Efficient Buildings in Unprecedented Times

Optimizing building operations during low-occupancy situations

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An action plan for uncertain times

In early 2020, buildings around the world transitioned from full occupancy to low occupancy in a matter of days. From office buildings to hotels to retail spaces, there are now tens of thousands of nearly empty buildings across the U.S.

Of course, securing the safety and health of your building's occupants is the top priority. But once that is done, what comes next? We've been in touch with numerous customers and partners around the country, and there are a few key questions building owners and managers are trying to answer.

How... can I make sure my building operates efficiently during low occupancy?

What... systems should I focus on adjusting during low occupancy?

How... can I make sure my building will return properly to normal operations in the future?

This guide offers answers to these questions, laying out best practices on energy efficiency, safety, and reliability.

First steps

Before you begin, we recommend you reach out to your service partner(s) if you have any. Your partner(s) should be able to help you complete much of the work laid out in this guide, either remotely or on-site. If you do not have a service partner, this guide offers tips on how your own team can get started.

One more thing: It's essential to document your work carefully. You want a detailed record of the adjustments so that you do not forget your standard temperature setpoints or occupancy settings when your building comes back to normal operation. Doing so will help prevent any safety or performance issues that could occur from ramping up capacity with misaligned HVAC equipment.

Checklist:

15 STEPS

for efficient low-occupancy buildings

Step 1

Establish your scope. First, take stock of your major HVAC and building automation assets, including chillers, air handlers, boilers, fan coils, packaged terminal air conditioners, and rooftop units. These are the key components that will be drawing energy and managing environmental conditions. How many of each do you have? Where are they located? Consult an existing list or build a new one.

Step 2

Determine your system architecture. Find out which assets are connected to your building management system (BMS) and which assets are standalone, requiring manual control. If, for instance, you run a hotel or office building with a BMS that can manage many rooms' setpoints, it may be a simple matter of adjusting temperatures globally. If room controls require local or manual adjustments, you will have to adjust them one-by-one.

Step 3

Factor in regional differences. If you manage multiple facilities in different climates, you should consider the implications of changing global setpoints. An 80 °F setpoint may turn off AC systems in Florida, as intended, but it could turn on heating systems in your New England facility. Similarly, humidity will factor in differently in Las Vegas compared to Georgia. This may seem obvious, but during these confusing times, it can be easy to overlook.

Step 4

Focus on deep efficiency. Consider the difference between typical low-occupancy setpoints (i.e., weekend setpoints) and "deep" low-occupancy setpoints. If on weekends you typically adjust to ±5 °F off the setpoint, you may consider a deeper ±10 °F change during a longer period of low occupancy.

Step 5

Accommodate remaining staff. Consider customizing your zones for the comfort of your remaining on-site staff (e.g., security and maintenance). These people will still travel in corridors and work in offices, but will not likely be using conference rooms, gyms, or cafeterias. Lighting systems should also be adjusted accordingly. Depending on your climate, you can also adjust window blinds to reduce heating or cooling demand.

Step 6

Consider your new BTU loads. Occupants, and the systems that support them (e.g., lighting, IT, etc.), all add heat to your building, which is measured in British Thermal Units (BTUs). Your HVAC systems are calibrated to a certain estimated BTU load for typical occupancy, but that will change with low occupancy. In other words, it's not just a matter of changing the thermostat by a few degrees — you should also factor in lower BTU loads.

Step 7

Assess your ventilation and economizer systems (use of outside air). During low occupancy, venting out particulates and maintaining proper carbon dioxide dilution is still necessary, but you can often ratchet this down if it's not already managed by your automation system. The wider range of acceptable temperatures means you can also decrease pressurization and use air economizers more frequently. Overall, the idea is to ease off temperature controls to boost energy efficiency. You can consult your building automation service partner for optimal settings.

Step 8

Keep humidity in check. Mold and moisture can become a problem if indoor dew points are not properly maintained. If dew points are too low, condensation could form on cold HVAC components and sensitive building materials. Alternatively, if dew points are too high, relative humidity may rise above 80 percent, which falls outside ASHRAE guidelines. This article offers more detail on humidity and ASHRAE guidelines.

Step 9

Address your electrical and storage spaces. During normal operation, electrical and storage rooms are often kept at comfortable temperatures for the benefit of maintenance workers. But electrical rooms are, in fact, often rated for outdoor operation, meaning they can be set upwards of 100 °F and remain within manufacturers' recommendations. Allowing higher temperatures in electrical rooms can lower demand on electrical infrastructure and save energy during low occupancy. You should, however, maintain typical setpoints in server closets and IT rooms to avoid downtime or damage.

Step 10

Adjust fans and freezers. Don't forget your commercial kitchens, labs, and other spaces with fans and freezers. These exhaust fans, and the make-up fans that accompany them, are often set to run 24/7 and so continuing to run them will waste energy. And if you no longer have products to store in refrigerators or freezers, shut them down.

Step 11

Protect your water system. Check to make sure water continues to flow through your pipes. Stagnant water creates a health risk in domestic systems and can lead to higher than normal corrosion in non-potable systems. Consult your water services specialist to find the most accurate regulation on minimum water flow. For steam and hot water boilers, consult trained specialists to reduce or shut down boilers, which may not be needed during low occupancy.

Step 12

Take advantage of variable speed drives (VSDs). Your building's systems are designed for near full capacity, not low capacity. With a fixed speed drive, your energy use will remain constant regardless of output. Chillers with VSDs can reduce output by inheriting partial load conditions and lowering amperage, thereby saving energy. Note that some VSDs may not be connected to your BMS, so you must adjust them manually. To save energy, only run VSD-powered chillers, boilers, and other HVAC components such as single-zone air handlers and fan coil units.

Step 13

Monitor your building to see how it responds. This period may be the first time your building has ever operated in deep efficiency or low-occupancy conditions. To make sure your building is responding well to the significant systemic changes, monitor environmental, power, and safety conditions at a predetermined cadence. Otherwise, you could unknowingly run into moisture problems, hotspots, and other issues.

Step 14

Record your changes so you don't forget them. This step was mentioned already, but it bears repeating. If you make all these adjustments without keeping track of the typical settings, you may struggle to return your building to normal operations. Returning to normal operations while some systems are still running on low-occupancy settings may cause issues with occupant comfort, HVAC performance, and safety.

Step 15

Focus on your next steps. Now that your building is set to run efficiently during low occupancy, consider other ways to increase performance. Perhaps you've been postponing maintenance because it would've caused downtime. Now may be the right time to do that maintenance, so that the building is even more ready to return to typical operations.

Further guidance on efficiency in low-occupancy buildings

As you conduct this work, consider using this opportunity to create and prioritize a "wish list" for future projects. You might locate standalone components that you'd like to connect to your BMS. You might also consider adding sensors to provide deeper monitoring (e.g., moisture detection), or remote access for service providers via digital integration. Use this time to take stock.

This 15-part list covers the basics of what you can do to drive efficiency in your buildings during low occupancy. Each building has its unique qualities. Perhaps your building has a pool, a heightened security protocol, or some other special situation. The best way to make sure you do what's right for your building is to work with trained experts in building management.

Unsure about getting this work done yourself? Our field service engineers can help, whether face-to-face or remotely. Call our service hotline at **877-822-2601**, or contact your local account representative.

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