

White Paper #3

Maintenance Tips for Energy Conservation

Maintenance is essential to keep your energy use low year after year.

Here a few ideas to keep in mind.

- There are two schools of thought for maintenance
 - Preventive Maintenance
 - Maintenance By Exception (ignore it until it screams or breaks)
- They each have their merits
- Maintenance by Exception actually costs less, at least for a few years
- Preventive Maintenance normally produces a higher quality environment
- Keys to Success in Maintenance:
 - Knowing what needs maintaining and why
 - Trained personnel
 - Record Keeping and diligence
 - Having systems that are maintainable to begin with
 - Refer to designer checklist for maintainability topics to consider
- Maintenance Tips For Energy Efficiency
 - Use good quality filters. 30 percent pleated (MERV-8) should be a minimum. Avoid the flat filters - their efficiency is about 7 percent.
 - The dirt that gets past the filters accumulates on the coils and in the ductwork. Dirty ducts have higher friction than clean ducts. Dirt covering heat exchange coils slows heat transfer making the heat/cool equipment run longer.
 - Clean air handler coils annually – to keep heat exchange rates high
 - Clean air-cooled condenser fins annually. This applies to A/C outdoor condensers, kitchen cooler condensers, ice machine condensers, vending machine condensers, etc.
 - Defrost reach in freezers often
 - Check and verify that control valves FULLY close when told to, annually. Internal leak by is hard to detect without visual inspection, and can creep up energy costs if neglected
 - Cycle all valves annually (so they really work when you need them!)
 - Calibrate electronic control sensors each 5 years
 - Test VAV box actuators (electric) annually. These have a short life – usually 5-7 years - and will fail in last-commanded state, and it is sometimes hard to tell they have failed by comfort complaints alone
 - Clean chiller condenser tubes annually – to keep primary cooling efficiency high. Determine the “new clean machine” full load approach temperatures and use these as a gage of when more frequent cleaning may be warranted. Tube cleaning is suggested whenever the approach temperature is more than 25 percent higher than clean state values.
 - Clean boiler fire-side tubes annually – to keep primary heating efficiency high. Fire side boiler tube cleaning is usually indicated whenever the flue gas temperature is more than 75 degrees above the heated medium (steam or hot water)

Energy Savings from Good Operations and Maintenance Practices

- Dirty outdoor coils can increase energy use up to 20 percent
- Dirty indoor evaporator coils can increase energy use by 15-20 percent
- A 1/16th inch layer of soot on a fired heat exchanger can increase energy use 4-5 percent
- A 1/16th inch layer of mineral deposit on the water side of a fired heat exchanger can increase energy use 12 percent
- Simultaneous heating and cooling from leaking terminal reheat valves or overlapping controls can increase summer cooling loads by 20 percent
- Automatic control sensors that are out of calibration or adjusted incorrectly can increase energy use by 10 percent or more
- HVAC equipment left on continuously instead of turned off each night can increase energy use by 15 percent
- Boilers left on during summer can increase gas use by 30 percent