Heating, Ventilating and Air Conditioning

Listed in this section are the technology findings that directly or in part could be applied to the mechanical infrastructure (heating, ventilating and air conditioning) of housing.

Next Generation Pulse Combustion Technology

Next generation pulse combustion technology reduces fuel consumption by 50 percent and reduces greenhouse gases by 30 percent through cleaner emissions. New breakthroughs in the design of heat chambers result in higher heat transfer coefficients with thermal efficiencies of 97 percent. This technology is under research for commercial and manufacturing uses, but with further research and development could be applied to residential heating systems.

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Micro-Capillary Heat Exchange/ Cooling System

Similar to radiant heat in floors, this technology uses liquid in tiny tubes in the ceiling to cool a space. Water moves through tiny tubes (twice the diameter of pencil lead) and is chilled to 59°F for cooling or warmed to 86°F for heating. The large surface area promotes faster heat exchange with substantial energy savings. Tubes are connected in parallel and placed in panel form, which can have plaster or other finishes applied over the top. Dehumidification is still required in humid climates.

Contact:
KaRo
Archhamps, France
www.karo.cc

Hydronic Radiant Cooling

Lawrence Berkeley National Laboratory is working on a project to develop Hydronic Radiant Cooling (HRC), which separates the tasks of ventilation and thermal space conditioning as it shifts the peak cooling load to later in the day. The technology relies on radiation from a cooled surface to provide sensible cooling, and it uses air distribution to fulfill ventilation and indoor humidity requirements. Demonstrations are currently operating in office buildings in Switzerland, Austria (2), and Oakland, CA, as well as at a retail store in Utah. (Refer to Project LBNL-13)

Contact:
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Email: HEFeustel@lbl.gov
http://epb.lblgov/thermal/hydronic.html

Solar Pre-Heat of Fresh Air Cuts Heating Cost

This is a technology from the agriculture industry's crop drying process. It uses solar energy to preheat air used in ventilation systems. The Department of Energy and the National Renewable Energy Laboratory are developing this technology for use in commercial and residential structures. The system heats air by as much as 54°F, reducing the annual heating cost by $1 to $3 per square foot. Solarwall uses perforated metal sheeting as a solar absorber, which costs half as much as traditional glazed solar panels.

Contact:
NREL Technology Transfer Office
Phone: 303-275-3008

Technology Scanning

One of PATH's major research support services is PATH Technology Scanning. *Technology Scanning* tells us about technology developments in other industries, from other nations, from federal laboratories, and from other building sectors. PATH looks for breakthroughs in other industries that could be transferred and applied to housing. *Technology Scanning*—published by the U.S. Department of Housing and Urban Development/PATH and prepared by the NAHB Research Center, Inc.—are updated as technology developments dictate. The Research Center works to unite technology developers from outside of residential construction with manufacturers in the residential housing sector.

This issue of *Technology Scanning* is one in a series. Each issue in the series falls into one of the following categories:

- *Design and Internet Tools*
- *Safety*
- *Surfaces and Interior Finishes*
- *Building Envelope Technologies*
- *Electrical*
- *Plumbing*
- *Heating, Ventilating and Air Conditioning*
- *Energy/Power Systems Generation*
- *Basic Materials*
- *Information Technology*
- *Sustainable Design Strategies*
- *Materials Recycling and Reuse*
- *Thermal and Moisture Protection*
- *Indoor Environmental Quality*

Call the ToolBase Hotline at 800-898-2842 for information about other available *Technology Scanning* issues. Or, log onto pathnet.org and www.toolbase.org.

