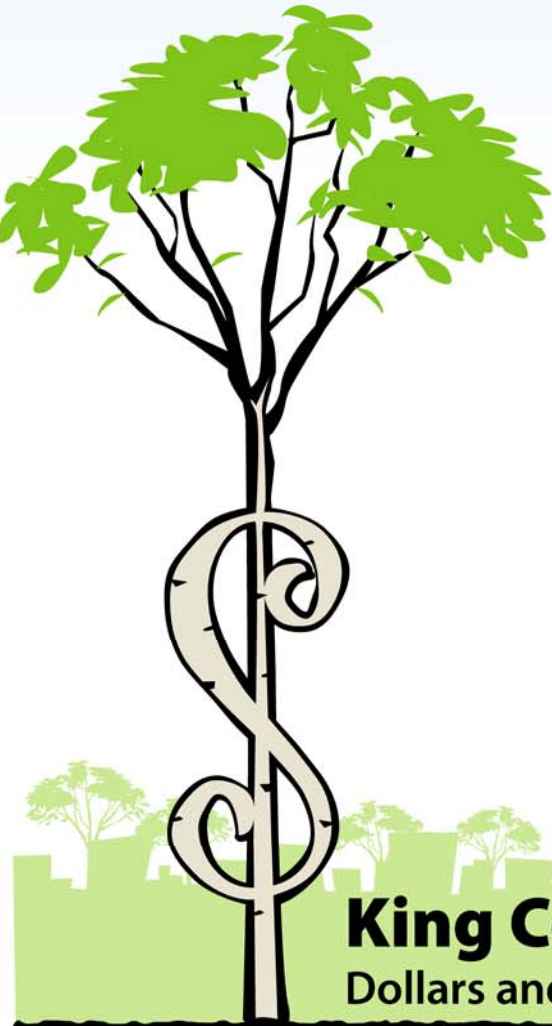# Building the Capacity for Change in King County

Lori Moen

Energy & Resource Conservation Program Manger

DNRP

King County Building Summit:
Dollars and Sense Tools to Green Your Project
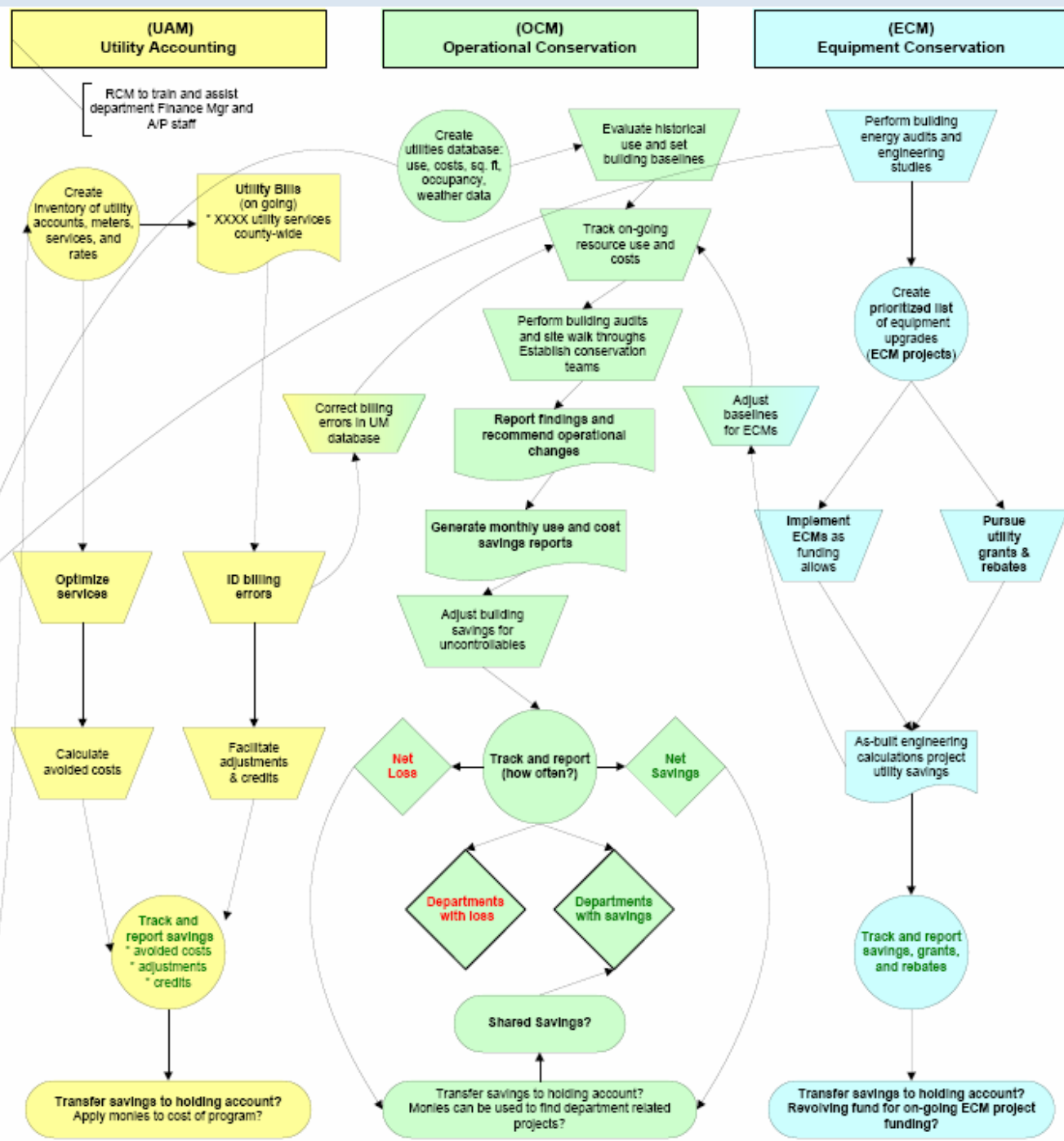
King County

