

# The Chiller Lifecycle

## Aging chillers and the case for Smart Connected Chillers



A chiller is one of the most critical pieces of equipment in your facility, accounting for half the total energy used in a building. As building equipment and systems become increasingly integrated and intelligent, they offer building owners and facility managers new and more effective tools to reduce repair costs, minimize downtime and keep their buildings operating at peak performance.

Buildings are responsible for 47 percent of global energy consumption. As a world leader in advanced HVAC technology, Johnson Controls understands how chiller equipment greatly contributes to that consumption. Maintaining efficient chiller performance is vital to the comfort and productivity of occupants, but also significant for sustainable, cost-efficient operations and decreased energy consumption. That's why Johnson Controls is committed to making sure that the technologies available to our customers reflect modern needs and adequate returns on such an investment. Our solutions take our breadth of knowledge about chillers and utilize the latest technologies to continue improving performance and monitoring capabilities.

A greater understanding of the chiller lifecycle allows for a more informed approach to equipment management. A proactive approach to maintenance and technology investments will ensure that sustainability and efficiency goals are met, downtime is minimized, and chiller performance is unwavering until it's time to replace.

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The median lifecycle of a chiller is 20–23 years, according to the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE). This is dependent on various factors, including the degree of routine predictive and preventive maintenance and average run conditions. Much like a car, a chiller will last longer if it is properly maintained and serviced. Worn electrical components, widening tolerances

between moving parts, fouled heat-transfer surfaces and other issues can lead to recurring failures and costly one-off repairs for aging chillers. While it is easy to put off preventative maintenance and let other priorities take precedent, deferred maintenance can result in unexpected downtime and inefficiencies that are costly.

Moreover, while an older chiller may still be running smoothly, it's important to consider how industry standards, technology, building use-cases and system capabilities evolve over the course of a 20-plus year timeframe. Ensuring that your business is adequately monitoring performance to retrofit with new technologies or replace as necessary is an important part of building maintenance. A business would not let an employee languish for 23 years without evaluating performance and providing resources for improvement. Equipment should be no different.

Even with diligent maintenance, time will eventually take its toll on chiller performance. When assessing chiller performance or diagnosing an issue, technicians and building owners must evaluate the cost of repairs compared to the estimated remaining chiller lifetime, and consider whether to repair, retrofit or replace equipment entirely.



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## Repair, retrofit or replace? Informed decision-making to reduce downtime, operational costs and headaches

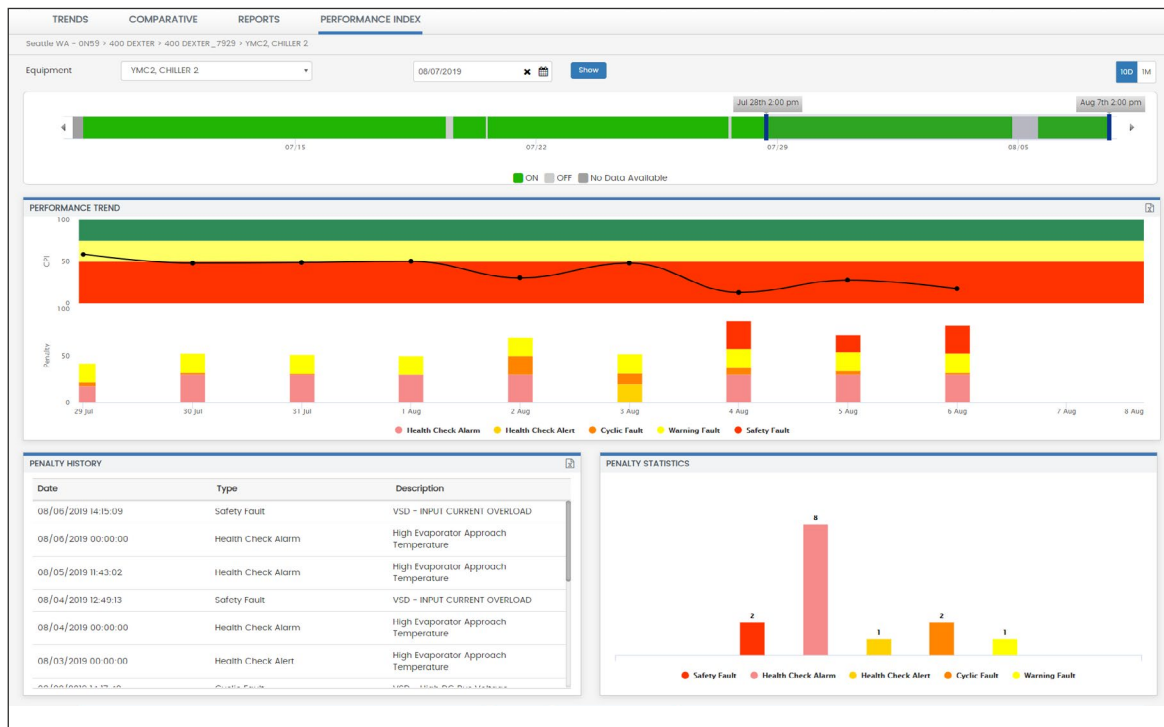
When a chiller requires more frequent repairs or cannot meet demands for capacity, the question of whether to replace, retrofit or repair equipment becomes subjective and complex. Regularly evaluating the current performance of a chiller allows for strategic maintenance and/or retrofitting based on insights gathered. Ultimately, the information can help facility owners and managers make more informed investment decisions depending on the unique needs of their facility.

