“Andromeda” Star of Energy Efficiency

Nominee: Aircuity, Inc.

Aircuity provides a unique solution that significantly reduces the energy associated with ventilating many different types of commercial buildings, including laboratories, health care facilities, commercial office buildings, and schools. By continuously monitoring indoor air for many different potential contaminants, Aircuity can adjust ventilation rates to maximize energy efficiency while ensuring a safe, comfortable, and productive work environment.

**Uniqueness of solution**: While the general approach to optimizing ventilation (known as Demand Control Ventilation or DCV) has been around for decades, technical challenges associated with the reliability and life cycle costs of sensing technology have limited the success of DCV. Aircuity has developed a deployed a unique system architecture that addresses these shortcomings, delivering significant savings that can be realized year after year (the brevity of this application eliminates the opportunity to describe the innovation of this application in any detail).

**Evidence of energy savings:** Direct evidence of energy savings can be measured (in different degrees of accuracy) depending on the specific type of application. In commercial buildings, schools and other variable occupancy spaces, the reduction of ventilation saves heating, cooling, and fan energy, and superior humidity sensing expands on these savings by optimizing economizer hours. In laboratory and some health care environments these savings are much more significant because they use 100% outside air without recirculation. Energy savings can be directly measured by reduced airflow, generally monetized by energy managers on a cost per cfm (cubic feet per minute of air) which typically ranges from $4-7 cfm.

**Estimated savings:** Aircuity has more than 350 installed systems in operation. Using a very conservative methodology (and counting <u>only</u> the laboratory space, which approximately 17M sq ft of a total installed 50M sq ft of monitored facilities), Aircuity is saving 187,170,000 kWh annually, with an additional 15,400,000 in Therm savings. The combined energy savings **annually** would be more than 2Billion MBTU’s.

**Estimated savings to date:** Aircuity began delivering its system in 2007, and savings to date based on the approach above are estimated to be approximately 6.8 Billion MBTU’s.

**Energy Savings Potential:** There is an estimated 700million sq ft of laboratory space alone in the United States, more than half of which would be applicable to Aircuity solutions.

**Evidence solution can be replicated:** Aircuity has sold more than 500 systems, with 350 installed and operating in all target market. Aircuity is the core technology in the University of California’s Smart Lab program, which is a DOE Better Buildings Showcase partner. Aircuity is in the first LEED Platinum skyscraper in NYC (One Bryant Park) and has been selected for installation in Apple’s new HQ. Aircuity is in the first Net Zero School (Richardsville KY) and is the basis of design by CMTA architect & design firm in the Midwest. Aircuity integrates to all building control systems (Siemens, JCI, Honeywell, etc.).

**Innovation & Creativity**: multiple patents have been awarded based on this design which included the development of unique carbon nano-fiber tubing to transport air samples to centrally located sensor suites.

WHY WATER HEATING?

Water heating has the second largest share of a home's annual energy consumption. Efficient water heating technologies will hence have a significant bearing on national energy usage and carbon footprint.

WHY HEAT PUMP WATER HEATERS?

Heat Pump Water Heaters (HPWHs) heat water by absorbing and moving heat from ambient air instead of creating heat like conventional water heaters. On average, HPWHs use a third of the energy used by electric or gas water heaters.

WHAT MAKES THE AIRTAP BRAND OF HEAT PUMP WATER HEATERS FROM AIRGENERATE UNIQUE?

While there are other manufacturers of HPWHs in the industry, AirGenerate has emerged as a technology pioneer by focusing on end user needs and operating efficiency even in extreme conditions. AirTap is the only HPWH:

1. Capable of operating the heat pump even in freezing temperatures to deliver hot water efficiently. As a result, AirTap is the only product that meets the Northwest Energy Efficiency Alliance's stringent Tier 2 criteria for super-efficient water heaters. Please refer to http://neea.org/docs/default-source/northern-climate-heat-pump-water-heater-specification/qualified-products-list.pdf?sfvrsn=18. NEEA is a non-profit alliance of over 140 utilities mandated to identify and commercialize cutting edge energy-efficient products.
2. Capable of dual venting. This allows the unit to duct exhaust air to supplement home cooling in warmer months (thereby saving additional energy) AND duct intake air to the unit (allowing the unit to be more efficient and install friendly).
3. Embedded with intelligent algorithms that are customizable depending on specific needs of the consumer. Automated generation of error codes make it easier to service the unit.
4. Made from stainless steel inside and out. This not only adds to superior aesthetics but also allows us to give a lifetime warranty on the tank body.

