MLB, NBA, NHL, NFL, and MLS), 68 have undertaken energy efficiency initiatives, 18 have installed solar arrays, and 15 have achieved LEED certification. With the help of the Natural Resources Defense Council (NRDC), in the last three years the NBA, the NHL, and MLB have instituted leaguewide environmental tracking systems to measure and benchmark energy use, water use, and more at their venues.

Mariners drive down EUI



Take the Seattle Mariners' Safeco Field, which now boasts the lowest source energy use intensity (EUI) in Major League

Baseball, at 110.2 kBTU/SF/HDD (among those reporting to Energy Star). That's less than half that of the average entertainment building.

The team has saved over \$1.75

million in energy costs since 2006. As Vice President of Stadium Operations Scott Jenkins has noted, if every Major League team cut their EUI by 25 percent, the collective annual savings would be \$16.5 million.

Much of the initial savings resulted from fine-tuning equipment controls and automating lighting and HVAC schedules based on occupancy. Replacing 800W metal halide suite lighting with 80W LEDs and installing motion sensors in garages cut lighting costs significantly. A new LED scoreboard consumes 90 percent less energy than the old incandescent one—130,000 kWh instead of 1.2 million kWh. And a 32.76-kW double-panel solar array (both sides absorb energy) is expected to generate 40,000 kWh annually.

Cardinals save power and water



Busch Stadium, home of the St. Louis Cardinals, installed a heat exchanger on the steam heating system to recover heat

from waste condensate. This eliminated the need to use city tap water—previously 5 million gallons annually—to temper the hot condensate before it is discharged to the sewer system.

Since 2007, the stadium's EUI has been reduced by 23 percent to 161.2 kBTU/SF/HDD, which saved more than \$300,000 over three years.

Other efforts include replacing 1,000 of the stadium's spotlights and floodlights with LEDs, which cut lighting power demand by 90 percent; repairing and improving insulation; and downsizing the cooling systems in individual conditioned spaces such as the scoreboard control room and video coaching rooms with smaller dedicated units. Last year, the stadium installed a 25 kW PV array, which powers all the ballpark's retail stores and helps shave peak demand.



At the St. Louis Cardinals' Busch Stadium, PV powers all the ballpark's retail stores and shaves peak demand. And a heat exchanger on the steam heating system recovers heat from waste condensate, saving 5 million gallons of water annually.


Eagles go big with solar and wind

At Lincoln Financial Field, the Philadelphia Eagles recently installed an 11,000-panel solar array and 14 vertical wind turbines, which they expect to provide 30 percent of the stadium's

The Philadelphia Eagles installed an 11,000-panel solar array and 14 vertical wind turbines, which they expect to provide an unprecedented 30 percent of the stadium's energy.

energy—an unprecedented proportion for a sports facility that size.

The cultural shift toward environmental responsibility in the sports

industry didn't happen overnight, and much work remains to be done. But by sharing best practices through organizations like the Green Sports Alliance—and using benchmarking to spur some friendly competition—teams and leagues across the country are not only making meaningful efforts to reduce their energy use, but also educating tens of millions of fans about environmental stewardship. 

Jessica Esposito is a consultant for the NRDC's Green Sports Program, where she helps coordinate sustainability initiatives with professional sports leagues, teams, and facilities. She holds an MS in sustainability management from Columbia University and is a LEED Green Associate.

Resilient Solar PV Systems

When the grid goes down: new options for emergency solar power

By Jim Dunn

Most solar systems are grid-tied and are required to automatically shut down when there is a grid failure—a measure that protects utility repair crews from being shocked and also reduces local grid interference. Until the grid is restored, the power generated by these arrays is useless. The sun may be shining, but just like any other home in the outage area, the solar-powered home is at the mercy of utility crews' repair backlog.

The solar industry has been clamoring for solutions to this problem for many years. Finally, two new product lines achieve the necessary temporary

Any PV system and inverter that users want to run offline must be 100 percent isolated from the grid.

isolation of the PV system from the grid. One is the SMA Sunny Boy 3000-5000 TL series of inverters, which features a built-in "secure power supply" switch and provides 1.5 kW of isolated 120 VAC power. The other, from my own company, Future Solar Systems,

is a novel and affordable do-it-yourself 1 kW grid-independent PV system that's completely automatic. These products are the first to be developed, but I expect others will soon follow as PV penetration, and therefore market demand, increases.

The challenge: isolating the PV system from the grid

As required by NEC (National Electrical Code) and UL (Underwriters Laboratories) regulations, grid-tied inverters prevent any independent source of AC power from connecting to the grid if the grid is not active. Upon grid failure, they must go offline within two seconds and stay disconnected for at least five minutes after service is restored. This is called "anti-islanding" (as defined by UL 1741 and related regulations like IEEE 1547).

Any PV system and inverter that users want to run offline must be 100 percent isolated from the grid with a UL-certified transfer switch or by manually disconnecting the AC service and breaker panel. Emergency power capability can also be accomplished, at significant cost, with a DC-coupled inverter and battery backup. Due to high cost, these options are seldom added to modern grid-tied PV systems un-

less there are frequent power outages in the area or 100 percent uptime is critical, as with cell towers and banks/ATMs. Further, the vast majority of grid-tied inverters and micro-inverters cannot operate at all without sensing that the grid is active and syncing their output to the local grid.

DC inverters, or off-grid inverters, supply power only to the loads connected directly to them, operating in total isolation from the grid (through a transfer switch or independent connection). However, the typical off-grid or hybrid/dual-mode PV system requires special energy storage and often uses two separate sine-wave inverters, a bank of batteries, and a charge controller, all of which significantly increases the total cost and complexity of the PV system.

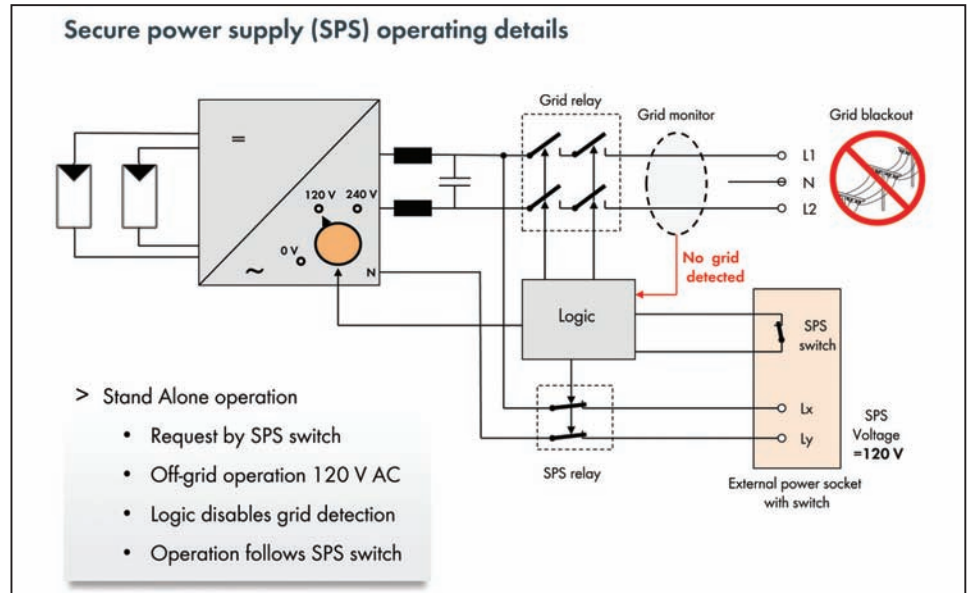
Traditional dual-mode options

There are several traditional options for using grid-tied PV systems during grid outages. One is a battery-backed hybrid PV system with both AC and DC inverters and batteries. Another is a bi-modal inverter like Princeton Power Systems', which is very costly but automatically changes over to DC mode during grid outages. A third is to use DC power from PV panels to run select isolated DC loads, such as hot-water

From the editors: Our usual editorial policy is to not feature product-specific articles written by the manufacturers of those products. We've made an exception for this article. After reviewing it, our editorial board was convinced that it was important to share with our audience, in a timely manner, that there are finally some solutions to the problem of operating grid-tied PV systems during grid failures. This outweighed our concerns about any appearance of partiality toward one manufacturer or another. NESEA does not endorse any of the products featured in this article, but we are excited about the technological breakthroughs they represent.



SMA's SB TL-US with secure power supply.



SMA Inverter with SPS feature showing added switch and isolated Secure Power outlet, (pink shading).

heaters, DC fans, lights, resistive loads, water pumps, irrigation, pool heaters, and so on. This approach bypasses the AC inverter and the grid altogether; it requires special controls and charge/load control, but minimal batteries. There are issues, however, with these dual-mode PV systems. Among them:

- Costly—two independent inverter systems fed by a common PV array
- Large-capacity battery bank needed
- Off-grid peak power is limited (based on inverter/battery size)
- More space required, for battery banks and extra equipment
- Special transfer switch needed in some cases
- More complex for the user—battery maintenance and some intervention
- Long payback period

Below, I'll discuss two new approaches to providing AC power during grid outages—without adding cost to the primary PV system or requiring extra transfer switches, other inverters, large battery banks, or other special equipment.

The first is the “secure power supply” (SPS) feature on SMA Solar Technology's 3000–5000TL-US invert-

ers, which provides 1500W of isolated AC power as long as the sun is out and the user switches the SPS option on each day of the outage.

The second is Future Solar Systems' reverse UPS (uninterrupted power supply) system, tied directly to PV panel output, which provides continuous AC power from PV to select loads, defaulting to grid power when the sun goes down. It operates automatically, without user intervention. During outages, evening power can be provided with auxiliary battery storage.

New option: SMA3000–5000TL-US series inverters

These transformerless inverters now provide a feature called the “secure power supply.” The SPS is a unique way to power an independent off-grid 120 VAC outlet with up to 1500 W of AC output during grid outages, as long as the sun is shining. This feature, outlined below, is built into SMA's new 3000TL, 4000TL, and 5000TL inverters and is easily connected to an independent 120V 12A outlet by the installer. And these inverters offer a host of important features:

- Emergency power supply provides up to 1500 W of daytime power in case of grid outage
- 97.1 percent maximum efficiency with up to 20-year extended warranty
- Integrated LED display
- Shade management with OptiTrac Global Peak MPP (maximum power point) tracking
- Wide input voltage range with 2 MPP trackers
- UL 1741 and 1699B compliant
- Integrated AFCI arc-fault circuit protection for added fire safety

SPS mode operation

The SPS option provides up to 1500 W of 120 VAC power to a special grid-isolated outlet for powering AC loads like refrigerators, lights, computers, microwaves, TVs, garage-door openers, and so on. After a grid failure (and LCD notification that the inverter cannot connect to the grid), the SPS switch is manually activated and the inverter goes into a special “secure power” mode in about 20 seconds. Even if the grid is restored, the inverter remains in off-grid “secure” operation until the inverter loses PV input, shutting off for the day, or until the user manu-

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ally shuts off the SPS switch. This SPS circuit is totally isolated from the grid, independent of the main breaker panel.

The inverter automatically switches back to normal (grid-tied) mode when the inverter starts up the next morning—even if the grid is not yet restored. If the grid is still down, the SPS switch must be manually reset to the on position to restart the SPS mode. Also, if the grid is restored while the sun is still shining, the user must manually turn off the SPS switch to get the inverter to reconnect to the grid for normal, full operation, feeding the grid and providing full 240 VAC output. Note: In order

SMA Solar technology's "secure power supply" is a unique way to power an independent off-grid 120VAC outlet with up to 1500W of AC output during grid outages, as long as the sun is shining.

to be aware of grid reactivation, the customer should not shut off the main panel disconnect.

The SPS option will drop power to the SPS outlet during reduced PV output, such as when a cloud passes over the PV array while the grid is still out, or if the secure loads draw more power from the SPS outlet than the DC input from the PV array can support, dropping the AC output temporarily. The inverter automatically tries to reset the AC "secure" output after the cloud passes or the SPS load is reduced, and it will keep trying every 20 seconds to reconnect to the SPS load, as long as the sun is shining and the SPS switch is on.

With regard to UL and NEC compliance, Section 690.61 of ANSI/NFPA 70 National Electrical Code permits a normally grid-interactive system to

operate as a stand-alone system when disconnected from the utility power system. Sunny Boy inverters equipped with the SPS feature comply with NEC 690.61 for interactive and stand-alone operation.

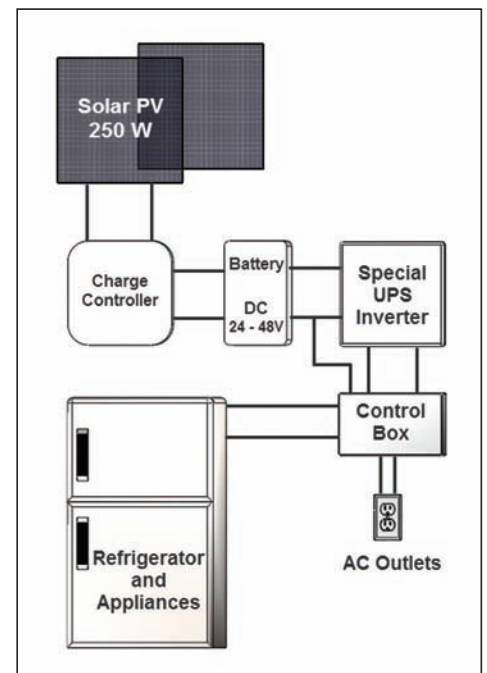
Limitations

- Maximum power of 12 A at 120 VAC for all isolated loads, regardless of the inverter size.
- Must be reset daily during extended grid outages and must be turned off to restart grid-tied inverter operation if the grid is restored during daytime hours.
- There is a delay of up to three minutes before the SPS switch can be activated after an outage, and another delay of 20 to 35 seconds before the SPS outlet is live.
- Added wiring by an electrician is required for the SPS outlet and the SPS auxiliary power switch.

