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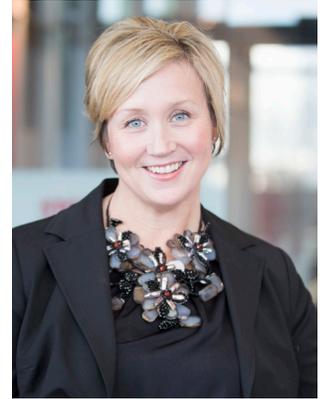
POWER MOVE

Using the latest technologies, Johnson Controls charges ahead in automotive battery development

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Johnson Controls executive Joe Walicki

EXECUTIVE PROFILE



BACK ON HER OWN TURF

After working for Summerfest earlier in her career, **Sarah Smith Pancheri** is back as vice president of sales and marketing. She's reconnecting with businesses that support the 11-day event, and promoting the music fest's 50th anniversary in 2017.

OLIVIA BARROW, 10

WORKING THE ROOM

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HEALTH CARE

Body of work

In Duncan Group's latest documentary, viewers will meet "The First Patient," the human cadaver from medical schools' appropriately named "Gross Anatomy" class. **RICH KIRCHEN, 8**



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Joe Walicki...“All of a sudden your market goes from \$7 billion to \$44 billion, that’s pretty exciting.”

SCOTT PAULUS

Juiced up for decades of growth

Johnson Controls plans for segment of \$130B battery market

BY OLIVIA BARROW
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Toyota made headlines around the world when it announced last October it expects to almost exclusively produce electric and hybrid vehicles by 2050.

To the casual observer, that might sound like the cue for automotive industry suppliers to switch gears and devote all research and development to electrification techniques, lest they go the inevitable “way of the

internal combustion engine.”

But at Johnson Controls Inc., research into improving lead acid and lithium ion batteries for internal combustion engines is at an all-time high.

And analysts think the company is onto something.

“Internal combustion engines are not going to go away anytime soon,” said Joe McCabe, president and CEO of AutoForecast Solutions LLC, an authority on the future of the automotive industry.

Glendale-based Johnson Controls is the current market leader for lead-acid automotive batteries, owning about a third of the

market, which brought in about \$7 billion in sales in 2015.

And if researchers at the company succeed in staying one step ahead of the game, the company could be sitting on top of a \$44 billion market that could become the next growth engine for the company following the spinoff of the \$20 billion Automotive Experience business.

Here’s how that breaks down. Power Solutions president Joe Walicki sees the battery market that Johnson Controls could operate in near term involving the automotive, heavy truck and equipment, and stationary markets. The automotive lead-

acid battery market – including trucks and motorcycles – currently is at \$27 billion. Add in batteries for industrial machinery like forklifts, telecom towers and data centers, and that market grows to \$37 billion.

And then there's the emerging distributed energy storage space, which Johnson Controls recently announced it is beginning to explore, and hybrid and electric vehicles, where Johnson Controls currently sells small volumes. That opens the market to \$44 billion, capturing the energy storage requirements for commercial office buildings, renewable energy installations and future generations of vehicle batteries.

"When you start looking at the set of capabilities we have and how we can leverage them to grow, and all of a sudden your market goes from \$7 billion to \$44 billion, that's pretty exciting," Walicki said.

And by 2025, the combined market opportunity for these segments is expected to grow to more than \$130 billion.

David Whiston, an analyst with Morningstar Inc. who covers Johnson Controls, said he will be closely following the Power Solutions side of the company over the next few years.

"I love the Power Solutions group," said Whiston. "I think it's the crown jewel of the business."

The distributed energy space is a new frontier, he said. No one



"Five years ago, you would never have predicted that turbo-chargers would have become ubiquitous."

MARYANN WRIGHT,
Johnson Controls Inc.

owns that space – so the market is wide open and tough to forecast.

"It's a bit of a wild card," Whiston said. "There will be a lot of competition both from Asia and also with Tesla."

But on the automotive side, Johnson Controls' strategy in the next two decades will determine whether Power Solutions dominates, or goes the way of the Edsel.

To stay ahead, the company is banking on three things: the typical technological development time-

line in the automotive industry, relatively low fuel costs, and inertia.

AUTOMOTIVE TECHNOLOGY DEVELOPS SLOWLY

"Disruptors don't just happen," said Lisa Bahash, vice president and general manager of Global Original Equipment for Johnson Controls. "In the auto industry, you can bet the next three to four years has already been defined and set in motion. The more innovation-type stuff, that's a 20-year window."

Johnson Controls is developing the next generation of automotive battery technology, unlike companies investing in fully electric vehicles, which are somewhere between next-next generation and next-next-next generation.

"JCI's investment in something that's not hugely disruptive and that could be adopted

▶ JOHNSON CONTROLS: BEFORE AND AFTER SPINOFF

Johnson Controls Inc. will look dramatically different following a spinoff of its largest business segment in 2016.

