



Internet of Things could be key to IT's response to climate change



Credit: [The Flower Fields](#)

How IT execs can protect their companies from the effects of global warming and create new business opportunities.



By [Julie Sartain](#) | [Follow](#)

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Scientists announced last month that 2014 was the planet's warmest year on record, sparking renewed debate in Washington about the causes of global warming and what to do about it. But global warming isn't just a political issue, it's an IT issue as well.

No matter what your personal beliefs are, IT execs would be remiss if they didn't think about global warming in the context of [disaster recovery](#), just as you would if your company were located in a region prone to hurricanes or earthquakes. And beyond that, global warming could present an opportunity for you to lead your company into new growth areas.

"I'm not here to say whether global climate change is happening or not," says Whit Andrews, vice president and distinguished analyst at Gartner. "Natural disasters occur regardless of global climate change. Whether anthropogenic or not, business opportunities are there regardless of the cause. Instead, companies should recognize that this creates opportunities to create products and services that were not there previously."

He adds, “Companies need to discuss it, research it, and establish scenarios in which global climate change occurs, then develop new technologies and Internet of Things (IoT) tracking and monitoring solutions to prevent and/or mitigate these adversities. Any major climate change event will have a direct impact on customers. Corporations must be ready to address how these events will affect customers, and then provide the appropriate products and services.”

So, what are the effects of [global warming](#)? We all know about rising sea levels, but what if you don’t live along the coast? According to the Intergovernmental Panel on Climate Change, heat waves, floods, droughts, and storm surges are some of the likely effects of unpredictable climate spikes.

IoT and drought in California

For example, the current drought in California triggered a state of emergency that left farmers, wineries, and all other agriculture businesses without enough water to sustain their crops.

The Carlsbad Flower Fields, which are farmed by Mellano & Company, hired the California-based Covell Group to help them deploy a smart irrigation system that measures soil water levels, alkalinity, and other crucial information on its 54-acre field.

Soil monitoring sensors were placed throughout the farm. A controller and communications equipment were housed in a metal cabinet, along with a ZyXEL’s ZyWALL2WG firewall/VPN gateway, which securely feeds all the sensor data to Mellano’s data center, according to company President Danny Covell.



In addition to wired Internet access, the system also provides a 3G/4G cellular connection via a mobile data card to areas that can’t easily be wired, such as the middle of the farm. With the system in place, Mellano can access all the critical soil data remotely—any time from virtually anywhere.

“This soil monitoring system provides over 10 percent water savings for Mellano & Company; a savings that surpassed the investment in equipment, while simultaneously conserving water; and the controlled irrigation system has improved yields and maintained the quality of soil,” says Covell.

Sensor sensibility

Farms aren’t the only places susceptible to the impact of global warming. “The need for cities to prepare and respond to issues related to climate change, congestion, and natural or man-made disasters is critical,” says Alicia Asin, co-founder and CEO of Libelium.

Libelium, based in Spain, creates open hardware and wireless-sensor network technology used in smart cities and other [Internet of Things](#) (IoT) projects. Libelium works with large system-integrators such as IBM, Telefonica I+D, universities, and cloud-solution providers such as Axeda, ESRI, Sentilo, and ThingWorx.



The end-customers are cities, factories, universities, public authorities, agriculture cooperatives, livestock management, etc.

Libelium's chief product, the Wasmote sensor node platform, integrates more than 80 different sensors that can be used to monitor the environment, water, cities, parking, agriculture, security, ambient control, radiation control, industrial automation, building automation, military and automobile applications, factory floor environments, and smart metering.

Barcelona was the first municipality to develop its own smart-city, cloud-software platform, called [Sentilo](#), using Wasmote sensor nodes to monitor noise and air pollution in a large public square in the city. "The main goal of the Sentilo platform is to make it easy for cities to integrate data from different sensors and facilitate smart-city deployments," says Jordi Cirera, project manager for Barcelona City Council. "With Sentilo and Libelium's products working together in an open, interoperable, sensor infrastructure, new opportunities are now open to any city that prefers open, non-proprietary solutions."

Libelium's smart parking and environmental-monitoring platform was installed in the city of Santander. Smart parking helps drivers locate free parking spaces quickly, reduces CO2 emissions and noise pollution, minimizes traffic, and saves fuel. And more cities are getting connected every day.

Opportunities for entrepreneurship

A Drought Impact Study conducted at UC Davis estimated the California water shortage would cause agricultural losses of at least \$2.2 billion and terminate more than 17,000 seasonal and part-time jobs in 2014. Stanford University's Climate and Earth System Dynamics Group is analyzing this drought crisis using data from a variety of sources.

"Real-world observations—assimilated using equipment ranging from simple 'bucket' rain gauges to technologically advanced Earth-orbiting satellites—help us place the current drought into historical context," says Daniel Swain, Dept. of Environmental Earth System Science at Stanford. "Other scientific tools—such as complex mathematical models, run on supercomputers at major international research institutions—allow us to run simulations and conduct experiments to test hypotheses about the Earth's climate and how it is changing over time."

Swain explains that other aspects of coping with the consequences of the drought require more constant real-time monitoring, using an entirely different array of sensors (stream gauges, data about groundwater losses from gravity-measuring satellites, fire weather information from weather stations on the ground, etc.). Studies like this are available on the Stanford website for California companies to research and use as a base-model for developing new climate change technologies, but also to inspire other companies and state organizations to get involved.

Steffen Sorrell, senior analyst at Juniper Research, adds that while the issue of climate change may be still under debate, these extreme weather conditions plus rising populations and greater demands for resources (especially food) have increased pressure on a global scale. For agriculture, the Internet of Things—where networked sensors enable monitoring of the soil, external environment, farming machines, and vehicles as well as resources required for the cultivation of food—is the ideal tool for sharing data and facilitating intelligent, analysis-based decisions.