New option: FSS reverse UPS system

This reverse UPS PV system from my company, Future Solar Systems, operates independent of the grid and can be installed by any home owner in less than four hours, without an electrician or an electrical permit. Although it automatically switches loads to the grid for evening operation, it never puts any power onto the grid, and it conforms with anti-islanding regulations. This unique system is totally automatic and does not require any action by the user during power outages. It's also affordable (as little as \$1,795 for a DIY 1 kW system with two panels, racks, wiring and special inverter) and expandable (1500 W and 2000 W systems are also available).

- When the sun shines, the system runs off-grid via a special UPS/inverter to power key loads like refrigerators, pumps, lights, computers, TVs, fans, and most microwaves; it displays the power being consumed and the state of charge of a backup power source.
- When the sun has gone down and there is no further output from the so-



Basic Future Solar Systems setup, including all components. No user intervention required. It defaults to grid power when the sun goes down.

lar panels, a proprietary control system automatically switches loads to utility grid power.

- It automatically switches between grid power and off-grid mode; no delays in transfer of loads or manual activation of the system during outages.
- No inverter outage when clouds block panels (for up to 30 minutes).
- It uses 250 W polysilicon PV panels from leading suppliers, as used on typical commercial PV systems; the shipping crate becomes the ground mounting system.
- An optional additional battery pack provides four to eight hours of additional off-grid power and can also be recharged from a vehicle's cigarette lighter plug or other AC source during emergency outages.
- Options are also available to use existing PV panels during emergency outages, but these may require an electrician to connect.

Limitations

- Maximum total power is limited by inverter size
- No grid-tie capability
- User may be ineligible for solar

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Congratulations to Maclay Architects of Waitsfield, VT & Scott Simons Architects of Portland, ME on winning NESEA's 2013 Zero Net Energy Building Award for their design of the Bosarge Family Educational Center at Coastal Maine Botanical Gardens, Boothbay, ME.

For more models of energy efficient ZNEB design visit nesea.org/zero-net-energy-building-award/.



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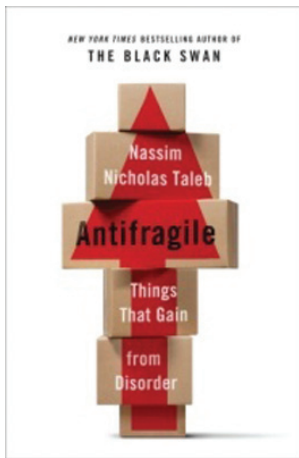
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Antifragile: Things That Gain from Disorder

Nassim Nicholas Taleb
Random House, 2012

By Joel Gordes

We at NESEA have a long history of looking outside ourselves to diverse ideas and events that we can incorporate into the fiber of the organization—the better to deliver the message of clean, renewable energy. The most recent of these is resilience, which the 2013 BuildingEnergy conference took as its underlying theme. But perhaps it is time already to embrace something new. Nassim Taleb’s latest book, *Antifragile*, makes a strong case that resilience is not enough. “The resilient resists shocks and stays the same,” he writes, “the antifragile gets better.”

Some of you may remember Taleb for his runaway best seller *The Black Swan* (36 weeks on the *New York Times* Bestseller List), which concerns events that come out of left field but have immense impacts. Most of the historic events that have shaped us—the advent of the Internet, for example—were black swan events. *Antifragile* is Taleb’s “antidote to *The Black Swan*.” In an unpredictable world, he says, positive outcomes depend not on trying to avoid randomness but on making it work for you. *Antifragile* may not provide concrete solutions to specific problems,

but it does provide a novel framework for approaching problems.

Might that framework inform the work of creating a sustainable built environment?

In my own specialty of energy resilience, Taleb, despite not being directly involved in the field, has a good deal to say and makes some outstanding observations. Here is one such passage that I suspect is applicable to many of our resilience-related endeavors (page 259):

Man-made complex systems tend to develop cascades and runaway chains of reaction that decrease, even eliminate, predictability and cause outsized events. So the modern world may be increasing in technological knowledge, but, paradoxically, it is making things a lot more unpredictable.

Having reviewed many books in this space, I can say this is the most difficult I have ever reviewed, or read. Taleb comes across as amazingly learned in philosophy, finance, natural science, theory of knowledge, and

For anyone into resilience and whatever lies beyond, Taleb opens up a new way of thinking about our surroundings and ourselves, and the interactions between the two. He helps us stand back and question our ability to predict events or even change existing conditions.

a host of other disciplines, and he is demanding of his audience. Keep an unabridged dictionary handy. Still, for anyone into resilience and whatever

lies beyond, he opens up a new way of thinking about our surroundings and ourselves, and the interactions between the two. He helps us stand back and question our ability to predict events or even change existing conditions. And he offers some tools and insights that can help us distinguish the systems, organizations, and processes that are and are not antifragile. In a world that has now (as of the week of May 6) passed a record-high threshold of CO2 emissions at 400 parts per million, maybe antifragility is the next-step approach we need.

Taleb sometimes oversimplifies and falls back on his strong Libertarian leanings, insulting academics and especially Nobel Prize winners. But he also impartially takes such fellow Libertarians as former Federal Reserve Board Chairman Alan Greenspan over the coals. Such evenhandedness enhances his credibility for those who may not fully share his politico-economic philosophies.

No review of this book would be complete without some mention of “Fat Tony,” a mythical character from Taleb’s earlier works who reappears here. He is almost what might be called an alter ego for the author.

Brooklyn-born Tony DiBenedetto is large, lacking refinement, and reading averse. But he has an instinct for smelling out “fragilistas”—those who, Taleb says, “fall for the Soviet-Harvard delusion” that they can come up with rational reasons for events in a world that is really wracked by complexity and randomness. Fat Tony also has an innate understanding of antifragility that allows him to make some very profitable investments. In fact, for all his apparent shortcomings, Fat Tony has become a multimillionaire by being at the right place at the right time—and breaking from all the suckers who bought the Kool-Aid of conventional economics and risks. The character is a great way to break up some of the longer, pedantic portions of the book and shows a fun side to the

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Book Review
from page 45

author that keeps you engaged.

By the way, having both read the book and listened to it via Audible, I advise listening to it. It seems to flow far better as a “play” than as a text, due largely to the reader, Joe Ochman. You can actually hear the sneer intended for the fragilistas. 🌱

Joel Gordes is an independent energy consultant. His energy career spans nearly four decades; he has extensive experience in energy efficiency and has designed or aided in the design of over 200 passive solar homes. A strong advocate for energy and environmental security for greater resiliency, he has been involved in policy to further those aims. Among the professional papers he's written are many concerning climate change and energy/environmental security. A resident of West Hartford, CT, he served as vice-chairman of the Connecticut legislature's Energy and Public Utilities Committee from 1987 to 1991. In 1990 he was a principal coauthor of the state's first global warming bill.

From the executive director
from page 5

committee member to track chair to mentor/advisor. Those who are willing and able will advance to roles of increasing responsibility, up to and including service on the NESEA board.

This is a tall order. Clearly, it won't happen overnight. But we're working on it. We've launched a “Where do I fit in?” campaign to guide current members with respect to where and how they might plug into NESEA's programs and community more effectively. We are developing tool kits that we hope will provide workgroup leaders with the support they need in handling logistics—conference call dial-in numbers, meeting scheduling and facilitation tips, agenda setting, and more. We are convening a leadership workgroup that includes members of the NESEA board and staff, as well as a select group of interested NESEA leaders.

We'll keep you updated on our progress. In the meantime, if you feel

you have untapped time and potential to contribute to NESEA, please contact me at jmarrapese@nesea.org or 413-774-6051, ext. 23, and let me know. I'll do my best to plug you in the old-fashioned way!



Jennifer J. Marrapese
Executive Director

New from NESEA: Zero Net Energy Database
from page 17

data, which of course we'll pursue later!)

- An extra \$200 if you are a first-time net-zero designer or builder

Even if you don't take the course, this \$1,000 incentive is available if you submit all documentation for a net-zero building whose construction is completed in February 2013 or later. Only Massachusetts-based projects that do not clearly have a large environmental impact based on their location are eligible.

Questions?

We welcome any questions about the database or the incentives. Contact Zero Net Energy Database and Award Coordinator Kelsey Hobson at khobson@nesea.org. 🌱

Jennifer Marrapese is NESEA's executive director.

Resilient Solar PV Systems
from page 43

renewable energy credits (SRECs) but is eligible for a 30 percent federal tax credit

- Ground mount designs only 🌱

Jim Dunn, CEO and president of Future Solar Systems, is an expert in renewable energy, particularly in photovoltaics and energy storage. He has more than 35 years of experience with large companies like IBM and Exxon and is a founder of five companies. For 15 years, he served as the director of NASA's Northeast Regional Technology Transfer Center.

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Zero Net Energy Building Awards: Winner
from page 8

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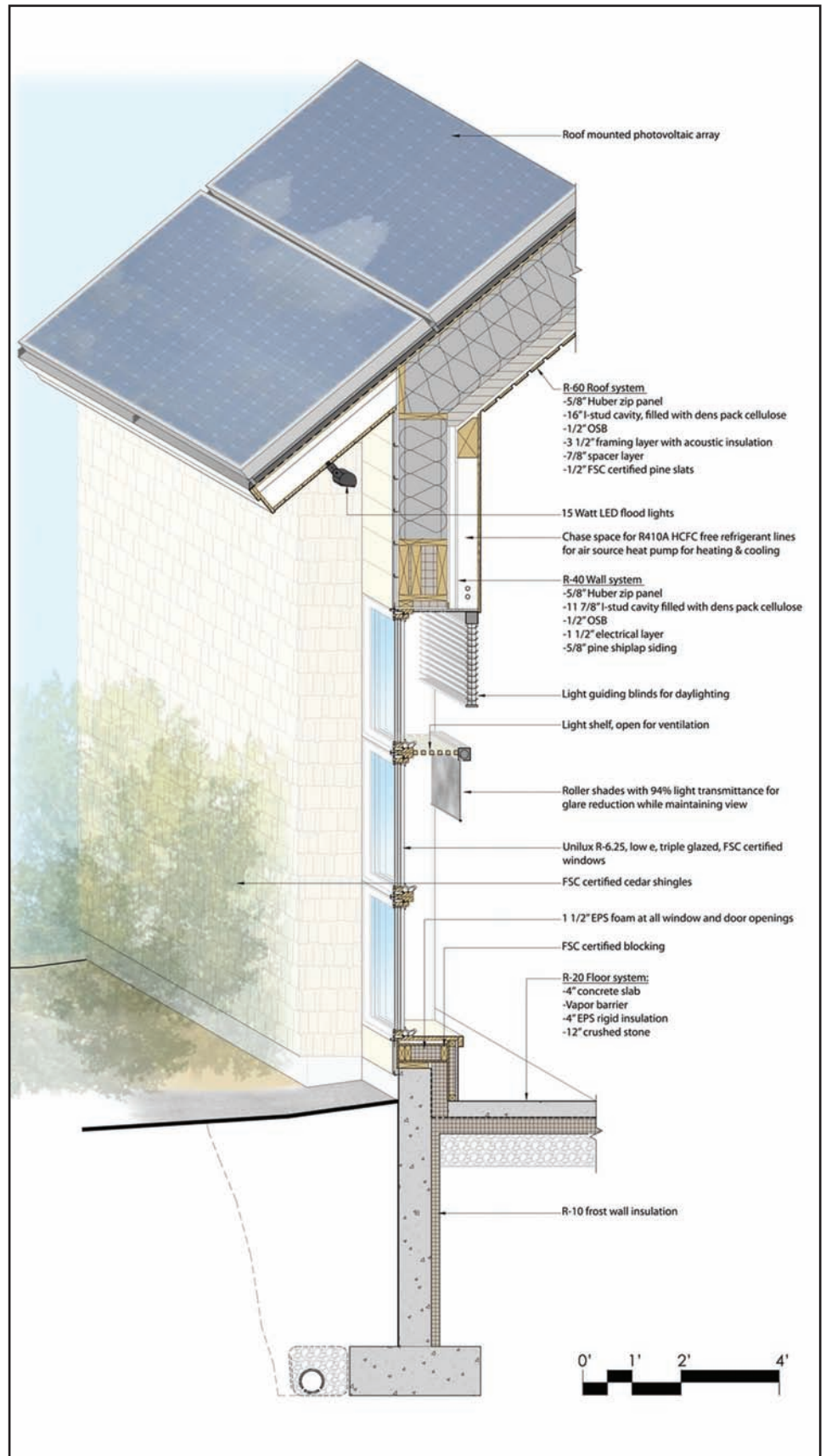
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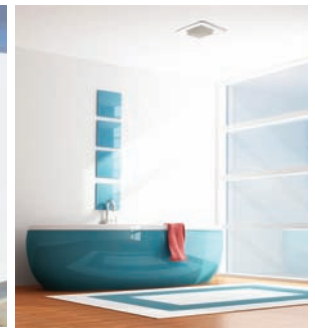
The roof, wall, and floor systems of the Bosarge Family Education Center, Maine's first net-zero institutional building—and NESEA's 2013 Zero Net Energy Building Award winner.



