# “Greening” Camps

## Cost-Effective Strategies to Demonstrate Environmental Leadership

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Land-of-Sky Regional Council &
NC Div. of Pollution Prevention and Environ Assistance

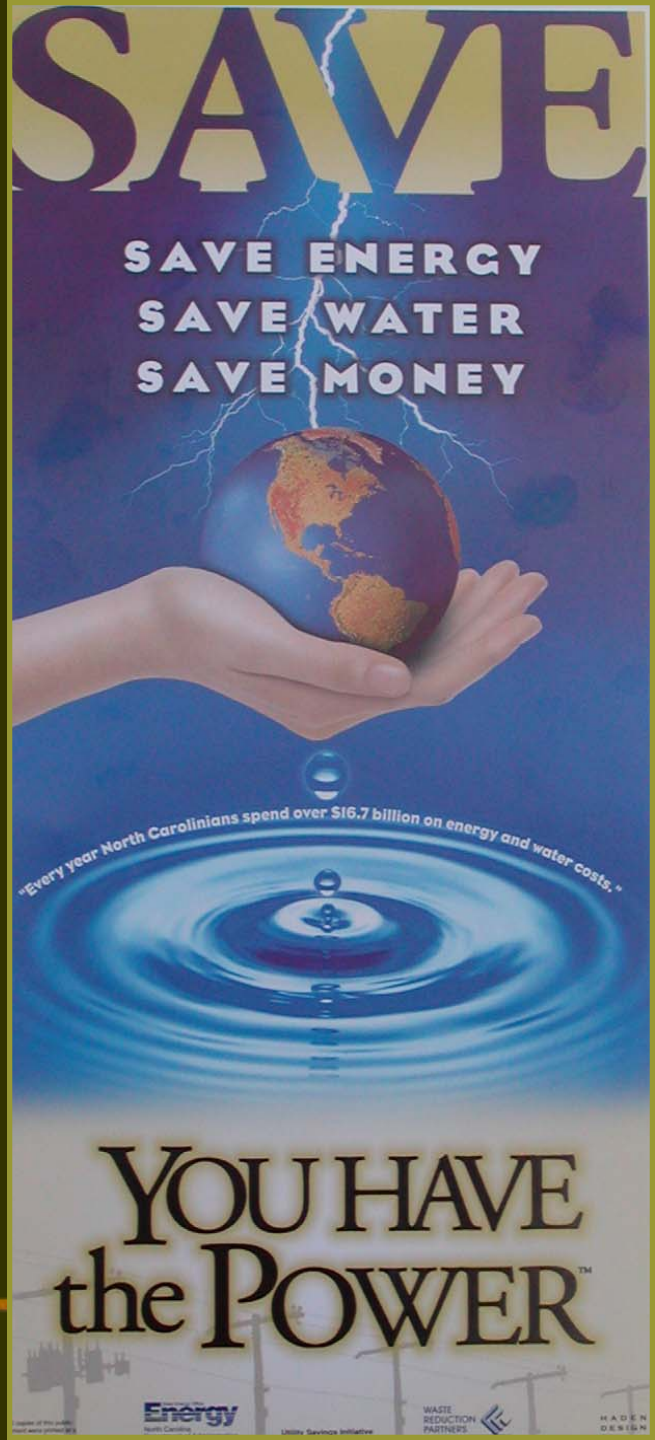


# What's your Camp's Environmental Impact?

- Activities?
- Impacts?

# Getting Started:
## Greening Your Organization

- Select a leader
- Organize a the right team
- Develop a policy
- Identify the opportunities
  - Seek technical assistance
- Build Implementation Plan
  - (no cost, low cost, capital projects)
- Institutionalize management team's review and update of the "greening" plan
- Continually improve – feedback, education and awareness



# Environmental Policy Example

The Shining Rock Camp shall operate with attention to sustainability so that we preserve and enhance natural resources, conserve energy, eliminate waste and emissions, achieve compliance, and lessen the overall environmental impact of our daily operations, activities, and projects.

Shining Rock Camp shall continually and openly communicate its commitment to environmental excellence and support of the sustainable programs to its staff, campers and community stakeholders.

Shining Rock will seek to integrate educational and training activities with the Camp's Sustainability Plan.

# Example Goals and Strategies

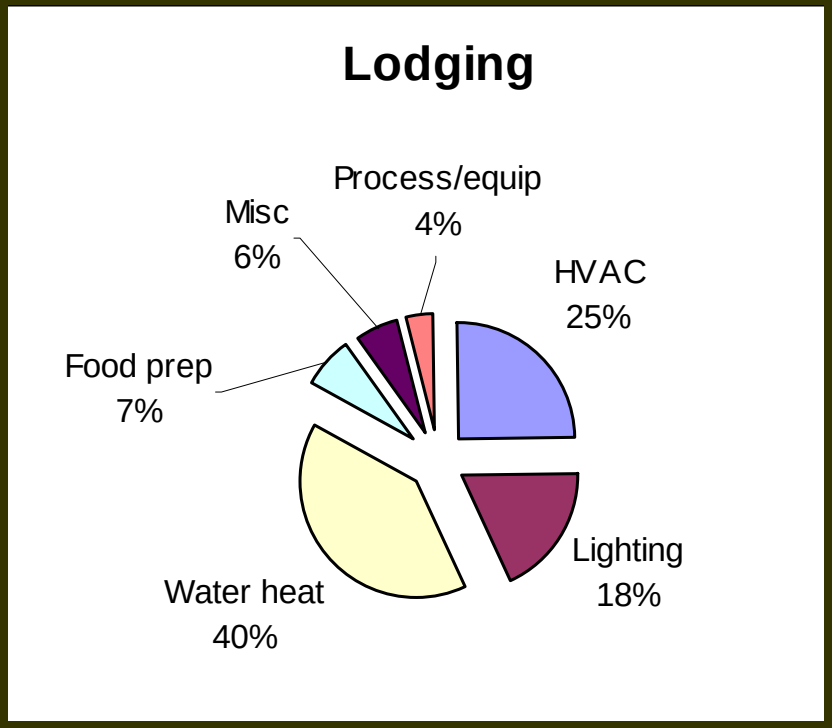
**Goal 1:** Maximize energy efficiency and use of renewables
**Goal 2:** Encourage alternative transportation
**Goal 3:** Practice resource efficiency and pollution prevention in all office operations, purchases and services.
**Goal 4:** Protect water resources through water conservation and storm water management
**Goal 5:** Ensure healthy indoor air quality and comfort
**Goal 6:** Consider sustainability in major renovations and new construction projects