"These automated systems and consequent data troves provide more efficient farming practices such as improved crop planning and yield according to soil quality, reduced vehicle downtime through automated parts and repair ordering, reduction in water use, feed tracking and planning, and so on. Traditional farming (and, therefore, industry profits) is



hugely dependent on the ability to manage crop and animal wellbeing through to the time of sale. The introduction of an IoT infrastructure into agriculture creates far greater visibility into the farm than was ever previously possible,” Sorrell says.

Public-private partnerships

When organizations in places like Oregon, Maine, Massachusetts and Vermont collaborate with corporations such as Intel, Symantec, Google, Microsoft, and others—good things happen. For example, the Technology Association of Oregon (TAO) has many hundreds of members throughout Oregon and southwestern Washington with ties to the software and technology industries.

When Facebook opened its Prineville, Ore., data center in 2011, they designed it to maximize energy efficiency. Facebook shared this technology with the industry as part of the Open Compute Project, a community effort designed to spark a collaborative dialogue for openly sharing ideas, specifications, and other intellectual property to maximize innovation—all part of the IoT philosophy.

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“We believe it’s important to protect our natural assets,” says Skip Newberry, TAO president. “TAO works closely with our member companies to support new initiatives and programs for greener businesses, and we’re proud of our local leaders who have stepped forward to curb climate change and carbon pollution using their homegrown technologies and smart business investments.”

Sam Blackman, CEO and co-founder of Elemental Technologies, agrees with TAO and explains that climate change creates real risks to the livability of Portland, but also threatens his company’s ability to compete effectively in the global marketplace. By taking steps to address this now, residents protect the Oregon way of life—their clean air, open spaces, and abundant water—but also ensure Oregon’s economy and its position in a very competitive market. “We must work together to conserve our natural resources and continue to develop, collaborate, and share technologies to achieve these goals.”

Get customers Involved

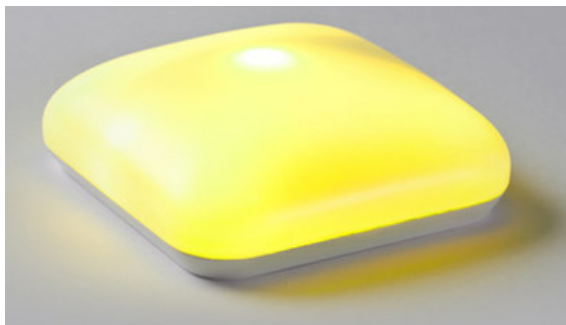
Maine’s tourist industry is threatened by climate pollution and climate disruption, which are harming the state’s coastlines, fisheries, forests, and natural resource-based economy. According to Lisa Pohlmann, executive director of the Natural Resources Council of Maine, the solution is relatively simple: reduce demand for energy through comprehensive energy-efficient measures, and shift the sources of energy from fossil fuels to cleaner renewable power sources.

“One example,” says Pohlmann, is Maine’s transition to a ‘smarter grid’ with more distributed production of energy and a two-way flow of information with energy consumers. This means energy users will have more capacity to generate their own power, primarily through solar photovoltaic electricity-producing installations, which are undergoing a revolution.”

At the same time, IoT options that help users monitor and control appliances (to use electricity only at certain times of day)—from electric vehicles to water heaters to central air will be available. Almost all Maine electricity customers now have digital smart meters, which will eventually send consumers and/or their appliances, direct signals regarding when to use power and when not to.

“Companies that are doing these things today are empowering their customers in two ways,” says Jessica Groopman, senior researcher at Altimeter Group. “The first is through the ability to monitor overall energy usage, to drill down into times of day, which devices, etc., and to compare things like electricity vs. natural gas.

The second is through a decision-making service that compares your energy efficiency to your neighbors and asks you whether you’d like to alter your energy settings in specific ways, like turning off lights in vacant rooms, etc.? “The possibilities for monitoring services are infinite,” she says.



Hydro One joule

Groopman explains that Hydro One, an electric utility based in Ontario, Canada, partnered with Ambient Devices to provide customers registered in its Peaksaver PLUS program with an “energy joule” device—a color-changing orb that alerts users of real-time electricity prices and consumption information. By communicating with the radio transmitter in customers’ Smart Meters, the orb changes colors—green, yellow, red—based on energy costs per kWh and how

it fluctuates during peak hours. One study revealed that the device optimized up to 25 percent in power savings.

Summary: Advice for All Organizations

“One of the most important things organizations can do is identify a set of possible signals that could have an impact; whether on supplies, product development, cost, revenue, or customer experience. The opportunities of sensor data are to collect and generate actual data that describes what is happening, to replace assumptions about what might be happening, with information about what is actually happening,” says industry analyst Susan Etlinger at Altimeter.

The data can be simple, Etlinger explains; temperature, rainfall, soil composition levels, product usage (heating, air conditioning, etc.). The transition organizations need to make is to use scientific methods and other IoT technologies to better understand which signals drive the business and which do not.

This requires setting an objective, then a hypothesis, and then testing against that to benchmark what is normal for a particular set of data and what is not. Understanding the norm such as the peak-to-average ratio of water usage helps identify outlying data that may signal an important insight. “The key is to then build algorithms that incorporate these benchmarks to suggest—even predict—future activity and, eventually, their impact on other processes,” she concludes.

According to Gartner, regardless of where commercial enterprises currently expend effort and attention, ultimately global climate change will affect its strategies. Every vendor in the IT ecosystem will discover opportunities, and every commercial enterprise will discover that, if it uses the right technology, it can deploy that technology for its own benefit.

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