Programs Addressing Sustainability

- Environmental Purchasing
- Waste-Wise
- Integrated Pest Management
- Water Conservation
- Green Building

New!

→ Energy & Resource Conservation Management

The Building Blocks of Resource Conservation

Services & Billing

Equipment in Existing Buildings

New Construction

People, People, and more People

(UAM) Utility Accounting

(OCM) Operational Conservation

(ECM) Equipment Conservation

RCM to train and assist department Finance Mgr and A/P staff

Create Inventory of utility accounts, meters, services, and rates

Utility Bills (on going) * XXXX utility services county-wide

Create utilities database: use, costs, sq. ft, occupancy, weather data

Evaluate historical use and set building baselines

Perform building energy audits and engineering studies

Track on-going resource use and costs

Create prioritized list of equipment upgrades (ECM projects)

Perform building audits and site walk throughs Establish conservation teams

Correct billing errors in UM database

Report findings and recommend operational changes

Adjust baselines for ECMs

Generate monthly use and cost savings reports

Implement ECMs as funding allows

Pursue utility grants & rebates

Optimize services

ID billing errors

Adjust building savings for uncontrollables

Calculate avoided costs

Facilitate adjustments & credits

Net Loss

Track and report (how often?)

Net Savings

As-built engineering calculations project utility savings

Departments with loss

Departments with savings

Track and report savings * avoided costs * adjustments * credits

Track and report savings, grants, and rebates

Shared Savings?

Transfer savings to holding account? Apply monies to cost of program?

Transfer savings to holding account? Monies can be used to fund department related projects?

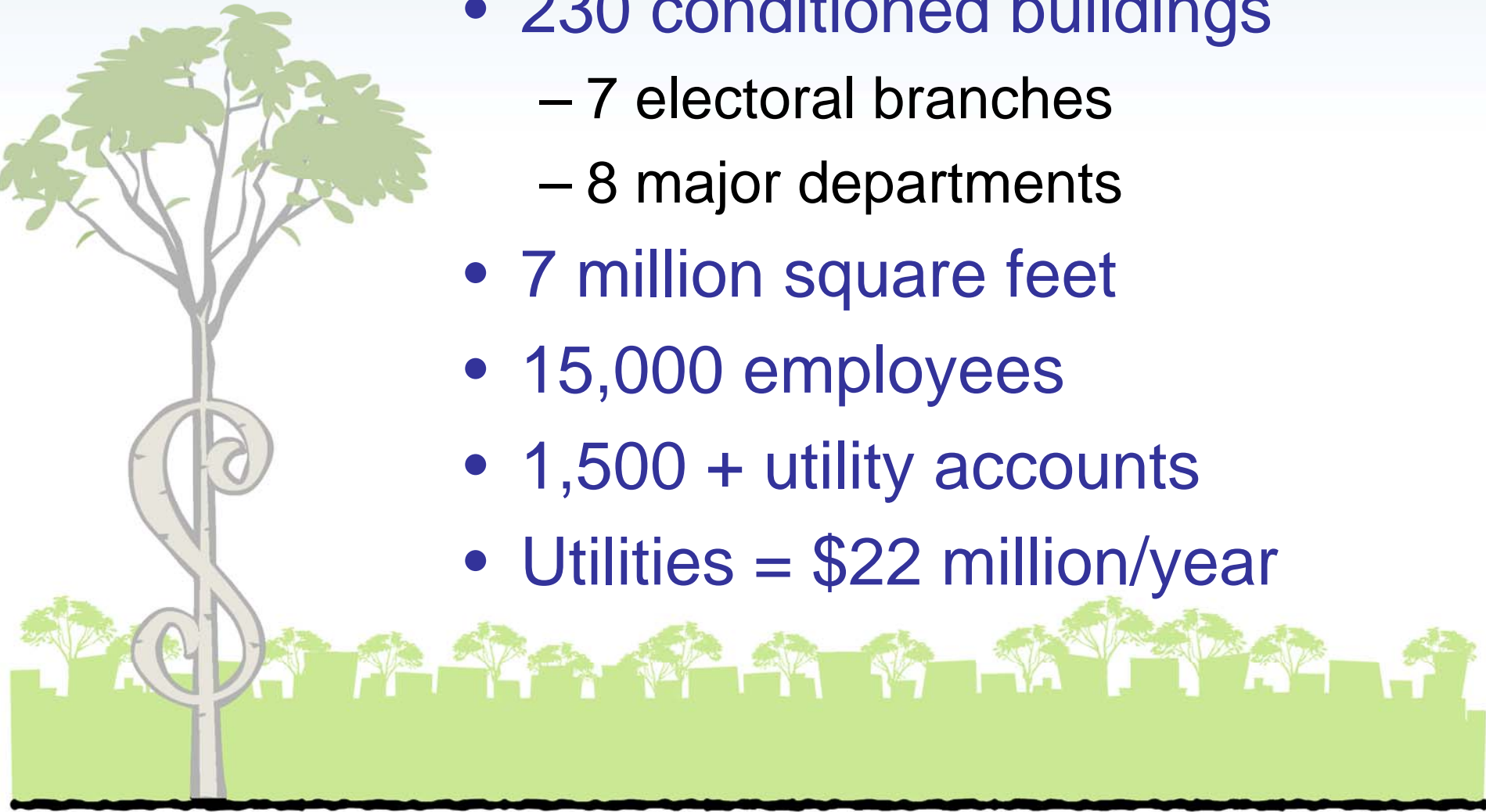Transfer savings to holding account? Revolving fund for on-going ECM project funding?

