CONDITION MONITORING SOLUTIONS

FOR POWER GENERATION, TRANSMISSION, AND DISTRIBUTION

FLIR ELECTRIC UTILITY SOLUTIONS

Save time and ensure equipment reliability with powerful, high-tech tools from FLIR. Whether it's your responsibility to maintain uptime at electric power generation stations, keep the power flowing through distribution networks, or troubleshoot failures at the residential and commercial level, FLIR offers the Total Solution for Condition Monitoring: thermal imaging, acoustic imaging, gas detection, test equipment, analysis software, and secure storage—all with the goal of helping you diagnose potential problems before they turn into expensive failures.

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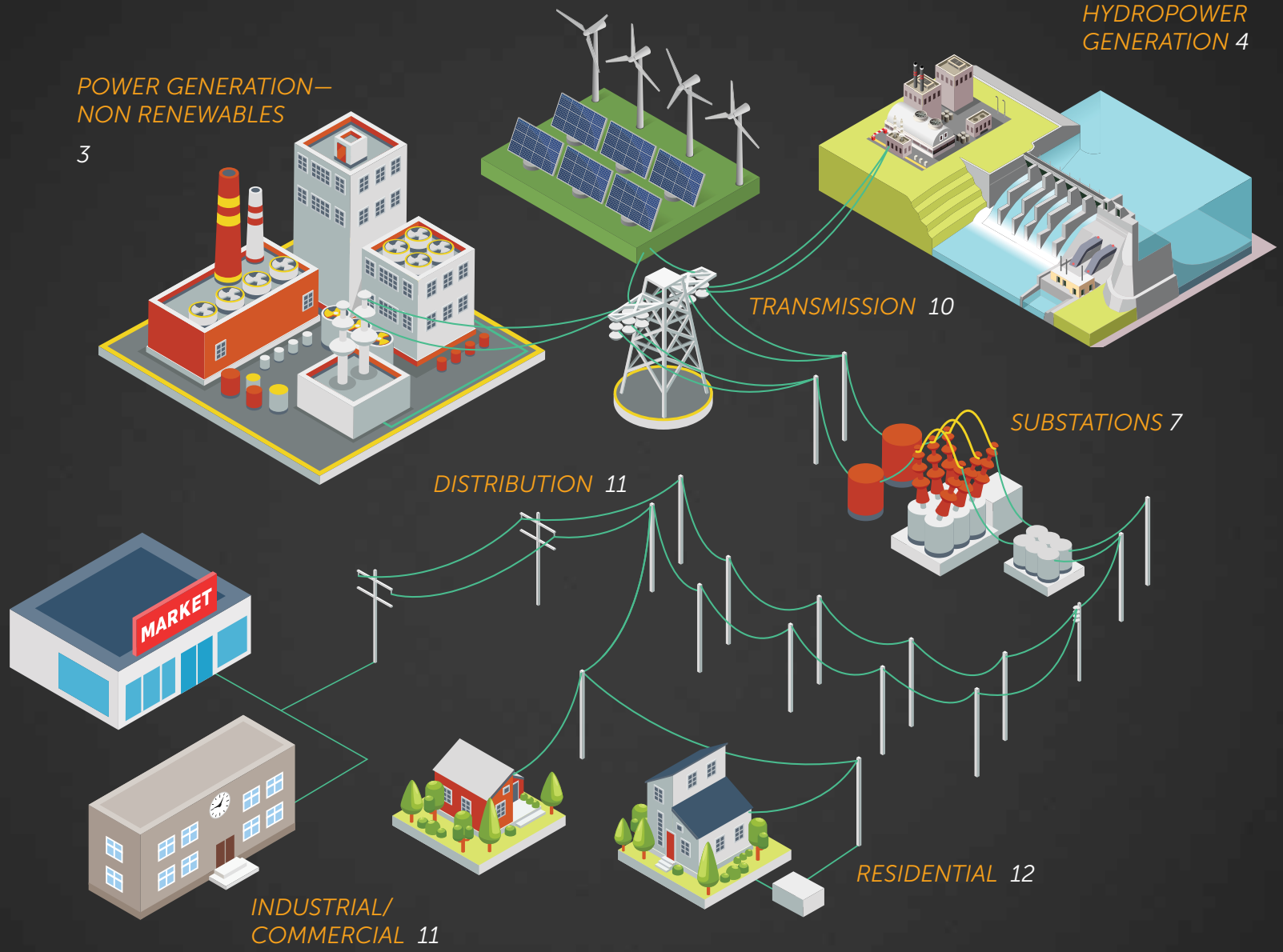
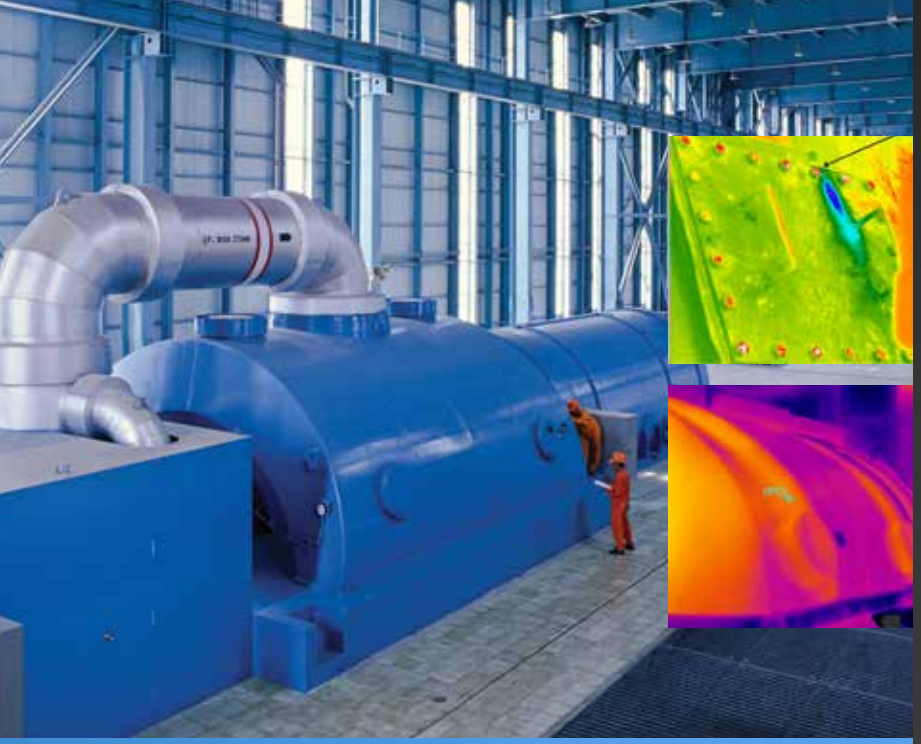