BEFORE (based on 2015 results)

ONE COMPANY, THREE DIVISIONS

- ▶ **Power Solutions:** \$7 billion
- ▶ **Building Efficiency:** \$11 billion
- ▶ **Automotive Experience:** \$20 billion

NYSE: JCI

CEO: Alex Molinaroli

Headquarters: Glendale

AFTER

Two separate, publicly traded companies, JCI and a name to be determined

Automotive Experience CEO: Bruce McDonald

Automotive Experience headquarters: Milwaukee

Johnson Controls Inc. will continue as:

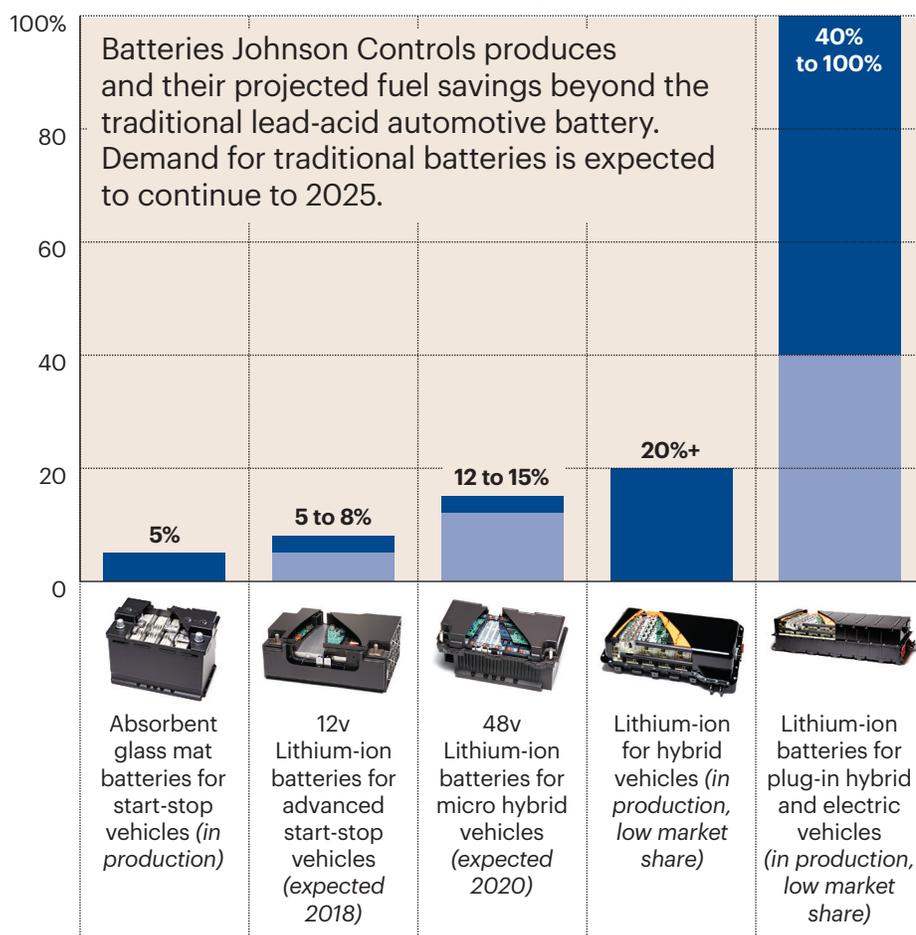
- ▶ Power Solutions
- ▶ Building Efficiency

globally, relatively inexpensively, is the right path," McCabe said.

Automakers want to meet consumer and government demands with their current capabilities. The factories they have now aren't capable of flipping a switch and producing electric vehicles, but many of the improvements to batteries that Johnson Controls is making are easy to implement.

The company is developing products on a continuum from the traditional flooded lead-acid battery, to absorbent glass-mat batteries for start-stop systems, to lithium ion batteries with the ability to provide much more power than today's systems, as well as combination systems that fill the gaps.

The current state of battery development



GIFT OF CHEAPER GAS

If fuel costs stay relatively low, government regulation will be the only driver of improved fuel economy and emissions over the next few decades.

“When consumers vote with their dollars, (fuel economy improvement) is not really the highest item on their list,” said Brian Maxim, vice president of global powertrain forecasting for AutoForecast Solutions.

For consumers to dramatically change their buying habits, gas would have to level off at \$6 per gallon or higher, estimates MaryAnn Wright, vice president of engineering and product development for Johnson Controls.

The technology Johnson Controls has under development can provide the incremental fuel economy savings the U.S., European and Chinese governments are demanding through at least 2025, Bahash said. That’s as high as 80 miles per gallon in Europe, and the U.S. likely will lag up to a decade before it hits those stringent requirements.

That means the “short-term” market opportunity could last at least the next 10 years, during which emerging markets and China are expected to add millions of cars to the entire market, organically increasing the demand for JCI products.

“By 2022, we see a global vehicle market that’s over 18 mil-

lion units more than it is this year globally,” McCabe said. “If they’re still the lead in the global battery side, they’ll be able to tap into the global growth market.”