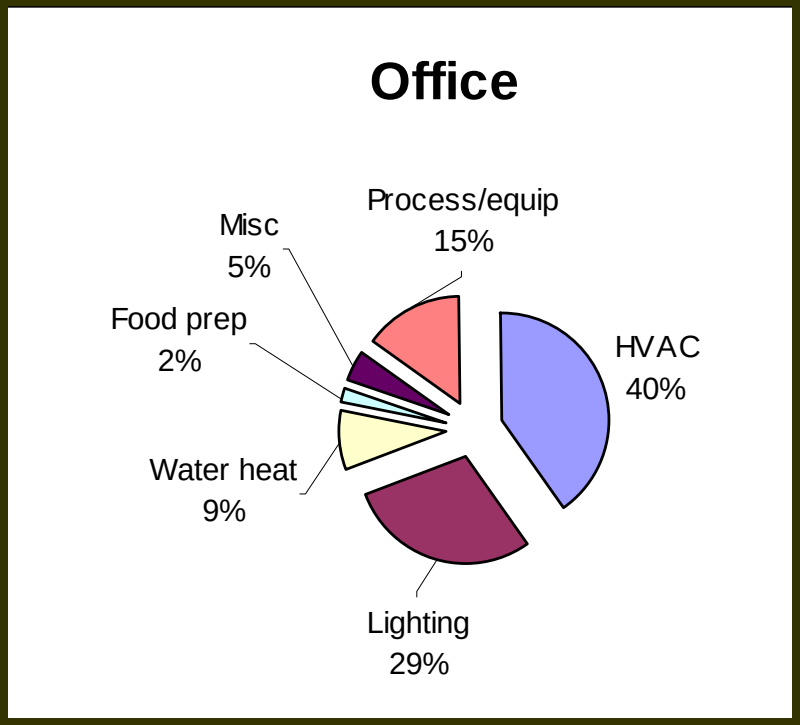
# “Greening” Topics  to be Covered

1. Improving **Energy** Management, Efficiency, & Renewable Ideas
2. Pursuing **Water** Conservation
3. Enhancng **Solid Waste** Management and Recycling Programs

(many other topics not addressed: wastewater, stormwater, landscaping, etc)

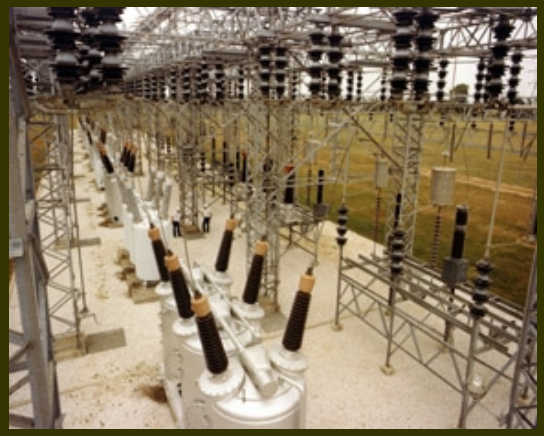
# Where do you use the most energy?



