

GIVE YOUR HOMES A COMPETITIVE ADVANTAGE WITH BOISE CASCADE CONDITIONED AIRSPACE HVAC FRAMING.



Boise Cascade
Engineered Wood Products

Great products are only the beginning.™



Boise Cascade Conditioned Air HVAC framing system installation summer 2010 in Central Point, Oregon by Vision Homes of Medford, Oregon. HVAC work by Spring Air Heating & Cooling, Inc. of Jacksonville, Oregon

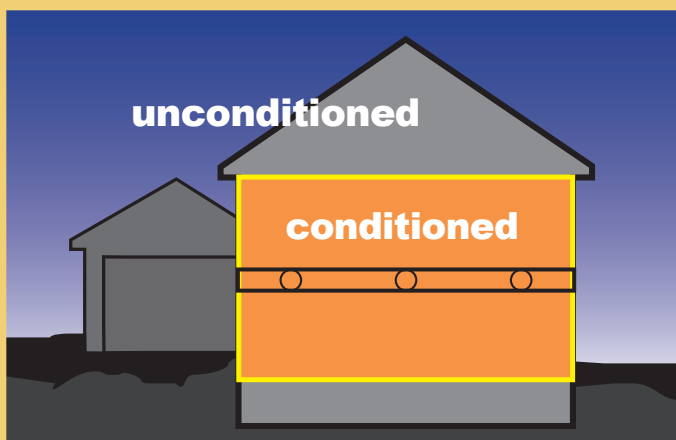
HVAC UNIT AND DUCTWORK IN CONDITIONED AIRSPACE CAN REDUCE ENERGY BILLS FOR THE LIFE OF THE HOME:

You can now gain competitive advantage over other homebuilders and at the same time improve the comfort, health and energy efficiency of the homes you build and sell. According to the NAHB Research Center and U.S. Department of Energy, HVAC through indoor conditioned airspace can reduce heating and cooling costs up to 20-35% every month for the life of the home*. The Boise Cascade

Conditioned Airspace HVAC framing system, available when you build with Boise Cascade BCI® Joist or AllJoist®

engineered floor systems, places the home's HVAC unit and ductwork indoors in the insulated, air-sealed shell of the house called "conditioned" airspace, instead of through the "unconditioned" air in garages, crawl spaces and attics.

This new system efficiently runs a single duct line through the 2nd floor joists to feed both 1st and 2nd floors. Instead of locating the air handler in the garage, where it can potentially draw in unclean air and circulate it throughout the home, the unit is located in an indoor closet to draw in clean, already-conditioned air. The heart of the system is the ability to cut holes and run ductwork through the Boise Cascade engineered floor joists – impossible to do with dimension lumber joists.



WHAT ARE "CONDITIONED" AND "UNCONDITIONED" AIRSPACE?

Conditioned airspace is the insulated, air-sealed shell of the home that's heated in winter and cooled in summer. Unconditioned air includes crawlspaces, attics and garages that can be close to outside temperature. Running ductwork through them can waste energy and money.

* U.S. Department of Energy:
http://apps1.eere.energy.gov/buildings/publications/pdfs/building_america/30506.pdf

* NAHB:
www.toolbase.org/Technology-Inventory/HVAC/hvac-in-conditioned-space

**GENUINE ENERGY SAVINGS
HELP HOMES SELL FASTER...**

Homebuyers are increasingly interested in owning homes with green features that will lower operating costs and reduce the true cost of home ownership. In a 2010 national consumer survey conducted by American LIVES, Inc., the most frequent answer to the question “Why buy a home at this time?” was “Having a newly constructed house that is more energy efficient.” What specifically do they want in new homes? High performance HVAC systems are the second most desired new home feature, reported to be “essential to my home” by 46% of those surveyed. More people wanted better HVAC than wanted additional insulation or energy-efficient appliances. And 43% said they would be willing to invest an additional \$5,000 or more for energy-saving options.



**...AND DIFFERENTIATE
YOUR NEW HOMES FROM
EXISTING HOMES.**

The Boise Cascade Conditioned Airspace HVAC framing system is a long-term benefit. It can reduce homeowners’ energy consumption and monthly energy bills for the life of the home. Most important for you – the builder – the energy efficiency of the Boise Cascade Conditioned Airspace HVAC framing system can help differentiate your new home offerings from existing homes because this amenity cannot be retrofitted to existing homes.

**HOW MUCH WILL HOMEBUYERS SAVE
WITH CONDITIONED AIR DUCTWORK?**

Your results may vary but Regional Technical Forum estimates the following savings for Energy Star Homes in the following cities when HVAC is moved from unconditioned to conditioned airspace:

ESTIMATED SAVINGS WITH CONDITIONED AIRSPACE HVAC IN AN ENERGY STAR HOME		
	ESTIMATED \$ SAVINGS/YEAR	
	THERMS	COST
Portland	110	\$124
Seattle	120	\$135
Boise	156	\$176
Spokane	205	\$231
Kalispell	260	\$293

Source: Regional Technical Forum of the Northwest Power and Conservation Council. Assumes 2,200 sq. ft. Energy Star Home, AFUE .90 Forced-Air Gas Furnace, \$1.125/therm Natural Gas cost. Numbers are approximate – your results may vary.

