High Performance for New Buildings and Retrofits: *Getting it Right*

May 18, 2007

Thank You!

Cape Light Compact

Cape and Islands Renewable Energy Collaborative

Waquoit Bay National Estuarine Research Reserve

Introduction

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Introduction

1. Today's schedule
2. In my opinion!
3. Credit where credit is due
4. Questions and Answers
5. For more information…

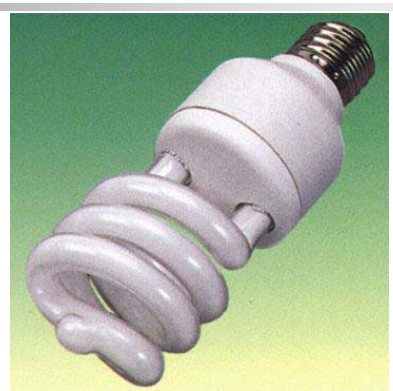
Energy Measures, Terms, and Definitions

- *Watts*
- *Kilowatts*
- *Kilowatt-hours*
- *Energy*
- *Demand*
- *Therms*
- *BTUs*
- *Tons*

"You can't just punch in 'let there be light' without writing the code underlying the user interface functions."

Energy Measures, Terms, and Definitions

Watts



Kilowatts

Kilowatt-hours

Energy Measures, Terms, and Definitions

- *Energy* - Energy Consumption is the total electrical energy consumed in a given time period, measured in kilowatt-hours (kWh)

- *Demand* - Energy Demand is the r*ate of electrical energy consumption* measured in kilowatts (kW)

