SION60

END EMISSIONS IN 60 MONTHS

RETROFIT PROJECTS

Top projects most used by hospitals to reduce energy use and carbon emissions.

AIRSIDE ECONOMIZATION
FREE COOLING

No/Low Cost Opportunity

SION60
END EMISSIONS IN 60 MONTHS

OVERVIEW

Excess energy is often spent running chilled water systems when outside air conditions are adequate for cooling spaces. Similarly, if a car or house is warm in the winter, cracking a window is easier and more efficient than running air conditioning.

CONSIDERATIONS

- Can be programmed to serve facilities with humidification requirements.
- Requires sensor calibration and potential freeze protection sequencing.
- Can be controlled by damper position or airflow stations.

KEY PERFORMANCE INDICATORS (KPIS)

- **1-3 point energy use intensity (EUI) reduction potential**
- **1-2% sitewide electric savings**
- **2-3 year simple payback**

CHILLER PLANT STAGING

No/Low Cost Opportunity

OVERVIEW

Chiller staging is intended to optimize the efficiency of the cooling plant by staging and ramping chillers to meet the building demand. Depending on chiller type this may mean several chillers operating at part load or fewer chillers operating at their design capacity.

CONSIDERATIONS

- Consult chiller manufacturer to ensure adequate system flow is maintained.
- Requires direct digital control (DDC) building automation.
- Can be programmed for a multitude of chiller types.

KEY PERFORMANCE INDICATORS (KPIS)

- **1-2 point energy use intensity (EUI) reduction potential**
- **1% sitewide electric savings**
- **<1 year simple payback**

HYDRONIC DIFFERENTIAL PRESSURE RESET

No/Low Cost Opportunity

SION60
END EMISSIONS IN 60 MONTHS

OVERVIEW

Variable speed drive (VSD) equipped pumps are programmed to increase or decrease speed according to a differential pressure across the supply and return pipes in a chilled water or hot water system. By allowing the differential pressure setpoint to modulate, pumps can further reduce their speed during low load conditions. This sequence can be programmed to modulate based on zone demands within the space.

CONSIDERATIONS

- More effective in buildings with varying internal loads.
- Diagnose and repair rogue zones that may prevent the sequence from rendering.
- Requires variable speed pumping, calibrated pressure sensors, and direct digital control (DDC) building automation.

KEY PERFORMANCE INDICATORS (KPIS)

- **0.5-1 point energy use intensity (EUI) reduction potential**
- **0.5% sitewide electric savings**
- **<1 year simple payback** ***if system is of a variable flow configuration***

CHILLED WATER SUPPLY TEMPERATURE RESET

No/Low Cost Opportunity

SION60
END EMISSIONS IN 60 MONTHS

OVERVIEW

A chilled water temperature reset is an electric saving sequence that allows the building chillers to modulate their temperature setpoint during low load conditions. Chillers typically operate more efficiently when producing warmer chilled water. A typical reset strategy analyzes zone demand or outside air temperature and resets linearly between 45°F and 55°F.

CONSIDERATIONS

- Most impactful in comfort cooling scenarios, or process cooling that has a variable load.
- Chillers must be capable of resetting their evaporator leaving temperature.
- Less viable for process or data loads that do not vary substantially.
- Will result in a small pump energy penalty when implemented.

KEY PERFORMANCE INDICATORS (KPIS)

- **0.5-2 point energy use intensity (EUI) reduction potential**
- **Up to 2% chiller savings per 1°F of chilled water temperature increase**
- **<1 year simple payback**

COMMISSION OUTSIDE AIR MINIMUMS

Low Cost Opportunity

SION60
END EMISSIONS IN 60 MONTHS

OVERVIEW

Outside air is essential for indoor air quality yet expensive to condition. Air handling equipment is designed to provide the minimum amount of ventilation air when the ambient conditions are outside of an economizing range. Commissioning and ensuring the minimum outdoor air setpoints are in place will minimize energy usage while ensuring adequate ventilation is provided to the space.

CONSIDERATIONS

- Review/release automation system overrides on outside air dampers.
- Can be managed by damper position or airflow stations for airside equipment.
- Verify ventilation minimums prior to making automation or mechanical changes.
- May require a Testing, Adjusting, and Balance (TAB) contractor to perform an airside balancing survey.