To radically change their habits, people need to be shocked by some game-changing event or development. Otherwise, they’re most comfortable buying what they’ve always bought: a car that looks, drives and costs similar to what they’ve always driven.

BMW, one of the first manufacturers to bring start-stop technology to the U.S., has met resistance from Americans who don’t think the “Ultimate Driving Machine” should hiccup every time they press the gas pedal, Maxim said.

For Johnson Controls, that resistance to change presents an opportunity, because the internal changes it is investing in will be the most widely accepted by the market.

“As much as the consumer doesn’t know it exists in their driving and it provides added benefit, JCI will win,” McCabe said.

And since consumers aren’t yet demanding the changes, the impetus for innovation lies with Johnson Controls and its competitors.

“We see the suppliers driving the shift,” McCabe said.

A FEW BIG IFS

Johnson Controls’ play for dominance is predicated on a few big ifs. One, that fuel prices stay low. Two, that fuel cell technology stays irrelevant for the next two decades. And three, that building an electric car remains more expensive than an internal combustion engine

for the next 20 years.

“What if there’s a rapid breakthrough in solid-state batteries, and you can get production cost to the point it’s cheaper to make an all-electric car than an internal combustion?” Whiston said. “You don’t want JCI to be left out of that.”

Johnson Controls’ Wright related a story about the turbo-

charger, which she called the most disruptive technology in the automotive industry in the last 25 years.

“Five years ago, you would never have predicted that turbo-chargers would have become ubiquitous,” she said. “They were terrible in the industry. They died. But someone said, ‘if we can get this right, it’s going

to be good.’”

And while turbo-chargers themselves set the stage for the lengthened life-span of the internal combustion engine by allowing for dramatic incremental improvements in fuel economy, the pace of the disruption is a warning: It could happen again, with fuel cells or with electric vehicles.

CLOSER LOOK

Who is Johnson Controls’ Joe Walicki?

BY OLIVIA BARROW
oliviabarrow@bizjournals.com

Joe Walicki is a relative stranger to building and selling automotive batteries. Before moving to Johnson Controls’ Power Solutions group in 2014, he spent the majority of his career in the Building Efficiency business at the Glendale-based company.

But that outsider’s perspective will prove crucial in helping the division access its full potential in the emerging distributed energy market.

“I grew up in Building Efficiency,” said Walicki, who joined Johnson Controls in 1988. “They had some super-exciting growth prospects. When you look at the sheer size of the commercial building market around the world, it’s got an enviable market opportunity.”

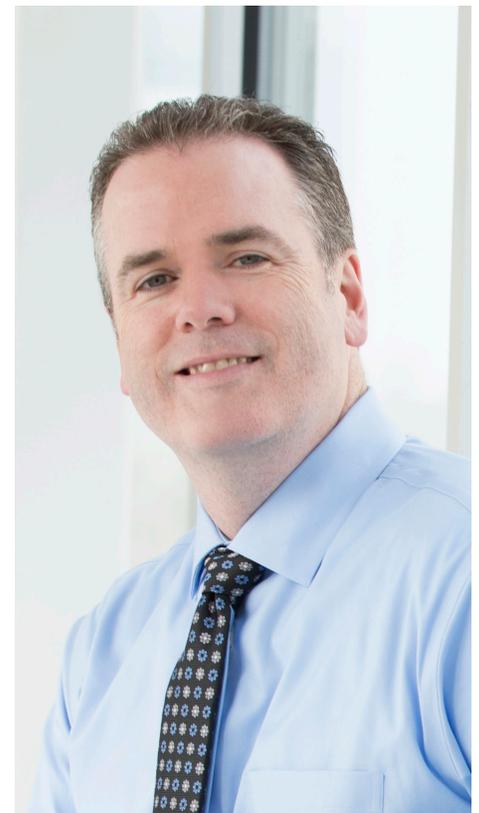
While automotive batteries will remain a huge focus for the Power Solutions division for the next few decades, Walicki will bring his experience to bear in the crossover applications between Building Efficiency and Power Solutions – the distributed

energy business, which Johnson Controls recently announced is a pilot project to help buildings become more efficient through stationary batteries.

“Building owners are trying to do things like frequency regulation, peak demand management,” Walicki said. “If they can use batteries to avoid a spike at any given time, they can use that to minimize consumption and the amount they’re going to get billed over a period of time. That’s where Building Efficiency and Power Solutions have great synergy. We’re barely touching on that right now with distributed energy.”

David Whiston, an analyst with Morningstar Inc., said the new aspect of applying battery technology to the commercial building market amplifies Power Solutions’ growth prospects dramatically, and fits with the mission of a multi-industrial company, which aims to diversify its revenue streams for long-term stability.

“The applications for energy storage aren’t in automobiles, they’re in industrial



Joe Walicki

applications, office buildings and potentially utility companies,” Whiston said, noting that Walicki’s trajectory mirrors CEO Alex Molinaroli’s, who ascended through the ranks of Building Efficiency before moving to Power Solutions.