Utilities Accounting

"You can't manage
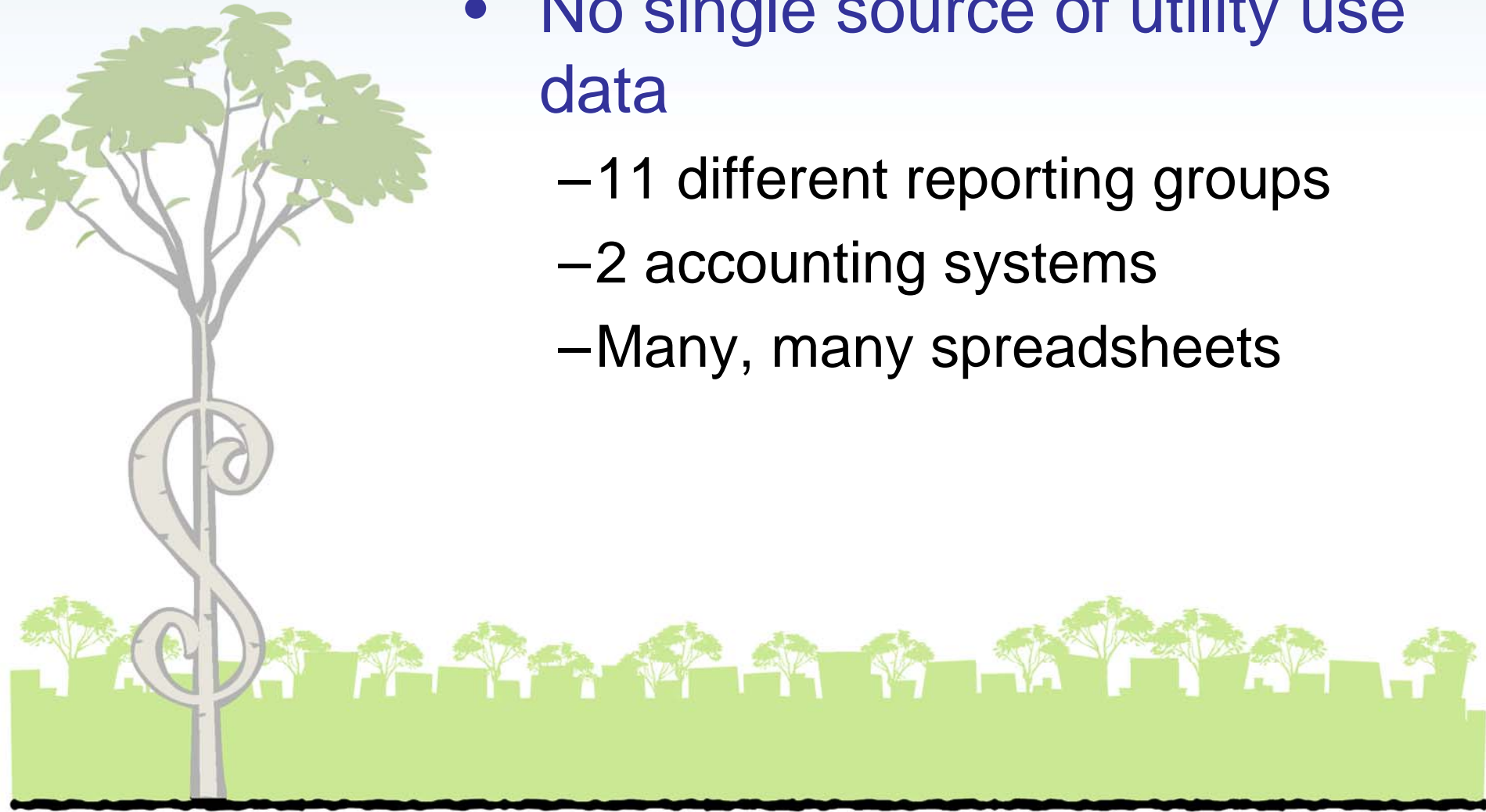what you can't measure"

King County (approximated)

- 230 conditioned buildings
  - 7 electoral branches
  - 8 major departments
- 7 million square feet
- 15,000 employees
- 1,500 + utility accounts
- Utilities = $22 million/year

Historically

- No single source of utility use data
  - 11 different reporting groups
  - 2 accounting systems
  - Many, many spreadsheets

Current Situation

- Populating a county-wide utilities accounting database
  - Flexible and detailed reporting
    - Historical use & statistics
    - County level reports & comparisons
    - Per square foot or MGD indices
    - Adjustments for weather, occupancy, etc.