KEY PERFORMANCE INDICATORS (KPIs)

- **2-5 point energy use intensity (EUI) reduction potential**
- **5% sitewide electric and natural gas savings**
- **1-2 year simple payback**

CONDENSER WATER
TEMPERATURE RESET

No/Low Cost Opportunity

SION60
END EMISSIONS IN 60 MONTHS

OVERVIEW

In certain chiller water systems, energy can be saved by resetting the condenser water temperature down to maximum evaporative cooling and lower chiller compressor energy.

CONSIDERATIONS

- Must be a variable speed chiller(s).
- Must be a water-cooled chiller system.
- More impactful energy savings in drier climates.
- Less economic savings in areas with expensive water supply.
- Consult chiller manufacturer on equipment ability to support lower condenser water temperatures.

KEY PERFORMANCE INDICATORS (KPIS)

- **0.5-1 point energy use intensity (EUI) reduction potential**
- **0.5% sitewide electric savings**
- **0.5-1.5 year simple payback**

DEMAND CONTROLLED VENTILATION

Low Cost Opportunity

SION60
END EMISSIONS IN 60 MONTHS

OVERVIEW

Excess energy is often spent ventilating indoor air with an unnecessary amount of outside air during periods of low occupancy. Demand controlled ventilation (DCV) relies on CO_2 sensors to determine the amount of ventilation air required throughout the occupied periods of the day.

CONSIDERATIONS

- To save energy, the baseline occupied airflow setpoints must be able to be lowered.
- Systems designed for ventilation of chemicals, combustion, etc., have different design constraints and may not be feasible for DCV.
- Typically, the threshold for CO_2 will be 800-1,000 ppm before additional outside air must be introduced. Above 2,000 ppm can be associated with stuffy, stale air and lethargy.

KEY PERFORMANCE INDICATORS (KPIS)

- **1-3 point energy use intensity (EUI) reduction potential**
- **1-2% sitewide electric and natural gas savings**
- **1-2 year simple payback** ***assuming CO_2 sensors need to be installed in addition to programming***

HOT WATER SUPPLY
TEMPERATURE RESET

No/Low Cost Opportunity

SION60
END EMISSIONS IN 60 MONTHS

OVERVIEW

As temperatures increase and demands for space heating in a building decrease, it is possible to save energy by reducing the temperature of the water supplied by the hydronic boilers. This ensures only the necessary amount of heating is available for interior space temperatures to be satisfied. For condensing boilers, this reset can achieve hot water temperatures as low as 120°F, which is often satisfactory for heating on a mild day.

CONSIDERATIONS

- Not applicable for steam boiler plants.
- Will result in a slight electric pumping energy penalty.
- Boilers must be of a condensing technology to avoid equipment degradation.
- Requires direct digital control (DDC) building automation to calculate system demand and adjust accordingly.

KEY PERFORMANCE INDICATORS (KPIS)

- **1-2 point energy use intensity (EUI) reduction potential**
- **1-3% sitewide natural gas savings**
- **<1 year simple payback**

SCHEDULING, SETBACKS, & AIR CHANGE REDUCTION

No/Low Cost Opportunity

SION60
END EMISSIONS IN 60 MONTHS

OVERVIEW

There is often a substantial amount of energy savings associated with temperature setbacks, equipment scheduling, and/or a reduction in air changes within a space. These sequences can include scheduling equipment off, increasing the differential between occupied and unoccupied heating and cooling setpoints, or reducing the amount of outside air introduced to the space during occupied periods. For spaces that have varying levels of occupancy but require positive pressurization, a reduction in air changes may be applicable, while still maintaining temperature and humidity setpoints (i.e. operating rooms). On the other hand, office spaces that have regular occupancy intervals, yet no specific humidification needs, may be eligible for scheduling and temperature setbacks.

CONSIDERATIONS

- Requires direct digital control (DDC) building automation.
- Must ensure conformance to building codes and standards.
- Includes a list of non-energy benefits, including reduced operations and maintenance costs and increased equipment service life.

KEY PERFORMANCE INDICATORS (KPIS)

- **5-20 point energy use intensity (EUI) reduction potential** ***depending on percent of floor area impacted***
- **5-10% sitewide electric and natural gas savings**
- **<1 year simple payback**

DUCT STATIC PRESSURE RESET

No/Low Cost Opportunity

SION60
END EMISSIONS IN 60 MONTHS

OVERVIEW

Excess fan energy is often spent over pressurizing the building supply ducts when all downstream zones are satisfied. Typically, an air handling unit (AHU) will modulate the variable speed supply fan to maintain a fixed static pressure set point, which is set based on the system needs during a design day condition (very hot or very cold). Resetting this setpoint down during periods of low load will save fan energy and prolong equipment lifetimes.

