



Switch Automation and Berkeley Lab Partner to Deliver Next-Generation Smart Buildings

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Innovation to drive operational cost savings

Switch Automation is a global provider of a digital buildings platform that has been deployed across commercial building portfolios in the US, Australia, Europe, Singapore, and Hong Kong. Switch Automation serves enterprise customers and partners in a variety of industries including financial services, retail, commercial real estate, and education, with a footprint of over 200 million square feet of floor area. With capabilities spanning data discovery interpretation and integration, benchmarking, and equipment analytics, their product packages help property owners and facility managers reduce operating costs and emissions, increase energy efficiency, and improve occupant satisfaction.

Researchers at Berkeley Lab have closely collaborated with Switch Automation and other industry partners to address a golden opportunity to enhance today's smart building technology - extending the software to empower users to not only identify opportunities, but also take action to easily implement operational corrections and control improvements in a streamlined, automated manner. In addition to fixing problems, these new advances allow the application of more efficient HVAC control sequences with far less effort and cost than would be required if they were implemented exclusively within the building automation system (BAS).

Switch Automation has successfully demonstrated these solutions with a major commercial real estate client, and released them within Switch OpX (Operational Excellence) to make them available to their broader base of customers.

Users of traditional FDD save an average 9%, with paybacks of just two-years, however the US Department of Energy estimates a much larger, 29% savings potential from improved control and operations.^{1,2} The enhancements that Switch Automation and Berkeley Lab are bringing to market will narrow this performance gap. With a national annual savings potential in excess \$11 billion dollars, the economic benefits are tremendous.

1 Kramer, H., Lin, G., Curtin, C., Crowe, C., Granderson, J. 2020. Proving the business case for building analytics. Lawrence Berkeley National Laboratory. <https://doi.org/10.20357/B7G022>.

2 Fernandez, N., Katipamula, S., Wang, W., Xie, Y., Zhao, M., and Corbin, C. 2017. Impacts of Commercial Building Controls on Energy Savings and Peak Load Reduction. Pacific Northwest National Laboratory. PNNL-25985.



Eliminating Performance Slip with State of the Art Software Approaches

Capitalizing on their analytics platform's ability to write back to the building automation system (BAS), Switch focused on resolving three of the most chronically recurring³, high-impact problems that compromise efficient comfortable performance - under/over economizing, overly aggressive zone temperatures, and equipment running when spaces are unoccupied. These problems are often a result of suboptimal sequences, or changes to address complaints or troubleshoot/service equipment that are meant to be temporary, but are inadvertently left in place for much longer periods of time. Switch developed logic to define a property's intended operational setpoints, flag deviations from those setpoints, and provide end users an interface to push corrections back to the BAS to restore them. Users are empowered to make improvements without needing to modify BAS programming, and can do so at permission levels that preserve the BAS' higher order automation priorities and safety parameters.

Further harnessing the power of modern software approaches, Switch invested in their 'back end' to more rapidly deploy across customer sites with highly varied system configurations and data availability. Leveraging emerging solutions in the industry that supercharge pre-existing tagging constructs, they integrated a 'semantic' information layer to represent the meaning and relationships between individual data streams. Not only does this data enrichment open the door to faster implementation of Switch's applications, it makes it easier for customers to directly interact with their data, and make it available to other providers.

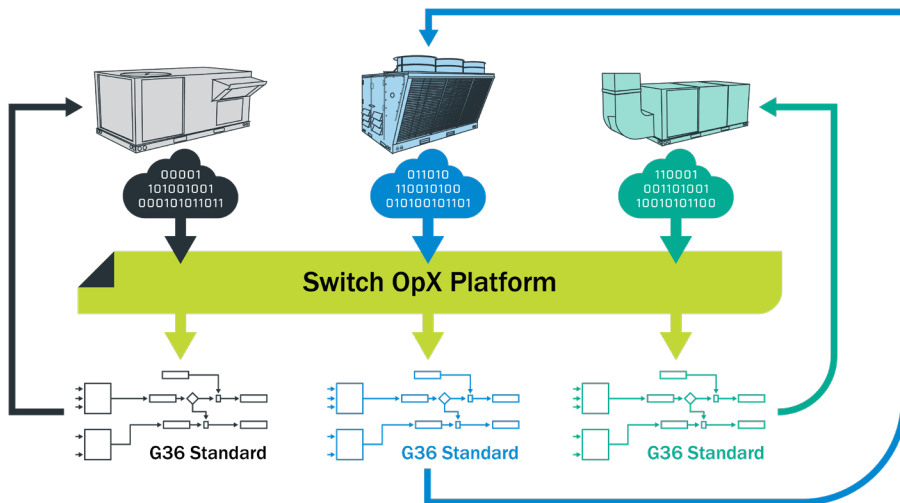


Figure 1. Diagram of communication architecture for Switch OpX functionality

Leading the Way in Partnership With Commercial Real Estate

In partnership with commercial real estate leader Cushman & Wakefield, Switch Automation has deployed the new capabilities in Switch's OpX product at 6 properties that they manage, comprising 1.15M square ft of floor space.



