



How to Identify Opportunities for Maximizing Energy Efficiency

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**Mn
TAP**

helping businesses
reduce waste and
maximize efficiency

MnTAP

- outreach program at U of MN
- pollution prevention & energy efficiency
- engineers and scientists
- telephone assistance
- site visits
- intern program



energy efficiency opportunities

- compressed air
- steam
- pumps
- fans
- motors
- process heat
- utility rebates



compressed air

- system pressure
- leaks
- inappropriate uses
- storage
- control systems

**8HP electricity to
run a 1HP air motor**

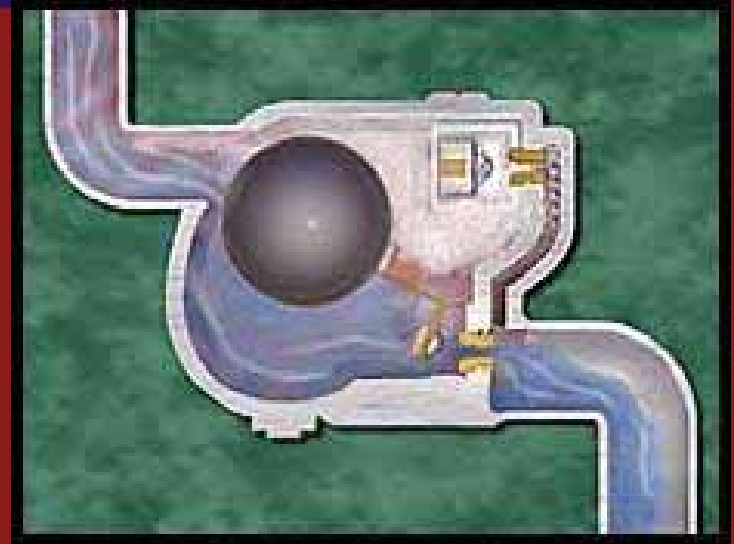
**1 HP out / 8 HP in =
0.125 = 12.5%**



**if you hear a compressed
air leak, it is at least \$700
per year of waste**

Steam: things to look for

- Leaks
 - visible
 - temperature
- traps / valves
 - inspections
 - replacement



things to look for: steam

- boilers 50 HP and up
 - esp. if run year round



- boiler size / age
- missing insulation / hot pipes
- is condensate returned to the boiler?



pump systems



- pumps have narrow efficiency band
- pumps must be considered in relation to pumping system
 - no “drop-in” efficiency solutions



things to look for: pumps

- throttling valve = variable speed application
- pumps that run for many hours per year
- closed loops (e.g. chiller loops) that don't have variable speed drives

US Dept of Energy provides free software (PSAT) to evaluate the “level of optimization” of a pump system



fans

- similar to pump systems
- engineers tend to overdesign systems
 - it is safe for them, they don't pay the power bill
 - as energy prices increase, the opportunity to run closer to actual process demand is attractive