RECOGNITION AND RESEARCH PROGRAMS

1. Selected by the National Renewable Energy Lab (NREL) as exclusive technical partner for cooperative research and development in designing and evaluating HPWHs from a net energy or building science perspective. This two year project is already underway and is yielding ground-breaking data.
2. Selected by Electrolux Home Appliance as exclusive OEM partner for North America. All Electrolux brand HPWHs are AirGenerate products.
3. Partnering with NASA to develop the world's first refillable and re-usable anode rod.

SUMMARY

Even though AirGenerate is a fraction of the size of its competitors, it is deemed as a technology leader in the industry. Its growth trajectory demonstrates that even a small company with vision, commitment and perseverance can make remarkable strides in an industry dominated by monopolies.

CALCULATION OF 2013 ENERGY SAVINGS

Per Energy Star, a conventional electric storage water heater with an Energy Factor of 0.95 uses 4,622 kWh per year. AirTap HPWH is Energy Star certified with an Energy Factor of 2.4 and annual energy usage of 1,870 kWh. In 2013, 1,224 units of AirTap HPWHs were sold. This represents energy savings of 1,224*(4,622-1,870) = 3.4 million kWh (rounded).

As the Senior Vice President, Operations Manager of the Energy and Sustainability Services group at JLL, Bruce Sirota is responsible for the development and execution of energy and sustainability portfolio management services. He has pioneered the energy-reduction movement in the industry, especially with ENERGY STAR and PEERS.

**ENERGY STAR**

Bruce has consistently increased the number of buildings in the JLL portfolio that participate in EPA ENERGY STAR benchmarking each year. 2013 was monumental: he increased JLL's ENERGY STAR participation by 90% from 2,697 buildings in 2012 to 5,146 in 2013. When the ENERGY STAR platform was upgraded in the summer of 2013, Bruce worked extensively with the EPA and JLL's IT staff to ensure that JLL's internal technology systems spoke to these changes. To have all 2,697 buildings up-to-date was quite a challenge, and the fact that Bruce was able to increase the number of properties in ENERGY STAR to 5,146 is nothing short of a miracle.

He aggressively pushed certification so that 387 of JLL's buildings achieved verification for EENRGYSTAR. He also developed industry-leading training for building managers and engineers through ENERGY STAR training sessions, annual conferences, the JLL online "Sustainability University" curriculum, and the newly-introduced JLL "Engineering Services University."

**PEERS™**

Bruce worked with JLL's Energy Services Team that includes over 35 Portfolio Energy Managers (PEMs) throughout the country. These PEMs oversee more than 400 on-site energy engineers nationwide, working closely with clients such as Bank of America, Proctor & Gamble, and United Healthcare. He pioneered and created Portfolio Energy & Environmental Reporting System (PEERS™,) a proprietary online system used by JLL's energy managers and property teams to manage all aspects of Energy Conservation Measures (ECM). Bruce saw a need for a platform that collected clients' energy consumption data; PEERS solves this problem by generating reports that include energy conservation opportunities that JLL PEMs can implement. Through his management of PEERS, he has seen over 8,000 energy conservation projects completed.

| Cumulative Client Energy Savings | |
|---|---|
| Year | Energy Savings ($ Millions) |
| 2007 | 38 |
| 2008 | 171 |
| 2009 | 404 |
| 2010 | 765 |
| 2011 | 1,231 |
| 2012 | 1,873 |
| 2013 | 2,554 |

Cumulatively, in 2013 these savings accounted for over 20.6 billion kWh and 11.9 Million Metric Tons of CO2.

## Innovating Solutions for Deep Energy Efficiency Retrofits in Small and Medium Businesses

Ecology Action, an environmental nonprofit consultancy, is transforming the way energy efficiency is delivered to the small and medium business market. Ecology Action (EA) has developed Direct Install 2.0 (DI 2.0), the preeminent model for delivering deep retrofits in the small and medium business (SMB) market. Since 2002, EA has used the DI 2.0 model to deliver over 4.1 GWh and 60,000 kW of energy savings through more than 14,000 retrofits. After a decade of extensive development, innovation and delivery throughout California, the DI 2.0 model and underlying savings calculation methodology is tested, proven, and ready for implementation across the nation.

