Case Study:

Energy Efficiency at a Small Business

Ernie Barbato – Owner

Mr. John's Cleaners

Everett, MA

- 3000 sq. ft.
- 6 employees
- walk-in counter, delivery to 35 mi radius, wholesale
- Own building: combination residential & commercial

Financial Goals

- Sell business for retirement in about 10-12 years
  - Improve net revenue to increase sale price
  - Maximize profit per customer order
  - Improvements for the long term
- Best margins for present income

Challenges

- Economic downturn starting 2008
- Road resurfacing lost customers

Strategies

- Convert from Perc-based dry cleaning to professional wet cleaning
- Improve margins by reducing operating costs
- Long-term energy efficiency for long-term margin protection
- Add wholesale cleaning services
- Start delivery service

National Grid energy audit

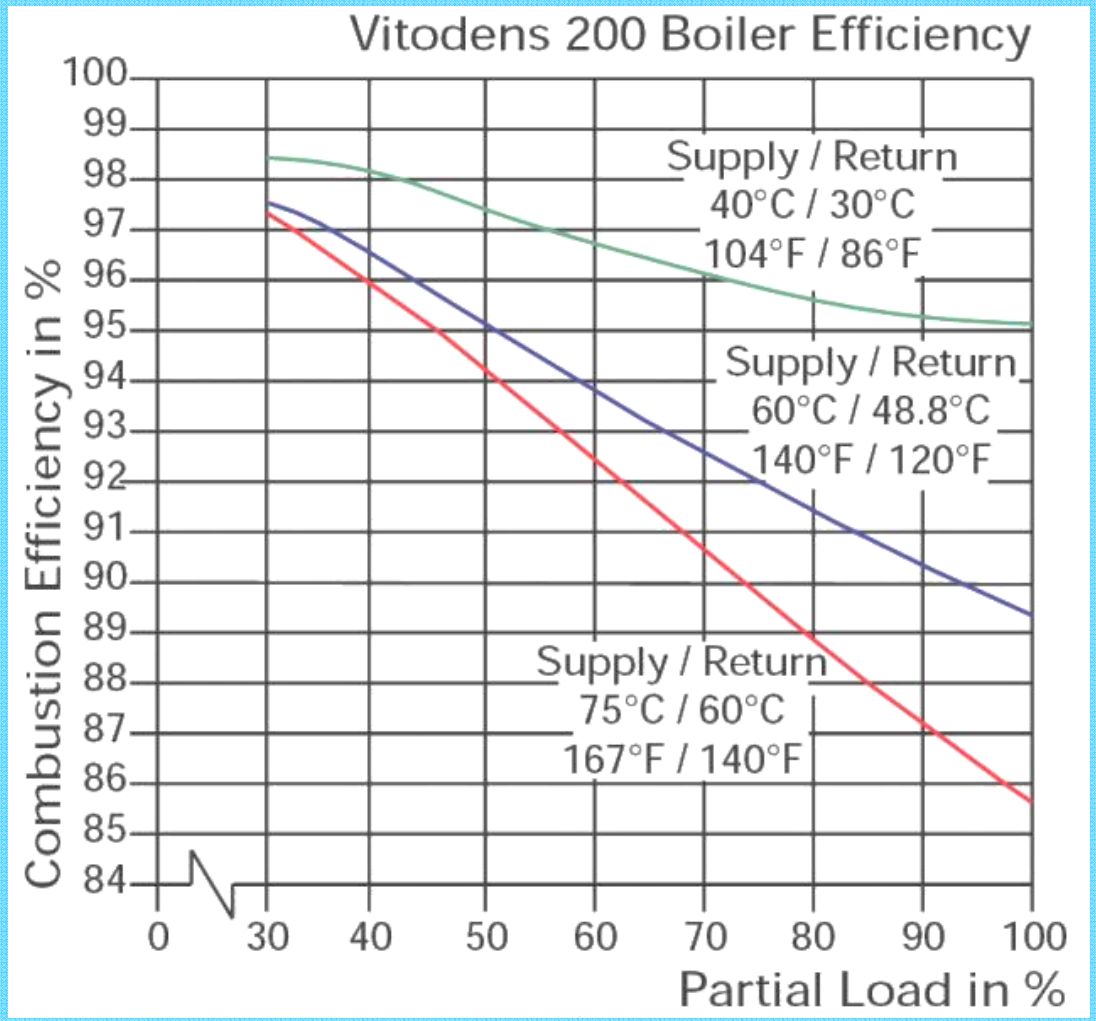
Lighting retrofit

- 70% paid by National Grid
- 30% paid by business
- T8 lamps, electronic ballasts, reflector fixtures

