

Retrofitting and monitoring your home for energy savings and good indoor air quality

HEAT: Reduce heat loss in cold weather and heat gain in warm weather to save energy.

- Sign up for free energy audit with MassSave
- Install continuous layer of insulation that will provide good R-value per inch

R4 for windows

R15 for foundation walls

R30 for floors over unconditioned space

R35 for above-grade walls

R50 for roofs over cathedral ceilings

R65 for vented attics

- Avoid thermal bridging caused by thermally conductive materials that penetrate or interrupt continuity of insulation.

AIR: Eliminate air leakage to prevent drafts, save energy (up to 40% of total heat load), and prevent moisture-laden air from entering exterior construction where it can condense and generate mold, rot and corrosion.

- Air seal perimeter of windows and other wall openings, joints between materials and around penetrations, such as electrical outlets, through exterior wall.
- Actively ventilate building interior - with dehumidification and energy recovery - as needed to control air quality.
- **Monitor AIR QUALITY:**
 - Relative Humidity: Ideal range for RH is above 30% for health reasons and below 60% to prevent mold
 - Carbon Dioxide: CO₂ should be below 800ppm (fresh air is 415)
 - Particulate Matter: Monitor concentration of small particles, especially PM 2.5
 - Many monitors also measure hydrocarbons and other organic compounds.

MOISTURE: Prevent liquid water from entering exterior construction and prevent trapping of water vapor, to avoid accumulation of moisture that can generate mold, rot and corrosion.

A FEW RESOURCES

Books

American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc. (ASHRAE); *Indoor Air Quality Guide: Best Practices for Design, Construction, and Commissioning*, 2009

Joseph Lstiburek; *Builders' Guide to Cold Climate*, 2022

Michael Maines, Daniel Kolbert, Emily Mottram, Christopher Briley; *Pretty Good House: A Guide to Creating Better Homes*, 2022

Websites

Pretty Good House: www.prettygoodhouse.org

United States Environmental Protection Agency: www.epa.gov/indoor-air-quality-iaq

IAQ Monitoring Equipment

- Temperature/ humidity recording devices are \$13 and \$14 on Amazon.
- Recording devices that monitor particles, CO2 and other gases can be under \$60.
- Desirable features: good display, recording capability, portability