RBI Solar, Salisbury, MA



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SMARTGRID, Seabrook, NJ



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2013 DIRECTORY

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This information is also available, with more search options, online at nesea.org/sgp. Businesses are joining or renewing all the time, so be sure to check in!

ON THE GREEN PAGES COVER (L)

RBI Solar, Salisbury, MA

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(C) Solectria Renewables' SMARTGRID

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P.O. Box 1356
660 Nutmeg Rd. North
South Windsor, CT 06074
Tel: 860-528-4436
guy@abcoolingandheating.com
abcoolingandheating.com
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Specialties: *Geothermal, Indoor Air Quality, Radiant Heating*

Affordable Comfort, Inc. (ACI)

1187 Thorn Run Ext., Ste. 625
Moon Township, PA 15108
Tel: 800-344-4866
Fax: 412-424-0075
info@affordablecomfort.org
affordablecomfort.org
Description: *Affordable Comfort, Inc. (ACI) is a nonprofit professional association dedicated to making every home healthy, comfortable, and resource-efficient. Since 1986, ACI has served as an unbiased go-to resource for home performance and weatherization, bringing together industry leaders for the purpose of education, professional networking, and business-to-business collaborations.*
Specialties: *Environmental Education*

Adirondack Alternate Energy

Brownell, Bruce R.
98 Northville Rd.
Edinburg, NY 12134
Tel: 518-863-4338
aaeinc@frontiernet.net
aaepassivesolar.com
Description: *We supply design, engineering and site supervision for insulated shell of any size, shape and style passive solar building. We have done over 300 homes/buildings.*
Specialties: *Alternative Technologies*

Advanced Solar Products

Rawlings, Lyle
270 South Main St., Ste. 203
Flemington, NJ 08822
Tel: 908-751-5818
sales@advancedsolarproducts.com
advancedsolarproducts.com
Description: *As one of the largest solar integrators on the East Coast, we have installed over 40*

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Specialties: *Building Design/Construction, Engineering Services, Photovoltaics*

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info@aegis-solar.com
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Specialties: *Photovoltaics, Solar Hot Water, Solar Pools*

Air Barrier Solutions, LLC

Harmon, Larry
257 Middle Rd.
Crown Point, NY 12928
Tel: 877-226-2641
lharmon@airbarriersolutions.com
airbarriersolutions.com
Specialties: *Consultant*

Alpine Solar Heat and Hot Water

Besnoff, Stu
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stu@AlpineSolarHeat.com
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altestore.com
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Alt Technica, Ltd.

Amon, Amelia
242 East 19th St.
New York, NY 10003
Tel: 212-260-0806
AAmon@alt-technica.com
alt-technica.com
Description: *Sustainable energy products & exhibits. Alt Technica designs/produces solar awnings, solar area lighting, solar freezer carts, solar fountains, interactive educational features.*
Specialties: *Alternative Technologies, College/University, Photovoltaics*

Antioch University New England

Fiderio, Janet
40 Avon St.
Keene, NH 03431
Tel: 603-283-2107
jfiderio@antioch.edu
antiochne.edu
Description: *Antioch University New England graduate school offers a transformative education to every student who yearns to make a difference in the world.*
Specialties: *College/University, Environmental Education*

Artisan Builders

Fulford, Jonathan
127 Stovepipe Alley
Monroe, ME 04951
Tel: 207-525-7740
Specialties: *Building Design/Construction*

Austin Design, Inc.

Austin, Bill
16 Call Rd.
Colrain, MA 01340
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office@austindesign.biz
austindesign.biz
Description: *Austin Design, Inc. provides architectural design services for homes, businesses and communities. We advocate a team approach among client, builder and architect that encourages the sharing of expertise and a passion for good design.*
Specialties: *Building Design/Construction, Landscape Design/Construction, Remodeling*

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Bakker, Margaret &
Lewis, Robert
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mbakker@bakker-lewis.com
bakker-lewis.com

Description: We are a small architectural firm specializing in designing new and retrofitting existing buildings which are both responsive to individual needs and that contribute to a greener environment.

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bart.bales@balesenergy.com
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Specialties: Building Design/Construction, Energy Audit Services, Photovoltaics

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info@beyondgreen.biz
beyondgreen.biz

Description: A green building collaborative working toward zero energy homes and businesses. Specializing in deep energy retrofits, comprehensive audits and various high performance techniques.

Specialties: Deep Energy Retrofits, Insulation, Remodeling

Blue Sea Development Company

Bluestone, Les
164 Main St.
Huntington, NY 11743
Tel: 631-923-0081 x2
les.bluestone@blueseadev.com

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Specialties: Building Design/Construction

Boston Community Capital

Jones, DeWitt [Dick]
56 Warren St.
Boston, MA 02119
Tel: 617-427-3580
djones@

bostoncommunitycapital.org
bostoncommunitycapital.org

Specialties: Finance/CPA, Social Services

BPC Green Builders

Trolle, Michael
523 Danbury Rd.
Wilton, CT 06897
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mike@bpcgreenbuilders.com
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briburn.com

Specialties: Architecture

Building Renewal, LLC

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45R Orzick Dr., Ste. 19
Durham, CT 06422
Tel: 860-372-4554
greg@buildingrenewal.net
buildingrenewal.net

Specialties: Windows, Remodeling

Building Science Corporation

Pettit, Betsy
30 Forest St.
Somerville, MA 02143
Tel: 978-589-5100
betsy@buildingsscience.com
buildingsscience.com

Specialties: Consumer Information, Consultant, Energy Education

BuildingGreen, Inc.

Wilson, Jerelyn
122 Birge St., Ste. 30
Brattleboro, VT 05301
Tel: 802-257-0019 x102
jerelyn@buildinggreen.com
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Description: BuildingGreen provides building industry professionals with well-researched information on environmentally sound building practices and green products.

Specialties: Alternative Technologies, Energy Conservation, Energy Education

Burrington's Solar Edge

Burrington, Gail Ann
6 Reed Circle
Windsor Locks, CT 06096
Tel: 860-623-0159
solaredge@yahoo.com
solaredge.biz

Description: Solar electric and energy efficient appliances, sales, and service; site evaluations, solar workshops, and consulting including PV roofing materials. CT Elec#0195608-PV1

Specialties: Building Design/Construction, Environmental Education, Photovoltaics

Byggmeister

Eldrenkamp, Paul
667 Sawmill Brook Pkwy.
Newton, MA 02459
Tel: 617-527-7871
byggmeister.com

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Specialties: Remodeling, Building Design/Construction, Energy Conservation

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LaRue, Kait
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Tel: 413-586-7350
kait.larue@cetonline.org
cetonline.org

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Specialties: Energy Conservation, Energy Audit Services, Energy Education

Clean Energy Design (CED), LLC

Wineman, Tom
11 Oak Ln.
Osterville, MA 02556
Tel: 508-563-6990
info@cleanenergydesign.com
cleanenergydesign.com

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Specialties: Photovoltaics, Solar Thermal, Wind

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Rivera, Gladys
845 Brook St.
Rocky Hill, CT 06067
Tel: 860-257-2351
gladys.rivera@ctinnovations.com
ctcleanenergy.com
Specialties: Finance/CPA, Photovoltaics, Solar Hot Water

Coldham & Hartman Architects

Hartman, Thomas
49 S. Pleasant St., Ste. 301
Amherst, MA 01002
Tel: 413-549-3616
tom@coldhamandhartman.com
coldhamandhartman.com
Description: Coldham&Hartman Architects is a full service architectural practice designing residential, commercial, and institutional buildings for mission-driven public, non-profit, and private clients. We create transformative designs for a renewable future, making buildings that are loved in the region where we live.
Specialties: Architecture, Energy Conservation, Deep Energy Retrofits

Conservation Services Group

Stanton, Patricia Deese
40 Washington St.
Westborough, MA 01581
Tel: 508-836-9500 x13297
pat.stanton@csggrp.com
csggrp.com
Specialties: Consultant, Engineering Services, Energy Conservation

Cornerstone Architecture

Hammond, Richard
700 Richmond St., Unit 110
London, ON N6A5C7
Canada
Tel: 519-432-6644
rhammond@cornerstonearchitecture.ca
cornerstonearchitecture.ca
Description: Est. in 1991, our firm has developed a wide range of experience in a variety of sectors from children's facilities to seniors' communities; as well as educational, administrative, healthcare, and community projects. These projects include new facilities as well as additions and renovations to existing buildings.
Specialties: Architecture

Cotuit Solar

Geyser, Conrad
P.O. Box 89, 64 Old Shore Rd.
Cotuit, MA 02635
Tel: 508-428-8442
conradg@cape.com
cotuitsolar.com
Description: Solar thermal, photovoltaics, wind and wastewater alternative engineering, installation and service. In business since 1988.
Specialties: Domestic Water Heating, Photovoltaics, Wind

Cozy Home Performance, LLC

Lantz, Mark
Mill 180, 180 Pleasant St.
Easthampton, MA 01027
Tel: 413-529-0200
info@mycozyhome.com
mycozyhome.com
Description: We provide energy assessments and performance contracting services to benefit health and comfort, while maximizing energy savings. Serving MA, VT, CT.
Specialties: Energy Audit Services, Insulation

Cushman Design Group, Inc.

Cushman, Milford
100 Mountain Rd., P.O. Box 655
Stowe, VT 05672
Tel: 802-253-2169
inquiry@cushmandesign.com
cushmandesign.com
Description: Offering personalized residential design services for those who value elegant design, natural materials and environmental consciousness in their home.
Specialties: Building Design/Construction, Interior Design

David Whitney Architect

Whitney, David
49 Linden St.
Arlington, MA 02476
Tel: 781-643-0759
mail@davidwhitney.com
davidwhitney.com
Description: I am a residential architect concerned about energy use and environmental impact. My projects range from additions and renovations to new home construction. You can see images and descriptions and more information at my website.
Specialties: Building Design/Construction, Remodeling

DEAP Energy Group

Eldrenkamp, Paul
667 Sawmill Brook Pkwy.
Newton, MA 02459
Tel: 617-775-4716
peldrenkamp@deapgroup.com
deapgroup.com
Description: DEAP Energy Group provides comprehensive consulting services to improve the quality of life and energy efficiency of homes. Our work encompasses both new construction and existing home retrofits. We work on single-family homes, multi-family up to three stories, and small-scale commercial and institutional projects. Our full range of consulting services is available in eastern New England: we are available for a more limited range of services throughout the US in climate zones 4, 5 and 6.
Specialties: Building Design/Construction, Energy Conservation, Remodeling

Delta Products Corp.

Carbone-Lawson, Rita
4405 Cushing Pkwy.
Fremont, CT 04538
Tel: 860-872-0425
Fax: 510-226-4184
rita.carbonelawson@delta-corp.com
deltabreez.com
Description: Delta Breez Bathroom Ventilation Fans are ENERGY STAR-qualified, low power consumption fans with low noise and high energy efficiency. These fans combine several design innovations, including a DC brushless motor and switching power supply, to provide a quieter solution with energy savings up to 85% compared to similar AC motor products.
Specialties: Energy Conservation

Dietz & Company Architects, Inc.

Sternick, Marc
17 Hampden St.
Springfield, MA 01103
Tel: 413-733-6798
marcs@dietzarch.com
dietzandcompanyarchitects.com
Description: Planning and design of beautiful, energy efficient buildings for educational institutions, affordable housing developers, commercial projects and healthcare facilities.
Specialties: Architecture, College/University, Building Design/Construction

Dimensional Architecture P.C.

