

## Small Buildings = Big Opportunity for Energy Savings

There is nothing small about the impact that small commercial buildings have on energy use in the United States. In fact, the 4.6 million small buildings across the nation consume 44% of the overall energy use in buildings, presenting an enormous opportunity to cut costs, energy use, and greenhouse gas emissions.

Despite this potential, small building owners and operators face unique challenges that have historically impeded the adoption of widespread energy efficiency solutions. A new report developed by the National Renewable Energy Laboratory (NREL) examines these barriers and suggests a path forward to support cost-effective energy savings for the small buildings and small portfolios sector, which typically has limited resources to pursue energy efficiency solutions.

### Small Buildings, Big Energy Use

Small buildings account for a large portion of energy consumed by U.S. commercial buildings. Most commercial buildings (95%) are smaller than 50,000 ft<sup>2</sup>, occupy 51% of total floor space of all buildings (including malls), and consume nearly 3 quadrillion Btu annually (see figure below).

However, the average small building size is less than 8,000 ft<sup>2</sup>. “Small portfolios” are qualitatively defined as collections of a small number of small buildings. The report specifically examines these portfolio owners and managers that generally lack staff and

other resources to track energy use and pursue energy efficiency solutions.

Through a comprehensive building characterization analysis, researchers from the Preservation Green Lab (PGL) used data from the Commercial Buildings Energy Consumption Survey (2003) and 800 small buildings in 10 U.S. markets to identify seven primary commercial building types with a high potential for energy savings—food service, retail, lodging, main street, offices, strip malls, and schools (PGL 2013). These specific building types represent more than 2 million buildings (more than 40% of the sector), 19 billion ft<sup>2</sup>, 3.6 million businesses, and they consume approximately 2.3 quadrillion Btu of energy annually.

Based on potential energy savings of 45%, derived from data presented in the Advanced Energy Retrofit Guides (DOE 2012), the seven primary small building types can potentially achieve 1.07 quads of annual site energy savings, or \$30 billion in energy cost savings per year. The maximum potential savings may not be realistic in all cases, but this analysis illustrates the magnitude of the potential impact of a well-designed small buildings and small portfolios initiative.

### Complex Challenges to Saving Energy

Given the fragmented nature of the small building community, meeting the energy efficiency challenges for this sector is no easy task. Furthermore, small buildings often house small businesses. Research indicates that the 4.6 million small commercial buildings are home to approximately 5.9 million small businesses (fewer than 500 employees) nationwide (PGL 2013). Therefore, it is important to consider the unique challenges facing small business owners and operators when developing energy



Cost savings from energy efficiency upgrades can mean increased profits for small building owners and tenants. Photo from iStock 8183427

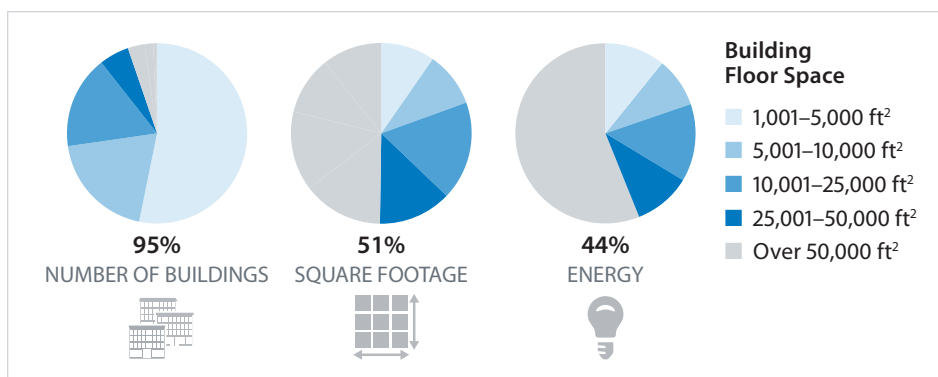
efficiency solutions for the small buildings and small portfolios sector.

According to a 2011 National Small Business Association energy survey, many small business owners and operators are concerned about energy costs and have taken steps to reduce energy use in their businesses in order to save money. However, busy owners face several barriers, including:

- Limited capital for energy efficiency measures
- Higher transaction costs related to energy cost savings
- Lack of time to research and implement energy efficiency solutions
- Split incentive obstacles between owners and tenants
- Lack of user-friendly, sector-specific resources and technologies.

### Benefits of Energy Efficiency for the Small Buildings and Small Portfolios Sector

- Many buildings in this sector are occupied by small businesses, and reducing energy use of buildings is an effective way to cut operating costs and boost profits. Dollars saved through energy efficiency directly impact the bottom line.
- The magnitude of the small building sector presents an enormous opportunity for energy savings nationwide. Estimated potential annual energy savings equal 1.07 quadrillion Btu or \$30 billion in cost savings per year.
- Small buildings are often aggregated in business districts, supporting economically scalable retrofit applications.
- Hands-on owners are involved with operational decision making in more than 60% of small commercial buildings.