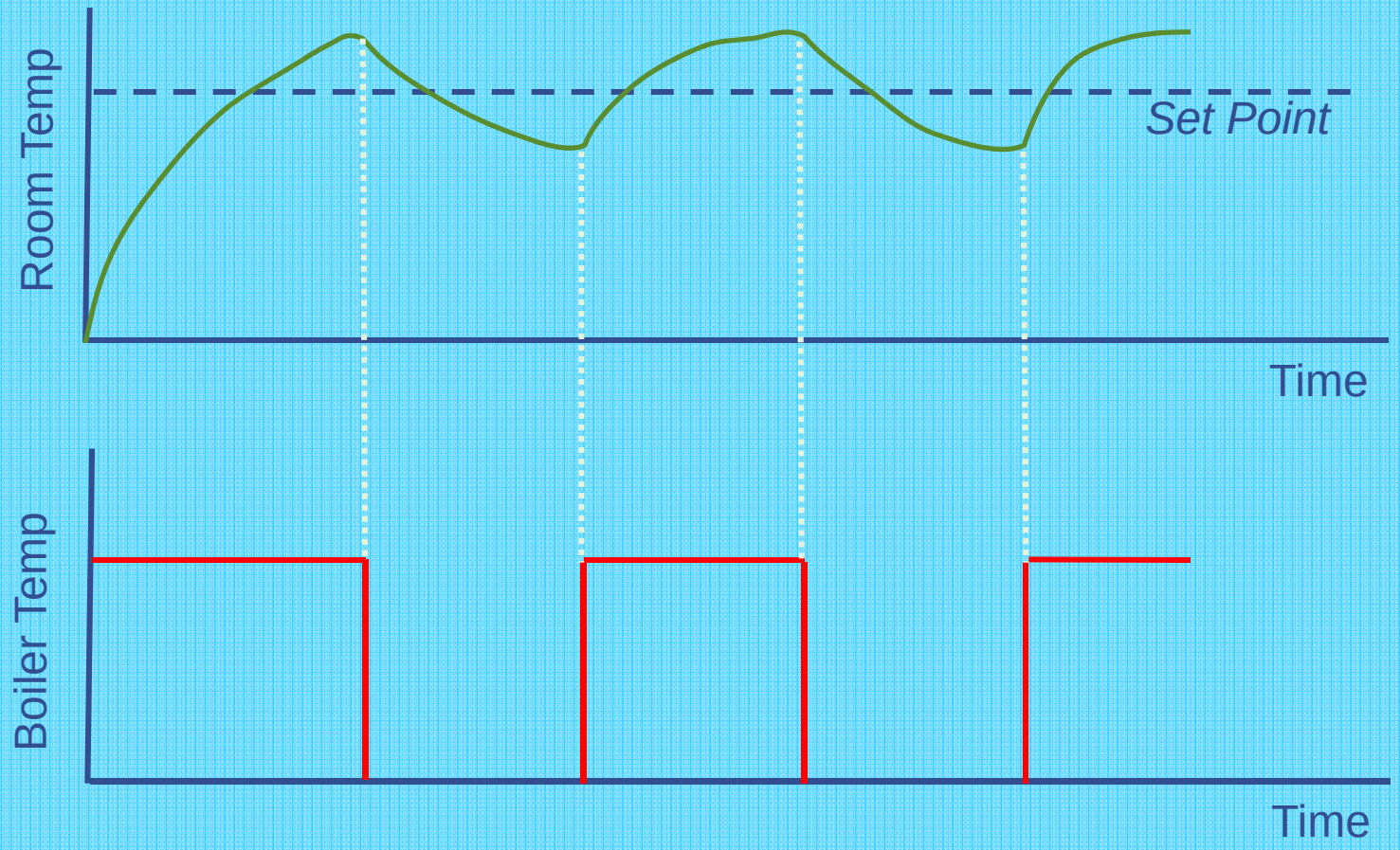
Boiler system upgrade

- Higher initial cost, least expensive overall
- Oil to gas conversion
- High-temperature condensing boiler
- Continuous turndown technology