### Elements of Direct Install 2.0

There are three key features of the DI 2.0 model that contribute to our impressive results:

1. **Full service, turnkey customer support:** SMB customers typically face many barriers that prevent widespread adoption of EE measures including a lack of understanding of EE, difficulty of implementing retrofits, upfront costs, and lack of trust in contractors. To minimize these market barriers, DI 2.0 offers comprehensive customer service, including free energy audits, retrofit specification and design, start-to-finish project management,, and rebate fulfillment. Providing customers this full suite of services increases customer participation rates and results in deeper retrofits with greater energy savings, while significantly improving customer satisfaction ratings.
2. **Bundled efficiency measures:** Direct Install programs typically install only free or low cost "low hanging fruit" measures, resulting in stranded savings. DI 2.0 programs combine deeper, more expensive measures with low cost measures to create an attractive package of energy efficiency upgrades that achieve significant energy and utility bill savings.
3. **Modified Lighting Approach (MLA):** Energy savings projections for lighting retrofits are typically calculated using one of two approaches: "Deemed" or "Measured". The Deemed approach estimates energy savings by using averages that are determined from large sets of historical data for a given energy upgrade installed in a specific business type. The Measured approach provides individual custom calculations for each retrofit project, providing highly accurate results that are time consuming and costly to perform and require extensive review and verification. The MLA combines elements of both Deemed and Measured methodologies striking a balanced middle ground between accuracy and efficiency. The MLA generates more accurate savings estimates than Deemed, while supporting flexible equipment specification. Calculating savings using the MLA provides customers with increased product offerings and improved energy savings and pay back projections.

Utilizing the innovative DI 2.0 model, EA's retrofits routinely achieve 15-20% energy reduction for our customers and capture up to 4.7 times greater energy savings per site compared to traditional DI models. In addition to the program benefits mentioned above, DI 2.0 programs deliver highly cost effective energy efficiency savings for utilities, with 2013 Total Resource Costs ranging from 1.8 and 2.2.

### State and National Leadership in Energy Efficiency

Ecology Action, in partnership with Pacific Gas and Electric Company (PG&E), has been leading the development of the DI 2.0 program model and Modified Lighting Approach for over a decade. Together with PG&E, EA has successfully secured formal approval of the MLA from the California Public Utilities Commission (CPUC). This approach is now approved for use by all investor owned utilities in California, allowing utilities to achieve deeper and broader energy savings while maintaining program cost effectiveness by using the MLA. Over a dozen efficiency programs are currently using this approach, saving over 1.6 GWh from March 2013 to March 2014.Finally, in recognition of the potential of Ecology Action's pioneering work to reshape how efficiency is delivered to the SMB market, the US Department of Energy recently awarded EA $2 million of funding to pilot this approach in markets across the US. With a decade of proven success in the SMB market, the approval of EA's MLA by the CPUC, and an investment in scaling the model nationwide, DI 2.0 is poised to dramatically advance EE offerings and achieve significant energy savings for the SMB market.

2014 Star of Energy Efficiency Award Nominations

"Andromeda" Star of Energy Efficiency

**FirstFuel Software**

FirstFuel Software is dedicated to helping organizations identify opportunities to reduce their commercial buildings' carbon emission through remote audits while simultaneously cutting the massive costs and extensive time associated with traditional approaches. Founded in 2009, FirstFuel developed its Remote Building Analytics (RBA) platform based on techniques used in the financial services industry which leverages data analytics to organize business processes. FirstFuel determined that energy savings opportunities could be found in a similar way, using data already stored in a building's smart meter system to gain deeper insight into how specific structures are using energy. The RBA platform is able to tap into this data without installations or on-site visits, allowing customers a faster and simpler deployment.

Leveraging building energy performance data in adding to readily available information on property square footage, weather and time of day, FirstFuel can offer customers step-by-step recommendations for realizing both operational savings (such as workers turning off their computers when they leave the office), and retrofit opportunities (such as replacing light bulbs with sensor LED lights). These recommendations are provided at-scale for each building making the RBA platform help standardize the energy consumption monitoring process. With the instantaneous ability to consistently monitor each individual building remotely, FirstFuel provides the commercial sector with a direct link to determining and acting upon its energy efficiency needs to reduce business costs.

FirstFuel's 15 North American utilities and government agency customers are collectively targeting over $250 million in annual energy reduction opportunity via the RBA platform. Among FirstFuel's largest customers are the United States General Services Administration (GSA) and Washington D.C.'s Department of General Service Administration (DC-DGS). The GSA's deployment of FirstFuel Software across its entire 125 million square feet of commercial property has already found $14 million of an expected $40 million in energy savings opportunities over less than 18 months and has reduced the GSA's building analysis costs by $1.3 million. DC-DGS has uncovered $3 million in operational savings opportunities and is on track to reduce its building portfolio's energy consumption by 20 percent in 20 months.