Deye, Sylvia
52 Mill Rd., P.O. Box 18
Geigertown, PA 19523-0018
Tel: 610-775-7105
Sylvia@dimensionalarchitecture.com
DimensionalArchitecture.com
Description: Dimensional Architecture is a small woman owned business (WBE) with over 20 years of experience servicing Morgantown and Eastern PA. We are a full service Architectural Firm with expertise in the following areas: Architectural Design, Energy Management and Maintenance Programs, New Construction and Additions, Historic Preservation and Renovation, Facility Relocation, Site Planning and Analysis, Master Planning and Phasing, Construction Administration, ADA Surveys, Interior Design/Space Planning. LEED Certified, AIA Member, DBE Certified
Specialties: Architecture, Interior Design, Consumer Information

Demand Management Institute (DMI)

Stevens, Alec
300 Chestnut St., Ste. 150
Needham, MA 02492
Tel: 781-449-5700
astevens@dmiiinc.com
dmiiinc.com
Description: DMI specializes in providing expert consulting and engineering services to improve energy efficiency and operation of commercial, industrial, institutional, and large-scale residential facilities. DMI has established itself as one of the most respected energy engineering firms in New England with unsurpassed attention to detail and quality.
Specialties: Energy Audit Services, Energy Conservation, Energy Monitoring

EcoArchitecture DesignWorks, PC

Welton, AIA, CSBA, LEED AP, BD+C, Janus
Greater NYC/Tri-State Area, NY
Tel: 845-247-4620
ecoarchitect@hvc.rr.com
JanusWeltonDesignWorks.com
Specialties: Architecture, Building Design/Construction, Environmental Education

Ecolibrium Solar

Young, Jonathan
340 W. State St., Unit 22
Athens, OH 45701
Tel: 740-249-1877
jyoung@ecolibrumsolar.com
Description: *Ecolibrium Solar is the leading supplier of simple, fast, and cost effective mounting systems. Our solution saves installers countless hours from planning and installing more complicated systems. Our research and development has created a smart solution, at an industry leading cost. Not wavering on quality, our revolutionary design will stand up nature's wrath. ECOFOOT will hold a ton -- Literally!*
Specialties: Manufacturing

EcoRealty

Hopkins, Dave
P.O. Box 3007
Amherst, MA 01004
Tel: 413-259-9800
dave@ecorealty.org
ecorealty.org
Description: *EcoRealty is an environmentally friendly buyer brokerage with a special interest in green building, farming, and living local economies.*
Specialties: Real Estate

Electrical Wholesalers

Cannata, Richard
100 Campanelli Pkwy.
Stoughton, MA 02072
Tel: 781-297-5666
r.cannata@ew-inc.com
ew-inc.com
Specialties: Photovoltaics, Lighting Supply

EnergySage

Aggarwal, Vikram
1 Broadway, 14th Flr.
Cambridge, MA 02142
Tel: 617-396-SAGE
hello@energysage.com
energysage.com
Description: *The EnergySage.com portal provides users with objective, comprehensive information and actionable advice to assist them in finding appropriate, cost-effective clean energy solutions specific to their individual needs.*
Specialties: Alternative Technologies, Consultant, Energy Education

EnergyWise Partners

Neale, David
125 Tech Park Dr.
Rochester, NY 14623
Tel: 585-420-8998
connect@ewpllc.com
ewpllc.com
Description: *Provide a go-to-market solution for delivery of renewable energy systems minimizing upfront purchasing cost. We connect financing with operational performance data, through a low cost software and hardware platform or embedded OEM controls.*
Specialties: Energy Monitoring, Geothermal

Energy Opportunities

Sheffer, Marcus
1200 E. Camping Area Rd.
Wellsville, PA 17365
Tel: 717-292-2636
sheffer@sevengroup.com
sevengroup.com
Description: *Energy Opportunities provides services focused on energy issues and the interface of nature and human enterprises. Founded in 1993, EO is also a part of 7group, LLC.*
Specialties: Building Design/Construction, Energy Conservation, Environmental Education

Enterprise Community Partners

Jung, Bomee
1 Whitehall St., 11th Flr.
New York, NY 10004
Tel: 212-284-7195
bjung@enterprisecommunity.org
enterprisecommunity.org
Description: *Since 1982, Enterprise has raised and invested more than \$14 billion to help finance nearly 300K affordable homes across the United States. Our award-winning Enterprise Green Communities initiative offers the first national framework for green affordable housing and inspires us to achieve sustainability across all of our activities and operations.*
Specialties: Social Services, Finance/CPA, Public Policy

Enviro Energy Connections

Link, Henry
45 Mountain St.
Hartford, CT 06106
Tel: 860-953-7611
hlinkage@alum.mit.edu
Description: *Enviro Energy Connections advocates for energy conservation, and renewable energies,*

promotes design of green buildings, overall sustainable strategies, proper waste management, and testifies at utility and legislative hearings.
Specialties: Consumer Information, Energy Conservation, Environmental Education

Fred Davis Corporation

Davis, Fred
120 North Meadows Rd.
Medfield, MA 02052
Tel: 800-497-2970
Fred@FredDavisCorp.com
FredDavisCorp.com
Description: *Leading national independent wholesaler of all efficient lighting products. Fred: former NESEA board member; worked on national lamp efficiency standards; chaired first conference on lighting and energy, 1987 (a NESEA conference).*
Specialties: Lighting Supply, Energy Conservation, Educator

Frontier Energy Solutions, Inc.

Sheehan, Francis
Brewster, MA
Tel: 800-939-1379
frontierenergysolutionsinc.com
Specialties: Energy Audit Services, Insulation, Finance/CPA

G & G Construction Inc

23 Winthrop Ave.
Revere, MA 02151-5024
Tel: 781-289-2977
info@ggconstructioninc.com
ggconstructioninc.com
Description: *G & G Construction, Inc. is a family-owned general contracting business that offers all-in-one remodeling and renovation services to residential and commercial. You can always count on us to handle every aspect of your general contracting project.*
Specialties: Building Design/Construction, Remodeling

Geoffrey H. Richon Company, Inc.

Richon, Tobias
19 Duncan St.
Gloucester, MA 01930
Tel: 978-283-6063
tsrichon@ghrichon.com
ghrichon.com
Description: *The Geoffrey H. Richon Company specializes in delivering high quality construction, remodeling and consulting services to Cape Ann and Essex County. Our experience is based on over 35 years in residential construction and remodeling. Through a whole-system ap-*

proach to design and construction, we provide our clients with a high level of energy efficiency, comfort and durability for their projects.
Specialties: Building Design/Construction, Consultant, Remodeling

Goody Clancy

420 Boylston St.
Boston, MA 02116
Tel: 617-850-6651
arch@goodyclancy.com
goodyclancy.com
Specialties: Building Design/Construction, Architecture

Greener Every Day

White, Rachel
124 Hagen Rd.
Newton, MA 02459
Tel: 617-905-6925
rachel@greenereverydayconsulting.com
greenereverydayconsulting.com
Description: *Greener Every Day provides green home and lifestyle consulting services to help consumers make choices that are good for them and the earth. We advise homeowners on how to conserve energy, save money, reduce waste, protect themselves from environmental health hazards, and promote their overall health and well-being. We also work with residential design/build professionals to develop and implement sustainability goals and targets.*
Specialties: Consultant, Educator, Research

GreenerU

Kopans, David
1 Moody St.
Waltham, MA 02453
Tel: 781-891-3750
Info@GreenerU.com
greeneru.com
Specialties: College/University, Energy Conservation

Healthy Home Builders

P.O. Box 282H
Scarsdale, NY
Tel: 914-723-0200
pete@healthyhomebuilders.com
healthyhomebuilders.com
Description: HHB creates properties that are distinguished by understated elegance, thoughtful floor plans, and meticulous detail. The guiding principles for the firm's projects are to be mindful of how their buildings will become part of the fabric of their community. We believe that indoor air and water quality are overlooked aspects of sustainable development. The firm's core principle is to pioneer the use of materials, systems, and design to protect the health and wellness of its occupants through improvements in indoor air and water quality.
Specialties: Building Design/Construction, Indoor Air Quality, Solar Hot Water

Heartwood Group, Inc.

Unger, Fred
165 Evergreen St.
Providence, RI 02906
Tel: 401-861-1650
Unger@hrtwd.com
HeartwoodSolutions.com
Description: Our company was founded in 1983 to create environmentally responsible buildings. Today we provide consulting and development services in the renewable energy and building industries.
Specialties: Energy Conservation, Photovoltaics, Wind

Heliocentrix, Inc.

Robertson, J. Craig
281 Henderson Rd.
Williamstown, MA 01267
Tel: 413-458-2255
info@heliocentrix.com
heliocentrix.com
Description: Specializing in the design and installation of solar hot water systems for water, pool and space heating. Installing Thermomax evacuated tube and Stiebel Eltron flat plate collectors.
Specialties: Domestic Water Heating

Home Energy Technologies

Harding, Peter
P.O. Box 364
Chester, CT 06412
Tel: 877-800-6440
Fax: 888-808-9196

peter@
homeenergytechnologies.com
homeenergytechnologies.com
Description: Home Energy Technologies is a RESNET-accredited Home Energy Rating System Provider. Our services include HERS ratings, ENERGY STAR & NGBS certification, comprehensive home energy audits, building performance testing and other energy diagnostic and analytical services. Our clients include architects, builders and owners of single-family and multi-family homes in CT and adjoining areas.
Specialties: Consultant, Energy Audit Services, Energy Conservation

Huber Engineered Woods

10925 David Taylor Dr., Ste. 300
Charlotte, NC
Tel: 800-933-9220
huberwood.com
Specialties: Manufacturing, Insulation, Roofing

Hudson River Design

Silver, Chuck
120 Lighthouse Dr.
Saugerties, NY 12477
Tel: 845-246-0725
csilver@hvc.rr.com
ChuckSilver.com
Description: Hudson River Design has been designing low energy-use homes in NY's Hudson Valley for over 30 years. We create extraordinary buildings, including the Greenest Building in NY.
Specialties: Building Design/Construction

Hudson Valley Community College -TEC-SMART

Hill, Penny
345 Hermes Rd.
Malta, NY 12020
Tel: 518-629-7075
p.hill@hvcc.edu
Specialties: College/University

IBACOS

Prahl, Duncan
2214 Liberty Ave.
Pittsburgh, PA 15222
Tel: 412-765-3664
ibacos.com
Specialties: Building Design/Construction

ICF International

Simmons, Kristen
Cambridge, MA
kristen.simmons@icfi.com
Description: Massachusetts Multi-

family New Construction Program
Specialties: Social Services, Consultant, Public Policy

In Site: Architecture

Yapicioglu, Ali & Hauser, Rick
Rochester - Perry - Geneva
Perry, NY 14530
Tel: 585-237-2614
rick@insitearch.com
insitearch.com
Description: WNY/Finger Lakes region. We create innovative, site-specific solutions to every project, marrying our interest in sustainable principles to clients' own priorities.
Specialties: Building Design/Construction, Green Electricity, Landscape Design/Construction

Independent Solar, LLC

Casagrande, Carl
111 Page Hill Rd.
Goshen, NH 03752
Tel: 603-863-6920
Specialties: Photovoltaics, Solar Thermal

Infrared Diagnostic, LLC

Lund, Flemming
9 Elaine Rd.
Sudbury, MA 01776
Tel: 978-440-9900
info@infrareddiagnostic.com
infrareddiagnostic.com
Description: Infrared energy audit, Duct Blaster and Blower Door testing. Certified Infrared Thermographer, RESNET/HERS Rater. Provide consulting to builders, home owners to reduce energy.
Specialties: Consumer Information, Energy Audit Services, Energy Conservation

INTEGRATA Architecture + Construction

Borgese, Andrew
419 Palmer Ave., Ste. 200
Falmouth, MA 02540
Tel: 508-495-6575
aborgese@integrata-ac.com
integrata-ac.com
Description: We are Architects & Builders focused on design & construction of high performance buildings that are less expensive to own and operate & provide maximum value to owners & occupants
Specialties: Architecture, Energy Conservation, Building Design/Construction

Integrated Eco Strategy

Stevenson, Charley
136 Water St. (Rear),
P.O. Box 417
Williamstown, MA 01267
Tel: 413-776-9343
info@integratedecostrategy.com
integratedecostrategy.com
Description: Integrated Eco Strategy is a consulting firm that focuses on sustainability planning, building energy efficiency, and green building certification. Our clients include architecture and engineering firms, institutions of higher education, not-for-profits and homeowners.
Specialties: Building Design/Construction, College/University, Consultant

J.F. Basnett Company, Inc

14 Gilson Rd.
Littleton, MA 01460
Tel: 978-952-2552
info@basnettdbr.com
basnettdbr.com
Specialties: Building Design/Construction, Energy Conservation, Remodeling

Jim Godbout Plumbing & Heating

Godbout, Jim
48 Elm St.
Biddeford, ME 04005
Tel: 207-283-1200
info@jimgodbout.com
jimgodbout.com
Description: We are a plumbing heating air conditioning company that has been around thirty years providing service to southern Maine. Our goal is to provide innovative, efficient, comfortable mechanical systems for our clients with professional service in mind.
Specialties: Space Heating/Cooling, Ground Source Heat Pumps

John Fülöp Associates, Architects & Planners

Fülöp, John
103 East Alford Rd.
West Stockbridge, MA 01266
Tel: 413-232-7122, 212-219-2121
john@fulopassociates.com
fulopassociates.com
Description: John Fülöp Associates, Architects provides design services for all building types, creating aesthetically pleasing, economic green architecture throughout the Northeast.
Specialties: Building Design/Construction, Energy Conservation, Remodeling

John Mateyko Architect, LLC

Mateyko, AIA, John
304 Pilottown Rd.
Lewes, DE 19958-1230
Tel: 302-645-2657

johnmateyko@verizon.net
johnmateykoarchitect.com

Description: JMA has been dedicated since 1974 to Whole System Sustainability thinking for place-based, ecologically-driven architecture, native landscaping for Natural Climate Stability and other points of intervention in the built environment. We vision Green Architecture, Green Energy, Green Streets, Green Cities, Green Economics, Historic Preservation and Ecological Preservation, the movement for healthy, vibrant and active living as all part of a historic shift toward a sustainable paradigm for justice and well-being for all life on the planet--about who we want to be, what we are living for, who we are.