Boiler efficiency vs demand

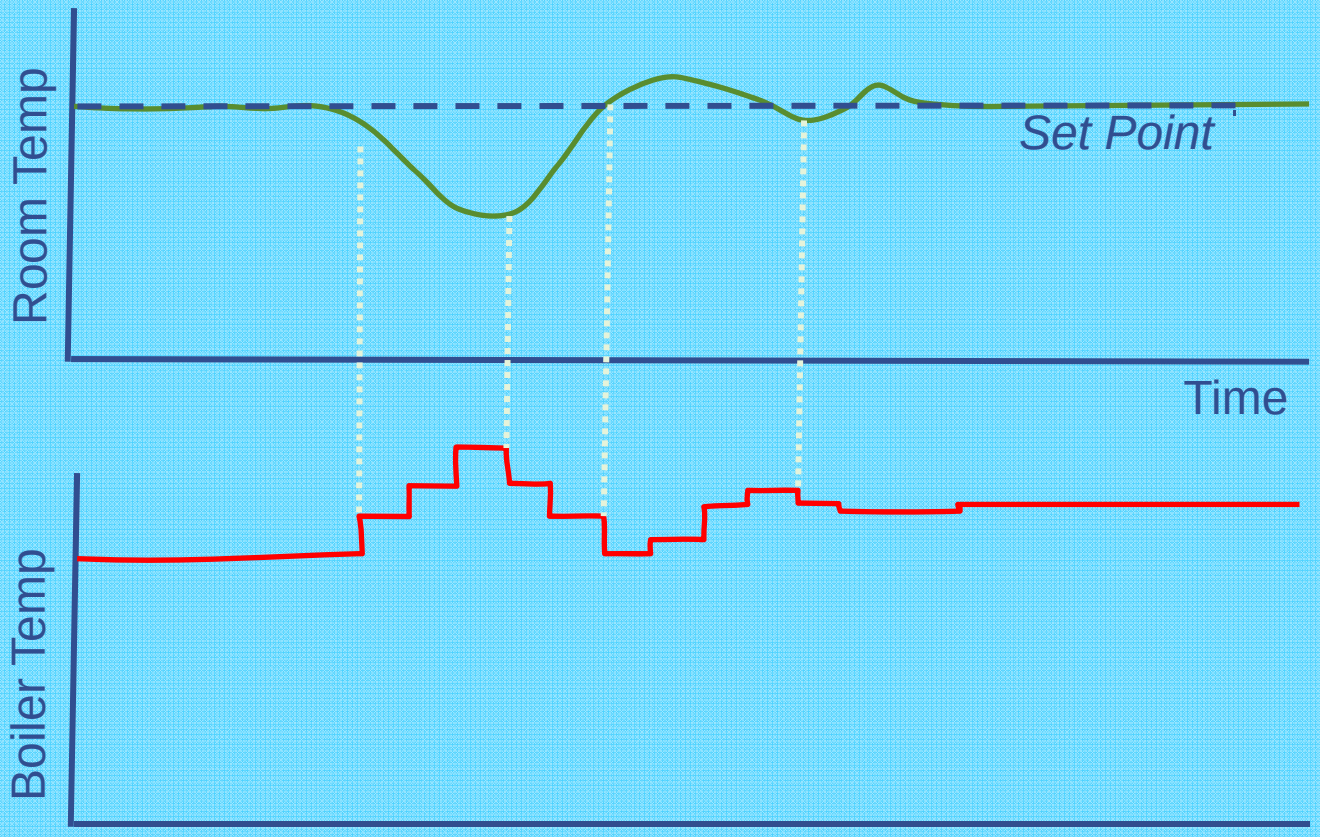


On-off boiler control



Boiler is all-on, or all-off

Continuous boiler control



