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How Open Automation Enables Industrial Sustainability

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The Connection Between Open Automation and Sustainability

Schneider Electric's Michael Martinez explains how open automation systems—like those supported by UniversalAutomation.org—enable and support sustainability, not just for production operations, but for the automation systems themselves.

By David Greenfield, Director of Content

The idea of industrial sustainability is hardly a new issue. For at least two decades, the push for industrial sustainability initiatives has focused on the bottom-line benefits sustainability can deliver through less waste and improved energy efficiencies. More recently we've seen heightened concerns about climate change from both the marketplace and the labor force driving industry even further toward more sustainable operations and practices.

To better understand the ever-evolving intersection of sustainability and automation, we connected with Michael Martinez, Foxboro DCS (distributed control systems)

global leader at Schneider Electric, for a recent episode of the "Automation World Gets Your Questions Answered" podcast series.

We began our discussion by getting Martinez's take on the current state of automation technologies in terms of how they're positioned to support industry's digital transformation—a critical component of any industrial sustainability effort.

Michael Martinez, Foxboro DCS global leader at Schneider Electric.

Looking across the economic, environmental, and social/human aspects of sustainability, we can start to see the more valuable and unique role of automation, he said, citing a recent report by Omdia which found that 94% of respondents believe that industrial digital transformation will have a moderate to high impact on their operations in the next two to three years, but only 55% of those respondents said the DCS and other automation systems they use are only "somewhat equipped" to support that digital transformation.

"The automation systems [most companies are using today] are not capable of achieving the business outcomes they're after," Martinez said. "But it is important to recognize that they see investing in these technologies will help them to achieve those [desired] outcomes. I think it's a double-edged sword in the sense that, yes, it's positive that industry sees technology making a vital impact on their operations; but the technology that many are using today is not ready to achieve those outcomes."

Martinez said some of the biggest disconnects in the automation systems many companies currently use involve interoperability, connectivity, and cybersecurity concerns.

Closing the gaps with open systems

With these disconnects in mind, Martinez noted industry's trend away from closed, proprietary systems and toward more open systems. Schneider Electric is supporting UniversalAutomation.org in this effort and Martinez explained how Schneider Electric sees the connection between the push toward open industrial software and sustainability.

"If you look at the two pillars of economic and environmental sustainability, software-centric automation enables you to decouple hardware and software to leverage best-in-class technology and get that technology applied into your processes faster to achieve the outcomes you're after," he said.

According to Martinez, the idea of using non-proprietary systems that run on standards-based configuration tools to decouple hardware and software will "enable us to democratize innovation. And by that I mean we can get these tools to the masses so that they no longer have to live in the halls of PhDs and experts, enabling operations management and personnel to contribute their expertise to the industrial automation

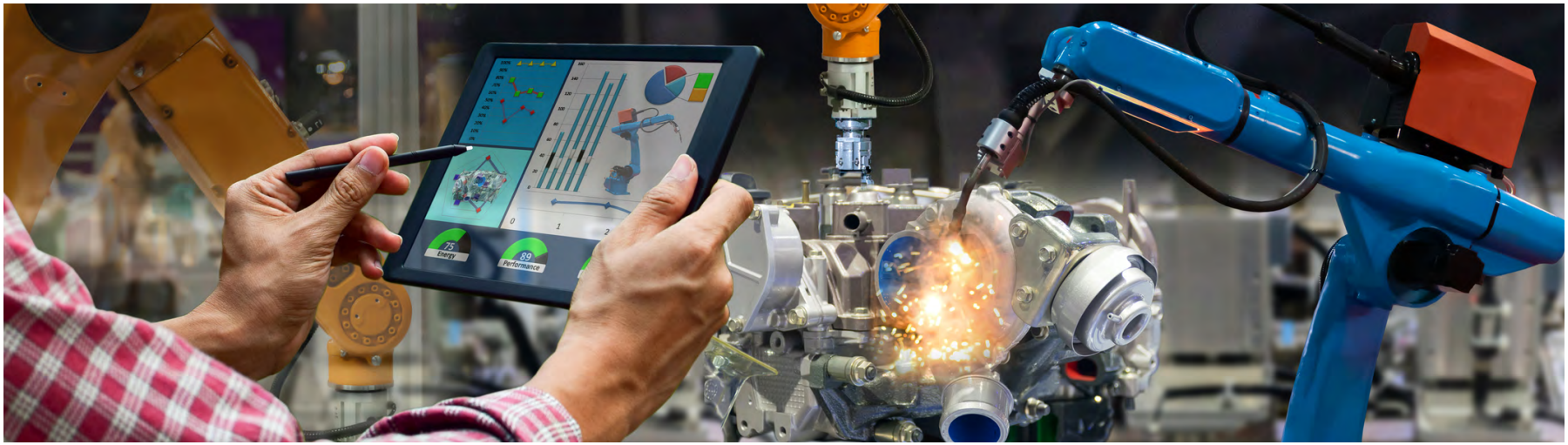
perspective," he explained. "With this change, we'll start seeing the best ideas winning because everybody can contribute, regardless of their location, in this more open, inclusive world of Universal Automation-based systems."

