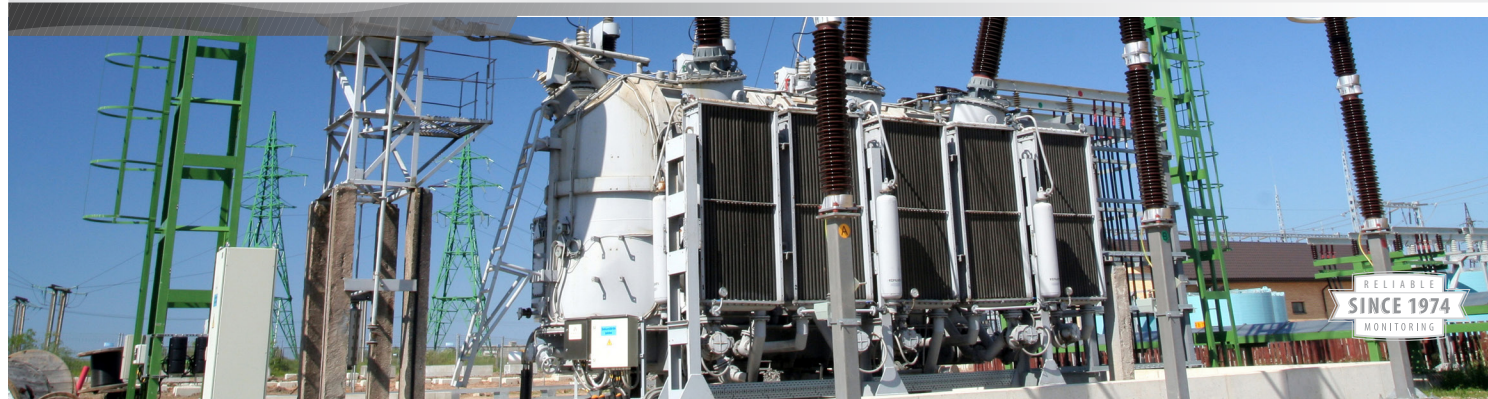




Utilities and Energy

Measurement and control for the power industry



Campbell Scientific's measurement and control systems provide reliable and versatile data collection at a variety of utilities and energy facilities. Whether your application requires long-term, remote monitoring, or monitoring and control based on complex logic, our systems provide accurate and reliable results. Our data acquisition systems

monitor conditions at power generation plants (hydroelectric, solar, and wind), terminals, substations, oil and gas pumping facilities, commercial and residential consumer sites, and along transmission lines. Key components include dataloggers, sensors, and communications devices, which are customized for each application.

MAJOR SYSTEMS

UTILITY-MET100

Utility-Grade Weather Station for SCADA Operations



| | Measurements | | Datalogger | Power | Communications |
|--|---|---------------------------------|------------|------------------|---|
| | Typical | Optional | | | |
| | air temperature, relative humidity, wind speed, wind direction, precipitation, barometric pressure, solar radiation | back-of-solar panel temperature | CR1000 | AC, DC, or solar | Modbus, multidrop, cellular, TCP/IP, fiber optic, radio, satellite, Wi-Fi |

Custom Systems

We offer a variety of products that can be used to create custom systems. Please don't hesitate to let us help you configure a full system that meets your exact needs.

Dataloggers

Our dataloggers can make and record measurements, control electrical devices, or both. Their multifaceted capabilities include functioning as PLCs or RTUs. They have many different channel types, allowing nearly all sensor types to be measured on a single unit. For example, one datalogger can measure voltage, solar radiation, temperature, and gas flow, while controlling a number of peripheral devices. Wind vector, vapor pressure, wet-bulb temperature, BTU or kWh production, and sample on maxima or minima are standard in the datalogger instruction sets. Our dataloggers interface directly to most sensors, eliminating external signal conditioning.



Data are typically output in the units of your choice (e.g., wind speed in mph, knots, m/s). Measurement rates and data recording intervals are independently programmable, allowing calculation of 15-minute, hourly, and daily data values from 1-minute or 1-second measurements. Our dataloggers can also control external devices, such as valves and samplers, based on time or conditional events. Atypical events can trigger alarms and cause additional data to be recorded. Channel capacity can be expanded using multiplexers.



Sensors

Almost any sensor can be monitored by our dataloggers, allowing the system to be customized for each application. Sensors often measure temperature (air,



water, equipment, and product), solar radiation, flow (gas and liquid), wind speed and direction, liquid level, electrical current, resistance, power, and voltage.

Communications

Multiple telemetry and on-site options for retrieving data or reporting site conditions allow our systems to be customized to meet exact needs. Communication options include serial, radio, telephone, cellular phone, voice-synthesized phone, satellite, field

display, fiber optic, Wi-Fi, and Ethernet. Systems can be programmed to send alarms or report site conditions by calling out to computers or phones. Compatible communication protocols include PakBus, Modbus, DNP3, TCP/IP, FTP, SMTP, and CanBus.

Utilities and Energy Case Studies

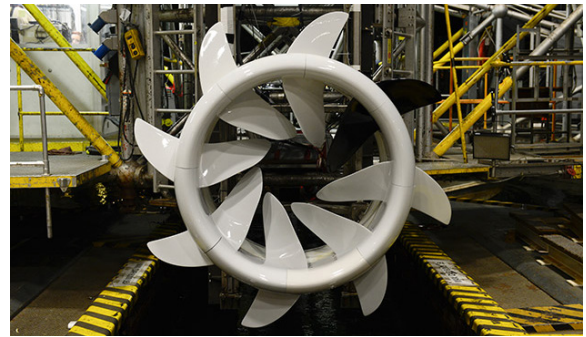
Our systems have helped a variety of organizations reach their goals. The following are a couple of these:

Our CR9000X datalogger monitors a hydrokinetic device that converts the energy of waves and currents into electrical power.

www.campbellsci.com/alaska-hydrokinetic-energy

Campbell dataloggers, sensors, and software were used to assess solar energy resources in South Africa.

www.campbellsci.com/africa-solar-energy



Hydrokinetic energy is ideal for rural Alaskan villages that are located along rivers and are off-the grid.

Monitoring Applications

The open design of our systems allows them to be used in a broad range of applications:

Solar

- › Average radiation
- › Total radiation
- › Hours of charging/day
- › Charging rate
- › kW produced

Hydroelectric

- › Flow
- › Pressure
- › Hours of charging/day
- › Water used
- › kW produced

Oil and Gas

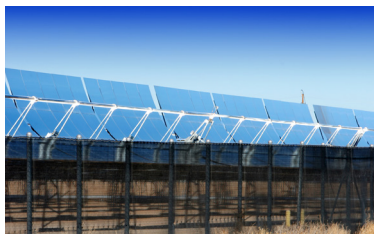
- › Temperature
- › Pressure
- › Flow
- › Distribution control

Research

- › Alternative energy
- › Feasibility studies
- › Fuel type comparison in same environment

Electric

- › Wattage
- › Time of maximum use
- › Equipment efficiency
- › Transmission-line monitoring
- › Current
- › Resistance
- › Voltage



Wind

- › Wind speed
- › Wind direction
- › Standard deviation
- › Gust
- › Percent of time above threshold
- › Structural loading
- › Stress
- › Cooling
- › kW produced