Boiler temperature varies in proportion to current demand, rate-of-change of demand, and cumulative demand (P-I-D control)

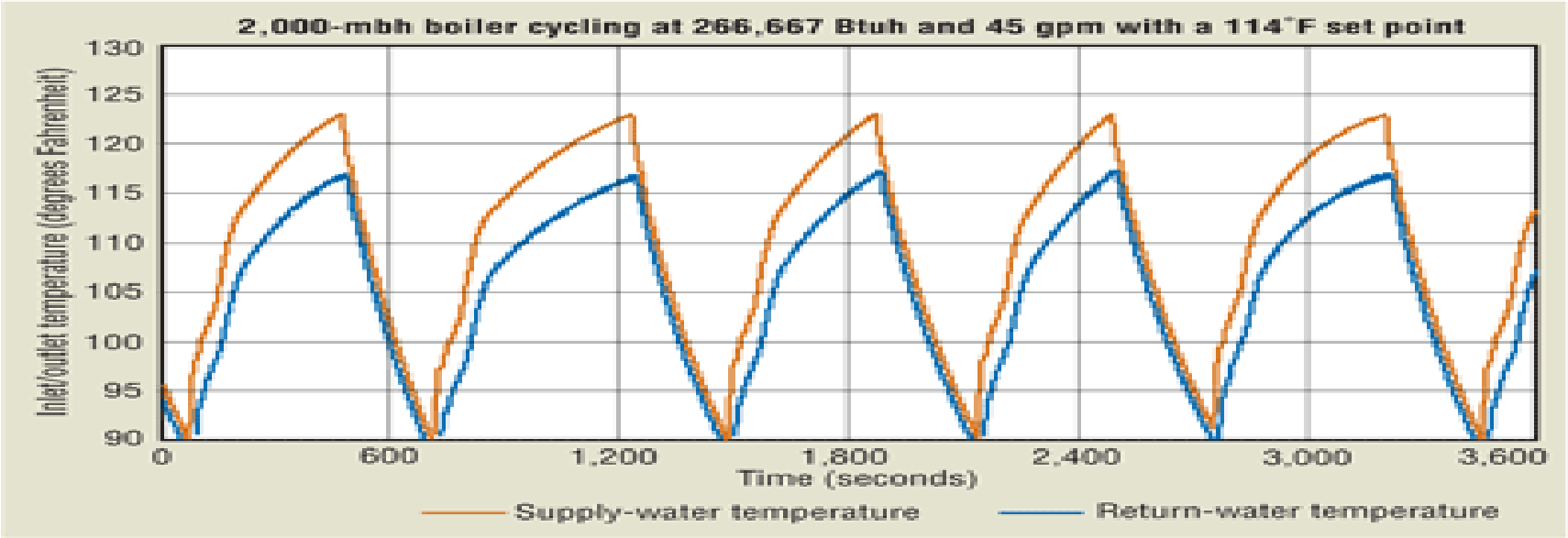
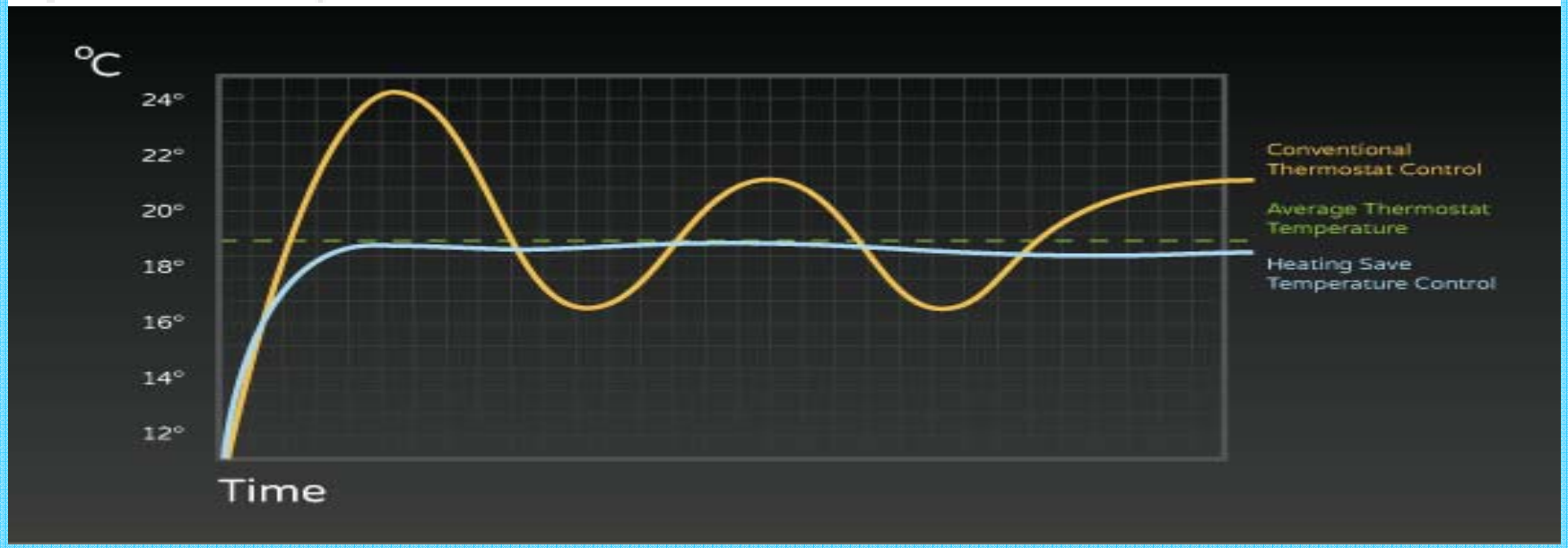


