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Deep Energy Retrofits

Bringing Your House into the 21st Century

Let's just say you really like your house – location, views, finishes, feel, size - but it has high energy bills, some recurring maintenance issues, perhaps some issues with mold, or it's not comfortable. If this describes your situation, your house is a good candidate for a deep energy retrofit (DER), especially if there are major repairs needed, such as a new roof, a window replacement, or a heating system replacement.

A DER project takes a holistic view of the house and your needs, and integrates solutions to comfort, health, durability, and energy efficiency. An additional benefit is increased resiliency to ride out chaotic events that may cut off power or other critical services.

There are many definitions of the term DER. Ours at SMC is simple – bring the house up to current standards for new superinsulated construction. The components of superinsulation are airtight construction with heat recovery ventilation, high levels of insulation (roughly, double that required by code), and triple glazed high performance windows. In most DERs, we add an air barrier and insulation to the exterior of the house; often we can leave the interior finishes untouched except for replacement of windows and doors. An exception is that we typically insulate the interior of basements and crawl spaces.

It is not uncommon for a DER to reduce the heating load of the house by a factor of three. This makes it possible to convert the heating and hot water from fossil fuels to electrically powered heat pumps. Heat pump operating costs are less than half of fuel oil or propane, they provide cooling as well as heating, and they set the house up to be powered by renewable solar electricity (and the possibility of attaining net zero energy use). Several of our DER clients have accomplished this.

When the DER is complete, the following additional benefits will be realized:

- The basement space is encapsulated by insulation, cutting off ground moisture and raising the surface temperatures above the dew point of the air, thereby creating a mold-free environment, and reducing or eliminating the need for dehumidification
- The framing components are inside the exterior insulation, keeping them warmer, which means lower wood moisture content and less vulnerability to decay
- High levels of roof insulation and airtight construction eliminate ice dams
- Air leakage, the most common cause of frozen pipes, is greatly reduced
- The superinsulated, airtight building enclosure combined with triple glazed windows provides high and more even interior surface temperatures, and therefore a draft-free interior and a more comfortable environment to be in
- Triple glazed low-e windows eliminate interior condensation in winter
- In the event of a winter power failure, the house loses heat slowly and maintains livable conditions far longer than conventional houses, and is very unlikely to freeze
- Moisture laden air is kept out of walls and roofs, preventing decay and mold
- Noise transfer from outdoors is substantially reduced
- Pollutants from outdoors stay there, and the ventilation system ensures fresh air

That's a serious list of benefits, all resulting from well-informed practice of good building science. They are non-energy-related, and in many cases may be more valuable than the energy savings. In essence, the low (or non-existent)

energy bills are an extra way our clients benefit from an SMC DER that leaves them with a healthy, durable, resilient, and comfortable house.