FirstFuel recently announced it has enhanced its RBA platform to provide more information for customers to aid in the implementation of energy efficiency acts allowing goals to be reached at a much quicker pace. FirstFuel strives to keep improving its technology to ensure that its platform is a beneficial resource for the commercial industry at every stage of the energy efficiency life cycle—from auditing to customer engagement to verification. FirstFuel is transforming the energy efficiency market by streamlining processes to analyze consumption and it shows no sign of slowing down.

**Judging Criteria**

1. Degree to which nominee has demonstrated an outstanding and/or unique contribution to energy efficiency beyond that which is to be expected. (35 points)

- Gore Mountain Ski Center, located in New York State's Adirondack Park, just celebrated its 80th Anniversary. The ski resort is developed on 9 sides of 4 unique mountains.
- Gore has 103 trails, boasts 2,537 vertical feet the 6th greatest in the East and is home to the most skiable acreage in New York
- Gore Mountain has been Awarded 3 separate International Silver Eagle Awards for Environmental Excellence.
- Gore Mountain has committed to long term efficiency measures including 230 new snow guns in 3 years, lighting upgrades, capacitor installation, and drive replacements.

2. Degree to which nominee can evidence quantifiable, cost-effective energy savings. Measurements given should be in the format listed below.

**2013 Snow Making Efficiency:**

**Snow Guns:**

- Existing: 30 portable Ratnik Snow Gun Giant II
- New:100 permanent Ratnik Sky Giant VI energy efficient
- Gross Annual kWh Savings: 791,933 kWh
- Annual Electric Cost Savings: $62,721
- Payback: 2.9 years
- CO2 Savings: 871,126lbs
- Total Cost: $351,052
- Total Incentive: $179,000
- Cost to Customer: $172,052

**Water System Modifications:**

- Modified and installed new valves to eliminate duplicate pumping requirements
- Gross Annual kWh Savings: 70,186 kWh
- Annual Electric Cost Savings: $5559
- Payback: 2.0 years
- CO2 Savings: 77,205 lbs
- Total Cost: $22,000
- Total Incentive: $11,000
- Cost to Customer: $11,000

**TOTAL ANNUAL COST TO CUSTOMER: $183,052**
**TOTAL ANNUAL COST SAVINGS: $68,280**
**TOTAL ANNUAL ENERGY SAVINGS: 862,119kWh**
**TOTAL CO2 SAVED: 948,151 lbs**
**Lifetime: 1,121,116 kWh / 1,233,048 lbs CO2**

3. Degree to which nominee can evidence that actions taken (i.e., program, practice, etc.) can be replicated, and/or can serve as a catalyst for further efficiency gains. (15 points)

- Under 3 year payback period reduces financial barriers to participation
- Replicable at any ski mountain with out of date snowmaking or water management equipment
- Incentives did cover a portion of the costs, however, many utilities offer similar incentives as National Grid across the country

Alliance to Save Energy Nomination for the 2014 Andromeda Award

Name of Nominee: Howard A. Learner, Executive Director, Environmental Law & Policy Center

Outstanding contributions to energy efficiency: Under the leadership of Howard Learner, the Environmental Law & Policy Center (ELPC) has spent the last 21 years advancing energy efficiency across the Midwest and through federal policies that hold particular relevance in the nation's heartland. Last year was game changing for energy efficiency across the Midwest, and ELPC has been involved each step of the way.

During this past year, ELPC has been on the front lines building coalitions and political support to defend Ohio's energy efficiency standard. An effort to gut the state's standards was tabled last fall, and we continue to work to ensure that Ohio keeps moving forward on energy efficiency. With Howard's guidance, ELPC spent much of the last year working closely with utilities in Iowa, Illinois, Michigan and Ohio to ensure that ratepayer-funded programs achieve the greatest impact. Victories include a dramatic expansion of LED programs in Iowa, smart device enabling rules in Illinois, and an increase in the amount of Ohio's energy efficiency savings that must be bid into PJM.

Nationally, ELPC has led efforts to fund the "Rural Energy for America Program," or REAP, in the 2013 Federal Farm Bill. Included for the first time in the 2002 Farm Bill, the program provides financial incentives for energy efficiency and renewable energy development at farms and rural small businesses. Between 2008 and 2013, more than 2,400 REAP grants were awarded to Midwestern farmers and small businesses and most of these were for energy efficiency projects. For the first time ever, the 2013 Farm Bill will give the REAP program baseline funding, creating program stability that will lead to even more successes.

