Battelle
The Business of Innovation

HVAC Economizers 101

Section #3

Why Economizers Fail and Increase Energy Use

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- Jammed or frozen outside-air damper
- Broken and/or disconnected linkage
- Nonfunctioning actuator or disconnected wire
- Malfunctioning outside air/return air temperature sensor
- Malfunctioning controller
- Faulty control settings
- Installed wrong or wired incorrectly

Wired poorly

Jammed/Frozen Damper

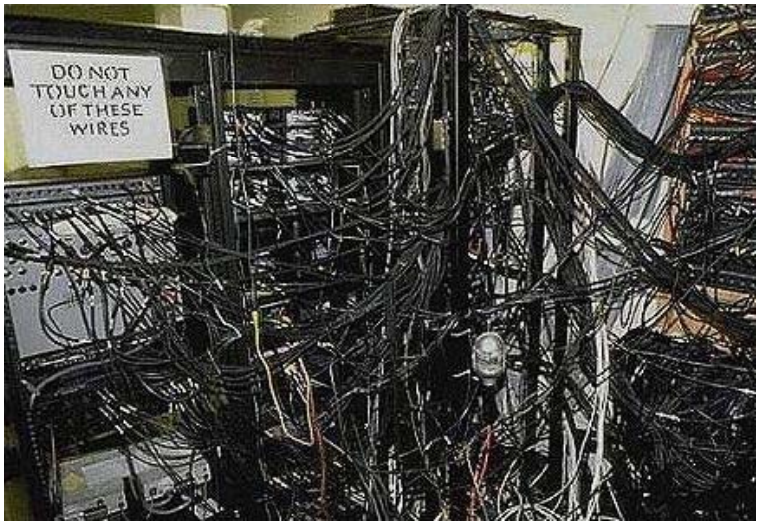
Source:
Financial Times Energy

Disconnected Damper

Packaged Rooftop Units with Economizers are Often Neglected, Hard to Access, or Installed Poorly

Poorly Design-Packaged Rooftop Units with Economizer Installed Next to Heat Source from Condenser