Figure 2. Two implementation sites located in Hanover, New Jersey, and Warwick, New York

3 Crowe, E., Mills, E., Poeling, T., Curtin, C., Bjørnskov, D., Fischer, L., & Granderson, J. (2020). Building commissioning costs and savings across three decades and 1500 North American buildings. *Energy and Buildings*, 227, 110408. <https://doi.org/10.1016/j.enbuild.2020.110408>

Cushman & Wakefield and Switch Automation applied zone temperature setpoint analytics to 250 terminal units. The analysis used zone heating and cooling setpoint recommendations from ASHRAE Guideline 36 as a reference, i.e. 72-80 F for cooling, and 65-72 F for heating. The analytics detected 30 cases of zone setpoints that had exceeded the high or low limits for weeks to months on end. Figure 3 illustrates a zoom-in two zones on the day that they their cooling setpoints were automatically corrected to align with the lower limit (72F) that is specified in the Guideline.

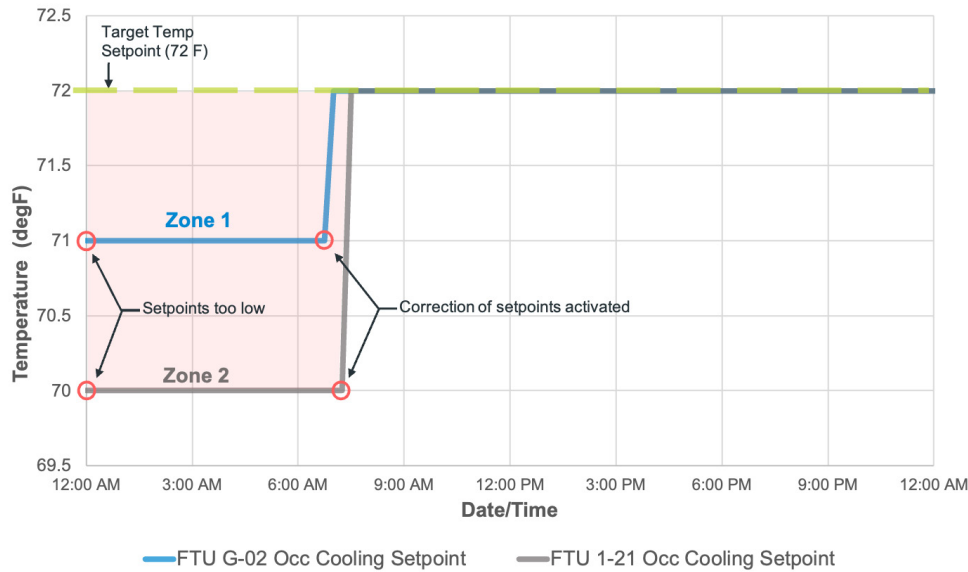


Figure 3. Overly aggressive cooling setpoints are detected, as highlighted in the orange shading, and then automatically restored to the site's intended operational target.

With decades of experience in top-tier property management, Cushman & Wakefield's team knows that economizers are a chronic source of missed savings opportunities. Switch again looks to industry best practice as defined by ASHRAE's Guideline 36, which recommends economizing when the outside air dry bulb temperature is less than the return air dry bulb temperature of an air handler system with varying degrees of offset. In real time, Switch identifies instances in which the economizer should and should not be running and optimizes the economizer operation to optimize energy savings. Figure 4 illustrates Switch OpX detecting an instance in which there is a missed opportunity to take advantage of free cooling (orange highlighted area). At 5:45am, OpX commands the economizer to 'on' to take advantage of the favorable outdoor conditions. While this strategy has energy benefits, the implementation of a best-practice well-articulated economizer control strategy also enabled operations staff new-found transparency into the sequences that were actually active, and how they function.