ELECTRICAL POWER GENERATION

Steam Turbine Inspections

Turbine generators are the heart of the power plant but must be maintained to avoid costly repairs and outages. Thermographic inspection technology can help detect issues early. A special camera that sees carbon dioxide (CO_2) can be used to help locate leaks in hydrogen-cooled generators by adding small quantities of CO_2 into the mix as a benign tracer gas. For generators that rely on natural gas, an uncooled optical gas imaging camera filtered for methane (CH_4) can help inspectors identify leaks throughout the system. Finally, maintenance teams can use an acoustic imager to identify high pressure leaks and a standard thermal camera to inspect electrical and mechanical components.

FLIR E96™

FLIR GF77™

FLIR G343™

FLIR Si2-LD™

Coal Power Plants

In coal power plants, thermal imaging, acoustic imaging, and optical gas imaging cameras work together to detect fires and protect equipment. Fixed thermal imaging cameras can continuously monitor temperature in coal storage, conveyors, and boilers, detecting abnormal heat buildup before ignition occurs. This early detection helps prevent fires caused by spontaneous combustion or overheating equipment.

Acoustic imaging cameras add another layer of protection by detecting ultrasonic sounds from mechanical issues, such as failing bearings or air leaks, which can indicate impending equipment failure. Identifying these problems early reduces the risk of malfunctions that could lead to fires or equipment breakdown.

FLIR A500f/A700f™

FLIR Si2-Pro™

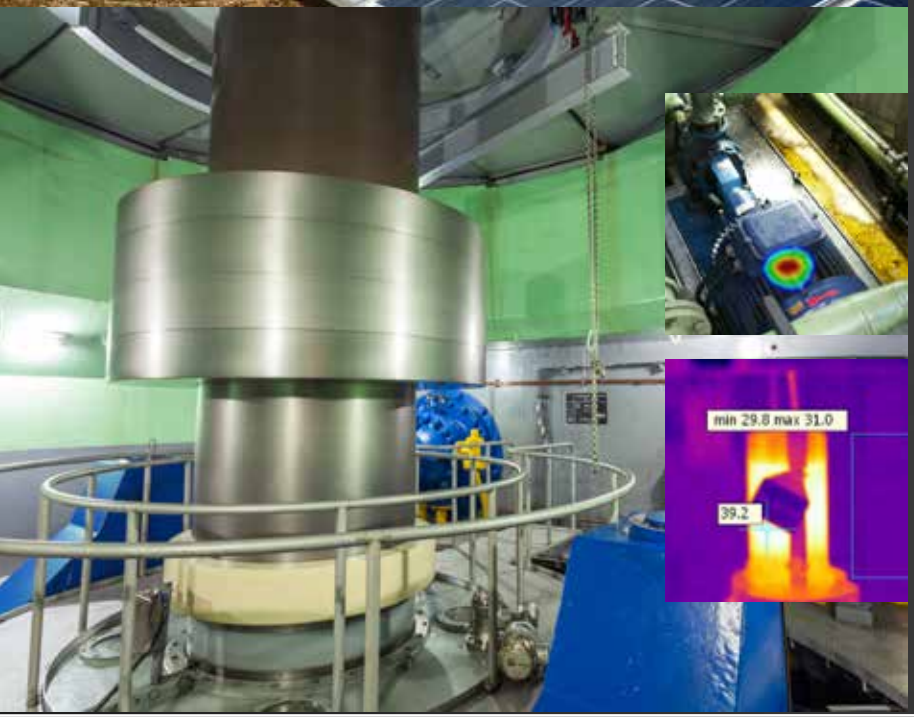
To learn more about FLIR Solutions for Power Generation visit www.flir.com/power-generation

Solar Inspections and Diagnostics

Routine solar panel inspections are an essential part of operational efficiency. They are critical to prevent larger breakdowns, manage warranty claims with equipment suppliers, and operate within contracted performance and yield guarantees. Thermal imaging makes it easy to quickly inspect a large target area and pinpoint solar panel problems . Once the problem is identified with infrared, a digital multimeter or clamp meter can help you diagnose electrical issues at the point of failure and determine the proper course of action. Incorporating thermal inspections into your routine maintenance plan will reduce your inspection times, help you work more safely, and improve your overall efficiency.