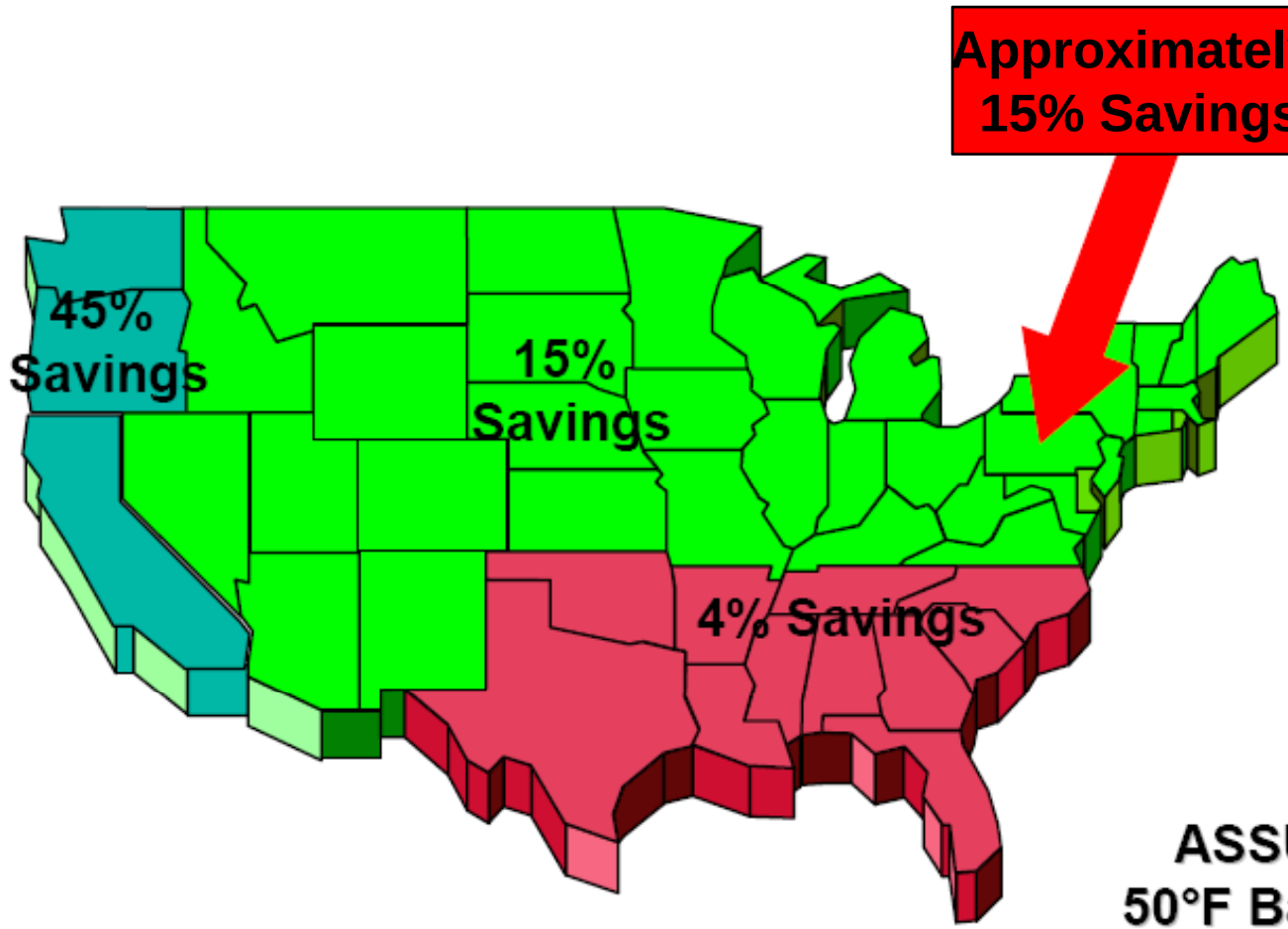
AHU and Economizers Often Don't Get Adequate Maintenance



Inefficient Designs on RTU Contribute to Poor Air Circulation at Intake Air

Rooftop HVAC Units with Economizers Are Installed Quickly on Flat or Pitched Roofs, and Serviced by Many Techs