After two decades working across the region, the commitment to energy efficiency championed by Howard and ELPC is changing the region's energy markets. A recent revision of a demand projection by MISO – a revision that was requested by ELPC – found that despite projected economic growth, demand in the region will experience a 2.5% reduction over the next three years. If you look at individual utilities you see big gains as well. In Minnesota, Xcel is predicting a 0.6% drop in demand in 2014; in Chicago, ComEd is predicting 0.2% drop in energy usage; and in Ameren territory, southern Illinois and Missouri, a drop by as much as 0.6% is expected this year.

As energy efficiency enters its next major stage – enabling the rapidly improving technologies to further the gains already made by technologies like CFLs – Howard and ELPC are leading the way. Working closely with ComEd, ELPC is using a landmark study looking at gains that can be made through technology and behavior change to guide future policy. Technologies like smart thermostats and a wide range of mobile applications will enable reinforcement of behavior change as never before. Smart thinking to incorporate tools like variable frequency drives in industrial energy efficiency plans will allow for energy gains once thought unimaginable.

From advancing and defending energy efficiency policy, to closely partnering with businesses, consumers, advocates and utilities to maximize ratepayer-funded energy efficiency, to embracing data and technology, Howard Learner and ELPC are making the Midwest a leader of energy efficiency.

*Submitted by Mel Nickerson, Deputy Director for Energy and Recycling, Illinois Department of Commerce and Economic Opportunity, and Hans Detweiler, Director of Development, Clean Line Energy Partners.*

Alliance to Save Energy – Annual Star of Energy Efficiency Awards nomination
Nominee: Isaac Elnecave, Midwest Energy Efficiency Alliance

Code Adoption and Training

Isaac has led and participated in numerous collaborative efforts in many Midwest states to assist in the effort to upgrade local and statewide building energy codes. This has resulted in an estimated potential savings of over **five trillion BTU annually** in the Midwest, compared to older energy codes. Isaac has provided technical expertise and policy recommendations to rulemaking bodies in the region during their code adoption cycles. In the time Isaac has been with MEEA, these efforts have increased the status of energy codes in the Midwest from below average to levels that compare with other leading regions in the country. Most recently, in 2012 and 2013, Isaac led efforts that resulted in Illinois and Iowa becoming two of the first states to adopt the 2012 IECC as a mandatory statewide energy code. He also played a key role in the process to adopt the 2012 IECC in Minnesota, which will be adopted in 2014.

After a new energy code is passed, Isaac has worked with state agencies to offer training to contractors and local building officials to familiarize them with the new code in order to attain high rates of compliance.

Annual Midwest Building Energy Codes Conference

Isaac has organized and hosted four annual successful conferences for stakeholders in the energy codes community in the Midwest region. These conferences have featured expert speakers from the local and national energy codes community to highlight technical and policy issues on the subject. Most recently, the 4th Annual Midwest Energy Codes conference was held in October 2013 in Louisville, Kentucky. Combined, more than 200 stakeholders have attended the events. Attendees have included representatives from local building departments, advocacy groups, academic organizations, and Midwest utilities.

Utility-Codes Programs Work

-**White Paper**

Isaac prepared a white paper in 2012 called "Utility Programs and Building Energy Codes" to describe the potential for utility claimed savings as a result of developing programs to increase energy code compliance. The paper describes some of the experiences in other states that have experimented with these types of programs and offers insight into how utilities might proceed on this issue in the future.

-**Illinois Utility Claimed Savings Collaborative**

Isaac has helped to lead a statewide collaborative working group comprised of the investor-owned utilities in Illinois to develop a comprehensive statewide code compliance program for the utilities' efficiency program portfolios. The resulting program will be the first of its kind in the country, and utilities in several other states have shown interest in replicating this effort.

Benchmarking and Building Energy Rating

Isaac has integrated building benchmarking and energy ratings into his building policy work at MEEA. This has included hiring Steve Kismohr as a full time manager to collaborate on local benchmarking efforts in the Midwest. Recently, the cities of Minneapolis and Chicago adopted ordinances requiring energy benchmarking for public and commercial buildings, and similar work is underway in several other municipalities. Work in this field is an important way to increase the efficiency of existing commercial buildings, a sector that includes some of the highest energy usage and a great potential for energy savings.