ESTIMATED ENERGY STAR HOME SAVINGS

EXTRAPOLATED FROM PREVIOUS DATA
AND WINTER AND SUMMER TEMPERATURES
IN THE FOLLOWING U.S. CITIES.
YOUR RESULTS MAY VARY:

	THERMS	\$ SAVINGS RANGE
Boston	150-170	\$170-\$190
Chicago	220-240	\$250-\$270
Denver	155-175	\$175-\$195
Des Moines	225-245	\$255-\$275
Hartford, Conn.	210-230	\$235-\$260
Kansas City	210-230	\$235-\$260
Milwaukee	260-290	\$295-\$325
New York City	150-170	\$170-\$190
Norfolk	110-130	\$125-\$145
Omaha	205-225	\$230-\$255
Pittsburgh	195-215	\$220-\$240
Providence	160-180	\$180-\$205
Raleigh	105-125	\$120-\$140
Salt Lake City	155-175	\$175-\$195



**A CONSUMER BROCHURE WILL
TELL THIS STORY TO YOUR BUYERS:**

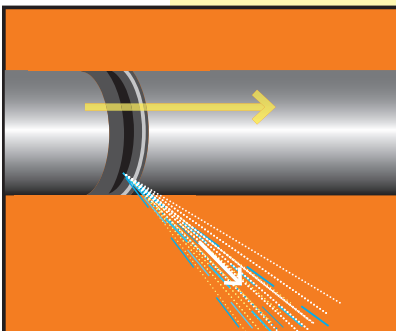
WHAT'S WRONG WITH CURRENT HVAC METHODS?

**“20-35% OF ENERGY SUPPLIED MAY BE LOST
WITH HVAC IN UNCONDITIONED AIRSPACE.”**

NAHB: www.toolbase.org/Technology-Inventory/HVAC/hvac-in-conditioned-space

“Heating, Ventilating and Air Conditioning equipment and associated ductwork are often placed in crawlspaces, attics, and garages. However, there is now an opportunity to improve energy efficiency, comfort and health by placing HVAC equipment and ductwork inside the insulated, air-sealed shell of the house, known as conditioned space. While new houses may have wall and ceiling insulation levels of R-15 to R-30 or more, ductwork outside conditioned space typically has R-4 to R-6 insulation.

Ductwork and equipment cabinets are also frequently very leaky, drawing in outside air and/or blowing out air that has been heated or cooled. Research on ductwork located outside of conditioned space indicates that between 20 and 35 percent of the energy supplied is lost through a combination of air leakage and conduction. Ductwork and equipment in these areas may also pull in potentially unhealthy air from crawl spaces and attics. Heated or cooled air that mixes with outside air due to leaky ductwork is delivered to rooms at lower or higher temperatures than otherwise, potentially resulting in reduced comfort.”

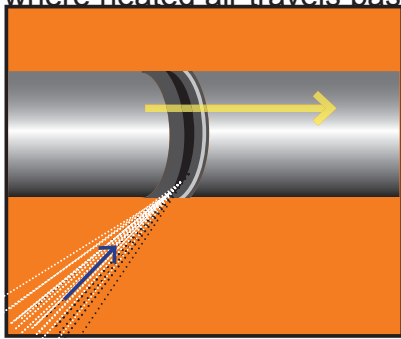


“MOVING THE HVAC SYSTEM INSIDE OFFERED THE HIGHEST INCREMENTAL ENERGY SAVINGS COMPARED TO ALL OTHER ABOVE-CODE ENERGY ALTERNATIVES.”

Washington State University white paper “Moving Ducts Inside: Big Builder, Scientists Find Common Ground” by Michael Lubliner et al. White paper available from: library@energy.wsu.edu.

UNHEALTHY FUMES COULD ALSO ENTER THE HOME THROUGH UNCONDITIONED AIRSPACE.

“In ‘Sick Home Syndrome,’ mold and mildew may be found in the home’s HVAC system,” said Bernie Gordon, Indoor Air Quality Master Consultant at Spring Air Inc. Heating & Cooling, a Jacksonville, Oregon heating and cooling firm. “A venturi effect, where heated air travels past a duct leak,



can draw fumes, mold, pollen, moisture, mildew and other foreign particles into the ductwork

and spread them throughout the house. It could easily have come from under the home, where standing water can often be found,” Gordon explained.



INSTALLATION COST? PROBABLY ABOUT THE SAME AS CURRENT METHODS.

With the right planning, installation should cost close to the same as current methods. Initial equipment costs may be reduced because system heating and/or cooling capacity and ducts themselves may be able to be downsized. Material and installation costs for duct insulation can be avoided. In some cases, costs for air sealing ducts can be reduced or avoided.

FUMES CAN ALSO ENTER FROM “THE DIRTIEST ROOM IN THE HOUSE”.

Some experts call the garage the dirtiest room in the house. Fumes from garden chemicals, auto emissions, insulation particles, paint and other toxic substances can travel from the garage throughout the home when the HVAC unit and ductwork with leaks and inadequate insulation are located in a garage.