- Database will be used to establish baselines and determine savings
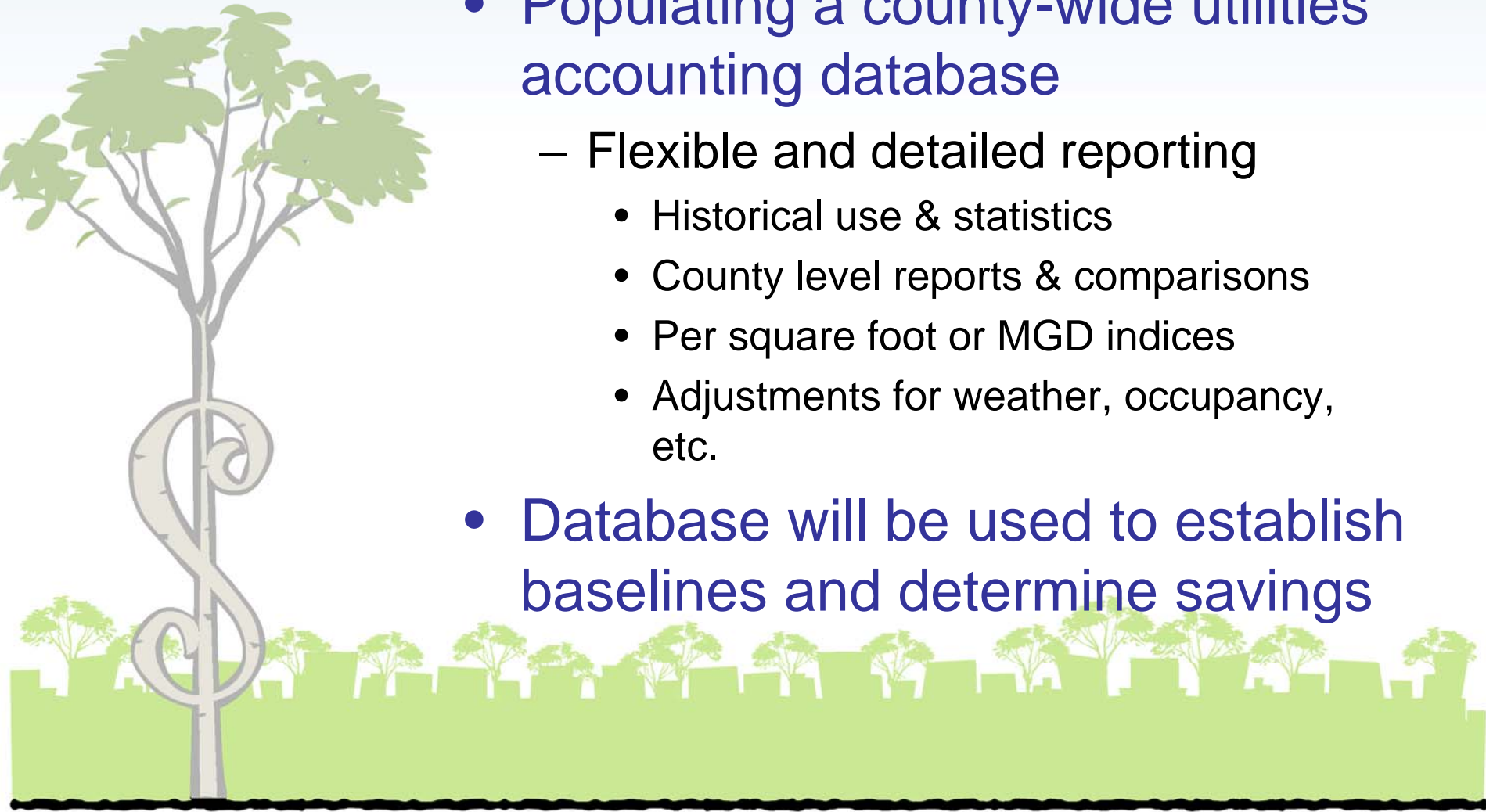
King County
Site Energy Cost Comparison -- Year Ending 10/2005

