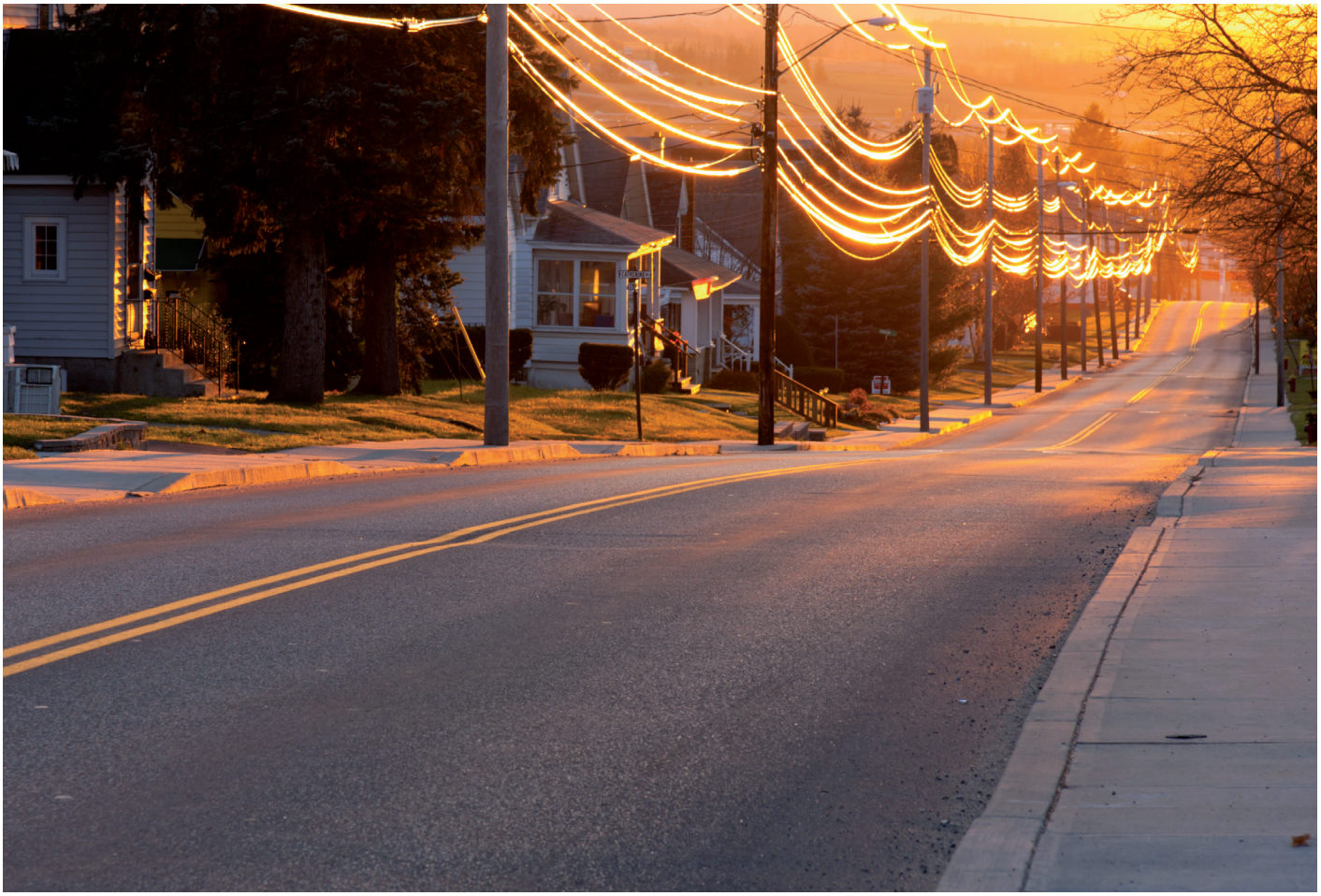
DCIM: The enabling technology for smart grid in the data center



Even as data centers account for a larger share of total electric consumption, the cost of electricity continues to rise. As a result, the ability to optimize operations for energy efficiency as well as processing capacity is quickly becoming a strategic imperative.

That's why there is so much interest in the use of smart grid technologies. They enable high-level use of techniques that are central to achieving the flexibility a data center needs to achieve the often-conflicting goals of increased computing power and decreased demand for electricity. The most established techniques include:

- Peak shaving to avoid spikes in demand for power that might otherwise incur penalty rates for electricity;
- Reducing load on request when the utility faces especially high demand, or to offset utility spinning reserve requirements;
- Load shifting that moves data center activity to off-peak hours – or to other physical locations where momentary demand for power is lower.

None of these techniques are new; at some level, many data centers are already using these and others to manage energy costs.

But using them to optimize operations – to maximize energy efficiency without sacrificing service levels – requires technology that many data centers don't have.

"As a concept, peak shaving, for example, is really simple," offers Gary Rackliffe, VP-Smart Grids North America at ABB. "When you're on the verge of drawing more load than your contract allows, you take actions to reduce your demand. It only gets complicated in the execution."

That's because there are so many variables involved. Is the peak a result of high computing demand, high temperatures or some other factor? What is the best combination of actions to mitigate it – from powering down servers to pre-cooling computer rooms to tapping short-term alternative power sources – and how much time to you need to implement them?

Being able to make these decisions effectively requires three high-level capabilities:

1. Comprehensive visibility: Real-time telemetry to provide moment-to-moment knowledge of exactly how much energy is being used and what it's being used for.

2. Understanding: The ability to analyze the constant flow of big data to create useful forecasts, conduct what-if modeling, and access market intelligence so the right techniques can be deployed at the right moment as conditions are continually changing.

3. Centralized control: The ability to manage all of a data center's systems through a common interface, and with a level of integration and automation that improves response time to changing conditions – allowing the data center to operate proactively to manage computing capacity as well as demand for energy.

But if peak-shaving and load-shifting get complicated in the execution, so do such concepts as visibility, decision-support and system integration. "These things don't come in a box," says Mark Reed, Director of ABB's North America Data Center Initiative. "You can't just plug in a 'visibility module.' You built it. That's why Data Center Infrastructure Management (DCIM) is now an imperative for any data center. It's the platform on which visibility, analysis and control are built."

"The smart grid exists to provide the information, insight and control that's needed for society to squeeze the most advantageous use out of every kilowatt,"

Using ABB's Decathlon DCIM as an example, here are a few key components that play a role in accessing smart grid capabilities:

Asset and capacity planning, to optimize space, power and cooling capacity through intelligent placement of IT assets.

Power management, to monitor and control power devices, power systems and meters – including substation, microgrid and on-site power generation – to maintain safe and reliable power distribution and consumption.

Energy management, combining real-time energy consumption data with energy contract information, real-time pricing information and demand response to allow real-time mixing of various resources to optimization energy costs.

Resource forecasting and energy planning through a subscription service that facilitates participation in energy markets – thus increasing the range of energy options available at any time.

"The smart grid exists to provide the information, insight and control that's needed for society to squeeze the most advantageous use out of every kilowatt," says Rackliffe. "It's a very advanced set of capabilities, and using it takes specialized tools. DCIM is the tool for data centers."

For more information please contact:

ABB Data Centers
12040 Regency Parkway
Cary NC 27518
Phone: +1 800 HELP 365

www.abb.com/datacenters

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