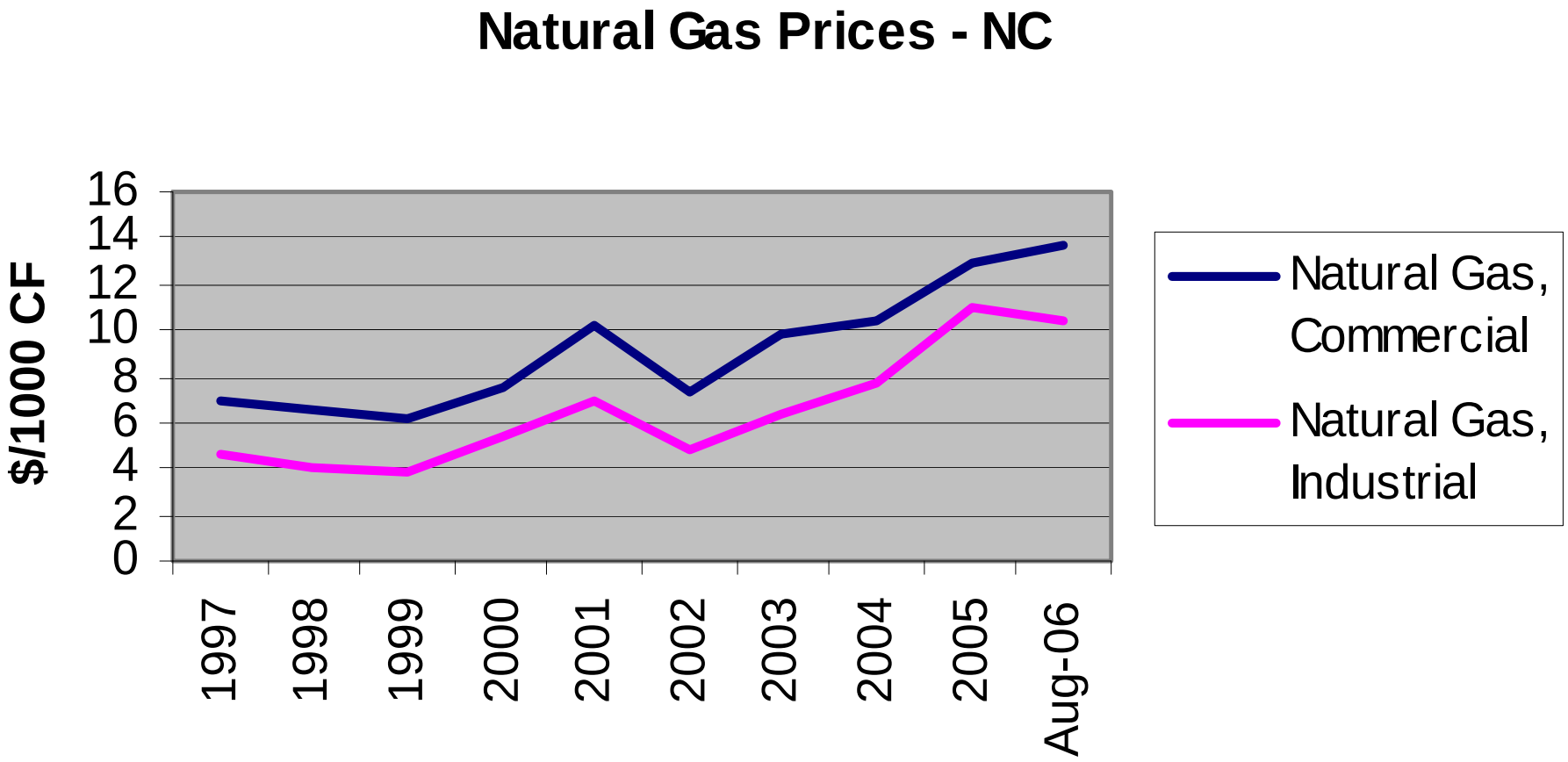

Source: Handbook of Energy Engineering, EIA, and NREL

# Energy $aving Opportunities
## That will help you meet your budget…



- Utility Accounting
- Heating, Cooling & Controls
- Building Envelop Improvements
- Lighting
- Equipment & Machines
- Hot Water and Water Conservation
- Vehicles Use & Fuel Savings

# Energy Supply - Cost Outlook




Source: EIA

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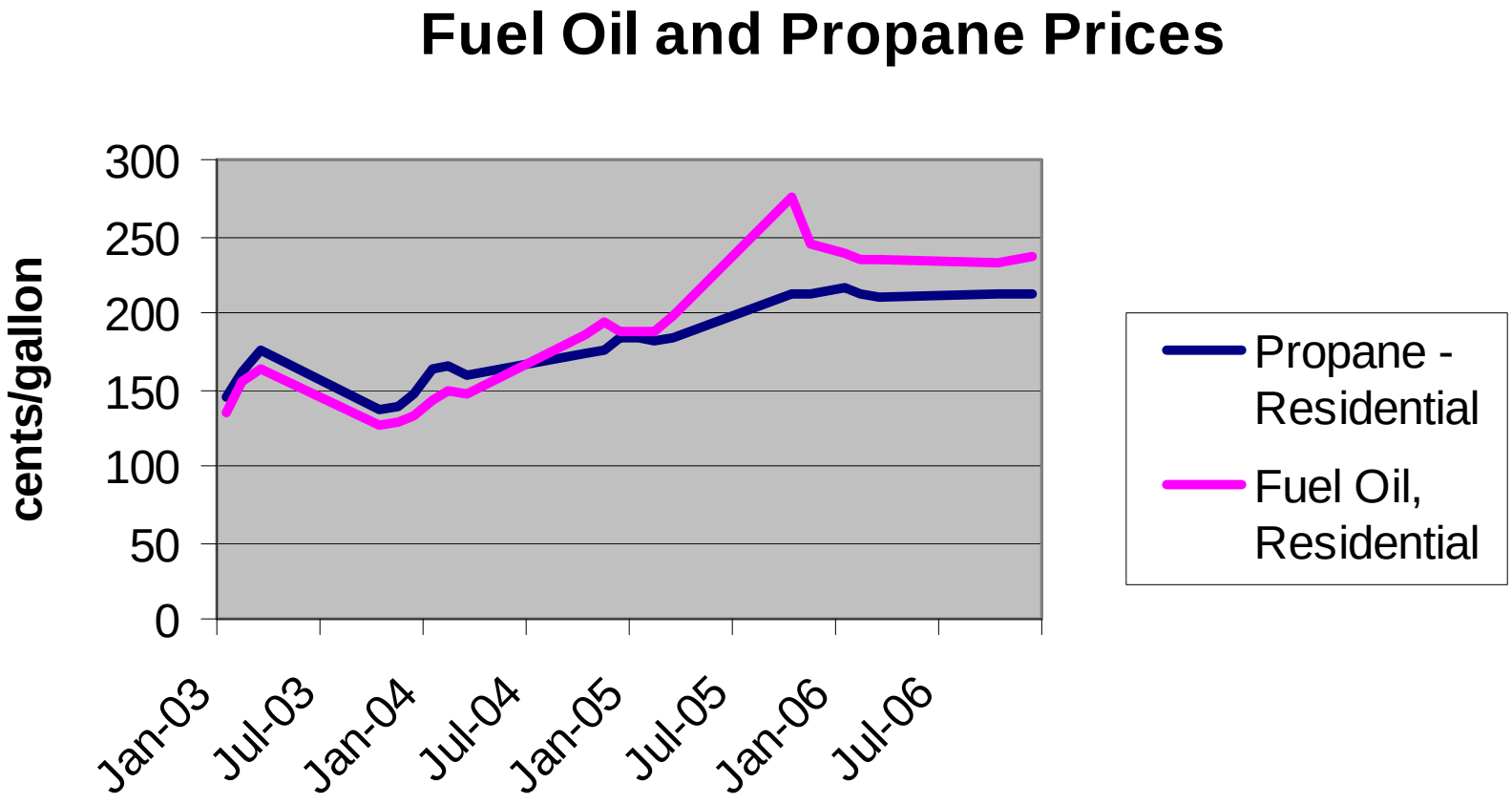