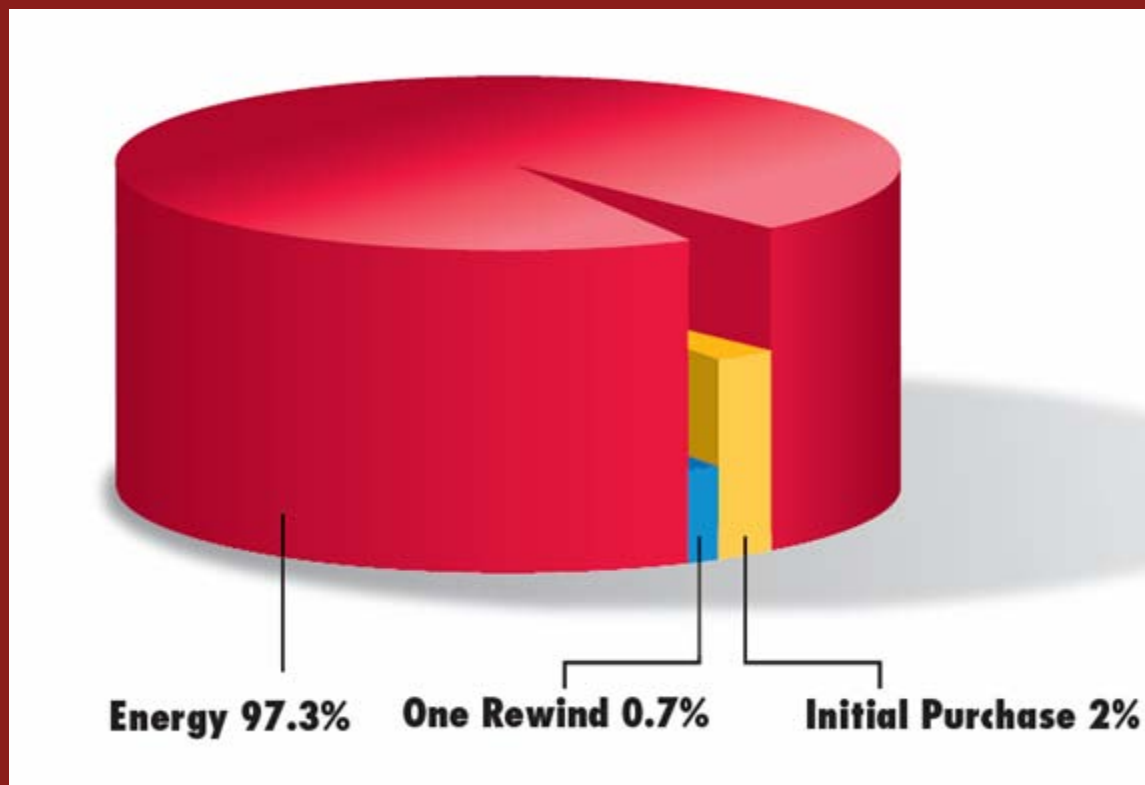
things to look for: fans

- dampers that are mostly closed
- older systems with large, high run-hour fans
- fans that are high maintenance or have lots of vibration

US Dept of Energy provides free software (FSAT) to evaluate the “level of optimization” of a fan system



Motor Life-Cycle Cost



motors

nameplate efficiency

age

size (HP)

hours of operation



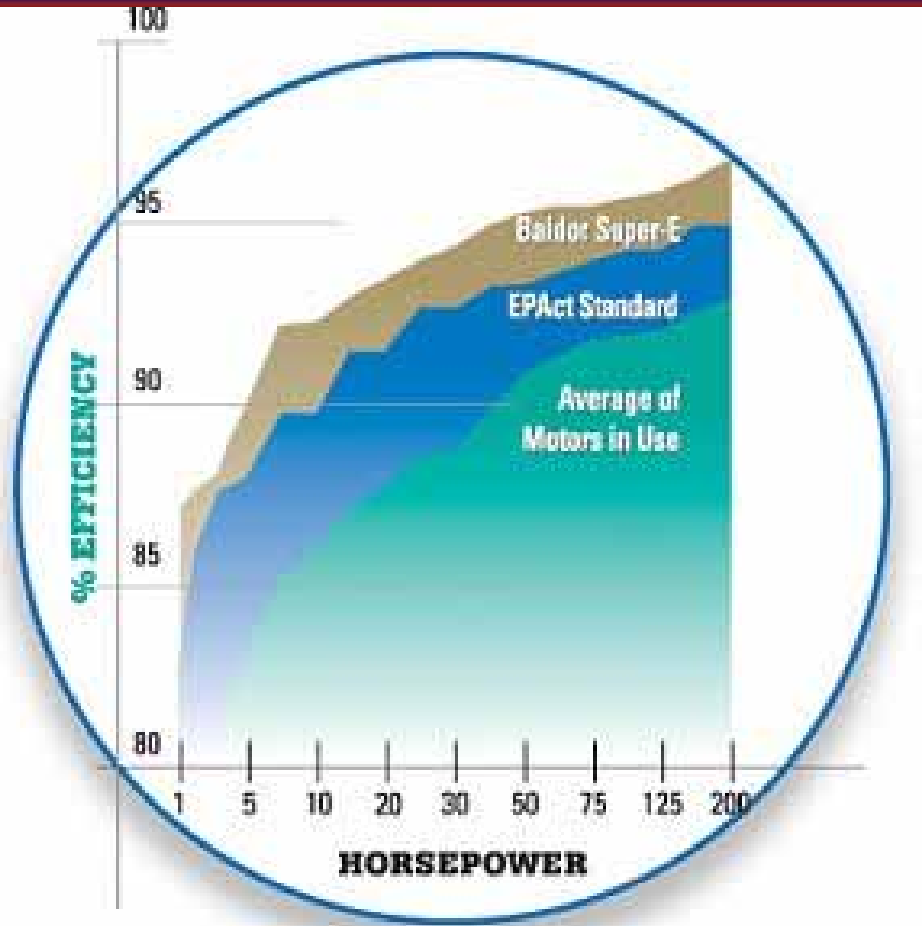
Standard Efficiency pre-EPACT (pre 1997)

EPACT Energy Efficient (post 1997)

NEMA Premium: exceeds EPACT requirements

EPACT = Energy Policy Act of 1992

Motor Efficiency



US Dept of Energy provides free software (MotorMaster+) to evaluate the efficiency of motors

process heat

some examples:

- paint cure ovens
- cleaning baths
- metal casting melt furnaces
- fluid heating: water heating, cooking, distillation
- drying
- heat treating
- incineration/thermal oxidation



things to look for: process heat

- large gas or electric bill associated with process heating
- open doors on ovens
- uninsulated areas of ovens/furnaces
- waste heat: is it utilized, or just vented?
- batching: are materials loaded and processed in an efficient manner?



rebates

utilities often offer rebates to provide an incentive to conserve energy:

- prescriptive
 - e.g. steam traps: Centerpoint rebates 35% of parts cost
- custom
 - specific rebates for projects that result in improved energy efficiency
 - examples:
 - » improve building envelope
 - » upgrade process controls
 - » right-size compressor system



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