Site	Total Elec Cost	Natural Gas Cost	Other Fossil Cost	Total Energy Cost	% Chg	SqFt	Total Energy Cost /SqFt
South Treatment Plant	$2,725,757	$332,384	N/A	$3,058,141	+838753.3%	N/A	N/A
West Point Treatment Plant	$2,545,401	N/A	N/A	$2,545,401	N/A	N/A	N/A
Regional Justice Center	$957,096	$402,770	N/A	$1,359,866	+13094.6%	N/A	N/A
King County Courthouse	$649,251	N/A	N/A	$649,251	N/A	N/A	N/A
King County Aquatic Center	$311,321	$94,104	N/A	$405,425	+1586.1%	N/A	N/A
King County Correctional Facility	$388,745	$3,115	N/A	$391,860	+95986.1%	N/A	N/A
Cedar Hills Regional Landfill	$363,892	N/A	N/A	$363,892	+4352680.6%	N/A	N/A
York Pump Station	$216,541	N/A	N/A	$216,541	N/A	N/A	N/A
International District Substation	$186,348	N/A	N/A	$186,348	N/A	N/A	N/A
Heathfield Pump Station	$156,930	N/A	N/A	$156,930	N/A	N/A	N/A
Sunset Pump Station	$144,725	N/A	N/A	$144,725	N/A	N/A	N/A
Juanita Bay Pump Station	$126,855	N/A	N/A	$126,855	N/A	N/A	N/A
Interurban Pump Station	$121,807	N/A	N/A	$121,807	N/A	N/A	N/A
Regional Comm & Emergency Center	$83,213	$31,246	N/A	$114,459	N/A	N/A	N/A
DDES Main Office	$107,388	$177	N/A	$107,565	+1742470.7%	N/A	N/A
North Creek Pump Station	$71,360	$192	N/A	$71,553	+146051.2%	N/A	N/A
Sweyolocken Pump Station	$66,070	N/A	N/A	$66,070	N/A	N/A	N/A
Central Substation	$60,196	N/A	N/A	$60,196	N/A	N/A	N/A
Kenmore Pump Station	$54,359	N/A	N/A	$54,359	N/A	N/A	N/A
Renton Pool	$26,804	$26,729	N/A	$53,533	+4863.4%	N/A	N/A
Northshore Community Service Center	$33,553	$4,123	N/A	$37,676	+90514.6%	N/A	N/A
Enumclaw Transfer Station	$36,635	N/A	N/A	$36,635	N/A	N/A	N/A
Kirkland Pump Station	$36,475	N/A	N/A	$36,475	N/A	N/A	N/A
Medina Pump Station	$35,810	N/A	N/A	$35,810	N/A	N/A	N/A
N. Mercer Island Pump Station	$34,922	N/A	N/A	$34,922	N/A	N/A	N/A
Interbay Pump Station	N/A	$30,195	N/A	$30,195	+475.8%	N/A	N/A
Bellevue Pump Station	$28,208	N/A	N/A	$28,208	N/A	N/A	N/A
Factoria Transfer Station	$27,595	N/A	N/A	$27,595	+223245.6%	N/A	N/A
Kent Courthouse	$21,057	$6,327	N/A	$27,384	N/A	N/A	N/A
Vashon Transfer Station	$26,142	N/A	N/A	$26,142	N/A	N/A	N/A
Kent Animal Control Shelter	$15,865	$9,360	N/A	$25,225	+19930.3%	N/A	N/A
Yarrow Bay Pump Station	$24,708	N/A	N/A	$24,708	N/A	N/A	N/A
Issaquah Courthouse	$18,431	$5,117	N/A	$23,548	+5228.2%	N/A	N/A
Houghton Transfer Station	$23,546	N/A	N/A	$23,546	N/A	N/A	N/A
Airport - Main Terminal	N/A	$21,173	N/A	$21,173	+1579.2%	N/A	N/A
Renton Transfer Station	$20,653	N/A	N/A	$20,653	N/A	N/A	N/A
Algona Transfer Station	$20,183	N/A	N/A	$20,183	N/A	N/A	N/A
S. Mercer Island Pump Station	$20,103	N/A	N/A	$20,103	N/A	N/A	N/A
King County Archives	N/A	$19,240	N/A	$19,240	+80.2%	N/A	N/A
Vashon Pool	$8,532	$10,510	N/A	$19,042	+851694.9%	N/A	N/A
Bow Lake Transfer Station	$17,944	N/A	N/A	$17,944	N/A	N/A	N/A
Vashon Treatment Plant	$16,302	N/A	N/A	$16,302	N/A	N/A	N/A
Woodinville Pump Station	$14,907	N/A	N/A	$14,907	N/A	N/A	N/A
Yesler Building	N/A	$14,439	N/A	$14,439	N/A	N/A	N/A
Cottage Lake Pool	$4,309	$7,988	N/A	$12,297	+43327.2%	N/A	N/A

Energy Use Graph - Monthly and Annual Trend for King County

11/2003 thru 10/2005

■ Electricity   ■ Fossil Fuels   ◆ Annual Trend

Immediate Feedback

Water Avg Use for Account #0702-050200 (Selected Sites)