Energy Measures, Terms, and Definitions

Gas is sold by the *Therm*

Oil and propane are sold by the *gallon*

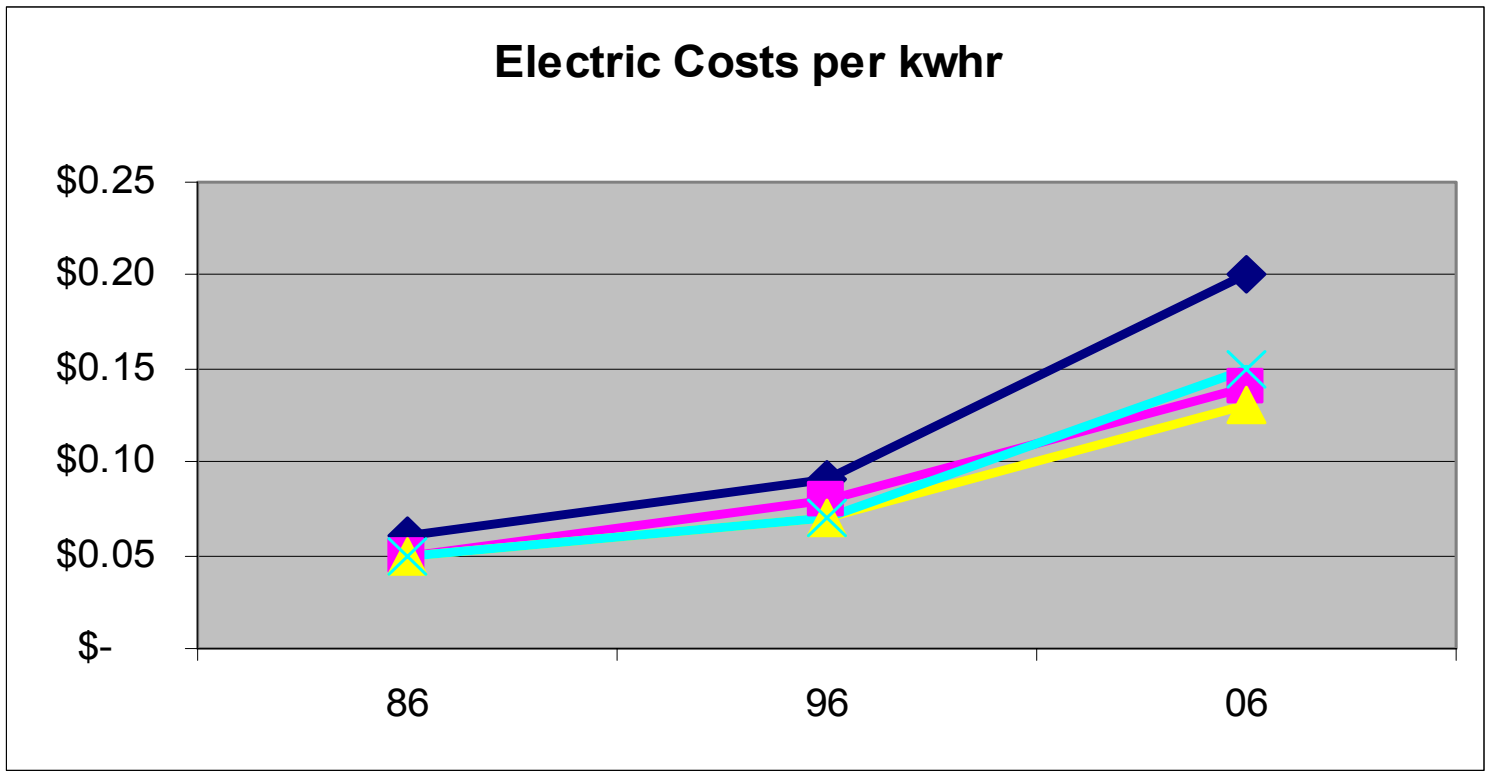
Energy Measures, Terms, and Definitions

Heating and cooling equipment capacities are stated in BTU/hrs and Tons

Energy Measures, Terms, and Definitions

- Energy Conservation Measures (ECMs)
- Simple Payback = (Cost-Incentive)/ Savings

Energy Usage and Your Bottom Line



Energy Usage and Your Bottom Line

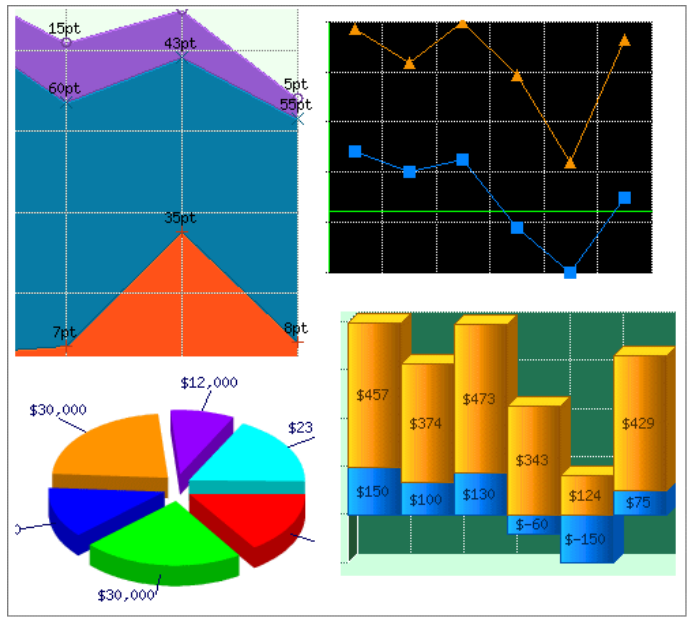
Energy Tracking

"You can't diet without a scale!"