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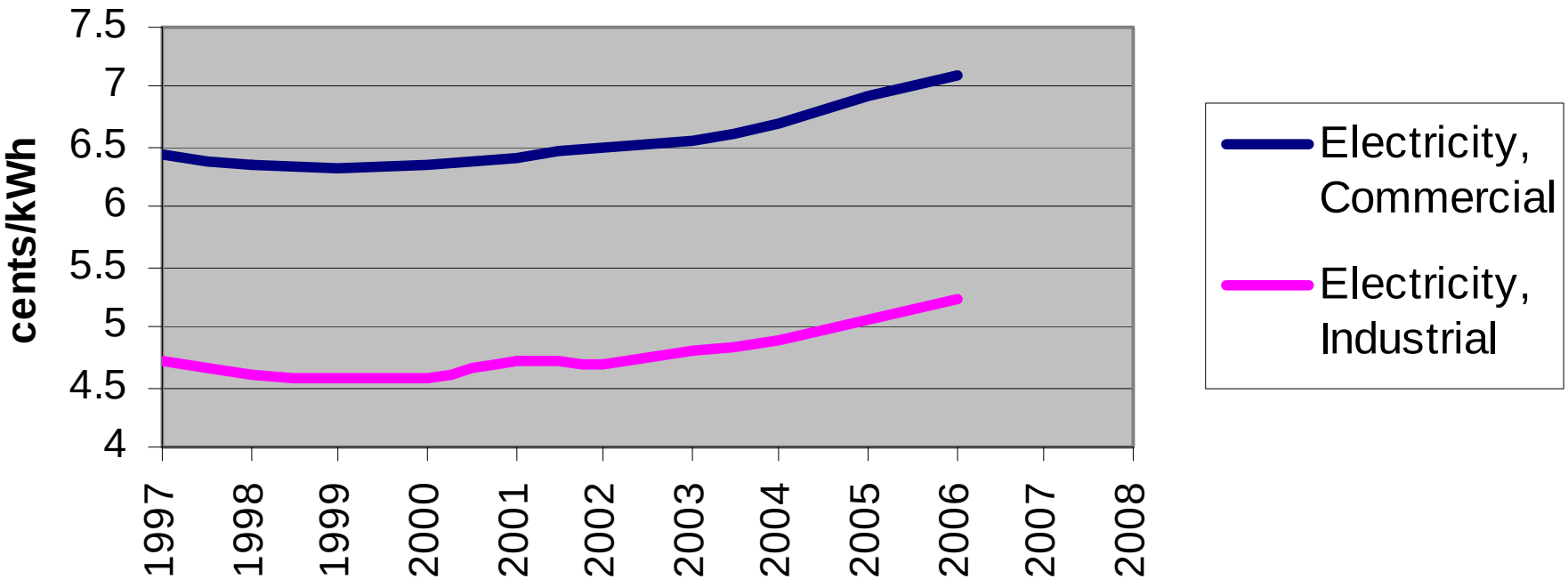



Source: EIA

# Utility Accounting

- Are you tracking energy consumption?
- Electricity: Usage “kWh” and Demand “kW”
- Utility Rate Structures: e.g. small general service, medium general service, TOU, etc.
- Natural gas usage: Therms
- Fuel Oil: gallons
- LP gas: gallons
- Water & Sewer: CCF – 748 gallons

# Customer Bill

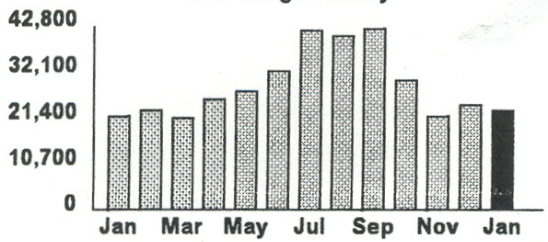


00045858 1 AV 0.278 00 **AUTO **C004

Customer Name
Address
ASHEVILLE NC 28801-3271

| | | |
|---|---|---|
| Account number | | 595 116 9860 |
| **Total due** | | **$1,904.39** |
| **Current charges past due after** | | **Feb 4** |
| Thank you for your payment | Jan 2 | $2,113.30 |
| Usage period | | Dec 18 - Jan 20 |
| This bill was mailed on | | January 21, 2004 |

kWh Usage History




## Usage

| | | | |
|---|---|---|---|
| Meter number | | | TA3536 |
| Readings: Jan 20 | | | 9787 |
| Dec 18 | | - | 9588 |
| Meter constant | | x | 120 |
| **kWh usage** | | | **23880** |
| Days in period 33 | Average kWh per day | | 724 |
| Actual kW Demand | | | 80.40 |