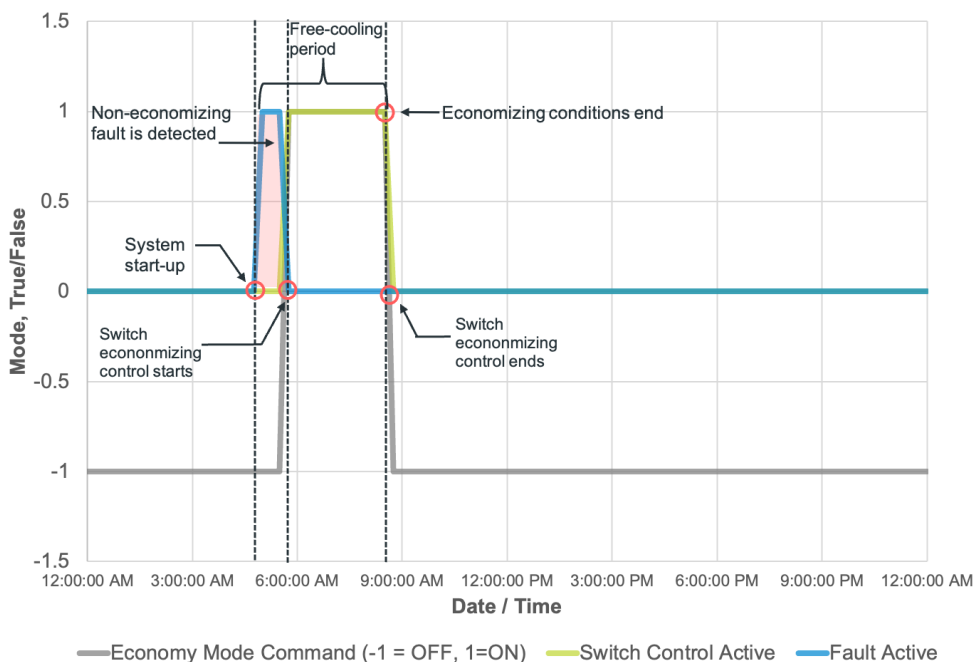


Figure 4. Automated optimization of economizer control in Switch OpX - the platform detects and flags ideal conditions, and turns on economizing to take advantage of energy savings opportunities.

Finally, Switch is tackling optimization of equipment schedules. Switch OpX is able to compare a target schedule and the current operation of a subset of building equipment. This means any HVAC equipment that is commanded 'on' outside of the occupied time period, promptly triggers a flag in the Switch software which was followed by a command to turn the system 'off' to comply with the target schedule. Deployed building-wide, site energy savings from the package of interventions that Switch and Cushman & Wakefield demonstrated are estimated to exceed 10%⁴, equating to over \$290,000/yr cost savings in these six buildings.

Flexible Data Discovery and Accessibility Grounds Implementation

With the new capabilities offered in OpX, Switch Automation is advancing the next generation of smart building technology. Implementation begins with energy or utilities benchmarking, followed by Switch's Dx3 Digital Device Discovery tool that scans the network for available data, connects to it, and reports on digital readiness. A catalog of integration drivers and APIs are available to interface with diverse building automation systems, meters, utility systems, and property and asset management systems. With OpX, users can then harness the full power of the analytics integrated with control. Throughout all aspects of implementation, Switch makes it a priority to provide end users a semantically enriched independent data layer that can be accessed by tools within and beyond the ecosystem of Switch product packages.

Looking Forward

Having successfully demonstrated and released the new fault corrections and control optimization capabilities in Switch OpX, Switch Automation is looking forward to further scaling them across their customer base. Customers can expect the new and improved version of OpX to further garner visibility into the control sequences that are running, as well as opportunities for energy savings, and operational streamlining. With their upfront investment in data interpretation and advanced 'tagging' structures, users of the Switch Automation Platform and OpX product can simply turn on the capabilities that they wish to access, with full confidence that they will run with the data that is available for their specific sites. In partnership with Cushman & Wakefield, these capabilities will be brought into use at additional customer sites, as well as with other end-users and service providers within and beyond the commercial real estate vertical.

“With Switch Automation and Berkeley Lab, we have demonstrated how innovative data utilization can augment facility operations and building performance. By improving how issues are identified and addressed, we are continuing to be more efficient and effective in meeting client goals, reducing costs and enhancing tenant comfort across the client’s portfolio.”

Ryan Droege, Director, Digital Buildings
Global Occupier Services
Cushman & Wakefield

Learn More

Checkout [Switch Automation's](#) product and managed services offerings

Checkout [Berkeley Lab's](#) work in autonomous commissioning, fault correction, optimal control

4 Fernandez, N., Katipamula, S., Wang, W., Xie, Y., Zhao, M. and Corbin, C. 2017. Impacts of Commercial Building Controls on Energy Savings and Peak Load Reduction. PNNL-25985. Richland, WA: Pacific Northwest National Laboratory.