The impact on sustainable operating processes

Explaining the connection between open systems and specific sustainability initiatives, Martinez said, "Historically, we've looked at optimization and reducing waste and consumption through our normal automation platforms, which can address economic and environmental sustainability factors. But being able to address emissions and the overall cost of running the operation helps us begin to see the future of a sustainable automation system."

As an example, Martinez noted the ability to use runtime software on different types of hardware to flatten your network. Before open automation systems, users would have to integrate different systems with gateways and mapping tags. Now they can be integrated into one solution running one operating system with one application. This reduces the need for hardware, space, and energy.

"Having one common platform allows users to operate a facility throughout its manufacturing processes—from raw materials all the way to finished product, packaging, and shipment," said Martinez. "That enables users to think about how to optimize skill sets. Being able to democratize innovation means that we can have skills and tools that more people have access to. And from an emissions and supply chain perspective, we can optimize procurement more easily to target more locally acquirable supplies. That's how it becomes a whole different way of thinking about [the connection between] sustainability and automation systems; because it's not just about what can be applied to [existing] processes, but how we design, configure, and use them to actually have a more sustainable impact."



Responding to Disruption with Sustainable Technology and Leadership

Schneider Electric lays out its sustainability and digital transformation strategy to help industry address the ongoing series of disruptions impacting business.

By David Greenfield, Director of Content

All disruptive change goes through three phases: first it's considered crazy; then it's considered dangerous; and finally, it's accepted as something that obviously needs to be done.

This is how Aamir Paul, president, Schneider Electric North America, put into perspective the changes industry is facing around digital transformation and sustainability during the company's Innovation Summit 2022 in Las Vegas. He added that, if you wait until it's obvious, it may be too late to react. "And it's already obvious," he said, "so we have to accelerate. What we thought we could do in years, we have to do in months."

Jean Pascal Tricoire, chairman and CEO, Schneider Electric, underscored Paul's points by noting how we've all faced a succession

Aamir Paul, president, Schneider Electric North America

of disruptions over the past three years: COVID-19 driving digitalization to support remote work, geopolitical tensions, an energy crisis that is the worst we've seen since 1970s leading to exponential growth in electrification, and noticeable climate impacts driving sustainability initiatives.

"The world will be much more electric in future than it is today," said Tricoire. The world's use of electricity has been growing by five terawatt hours every 10 years for the past couple of decades, he noted, but that will double to 10 terawatt hours in 2020-2030 and then quadruple to 20 terawatt hours between 2030-2040.

Jean Pascal Tricoire, chairman and CEO, Schneider Electric

With price of energy expected to stay high at least for the near term, Tricoire stressed that industrial companies must focus on a quick return on investment for their technology investments. "You can have ideas [about how to be more energy efficient and sustainable], but you need technology to support those ideas. And those technologies exist—70% of current carbon emissions can be removed today with existing technology," he said.

"This is possible because we can now connect everything," said Tricoire. "And the blood of this transition is data."

Creating the toolbox

In response to these changes, Schneider Electric has identified five integration steps it considers essential to industrial efficiency:

1. Align energy and process automation efficiency;
2. Connect every end point on shop floor to the cloud for data storage and analysis;
3. Design and build from the start with a view toward future operations and maintenance in mind;
4. Connect each facility to a unified operations center for broad visibility insights; and
5. Move from opportunistic supply chain connections to sustainable and integrated supply chains.

Tricoire noted that Schneider Electric's Ecostruxure, Aveva's software, and OSISoft's Data Hub (now called Aveva Data Hub) can be used to connect operations, systems, and facilities to address all five of these steps by delivering full data transparency.

Schneider Electric can provide this array of technology through Aveva's acquisition of OSISoft in 2021 and Schneider Electric's pending acquisition of Aveva, which is expected to be finalized in 2023.

70% of current carbon emissions can be removed today with existing technology.

"We've created a toolbox to make this possible, Tricoire said. "And the first priority is to aggregate all data from your operations in one specialized repository that makes it easy to maintain at scale."

He said OSISoft Data Hub is this "specialized repository" to connect all legacy devices, including building automation, control systems, and data centers. Having all data aggregated in this way enables developers to create their own software as needed, deliver augmented reality to operators and maintenance personnel operators, and gives them the ability to use additional software from any source. The data analytics and visualization offered by OSISoft Data Hub is agnostic (as to the source of the data), cloud-based, and open, which means it can be used to build digital twins not just for your machines or plant, but for an entire enterprise with Ecostruxure as well as deliver a plug-and-play architecture for process controls and Internet of Things connectivity.