Rate Structure

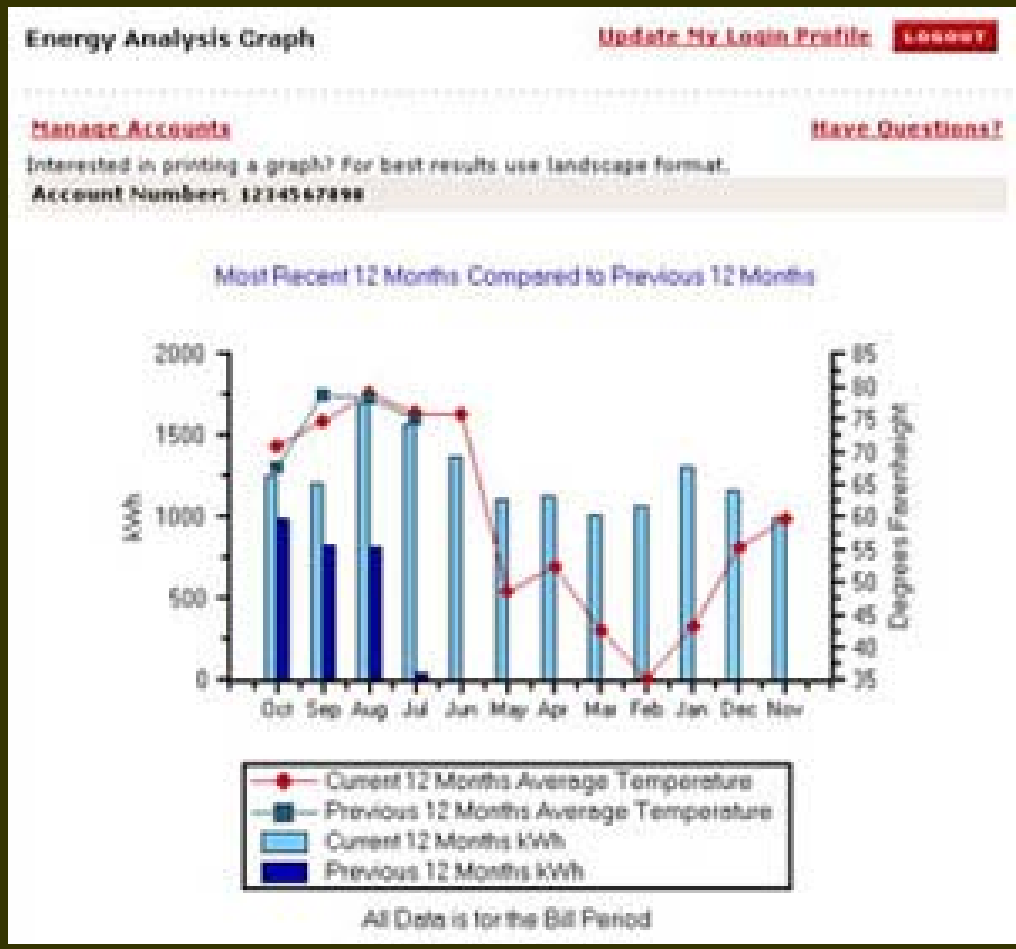
## Billing

| | | | | | |
|---|---|---|---|---|---|
| **MGS rate** | | | | | 33 Days |
| | Basic customer charge | | | | 12.00 |
| | Energy charge | 23,880 kwh | x | $0.05132 | 1,225.5216 |
| | Demand charge | | | | |
| | (80% of 132.00 kw (09/03)) | 105.60 kw | x | $4.89000 | 516.3840 |
| | Three phase service charge | | | | 9.00 |
| **ALS rate** | | | | | 33 Days |
| | Metal halide light, 160 kwh, 40000 lumens, flood | | | | |
| | Area lighting | 1 Light | x | $25.63 | 25.63 |
| | Wood pole charge | 1 Pole | x | $2.16 | 2.16 |
| **ALS rate** | | | | | 33 Days |
| | High Pressure Sodium light, 46 kwh, 9500 lumens, flood | | | | |
| | Area lighting | 1 Light | x | $11.15 | 11.15 |
| **ALS rate** | | | | | 33 Days |
| | High Pressure Sodium lights, 109 kwh, 28500 lumens, flood | | | | |
| | Area lighting | 3 Lights | x | $15.69 | 47.07 |
| | 3% North Carolina sales tax | | | | 55.47 |
| | **Total due** | | | | **$1,904.39** |

**Please detach here.** **Turn over for helpful phone numbers and customer service tips.** **PIN:**

# Utility Accounting

- Easy ways to track bills & Use
  - Go on line to view –
    - Account information
    - Energy Usage
    - Energy analysis
- Benchmark your Energy Usage
  - Tools
  - www.energystar.gov



# Fuel Cost Comparison

**NC Commercial Averages**

- Electricity: $0.069/kWh
- Natural gas $1.50/therm
- Propane $1.60 / gallon
- #2 Fuel Oil $1.94/gallon

**Unit Energy Comparisons**

- Electric Strip Heat: $19/MMbtu
- Heat Pump: $6.33/MMbtu
- NG Furnace: $17.65/MMbtu
- Propane Furnace 20.46/MMbtu
- #2 Oil Furnace: $15.85/MMbtu

# HVAC
# Efficiency Opportunities

- Heating
- Ventilation &
- Air Conditioning

# Temperature Set-backs

## During unoccupied times

- Manually
- Programmable 7-day Thermostats
  ($50-$200, manual override, locking, proper selection)
- Proper use of Energy Managements Systems or Building Automation System (BAS)
- Winter Set-back Temperature saving;

Asheville Climate – Typical % savings

| 60 ° F | 55 ° F | 50 ° F |
|---|---|---|
| 10% | 20% | 30% |

# Reduce Temperature Settings

## (in the winter – raise in the summer)

- 1 degree change can save 3% in small buildings
- Comfort issues - #1 complaint for facility managers
- Need awareness campaign
- Make changes gradually
- At normal comfort set-points, ASHRAE say 5% of occupants are not comfortable

# Maintenance Saves Money

- Replacing air filters regularly
- Cleaning heat-transfer coils in heat pumps, air conditioners, and chillers
- Inspecting ducts for leakage and missing insulations
- Adjusting furniture and removing obstructions to radiators, air diffusers, intakes
- Have fuel-fire boilers inspected annual
- Test, adjust and balance if needed

*Have your system on a routine maintenance & service contract.*

# Boiler Tune-up

- Improve the combustion efficiency of your boiler to save money
- Reduce hot water temperature.

# Building Envelop Improvements

- Doors left open (windows too)
- Insulation Opportunities
  - No insulation to R19: 1.5 yr payback
  - No insulation to R-38: 1.9 yr payback (ceiling)
- Weather Stripping
  - Commercial Building saving $.01 - .02/sf
- Addressing root-causes of the poor-practices

Exterior Door Missing Weather Stripping

# Doors Left Open

# Lighting – Energy Savings

- Turning Lights Out
- Delamping / Reducing Wattage
- CFL Upgrades
- T-8 Upgrades
- Outdoor Lighting
- LED Exit Signs

# Turning Lights Out


# Delamping

- Removing some of Fluorescent lamp from a fixture
- Rule of Thumb: have at least 2  4-foot lamps per 64 square feet
- Disconnect ballast for more savings