John Proctor has made numerous unique contributions to energy efficiency for all economic levels within the residential sector. He moved low income weatherization (in Colorado followed by other states) from assumed savings concentrating on storm windows to effective energy efficiency measures including: measured building air tightness, concentration on eliminating duct leakage and improving furnace efficiency. He was instrumental in developing the "house as a system" and "whole house" approach to energy efficiency. He developed the original combustion safety protocols, widely used across the industry. He started four non-profit organizations in Colorado: the Westside Energy Coop serving low income families, the Sun Power Consumer Association serving middle income families, the Professional Energy Auditors of Colorado and Energy Wholesalers of Colorado that provided bulk purchasing power to agencies and firms in the energy efficiency arena.

John developed the first method of grading leakage locations to concentrate on air leakage high and low in the structure. One of John's innovations is the Western Cooling Control™, a low cost AC control used in dry climates to increase the sensible energy delivery and reduce unnecessary dehumidification saving between 8% and 17% of an AC's electric usage. The average cooling savings for the over 42,000 WCCs already installed in California, Nevada, Colorado and Arizona is over 244 kWh per year per unit for a device that costs less than $35 and takes 15 minutes to install. Over a 10 year period, these devices will deliver 102.48 million "negawatthours" at a cost of less than 1.8 cents a displaced kWh.

John produced the first cost effective quality assurance (QA) system to replace the more common "post-retrofit inspection" quality control (QC) system. The CheckMe!® system addresses the performance of field technicians from their initial training though the final feedback from the customer – insuring that before the technician leaves the site the job is properly completed using measured performance criteria. Mr. Proctor invented the "Charging Jacket™" that, for the first time, allows HVAC technicians to properly charge an air conditioner in the winter.

Mr. Proctor developed the concept of the hot dry air conditioner, designed, built, lab tested, and field tested the results with a resulting peak reduction of 0.57 kW per residential unit (1.46kW per small commercial unit) and a life cycle savings of $407 for a residential unit ($2684 per small commercial unit). This work was followed by a few experts and resulted in an international contract with the Kingdom of Saudi Arabia (KSA). That contract resulted in the upgrade of the KSA air conditioner standards which, when fully implemented will save a cumulative 17.24 TWh terawatt hours of electricity, reduce CO2 production by 13,052 kton as well as SO2 and NOx reductions.

Mr. Proctor has attacked the most difficult of all sectors for energy efficiency – the residential market. The use of energy and the peak demand for electricity is huge within this sector, but it is very dispersed. This dispersion makes energy savings a huge challenge since, within utility programs, it competes for cost effectiveness against sectors wherein the energy use is concentrated and thus easier to reduce.

The impact of John's work continues to grow as others adopt the changes he introduced. For example, the residential energy code for California (Title 24) has adopted duct sealing standards and proper air conditioner and heat pump installation verification largely due to his research and contributions as a member of the Standard writing team.

Proctor Engineering Group is a totally "bootstrapped" company that has grown to a research, development and implementation firm that directly delivered over 58 million kWh first year savings and 30 thousand residential peak kW reduction for utility programs across the US in 2013.

***ALLIANCE TO SAVE ENERGY "Andromeda" Star of Energy Efficiency Award Application***

***Submitted by: KSBA's School Energy Managers Project (*www.ksba.org/semp.aspx)**

Kentucky School Boards Association ("KSBA) in partnership the Commonwealth of Kentucky, created and implemented the School Energy Managers Project ("SEMP") in March 2010, with the support of ARRA funds. SEMP coordinated the development of a **state-wide energy management** infrastructure that focused 173 public school districts on fostering intelligent energy choices in new and existing buildings through implementation of energy efficiency projects. SEMP provides partial funding and support for school districts to employ energy managers to assemble information, access technical resources and formulate and implement energy management plans. As Kentucky has many small school districts the SEMP business model focused on the formation and oversight of partnerships of neighboring districts to share in the cost and services of an energy manager. This model is one that could be implemented in other states, has been assessed by other states' school boards associations."

KSBA-SEMP assists district/partnerships in the employment, coaching, monitoring and evaluation of energy managers; coordinates professional development opportunities for energy managers; utilizes its outreach capacities to timely communicate success stories to board members, superintendents, governmental officials and the general public; fosters best practice implementation; and monitors and coordinates utility activities and relations. As a result both significant emission reductions and monetary savings are being captured to enhance both the environment and educational opportunities for the Commonwealth's 645,000 public school students. Current statistics include:

- Annual FY2013 avoided site savings
  - 100*,000,000 kWh electricity*
  - *2,500,000 ccf natural gas*
  - 70,000 Metric Tons CO2
- Business practices, % of Districts
  - Board Energy Policy: 100 %
  - Funded Energy Managers: 30 serving 75 districts
  - Energy Management Plan: 88 %
  - Utility Bill Analysis: 100 %
  - Board and Legislative Reporting: 100 %
  - Building energy assessments – over 400
- Increase of ENERGY *STAR Certified Schools from 12 in 2008 to 245 in November 2013*
- *$33,000,000* Cumulative Avoided Costs *since FY2009-10*

Kentucky public school districts are governed by five-member school boards who control and manage all school funds and property to promote public education consistent with the administrative regulations of the Kentucky Board of Education. Kentucky school districts are charged to "prepare Kentucky students for next-generation learning, work, and citizenship." The process and benefits of energy management provide a huge opportunity for redeploying dollars spent on utilities to dollars spent on students and education.

When the ARRA funds expired in April 2012, leaving many districts trying to justify retaining energy managers, KSBA-SEMP facilitated Kentucky Public Service Commission approval in April 2013 of a **first-of-a-kind demand-side management program** of Louisville Gas & Electric and Kentucky Utilities Companies to provide $1.45 million to support 24 energy managers in their service territory for FY2014 and FY2015. This created a precedent for other utility companies to follow in their demand-side management initiatives, and SEMP is currently in negotiations with other utility companies to facilitate similar programs for their service territories. SEMP also successfully earned funding support through a competitive proposal process in 2013 by the Kentucky Energy and Environment Cabinet to fund additional energy managers and provide training, support and oversight for energy management in all Kentucky school districts. These efforts continue the focus on energy management and position schools to capture significant additional savings.

Changing the energy and environmental culture of school districts is not an overnight task. . SEMP has been successful in working with school boards, administrators, teachers, students and building staff by providing energy information and technology to improve the learning environment while lowering energy usage and costs.

# National Housing Trust-led partnership paves way for utilities to invest nearly $40 million in energy efficiency improvements in multifamily rental housing

The National Housing Trust (NHT) has demonstrated that obstacles preventing multifamily affordable rental housing from accessing utility energy efficiency resources can be overcome through collaboration between the housing and energy sectors. In 2013, NHT completed a 2-year project in partnership with the American Council for an Energy Efficient Economy (ACEEE), the National Consumer Law Center (NCLC) and D&R International aimed at advancing effective utility-sponsored multifamily energy efficiency programs. Together, these organizations broke down long-standing silos, engaging with utility companies, affordable housing finance agencies and other housing stakeholders, and energy advocates in targeted states **resulting in utilities committing $40 million to reduce energy consumption in multifamily rental housing**.

By effectively targeting utility resources to multifamily affordable rental housing we have helped (and continue to help) utilities and state governments achieve their energy savings goals, increase housing affordability for low-income households, spur economic growth, and significantly reduce carbon emissions.

**Tangible results from this project include the following, which are resulting in combined average annual savings of 54,000 MMBtu and almost 34,500 MWh**:

- The Pennsylvania Public Utility Commission changed its policies to make it more attractive for utilities to address multifamily housing and that led to the creation of several targeted utility programs. These programs will save over 33,000 MWh over 2013-2016, for average savings of 11,000 MWh annually.
- Utilities in Minnesota created the first ever low-income multifamily programs in the state. On the electric side, savings will be almost 2,000 MWh over 2013-2015, for average savings of 653 MWh annually. For gas, the savings will be 27,000 MMBtu over three years.
- The Maryland Public Service Commission made it significantly easier to mesh utility and affordable housing funding streams by tapping the Maryland Department of Housing and Community Development to administer more than $20 million in utility funding. New programs will produce over 47,500 MWh in savings over 2012-2014, for average savings of over 18,500 MWh annually.
- And collaboration among National Grid and the Rhode Island Housing Finance Agency led to a more streamlined and efficient process for delivering services to multifamily housing. In 2014, these efforts will produce electric savings of over 4,000 MWh and gas savings of 27,000 MMBtu.

In order to ensure that the results of this engagement are replicated, NHT has released *Partnering for Success: An Action Guide for Advancing Utility Energy Efficiency Funding for Multifamily Housing* (The report can be accessed here: http://www.nhtinc.org/partnering_with_utilities.php). The report provides guidance on how key stakeholders from the housing and utility sectors can effectively work together to significantly improve the energy efficiency of multifamily affordable rental housing.

*Partnering for Success* serves as a practical tool for those seeking better partnerships among utility companies and affordable housing providers and investors to overcome obstacles to improving the energy efficiency of multifamily affordable housing. Obstacles include the split incentive problem; lack of targeted, streamlined multifamily programs; limited access to upfront capital; and lack of coordination and collaboration among key players from both sectors.