FLIR CM276™

FLIR E96™



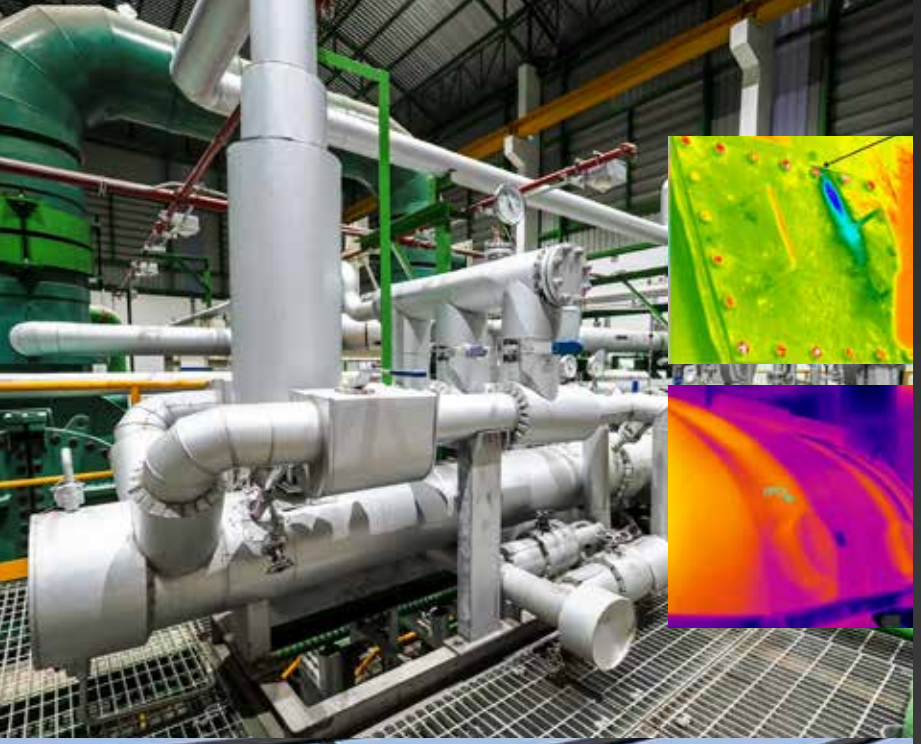
Hydro Power Preventive Maintenance

Hydro power systems face continuous exposure to environmental threats, requiring 24/7 monitoring. FLIR thermal cameras such as the A500f/A700f offer all-weather surveillance that detects high temperatures and other abnormalities, which trigger automatic alarms. These, IP67-rated cameras enable efficient monitoring, reduce manual inspections and ensure plant stability and safety by preventing malfunctions in power generation and transmission.

Acoustic imaging cameras enhance maintenance by capturing mechanical noises and ultrasonic signals from hard-to-access areas like turbines and pipelines, enabling early detection of wear or leaks and preventing potential outages in power generation.

FLIR A500f/A700f™

FLIR Si2-Pro™



Biofuel

Biofuel facilities are prone to fire risks from high-temperature processes and flammable materials. Thermal imaging can identify abnormal temperature increases in key areas like storage tanks and conveyors. It also detects potential fire hazards before they become visible, allowing operators to implement preventative measures in a timely manner.

Thermal imaging further supports safe equipment operation by monitoring for overheating and mechanical failures, which could reduce operational downtime. With real-time insights and automated alarms for temperature anomalies, these systems improve safety, minimize manual checks, and ensure compliance with safety standards.

FLIR E96™

FLIR A70™

FLIR T1020™

Preventative Maintenance

Bushing and other electrical component failures can cost your company millions of dollars in lost revenue from downtime, repairs, and overtime pay for workers. Through regular inspections, you can detect electrical component failures before they occur. Traditional inspection methods, including Micro-ohm tests or power factor measurement, can be labor-intensive and require you to take the system out of service. Incorporating thermal and acoustic imaging technologies into your inspection routine allows you to locate sources of potential equipment failure early, saving repair costs and avoiding equipment downtime.

FLIR T865™

FLIR Si2-Pro™

To learn more about FLIR Solutions for Power Generation visit www.flir.com/power-generation