Reduced Wattage

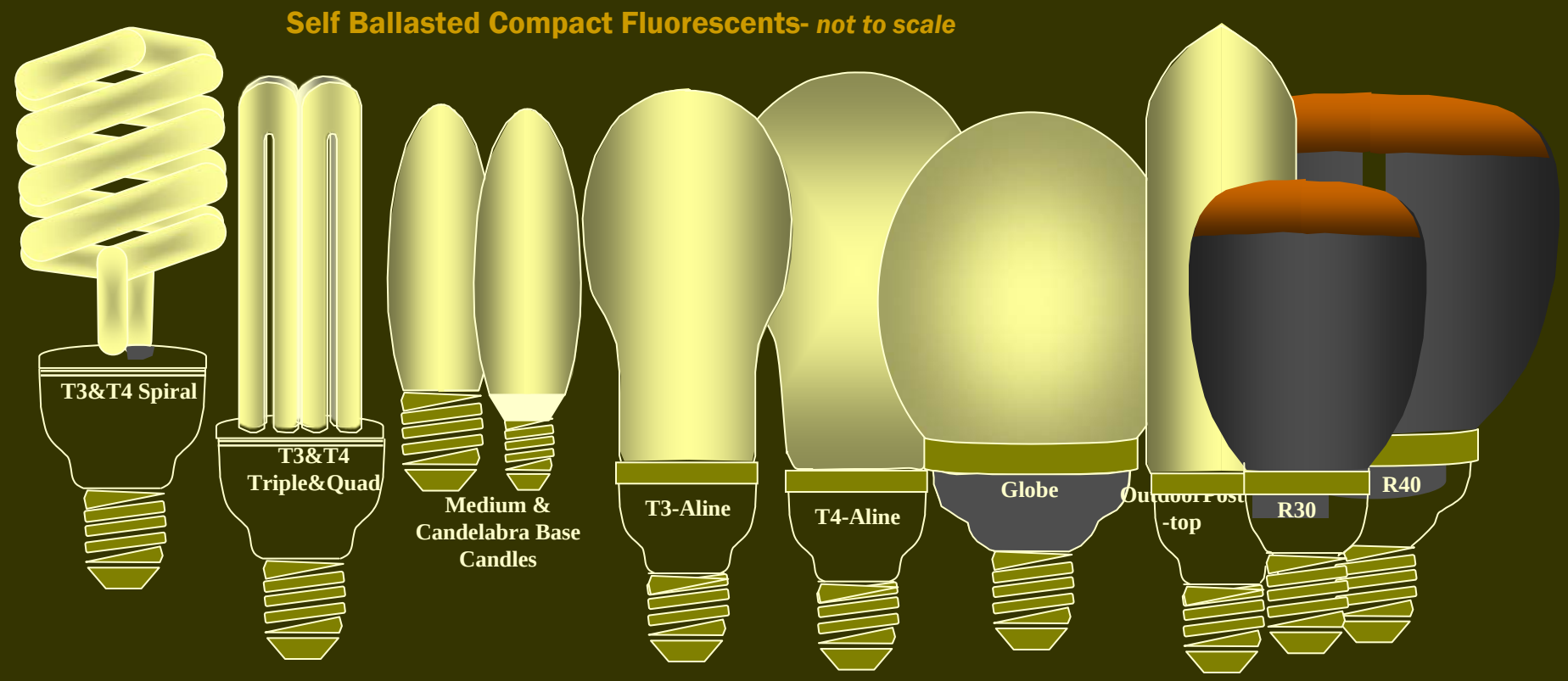
- 40 – 34 w four foot fluorescent
- 400 – 360 watt metal halide (gyms & outdoors)

# Target Light Levels

| Categories | foot candles |
| --- | --- |
| Office Work | 30 - 50 |
| School Classrooms | 50 (task areas) |
| Bank Lobbies | 15 |
| Garage Repair Area | 75 |
| Bathroom, Stairwells | 15 |
| Library Study Area | 50 |

- Light Meters

# Self-ballasted CFLs



# Incandescent to CFL comparison

CFL retrofits for dinning room pendant lighing

| Incandescent Wattage | CFL Wattage |
|---|---|
| 40 | 7 |
| 60 | 13 |
| 75 | 22 |
| 100 | 27 |

# Incandescent vs. CFL Cost Comparison

| | **Incandescent** | **CFL** |
|---|---|---|
| Watts | 100 | 27 |
| Rated Life | 750 hours | 10,000 hours |
| No. Bulb per 10K hours | 13 | 1 |
| kWh over 10K hours | 1,000 | 270 |
| Cost per kWh | $0.08 | $0.08 |
| Operating Cost over 10K hours | $80.00 | $21.60 |
| Cost per Bulb | $0.50 | $5.00 |
| Bulb Cost over 10K hours | $6.50 | $5.00 |
| **Life Cycle Cost** | **$86.50** | **$26.60** |

Net Savings over 10,000 hours: $54.90

# 4-foot Fluorescent Lamp Upgrades

## Lamp and ballast replacement using existing fixture

- Replace T-12 Lamps with T8 & Electronic Ballasts
- Saves 15-35% in energy
- Typical fixture upgrade cost: $55
- Typical payback: 2.7 -5.0 years
- T8 lamp systems offer better performance, more selection, less heat, & elimination of hum
- Group upgrade or spot upgrade

# Outdoor lighting

- Evaluate Need (short- term)
- Turn-off or reduce
- Maintenance of timer and photo cells


# LED Exit Signs

# Install LED Exit Signs


| Type of Sign | Watts used | Lamp life |
|---|---|---|
| Conventional Incandescent sign | 20-50 | 2,000-5,000 hrs |
| LED sign | 2 | 100,000 |

# Equipment, Machines & Processes

- Office Equipment
- Kitchen Equipment
- Laundries
- Air Compressors
- Motors

# Office Equipment


- Use sleep mode
- Turn-off when not in use
- Is Energy Star equipment specified for new purchased

Using Energy Star Office Equipment save about $50 per employee per year.

# Monitor Power Management

- Typical computer monitors cost $34 per year to operate
- With Power Management - saves $21/year
- Activating Sleep Mode
  - Individual PCs
  - EZ Wizard for workstation & networks
- Energy Star Products and LCD Flat Panel

# Kitchen Checklist

- Use low-flow pre-rinse sprayer
- Keep stoves and griddle, ranges pushed back (under ventilation)
- Avoid excessive pre-heating
- Turn-off unneeded section – (i.e. broilers, griddles, etc.
- Scheduling and cleaning are important
- See www.fishnick.com

# Refrigerators

- Do you need it? Consolidate?
- Keep the door shut?
- Check the Temperature settings
  - Freezers (-14 to -8 ° F), refrig (35 - 38 ° F)
- Load properly
- Position properly
- Clean the cooling coils
- Check the door seals

Replacing a warped refrigerator gasket can save $50 per year.

# Vending Machines


- Background
  - Typical refrigerated vending machine consumes 400 watts, $225/year
- Opportunities
  - Delamping – 180 watts reduction, $100/yr savings
  - Energy Saving Sensors – 30-50% savings, typical cost: $170/unit, < 2 yr payback
- Future/Better Ideas
  - Vendor Requirement in new contracts

# Air Compressors

- Turn off when not in uses
- Fix the leaks (1/16” leak waste $666/year)
- Lower operating pressures (10% reduction saves 3-6%)
- Use the right nozzles
- Use out-side make-up air (save 5-7%)
- Consider the right application

# Renewables

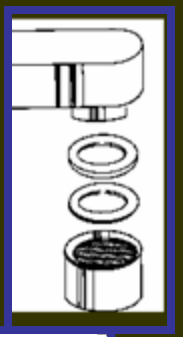
- Solar Hot Water Heating
- Photo-voltaic (PV)
- Tax Incentives
- Resources:
  - NC Solar Center
  - www.ncsc.ncsu.edu

