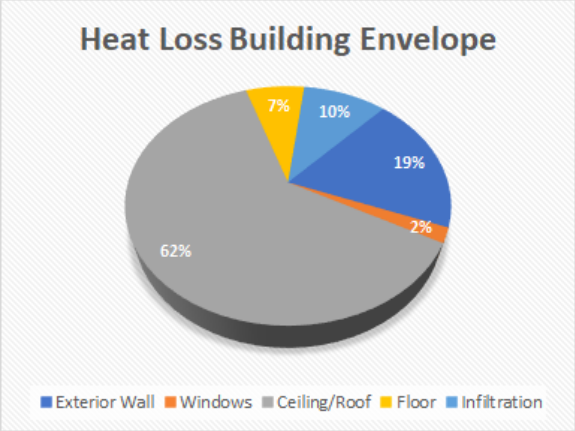
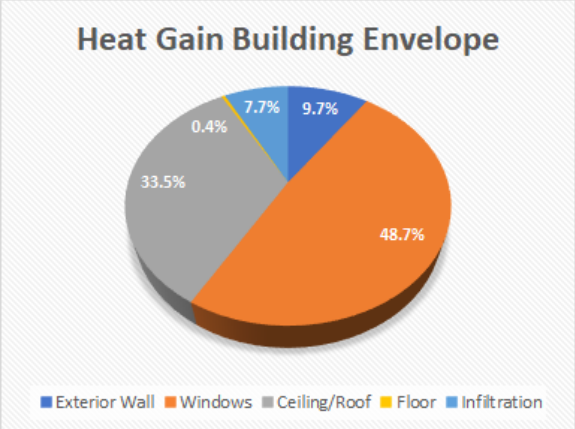
ADVANCED
Building Products Inc.

# Energy Use & Above Sheathing Ventilation (ASV)

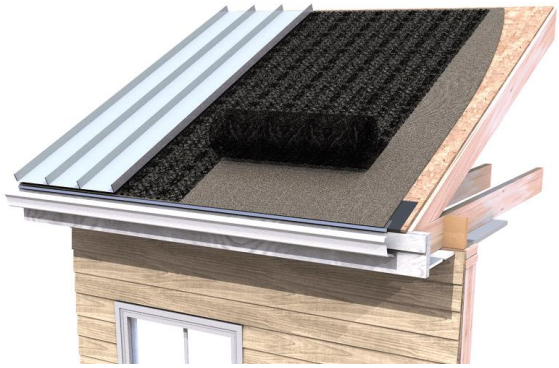
Of the total energy use in the US, 21% is used in the Residential sector.[1] In the Residential sector 55% of the energy is used for heating & cooling.[2] 62% of the building heat loss is through the ceiling & roof while 33.5% of the building heat gain is through the ceiling & roof.[3] Reducing energy wasted through innovative roof design should be considered carefully by architects, engineers, building envelope consultants, & builders.



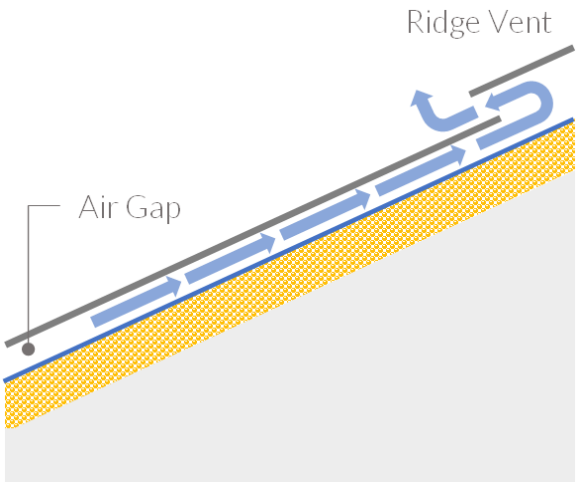

Some basic principles of physics are helpful to explain heat energy transfer in a roof/ceiling assembly. Conduction is when heat flows from a hotter material to a cooler material when the two materials touch. Conduction depends on materials having some amount thermal conductivity & also that materials be in contact with each other. Convection requires a fluid material such as water or air. When air comes in contact with a hot object it becomes heated & begins to rise. Radiation is when heat travels away from a hot object or surface by way of infrared rays or electro-magnetic waves & heats up anything solid in its path. Radiant heat is only felt when it is absorbed by a material & changed to heat energy.