Leak in boiler supply line
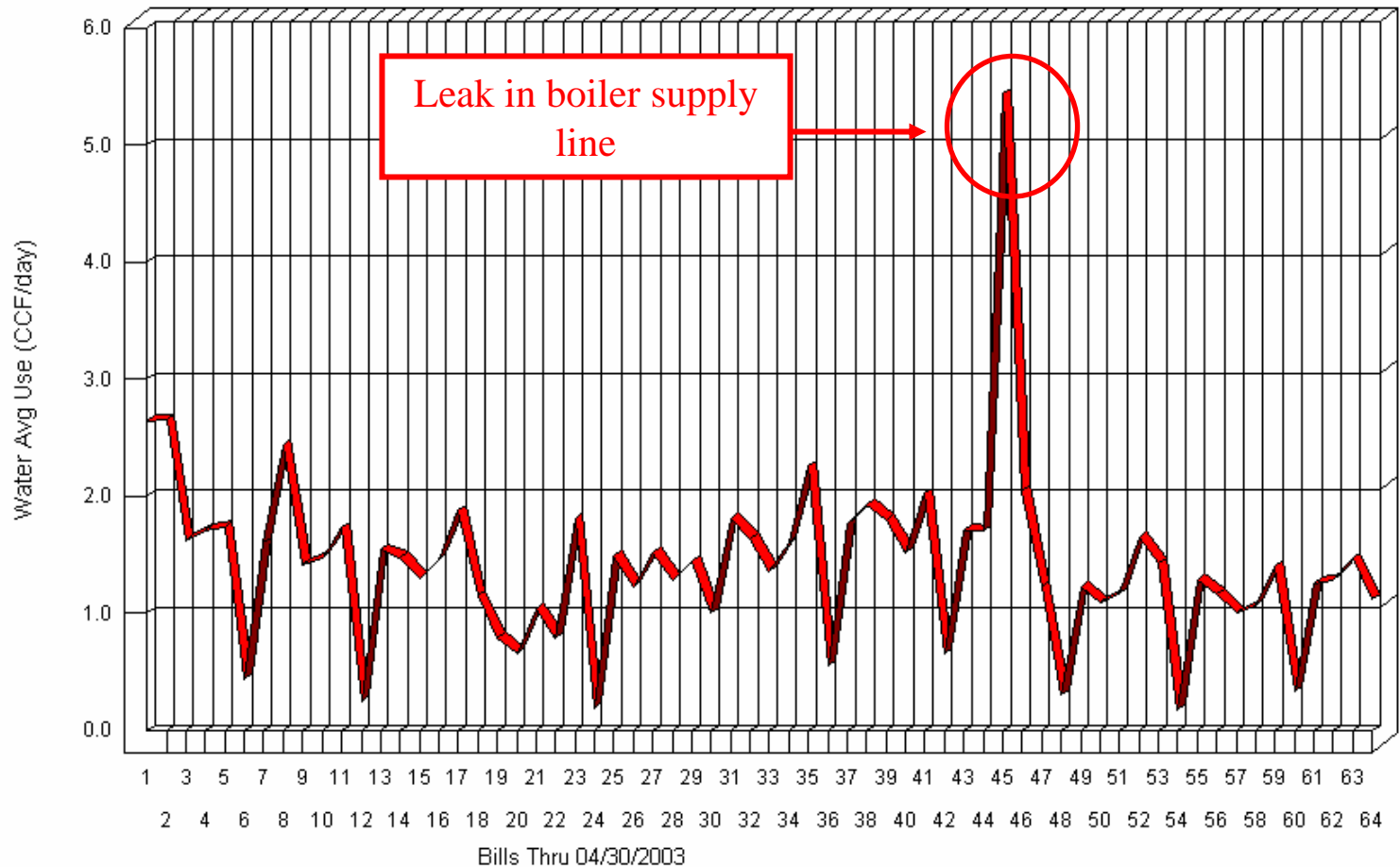
Utility Bill Auditing

- Verify:
  - Meters & services
  - Meter units & multipliers
  - Rates & charges
- Optimize:
  - Close dormant accounts
  - Combine services
- Examine:
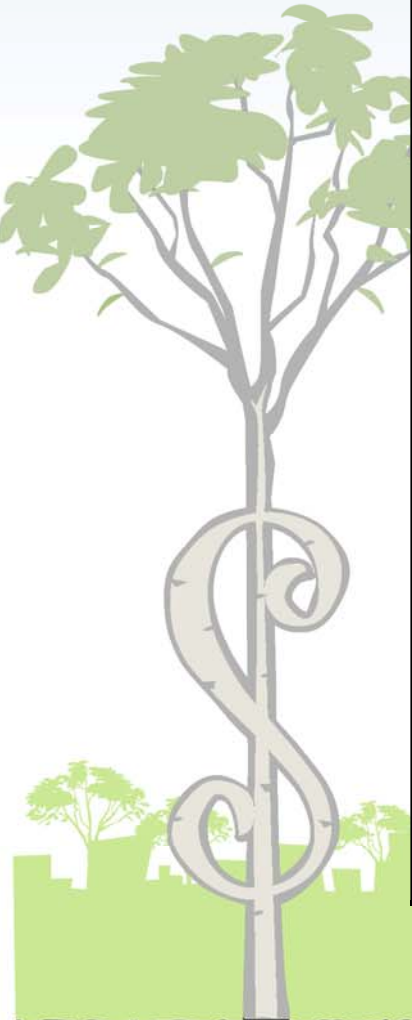 - Rate, service or meter changes
  - Estimates

Typical Findings = 1% of Expenses

- Dormant accounts or inactive meters
- Accounts that aren't ours
- Inaccurate estimated meter readings
- Wrong utility rate or multiplier
- Peak demand meters not reset
- Water & sewer charges don't correlate
- Deduct meters not deducted
- Volume charges on fire protection
- Leak adjustments