# Water Conservation & Hot Water

- Low-flow Fixtures
- Hot Water Setting & Controls
- Potential Utility Savings

# Top Water Efficiency Measures For Camps

1. Use low Flow Showerhead (Water and Energy Savings)
2. Use low Flow Toilets and Urinals
3. Install Faucet Aerators
4. Use Efficiency Laundry Machines
5. Run Fuller Dishwasher loads/Reduce No. of Cycles
6. Repair Leaks and Improve Maintenance
7. Reduce Landscaping Irrigation Time Schedules
8. Install Low Flow Pre-Rinse Nozzles
9. Use Air-Cooled Ice Machines vs. water cooled
10. Behavior improvements - Turn Off Equip When Not In Use
11. Dry Clean-up – Use a broom vs. hose (where appropriate)



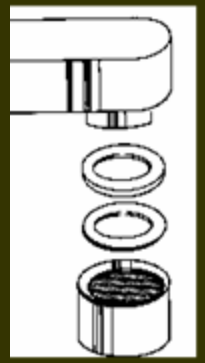
0.5 – 1.5 gpm lavatory faucet aerators

Low-flow water fixtures

2.0 – 2.5 gpm

# Domestic/Sanitary Continued

- Faucets
  - aerators, flow restrictor, (1.0 -1.5 gpm) automatic & metered shut-offs
  - Payback 3 weeks – 9 months
- Showerheads
  - behavior, leaks, replacements
  - Payback 3 months - 2.5 yrs
- Infrared/Ultrasonic Sensors
- Water Spigots



# Toilet Water Efficiency

*Driving Factor - 1992 Energy Policy Act*

- Toilet Retrofits – improving pre-1995 units
  - displacement devices, flappers valve, inserts...
- Newer 1.6 gpf Toilets (standard code since ’97)
  - gravity, flushvalve, pressurized flush units
- Newer 1.0 gpf Urinals & Waterless
- Maintenance Checklists

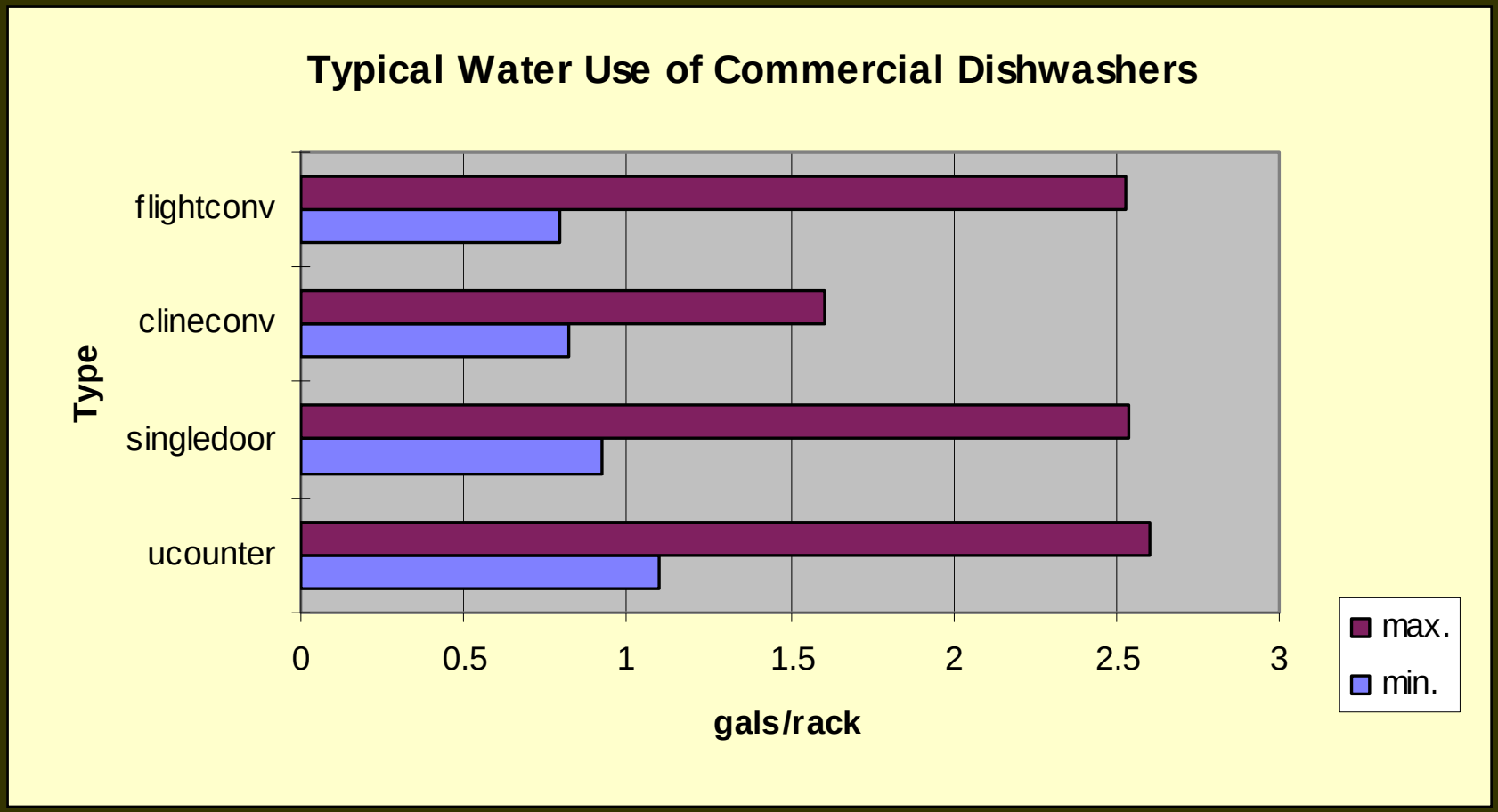
# Ensuring a Successful Toilet Replacement Project

- Replace highest use toilets first
- Select type carefully
- Know sewer/sanitary infrastructure
- Base decisions on current models
- Educate employees toilet ≠ trash can
- Check references
- Consider noise levels
- Plan for legal disposal/ recycling options