Wind Turbine Preventative Maintenance

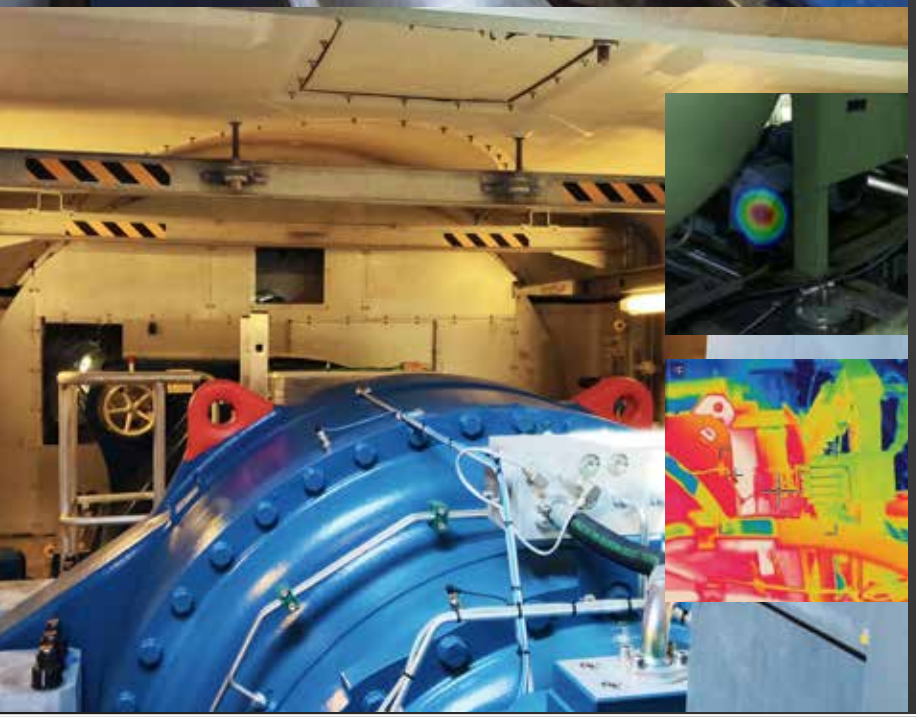
Thermal cameras and acoustic imaging cameras are powerful tools in wind turbine preventative maintenance. Thermal cameras detect overheating in components such as gearboxes and bearings. Acoustic imaging cameras, on the other hand, visualize sound waves, making it easier to detect mechanical anomalies such as loose parts, misalignments, or lubrication issues. Together, these technologies offer a comprehensive view, allowing early detection of potential failures before they lead to costly downtime. By combining heat and sound data, maintenance teams can address issues proactively, ensuring wind turbines run efficiently and extend their operational lifespan.

FLIR Si2-PD™

FLIR AX8™

FLIR VS80™-IR21

FLIR A50/A70™ Smart Sensor



Wind Turbine Rotors

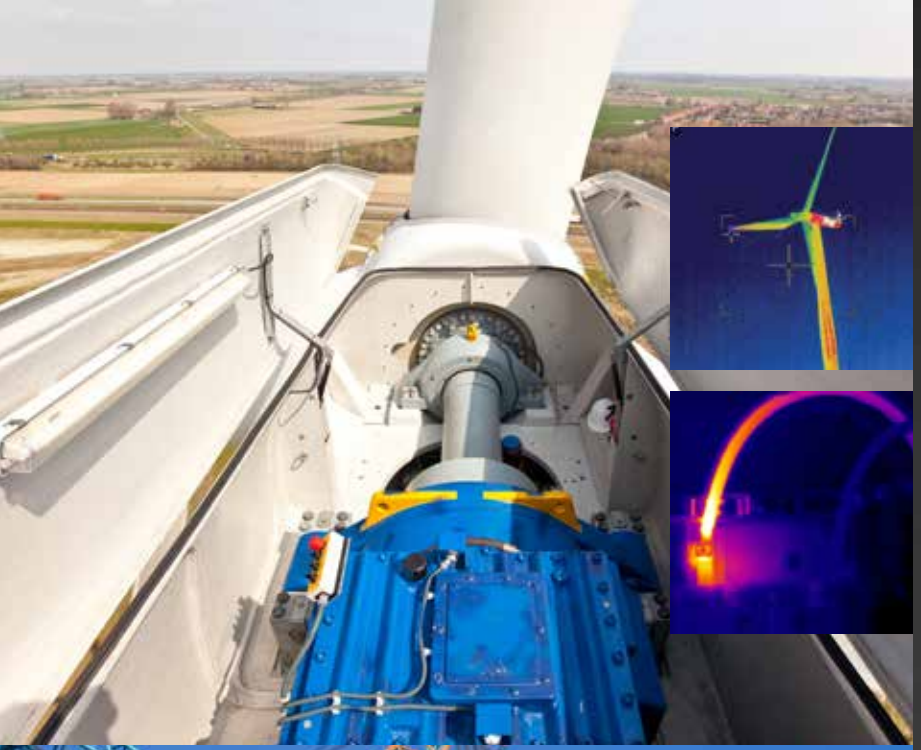
Wind turbine components are susceptible to wear and can break down, especially the rotor bearings: a series of bearings within the rotor shaft that connect the wind turbine blades to the gearbox. Ensuring proper operation is critical to maintaining operational efficiency and asset health. A thermal videoscope allows maintenance professionals to see the cramped bearing casing to look for signs of overheating, while a vibration meter or remote vibration monitoring system could detect signs of mechanical failure through vibration analysis.

FLIR SV88/89™

FLIR Si2-Pro™

FLIR T560™

FLIR VS80™



Wind Turbine Generators

A wind turbine's generator takes output from the gearbox and produces electric power. These complex systems can include communicators, slip rings, coils, cooling systems, and more—all of which require regular inspection to ensure proper operation and asset health. Acoustic imaging allows you to inspect electrical systems to detect problems before breakdowns occur, while a thermal camera and digital multimeter can be used to verify the health of mechanical and electrical components. Finally, test tools such as a phase rotation tester can ensure proper installation and function of three-phase power sources.

