

## SYSTEMS EFFICIENCY INITIATIVE: A New Approach to Energy Efficiency in Buildings

The Systems Efficiency Initiative (SEI) is a multiyear collaboration among more than fifty entities—including manufacturers, designers and builders, electric and natural gas utilities, national and state-level government agencies, and efficiency advocates—to advance energy efficiency in building systems. The Alliance to Save Energy launched the SEI in February 2015 to investigate the significant untapped energy savings potential of a systems-level efficiency approach to buildings, which considers the interactions of components within and among various building systems. Because adopting a systems perspective will become increasingly necessary to achieve future meaningful and cost-effective energy savings within the built environment, the SEI focuses on developing strategies for moving the market in this direction.

### THE OPPORTUNITY

The buildings sector accounts for roughly 40 percent of primary energy use in most countries, including the U.S. Significant energy efficiency gains in buildings already have been made through policies and programs that focus on individual building components (e.g., equipment energy efficiency standards) or whole buildings (e.g., building energy codes). However, building energy consumption continues to rise globally, due in large part to a combination of growing floor space and increasing electricity demand from new devices and equipment. The SEI provides a critical forum to look beyond traditional policy instruments and consider a new path to energy efficiency. The SEI members work together to understand the energy savings potential of a systems approach and to recommend strategies for achieving this potential.

What is a **building system**? A combination of equipment, operations, controls, accessories, and means of that use energy to perform a specific function.

**Building system efficiency** is a ratio of the services or functions provided by a building system to the amount of energy the system consumes directly (taking into account the thermal load imposed on other building systems).

A **systems-efficient building** is thus a building in which multiple building systems (e.g., lighting, HVAC) are designed, installed, and operated to optimize performance collectively to provide a high level of service or functionality for a given level of energy use or input.

### SEI ACCOMPLISHMENTS

In its first year, the SEI developed a detailed report, *Greater than the Sum of its Parts: The Case For a Systems Approach to Energy Efficiency* ([www.ase.org/sei](http://www.ase.org/sei)). The report, **launched in May 2016**, compiles lessons learned about systems efficiency by the building industry in the U.S. and other countries, characterizes the potential benefits of a building systems approach, and prioritizes areas for further technical and policy research. With a focus on new and renovated commercial buildings, the report explores opportunities for improving efficiency in building mechanical systems, lighting systems, and miscellaneous electric loads (MELs); and through the use of direct current (DC) power and building-to-grid (B2G) integration. For each of these topics, the Report outlines the benefits, challenges, opportunities, and recommendations for next steps to achieve greater efficiency through a building systems approach.

## ONGOING SEI EFFORTS

Building on the findings in the report, the SEI continues to gather feedback from stakeholders in the buildings industry as well as from local, state, and national policymakers to develop strategies to achieve savings through a systems approach.

The SEI is focused on developing a *Systems Efficiency Roadmap*, consisting of recommendations for specific actions by a range of stakeholders – e.g., national and state legislators, federal agencies, utilities, industry associations, and building designers. Recommendations will focus on areas of highest potential gains for systems-level energy savings, such as:

- development of new systems metrics;
- proposed changes to building codes, equipment standards, or green building rating systems;
- federal and state tax incentives to support systems efficiency; and
- opportunities to incorporate systems-oriented content into professional and technical training and certification curricula.

Overarching strategies discussed in the report, *Greater Than the Sum of Its Parts*, for promoting a systems approach include:

- **Breaking down silos.** A systems-oriented approach will require creativity and a new level of collaboration across a range of stakeholders—including architects, engineers, designers, developers, and building operators—as well as between the building industry and policymakers.
- **Integrating systems.** Integration both within and among systems operating in a building is vital to maximizing efficiency gains and opportunities.
- **Optimizing operations through technology.** Controls and smart technologies are important for improving the efficiency of many types of systems.
- **Incorporating systems strategies through all phases of the building life cycle.** Strategies to incorporate a systems approach should be applied during building design and construction, as well as during the operations and maintenance phases.
- **Thinking outside the building.** Further opportunities for systems approaches exist beyond a building itself, across multiple buildings, and between a building and the electric grid.

## ABOUT THE SYSTEMS EFFICIENCY INITIATIVE

The SEI focuses on achieving the next level of efficiency in buildings. For additional information on the Initiative or to get involved, contact Laura Van Wie McGrory at [LVanWie@ase.org](mailto:LVanWie@ase.org).