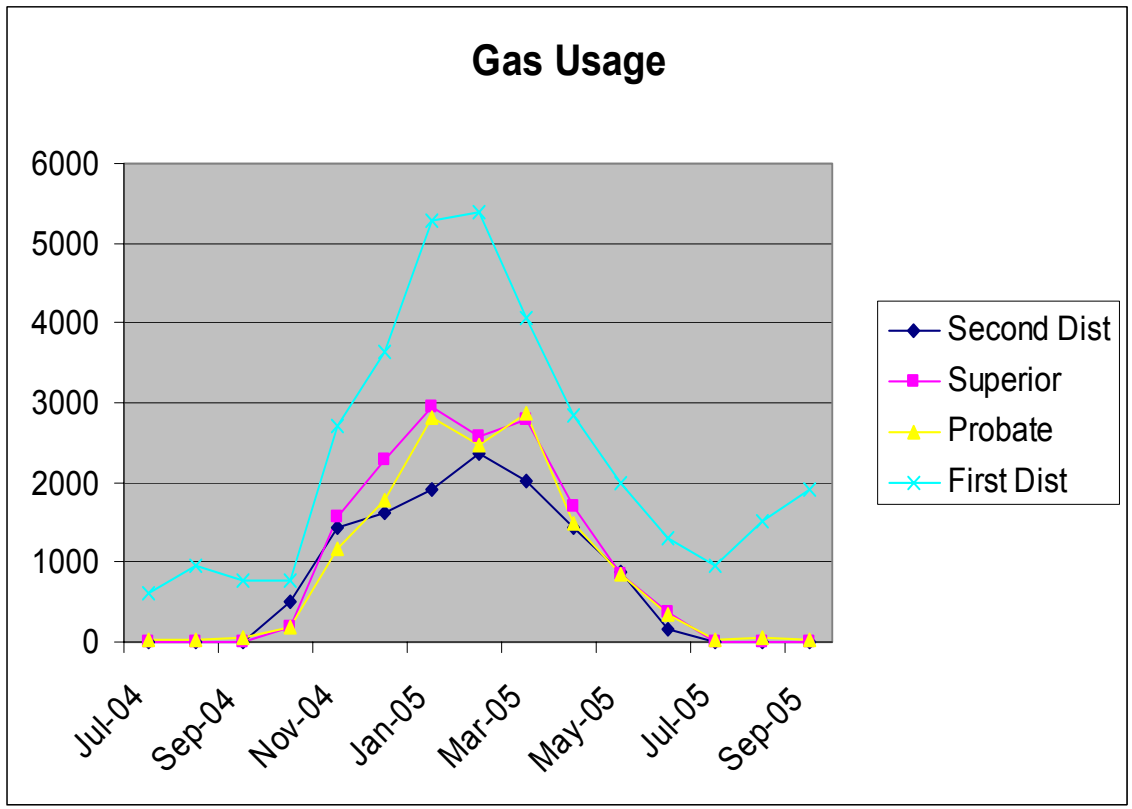
Energy Tracking

Collect Energy Data

- Sources
  - Electricity
  - Natural gas
  - Oil
- Monthly Bills
  - Use most recent data
  - Minimum of 1 year, prefer 2 or 3 years
  - Usage data (kWh, therms, gallons)
  - Cost data ($)



Energy Tracking



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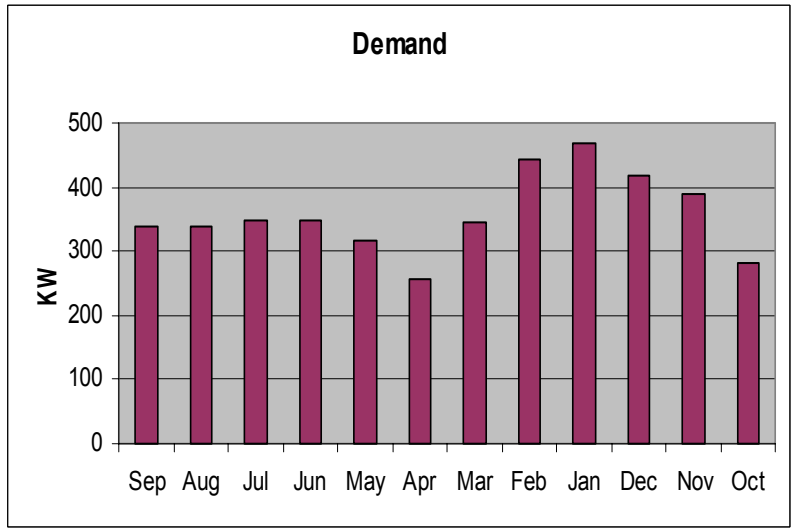
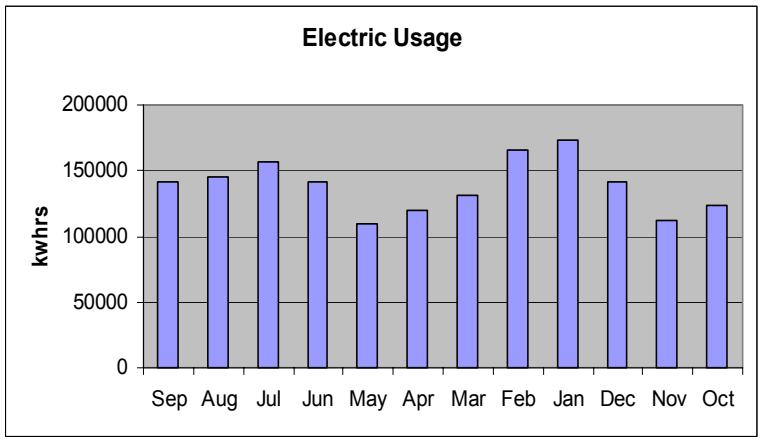




Energy Efficiency Fundamentals

Example

- Church Project:
  - lighting (T12s to T8s)
  - no controls
- Results:
  - 41% reduction in kwhrs
  - 29% reduction in elec bill
  - 1+ year payback

Example

- College Project?