FLIR T-Series™ with FlexView™ Dual FOV Lens

FLIR DM286™

FLIR Si2-Pro™

Wind Turbine Gearboxes

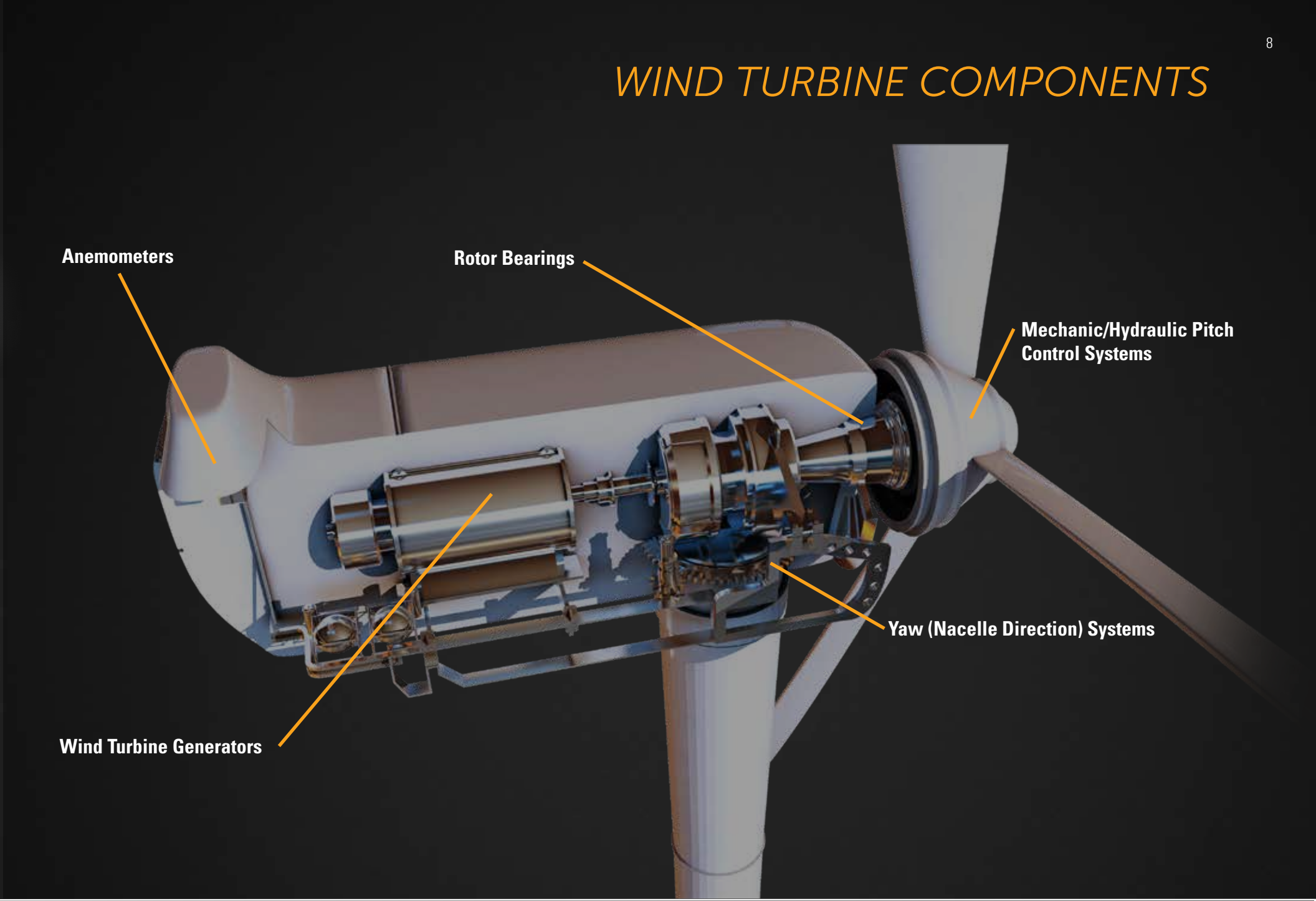
A wind turbine's gearbox connects the rotor shaft to the generator, increasing RPMs to optimize power. This critical component must operate efficiently under changing weather, loads, vibrations, and temperatures. Monitoring the condition of bearings, gears, and other parts is vital for operational health. Gearbox cooling systems regulate temperatures, preventing damage from heat generated during energy conversion and solar radiation. Regular inspections using thermal cameras and acoustic imaging cameras can detect issues like misalignments and early warnings of failure.

FLIR Si2-Pro™

FLIR T865™

For more information about FLIR Electric Substation/Transmission solutions, or to schedule a product demonstration please visit www.flir.com/substation-transmission

WIND TURBINE COMPONENTS



ELECTRICAL SUBSTATION

Insulator Inspections and Diagnostics

When an insulator fails, it may cause a widespread outage. There's a good chance it will affect multiple components in the transmission system—creating a larger, more unmanageable problem. It isn't always easy to inspect for potential failures as insulators are often located up high and out of reach. Regular temperature monitoring using a combination of acoustic and thermal imaging cameras can help you both inspect and diagnose impending failures before they occur. With an acoustic imager, you can inspect for partial discharge. Using a thermal camera, you can easily scan for temperature differences and hot spots to locate the problem area and diagnose the issue. You'll establish a safer work environment, increase grid reliability across the system, and improve customer satisfaction by ensuring no loss of electricity.