Metal roofs are most typically attached directly to the sheathing deck. This means that radiant heat from the sun is absorbed by the metal roof & then conducted through the roof materials that are touching each other. It then radiates heat through the attic space to the ceiling & other materials, heating up the rooms below. The heated roofing materials can also heat by convection air that comes in contact with it. Some of the heated air then vents out the ridge vents.



Creating an air space or gap between the roof sheathing material and a metal roof (or a wood shingle roof), separates the roofing materials which reduces conduction of heat. This also allows convective cooling of the roof by means of air movement through the air gap. This air gap is commonly referred to as above sheathing ventilation (ASV). During cold weather the

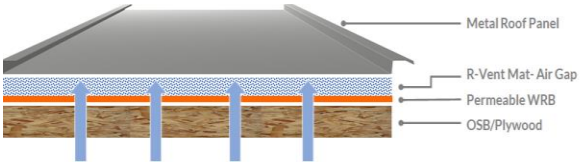
separation of roofing materials with an above sheathing ventilation space, stops conduction and thereby reduces snow melt on the roof caused by interior heat loss warming the roof. Melting snow and refreezing is the main cause of ice dams in cold climates. Separation and venting both give energy benefits in the summer and winter seasons as well as reducing the severe effects of ice dams.
Wood battens have always been able to vent and achieve these benefits, but the R-Vent® - Roof Ventilation Mat does this using a thinner profile and more cost effectively. The clear pathway of R-Vent® provides a way for the buoyant heated air to move up the slope of the roof and out through the ridge vents.




The Oak Ridge National Laboratory (ORNL) has done several important research projects on ASV. Researchers said “we serendipitously discovered the second major advance in roofs for our century: We found that elevating the roof cover from the roof deck to induce above-sheathing ventilation is as important as increasing solar reflectance and may be the stronger player in reducing heat gain into the attic. The two combined can reduce heat gain through the roof by 50% compared to nailed asphalt shingles” [4]

The California Title 24 Energy Code now requires a cool roof for new and replacement roofing. A 20% reflective roof covering meets this requirement, but Title 24 also allows a ¾ inch air gap in place of the reflective roof.[5] When ASV and a reflective roof are combined excellent energy benefits are realized.

Using R-Vent® to create ASV also vents unwanted moisture. The continuous air movement has an added benefit of drying moisture from the roof sheathing. In another study by ORNL it was found that “ASV accelerated the removal of unwanted moisture and reduced the moisture content well below that of the OSB in a non-vented cavity ” [6] Above sheathing ventilation improves roof durability and creates a cooler roof.




R-Vent® creates an air gap but also provides support for the metal roof. Standing seam metal roofs can be installed with clips/cleats of an extended height or with a shim under a standard height clip/cleat to create an air space. With this method the metal roof panel is no longer supported by the sheathing. In this scenario you will risk bent roof panels from any foot traffic, or the metal roof manufacturer will require a more expensive, heavier gauge metal. With R-Vent®, clips/cleats of an extended height or a shim under a standard height clip/cleat are installed by completely compressing the R-Vent®. This provides continuous support under the roof panel while creating an air gap. The support of R-Vent® filament also helps reduce the “oil canning” effect frequently encountered with metal roof panels.


1. US Department of Energy, National Residential Energy Facts
2. US Department of Energy, National Residential Energy Facts
3. Yuanming Kwan, Lisa Guan, Design a Zero Energy House in Brisbane, Australia, 3rd Annual Conference on Building Energy and Environment, 2015
4. W. Miller, Cool Roofs Will Revolutionize the Building Industry, Oak Ridge National Laboratory Fact Sheet, Oak Ridge National Laboratory, Managed by UT-Battelle for the US Department of Energy
5. Title 24 California Building Standards, Section 152, and NAHB Green Building Standard, Chapter 7 both state that roofs installed with appropriate air gap are considered equivalent to the prescriptive definition of a cool roof (i.e cool pigment roofs) regardless of roof color and solar reflectance
6. W. Miller, T. Stovall, D. Yarbrough, J. Kosny, A. Karagiozis, A. Desjarlais, Building Envelope Program, Oak Ridge National Laboratory


95 Cyro Drive, Sanford, ME, 04073, Phone: 800.252.2306, Email us at info@abp-1.com