
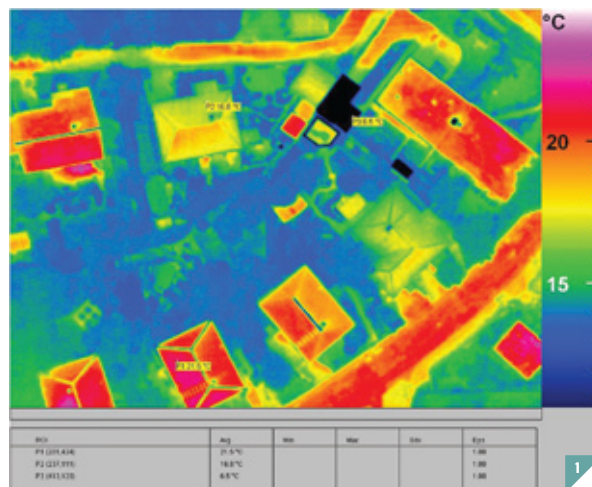


Thermal Infrared Applications for Hot Markets

EARTH SCOPE

 **Green jobs are just kicking off in this** nation, with Vice President Joe Biden holding the standard as the most visible of the administration spokespersons. Van Jones, the green collar guru, has been recruited into the White House, demonstrating further support for this societal transition to all things green and sustainable. The ship of state is large, however, and even with the stimulus, our national agenda is turning ever so slowly towards energy conservation and greener lifestyles. More money has been spent on ads by the energy companies touting their green credentials than has actually be spent on green investments, but the sentiment is there in the marketing/PR departments and that in itself is a harbinger for change.

Perhaps a revisit to the classic I Ching text offering metaphorical guidance through life's seasons of change is appropriate for us now. Energy issues are reaching all Americans, as tracked



► FIGURE 1

Airborne Thermal IR of homes, depicting energy loss differences with 25-cm ground resolution at 1000-meter altitude (courtesy of Jenoptik).

► FIGURE 2

Hand-held thermal IR sensor image depicting energy loss areas, especially glazing surfaces in homes (image courtesy of FLIR Systems, Inc.).

► FIGURE 3

Hand-held thermal IR sensor for energy audits and building inspections (image courtesy of FLIR Systems, Inc.).



by media headlines. As of this writing, Congress is wrestling with the American Clean Energy and Security Act of 2009, which addresses a litany of issues from creation of a 'cap-and-trade' system to electric and hybrid cars to energy efficiency in homes and buildings. The fossil fuel companies are lobbying a tug-of-war with environmental and consumer groups,

with consensus that coal will come out a winner for the foreseeable future. Energy efficiency, however, is being codified for building ordinances and is adding momentum to current programs by states and municipalities to measure and monitor the carbon footprints of their jurisdictions.

Carbon calculators are becoming mandated throughout country and were a hot topic at the National League of Cities (NLC) "Green Cities" conference held in Portland, Oregon, in April 2009. The International Council for Local Environmental Initiatives (ICLEI, www.iclei.org), with over 500 city members, is leading

the parade of carbon calculators and garnering the market share by forging ties with NLC and the U.S. Green Building Council. In my state of Maryland, the governor has established a special task force to perform energy audits for all state buildings, with the goal of quantifying the state energy efficiency. Government managers throughout the nation are becoming occupied by the new trends for carbon accountability and are eagerly repositioning priorities to address the deluge of weatherization funds stimulated from our nation's Capitol. All of these actions and policies should be viewed

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as good news for the remote sensing community, due to the intrinsic need to apply technology into this fray.

Thermal infrared (IR) remote sensing technology represents both low hanging fruit and a potential market stimulator for *Imaging Notes* readership. It is still early in the game, with many elements of legal instruments still remaining to make this topic interesting, but clearly, thermal IR holds great promise and utility in the energy conservation arena. First, we can think of applying thermal IR data collection over-flights for whole communities or cities as a precursor to establishing a baseline for the energy efficiency of homes and buildings.

It would seem logical that, if states, counties, and cities are going to expend millions of dollars for calculating carbon, a baseline quantification would be prudent. (Note: Current carbon calculators are spreadsheet-based approximations lacking any scientific calibration.) Large amounts of money will be distributed based on targeting goals for energy reduction, and baselines are requisite to this process. Thermal IR has been well demonstrated for its capacity to quantify temperature differences (one degree Kelvin) for surface objects (*Figure 1*).

Delineating the relative differences for energy loss in buildings and homes is straightforward and can be overlain for georeference with municipal GIS databases. County and city administrators can work with utility providers to link the energy loss data with customer billings to create a robust energy conservation profile for their jurisdictions. While privacy issues may be raised, the only winners will likely be plaintiffs' lawyers, due to the forensic history in remote sensing.

The boost in small and large firms hawking their services is evidence that energy audits of homes are increasing. On a house-to-house basis, hand-held thermal IR offers a great way to assess energy heat losses in a building (*Figures 2 and 3*). Hand-held thermal IR sensors provide answers to the hidden clues regarding glazing losses, insulation gaps, empty wall cavities, and seam or joint leaks. This information is critical for the weatherization retrofit construction work that can most effectively address remediation of heat loss and thereby lower the building owner's utility bill. Because there is a direct link between professionally executed weatherization and lowering of energy bills (estimates range from \$500 to \$1000 per year for the average home along the mid-Atlantic region), the impetus to market thermal IR to a larger but disaggregated customer base should be improving.

Is our industry paying attention to the energy conservation trend? At the March 2009 ASPRS meeting in Baltimore, a survey of the industry demonstrated only anecdotal evidence of interest in thermal IR sensors. No company represented there offered the services to the commercial market. Thermal IR sensors have held fast to the market needs of the Department of Defense and have not ventured out to the energy security of our nation. Perhaps, with the advent of the American Clean Energy and Security Act of 2009, the remote sensing industry will shift gears and make forays into the rapidly expanding market for home and community energy audits and into the longer term requirements for monitoring our nation's buildings for ever-increasing energy efficiencies. We might start by introducing our technological prowess to the leading architectural and engineering firms and mayor's offices. ☞