FLIR T-Series™ with FlexView™ Dual FOV Lens

FLIR Si2-PD™

Continuous Monitoring

FLIR offers solutions that provide continuous intruder-detection capabilities for perimeter security as well as temperature monitoring of equipment. Built-in convolutional neural network (CNN) analytics accurately detect and classify human and vehicle threats moving at high or low speeds, minimizing false alarms and daily operation costs. Custom scheduling enables security operators to set intrusion analytics to run on visible streams during the day and on thermal streams throughout the night, establishing optimized coverage for any lighting condition. If a LTC fails, the entire transformer will shut down, costing your utility millions of dollars in added overtime pay for workers and expenses to expedite repairs. This outage will adversely affect numerous distribution circuits and the remaining power grid due to the need to reroute the load to supply the affected circuits. It can be challenging to collect sensor data from products with different communication protocols across a system. A communication hub such as FLIR Bridge solves the problem of sensor incompatibility by allowing companies to integrate different sensors without in-house IIoT programmers.

FLIR AX8™

FLIR A500f/A700f™

FLIR Bridge Pro™

FLIR FH-Series ID

For more information about FLIR Electric Substation/Transmission solutions, or to schedule a product demonstration please visit www.flir.com/substation-transmission

ELECTRICAL TRANSMISSION

Inspecting Connections in Electrical Transmission

Unplanned transmission line repairs can easily cost millions, so it's important to regularly inspect every connection to ensure that they are in working order. Every system has a lot of small connections, often located high up out of reach. Connections get hot before they fail. Conducting regular surveys of substations and transmission lines using both acoustic and thermal imaging devices can give you a full picture of potential problems. You can visualize partial discharge or measure the temperature of overheating connections and diagnose problems before outages occur—minimizing the cost of repairs, maximizing equipment life, and keeping the power on for customers.

FLIR Si2-PD™

FLIR T1020™

Inspection of SF_6 Circuit Breakers

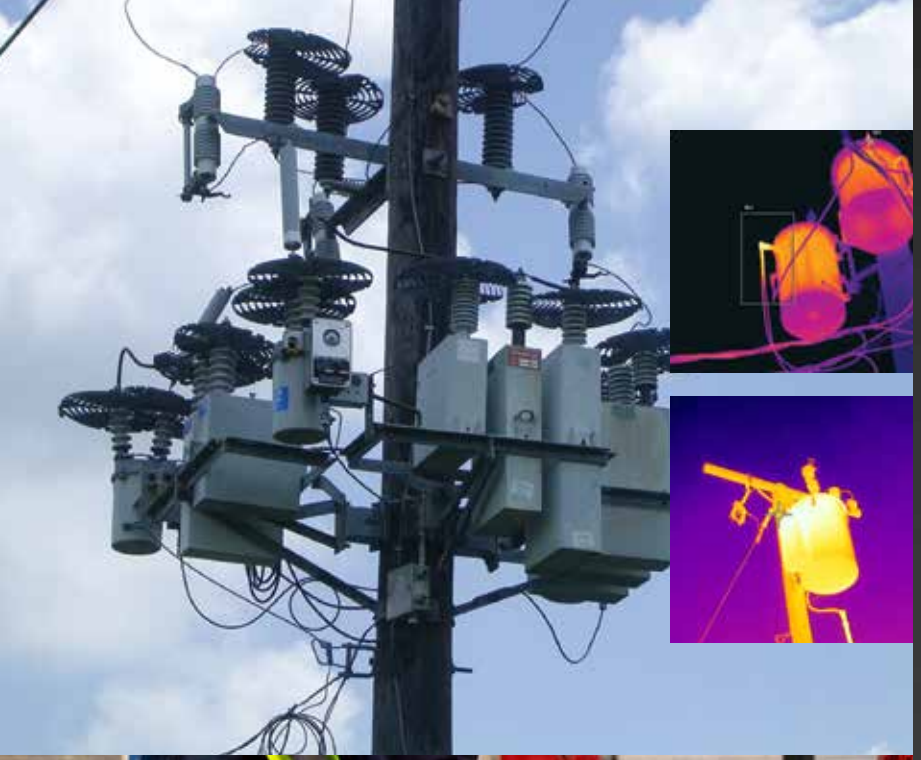
When you suspect that there's a gas leak in a SF_6 breaker, it's crucial to locate and fix it immediately to minimize downtime and revenue loss. This isn't always easy to do using traditional gas-detection methods such as sniffers or soap bubbles. The longer a leak is left unrepaired, the more revenue lost, and the greater the carbon footprint on the environment. By using a portable, non-contact optical gas imaging camera you can visualize SF_6 and other gas emissions without the need to shut down operations. You can also quickly scan substations for leaks while maintaining a safe distance from high-voltage equipment. Catch leaks early, reducing revenue lost from breakdowns and repairs. Doing so will also help reduce emissions so your company can meet environmental regulations and avoid potential fines.

FLIR T1020™

FLIR GF77

FLIR G306

FLIR E8 Pro™



ELECTRICAL DISTRIBUTION

Distribution Transformer Inspections

If a transformer overheats and fails, it can be devastating to the utility. A widespread outage might disrupt power to thousands of customers, and the cost to repair or replace equipment is expensive. Regular temperature monitoring using advanced diagnostic thermal imaging cameras can help you easily inspect and monitor the temperature distribution on the outside surface of each transformer to catch impending failures before they occur. It will show you what the naked eye can't see – hot spots that indicate overheating parts – so you know where to investigate further. Find hidden signs of electrical resistance and mechanical wear so you can begin repairs immediately.