Specialties: Architecture, Energy Conservation, Landscape Design/Construction

Junto Consulting Group

Tannenbaum, Isaac
708 Third Ave., 6th Flr.
New York, NY 10017
Tel: 212-209-3955
Fax: 212-209-7125

it@juntoconsulting.com
juntoconsulting.com

Description: Soon, there will be no difference between a green project and a standard one; green will revert back to being a color, and high-performance building will be the norm. Our mission is to facilitate this process from multiple angles. Our leaders synthesize decades of experience in real estate, construction, business development, marketing, finance, sustainability and law. Building on past accomplishments, we have banded together to dynamically advance sustainable development in the urban environment.

Specialties: Building Design/Construction, Energy Conservation, Consultant

Kaplan Thompson Architects

424 Fore St.
Portland, ME 04101
Tel: 207-842-2888

info@kaplanthompson.com
kaplanthompson.com

Description: Our mission is to bring beautiful, sustainable and attainable buildings to the world. From your home to your business, we can

design the sustainable building you have been looking for.

Specialties: Architecture, Building Design/Construction, Deep Energy Retrofits

Kent Hicks Construction Co.

Hicks, Kent
P.O. Box 57
West Chesterfield, MA 01084
Tel: 413-296-0123

khicksconstruction@verizon.net

Specialties: Building Design/Construction

Klearwall Industries, LLC

120 Saddle Hill Dr.
Guilford, CT 06437-1432
Tel: 203-689-5404

klearwall.com

Specialties: Windows, Energy Conservation

Kohler & Lewis Engineering

27 Mechanic St.
Keene, NH 03431
Tel: 603-352-4841

general@kohlerandlewis.com
kohlerandlewis.com

Specialties: Engineering Services

Kolbert Building

Kolbert, Dan
90 Gray St.
Portland, ME 04102
Tel: 207-799-8799

dan@kolbertbuilding.com
kolbertbuilding.com

Description: Our team's decades in home construction & renovation include a strong focus on energy efficiency & sustainable design. We have significant experience with LEED for Homes.

Specialties: Building Design/Construction, Consultant, Remodeling

Kraus-Fitch Architects, Inc.

Kraus, Mary
110 Pulpit Hill Rd.
Amherst, MA 01002
Tel: 413-549-5799

mkraus@krausfitch.com
krausfitch.com

Description: Kraus-Fitch Architects offers a full range of services emphasizing ecologically sound and socially responsible design. Our work ranges from deep energy retrofits and zero net energy buildings to cohousing communities and other smart-growth projects. Our interactive approach allows us to realize your vision with practical, innovative, and cost-effective solutions.

Specialties: Architecture, Building Design/Construction, Deep Energy Retrofits

Langlais Group, Inc.

Langlais, Art
15 Morgan Farms Dr.
P.O. Box 696
South Windsor, CT 06074

Tel: 860-648-2372
Fax: 860-648-2480
art@langlaisgroup.com
langlaisgroup.com

Description: Independent lighting manufacturer's representative agency representing the finest in residential and commercial lighting. We sell to lighting distributors and electrical supply houses in New England. Our knowledgeable staff can assist you with every aspect of your lighting needs.

Specialties: Lighting Supply, Lighting Design

Lewis Creek Builders

Boudreau, Mark
771 Long Point Rd.
N. Ferrisburgh, VT 05473

mark@lewiscreekbuilders.com

Description: Our Company has four integrated divisions. Design, Build, Energy and Education. We offer traditional design/build residential services which are coupled with expertise in renewable energy, high performance homes and passive house construction. What makes us special is our whole systems approach which includes not just the built environment but the education of the public and homeowners in matters related to sustainability and generative living.

Specialties: Building Design/Construction, Energy Conservation, Educator

Liberty Utilities

Reals, Jr., Bob
11 Northeastern Blvd.
Salem, NH 03079
Tel: 603-328-2782

Bob.Reals@LibertyUtilities.com
libertyutilities.com/efficiency

Description: Liberty Utilities-NH is a regulated energy distribution company serving 87,000 natural gas and 43,000 electric customers. Efficiency programs listed at NHSaves.com. For Deep Energy Retrofit & Near Net Zero building incentives call or email.

Specialties: Energy Audit Services, Space Heating/Cooling, Deep Energy Retrofits

Lipidex Corporation

411 Plain St.
Marshfield, MA 02050
Tel: 781-834-1600

sales@lipidex.com
lipidex.com

Description: AirCycler provides innovative ventilation solutions to builders, contractors, architects, raters and weatherization professionals, to help meet all their mechanical ventilation needs including, ASHRAE 62.2, IMC 403.4, LEED & Indoor Air Plus

Specialties: Energy Conservation, Indoor Air Quality, Manufacturing

Little Green Homes, LLC

Redmond, Chris
23 Autumn Pond Park
Greenland, NH 03840
Tel: 603-319-8095

chris@littlegreenhomes.com
littlegreenhomes.com

Description: Little Green Homes, LLC is a residential design-build company focusing on healthy, durable and energy efficient new homes and renovation/addition projects.

Specialties: Building Design/Construction

Littlewolf Architecture

Vlcek, Chris
10 Highland Dr.
Great Barrington, MA 01230
Tel: 413-528-5571

chris@littlewolfarch.com
littlewolfarch.com

Description: Certified Passive House Designer/Consultant. Designing small, earth-friendly, energy resilient homes that find a natural place in the landscape. Architectural License for MA, CT, NY.

Specialties: Architecture, Building Design/Construction, Interior Design

Loewen Window Center of Vermont & New Hampshire

52 Bridge St.
White River Junction, VT 05001
Tel: 800-505-1892
info@loewenvtnh.com
loewenvtnh.com

Description: We are a state-of-the-art window & door showroom located in the historical railroad village of White River Junction, Vermont. We service all of VT and Western NH. We offer exceptional service beginning with the blueprint take-off, technical & design assistance, factory direct jobsite or warehouse deliver and after installation walkthrough and warranty support.

Specialties: Windows

M.G. Kane Properties, Inc.

Kane, Michael
162 Pond St.
Ashland, MA 01721
Tel: 508-881-8882

Specialties: Real Estate

Maclay Architects

Maclay, William
4509 Main St.
Waitsfield, VT 05673
Tel: 802-496-4004
bill@maclayarchitects.com
maclayarchitects.com

Description: Maclay Architects is an architecture and planning firm specializing in the collaborative and integrated design of buildings. With over 30 years of experience, our ecological design work incorporates energy and resource conservation and environmentally responsive land use.

Specialties: Architecture, Building Design/Construction, Energy Conservation

Maine Association of Building Efficiency Professionals (MABEP)

Howe, Robert
11 Columbia St.
Augusta, ME 04330
Tel: 207-620-8214
info@mabep.org
mabep.org

Specialties: Energy Conservation, Public Policy

Maine Green - Performance Building Supply

Konstantino, Steve
111 Fox St.
Portland, ME 04101
Tel: 207-780-1500

info@mainegreenbuilding.com
mainegreenbuilding.com
Specialties: Photovoltaics, Windows, Space Heating/Cooling

Maple Hill Architects, LLC

Sacra, Doug
55 Glezen Ln.
Wayland, MA 01778
Tel: 508-358-1615
Doug@maplehillarchitects.com
maplehillarchitects.com

Description: Maple Hill Architects is a full service design firm specializing in green design work in a variety of project types including educational, religious, and residential.

Specialties: Building Design/Construction

Massachusetts Clean Energy Center

Natella, Arthur
55 Summer St. 9th Flr.
Boston, MA 02110
Tel: 617-315-9347
anatella@masscec.com
masscec.com

Description: Massachusetts is leading the way in innovative and comprehensive energy reform that will make clean energy a centerpiece of the Commonwealth's economic future. The Green Jobs Act of 2008 created the Massachusetts Clean Energy Center (MassCEC) to accelerate job growth and economic development in the state's clean energy industry. This new quasi-public agency serves as a clearinghouse and support center for the clean energy sector, making direct investments in new and existing companies, providing assistance to enable companies to access capital and other vital resources for growth, and promoting training programs to build a strong clean energy workforce that capitalizes on the job opportunities created by a vital new industry.

Specialties: Alternative Technologies, Energy Education, Workforce Development

Mass Audubon

Poor, Bancroft
208 South Great Rd.
Lincoln, MA 01773
Tel: 781-259-2110
bpoor@massaudubon.org
Specialties: Environmental Education, Public Policy, Consumer Information

McCauley Lyman, LLC

10 Speen St.
Framingham, MA 01701
Tel: 508-665-5801
inquiries@mccauleylyman.com
mccauleylyman.com

Description: McCauley Lyman advises people about energy and business law and represents them in business-related transactions. We have a particular focus on the energy industry, including energy regulatory agencies, and have done a great deal of work with all aspects of developing, financing and operating independent energy projects. We help people negotiate letters of intent and contracts, arrange financings, buy and sell businesses and their assets, resolve disputes, and do the myriad other things business people (and government officials who deal with business people) need to get done in order to accomplish their business objectives.

Specialties: Legal

MD Eco Build

Hars, Maria
Groton, MA
Tel: 978-808-1456
MDEcoBuild@yahoo.com
mdcobuild.com
Specialties: Remodeling, Indoor Air Quality, Energy Conservation

Mitch Anthony

Anthony, Mitch
23 Chestnut Hill
Greenfield, MA 01301
Tel: 413-530-6978
mitch@clarity-first.com
mitchanthony.us

Description: Organizational cat herder and brand guy. My sweet spot is positioning, brand strategy, communications design and ideation/concept development. I work where mission meets message to get organizations moving in harmony.

Specialties: Communications, Marketing, Workforce Development

Mitsubishi Electric Cooling & Heating

Pickett, Susan
150 Cordaville Rd.
Southborough, MA 01772
Tel: 978-988-5571
spickett@hvac.me.com
Specialties: Space Heating/Cooling, Energy Conservation

Munro Distributing

33 Commercial St.
Raynham, MA 02767
Tel: 508-536-2178
munrodistributing.com
Description: Munro Distributing Company is a forward-thinking purveyor of electrical, conservation and renewable energy solutions. For 6 decades and 3 generations we have leveraged our expertise, buying power and value-add philosophy to deliver exceptional products and services to our National Account, Contractor, ESCO and Utility patrons nationwide.

Specialties: Energy Conservation, Green Electricity, Photovoltaics

National Fiber

Hoch, Chris
50 Depot St.
Belchertown, MA 01007-9619
Tel: 800-282-7711
chris@nationalfiber.com
nationalfiber.com

Description: National Fiber's Cel-Pak cellulose is the only sustainable insulation product made in the Northeast. Real world R-values, 83% recycled content & superior fire resistance makes Cel-Pak ideal for new construction & retrofit.

Specialties: Insulation

National Grid

Cantello, Paul
1 Metrotech Center, 13th Flr.
Brooklyn, NY 11201
Tel: 718-403-6963
paul.cantello@us.ngrid.com
nationalgridus.com
Description: National Grid (LSE: NG.; NYSE:NGG) is an international electricity and gas company and one of the largest investor-owned energy companies in the world. Our core business is the delivery of electricity and natural gas. We are committed to serving customers well, delivering energy safely and reliably, and keeping costs low.
Specialties: Green Electricity, Consumer Information, Energy Audit Services

Neighborhood Housing Services of New Haven, Inc.

333 Sherman Ave.
New Haven, CT 06511
Tel: 203-562-0598
nhsofnewhaven.org/staging
Specialties: Social Services, Remodeling, Energy Conservation

New Commons

Leaver, Robert
545 Pawtucket Ave., Ste. 106A
Pawtucket, RI 02860
Tel: 401-475-6762
rleaver@newcommons.com
newcommons.com

Description: *New Commons is a whole new kind of think tank which helps clients move from thought to action by helping them build a network and then mobilize that network to get the job done.*

Specialties: *Consultant, College/University, Communications*

New England Geothermal Professional Association (NEGPA)

44 Bradstreet Rd.
N. Andover, MA 01842
Tel: 800-236-8215
info@negpa.org
negpa.org

Description: *NEGPA is a regional non-profit association formed to address issues with geothermal that are specific to New England. Our mission is to educate the public and advocate with state and federal officials, as well as utilities, to give Geothermal Systems the same consideration and incentives as other renewable technologies.*

Specialties: *Ground Source Heat Pumps, Geothermal, Energy Education*

New York State Energy Research and Development Authority (NYSERDA)

17 Columbia Circle
Albany, NY 12203
Tel: 1-866-NYSERDA
info@nysesda.ny.gov
nysesda.ny.gov

Description: *NYSERDA offers objective information, innovative programs, technical expertise, and funding to help New Yorkers increase energy efficiency, save money, use renewable energy, and reduce reliance on fossil fuels. A public benefit corporation, NYSERDA has been advancing innovative energy solutions since 1975.*

Specialties: *Workforce Development, Energy Education, Energy Efficiency*

NextEnergy Geothermal

10 East 40th St., Ste. 1310
New York, NY 10016
Tel: 888-436-3200
info@nextenergyusa.com
nextenergyusa.com

Description: *NextEnergy is North*

America's leading provider of innovative geothermal solutions, financing and equipment. Experience: residential, schools, office buildings, multi-unit residential, medical facilities and retail.