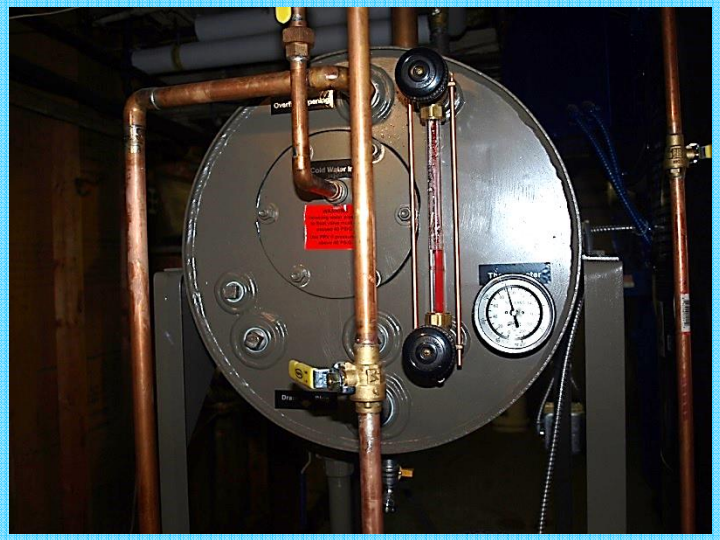
FIGURE 1. A 2,000-mbh boiler cycling at 65˚F for 742 hours is inefficient and creates system instability.