FLIR T-Series™ with FlexView™ Dual FOV Lens

Underground Electrical Vault Inspections

Catching the hot spots that indicate electrical faults is the best way to avoid outages that disrupt power to thousands of customers. But performing a thorough inspection of underground electrical distribution vaults can be problematic: they're hazardous, difficult to access, and can require special permits to open. A thermal industrial videoscope will allow you to inspect an underground vault while staying topside—and in some cases, without removing the manhole cover—all while avoiding the dangers of energized cables and water intrusion. Continuous thermal imaging with an alarm-enabled sensor is another easy way to detect potential problems in small or difficult-to-reach spaces. Both methods can work together to ensure potential faults are caught early, correctly diagnosed, and repaired before causing an outage.

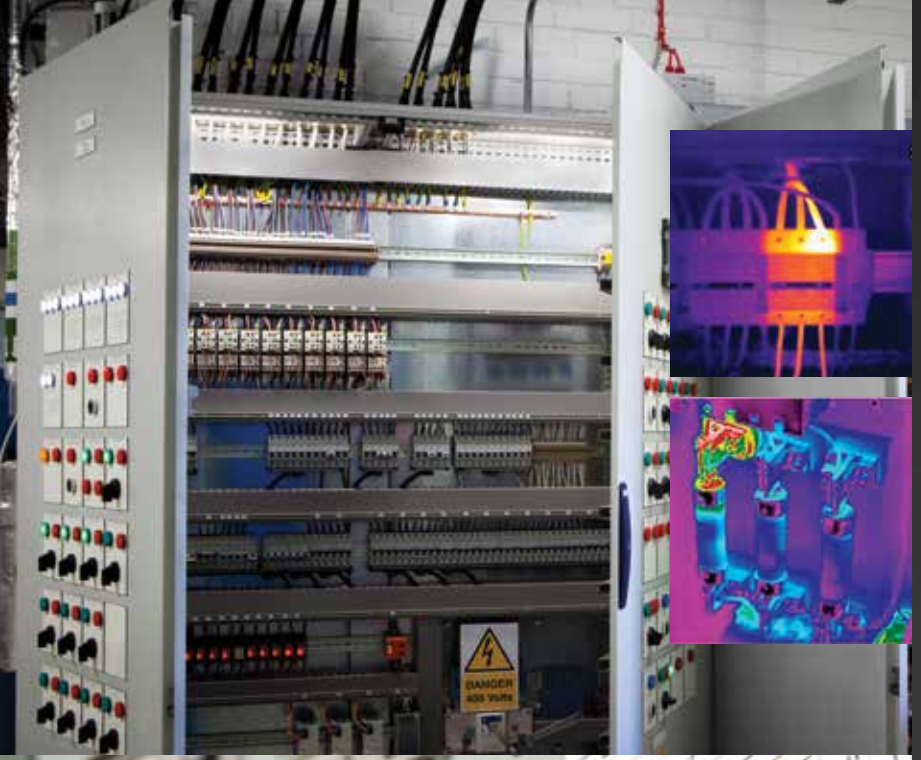
FLIR AX8™

FLIR VS290-32™

FLIR A50/A70™ Smart Sensor

For more information about FLIR Electric Distribution solutions or to request a product demonstration please visit www.flir.com/power-distribution

COMMERCIAL & RESIDENTIAL

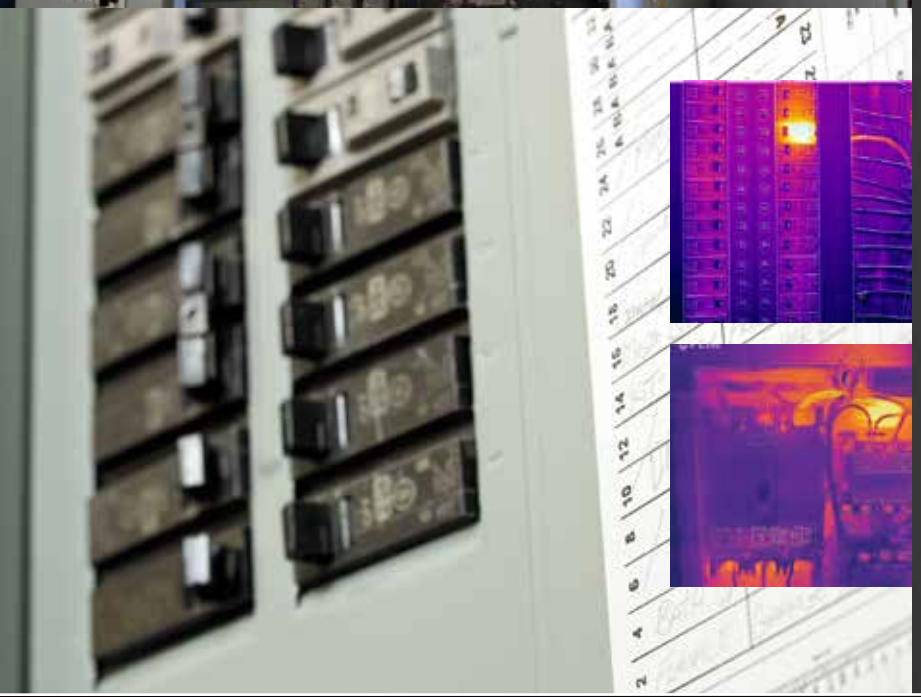


HV Electrical Distribution Panel Inspection

Without power, factory operations cannot continue. That's why regular scheduled maintenance is important to ensure your electrical distribution system is in working order. A thermal imager can help you detect hot spots in your distribution system before an outage occurs. Once the source of the problem is identified, a clamp meter can help you diagnose electrical issues at the point of failure and determine the proper course of action. You'll avoid downtime, unnecessary maintenance or repair costs, and lost profit.

