

OpenBlue

Net Zero Buildings

Operation decarbonization

An eight-step plan for net zero buildings



By Mark Reinbold, Vice President, Global Sustainable Infrastructure and Solutions

The world is moving into the final act of the fossil fuel era. As the curtain falls on the age of combustibles such as oil and gas, we are entering what some policymakers have dubbed the 'Renewables Decade,' with an anticipated explosion in the build-out of solar farms and wind parks in coming years. Meanwhile, businesses, which consume two out of every three electrons on the planet's power grids, are in a race to decarbonize their operations.

The holy grail for many companies is 'net zero' carbon emissions, a state in which the greenhouse gases from activities across their value chain have no net impact on the climate. According to the Net Zero Tracker, which uses data compiled by a team of nonprofits and academics, nearly 700 of the 2,000 largest publicly-traded companies in the world by revenue have committed to a net zero strategy in one of the three categories associated with business operations: Scope 1, 2 and 3.

Spotlight on buildings

Top of the decarbonization list for many companies are the offices, factories and warehouses that serve as arenas of productivity: their buildings. It's a good place to start. Throughout their life cycle, buildings are the source of around 40% of the planet's total energy consumption and 36% of global greenhouse gas emissions from energy use.

Most companies want to move quickly and decisively on the issue because the pressure to decarbonize is coming from several quarters. In the short term, firms are facing onerous transparency requirements, such as the United States Securities and Exchange Commission's (SEC) new rules for environmental, social and governance (ESG) reporting and climate disclosures. And the legislative burden will not grow any lighter: Most countries have passed, or are considering, stricter laws on energy efficiency. Consumers and shareholders are also growing more adamant that companies decarbonize.

"A company's brand is a huge driver of a decision to pursue net zero emissions," says Leigh-Golding DeSantis, executive director of Sustainability Products and Solutions at Johnson Controls. "There's plenty of evidence that consumers are willing to spend more if a company or product aligns with their values."

Not an easy road

However, the path to net zero is far from straightforward. For a start, there is no one-size-fits-all approach to purging CO₂ emissions from a real estate portfolio. Decarbonization goals vary according to a company's size, ambition, and line of business. Some consumer-conscious multinationals have previously purchased compliance carbon offsets to achieve carbon neutrality and are now exploring the possibility of net zero. Other specialist manufacturers have committed

to science-based targets for their factories in response to shareholder demands. And many real estate investment trusts (REITs) have pledged net zero buildings all the way down to the lunches served in the canteens of their office blocks.

It's also a long and winding road from pledge to decarbonization, let alone net zero. A thought leadership study produced jointly by Johnson Controls and Forrester Consulting found that:

- Many companies struggle to outline their goals or are unsure about the steps needed to achieve them.
- The companies most likely to achieve net zero goals and enjoy growth understand that sustainability isn't a duty but the future of business. As a result, they will enjoy a competitive edge, the study predicts.
- While 'green' business opportunity varies from company to company, the most successful, sustainably engaged firms have something in common: strong leadership and strong partners.

If companies want to boost energy efficiency and lower the carbon emissions of their buildings in an impactful, permanent way, they will need to define clear goals, make stable, long-term investments, and pursue strong partnerships.

Moving towards a 'paid-for' service

Fortunately, many firms are starting to do exactly this, which bodes well for their net zero goals. For example, several major companies are eschewing sustainability strategies that rely on the trading of offsets such as Renewable Energy Certificates (RECs), and are embracing 'paid-for' services from specialist vendors.

Companies will need to tread carefully. Legions of consultants and software providers claim they can help companies decarbonize in specific areas, but very few offer fully fledged, tried-and-tested roadmaps for net zero. Even fewer offer proven strategies that can achieve all a company's net zero and renewable energy goals while simultaneously boosting a building's performance and reducing their costs.

However, Johnson Controls, which has been making buildings smarter since 1885, offers exactly that. It provides an eight-step plan for net zero buildings that harnesses industry-leading net zero advice, cutting-edge technology and one-source turnkey delivery to set companies on a path for large-scale decarbonization and renewable energy adoption.

"Companies are also trying to get out in front of the pressure," says DeSantis. "And we're willing and prepared to take the lead and shoulder the risks of cutting the carbon emissions that stem from every area of a company's building portfolio."

Here are the eight steps in Johnson Controls 'as-a-service' model that give companies guaranteed outcomes and risk management models to achieve their emission reduction commitments, leading to healthier buildings, people, places and the planet:

Step 1: Goal setting and advisory services

Regulations, incentives and innovations are in a state of constant flux, which is why many firms struggle to determine how to begin decarbonizing. Johnson Controls works across every area of the built environment, and is equipped to advise on all trends, policy changes and compliance requirements. It can design bespoke roadmaps for companies, whether they have yet to begin their journeys, have lost their way or are unsure of their destination.

