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## Reevaluate HVAC Equipment Scheduling

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

### Description

Reevaluate scheduling of heating, ventilation and air conditioning (HVAC) equipment such as air handlers to optimize facility operations, save energy and reduce peak demand.

### Project Talking Points

- Understand your utility bill to know how your facility is charged for energy.
- Improved scheduling enhances energy efficiency, reduces costs and extends the life of equipment by operating equipment only when needed and only at the necessary speed.
- Scheduling and controls calibration in main air handling units (AHU) are potentially big opportunities for improving energy efficiency as they often require no upfront cost.
- Establishing setbacks during low or no occupancy periods can provide significant energy savings.
- Reducing or eliminating manual holds and excessive air changes are great opportunities for savings.
- Advanced controls strategies can be implemented beyond simple setbacks. (See additional ECMs for how-to guides.)
- Regular evaluation and recommissioning of HVAC systems and sensors support optimal performance of the HVAC system.

### Triple Bottom Line Benefits

- **Cost benefits:** Turning off equipment or adjusting setpoints to match specific space needs can provide energy savings, resulting in cost savings. Advanced control strategies can drive further savings.
- **Environmental benefits:** Reducing the energy used will reduce carbon emissions, lowering the building's carbon footprint.





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- **Social benefits:** Depending on the improvements made, controllability and thermal comfort may be improved, which enhances patient and staff experience.

### **Purchasing Considerations**

- Many of these changes can be made with no additional equipment. However, consider whether inexpensive sensors or variable frequency drives (VFDs) can be purchased to drive additional savings with short paybacks.
- Evaluate the return on investment of upgrading to a controls system with additional features.

### **How-To**

1. Evaluate your utility bill to understand how you are being charged for electric and natural gas.
2. Engage clinical staff to ensure changes will not negatively impact patient care.
3. Determine whether controls changes can be made in-house or maintenance staff needs to engage their preferred controls contractor.
4. Review the facility occupancy schedule to identify which areas are not occupied on nights and weekends.
5. Conduct an occupancy audit to update the facility occupancy schedule, including details regarding occupancy level, daily hours of operation, areas that have changed usage types and seasonal fluctuations in occupancy.
6. Review air change requirements for each space type in the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) 62.1 manual. This is especially important for spaces that have changed use type, for example, a procedure room that has been converted into a private office.
7. Review historical data from the building automation system (BAS) to identify whether HVAC systems are cycling down during unoccupied hours.
8. Perform a walk-through during unoccupied hours and document equipment that is running unnecessarily.





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- Determine whether unnecessary operation is due to inaccurate occupancy schedule, miscalibrated controls or building occupants neglecting to turn off equipment. Whenever possible, shutoffs for office equipment should be automated.
  - Use the [BetterBricks toolkit](#) to diagnose specific energy performance symptoms.
9. Set up alerts in the BAS for any manual holds, and continuously monitor whether these manual holds are outdated or are a symptom of a larger issue that needs repair. A high-performing building should have very few, if any, manual holds at any given time.
10. Hospitals are under nearly constant construction. Perform a biannual assessment of the facility occupancy schedule to ensure optimal HVAC performance.
11. For facilities that are charged heavily for peak demand, evaluate peak shaving and peak shifting strategies.

### **Case Studies**

- **Regions Hospital, St. Paul, MN**
  - The hospital's central monitoring system had not been adjusted to reflect changes in occupancy.
  - AHUs ran 24/7, even in areas that were unoccupied on nights and weekends. In many cases, the units were drawing 100% outside air 24 hours a day. Tailoring ventilation airflow to the actual occupancy schedule yielded 65% energy savings for these units.
  - The facility optimized outside air dampers and air temperature controls using occupancy sensors, resulting in \$52,464 annual savings on gas.
  - Savings from the overall retro-commissioning project: 3.5% overall energy savings and 6.5% reduction in peak demand.
- **St. Joseph Hospital, Bellingham, WA**
  - Implementing scheduling control was identified as one of the top three opportunities for the retro-commissioning project.
  - Expected annual energy savings: \$108,000 with a 1.8-year simple payback period.





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## Resources

- ASHARE:
  - [Guideline 14: Measurement of Energy and Demand Savings](#)
  - [Procedures for Commercial Building Energy Audits](#)
- BetterBricks:
  - [Building Symptom Diagnostic Tool](#)
  - [Top Five Savings Opportunities](#)
- [Energy University Courses](#)
  - Energy Efficiency with Building Automation Systems I
  - Energy Efficiency with Building Automation Systems II
- Federal Energy Management Program (FEMA): Operations & Maintenance Best Practices Guide (Release 3.0), Chapter 9: [O&M Ideas for Major Equipment Types](#)
- Pacific Northwest National Lab: [Building Retuning Training](#)
  - Level 1: Walk-Through Analysis
  - Level 2: Energy Audit, Energy Survey and Analysis. Auditing can help provide diagnostic tools to help identify scheduling opportunities.
- U.S. Department of Energy:
  - [Building Technologies Program Tools](#)
  - [Efficient Hospital Boilers Result in Financial, Environmental, and Safety Payoffs](#)
  - [Energy Smart Hospitals: Retrofitting Existing Facilities](#)
  - [Hospitals Benefit by Improving Inefficient Chiller System](#)
  - [Hospitals Realize Fast Paybacks from Retrofits and O&M Solutions](#)
  - [Hospitals Save Energy and Money by Optimizing HVAC Performance](#)
- U.S. Environmental Protection Agency (EPA): [ENERGY STAR Program Building Upgrade Manual](#)

## Regulations, Codes and Standards, Policies

- ASHRAE:
  - [Standard 62.1: Ventilation for Acceptable Indoor Air Quality](#). See minimum ventilation requirements for space types not covered in ASHRAE 170.
  - [Standard 170: Ventilation of Health Care Facilities](#) (incorporated into the 2010 edition of the FGI Guidelines for Design and Construction of



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Health Care Facilities). See minimum ventilation and air change requirements for various space types.

### **ECM Synergies**

- Establish baseline for current energy consumption.
- Retro-commission HVAC controls.
- Install variable frequency drives on pumps and motors.
- Utility bill audit.
- Practice preventive maintenance of major HVAC equipment.
- Set thermostats to balance efficiency and comfort.
- Evaluate setback of temperature and airflow settings at night.

### **ECM Descriptors**

Energy

Category List:

- Building and maintenance
- Commissioning
- Contracted services

Controls

- HVAC

ECM Attributes:

- Optimize operations
- Repair or optimize existing systems
- System upgrades

Improvement Type:

- Commission/retro-commission
- Retrofit/renovations
- New buildings
- Operations and maintenance (O&M)

Department:

- Engineering/facilities management





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