Operational Measures
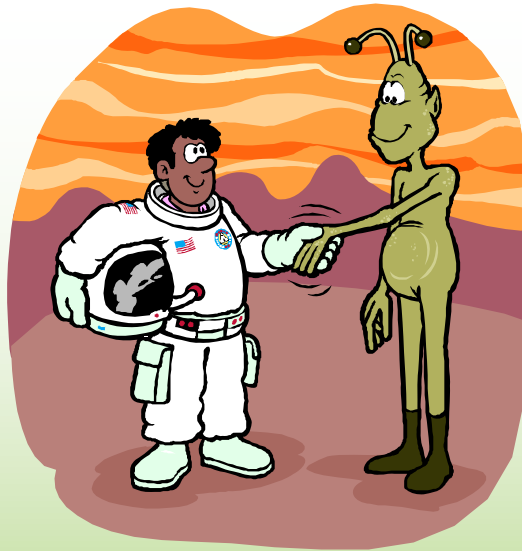
"If we all do a little,
we can all save a Watt"

Everyone Contributes

Building Operators (40%)	Building Occupants (20%)	Building Maintenance (40%)
• Daily building operation	• Daily operation	• Control settings
• Cleaning process	• Evening shutdowns	• PM & tune-ups
• Identifying & reporting MT issues	• Model behavior	• Quick response

Top Level Support

- ## County Code
  - Title 18, Energy Management

- ## Ordinance 5770
  - Energy Management Plan

- ## Executive Policy FES 9-2
  - Task Force for Energy Efficiency

- ## MOU with PSE

Task Force

- Currently forming in DRNP
  - Expect to expand to all KC
- Charges
  - Integrate strategies
  - Increase accountability
  - Create supporting materials
  - Communicate results
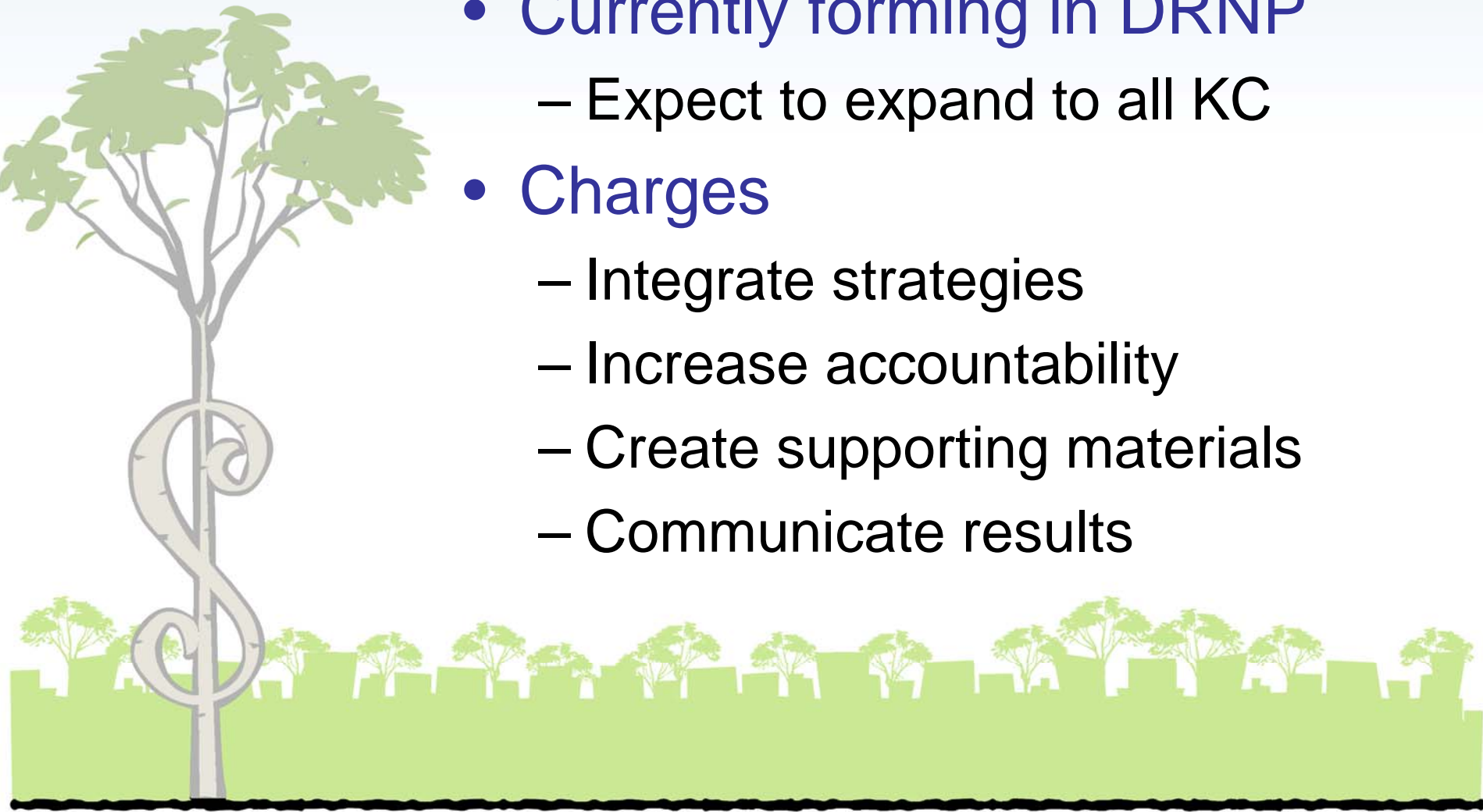
Action Plan

