

Indoor Environmental Quality

Indoor environmental quality includes technologies that hold potential for improving the various aspects of indoor living quality: indoor air quality, water quality, health, and comfort quality.

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.

PATH

451 7th Street, SW
Washington, DC 20410
Email: pathnet@pathnet.org

Water Quality

Water Purification - BioClear

BioClear is an inexpensive, chemical-free process for purifying water. It was originally developed for the defense industry and NASA. It is technology that is migrating to the recreation industry and holds potential for clean water systems development in the housing industry.

Contact:

Natural Water Technologies
Atlanta, GA
Phone: 401-303-0068
www.nctn.hq.nasa.gov/innovation/Innovation56/water.htm

Comfort Quality

Intelligent Rooms

This technology allows a room to respond to verbal commands for information or give users related information the user didn't think to ask for but might need or find useful. It begins to automate the comfort aspects of indoor living and gives users of the room easier command of their environment to meet their specific criteria.

Contact:

Howard Shrobe, Director of Artificial Intelligence Lab
MIT
Phone: 617-253-7877
Email: hes@w.ai.mit.edu
www.ai.mit.edu

Embedded Technologies in Houses

As a connected technology to the project above, this technology makes a house responsive and reactive to environmental influences, much like the human body does. As the body automatically adjusts itself to the surrounding conditions, so, too, would the house. Embedding thinking chips, sensors, and other control devices will allow homes to anticipate, adjust, and react to changes around it.

Contact:

Chris Luebke
Assistant Professor
MIT
Email: chrisl@mit.edu
www.web.mit.edu/newsoffice/mr/1998/house.html

International Joint Venture Indoor Comfort

Canada and Japan collaborated to provide improved ventilation in houses. The joint venture focused on the development of international standards for non-forced air systems. Japan's Building Research Institute (BRI) has built a test house using alternative systems. Testing, data collection, and experiments are done jointly, with exchange of ideas and information to find better alternatives for indoor home comfort.

The collaborative effort is investigating thermal comfort and noise reduction for mechanical ventilation systems. The agencies will bring findings to manufacturers, designers, and regulatory agencies in an effort to create better ventilation and indoor air quality strategies than are currently used.

Contact:

National Research Council of Canada
Institute for Research in Construction
Dr. James Reardon
Phone: 613-993-9700
Email: james.reardon@nrc.ca
www.nrc.ca/corporate/english/index.html

Building Control Systems and Micro HVAC Systems

Pacific NW National Laboratory, Material Resources Group, is researching advanced controls, low-cost, highly reliable long-life sensors, automated diagnostics, and advanced micro-scale HVAC technology. The micro-scale HVAC technology consists of compact heat pumps, miniature heat actuated compressors, and a micro-channel heat exchanger. This technology could make automation control available on a miniaturized scale.

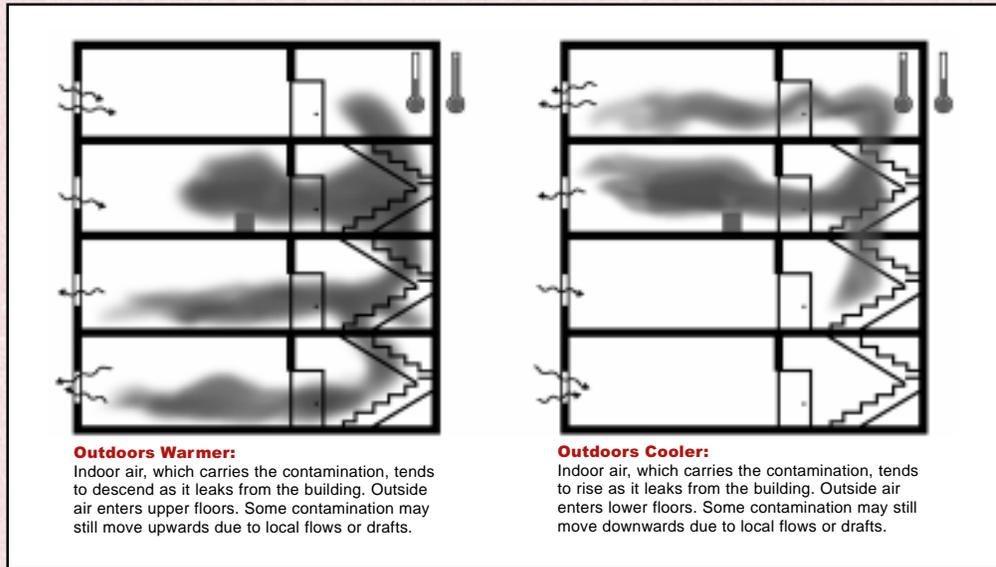
Contact:

Bernie Saffell
Pacific NW National Laboratory
Richland, WA
Phone: 509-372-4565
Email: bf_saffell@pnl.gov
www.pnl.gov/microcats

**Information for
FIRST RESPONDERS TO AN
INDOOR CHEMICAL
RELEASE**

Ventilation System OFF

Flows depend strongly on wind and on the indoor-outdoor temperature difference, especially when windows are open.



Courtesy: Lawrence Berkeley National Laboratory

Air Quality

Indoor Pollutant Sources Study

LBNL has a large research program on the indoor environment, including air distribution and ventilation in commercial and residential buildings, chemistry and physics of indoor air pollution, air flows and pollutant transport within buildings, and exposures to airborne pollutants and resulting health risks.

Although this research program is not funded to answer questions about the above topics from home builders, building owners and the general public, the researchers maintain a useful website where the visitor can identify existing publications in journals, in conference papers, and as LBNL reports. It is then possible to request copies of specific publications from LBNL.

The website of the Indoor Environment Department is:
<http://eetd.lbl.gov/ied.html>

Contact:

Lawrence Berkeley National Lab
Email: RCDiamond@LBL.GOV

Intelligent Air Quality Monitoring

The Idaho National Engineering and Environmental Lab has a project, which integrates embedded sensors and micro-systems to detect, measure, and analyze indoor air quality. They then use the information to make necessary adjustments in the HVAC system to meet pre-determined parameters for indoor air quality. (Project reference INEEL-4)

Contact:

Idaho National Engineering and Environmental Laboratory
Idaho Falls, ID
Phone: 800-708-2680
Email: info@inel.gov

“Displacement Ventilation” Indoor Air Quality

Sponsored by ASHRAE, this is an approach to ventilation that improves indoor air quality while saving energy. “Displacement ventilation” provides cleaner air with greater comfort while reducing the amount of air needing heating or cooling. It is an alternative method to move hot or cold air in a structure.

Contact:

Professor Quingyen Chen or Leon Glickman
MIT
www.architecture.mit.edu/research/bt/iaq_fdv.html

Materials Produce No Out-gassing

Materials that produce no out-gassing in closed system environments (like the space station) can significantly improve indoor air quality. In outer space, it's critical to survival. Applied to homes on earth, it creates healthier living spaces. Any gasses given off materials can dramatically affect the air quality of the space station. Materials NASA is researching in various applications include glass textiles, non-porous composites, non-toxic adhesives, and material surfaces that do not promote bacterial growth. They are also researching materials which will assist in low noise propagation.

Contact:

Laura Nelson
NASA International Space Station Project
Email: lnelson@ems.jsc.nasa.gov
www.jsc.nasa.gov