

# THE ROLE OF THERMAL IMAGING IN TODAY'S ELECTRICAL UTILITIES SECTOR

By Chris DeLorey

In today's society, we are faced with many obstacles. One of these obstacles is the high cost of electricity around the world.

Electricity prices for commercial, industrial and institutional have increased considerably. There are many reasons why this is occurring, including the lack of energy/efficient businesses, the need for further investments to hook up to other reliable and cheaper resources, and not being able to handle peak hours causing electrical companies to use other means of energy such as oil and gas. Labor costs from outages caused by mother nature through thunder and lightning storms is also a major cause.

So what can be done to help keep the cost of electricity from skyrocketing each year? One area to look at in a preventative maintenance program is adding Infrared Thermography. What is Infrared Thermography? Simply put, it is equipment or methods which detect infrared energy emitted from objects and convert that energy to temperature, displaying an image of temperature distribution. The amount of radiation emitted by an object increases with temperature; therefore, thermography allows one to see variation in temperatures. When viewed through a thermal imaging camera, warm objects stand out well against cooler backgrounds; e. g. a hot transformer at

nighttime or even in daylight would stand out.

Thermal energy inspections can be performed on an 'as required' basis or as part of your regular maintenance schedule, whether it be daily, monthly, bi-annually or annually. Although inspections should be initiated when a problem, or a suspected problem, arises, it is good practice to have a thermographic audit completed at least bi-annually as part of your preventative maintenance program. This of course would depend on the company, the electrical equipment, and maintenance department budget allowances.

As part of a preventative maintenance program, infrared thermography should be performed on T & D systems (transmission and distribution systems). Infrared can help avoid emergency interruptions that can result in down time and restorations, and identify other issues that may need to be addressed during routine maintenance. It can also minimize component deterioration, thereby extending life cycles of your electrical systems. It is one of the quickest ways of trouble shooting and finding problems within your electrical systems and can also identify where safe work practice improvement is required, therefore, preventing electrocution or putting you or your fellow workers at risk.

It is vital that prior to inspection an infrared thermographer knows everything about the equipment being assessed. In the case of electrical equipment, the physical principle



## HOW THERMOGRAPHIC INSPECTIONS WORK

**Thermography: a technique for measuring temperatures**

**Thermogram: a graphic or visual record produced by thermography**

Thermography measures surface temperatures by using a specialized infrared camera. Images on the video or film record the temperature variations of the building's envelope, ranging from white for warm regions to black for cooler areas. The resulting images help the auditor determine whether insulation is needed. They also serve as a quality control tool, to ensure that insulation has been installed correctly.

Thermograms of electrical systems can detect abnormally hot electrical connections or components. Thermograms of mechanical systems can detect the heat created by excessive friction.

Energy auditors use thermography as a tool to help detect heat losses and air leakage in building envelopes and to check the effectiveness of the building's insulation and detection of roof leaks.

A thermographic inspection can be either an interior or exterior survey. The energy auditor decides which method would give the best results under certain weather conditions. Interior scans are more common, because warm air escaping from a building does not always move through the walls in a straight line. Heat loss detected in one area of the outside wall might originate at some other location on the inside of the wall. Weather can be a contributing factor, therefore interior surveys are generally more accurate.

of why faults show a different temperature pattern is because of increased resistance or increased electrical current. That being said, however, it is important to realize that some components normally run hot and cold. Knowing specifications and equipment information prior to entering is crucial for all concerned. When performing an inspection, the infrared thermographer should be aware of all safety procedures, wear proper personal protective equipment and abide by all rules and regulations within the workplace. All of this leads to reduced utility maintenance costs and component inventory, while increasing system reliability, utility and revenue, customer retention and worker safety.

Taking a proper thermal image with an Infrared Thermography camera is paramount to identifying issues required to be addressed during a maintenance check. To use the camera correctly is a complicated process which requires training and certification. The most important process attributes when taking a thermal image is Focus, Range and Distance. After the photo images are taken, they cannot be changed, so either during the day or night important considerations are; the relative ambient temperature (T-Reflective), emissivity, and weather conditions, i.e. wind, humidity. These can all be found by utilizing other test/diagnostic instruments, including moisture meters, clamp on meters and anemometers. Depending on what type of Infrared Thermography camera is used, the data results from these other instruments can be installed into the Infrared Thermography camera and can be used to check or calibrate against the camera as well. For practically all applications, it is important to have the correct software to download, analyze and report the findings.

To keep operational 24 hours a day, 365 days a year, many companies have combined their predictive/preventative maintenance programs and included thermal energy inspections with the most valuable diagnostic tools for industrial applications on the market. Once in operation, the thermal imaging camera becomes a vital piece of equipment in industry today.

### FURTHER INFORMATION

<http://www.infrared-solutions.ca>

### ABOUT THE AUTHOR

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