# ENVIRONMENTAL MONITORING

What Does Environmental Monitoring Mean?



Environmental monitoring means using observational techniques and tools (such as sensors, wireless communications and remote management software) to detect, observe and measure environmental conditions at a specific site or location. However, the actual reality

of these processes — the tools used, what parameters are selected, and how the processes are implemented — can vary greatly depending on the use case.

In the past, environmental monitoring has been primarily used for ecological purposes. For example, researchers that want to observe air pollution, or the effect of industrial pollution on protected areas and habitats, might employ disconnected methods for the measurement of environmental conditions long-term.

Periodically, they would need to go collect the monitoring devices they've distributed in the field in order to retrieve the desired data. Now, with IoT devices, wireless connectivity, and platforms supporting near-instant access to information from anywhere, the principles of environmental monitoring have become applicable to new use cases, from monitoring water treatment plants and groundwater supply to monitoring oil and gas pipelines for leaks.

# Objectives of Environmental Monitoring
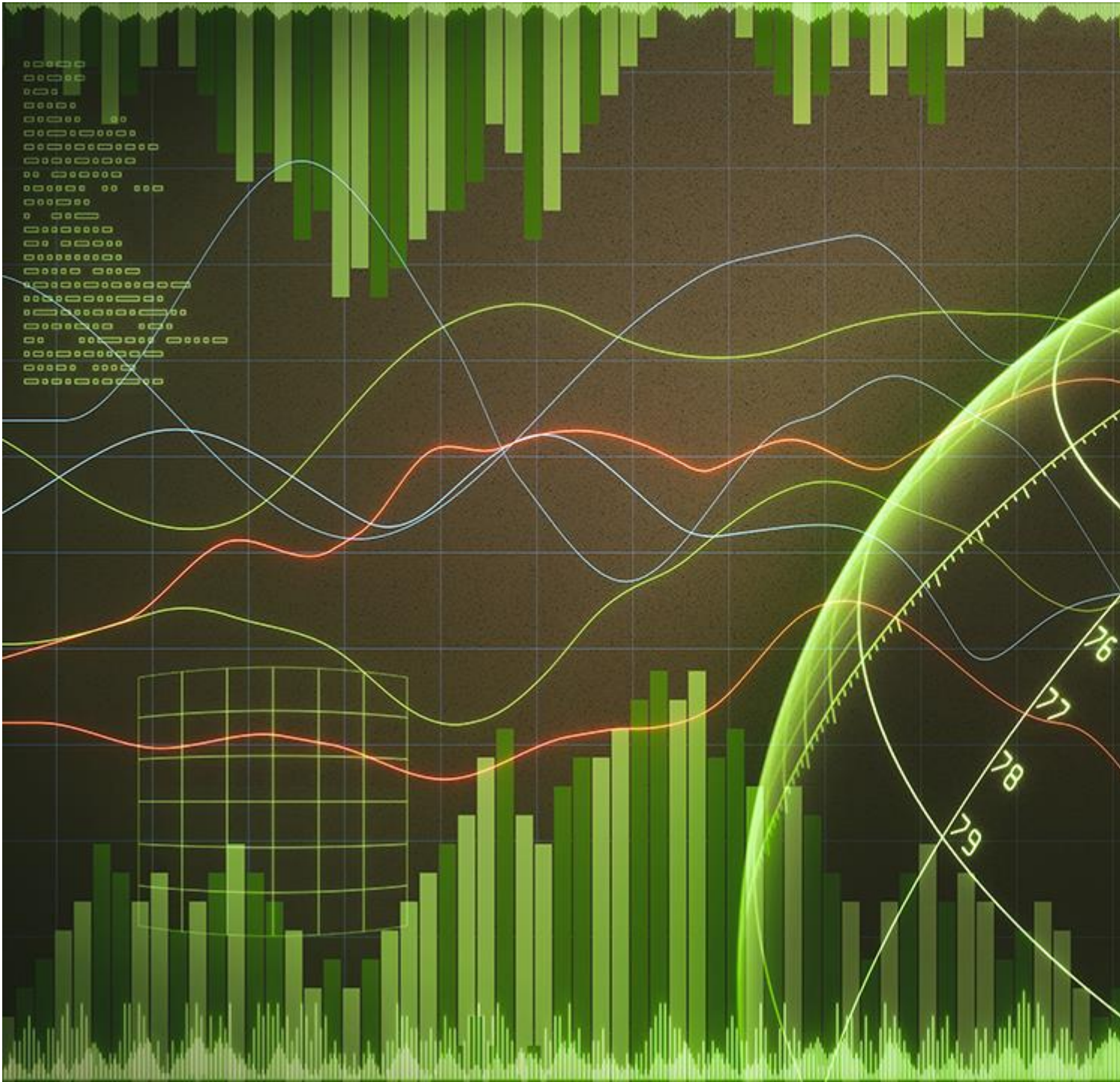


When adopting environmental monitoring, each organization needs to consider what its primary and secondary objectives are. Doing so will allow them to plan the strategic deployment of appropriately designed IoT devices.

In industrial applications, reasons for environmental monitoring include:

- **Optimizing operations for safety and efficiency.** Environmental monitoring allows companies to observe and react to changing conditions on-site, reducing the risk of equipment failure, accidents and resulting damage.

- **Minimizing an organization's impact on the environment.** Industrial sites can track and find ways to decrease pollution or carbon output using ecological monitoring techniques.
- **Validating ongoing safety protocols.** In industries that require specific site conditions to operate effectively, companies can assess their existing procedures using environmental monitoring reports.

## Techniques of Environmental Scanning and Monitoring



When monitoring environmental systems, organizations have a variety of scanning and monitoring techniques to choose from. Data streams generated at edge sites can produce thousands of data points, often much more than can be processed or stored in the cloud for real-time use, so it's important to consider which techniques are best suited for each organization's industry, priorities and operational needs.