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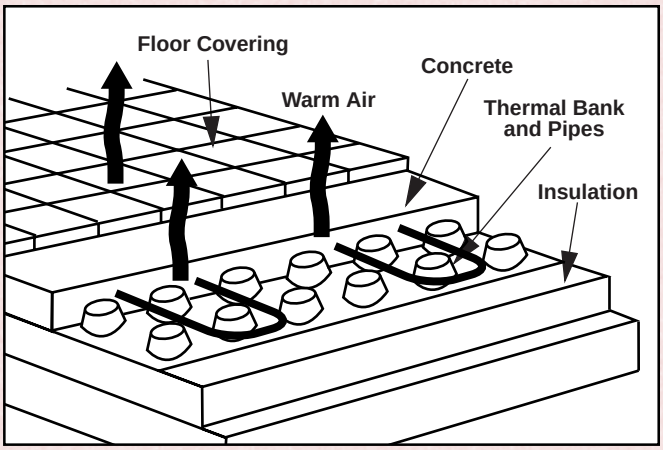
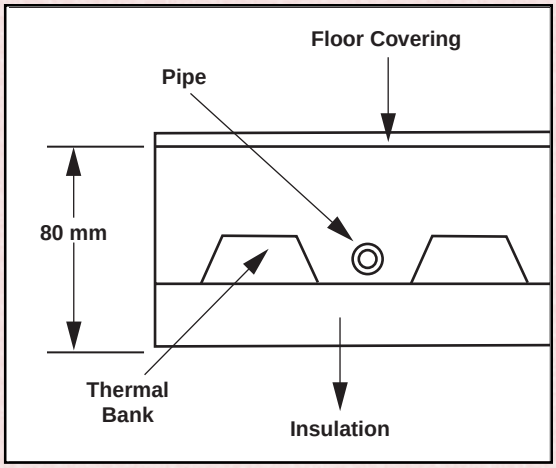
The system installs simply over concrete slabs.



Courtesy: Luwa BV, Netherlands, an agent of TEAP in Europe

Energy is absorbed by the system during excess heat production times, then released during need in off-peak times.



State-of-the Art in Building Automation

Progress in communication standards has led to new forms of building automation. BACnet is one set of operability protocols that allow field devices in HVAC to talk to each other and centralized command centers. The other is LonMark and LonWorks operability protocols. The LonMark catalog now contains over 220 products that inter-operate over a LonWorks Network. The IT industry has spawned a whole new set of scripting languages with the intent of integration and blending of protocols and soft technologies. Common language has allowed many devices to link together and be controlled collectively versus individually.

Contact:
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Heat Storage System Under-floor

Luwa Sustainable Energy demonstrated its latest in heat storage systems for storing heat produced by solar PV systems, at Sustain 2001. Their TEAP29 product makes use of latent heat to achieve higher thermal density. Energy is absorbed by the system during excess heat production times, then released by programmable controls during need in off-peak times. The system installs simply over concrete slabs and comes in easy-to-use capsule sections that are embedded with under floor heating tubes or electrical heating cables. A screen is then applied over the top to provide a finished, walkable surface.

Contact:
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Phone: +31 0-35-541-55-51
Email : infosustain.mrg@luwa.nl
www.teappcm.com

Airflow Modeling Software

Flovent provides software and consulting services to evaluate and simulate airflow/movement in a structure during the design phase to optimize the design and performance of HVAC systems for better indoor air quality, and healthier and more comfortable homes at lower costs. By studying and modeling airflow, more accurate equipment can be sized. Floor plans and wall plans can be adjusted to take problem areas away and create more efficient air flows, thereby reducing the energy needed to run the systems. They refer to it as interior aerodynamics.

Contact:
Flowmerics
Phone: 508-357-2012
www.flovent.com

Duct Audits for Peak Efficiency

Brookhaven National Laboratory is doing field research using duct audits on forced air duct system performance. They measure inefficiencies in duct design and layout and installation and assembly, which directly result in energy loss and indirectly contribute to poor indoor air quality.
(Project reference BNL-2)

Contact:
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Brookhaven National Laboratory
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Alternative to Metal Ductwork

FabricAir, Inc. in Louisville, KY, has brought over a European series of fabric ductwork to the U.S. UL-approved and NFPA-certified, it has been used for over 30 years in Europe. It provides an alternative to metal ducts that is energy efficient, quieter, lightweight, and has a potentially lower installation cost. The fabric ducts are available in sizes from 8 to 80 inch diameter round ducts. The fabric is treated to resist mold, with zipper connections for ease of assembly.

Contact:
www.fabricair.com

Other Fabric Duct Manufacturers:
Pal Int'I Soft Air
DuctSox, Dubuque, IA
Phone: 319-589-2777
Email: pal@koolduct.com