*Partnering for Success* describes several common lessons about successful engagement to advance multifamily utility programs. These include building relationships with key utility and regulatory decision makers and bringing stakeholders together and facilitating an open dialogue; defining the value proposition for utilities by demonstrating the significant energy savings potential in this housing stock; and taking advantage of strategic entry points such as utility plan filing deadlines and rulemaking proceedings in which the design of energy efficiency programs could be raised. NHT is now working with the Natural Resources Defense Council to expand state-level engagement in order to build networks, spread best practices, and further replicate results.

Submission by: **Systems Building Research Alliance (SBRA)**

**Background**: SBRA was established in 1995 by a consortium of utilities, home manufacturing companies and affiliated organizations for the express purpose of improving energy performance of manufactured homes. Formerly referred to as mobile homes, manufactured homes account for about 12%-15% of all new single family homes. The goal was ambitious: using a collaborative process engaging otherwise competing companies to together develop and bring to market technologies that radically improve the energy performance of what was, at the time, the nation's least efficient housing type. The barriers to improving performance are daunting; most notably, the industry provides the nation's most affordable housing option so the prospect of increasing first cost to achieve increased efficiency faced stiff resistance. SBRA's strategy involved leveraging inherent industry advantages, including the scale advantages afforded by factory building.

**Outstanding and unique contribution to energy efficiency**: SBRA delivered to factory home builders solutions that have transformed an industry from energy laggard to efficiency leader, permanently changing factory building practices while altering the industry's perception of itself as a provider of high quality, high performance homes. Highlights of SBRA projects include: (1) in cooperation with U.S. EPA, established a path for factory builders to qualify homes for the ENERGY STAR label. EPA charged SBRA with serving as the national ENERGY STAR Quality Assurance Provider for the manufactured homes program. (2) In partnership with U.S. DOE, U.S. HUD, NYSERDA, utilities and other research sponsors, SBRA developed technologies and innovations that permanently changed factory building practices, including high performance envelope systems that leverage industrialized building methods, fundamentally new HVAC solutions, new methods for assuring quality installation practices and applying lean building principles that drive down the cost of innovative energy solutions.

**Quantifiable, cost-effective energy savings**: With research that has impacted a range of building systems and end uses over a span of years and across the nation, estimating with precision the cumulative benefits is impossible. However, the size and dimension of the energy benefits associated with SBRA's efforts are suggested by the following: SBRA' efforts have resulted in the construction, verification and certification of more than 25,000 ENERGY STAR manufactured homes, homes that otherwise would have been built to the far less stringent HUD standards. The resultant savings of this program alone are on the order of 150 GWh/year. In partnership with utilities and state agencies, SBRA created a series of incentive programs to jump start interest in ENERGY STAR. For example, a program with TVA is moving about 2,000 new homeowners each year up to ENERGY STAR, generating about $700/home/year in utility cost savings. Further, SBRA-sponsored research has revolutionized manufactured home building practice, reinventing how manufactured homes are built, installed and commissioned. The cumulative impact of these innovations on energy use, while difficult to gauge because they are diffused across the industry and impact all of the major energy end uses, are immense.

**Actions that are a catalyst for further gains**: One of the most striking SBRA successes is the use of a cooperative model, based on the concept of Collective Impact, which is engaging and empowering the entire industry and creating the framework for developing innovations and the mechanism for moving the market to energy efficient building practices. Engaging industry as research partners and owners of the resulting innovations is an essential, and perhaps the most effective, way to conduct research and sustain advances over the long run. SBRA serves as a model for how an industry can harness its collective expertise and creatively accomplish shared and ambitious goals.

**Innovation/leadership**: SBRA's founding core goal was to change how the manufactured housing industry, nationwide, approached the design and construction of factory built housing. SBRA embraced industry leadership, creating a Board wholly representative of the industry and creating symbiotic partnerships with public agencies and private organizations that shared the goal of improving energy performance. Today SBRA stands as the research arm of the industry, leading research for its benefit and the families they serve. The challenges of moving a conservative industry, deeply vested in minimizing first cost, to embrace cutting-edge efficiency innovations based on life cycle cost thinking, have been formidable. Despite the obstacles, SBRA fostered innovations that today place the industry on the cusp of producing the nation's most efficient homes, realizing the immense potential for efficiency afforded by factory building and benefitting homebuyers most in need of the financial and comfort benefits of improved efficiency.