SYNEX
CONTROLS
Tribute Steam Boiler
Main Menu
Steam Pressure: 99 psi
Setpoint: SC-750 110 psi
Control Variable: Local 20 %
Status: Modulating
Modulation Rate: 36 %
Flame Signal: 96.0 %
Stack Temp: 449 F
Auto

High temperature condensate pump

- Hi temperature pump can handle up to 235°F, vs regular pump max = 160°F



Steam traps, Pipe insulation

Outdoor reset control

Modulates boiler temperature in proportion to outside - inside temperature difference

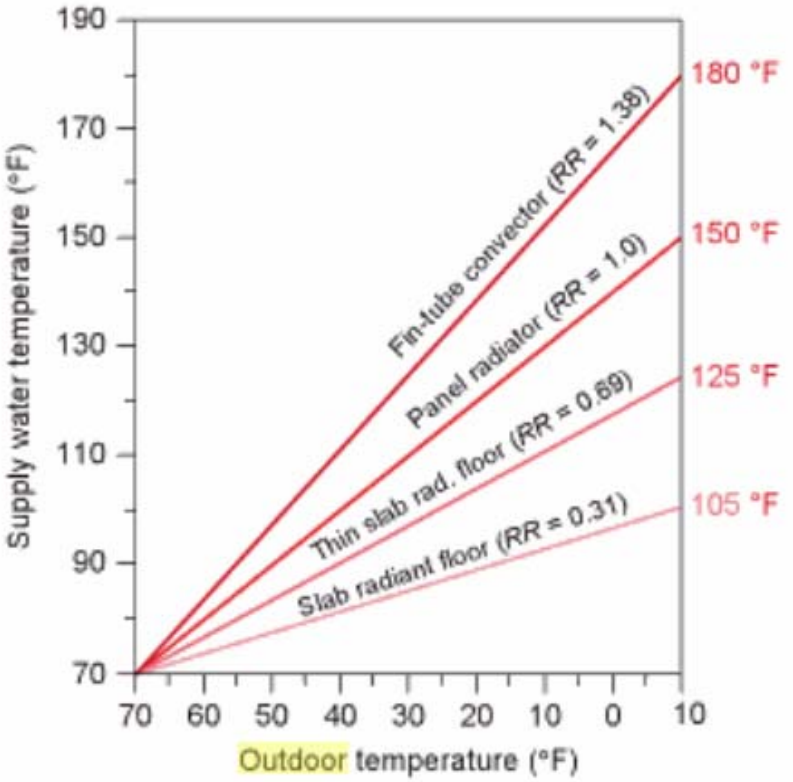
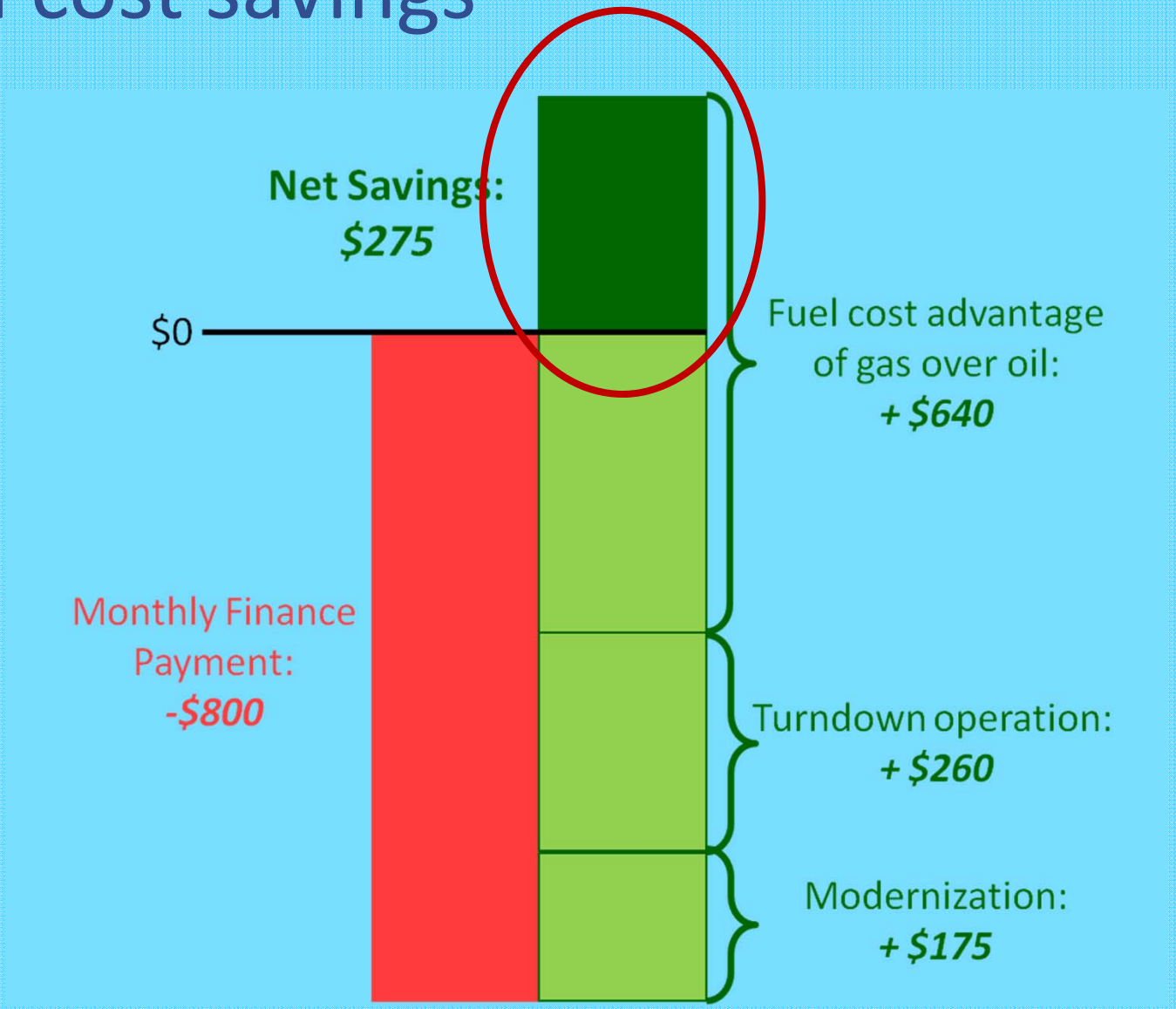