Specialties: *Geothermal, Energy Conservation, Ground Source Heat Pumps*

Northern Manhattan Improvement Corporation (NMIC)

Rieber, Daniel
76 Wadsworth Ave., 4th Flr.
Weatherization Dept.
New York, NY 10033
Tel: 212-822-8340
Fax: 212-740-6432
danrieber@nmic.org
nmic.org

Description: *NMIC has been providing Weatherization Services for over 30 years. If you have a Multi-family building in Manhattan we can help you reduce your heating/hot water costs. We have helped dozens of buildings save as much as 35%.*

Specialties: *Energy Conservation, Energy Audit Services, Domestic Water Heating*

Noble Home, LLC

Grunberg, Noah
P.O. Box 476
Shelburne Falls, MA 01370
Tel: 617-694-7253
info@noble-home.net
noble-home.net

Description: *The modern, all natural, affordable home. The Noble Home is a house kit designed for each building site, easily assembled by an owner-builder.*

Specialties: *Alternative Technologies, Building Design/Construction, Research*

NorthEast Electrical Distributors

Pedro, Nate
560 Oak St.
Brockton, MA 02301
Tel: 781-401-8500
nate.pedro@needco.com
needco.com

Specialties: *Photovoltaics, Lighting Supply, Manufacturing*

NorthEast Solar Design Associates

Bronner, Ann
136 Elm St.
Hatfield, MA 01038
Tel: 413-247-6045
info@northeast solar.biz
northeast solar.biz

Description: *NorthEast Solar provides professional design and*

turnkey installation of commercial, municipal, residential and village solar electric systems.

Specialties: *Photovoltaics*

October Engineering Associates, LLC

Morrison, Robert
16 October Rd.
Sudbury, MA 01776
Tel: 508-561-7553
rlm@octoberengineering.com
octoberengineering.com

Specialties: *Engineering Services, Energy Audit Services*

Optimal Energy Solutions, LLC

Spindler, Henry
64 Peg Shop Rd.
Keene, NH 03431
Tel: 603-283-0366
hcs@optimalenergysolutions.net

Description: *Comprehensive building system analysis and design, including: building envelope, high-efficiency HVAC (esp. hydronic), customized control systems and renewable energy.*

Specialties: *Biomass, Engineering Services*

Partners for Architecture

Grasso, Stephen
48 Union St., Bldg. 1
Stamford, CT 06906
Tel: 203-708-0047
lagrasso@pfarch.net
pfarch.net

Description: *Partners For Architecture Inc. was inaugurated in 1999 to provide comprehensive and environmentally sensitive architectural services.*

Specialties: *Building Design/Construction, Energy Conservation*

Paul Huijing, Inc. Construction and Engineering

Huijing, Paul
P.O. Box 516
Wilbraham, MA 01095
Tel: 413-599-4884
phinc@charter.net
paulhuijing.com

Description: *Paul stresses sustainable projects with lasting value. His commitment to efficiency, organization, responsiveness, and knowledge make the company unique. An organized professional approach makes life easier/less stressful for customers. Quality scheduling and construction are a powerful combination for customers. A realistic completion date enables you to ac-*

curately plan your move-in date.

Specialties: *Building Design/Construction, Consultant, Educator*

Pavers by Ideal

Feeley, Patti
P.O. Box 747, 45 Power Rd.
Westford, MA 01886
Tel: 978-692-3076
info@IdealConcreteBlock.com
IdealConcreteBlock.com

Description: *Ideal manufactures a full line of interlocking concrete pavers and retaining wall systems. Products include Eco-Stone, Aqua-Bric, and Turfstone, environmentally friendly, permeable pavers. Pavers by Ideal offers a GREEN solution.*

Specialties: *Landscape Design/Construction, Pavement*

Picton Brothers, LLC

Picton, Jim
10 Titus Rd., P.O. Box 438
Washington Depot, CT 06794
Tel: 860-868-5007
info@pictonbrothers.com
pictonbrothers.com

Description: *We are a construction & general contracting co. interested in progressive projects that incorporate practical & pleasing design geared to long-term sustainable use of resources.*

Specialties: *Building Design/Construction, Remodeling*

Pill - Maharam Architects

Pill, David
P.O. Box 1300
Shelburne, VT 05482
Tel: 802-735-1286
dpill@pillmaharam.com
pillmaharam.com

Description: *Pill-Maharam Architects, founded in 1991 by David Pill offers comprehensive architectural services for institutional, commercial and residential clients. With hands on experience in the construction field, our staff brings to each project a realistic body of knowledge to create a buildable innovative solution. We are continually doing research into and incorporating sustainable strategies so that our finished projects are environmentally responsible. We fuse creative ideas with functional, budgetary and programmatic requirements to create finely detailed sculptural spaces and buildings.*

Specialties: *Architecture, Building Design/Construction, Energy Conservation*

Pioneer Valley Planning Commission (PVPC)

Ratte, Catherine
60 Congress St., 1st Flr.
Springfield, MA 01104
Tel: 413-781-6045
cratte@pvpc.org
pvpc.org

Description: The PVPC is the legally designated regional planning agency for the Pioneer Valley region in Western MA. Our Mission is to preserve and enhance the quality of life for its individual member communities and for the region as a whole.

Specialties: Public Policy, Energy Education, Other, Transportation Technologies/Services

Polanik Architects

Polanik, AIA, Gregory J.
6 Pine Cone Dr.
East Sandwich, MA 02537
Tel: 508-833-6540
mr7b7@aol.com
polarch.com

Description: Specializing in environmentally appropriate architecture, planning and consulting, we strive to design efficient, healthy buildings, that preserve the local community and are a delight for their users.

Specialties: Building Design/Construction

PowerWise Systems

Steenberg, Carsten
6 Mines Rd., Unit A
Blue Hill, ME 04614
Tel: 207-370-6517
sales@powerwisesystems.com
powerwisesystems.com

Specialties: Energy Monitoring, Energy Conservation

Precision Decisions, LLC

Vreeland, Chris
P.O. Box 179
West Stockbridge, MA 01266
Tel: 413-269-4965
vreeland67@msn.com
precdec.com

Description: Providing engineering services for renewable energy, conservation and green construction. We service contractors, architects and directly to industry, commercial and residential clients. Professional Engineering licensed in MA, CT, NY, RI.

Specialties: Engineering Services, Photovoltaics, Alternative Technologies

Project Planning and Management

Lapointe, Paul H.
224 Follen Rd.
Lexington, MA 02421
Tel: 781-861-9545
paul@paulhlapointe.com
paulhlapointe.com

Description: Plan and manage construction projects for environmentally conscious educational and cultural institutions; represent institutions throughout the project delivery process; assist institutions in selecting architects, consultants, and contractors.

Specialties: Building Design/Construction

Providence Energy Group

Raducha, Paul
10 Dorrance St, Ste. 700
Providence, RI 02809
Tel: 401-427-0530
praducha@providenceeg.com
providenceeg.com

Description: Providence Energy is comprised of several professionals from various facets of the energy industry, including project development, regulatory, legal, accounting, administrative, project management and energy consulting. Collectively, the group is engaged in over 100 projects ranging from 5 kW to 5 MW and beyond. Whether you are a developer, investor, or owner/operator, Providence Energy, through its Solar Asset Management System (SAMS), provides the full support in maximizing the return on your energy assets.

Specialties: Alternative Technologies

PV Squared

311 Wells St., Ste. B
Greenfield, MA 01301
Tel: 413-772-8788
pvsquared.coop

Description: Pioneer Valley PhotoVoltaics, (PV Squared) has over 10 years of experience providing renewable energy solutions to home owners and businesses in the Pioneer Valley and the surrounding regions.

Specialties: Photovoltaics

Quigley Builders, Inc.

Quigley, Mary
P.O. Box 2008
Ashfield, MA 01330
Tel: 413-625-2301
maryquigley@quigleybuilders.com
quigleybuilders.com

Description: Quigley Builders is a woman-owned construction and renovation firm located in the hills of Western MA. We specialize in deep energy retrofits of historic buildings, using new materials and techniques in traditional configurations that respect and honor the vernacular architecture. Our goal is to achieve elegance and efficiency not just in appearance but also-especially-in the function of every project we undertake. This means conserving resources in materials and labor, as well as investing in the life of the building over the next hundred years.

Specialties: Building Design/Construction

R.H. Irving Homebuilders

Irving, Bob
543 West Salisbury Rd.
Salisbury, NH 03268
Tel: 603-648-2635
bob@rhirvinghomebuilders.com
rhirvinghomebuilders.com

Description: Building fossil fuel free high performance homes with constant fresh air supply for excellent air quality and low energy bills. Deep Energy Retrofits for existing homes. Design-build; panelized construction. Certified Passive House Consultant.

Specialties: Building Design/Construction, Deep Energy Retrofits

R.J. Aley Building Contractor

Aley, Judson
185 Wilton Rd.
Westport, CT 06880
Tel: 203-226-9933
rjaley.com

Specialties: Building Design/Construction, Remodeling

R.L. Benton - Builder

Benton, Rich
154 Schoolhouse Rd.
Center Sandwich, NH 03227
Tel: 603-284-6860
rlbenton@cyberpine.net

Description: Full service builder/designer for energy-efficient residential construction in the NH lakes region. Timber-framing as well as advanced hybrid construction, with expertise in solar thermal system design and installation since 1978. Our Sandwich Cabinet Shop can furnish your project as well.

Specialties: Building Design/Construction, Energy Conservation, Other Renewable Energy Generation

R.W. Chew, LLC

Chew, Bob
15 Garfield Ave.
Bristol, RI 02809
Tel: 401-447-7835
bob@rwchew.com
rwchew.com

Description: Bob Chew has been an eco-entrepreneur for 35 years. Bob specializes in helping companies achieve a triple bottom line by implementing innovative management strategies.

Specialties: Consultant, Photovoltaics, Building Design/Construction

RBI Solar, Inc.

Kaur, Harman
5513 Vine St.
Cincinnati, OH 45217
Tel: 513-618-7214
Fax: 513-242-0816
hkaur@rbisolar.com

Description: RBI Solar is the leading turn-key supplier of solar mounting systems. As a specialist in ground mount, roof mount, landfill and custom designed specialty solar structures, RBI focuses on providing the most robust solar racking systems.

Specialties: Photovoltaics

Real Goods Solar - CT

523 Danbury Rd.
Wilton, CT 06897
Tel: 888-567-6527
solar@realgoods.com
realgoods.com

Specialties: Photovoltaics

Real Goods Solar - MA

Tel: 888-567-6527
solar@realgoods.com
realgoods.com

Description: Serving Western MA, Cape Cod, Southeast MA, Boston Metro, North Shore, South Shore, and Worcester County

Specialties: Photovoltaics

Real Goods Solar - NY

Maier, Kathleen
22 Third St.
New City, NY 10956
Tel: 888-567-6527
solar@realgoods.com
realgoods.com

Specialties: Photovoltaics

Real Goods Solar - VT

64 Main St.
Montpelier, VT 05602
Tel: 888-567-6527
solar@realgoods.com
realgoods.com

Specialties: Photovoltaics

Recycled Paper Printing

Truesdale, Todd
12 Channel St., Ste. 603
Boston, MA 02210
Tel: 617-737-9911
todd@recycledpaper.com
recycledpaper.com

Description: Recycled Paper Printing is the nation's oldest green printer. Founded in 1983, we specialize in sustainable printing-using certified recycled papers, soy-based inks, and 100% certified wind-energy credits.

Specialties: Marketing, Communications, Other

Renewable Energy Systems, LLC

Boyle, Erica
P.O. Box 262
No. Scituate, MA 02066
Tel: 781-545-3320
erica@ressolar.com
ressolar.com

Description: Renewable Energy Systems, LLC specializes in solar thermal hot water and space heating. We also work with energy conservation and solar electricity.

Specialties: Radiant Heating, Solar Hot Water, Space Heating/Cooling

Renewable Resources Energy Solutions, Inc.

Lawrence, Ted
119 Research Dr.
Stamford, CT 06906
Tel: 203-674-8361
Fax: 203-674-8365
info@

renewableresourcesinc.com
rr-solar.com

Description: Renewable Resources Energy Solutions is a solar PV provider based in Stamford, CT. We offer turnkey solar installations for both residential and commercial clients. CEFIA-approved, NABCEP-trained, E-1 electrician on staff.

Specialties: Photovoltaics

Renewable Sales LLC

Price, Kevin
35 Jeffrey Ave.
Holliston, MA 01746
Tel: 508-309-4437

kprice@renewablesales.com
renewablesales.com

Description: RENEWABLE SALES is your one stop Solar Energy product source featuring the very best Solar Panels, Mounts, Inverters and Thermal Collectors for commercial, government and residential properties.