FLIR E96™

FLIR CM85-2™



Commercial & Residential Electrical Panels

As an electrician or service provider, it's crucial that you find and fix electrical problems before they turn critical. You rely on pocket-portable thermal imagers and test instruments to investigate failing power inlets, transfer switches, and fuses. Inexpensive thermal imaging cameras can help you locate problems, point them out to customers, and prove they've been repaired. Clamp and digital multimeters enhanced with thermal imaging offer a two-in-one advantage by helping you find the source of a problem and collect the data you need to fix it.

FLIR DM286™

FLIR C5™

FLIR PORTABLE INFRARED AND ACOUSTIC CAMERA SOFTWARE

FLIR helps you work more efficiently and boost productivity with robust software suites, routing plugins, and cloud storage.

SOFTWARE AND CLOUD SOLUTIONS

FLIR provides the total solution your team needs to streamline inspections, analysis, and reporting.

FLIR Thermal Studio: Manage thousands of thermal images and videos in this subscription software. Thermal Studio offers advanced image processing and editing features and allows you to build comprehensive reports with fully customizable templates, overlays, and formulas.

For acoustic imaging, the FLIR Si-Series comes with a software plugin for FLIR Thermal Studio Pro that allows you to calculate critical decision-making data such as leak rates, costs, and level of threat from partial discharge.

FLIR Ignite: Upload images wirelessly to this cloud-based service, which automatically manages the safe and secure back-up of your data and instantly shares the content with authorized team members.

FLIR Route Creator: Create and export multiple inspection routes and download them to compatible* FLIR cameras running the optional FLIR Inspection Route for streamlining inspections of multiple assets across a large site or several locations. The route guides you along planned inspection points, where images and data are collected in a structured manner. The Reference Imaging functionality enables you to conduct repeat inspections using pre-defined image parameters, capturing images of an inspection target over time to achieve better trending and analysis. Once the inspection is complete, you can import results back to FLIR Thermal Studio Pro for analysis and reporting.

FLIR METERLiNK®: This feature makes it possible to transfer data acquired by FLIR test and measurement tools to your FLIR infrared camera. The data is embedded into the infrared image, giving you comprehensive documentation while saving you time and minimizing risk of error.

FLIR METERLiNK® App: With the FLIR METERLiNK® App, you can connect up to seven compatible meters at once and monitor a variety of electrical and environmental conditions simultaneously. Whether you're connecting FLIR clamp meters, digital multimeters, or any other METERLiNK app compatible meters, you will be able to keep tabs on key readings around your facility and easily share them with your team.

FLIR Software Development Solutions

FLIR's Software Development Kit (ATLAS SDK) allows companies to use their own Computerized Maintenance Monitoring Systems (CMMS) to support read-out of thermal measurements as well as inclusion of METERLiNK data, GPS, compass, and other important parameters embedded within the image.

THE INFRARED TRAINING CENTER

Thermal Imaging Value

The greater your knowledge of thermal imaging, the greater the dividends you'll realize for your company and your career. That's why the Infrared Training Center (ITC) offers classes for utility industry applications—from free, online courses to advanced certification training.

ITC courses include:

- *Level I, II, and III Thermography Courses*
- *Electrical Inspection and Level I Electrical Thermography Courses*
- *Optical Gas Imaging Certification Course*

WORLD-CLASS INFRARED TRAINING

ITC thermography certification courses help prepare you to take a leadership role in an infrared inspection program. Level I certifies that you know how a thermal imager works and how to use it. Level II cranks up your credibility with more in-depth concepts and intensive labs. Level III asserts that you have the knowledge and skills to develop and administer your company's thermography program. These certifications offer strong validation to support the work you do as a thermographer.

ITC offers classes at training centers around the globe, at locations within your country, at your company's facility, and even on-line. On-site training is encouraged if your company needs to certify a group of 10 or more. ITC's on-site training courses are the best way to accommodate a large group on a limited budget. Our instructors will travel directly to your facility to limit your travel costs by keeping staff on site, reducing downtime and short staff issues.

Visit https://flir.com/ITC-onsite-training for more information about on-site training.

For a complete list of courses and a current schedule, visit infraredtraining.com.

FLIR CARE AND PROTECT

Extended warranty and service packages from FLIR provide the peace of mind you need, protecting your camera from material defects and issues for a full three years beyond your factory warranty. If anything goes wrong with your camera or its battery*, you won't have to worry about expensive repairs or replacements. And with our range of premium warranty options, you will receive one free service with calibration, discounts on additional service needs, and options for fast-delivered loaner cameras.

FLIR CARE+

FLIR PROTECT+

For more information or to find your local support number, visit:
flir.com/contactsupport

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