Many firms are starting from ground zero. "Very often, Step 1 marks a company's entry into the broader sustainability arena itself," explains Dan Svejnar, Vice President of Renewable Energy and Sustainability.

"Sometimes, companies don't know what they're trying to achieve," says DeSantis. "For example, are they targeting net zero carbon or carbon neutrality? The two are very different."

Goals plucked from thin air tend to be unrealistic. The global study conducted by Forrester in collaboration with Johnson Controls revealed firms that lack reporting software or face considerable challenges expanding their still set sustainability goals without a detailed plan.

Vague goals also risk being unambitious. The same study revealed that sustainably engaged companies tend to have more aggressive carbon reduction goals than their less engaged counterparts. Nearly half (47%) of respondents from the same cohort of engaged companies said their organization has carbon reduction goals of 50% or more, while only 36% of respondents from 'aspirational' companies said the same.

Step 1 gives companies a clear-eyed start. “We complete assessments, best practices, roadmaps and benchmarks for companies, helping them to determine their achievable targets,” said Ali Badreddine, vice president, Project Delivery APAC Region Enterprise.

Many roadmaps begin with a detailed greenhouse gas inventory that breaks down a company’s emissions by Scope 1, 2 and 3. This offers a panoramic view of the greenhouse gases across a business, allowing firms to drill down into their buildings-related emissions. Companies may discover that it is relatively easy to reduce the Scope 1 emissions from certain facilities, but Scope 2 emissions – such as CO₂ from the power and steam they purchase – are a more complicated matter.

Johnson Controls can work with companies whether they have pledged net zero emissions for their portfolio of buildings or across their entire value chains, explains DeSantis. In either scenario, Johnson Controls would preside over the buildings’ element of the net zero pledge and work alongside globally recognized partners on other elements of the value chain.

Step 2: **Safe, secure and healthy environments**

The second step of the journey is crucial, but regularly overlooked by many vendors: balancing net zero and healthy buildings strategies.

“As we work to decarbonize and make buildings sustainable, we shouldn’t sacrifice the building occupants at the same time,” explains Tim Bakker, Johnson Controls Director of Business Development and Performance Infrastructure as a Service. “We need to implement safe, secure and healthy environments.”

This requires planning ahead to decarbonize operations while simultaneously prioritizing the health and security of a building’s space and occupants. For example, Johnson Controls can implement technology that optimizes indoor air quality and ventilation, beefs up fire security and cyber security systems and strategies and enhances building code compliance.

It can cut both ways. DeSantis explains that a strategy to boost the health and well-being of a building’s occupants could lead to an increase in the structure’s power consumption. This might require a new strategy for lighting to stay on track for net zero goals. “A building is not a static thing,” says DeSantis. “We’ve got the technology and expertise to ensure that companies don’t have to choose between decarbonization, building performance and the health and well-being of their occupants,” she adds. “They can achieve all three.”



Step 3: **Digitally enabled environments**

Technology is an excellent partner to decarbonization. In Step 3, Johnson Controls fully implements digitally enabled environments that boost energy efficiencies and cut greenhouse gas emissions. This includes: energy management information systems; streamlined data acquisition; data-driven decision making that harnesses predictive analytics; digital models for master planning and scenario assessment; and transparent, traceable decarbonization dashboards.

“These environments tell companies how their buildings are procuring and using energy and allows them to see if they’re achieving the goals that they set out,” says Bakker.

For example, Johnson Controls can design and implement everything from the artificial intelligence (AI)-enhanced software that churns out actionable insights from the mountains of data generated by a building’s central utility plant, all the way through to the smart dashboards and analytics that allow facility managers to monitor, measure and report emissions in real-time.

Step 4: **Efficient infrastructure**

Whether firms are planning new developments or retrofitting older properties, Johnson Controls can help them harness efficient infrastructure, especially when it comes to energy-intensive equipment. This might include cutting-edge chillers, energy-efficient heat pumps and intricately designed cooling towers. “This stage is all about implementing energy conservation measures via infrastructure,” says Svejnar. He explains that Johnson Controls Performance Infrastructure unit would oversee this stage, laying the groundwork for later steps.

There are obvious targets for reducing Scope 1 emissions, such as a company's natural gas-fired boilers or the fugitive refrigerant losses from HVAC systems. DeSantis says companies can easily replace those boilers with ultra-efficient heat pumps, make repairs to leaky chillers and use refrigerants with low global warming potential, such as hydrofluoroolefins.

The plan for efficient infrastructure is split into various sections: savings and outcome-based energy efficiency programs; deferred maintenance resolutions; infrastructure resilience; portfolio energy management; waste management; and water conservation.

"The first four steps are the strategic plan to net zero; the pathway to get there," says Bakker. "It's now time to implement sustainable operations."

