

SUSTAINABLE DESIGN AS INTEGRATED DESIGN

Emily Mottram's version of sustainability is designing efficient spaces with character that breathe life into functional design



Filled with a passion for building science, architect Emily Mottram spent several years doing as she says “very little architecture and a whole lot of energy consulting.” During that time, she performed energy audits, HERS ratings, and large-scale multi-family energy performance projects calculating how improvements pay for themselves and showing homeowners how to be happy—not to mention, comfortable—in their

homes, no matter the season. “It wasn’t just good enough to build efficient homes,” says Mottram. “I wanted to understand the science behind building and I wanted to teach it to other students, professionals, and homeowners.” Mottram believes, thanks to her experience in building science, that truly sustainable design starts with a whole-home approach. *MH+D* asked Mottram to tell us more.



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Q. What does building science mean?

A. Building science is about a detailed analysis of building materials, envelope, HVAC, natural, and electrical lighting, indoor air quality, passive environmental strategies, and renewable energies in buildings. Architects have to concern themselves with the details of the design of buildings in response to naturally occurring elements such as the sun, wind, rain, temperature, and humidity, while at the same time analyzing science principles such as conduction, convection, and radiation. It is also extremely important to consider at the same time the effects of vapor pressure and chemical reactions (because our homes are often heated with fossil fuels—think combustion). In addition to the natural elements and the science principles, building science also takes into account the human comfort within the space and human responses to chemical sensitivities, light radiance (glare, overheating, warmth). And last, but certainly not least in a cold climate like Maine, energy consumption. What is our ability to control the consumption of the building, the environmental impact, the maintenance or life cycle of the building, its longevity and sustainability, and then the health of both the occupants and the building. Tighter buildings can trap contaminants both within the building envelope and within the indoor air affecting the durability of the building and the health of its occupants. Building science is about the strategies that are implemented around a specific arrangement of building form (orientation), building function (daylight zoning), building materials and assemblies (adhesion, friction, ductility, elasticity), and the building components (lighting, heating, cooling, energy production, water, and waste). It's observed in the architectural detailing of the building and the long-term performance of the building shell. Both of which are directly reflective of the scientific and environmental analysis of the site and the building enclosure.

Q. What do you mean when you say sustainable design is integrated design?

A. Environmentally friendly with an emphasis on cold climate building. It's about creating places we love to live in that also support our psyche, our surroundings, and our budgets. Green building often complies with a minimum standard supplied by different rating systems like LEED, Passive House, or Energy Star. I feel that a truly high performance building is so much more than a rating system. It's more than a series of components—for me it's about the soul of the project. It has to be about more than the reduction in energy consumption, although I feel that is extremely important. In an ideal world we would produce all of the energy that we need on site and process whatever waste we generate before it left the site. But until the world demands

that type of architecture, sustainable design will move slowly toward it by being efficient and responsible with our water, our waste, our site, our resources, and our consumption. Living in Maine, with some of the oldest housing stock in the country, it's not always the best solution to start new and become resource detrimental. Improving the efficiency of existing homes while keeping the character built by master craftspeople can be just as sustainable as building a whole new home from scratch. It's not enough to make a space energy efficient; it has to have character.

Q. What do you think some of the common misconceptions are about sustainable design and how can the architecture community work through them?

A. When we talk about sustainable design people often think about “green” products or energy savings, but sustainable design is about good design and functionality. I don't believe that we need more space; I believe we need great space that functions well. Designing and renovating homes for me is about having light in the right rooms, grouping spaces together, or facing the home in the right direction. It's about the building spilling out into the landscape as if it always belonged and protecting itself from the elements to use as little energy as possible. It takes into account how every change affects the whole home. For me, sustainable design is about creating something that we want to keep around for 100 years or more. It's true that sustainable design can be more complicated, with more systems, more intricate design parameters, and new technology. With the rating systems and the change toward greener products the market is now asking for or demanding these improvements. With the increase in superinsulated buildings the architecture community also learned a few lessons about indoor air quality. Adequate ventilation is essential for indoor air quality and the health of the occupants, but equally as important is the ability to control where that air comes from, how frequently it is exchanged, and at what location within the home.

Q. How does this translate into your work?

A. I prefer to design natural spaces that blur the lines between inside and outside. I want the character of the spaces to embody the owner creating a home where they not only live, but they love to live. I enjoy creating functional spaces that work specifically for the current homeowner and how they live in the space. It's about designing carefully thought-out homes that feel spacious while minimizing the impact on both resources and budgets. For me, it's not about more space, it's about well thought-out, carefully planned space. **MH+D**