CONSIDERATIONS

- Must be a variable volume system with variable speed supply fans.
- Must have direct digital control (DDC) building automation for the airside equipment.
- Programmed based on downstream variable air volume (VAV) box damper positions; customized thresholds should be investigated by a controls vendor and airside balancer.

KEY PERFORMANCE INDICATORS (KPIS)

- **1-2 point energy use intensity (EUI) reduction potential**
- **1-2% sitewide electric savings**
- **<1 year simple payback**

SUPPLY AIR
TEMPERATURE RESET

No/Low Cost Opportunity

SION60
END EMISSIONS IN 60 MONTHS

OVERVIEW

Excess energy is often spent to reheat supply air that has been overcooled by the central air handling unit. Increasing the temperature setpoint of the supply air can often mitigate this simultaneous heating and cooling. A typical reset range can be 55°F to 65°F and can reset based on outside air, zone demand, or a combination of both.

CONSIDERATIONS

- Must be a variable volume system with variable speed supply fans.
- Must have direct digital control (DDC) building automation for the airside equipment.
- Can be programmed based on number of downstream variable air volume (VAV) boxes requesting cooling.

KEY PERFORMANCE INDICATORS (KPIS)

- **2-5 point energy use intensity (EUI) reduction potential**
- **2-4% sitewide natural gas or electric energy savings**
- **<1 year simple payback**

BOILER REPLACEMENT

Capital Investment Opportunity

SION60
END EMISSIONS IN 60 MONTHS

OVERVIEW

Replacing an existing steam or hydronic hot water boiler with a higher thermal efficiency unit will result in significant energy savings. Alternatively, there are several measures to "tune up" existing equipment that can also have a significant impact on energy usage with a more favorable return on investment.

CONSIDERATIONS

- For a hydronic system, condensing boiler technology allows the system to capture otherwise wasted heat from the flue gases to further enhance efficiency.
- Upgraded burner modulation can enable equipment to turn down to meet building demand, reducing wasted energy.
- Suggested that downstream hot water coils are inspected to ensure full actuation. Leaking hot water coils result in wasted heating energy as well as downstream cooling energy.

KEY PERFORMANCE INDICATORS (KPIS)

- **5-15 point energy use intensity (EUI) reduction potential**
- **8-12% sitewide natural gas savings (assuming natural gas fuel)**
- **10-20 year simple payback**

DIRECT DIGITAL CONTROL

DDC - BUILDING AUTOMATION

Capital Investment Opportunity

SION60
END EMISSIONS IN 60 MONTHS

OVERVIEW

Excess energy can be spent relying on older, less precise, pneumatic building controls. Antiquated controls systems often do not provide a level of granularity that allows building operators to take advantage of updated controls sequences and efficient operating parameters.

CONSIDERATIONS

- Many additional energy conservation strategies rely on the installed capabilities of DDC automation, resulting in numerous overlapping benefits.
- Provides tighter control in sensitive areas with strict pressure, temperature, and humidity requirements.
- Updated, user friendly interface provides a more seamless experience for building operations staff and further reduces overhead and maintenance costs.

KEY PERFORMANCE INDICATORS (KPIS)

- **5-15 point energy use intensity (EUI) reduction potential**
- **8-10% sitewide electric and natural gas savings**
- **10-15 year simple payback**

CHILLER REPLACEMENT

Capital Investment Opportunity

SION60
END EMISSIONS IN 60 MONTHS

OVERVIEW

Replacing an existing chiller with a higher efficiency unit can result in significant energy and demand savings. This means the chillers will require much less energy to provide the same amount of cooling to the building end uses. Newer chillers are often equipped with variable speed compressors, oil-free magnetic bearings, and refrigerants capable of absorbing large amounts of heat.

CONSIDERATIONS

- Oil-free technology greatly reduces operations and maintenance needs.
- For facilities with variable loads, efficient chiller staging strategies should be considered during plant design and equipment selection.
- Water-cooled plants typically operate at a much higher efficiency (lower kW/ton) compared to air-cooled plants.
- Create savings on the energy and demand portions of the end user's utility bill (depending on utility provider and associated electricity rate).