  ISO Load Response Program

- Results?

  280 KW predicted

  330 KW actual

  plus kwhrs

  plus LRP payment

  plus AC reduction

Example

- Navy Project:

  Uncontrolled Testing - Labs

- Results:

  Turn them off!

  Savings - 14.8 MW to 8.2 MW

Example

- Project:

  Hot water – 5 electric and
  2 holding tanks off boilers

- Results:

  8% reduction in kwhrs

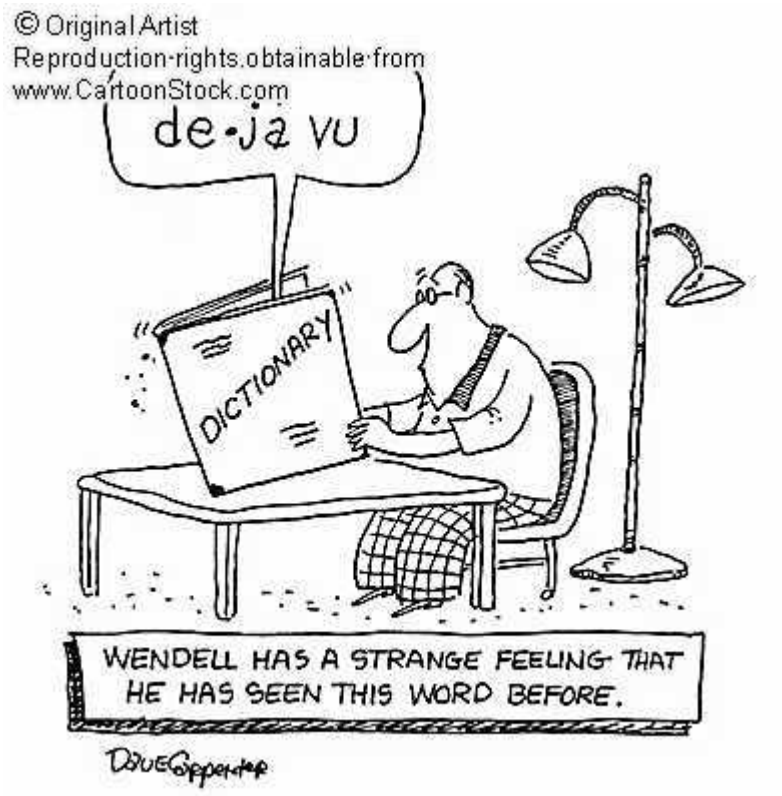
  $7500 cost for tankless

  2 year payback

Energy Efficiency Fundamentals

Terms and Definitions:

1. **Retrofit**
2. **New Construction**
3. **Incentive**
4. **Motor Up**
5. **Cool Choice**
6. **Retro-commission**
7. **Commissioning**

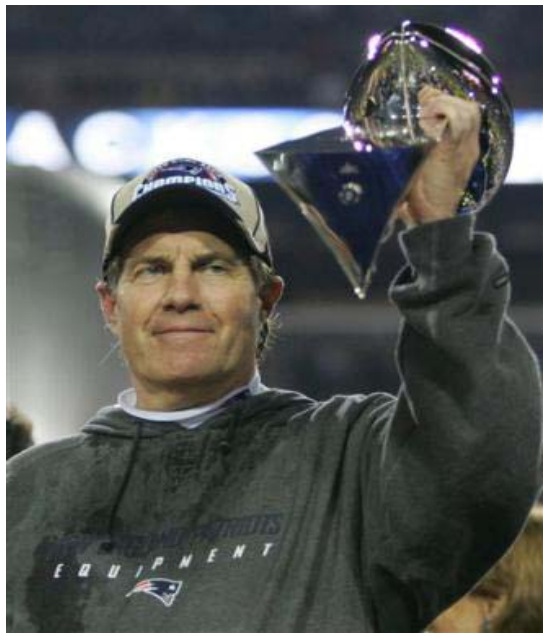


Benchmarking

1. *Compare your buildings to each other and similar facilities.*
2. *Good performers? Poor performers?*
3. *EPA Energy Star Building Portfolio Manager*
4. *https://www.energystar.gov*