These techniques can be broken down based on three major categories of environmental problems:

- **Monitoring air quality**
  - Using sensors to measure temperature, humidity, or emissions
  - Air dispersal modeling using networks of sensors and Geographic Information System (GIS) models
- **Monitoring water quality**
  - Using sensors to monitor temperature, chemical composition and radioactivity
  - Environmental sampling to measure biological and chemical parameters
- **Monitoring soil quality**
  - Grab or composite sampling to measure organic material, contamination, pH levels, or biodiversity
  - Using remote sensors, electromagnets and GIS to measure salinity
  - Erosion and instability monitoring
  - Soil compaction testing

# Examples of Environmental Monitoring Systems



The availability of remote monitoring solutions and new wireless technology has made it possible for companies in oil and gas, manufacturing, agriculture and even healthcare to gain value from environmental monitoring. Using IoT-based environmental monitoring systems [link to IoT Based Environmental Monitoring once published], businesses can implement proactive environmental monitoring and assessment into their on-site management and operational processes.

And as the following examples of environmental monitoring systems will show, adopting these IoT-based monitoring systems can help businesses accelerate and improve their response to situations that need immediate attention (such as leaks or equipment failures)

and long-term issues (like pollution and changes in water supply conditions).

## Pollution Monitoring Systems



Pollution monitoring has become an incredibly valuable tool in manufacturing, civil planning and agriculture. These systems can allow organizations to observe, measure and even mitigate pollution and contamination that affect both natural and manmade water stores, air quality and soil quality. Monitoring the acidity and overall chemical composition of these environmental elements can provide both private and public organizations with valuable information – but they also need the ability to process and react to that information quickly.

When these environmental monitoring capabilities are integrated and managed via IoT platforms, companies and local governments can react faster to pollution's effect on project timelines, equipment uptime, public health, worker safety and sustainability efforts. For example, construction companies and agricultural operations that require environmental monitoring impact assessments to begin and complete regulated projects can implement continuous environmental monitoring to always remain aware of and responsive to site conditions.