

Technology Fact Sheet

Bedbugs infest homes and businesses by hiding and reproducing in small crevices, such as mattress seams and the spaces around baseboards. Chemical treatments can be harmful to human health, are often limited by regulatory restrictions, and are proving less effective as bedbugs grow more resistant to insecticides.

Thermal remediation uses heat instead of chemicals to control bedbug infestations. Using University of Minnesota research on bedbug behavior at high temperatures, Temp-Air developed a mobile thermal remediation system powered by propane. The new unit provides a safe, environmentally friendly way to control bedbugs without the use of chemicals.



“There are significant advantages to using heat for pest management...high temperatures kill all life stages of the insect; it is non-pesticidal, so it can be used in organic-production plants; and unlike fumigation, specific areas can be treated without shutting down operations.”

– Copespan, an alliance of pest management companies



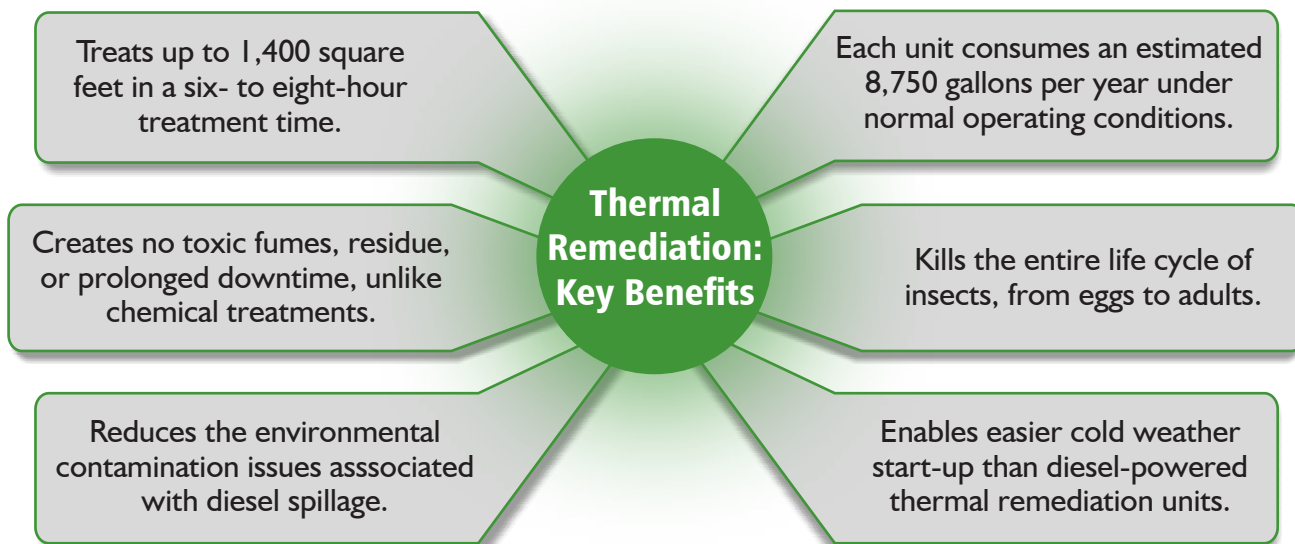
Current Status: Commercialization

Research Development and Testing Demonstration **Commercialization**

- Expected date of product release: late 2011
- Results of field demonstration will be incorporated into propane-powered thermal remediation units prior to release.

Technology Features

- 40-kilowatt propane generator with 4.3-liter Vortec 6-cylinder engine and vaporizer.
- 75-gallon propane tank with auxiliary port.
- Four electric heaters.
- Towable unit that integrates all components.



A Closer Look

Thermal Remediation: How It Works

- A propane generator in the mobile unit powers electric heaters that are placed inside the infested space.
- The electric heaters introduce and recirculate heated air with a target temperature not to exceed 135 degrees Fahrenheit for the controlled application of heat.
- High-temperature fans move heated air throughout the space to reach insects in cracks and crevices or high infestation zones.
- Temperatures are monitored in real time from a remote location using wireless sensors to ensure lethal temperatures (between 120 degrees Fahrenheit and 135 degrees Fahrenheit) are reached without damaging the space and its contents.



Demonstration of thermal remediation heaters fueled by propane at Temp-Air facility in Burnsville, Minn.

Projects:

Fundamental Research on the Efficacy of Heat on Bed Bugs and Heat Transfer in Mattresses (**Docket 12221**)
Development & Testing of Mobile Propane System for Bedbugs (**Docket 16725**)

Partners:

Temp-Air, University of Minnesota

Research Process (✓ = completed; ➤ = in progress; ★ = upcoming)

Research ✓

- Determine the lethal temperature and exposure time for control of bedbugs.
- Determine the threshold behavior and subsequent movement of bedbugs in response to increasing temperatures delivered through conduction and convection.
- Determine the rate of penetration of lethal heat through mattresses, upholstered furniture, exterior walls, and other structural elements in both an apartment and a house.

Development and Testing ✓

- Select and optimize the propane generator in tandem with fuel tank capacity and determine the design aspects of incorporating a vaporizer.
- Assess and select the components of the system, including the electric heaters.
- Design and develop the prototype and conduct laboratory testing for fuel efficiency and performance under various electric load situations.

Demonstration ✓

- Conduct field testing at commercial sites in collaboration with local pest control companies.

Commercialization ➤

- Release product in the pest control market for use in residential and commercial applications.

What's Next?

Temp-Air plans to make the 40-kilowatt propane-powered thermal remediation system available to pest control companies in late 2011.

FOR MORE INFORMATION:

Propane Education & Research Council
Gregory Kerr, Director of Research and Development
1140 Connecticut Ave. NW, Suite 1075
Washington, DC 20036
202-452-8975

www.propanetechnology.com
www.usepropane.com

PROJECT PARTNER:

Temp-Air
Rajshekhar Hulasare, Ph.D.
Senior Scientist and Product Manager
3700 West Preserve Boulevard
Burnsville, MN 55337
952-240-3630

August 2011