# Kitchen and Food Prep Dishwashers

- Behavioral
  - educate staff
  - report leaks
  - run racks only when full
  - Pre-wash soak
- Mechanical
  - Recycle final rinse water
  - use “electric eye” sensors on conveyor systems
  - use properly sized dishwashers

# Dishwasher Water Use Ranges



# Kitchen & Food Prep Other Water Use Option

- Kitchen Faucets
  - leaks, aerators, pedal operated controllers
- Pre-rinse Sprayers
  - 1.6 to 2.65 gpm models available
- Ice-making Machines
  - Air Cooled (<50 gal/100 lbs. ice) vs. Water Cooled (120-300 gal/100 lbs. ice)
  - Bin Storage, ‘Full’ Bin sensor adjustment
  - Turn machine off when not in use
- Garbage Disposal Use

# Low Flow Pre-Rinse Sprayer

| Hours of Spray Valve Usage | Water Savings gallons/day | Waste Water Savings gallons/day | Gas Savings therms/day | Annual Dollar Savings |
|---|---|---|---|---|
| **2** hours/day | **100** gallons | **100** gallons | **0.7** therms | **$400 - $500** |
| **4** hours/day | **200** gallons | **200** gallons | **1.3** therms | **$800 - $1000** |
| **6** hours/day | **300** gallons | **300** gallons | **2.0** therms | **$1200 - $1500** |

Table shows conservative results based on spray valve water savings of 1 gallon per minute, water cost of $2.00 per unit (748 gallons), sewer cost of 3.00 per unit (748 gallons), and gas cost of $0.60 per therm.

# Hot Water Setting & Controls

- Reduce Hot Water Heater Temperature to 110° F if allowable
- Insulate Hot Water Tanks
- Reducing Hot Water Boiler temp
- Timer on Recirulating pumps
- Turn heat off at hand washing stations

# Don’t pay sewer changes on water you don’t discharge

- Water/sewer bills typically based on “water use”
- Some water/sewer authorities will reimburse you for water not discharged
- If you have cooling towers or irrigation systems, ask your water authority if option is available
- Typically requires a  sub-meter.

# Vehicle Use and Fuel Savings

- Reduce or eliminate idle time. No more than 30 seconds of idling on winter days is needed.
- Aggressive driving (speeding, rapid acceleration, and hard braking) wastes gas. It can lower your highway gas mileage 33% and city mileage 5%.
- Avoid high speeds. Each 5 mph you drive over 60 mph is like paying $0.10 more per gallon.
- Maximize use of most efficient vehicles
- Provide incentives for car pooling / Ride Share program
- Become involved in Clean Cities programs


Hydrogen Prototype Vehicle: photo courtesy of USDOE

See www.fueleconomy.gov

# AFV and Hybrids Vehicles

- Hybrids
- Biodiesel (B20)
- Ethanol (E-85)
- Electric
- Compress Natural Gas (CNG)
- Propane

- Resources
- DOE Clean Cities programs
- www.c**cities**.**doe**.gov
- www.landofsky.org/planning/p_cvc_home.html

# Improving Solid Waste Management

# Ways to Improve Existing Programs

- Food waste reduction
  - composting piles -
    - case study= Frost Valley YMCA in Catskill Mountains reduced its solid waste by 53% (by weight) by composting their kitchen food scraps ; they saved $5200 annually.
  - Worm composting
  - Commercial composting vessels - earth tub/ tumblers
- Beverage container recycling at central locations where beverages are served
- Using recycled material/scrap for arts and crafts

# Purchasing Ideas that Promote Waste Reduction and Recycling

Paper waste reduction and reuse - duplexing

Environmentally preferable purchasing - policy

Recycled content paper

Reducing use of disposable items

Minimizing unnecessary Packaging

Electronics Recycling programs

Purchasing Energy Star Products & water efficient products

Purchasing Green Power or carbon-offset credits

# Waste Reduction Partners

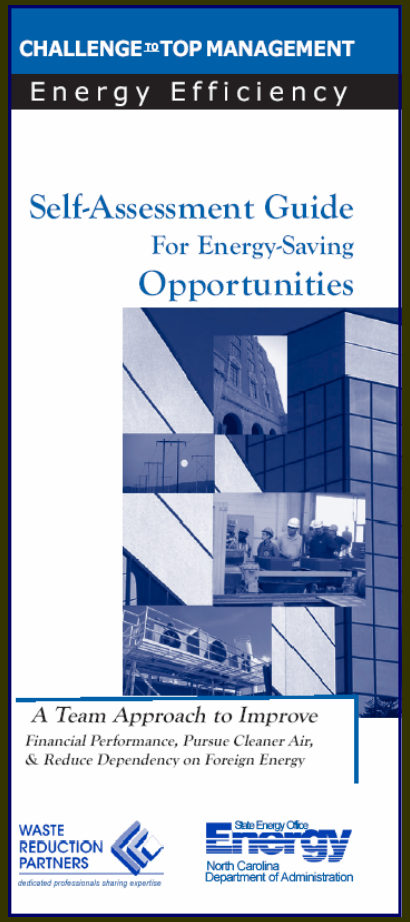
## Area Technical Assistance in Energy Efficiency

Since 2000

- 238 Energy Audits Preformed – WNC Business, Industry, Government, Institutions, Non-profits
- 45.5 million kWh/yr Energy Efficiency Strategies - Rec
- 19.5 million kWh/yr: consumption Reduced
- $2.53 million/year:  Client Savings
- Equivalent Carbon Dioxide Reduction: 4345 vehicles
- 5-10% Cost Savings – Low Hanging Fruit

# Identifying Opportunities: Basics of Conducting an Energy Audit

- Energy/utility Bill Review
- Have the right people on the Team
- Auditing by wandering around
- Area to be reviewed
- Data collection
- Getting the Questions Answered
- Recommendations
- Financial analysis



# The Progressive…

Strategic Energy Planning

Sustainable Energy Policies (incentives) in Place

AFV Vehicles & Fleets

Commitment to LEED Buildings

Investment in Renewable Technologies

Purchasing Green Power

Promoting & Recruiting Energy-Based Businesses

Energy Mindful Community Planning

# Contact WRP

Waste Reduction Partners
Land-of-Sky Regional Council
25 Heritage Drive
Asheville, NC 28806
(828) 251-6622
(828) 251-6353 fax
www.landofsky.org/wrp
wrp@landofsky.org

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