“We feel it probably costs about the same to install ductwork through conditioned as unconditioned airspace”, said Jared Murray, president of Spring Air Inc. Heating and Cooling. “And versus the old system of running ductwork through crawlspace and attic, only one line is run, so there are some labor savings with this new system”, Murray said.



Vision Homes installation, Central Point, Oregon

If the Boise Cascade dealer has SawTek™ automated cutting and processing equipment, the holes for ductwork can be cut automatically as joists are cut to length. If there is no SawTek™ in the market, the holes can be cut quickly and precisely with the Matrix™ Xtreme™



Saw. Mark Wickman, owner of Vision Homes of Medford, Oregon, said “It was a very fast and easy process with the Matrix™ Xtreme™ Saw.”

SHORTER, WELL-PLANNED RUNS CAN BE EVEN MORE EFFICIENT, LESS COSTLY.

In a well-planned conditioned airspace ductwork system, air may be pushed only about 45 ft. instead of 90, the usual for ducting run through unconditioned space. With properly designed ductwork running in conditioned airspace, there’s less wasted conduction, and possibly smaller ducting or even a smaller HVAC unit may suffice, for even greater cost savings.

“WASHINGTON STATE UNIVERSITY’S BUILDING AMERICA RESEARCH TEAM HAS FOUND IT POSSIBLE TO MOVE THE HVAC SYSTEM INSIDE WITH MINIMAL, IF ANY, COST INCREASE, INCONSEQUENTIAL LOSS OF INDOOR SPACE, AND SIGNIFICANT ENERGY SAVINGS.”

(Washington State University white paper “Moving Ducts Inside: Big Builder, Scientists Find Common Ground” by Michael Lubliner et al. White paper available from: library@energy.wsu.edu)

PROTECTED DUCTWORK MEANS LESS CHANCE OF PROBLEMS DOWN THE LINE.

Ductwork through BCI® Joists is protected from routine damage, while ductwork in attics and crawlspaces can be tangled, kinked, or otherwise damaged and its ability to conduct air impaired. Protecting ductwork inside the home can help you sleep better.



The air handler can easily be installed in a central closet in conditioned air, where it is readily available for service or less back-breaking eventual replacement. Getting the air handler out of the attic has other advantages, like being much easier and faster to change furnace filters. Vision Homes installation, Central Point, Oregon



2nd floor closet plumbed to receive air handler.

HOW TO DESIGN A SYSTEM:

- 1) Builder, home designer, HVAC contractor, plumber and Boise Cascade Engineered Wood Products rep all meet to review the process of incorporating the HVAC system into the floor system.
- 2) Boise Cascade EWP design staff incorporates HVAC design into the Boise Cascade EWP floor system layout.
- 3) In markets with a Boise Cascade SawTek™ system, the floor system design is fed into the automated SawTek™ system for the precision cutting of joists and routing of holes for the ductwork.
- 4) In markets without a SawTek™ system, framers can use the BC FRAMER® layout to locate the holes to be cut through the BCI® Joist system for the ductwork. A Matrix™ Xtreme™ Saw can then be used to cut precise holes.
- 5) Install the HVAC system.



SOURCES FOR HELP MAKING CONDITIONED AIRSPACE HVAC HAPPEN:

BOISE CASCADE ENGINEERED WOOD PRODUCTS

www.BCewp.com or call 800-232-0788

VISION HOMES

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Mark@visionhomesinc.net; www.visionhomesinc.net

SPRING AIR INC., HEATING & COOLING

Jared Murray, President, and Bernie Gordon, Indoor Air Master Consultant 810 5th Street, Jacksonville, OR 97530,
800-588-1562, www.springairinc.com

NAHB RESEARCH CENTER: TOOLBASE.ORG

<http://www.toolbase.org/Technology-Inventory/HVAC/hvac-in-conditioned-space>

WASHINGTON STATE UNIVERSITY white paper

“Moving Ducts Inside: Big Builders and Scientists Find Common Ground”

by Michael Lubliner, WSU Extension Energy Program, Ryan Kerr, ConSol/BIRA, Andy Gordon,
WSU Extension Energy Program and Chuck Murray, WSU Dept. of Community Trade and Economic Development)
White paper available from: library@energy.wsu.edu

CALIFORNIA ENERGY COMMISSION Guide: “Home Builder’s Guide to Ducts in Conditioned Space”.

www.energy.ca.gov/efficiency/qualityhomes/procedures.html

PATHNET

Partnership for Advancing Technology in Housing, managed by HUD:
www.pathnet.org

ASHRAE

(American Society of Heating, Refrigerating and Air Conditioning Engineers)
“Systems and Equipment Handbook” www.ashrae.org/education

U.S. DEPARTMENT OF ENERGY

http://apps1.eere.energy.gov/buildings/publications/pdfs/building_america/30506.pdf

MATRIX EXTREME PRODUCTS, L.L.C.

702-400-2195, matrixextremeproducts.com

SPECIAL THANKS

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Great products are only the beginning.™

www.BCewp.com or call 800-232-0788