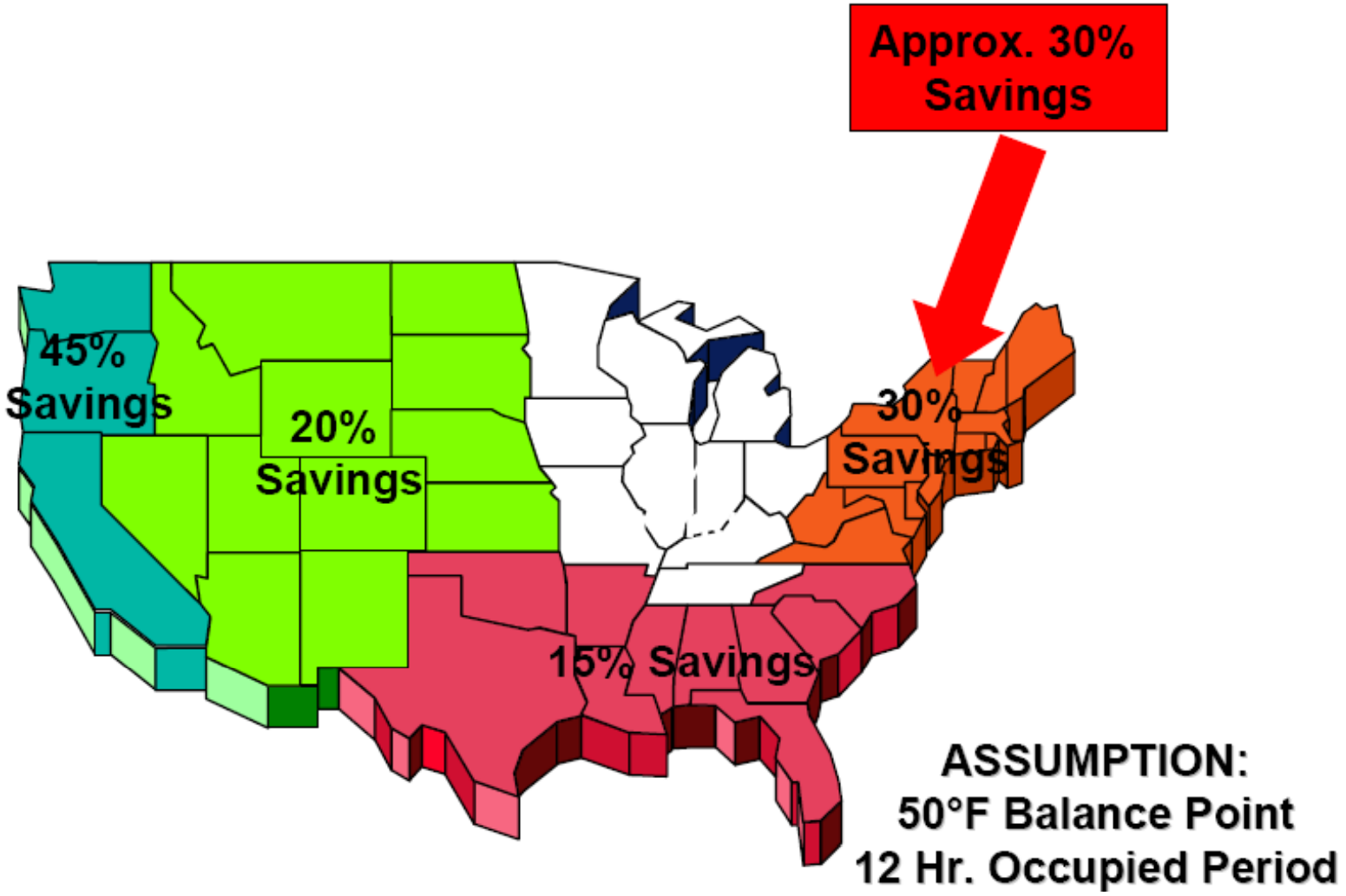
Potential Economizer Savings from Enthalpy Control