Schneider Electric's SureSeT MV switchgear

Beyond the higher-level technologies like Schneider Electric's Ecostruxure, Aveva's Insights, and OSISoft Data Hub, Schneider Electric also highlighted the company's focus on driving connectivity and interoperability down to field level devices. For example, Schneider Electric's SureSeT MV switchgear and EvoPacT circuit breakers for medium voltage power distribution and control. New digital features of these devices include monitoring and control of equipment health, predictive maintenance, and operational efficiency. Embedded sensors on these devices detect problems and predict potential issues based on real-time asset insights, enabling condition-based maintenance. Also, with SureSeT's wireless equipment operation and monitoring capability, technicians can remain at safe working distances. According to Schneider Electric, these devices can last up to 40 years (through 30,000 operations), which is 3x the industry standard.

Technology is just one piece of the puzzle

Given the availability of technology to address the core issues facing industrial businesses today, Paul made it clear that technological capability is no longer a barrier for companies adapting to the disruptive changes they face. “The technologies needed to address these changes already exist,” he said. “Instead, it’s a leadership issue to create the culture change needed to respond.”

Debbie Donovan, senior vice president of environment, health and safety, Moderna

Debbie Donovan, senior vice president of environment, health and safety at Moderna, was featured at the Schneider Electric Innovation Summit as an example of a company whose leadership focuses on levering technology to address change through executive leadership.

Donovan noted that, prior to COVID, Moderna was a relatively small company—with just a few hundred employees in 2019—developing mRNA technology for flu vaccines. Now, just three years later, they employ nearly 4,000 people.

Highlighting the speed at which Moderna grew, Donovan said Moderna went public in 2018 and built its first factory in 2018 with LEED concepts in mind. “Now we’re looking to build out new factories with net zero in mind. Part of our culture is to push past what’s considered possible and act with urgency. Some companies creating vaccines have 15-year timelines, we did it in 11 months.”

Creating the Smart, Sustainable Factory

Manufacturers on a journey to lower carbon emissions and optimize energy use need to measure consumption from the supply chain to the line, the cell, and the product being produced.

By Stephanie Neil,
Editor-in-Chief at OEM Magazine

In 2020, Schneider Electric's Lexington, Ky., facility—a 60-year-old brownfield facility where safety switches and circuit breakers are produced— was recognized as a "Lighthouse Factory" by the World Economic Forum (WEF), which, together with McKinsey & Company in 2018, created the Global Lighthouse Network initiative. "Lighthouse Factories" are companies that effectively use Industry 4.0 technologies to drive digital transformation. As a result, these companies are recognized as beacons for others to follow.

The Lexington factory's digital energy management strategy leverages IIoT (Industrial Internet of Things) connectivity with power meters and predicative analytics to capture greater energy consumption granularity and optimize energy costs. As a result, the company has been able to reduce

At the Schneider Electric Lexington smart factory, engineers and plant managers use Aveva Insight software to view and optimize consumption across the factory floor.

energy use by 26%, net CO2 by 30%, and water use by 20%. Based on that progress, the Schneider Electric factory was selected by WEF in 2021 as one of only three facilities in the world to be named a "Sustainability Lighthouse."

"It's a testament to the work we've been doing in Lexington, and a reflection of the broader Schneider mission," said Luke Durcan, Schneider Electric's director of the company's EcoStruxure platform. "We have been on the decarbonization sustainability path for many years."

Decarbonization is part of the company's commitment to Sustainable Development Goals (SDGs), a universal call to action by the United Nations which outlines a collection of 17 interlinked global goals designed to be a "blueprint to achieve a better and more sustainable future for all." Schneider Electric is engaged in efforts to accomplish all 17 SDGs, as well as five sustainability megatrends related to climate, the circular economy, ethics, health and equity, and development.

For its core business, Schneider is transitioning to more electric, digital, decarbonized, and decentralized energy. The company notes that it is committed to carbon neutrality at its sites and in its ecosystem by 2030. "As a manufacturer of things, this is aggressive," Durcan said.

As aggressive as Schneider Electric's actions around sustainability are, more companies are following a similar path. According to a Capgemini Research Institute report on sustainable operations, of the 960 executives surveyed, 91% aim to achieve 100% renewable electricity and 87% plan to be carbon neutral by 2040.

Achieving this, however, takes intent and technology. "We have a decarbonization pathway which is a four-stage, 12-point plan to understand the baseline and set targets," Durcan said. And Schneider Electric uses some of its own technology to understand the actual base level in the plant. This technology includes its PowerLogic power meters, the EcoStruxure Power Monitoring Expert energy visualization and analysis tools that collect metering and machine data at the control layer, and Aveva Insight—a cloud platform that uses artificial intelligence to create actionable information to improve asset reliability and operational performance from enterprise systems, MES (manufacturing execution systems), time series, and non-sequential energy data.

Schneider Electric says its manufacturing customers are using the same technologies for their own sustainability initiatives. "To say there's been an explosion in the last 12 months is an understatement," Durcan said. "There's been a seismic shift in people's decarbonization efforts."