Benchmarking

Portfolio Manager – *make your boss look good!*



Energy Conservation:

A Few Good Ideas

#1 Energy Conservation

Gymnasium lighting: HID vs T-5's

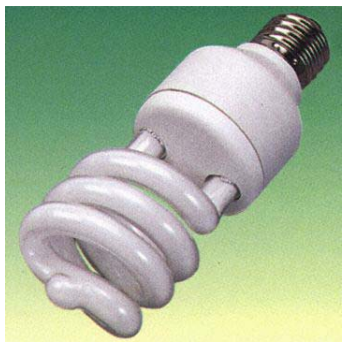
#2 Energy Conservation

#3 Energy Conservation

T8s and Super T8s

#4 Energy Conservation

Compact Fluorescent Lamps



#5 Energy Conservation

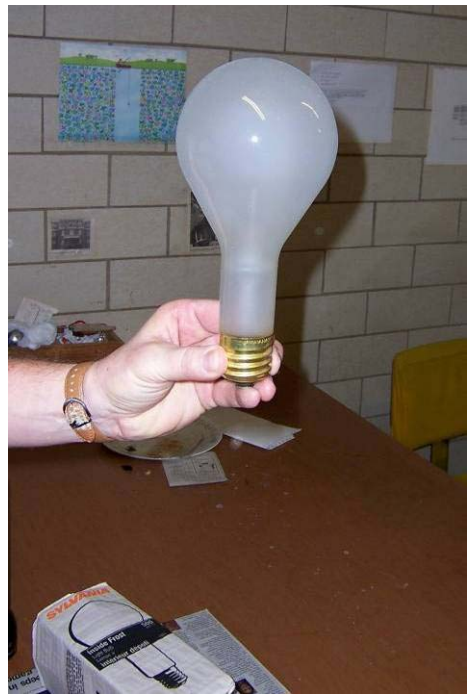
LED Lighting

#5 Energy Conservation

#6 Energy Conservation

Small Wattage HIDs

Vs.

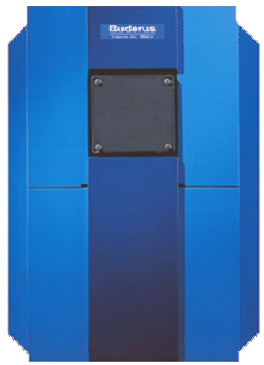


#7 Energy Conservation

Demand Control Ventilation

#8 Energy Conservation

Full Condensing Boilers

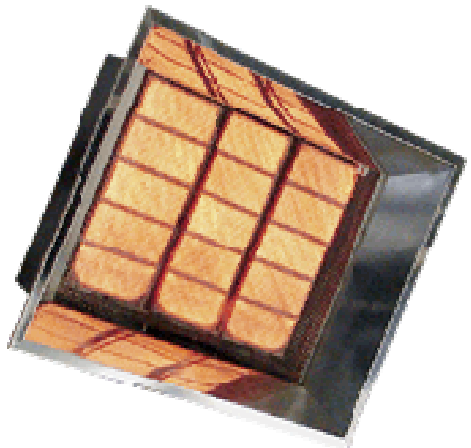


#9 Energy Conservation

Electric Motors:

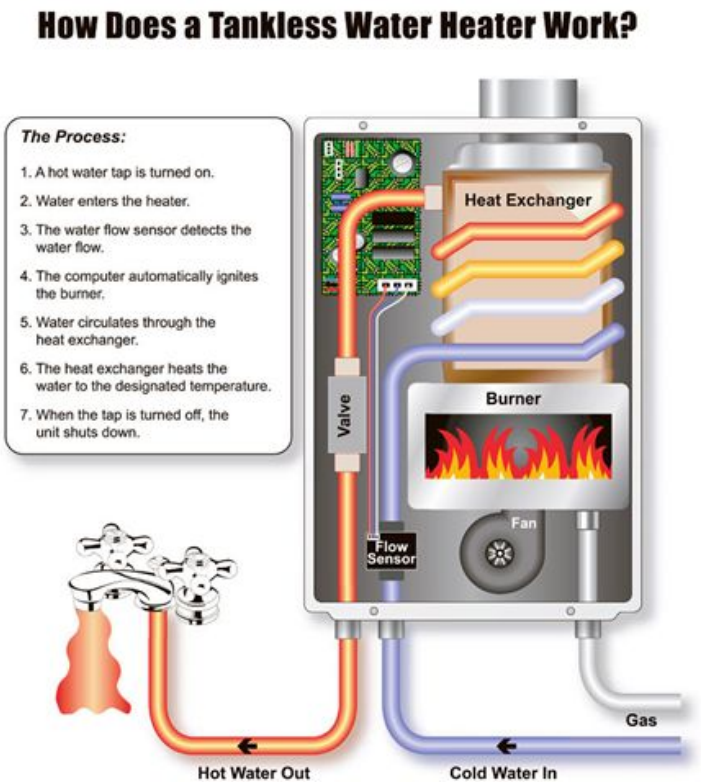
#10 Energy Conservation

Infra Red Heat



#11 Energy Conservation

Tankless Water Heaters



#12 Energy Conservation

Variable Speed Drives (aka VFD's)

#13 Energy Conservation

Miscellaneous Good Ideas

#13 Energy Conservation

- Vendor Mizers; www.electricitymetering.com
- Kitchen Economizers; www.nrminc.com
- Ice Machines
- Ultra Spray Nozzles; www.fisher-mfg.com
- Ice Rink Temperature Sensors
- LED Scoreboards
- Pulse start MH
- Ductless split heat pumps

#14 Energy Conservation

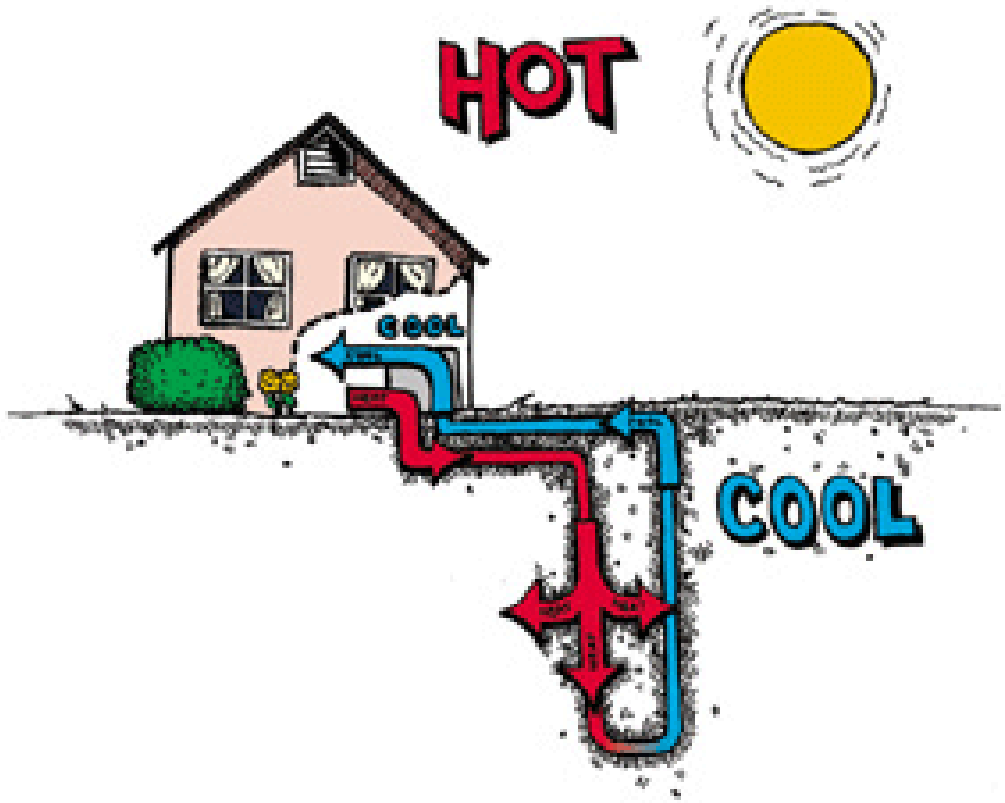
Operations and Maintenance

#15 Energy Conservation

White vs Black Roof

#16 Energy Conservation

#17 Energy Conservation



#18 Energy Conservation

Thank you!
Questions?