ASSUMPTION:
50°F Balance Point
12 Hr. Occupied Period

Source: Honeywell Controls

Potential Economizer Savings from Differential Enthalpy Control

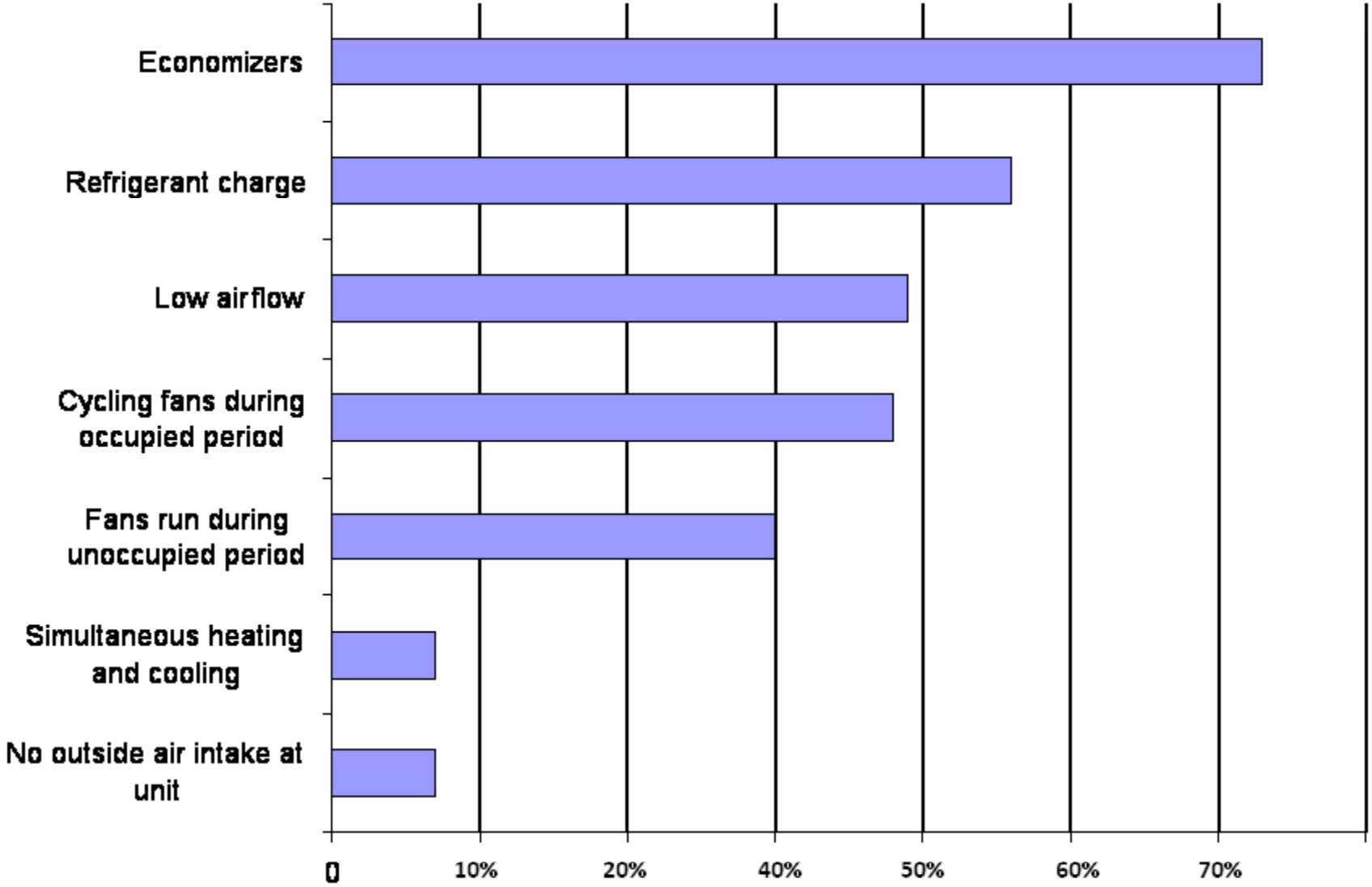


Source: Honeywell Controls

The Potential of Energy Savings from Properly Operating Economizers in Various Cities

New York	16.3%
Washington, DC	13.0%
Atlanta	15.0%
Miami	5.5%
Pittsburgh	15.0%
Chicago	13.2%
Nashville	13.4%
Minneapolis	12.3%
Fort Worth	12.5%
Denver	24.9%
Albuquerque	27.9%
Seattle	17.4%
Sacramento	17.5%
Los Angeles	32.0%
Phoenix	9.5%