Specialties: Photovoltaics, Solar Thermal, Energy Education

RetroFuture Remodeling

Koskinen, Kerry
97 Ellis Rd.
Westminster, MA 01473
Tel: 508-397-7844
retrofutureremodeling@gmail.com

Specialties: Remodeling, Deep Energy Retrofits

Revolusun

Stern, Chad
25 B St.
Burlington, MA 01803
Tel: 781-270-6555
bos.office@revolusun.com
revolusun.com

Specialties: Photovoltaics

Ridgeview Construction

Carter, Shane
43 North Rd., Ste. 303
Deerfield, NH 03037
Tel: 603-303-7206
scarter@

ridgeview-construction.com
greenbuildernh.com

Description: We are a group of professional craftsmen dedicated to building sustainable, high-quality homes and spaces for our clients. We focus on local and renewable materials and systems.

Specialties: Building Design/Construction, Remodeling, Energy Conservation

Robert L. Spencer, AICP - Environmental Planning Consultant

Spencer, Robert
15 Christine Court
Vernon, VT 05354
Tel: 978-479-1450
spencebbc@aol.com

Description: Professional planner specializing in organic waste management & project development. Assessment of on-site & off-site recycling of food waste, manure, yard waste & biosolids.

Specialties: Other Renewable Energy Generation, Research

Rodman & Rodman CPAs

Rodman, Steve
3 Newton Executive Park
Newton, MA 02462
Tel: 617-965-5959
steve@rodmancpa.com
rodmancpa.com

Description: The Rodman & Rodman Green Team is a specialty accounting practice dedicated to providing alternative energy producers and other businesses that pursue energy efficiency initiatives with expert counsel and services in green energy tax accounting and business strategy.

Specialties: Finance/CPA

RST Thermal

Hickey, Mary Ellen
372 University Ave.
Westwood, MA 02090
Tel: 781-320-9910
mehickey@rstreps.com

Specialties: Domestic Water Heating, Space Heating/Cooling

S&H Construction

Leef, Jamie
26 New St.
Cambridge, MA 02138
Tel: 617-876-8286
jamie@shconstruction.com
sandhsolar.com

Description: An award-winning general contractor delivering sustainability and quality to residential renovations. Our Renewable Energy Division designs and installs solar electric, hot water, and geothermal systems, and offers energy management consulting.

Specialties: Building Design/Construction, Photovoltaics, Solar Hot Water

Sage Builders, LLC

Kantar, Jonathan
672 Chestnut St.
Newton, MA 02468
Tel: 617-965-5272
info@sagebuilders.com
sagebuilders.com

Description: Award-winning, full service Boston area residential design-build company committed to responsible design and construction practices. Experts in energy efficiency and weatherization.

Specialties: Building Design/Construction, Energy Conservation, Remodeling

Salmon Falls Ecological Design

Erslev, Kim
16 Wilde Rd.
Shelburne Falls, MA 01370
Tel: 413-369-4044 x1
erslev@csl.edu

Description: Green architecture and landscape design firm that works closely with clients to create designs that connect our homes and communities to the power and beauty of the natural world.

Specialties: Architecture, Landscape Design/Construction, Alternative Technologies

Saltonstall Architects, Inc.

Saltonstall, William
380 Wareham St.
Marion, MA 02738
Tel: 508-748-1043
will@saltonstallarchitects.com
saltonstallarchitects.com

Description: Providing architectural services to residential, commercial and institutional clients the firm is committed to sustainable design practices; focusing on working closely with our clients to design thoughtful, innovative, healthy and energy-efficient places to live and work.

Specialties: Building Design/Construction

Sandri Energy, LLC

Goodyear, Jake
400 Chapman St.
Greenfield, MA 01301
Tel: 800-628-1900
jgoodyear@sandri.com

sandri.com/renewable-energy
Specialties: Biomass, Photovoltaics, Solar Thermal

Sellers Lathrop Architects, LLC

Lathrop, Ann
1 Kings Hwy. North
Westport, CT 06880
Tel: 203-222-0229
ann@sellerslathrop.com
sellerslathrop.com

Description: Small, woman-owned firm designing upgrades, additions and renovations for 21st century living. Primary projects are residential and light commercial work in Fairfield County, CT, emphasizing energy efficiency and smart building technologies to create high quality solutions with character and style.

Specialties: Building Design/Construction

Sirois Solar, a division of Sirois Electric, Inc.

Sirois, Chris
6 Duncan Rd., Ste. 6
Burlington, MA 01803
Tel: 781-229-9988
chris@siroiselectric.com
siroiselectric.com

Description: A full service electrical contractor performing energy audits and installations of solar voltaics for home or business. Master electricians.

Specialties: Energy Audit Services, Photovoltaics

SJP Environmental Consulting, LLC

Pick, Sally
P.O. Box 303
Montague, MA 01351
Tel: 413-367-0082
SJP@crocker.com

Description: Committed to working with residents to help them explore cost-effective energy saving measures for a cozier home, navigate the maze of information and find the right resources, understand clean energy technologies, take advantage of financial incentives and learn about financing options for energy saving projects. For associations, businesses, and nonprofits, offers a range of services including writing (i.e. news releases, policy papers, & grants); managing projects and collaborations; and directing public education and community outreach programs.

Specialties: Energy Education, Consumer Information, Communications

Smart Energy Of New England, LLC

Belanger, David
120 Angels Rd.
Colebrook, NH 03576
Tel: 603-496-3504
david@smartenergyne.com
Specialties: Photovoltaics, Wind, Biomass

SolaBlock, LLC

Quinlan, Patrick
Scibelli Enterprise Center
1 Federal St.
Springfield, MA 01105
Tel: 339-230-4600 x101
Fax: 339-230-4640
pquinlan@SolaBlock.com
SolaBlock.com

Description: SolaBlock LLC manufactures permanently PV-clad building materials, providing a cost-competitive solar solution to

meet most of the electric load in a energy-efficient building.

Specialties: Wind, Photovoltaics, Building Design/Construction

Solaire Generation

Winston, Logan
150 West 28th St., Ste. 1801
New York, NY 10001
Tel: 646-738-6955
eaccounts@
solairegeneration.com
solairegeneration.com

Specialties: Photovoltaics, Pavement

Solar Store of Greenfield

Chang, Claire & Ward, John
2 Fiske Ave.
Greenfield, MA 01301
Tel: 413-772-3122
info@

solarstoreofgreenfield.com
solarstoreofgreenfield.com
Description: Local western MA renewable energy advice, design and installation for residential and commercial clients. Also pellet stoves, interior window inserts, lighting, biodiesel, and energy conservation available in the store.

Specialties: Photovoltaics, Solar Hot Water, Energy Conservation

Solar Design Associates

Strong, Steven
P.O. Box 242
Harvard, MA 01451
Tel: 978-456-6855
info@solar design.com
solar design.com
Specialties: Photovoltaics, Engineering Services, Alternative Technologies

SolarReviews

Truax, Jesse
550 S Wadsworth Blvd. #540
Lakewood, CO 80226
Tel: 303-800-4083
jesse@solarreviews.com
solarreviews.com
Description: SolarReviews is the largest consumer reviews website in the solar industry, with 10,000+ solar installer reviews and access to over 700,000 unique visitors each year who are interested in learning more about going solar.
Specialties: Photovoltaics, Solar Hot Water, Marketing

Solar Wave Energy, Inc.

Vandermark, Henry
2 Tyler Ct.
Cambridge, MA 02140
Tel: 617-242-2150
hkv@solarwave.com
solarwave.com

Description: Providing solar energy products and services since 1978. Today we provide controller integrated Web-based monitoring for solar thermal (heating & hot water) systems.

Specialties: Energy Monitoring, Solar Hot Water, Other

Solect, Inc.

Driscoll, Ken
89 Hayden Rowe
Hopkinton, MA 01748
Tel: 508-589-4630
kdriscoll@solectenergydev.com
solectenergydev.com

Description: Solect, Inc. is a solar renewable energy development company focused on the deployment of solar photovoltaic (PV) systems. Solect works with the appropriate financial partners to fund the deployment of solar renewable energy systems.

Specialties: Other Renewable Energy Generation

Solectria Renewables

360 Merrimack St., Building 9
Lawrence, MA 01843
Tel: 978-683-9700
inverters@solren.com
solren.com
Description: Solectria Renewables designs and manufactures grid-tied photovoltaic inverters and related equipment (string combiners and data monitoring) for residential and commercial applications.

Specialties: Photovoltaics

Sorapro

120 Route 156
Yardville, NJ 08620
Tel: 855-767-2776
info@SORAPRO.com
sorapro.com
Specialties: Photovoltaics

South Mountain Company

P.O. Box 1620, 15 Red Arrow Rd.
West Tisbury, MA 02575
Tel: 508-693-4850
info@southmountain.com
southmountain.com
Description: An employee-owned design/build firm specializing in green development, houses and

housing, furniture and interiors, and renewables. Our work is limited to Martha's Vineyard except education and consulting.

Specialties: Building Design/Construction, Energy Conservation, Photovoltaics

Southern Light Solar, LLC

Sheldon, Christopher
1128 Acushnet Ave.
New Bedford, MA 02746
Tel: 774-473-9339
Fax: 508-991-7368
chris@southernlightsolar.com
SouthernLightSolar.com
Description: Southern Light Solar is a full service engineering, procurement and construction contractor specializing in concept design, planning and installation of residential and commercial photovoltaic systems.
Specialties: Green Electricity, Photovoltaics, Roofing

SouthPoint, LLC

Lastella, Michael
77 Arlington St.
Leominster, MA 01453
Tel: 978-840-4300
info@southpoint-llc.com
southpoint-llc.com
Description: Provide design/installation services; specializing in solar electric systems in the New England area. Our systems are for new and existing residential and commercial applications.
Specialties: Consultant, Domestic Water Heating, Photovoltaics

Sparhawk Group

Holden, Matthew
81 Bridge St. Ste. 107
Yarmouth, ME 04096
Tel: 207-846-7726
mholden@sparhawkgroup.com
sparhawkgroup.com
Specialties: Consultant, Energy Audit Services, Engineering Services

Spire Solar Systems

Hogan, Steve
1 Patriots Park
Bedford, MA 01730
Tel: 781-275-6000
shogan@spirecorp.com
spirecorp.com
Description: Spire Corporation - Spire is the leading global solar company providing capital equipment to manufacture PV modules & cells, turnkey solar manufacturing lines and PV systems. Spire has provided innovative solar technolo-

gies for over 30 years.

Specialties: Alternative Technologies, Photovoltaics, Manufacturing

Stephen Turner Inc.

Turner, Stephen
P.O. Box 2523
Providence, RI 02906
Tel: 401-273-1935
stephen@sturnerinc.com
GreenBuildingCommissioning.com

Specialties: Alternative Technologies, Energy Conservation, Indoor Air Quality

Stiebel Eltron, Inc.

Riley, Bill
17 West St.
West Hatfield, MA 01088
Tel: 800-582-8423
Fax: 413-247-3369
bill.riley@stiebel-eltron-usa.com
stiebel-eltron-usa.com
Description: Stiebel Eltron is the German manufacturer of the energy saving Temptra Plus tankless electric water heaters, Accelera 300 heat pump water heaters and solar hot water heating renewable energy systems.

Specialties: Energy Conservation, Manufacturing, Solar Hot Water

SunDrum Solar

Intrieri, Michael
15 Hillside Rd.
Northborough, MA 01532
Tel: 978-257-2981
mintrieri@sundrumsolar.com
sundrumsolar.com

Description: SunDrum Solar provides leading hybrid solar solutions to the residential and commercial markets. By maximizing electrical and thermal solar collection in the same footprint we lead the industry in economic value.

Specialties: Alternative Technologies

Sustainable City Network

Rodgers, Randy
470 W. 4th St.
Dubuque, IA
Tel: 563-513-1244
Fax: 877-819-1533
randy@scitynetwork.com
sCityNetwork.com

Description: Sustainable City Network is a business-to-government media company that provides elected officials and municipal professionals with quality and timely

information on sustainability products, services and best practices.

Specialties: Communications, Public Policy, Marketing

Symmes Maini & McKee Associates

1000 Massachusetts Ave.
Cambridge, MA 02138
Tel: 617-547-5400
smma.com
Specialties: Building Design/Construction, Energy Conservation, Engineering Services

TD Bank

Henke, Jacquelynn
tdbank.com
Specialties: Finance/CPA

Techno Metal Post

5 Hill View Ln.
Asbury, NJ 08802
info.cnj@technometalpost.com
technometalpostcnj.com
Specialties: Building Design/Construction, Photovoltaics

Thermotech Fiberglass Fenestration

Thwaites, Stephen
2121 Thermotech Rd.
Ottawa, ON K0A 1L0
Canada
Tel: 613-816-6156
Fax: 613-839-6158
steven@thermotechwindows.com
thermotechfiberglass.com
Specialties: Windows

The Community Preservation Corporation

Padian, Andrew
28 E. 28th St., 9th Flr.
New York, NY 10016
Tel: 212-869-5300 x544
apadian@communityp.com
communityp.com
Description: CPC is a nationally recognized leader in helping developers finance and build affordable multi-family housing. To CPC, no loan is simply a financial transaction. Each project reflects CPC's commitment to help developers succeed at strengthening communities. In its 37 years, CPC has financed more than 144K new or rehabbed units. This investment of over \$8 billion has improved the quality of life for tens of thousands of people, preserving and enhancing dozens of communities.