Figure 9-22 Representative reset lines for different heat emitters with different reset ratios (*RR*). Higher reset ratios result in higher supply water temperatures at a given outdoor temperature.

Fuel cost savings



Maximizing equipment efficiency

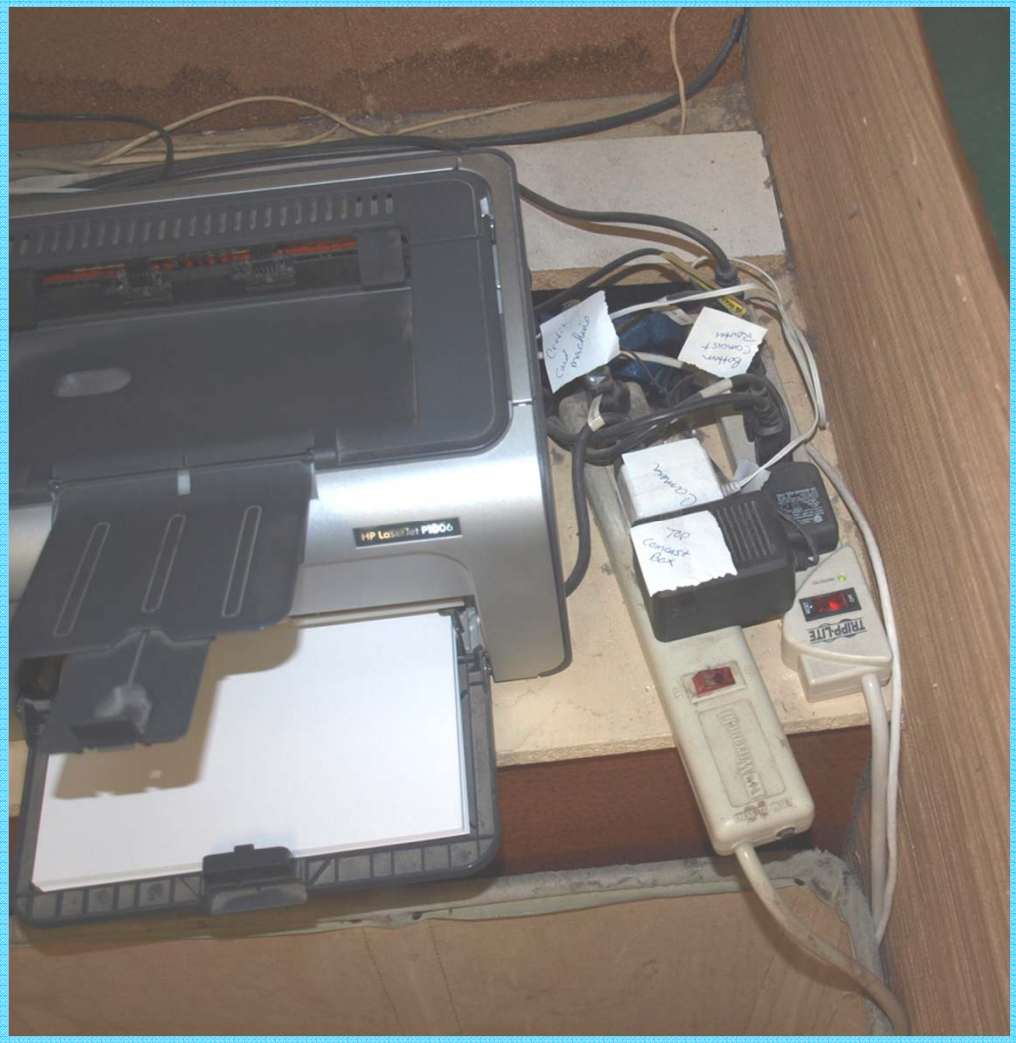
- Learn equipment operation
  - duty cycles
  - standby energy consumption
- Adjust work schedules to group together all work on each machine
  - then machine off when not in use
- Timers

Compressed air & vacuum

- Equipment that needs less pressure
- Separate vacuum tanks each equip.
- Turn off when not needed

Electricity monitor

Plug loads – energy vampires



New racks – smaller vehicle

22 MPG **9 MPG**

Hypermiling

- Track your fuel consumption
- Use a fuel consumption display
- Leave early and don't rush
- Note your transition points
- Avoid peak traffic
- Conserve momentum: stop sign 'stop and crawl‘
- Combining errands: do the longest leg first
- Traffic light timing - stale 'green', no pedestrian signal
- Constant throttle position cruising
- Conserve momentum: avoid stopping
- "Drive without brakes" (DWB)

- Keep windows up
- Engine block heater
- Block the radiator in winter
- Keep vehicle clean
- Unload unneeded weight
- No outside racks
- Keep up tire inflation
- Use wind deflectors
- Window tint

Lessons Learned

- Take a comprehensive approach
- Investing for the long-term saves money in the short term
- Persistence pays
- Quantify energy use and costs before making decisions
- Keep improving

Let customers know

Thank you

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