



Greater efficiency supports patient care.

Perform economizer maintenance.

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

Description

Take advantage of “free cooling” and reduce the risk of economizer malfunction by regularly inspecting and maintaining dampers, actuators, sensors, and linkages.

Project Talking Points

- Proper economizer operation enhances energy efficiency, reduces costs, and extends equipment life.
- Maintenance is especially important because outdoor air (OA) dampers can be frozen or stuck open, resulting in increased energy consumption.
- Economizers can be “silent energy wasters” because open dampers can have little effect on overall occupant comfort.
- Utilize a proactive rather than reactive economizer maintenance strategy to avoid high energy costs and replacing equipment before the end of its useful life.

Triple Bottom Line Benefits

- **Cost benefits:** When operating as intended, economizers reduce costs by providing “free cooling”, enabling equipment to run less frequently. Preventive maintenance reduces the need for costly equipment repairs before the end of equipment life. Lower energy usage and fewer repairs save money.
- **Environmental benefits:** Reducing energy use reduces emissions and environmental impact (see [Benefits Calculator Page](#)).
- **Social benefits:** When equipment operates as intended, the indoor environmental quality is better for staff and patients.

Commissioning Connections

The ASHE *Health Facility Commissioning Guidelines* and accompanying *Health Facility Commissioning Handbook* offer helpful information for economizer maintenance.

- 6.1 The Retrocommissioning Process (*in both books*)
 - (24) Develop revised air-handling unit sequences of operation and set points for optimum energy efficiency (supply air temperature control, humidity control, economizer cycles, damper sequencing, supply air temperature set-point reset, and supply air static pressure set point reset).
- ASHE (www.ashe.org)

- *Health Facility Commissioning Guidelines*
- *Health Facility Commissioning Handbook*

Purchasing Considerations

Ensure that economizer maintenance is included in your controls vendor's contract and your annual maintenance budget.

How-To

1. Assemble a team of relevant stakeholders, including the commissioning agent, building engineer, HVAC maintenance personnel, and the building automation system (BAS) manager.
2. Review historic data from the BAS to identify economizers that may not be working properly. For example, if an outdoor air damper is stuck it may read as consistently open at a specific percentage rather than varying.
3. Perform a facility walkthrough every six (6) months to inspect economizer equipment. Check for the following during the inspection:
 - Loose actuator or linkage connections
 - Temperature or enthalpy sensor malfunction
 - Operating mixed air temperature that is too high or too low
 - Deviation from control settings for high-limit temperature, lockout temperature, and building pressure
 - Weak or warped economizer damper blade seals when the economizer is fully closed
 - Corrosion, condensation, or build-up that could cause the outside air damper and/or linkages to freeze in place
 - A good way to check the performance of damper operation and calibration is to take CO₂ or dry-bulb temperature readings at various damper settings (including outside air damper closed position) and use the following formula to correlate actual outside airflows:

$$\% OA = \left(\frac{X_r - X_s}{X_o - X_s} \right) * 100$$

Given:

X_r= return air CO₂ or dry-bulb temperature

X_s= supply air CO₂ or dry-bulb temperature

X_o= outside air CO₂ or dry-bulb temperature

4. Perform the following maintenance with each inspection, in addition to any needed repairs:
 - Clean linkages and verify they are properly connected to the damper.
 - Verify the actuator is connected to a power supply and functioning properly.
 - Calibrate the enthalpy sensor and check that it is functioning properly.

- Program the BAS to cycle the economizer regularly by opening and closing the dampers to reduce the risk of freezing up in between maintenance inspections.
- Continue to track economizer performance using BAS trending data.
- Integrate the economizer maintenance program into performance improvement measure Retrocommission HVAC controls and performance improvement measure Practice preventive maintenance of major HVAC equipment.
- Consider Fault Detection Diagnostics (FDD) to observe and maintain the performance of all mechanical equipment.

Regulations, Codes and Standards, Policies

- ANSI/ ASHRAE/ IES Standard 90.1-2019- [Energy Standard for Buildings Except Low-Rise Residential Buildings](#)
- ANSI/ ASHRAE Standard 62.1-2019- [Ventilation for Acceptable Indoor Air Quality](#)
- ANSI/ ASHRAE/ ASHE Standard 170-2017- [Ventilation of Healthcare Facilities](#)
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Cross References: LEED

- [LEED for Existing Buildings: Operations + Maintenance](#)
- [LEED for Healthcare: New Construction and Major Renovations](#)
 - Energy & Atmosphere Prerequisite: Fundamental Commissioning and Verification
 - Energy & Atmosphere Prerequisite: Minimum Energy Performance
 - Energy & Atmosphere Prerequisite: Building-Level Energy Metering
 - Energy & Atmosphere Credit: Optimize Energy Performance
 - Energy & Atmosphere Credit: Enhanced Commissioning
 - Energy & Atmosphere Credit: Advanced Energy Metering

ECM Synergies

- [Establish baseline for current energy consumption.](#)
- [Practice preventive maintenance of major HVAC equipment.](#)
- [Evaluate setback of temperature and airflow settings at night.](#)
- [Replace air-handling unit \(AHU\) filters regularly.](#)
- [Reevaluate HVAC equipment scheduling.](#)

More Resources

- [American Society of Heating, Refrigerating, and Air-Conditioning Engineers](#)
- [Procedures for Commercial Building Energy Audits](#)
 - Level 1, Walk-Through Analysis

- Level 2, Energy Audit, Energy Survey and Analysis (Because many building codes require economizers in certain scenarios, understanding how to identify if they are functioning properly is key.)
- Building Owners and Managers Association International (www.boma.org)
 - [Preventive Maintenance Guidebook: Best Practices to Maintain Efficient & Sustainable Buildings](#)
- Lawrence Berkeley National Laboratory-[What is an Economizer?](#)
- Liescheidt, Steven, [Economizers in Air Handling Systems](#)
- U.S. Department of Energy, Energy Efficiency & Renewable Energy Building Technologies Program Tools:
 - [Hospitals Realize Fast Paybacks from Retrofits and O&M Solutions](#)
 - [Hospitals Save Energy and Money by Optimizing HVAC Performance](#)
- U.S. Department of State, [HVAC Controls Guide for Plans Examiners and Building Inspectors \(2011\)](#)
 - Economizer basics on pg. 22
- U.S. Environmental Protection Agency)- [Energy Efficient Products, Air-Side Economizer](#)
- U.S. Environmental Protection Agency- [ENERGY STAR Building Upgrade Manual](#)
 - See Chapter 8 for a discussion of economizers.

ECM Descriptors

Category List:

- Building and Maintenance
- Commissioning
- Contracted Services
- HVAC

ECM Attributes:

- Optimize Operations
- Repair or Optimize Existing Systems (fix what you have)

Improvement Type:

- Commission/Retro-Commission
- Retrofit/Renovations
- New Buildings
- Operations and Maintenance

Department:

- Engineering/Facilities Management
- External Controls Vendors

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