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Installing Demand Control Kitchen Ventilation

All ECM content was independently developed and reviewed to be vendor, product and service provider-neutral.

Description

Demand control kitchen ventilation (DCKV) systems are a type of kitchen ventilation, usually kitchen hoods, which modulate the amount of exhaust based on cooking demand. Modulating kitchen exhaust and corresponding make-up air when exhaust is not needed can save a significant amount of energy.

Project Talking Points

- Typical kitchen hood operations wastes energy because they are generally turned on when staff arrive and shut off when staff leave, regardless of how often hoods are used during the day.
- DCKV hoods are a class of kitchen exhaust systems that modulate exhaust air depending on the intensity of cooking underneath them.
- DCKV systems operate by sensing opacity from smoke, steam, heat and other factors to control the amount of exhaust. Linking make-up air and other associated heating, ventilation and air conditioning (HVAC) systems with DCKV control will dramatically increase savings.
- Food services can be 34% more energy intensive than general hospital square footage, according to ENERGY STAR®. DCKV targets one of the most energy intensive portions of a facility.
- Due to the slightly higher payback (three to eight years), target advanced kitchen controls after quicker payback ECMs, leveraging past savings to help fund this ECM. Also consider adding the smaller marginal cost of DCKV during end-of-life replacement of kitchen equipment.
- Reducing high kitchen ventilation and exhaust requirements when the space is unoccupied will reduce kitchen and tertiary (HVAC make-up air) equipment runtime, extending equipment life.

Benefits

- **Cost Benefits:** Modulating intensive kitchen exhaust and make-up air will save significant amounts of energy and reduce equipment runtime. Payback is normally three to eight years.

- **Environmental and Health Benefits:** Energy savings, especially those served by fossil fuel intensive electric grids, will have significant environmental benefits. Health benefits

ASHE AHA Data & Insights

due to a reduction in power plant emissions can be summarized using the Healthcare Energy Impact Calculator.

- **Societal Benefits**: Reducing energy costs associated with kitchen hoods means more capital can be directed toward enhanced patient care.

Purchasing Considerations

- Consider DCKV during end-of-life replacement of kitchen hoods or controls upgrades of tertiary make-up air units.
- Ensure that building controls technicians are included in project scope.
- Consider purchasing a DCKV system that uses multiple sensors to detect cooking activity (smoke, heat, etc.).

How-To

1. Engage all stakeholders, including facility staff, kitchen staff, purchasing, the building automation system (BAS) contractor/expert and the building commissioning agent.

2. Discuss kitchen occupancy with food service staff and determine an occupied/unoccupied schedule.

3. Involve building controls technicians and identify all tertiary HVAC equipment like make-up air fans or units.
    - Develop a controls strategy to control tertiary unit demand with DCKV system.

4. Commission and functionally test controls and new demand control hoods. Educate kitchen staff on how to operate new equipment.

5. Map and trend new equipment and controls points on the BAS. Periodically check on equipment operation and override frequency.

If kitchen staff overrides are too frequent, discuss with staff and make necessary changes to controls.

Resources

- Better Buildings Center (energy.gov): Guidance on Demand-Controlled Kitchen Ventilation
- ENERGY STAR Emerging Technology Award Fact Sheet: Demand Control Kitchen Ventilation
- LEED v4. For BD + C: Healthcare
    - Energy and atmosphere
        - Fundamental commissioning and verification: Prerequisite
        - Minimum energy performance: Prerequisite
        - Enhanced commissioning: Credit
        - Optimize energy performance: Credit
    - Indoor environmental quality
        - Enhanced indoor air quality strategies: Credit
- LEED v4. For Operation & Maintenance: Existing Buildings
    - Energy and atmosphere

        - Energy efficiency best management practices: Prerequisite
        - Minimum energy performance: Prerequisite
        - Existing building commissioning and analysis: Credit
        - Existing building commissioning and implementation: Credit
        - Ongoing commissioning: Credit
        - Optimize energy performance: Credit
    - Indoor environmental quality
        - Minimum indoor air quality performance: Prerequisite
        - Enhanced indoor air quality strategies: Credit
        - Thermal comfort: Credit

Regulations, Codes and Standards, Policies

- The American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) 62.1 – Ventilation for Acceptable Indoor Air Quality
- ASHRAE 90.1 – Energy Standard for Buildings Except Low-Rise Residential Buildings
- ASHRAE 170 – Ventilation for Healthcare Facilities
- ASHRAE 189.3 – Design, Construction and Operation or Sustainable High-Performance Health Care Facilities