Typical Problems with Rooftop Units

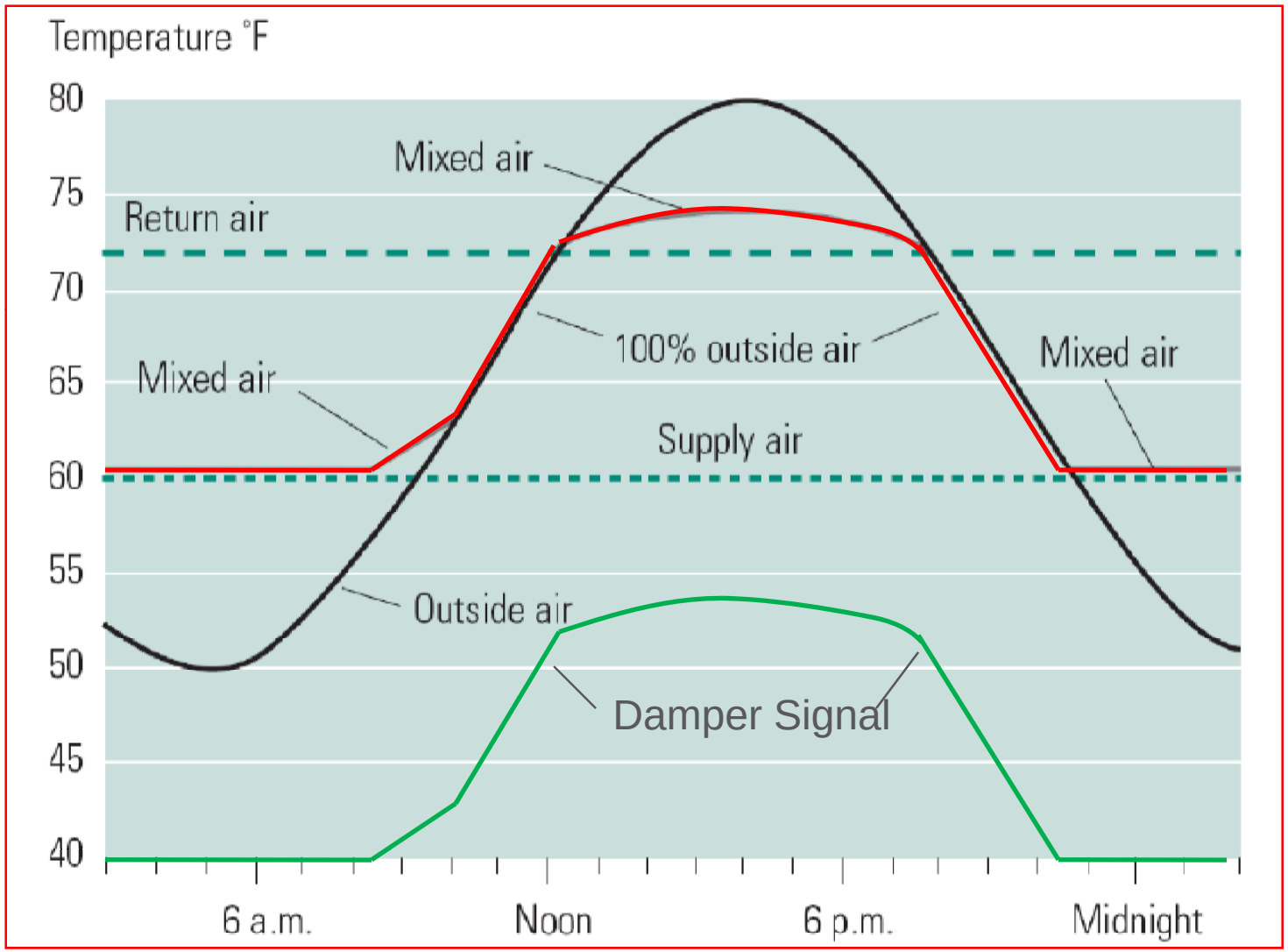


Problems and Frequency in %

Source: New Buildings Institute - PIER

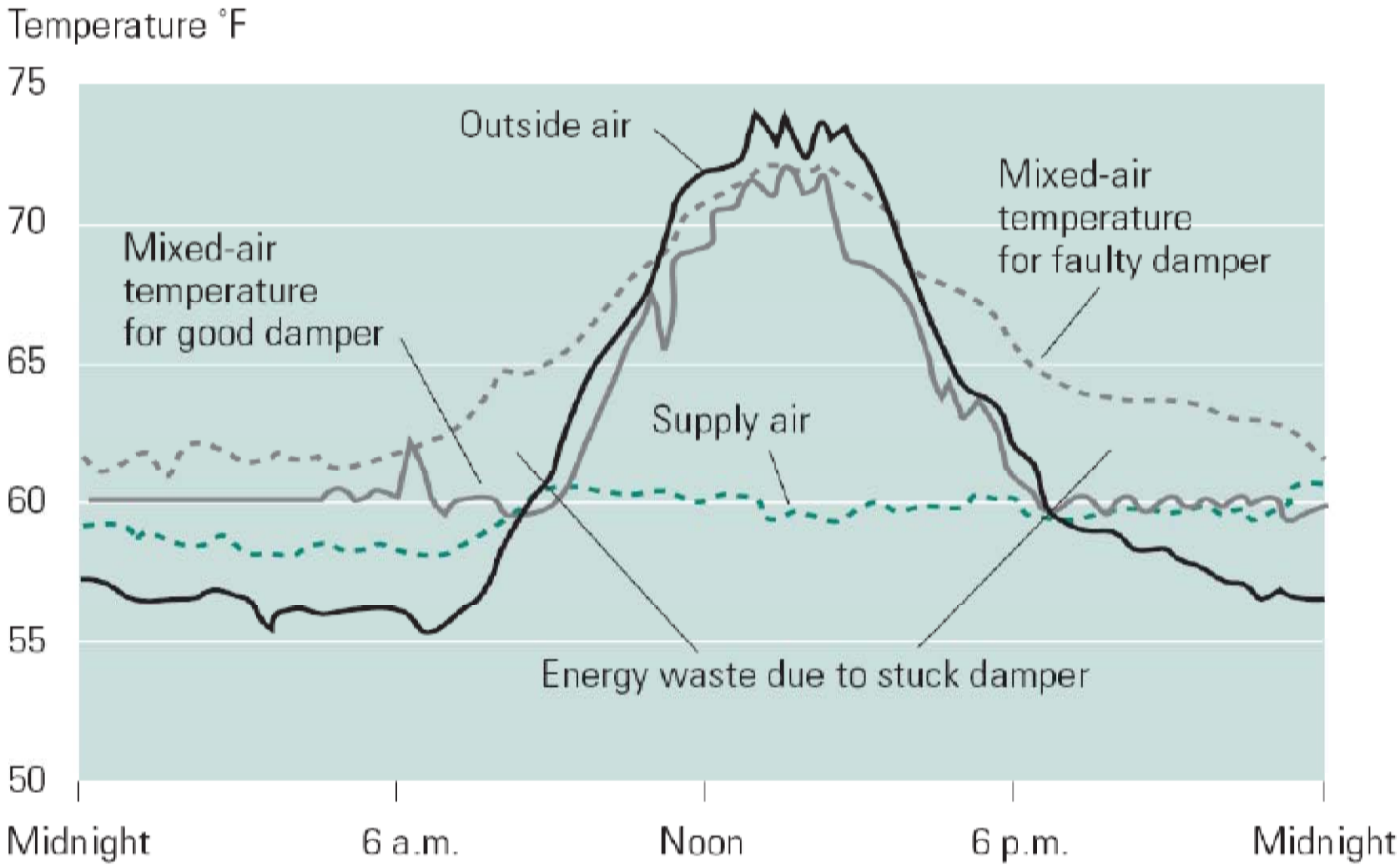
Notice-Economizers are a problem on rooftop units over 70% of the time

Ideal Economizer Performance Profile During the Day



Source: Pacific Energy Center

Good vs. Evil of Malfunctioning Economizers



Source: Pacific Energy Center

Why Economizers Fail
Exercise #3
(Provide Answers below on notes page)

1. List three reasons economizers fail or do not work properly.
2. What are the top two reasons that rooftop HVAC equipment is energy inefficient?
3. Which has a greater impact on the energy of the HVAC unit refrigerant charge or low air flow?
4. What hours of the day are best for utilizing free cooling via the economizer?
5. Which areas of the country have the greatest percent of energy savings regarding single enthalpy controlled economizers, the west or the mid-west? Explain.