Breakdown of the small buildings sector by number of buildings, floor space, and energy usage. Illustration by Rois Langner, NREL (based on data from CBECS 2003)

Understanding the behavior and challenges in the small buildings and small portfolios sector is critical in bridging the gap between the interest in reducing energy costs and actions taken to improve building energy efficiency. This report suggests opportunities for DOE to remove barriers and catalyze the small building community to implement energy efficiency measures.

### Pathway to Energy Savings

DOE is uniquely positioned to provide national leadership, objective information, and innovative tools, technologies, and services to remove

obstacles and support cost-effective energy savings for the small buildings and small portfolios sector. Using the findings from NREL’s report, DOE could enhance and complement energy efficiency approaches that are in place at local and state levels.

The findings in NREL’s report recommend potential focus areas for DOE that balance innovation, technology, policy, market, strategic deployment and economic considerations to provide the biggest energy-savings impact for the tax dollar (see table below). In addition, a

robust communication and outreach strategy was developed to engage stakeholders and disseminate information about the ongoing activities and results of the effort. This effort will help to support small building and small business owners in navigating the tricky but ultimately rewarding route to achieving energy cost savings.

For more information, visit the Small Buildings and Small Portfolios website at: [http://www1.eere.energy.gov/buildings/commercial/small\\_buildings.html](http://www1.eere.energy.gov/buildings/commercial/small_buildings.html).

| Opportunity  | Research Strategy  | Potential Topics for Exploration   |
|--|--|--|
| <b>Tools and Technical Guidance</b>  |  |  |
| Address the lack of benchmarking data for small buildings  | Encourage submission to DOE's open, interactive energy data sets and platforms to develop benchmarking data that helps owners, utilities, and financiers identify the best energy-saving opportunities for small buildings | <ul style="list-style-type: none"> <li>• Coordination of programs for large-scale information gathering on energy use patterns</li> <li>• Tools and training for utilities and financiers to analyze utility and building data in order to identify high-priority small building and business markets</li> <li>• Standard, low-risk, high impact energy efficiency measure (EEM) packages for new and existing small buildings</li> <li>• Estimation of capital needed to deliver EEMs at different points in the building life cycle</li> <li>• Design and retrofit guides to improve design, procurement, and implementation of EEMs in small buildings</li> </ul> |
| Support solid investment decisions at building and district level  | Develop user-friendly, simple energy efficiency decision-making tools for small business owners and third-party service providers that overcome high transaction costs and lack of owner expertise                         |  |
| Assist third party service providers in making appropriate energy efficiency decisions   | Characterize, support, and better align the third-party service provider industry with design resources and incentive programs   |  |
| <b>Equipment and Controls</b>  |  |  |
| Improve efficiency and controls of equipment for small buildings   | Engage and incentivize manufacturers and contractors to produce and install high-efficiency equipment, controls, and other technologies that are appropriate for small buildings   | <ul style="list-style-type: none"> <li>• Focus groups and energy forums with manufacturers</li> <li>• Advanced equipment challenges</li> <li>• Advanced controls for small business sector</li> <li>• Simple tools for energy use analysis and control</li> </ul>  |
| <b>Pilot Programs</b>  |  |  |
| Boost confidence in the success of energy efficiency investments   | Prove the cost effectiveness of energy efficiency investments through demonstration projects and case studies that include detailed cost data and performance verification   | <ul style="list-style-type: none"> <li>• Pilot programs focused on specific building types and climate regions to collect real data on actual building performance</li> <li>• Pilot program on large-scale information gathering</li> </ul>  |
| <b>Organizational Guidance</b>   |  |  |
| Remove organizational and administrative barriers  | Identify or develop SBSP-specific guidance and materials that address barriers such as cumbersome tax credit documentation and split incentive obstacles   | Guidance for: <ul style="list-style-type: none"> <li>• Incorporating energy efficiency value into leasing and appraisals</li> <li>• Distributing responsibility to tenants and owners</li> <li>• Using tools to automate tax credit documentation</li> </ul>   |
| The report outlines unique roles and key opportunities to boost building efficiency in the small buildings and small portfolios sector. Further details can be found in the full report at <a href="http://www.nrel.gov/docs/fy13osti/56747">http://www.nrel.gov/docs/fy13osti/56747</a> . |  |  |

### References:

CBECs. (2003). *Commercial Buildings Energy Consumption Survey*. [http://www.eia.gov/emeu/cbeecs/cbeecs2003/detailed\\_tables\\_2003/detailed\\_tables\\_2003.html](http://www.eia.gov/emeu/cbeecs/cbeecs2003/detailed_tables_2003/detailed_tables_2003.html).

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