

Note 1

35% of total
kWHs consumed
during a period =
HVAC kWH
savings



Note 2



Indicated savings are adjusted to be used on total kWhs consumed during a period.

Total kWhs X (.35 X Est. Svgs %) = Est. kWhs Saved

Note 3

A reasonably well operated commercial office bldg consumes 18 – 21 kWhs per sq ft per year.





Note 4

The assumption is that you are already doing what you should be doing.

CO2 Monitoring

- More controlled operation due to demand based ventilation
- Reduces OAF and TEF fans op exp
- Range of control from hard start/stop to VFD
- Savings = 0.18%



BAS Program

- Optimization
- Reduce sloppy band-widths
- Confirm proper damper operation
- Calibrate
- Stage multi-element PIUs
- Stagger start/stops
- Confirm/modify setbacks
- Supply air reset
- Add lighting and WH control and CHW reset
- Add Oversight PM
- Regular back-ups



"Notice how few people fiddle with the heating controls since putting up that sign?"

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Savings = 1.8%

Equipment PMs

- Rotation assembly alignment
- Check tolerances and calibrations
- Clean
- Adjust linkages
- Develop SOPs
- Brush/clean coil tubes
- Lubricate
- Trend pressures, amps, volts, heat, noise, etc.
- Visual inspections
- Safety verification



Savings = 0.35%

Building Thermal Efficiency

- Insulate stone panels, spandrels, etc.
- Seal penetrations
- Add window treatments
- Repair roof leaks
- Weatherstrip

Savings = 0.35%



Dampers

- Find them
- Verify logical code compliance positions
- Adjust/service linkages
- Verify proper operation
- Add where necessary
- Reduces “chimney effect”

Savings = 0.18%

Internal Coil Cleaning

- CSCs, AHUs, chillers, FCUs, etc (est = \$300 - \$600 per coil bundle)
- Greater efficiency
- Increase temp diff = greater heat transfer
- Reduce humidity
- Lowers fan requirements
- Quicker response to space

Savings = 0.18%

Water Treatment

- Remove silt, slime, etc.
- Clean water = better heat transfer
- Reduces expenses related to deferred maintenance

Savings = 0.18%



Air Filtration

- Reduces PM efforts
- Reduces potential for IAQ issues
- Reduces overall building cleaning efforts
- OAF - Reduces excessive pressure drop across filter face reducing work required by the fan motor
- Be careful! High efficient filters can cause adverse conditions as original equipment design may not have compensated for the added restrictions present in some high efficient filters.

Reduced air flow

Reduced heat transfer

Savings = 0.18%

Commissioning Equipment and Controls

- Verify ALL equipment operates as designed
- Implement during all future TI

Savings = 1.8% when all of the equipment is done. The savings is a fraction of this when only parts of floors or individual floors are commissioned



Condensate Recovery

- Reuse as condenser make up water reducing water consumption
- The sum participation of everyone that can recover condensate reserves the resource for more critical needs.

Savings = negligible

Consider Effects of Other Projects

- Lighting retrofit
 - Reduction in lighting watts = less heat output = less cooling needs
 - 1 kW (1000 watts) = 3413 BTUs
 - Reducing 4 watts per lamp = 1kW reduction per 250 lamps (125 2-lamp fixtures or +/- 1/2 of a typical commercial office building floor)
- (kW reduction) X (hours of use) X (3413 BTUs/kW) =
Saved BTU's = Saved HVAC kWh's

Estimated Savings Recap

- CO2 Monitoring = .18%
- BAS Programming = 1.8%
- Equipment PMs = .35%
- Building Thermal Eff = .35%
- Dampers = .18%
- Internal Coil Cleaning = .18%
- Water Treatment = .18%
- Air Filtration = .18%
- Total HVAC Sys Commissioning = 1.8%



Results

Example building uses 10,000,000 kWhs per year

- CO2 Monitoring = 18,000 kWhs
- BAS Programming = 180,000 kWhs
- Equipment PMs = 35,000 kWhs
- Building Thermal Eff = 35,000 kWhs
- Dampers = 18,000 kWhs
- Internal Coil Cleaning = 18,000 kWhs
- Water Treatment = 18,000 kWhs
- Air Filtration = 18,000 kWhs
- Total HVAC Sys Commissioning = 180,000 kWhs

Estimated Saved kWhs

- 520,000 kWhs saved
- Around a 5% reduction in kWhs purchased
- Assumes all suggested projects were successfully completed