KEY PERFORMANCE INDICATORS (KPIS)

- **3-7 point energy use intensity (EUI) reduction potential**
- **Up to 25% sitewide electrical savings**
- **Expected service life of up to 25 years**

COOLING TOWER REPLACEMENT

Capital Investment Opportunity

SION60
END EMISSIONS IN 60 MONTHS

OVERVIEW

The average life expectancy of a cooling tower is 15-20 years before needing to be rebuilt or replaced; however, many can last beyond 30 years. Cooling towers are intended to reject heat from a building equipped with a water-cooled chilled water system. Essentially, towers consist of an evaporative media, large fans, pumps, and a sump basin. Tower degradation will lead to a decrease in system efficiency as the tower will be less capable of rejecting heat. Ultimately, this results in warmer return water to the chiller condensers and an increase in compressor energy to provide the desired chilled water temperature to the space.

CONSIDERATIONS

- Colder condenser water can often result in improved chiller efficiency.
- Decreased cooling tower performance can result in excessive energy and water use.
- Refurbishment is an option over full replacement and can result in significant electricity and water savings, at a fraction of the cost.
- Effective towers will drastically improve waterside economizing capabilities (if applicable) leading to further energy savings.

KEY PERFORMANCE INDICATORS (KPIs)

- **1-3 point energy use intensity (EUI) reduction potential**
- **Up to 5% sitewide electric and water savings**
- **12 - 20 year simple payback**

VARIABLE FREQUENCY DRIVES

Capital Investment Opportunity

SION60
END EMISSIONS IN 60 MONTHS

OVERVIEW

Variable frequency drives (VFDs) adjust motor speed and torque by modulating the voltage and frequency. They are often used in HVAC fans and hydronic pump motors. VFDs can match the speed of the motor to the required load, therefore, saving energy during low demands.

CONSIDERATIONS

- Ensure motor is VFD rated (typically inverter duty)
- Typically have sizeable rebates from utilities
- Recommended for applications with variable loads
- Prolong equipment lifetime

KEY PERFORMANCE INDICATORS (KPIs)

- **1-3 point energy use intensity (EUI) reduction potential**
- **1-5% sitewide electric savings**
- **3 year simple payback**

LIGHTING UPGRADE

Capital Investment Opportunity

SION60
END EMISSIONS IN 60 MONTHS

OVERVIEW

Light emitting diode (LED) light fixtures require significantly less energy than traditional fluorescent or metal halide technology while producing the same light output. By replacing older lighting technologies with LEDs, considerable energy savings can be realized, along with an increase in equipment lifespan. LED technology offers a wide array of lighting color temperatures, functionalities, control options, and fixture designs.

CONSIDERATIONS

- More cost effective for buildings with high run hours and long occupancy durations.
- Reduces the interactive cooling load during the summer as LEDs give off less heat during operation.
- Options consist of lamp replacement or full fixture replacement.
- Utility rebates often available to offset the large capital cost.
- Small energy penalty during the heating season as LEDs emit less heat compared to older lighting technologies.
- Reduce peak facility demand and associated charges (depending on utility and region), in addition to energy savings.

KEY PERFORMANCE INDICATORS (KPIs)

- **1-5 point energy use intensity (EUI) reduction potential**
- **5-15% sitewide electric savings**
- **3-8 year simple payback**

WATERSIDE ECONOMIZATION

Capital Investment Opportunity

SION60
END EMISSIONS IN 60 MONTHS

OVERVIEW

Waterside economizing utilizes a flat plate heat exchanger to serve the building cooling load when outdoor conditions are mild. This operation relies solely on the evaporative capabilities of the cooling tower and will bypass the chiller when operating. Typically, this is only feasible when the outside air wet bulb temperature is below a predetermined threshold. Newer or refurbished cooling towers can provide a lower approach temperature, enhancing the capabilities of waterside economizing. Approach temperature represents the delta between the wet bulb temperature and the condenser water temperature sent from the cooling towers to the building chillers.

CONSIDERATIONS

- Requires a digital building automation system (BAS) to control the changeover from economizing to mechanical cooling.
- Exchanger plates can be added to increase loading capabilities.
- Most effective in regions with lower wet bulb temperatures and a constant baseload of cooling in the building.

KEY PERFORMANCE INDICATORS (KPIS)

- **5-15 point energy use intensity (EUI) reduction potential**
- **5-10% sitewide electric savings**
- **3-7 year simple payback**

SION60

END EMISSIONS IN 60 MONTHS

- SUSTAINABILITY AS A SERVICE
- CARBON EMR™
- LOW COST