Repairs and retrofit solutions allow building owners to modernize a building's HVAC system and can be a means to extend the lifespan of chiller equipment. With both repairs and retrofits, facility managers and building owners must account for future chiller and building needs and understand how a repair or retrofit will improve system efficiency and operations. A careful examination begins with the collection of all available information regarding the system, including records of the original installation and cost of periodic maintenance and repairs. Factors to consider when deciding to repair, retrofit or replace your chiller equipment include:

- How much more life will repairs give to the equipment? One year? Five years? Ten years?
- Use of the building: Have facility needs changed since the original installation?
- Are there limitations to a repair or retrofit because of the equipment age? Parts availability? Refrigerant availability? Cost?
- How does the cost of operation and maintenance going forward compare to the installation and operating costs of a new, more efficient chiller?

All buildings are unique and have different functions and operational use-cases that make the decision to invest in a new chiller multifaceted. Comparing current operating expenses and projected repair and operating expenses for an existing chiller to the installation and operating costs of new, high-efficiency chiller should be a priority factor in the decision-making process.

Johnson Controls can provide resources and guidance when deciding if an investment in new chiller equipment is the best approach for a facility.



*Johnson Controls chiller performance index gives advanced insights into how a chiller is performing, allowing for proactive maintenance and energy optimization*

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## New capabilities: the case for Smart Connected Chillers

New advancements in chiller technology have undeniable benefits to building owners and operations alike. The biggest advancements stem from the increased capabilities of smart equipment fueled by data and connectivity. Smart connected chillers gather data from your equipment, analyze it and inform technicians and facility managers of the optimal time to make upgrades or perform maintenance, quantify operational efficiencies and identify cost-savings.

Smart Connected Chillers have sensors—some have as many as 150-200 – on the chiller that gather data and store it in the cloud for unprecedented insights into current operations and potential issues. This ensures that problems are identified and addressed earlier, resulting in reduced downtime, cost-savings and increased operational efficiency. As a proof point, it is estimated that data-enabled smart chillers can reduce unplanned and emergency repairs by as much as 66 percent—and that predictive algorithms can generate a 65 percent reduction in the total time from when a problem is identified to when it is resolved. This data can also be used to compare chiller performance over time and under different conditions, such as location, climate or changing building functions.

Once your chillers are connected, they will have the ability to provide operating and trend data to the customer to help better understand the chiller's health and that data can be accessed anywhere, anytime either by the end user or chiller experts. This remote monitoring capabilities mean quicker response in the event of an issue and lessened down time.



## The benefits of Smart Connected Chillers

While investing in a new chiller can be daunting, Smart Connected Chilllers offers building owners and facility managers new and more effective tools to reduce repair costs, minimize downtime and keep their buildings operating at peak performance. The upfront costs are outweighed by the long-term benefits and lower total cost of ownership. Benefits include:

- **Remote monitoring:** Given the wide range of building management tools and the increasing amount of data that smart equipment provides, technicians and facility managers have 24/7 insight into operations and can run diagnostic reports in real-time when they are away from the facility.
- **Condition-based model:** In the traditional task-based service model, maintenance is often performed based on a time-based schedule that does not include any input of the condition of that asset. In addition, when a service provider is called, diagnosis can't begin until a technician arrives on site. Connected chillers can report its performance, including any problems or malfunctions, on a regular basis to the service technician or facility manager. With remote access to trends and diagnostics, operations are continuously monitored enabling a true conditioned based service model, and planned corrective action can be suggested before a problem occurs. Unnecessary time based inspections can be eliminated that will create additional savings



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- **Maintenance and reliability:** Data enables technicians to identify faults before they affect occupant comfort or critical processes. Sensor data and algorithms can pinpoint the root cause of an issue so time is spent resolving, not diagnosing the problem. If operations are not running as they should, a notification will be sent to key stakeholders so they can take focused, corrective action. When surveyed, 70 percent of respondents said the ability to predict and diagnose problems and provide or propose solutions was a “game changer.”
- **Energy efficiency and sustainability:** Data allows you to identify waste through additional visibility into trend data and current operating conditions. It also allows you to identify operational deficiencies or problems that prohibit chillers from running at peak performance. This is important as degradation or failures lead to increased energy consumption. If energy monitoring is added, performance optimization can be done with energy savings of 10-20%.
- **Integrated systems:** Smart Connected Chillers can be integrated with other building components and operate as part of a broader initiative centered on overall building performance and sustainability. This enables systems to work in harmony and operate together to maximize efficiencies.

## Maximizing Chiller Operations

Aging chillers are more prone to degradation and failures. While repairs and retrofits help to extend the life of chillers, at some point facility managers and building owners must assess what approach is most cost-effective – fixing individual issues or investing in a new replacement system. In the long-term, substantial energy savings and increased operational efficiencies can be achieved by replacing an aging chiller.

To learn more about how innovative chiller technology can streamline your operations, please call **(888) 365-4461**.



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