Specialties: Finance/CPA, Energy Conservation, Building Design/Construction

The Green Engineer, Inc.

Schaffner, PE, Christopher
54 Junction Square Dr.
Concord, MA 01742
Tel: 978-369-8978
chris@greenengineer.com
greenengineer.com
Description: Sustainable design firm offering Energy Modeling and LEED Certification for commercial buildings. Technical staff of 10 LEED APs with 150+ LEED projects. Also work with local utilities' energy efficiency programs. Certified B Corp.
Specialties: Building Design/Construction, Energy Conservation, Engineering Services

The Jordan Institute/Resilient Buildings Group

Richardson, Laura
17 Depot St., 2nd Flr.
Concord, NH 03301
Tel: 603-226-1009
lrichardson@jordaninstitute.org
jordaninstitute.org
Description: As a non-profit, we address climate change by reducing energy use in buildings. We consult on High Performance and Deep Energy Retrofits, LEED buildings, manage projects, M+V, commission, and advocate for strong public policy.
Specialties: Consultant, Deep Energy Retrofits, Public Policy

The Ley Group

Ley, Simon
3704 Macomb St. NW
Washington, DC 20016
Tel: 202-237-0334
Fax: 202-237-0335
simon@theleygroup.com
theleygroup.com
Description: Custom residential & commercial builder from ground up or simply remodel your kitchen your bath with a focus on sustainable and environmentally conscious approaches.
Specialties: Remodeling

The United Illuminating Company

Burns, Patrick
157 Church St. MS 1-6B
P.O. Box 1564
New Haven, CT 06505
Tel: 203-499-3504
patrick.burns@uinet.com
uinet.com
Description: The United Illuminat-

ing Company (UI) is an administrator of the Residential and Commercial & Industrial Energy Efficiency Programs through the Connecticut Energy Efficiency Fund (CEEFF). The CEEFF promotes efficient energy use, helps residents and businesses save on their electric bills, advances economic development, reduces electric demand and helps reduce air pollution. Additional information on Connecticut's energy-efficiency programs can be found at ctenergyinfo.com.

Specialties: Building Design/Construction, Energy Audit Services, Energy Conservation

The Valle Group, Inc.

Valle, Christian
70 East Falmouth Hwy., #3
East Falmouth, MA 02536
Tel: 508-548-1450
info@vallegroup.com
vallegroup.com

Description: The Valle Group sets the standard for thoughtfully-planned communities in southern New England. The company's special expertise is planning and creating communities of quality, energy-efficient homes, and building and remodeling for homeowners.
Specialties: Building Design/Construction, Remodeling

Thoughtforms Corporation

Doughty, Mark
543 Mass Ave.
Acton, MA 01720
Tel: 978-263-6019
mark@thoughtforms-corp.com
Description: Thoughtforms Corporation specializes in building high-end custom homes and unique institutional buildings in eastern Massachusetts.
Specialties: Building Design/Construction

Timeless Architecture

MacLean, Henry P.
147 School St.
Milton, MA 02186
Tel: 617-696-6448
hmaclean@timearch.com
timearch.com
Description: Timeless Architecture is an architectural office specializing in residential & light commercial work, focused on the integration of historic preservation and green design.
Specialties: Building Design/Construction, Energy Conservation, Remodeling

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Boston Area Solar Energy Association (BASEA)

Henry K. Vandermark
Tel: 617-242-2150
hkv@solarwave.com
basea.org

GreenHome NYC

info@greenhomenyc.org
greenhomenyc.org

NESEA Cape & Islands

Part of the Cape and Islands
Renewable Energy Collaborative
Liz Argo
Tel: 774-722-1812
argoconsulting1@gmail.com

NESEA Hudson Valley (forming)

Luis Hernandez
luis@loweryourenergynow.com

NESEA RI

John Jacobson
johntaborjacobson@gmail.com
neseari.wordpress.com

Sustainable Delaware - NESEA

John Mateyko
Tel: 302-645-2657
johnmateyko@verizon.net

Western New York Sustainable Energy Association (WNYSEA)

wnysea.com

Springfield Area Sustainable Energy Association (SASEA)

(Massachusetts)
Mike Kocsmiersky
Tel: 413-883-3144
mikek@spiritsolar.net

UMASS Lowell Solar Energy Association (student chapter)

energy.caeds.eng.uml.edu

In the NESEA community, collaboration is the name of the game. That's why we're growing our network of affiliates. View our legacy affiliates and our growing list of new affiliates at nesea.org/members/affiliates/

Topaz Engineering Supply, Inc.

35 Park Pond Rd.
Hingham, MA 02043
topazeng.com

Description: Since the beginning Topaz has always focused on the wide format document needs of Architects, Engineers, Designers and CAD professionals. As computer aided design became more prevalent the entire design process changed and Topaz changed with it. Our products shifted toward plotters and plain paper engineering copiers instead of blueprint machines.

Specialties: Engineering Services, Manufacturing, Other

Transformations, Inc.

Scott, Carter
8 Coppersmith Way
Townsend, MA 01469
Tel: 978-597-0542
carter@

transformations-inc.com
transformations-inc.com

Description: Transformations, Inc. is focused on creating Zero and Near Zero Energy homes including Sustainable Developments.

Specialties: Building Design/Construction, Photovoltaics

Tremco Commercial Sealants & Waterproofing

3735 Green Rd.
Beachwood, OH 44122
Tel: 800-321-7906
cpokorny@tremcoinc.com
tremcosealants.com

Specialties: Indoor Air Quality

Trillium Architects

DiSalvo, Elizabeth
129 Washington St.
Norwalk, CT 06854
Tel: 203-838-5689
trilliumarchitects@gmail.com
trilliumarchitects.com

Description: At Trillium Architects we design Fine Green Homes. We believe that you should live in a home you cherish today and would be proud to leave your grandchildren tomorrow.

Specialties: Building Design/Construction

Truth Box, Inc.

Case, Peter Gill
460 Harris Ave. Unit 104
Providence, RI 02909
Tel: 401-453-1300
pgc@truthbox.com
truthbox.com

Description: This architectural firm is for clients who seek alternatives to wasteful building practices. We offer cost effective solutions that help the environment and enhance design and comfort.

Specialties: Building Design/Construction, Energy Conservation, Real Estate

Turn Key Builders, Inc.

Meehleder, Jim
50 Miles St.
Greenfield, MA 01301
Tel: 413-774-9946
turnkeybuild@gmail.com
turnkeybuilders.net

Specialties: Building Design/Construction, Photovoltaics, Remodeling

US Solar Works, LLC

Fine, Pete
7 North Main St.
Attleboro, MA 02703
Tel: 508-226-8001
pete@ussolarworks.com

Specialties: Consultant, Energy Conservation

Vantem Panels

Anderson, Doug
74 Glen Orne Dr.
Brattleboro, VT 05301
Tel: 802-254-3435
Fax: 802-254-4999
doug.anderson@vantempanels.com
vantempanels.com
Description: Vantem Panels manufactures Structural Insulated Panels (SIPS), with either urethane or EPS foam cores. R-values from 15 to 50. Design and pre-cutting services are available. Net zero energy Smart-Homez kits are offered. Please visit our web sites: smarthomez.com and vantempanels.com.

Specialties: Energy Conservation, Insulation, Translation

Viessmann Mfg.

Fuller, Lauren
45 Access Rd.
Warwick, RI 02886
Tel: 401-732-0667
Fax: 401-732-0590
full@viessmann.com
Specialties: Biomass, Solar Hot Water, Space Heating/Cooling

Warren Construction Group

P.O. Box 362
South Freeport, ME 04078
Tel: 207-865-3522
info@warrenconstructiongroup.com
warrenconstructiongroup.com
Specialties: Building Design/Construction

Warren Design Build

Warren, Carl
268 West St.
Berlin, MA 01503
Tel: 978-838-0022
carl@warrendesign.com
warrendesign.com
Description: 30 years experience using current building science techniques to design and build durable, low maintenance, healthy, low-impact homes. Check us out at our website.
Specialties: Building Design/Construction

Water Energy Distributors, Inc.

Orio, Martin J.
2 Starwood Dr.
Hampstead, NH 03841
Tel: 603-329-8122
martin@northeastgeo.com
northeastgeo.com
Description: Geothermal design & geothermal heat pump distribution for the northeastern United States since 1978.
Specialties: Energy Conservation, Geothermal, Space Heating/Cooling

Weedon Design Build

Weedon, Charles
24 Tull Ln.
Pomfret, CT
Tel: 860-974-2362
Specialties: Building Design/Construction

Wesson Energy, Inc.

Wesson, William
165 Railroad Hill St.
P.O. Box 2127
Waterbury, CT 06722
Tel: 203-419-5046
wwesson@wessonenergy.com
wessonenergy.com
Description: Wesson Energy is a progressive energy partner specializing in modern, high-efficiency solutions and comprehensive home comfort service. We help homeowners and businesses integrate alternative energy sources, including solar and biofuel.

Specialties: Domestic Water Heating

Wolfworks, Inc.

Wolf, Jamie
195 West Main St.
Avon, CT 06001
Tel: 860-676-9238
jamie@homesthatfit.com
homesthatfit.com
Description: We are guides. We guide a process for clients who are prepared to design and build collaboratively and responsibly. Together we create spaces that look great, work well and feel good to be in.
Specialties: Building Design/Construction, Remodeling, Deep Energy Retrofits

Wright Builders, Inc.

Paige, Joyce
48 Bates St.
Northampton, MA 01060
Tel: 413-586-8287 x32
jpaige@wright-builders.com
wright-builders.com
Description: A design/build general contractor specializing in energy efficient housing since 1977, serving the Pioneer Valley.
Specialties: Remodeling

Yaro-DSI

Kocis, Tomas
84 Sherman St.
Cambridge, MA 02140
Tel: 617-671-8905
tk@yaro-dsi.com
yaro-dsi.com
Description: Yaro Windows and Doors is a full service, high performance window and door supplier. We specialize in Passive House Certified windows, large span glass, and custom fenestration assemblies.
Specialties: Windows

Zehnder America, Inc

540 Portsmouth Ave.
Greenland, NH 03840
Tel: 603-422-6700
Fax: 603-422-9611
info@zehnderamerica.com
zehnderamerica.com
Description: Zehnder specializes in advanced heating and ventilation solutions to promote comfortable, healthy, and energy-efficient indoor living. Zehnder HRVs recover over 90% of the room temperature and ensure fresh filtered air for the inhabitants.
Specialties: Indoor Air Quality, Alternative Technologies, Space Heating/Cooling

ZeroEnergy Design

Prince, Adam
156 Milk St., Ste. 3
Boston, MA 02109
Tel: 617-720-5002 x 102
aprince@zeroenergy.com
ZeroEnergy.com
Description: Green Architecture, Mechanical Design & Energy Consulting. Passive House Consultants & Registered Architect. Modern houses, green homes, multi-family, and institutional architecture & consulting.
Specialties: Architecture, Engineering Services, Consultant

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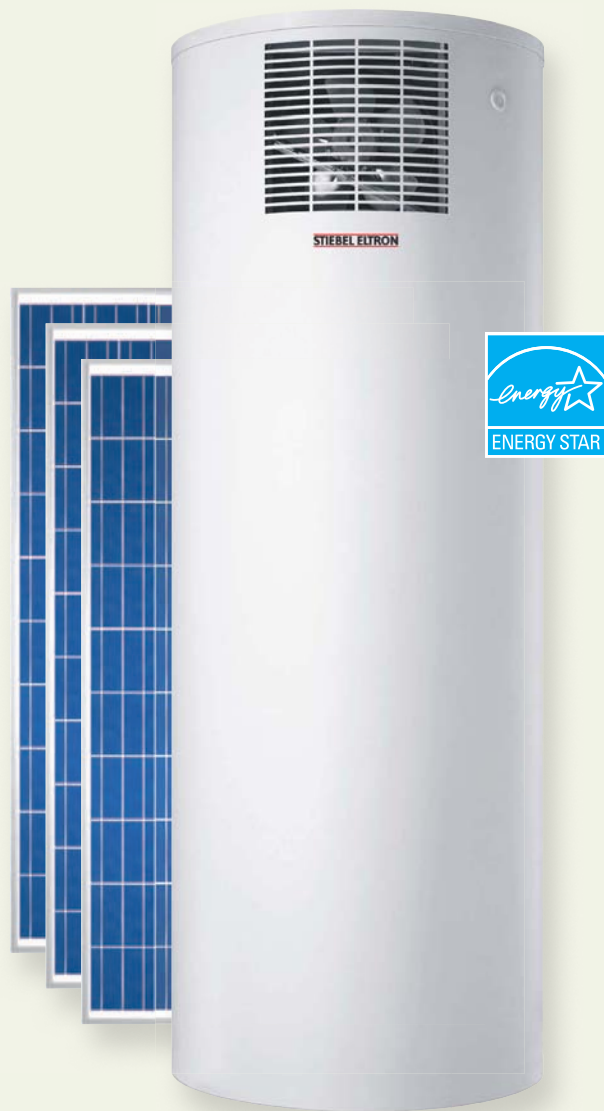
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