Step 5: Sustainable operations

The eight-step program is not a 'set it and forget it' proposition. Johnson Controls will implement sustainable operations to ensure that the benefits of ultra-efficient infrastructure and digitally enabled environments are locked into a building's life cycle. Its offerings might include developing a continuous decarbonization operations management plan, training or hiring sustainability experts and employing condition-based, predictive maintenance.

"We've seen far too many buildings where a massive capital improvement program takes place, and the building gets as efficient as it can be from a systems perspective – and then over time, it loses that efficiency due to improper operations or the failure to plan for life cycle renewals and ongoing improvements," says Bakker.

Sustainable operations will harness cloud-based platforms that form a 24/7 feedback loop. The software will continually identify additional operational efficiencies and energy savings from a building's energy-intensive assets, thereby freeing up technicians and facility managers to focus on other priorities. "This is when we start to squeeze the efficiencies out of the new boiler or chiller to ensure the customer is consuming less electricity," says Svenjar. "They'll see a real difference in their energy bill and consumption."

The cloud-based software also provides fault detection and diagnostic (FDD) tools that use predictive condition-based maintenance to keep companies abreast of what their assets are doing. By closely tracking available trends and diagnostics,

customers can plan corrective action before a problem even occurs. This eliminates the costs of unnecessary inspections and maintenance as well as unplanned downtime.

Step 6: Distributed energy resources

By this stage, companies should have an efficient, digitally enabled and sustainably operated and maintained building at their disposal. Svejnar offers an analogy for stages for one to five. "The customer has 'lost its weight'," he says, referring to the inside-the-building work to boost the energy efficiency of a structure, and place it on a more sustainable footing. "It's now time for them to buy their suit."

He explains that Johnson Controls can help companies design, construct and operate their own distributed renewable generation assets, which can reduce or replace the power they consume from the grid with zero-carbon electricity. For example, several firms might choose to install solar panels and battery-based energy storage on their own buildings. Johnson Controls can also provide grid interactive services, and help to structure and execute the Power Purchase Agreements (PPA) that will allow firms to sell excess renewable generation to the grid.

"Sometimes we'll install electric vehicle (EV) charging for transportation, which can reduce a company's Scope 3 emissions and further drive the net zero decarbonization journey on-site," says Bakker.

Step 7: Renewable Energy Supply Services

Some companies cannot utilize distributed generation due to their building's location or design. But they can still use Johnson Controls renewable energy supply services to decarbonize their electricity consumption. That might include purchasing Renewable Energy Certificates (RECs) from the grid, creating long-term PPAs and virtual PPAs with utilities that supply renewable power or trading renewable power on the wholesale electricity market.

"We often see customers starting here, because they take a look at their net zero or decarbonization goals, and the first thing they do is buy as much decarbonized energy as they can to support their operations," says Bakker. "And we don't discourage that," he adds.

"The grid is not 100% green, but there is generation on the grid that is 100% green," says Svenjar. "Companies can harness that to get to net zero," he adds. "This is about giving companies

the ability to procure green electrons," he adds. Says Bakker: "Firms can drive down the Scope 2 emissions of the power they're purchasing as a supply-side initiative."



Step 8:

Certify and recognize impact

It is time for companies to take stock, and formally recognize the progress they have made on the path to net zero. "Once customers have reached this point, they have the data they need to get certified by the relevant third-party bodies," says Svenjar.

During this step, Johnson Controls provides transparent, traceable decarbonization dashboards, accounting and reporting, assists with brand public relations and communications, and offers industry-leading certificates facilitation. "They can then take the certificates to their stakeholders, whether they are consumers, shareholders or students," says Svenjar.



The clock is ticking...

The eight-step plan is a proven formula for setting companies on the path to net zero.

- It provides win-win solutions that inherently increase the reward while mitigating risks as much as possible.
- It delivers compliance with regulations, helping companies to avoid expensive fines.
- It helps with upfront capital decisions and takes on risk and responsibility for design and construction.
- Johnson Controls can own companies' decarbonization goals and reporting, ensuring they pay for expected outcomes and not the assets.
- Johnson Controls deal structures are flexible and tailored to meet companies' needs and include options for simple fixed-fee models.

But time is running out: The Johnson Controls and Forrester Consulting study found that the average target date for achieving net zero goals was 2024. If companies want lower-emitting, smoother operating and higher-value buildings by then, they'll need proven strategies and reliable partners immediately.

About OpenBlue

OpenBlue is a complete suite of connected solutions that serves industries from workplaces to schools, hospitals to campuses, and beyond. This platform includes tailored, AI-infused service solutions such as remote diagnostics, predictive maintenance, compliance monitoring, advanced risk assessments, and more. A dynamic new space from Johnson Controls, OpenBlue is how buildings come alive.



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