- Goal
  - 5% reduction by 2008
- Program "brand"
- Kick off campaign
  - Quick 5 actions
  - Involve all staff
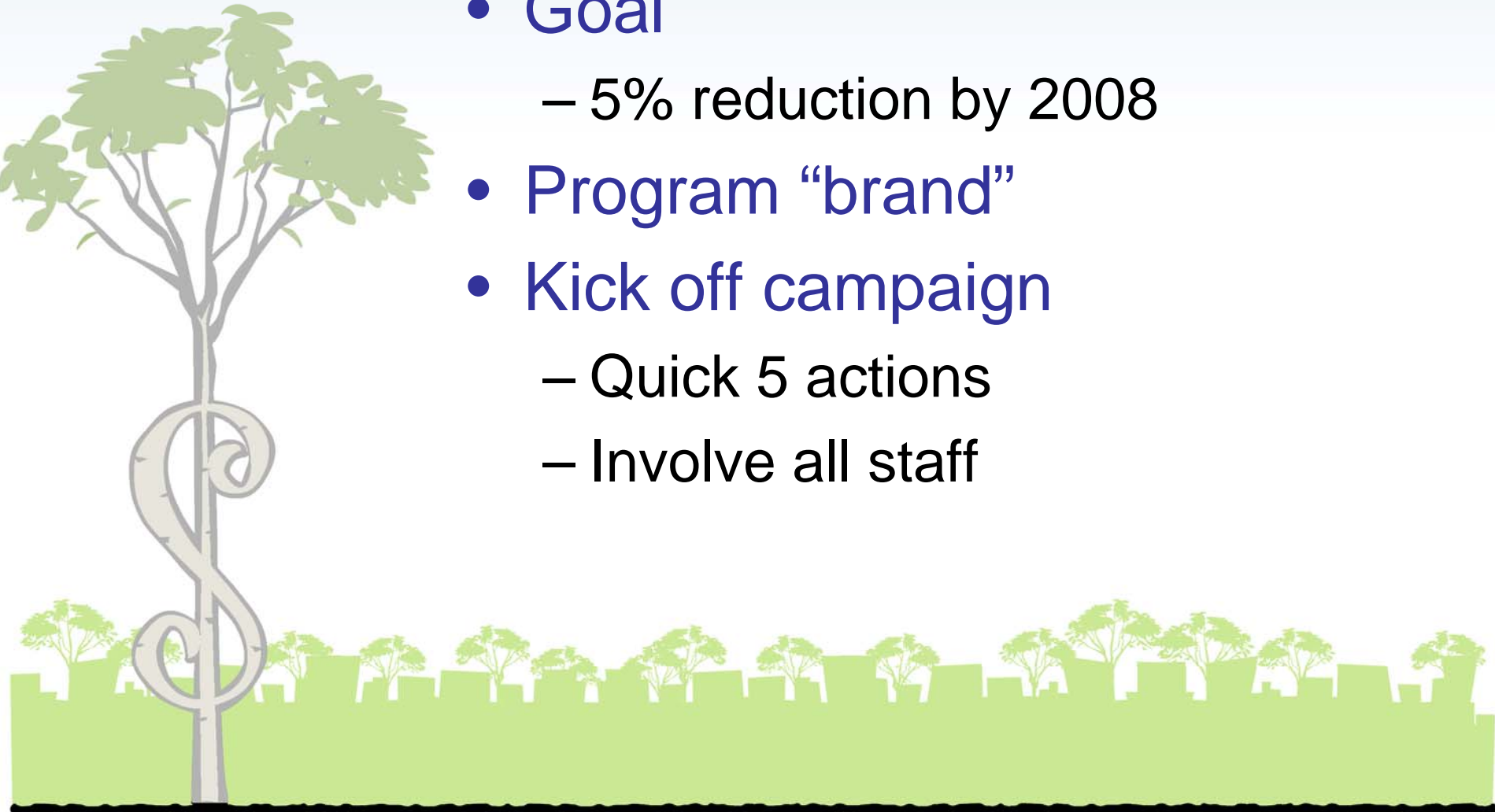
Temperature Standards

- Specified by area type

Area	Occupied Set Points		Unoccupied Set Points	
	Heating	Cooling [1]	Heating	Cooling [1]
Offices	69	74	55	85
Meeting Rooms & Libraries	69	74	55	85
Staff Lounges & Cafeterias	69	74	55	85
Locker Rooms	69	74	55	85
Work & Copy Rooms	67	74	55	85
Computer Labs	67	73	55	77
Shops & Industrial Arts	67	75	55	85
Gyms	67	73	55	85
Kitchens	65	74	55	85
Restrooms	65	75	55	85
Hallways & Common Areas	65	75	55	85
Storage Rooms	62	78	55	85

Building Operating Guidelines

- Hours during which we will provide heat
- After-hour access
  - Limited or pre-approved
  - Use override buttons
- Interior lighting
  - Hallways and common areas to 50% after hours
- Exterior lighting
  - No earlier than 5:00AM
  - Off after building is secured
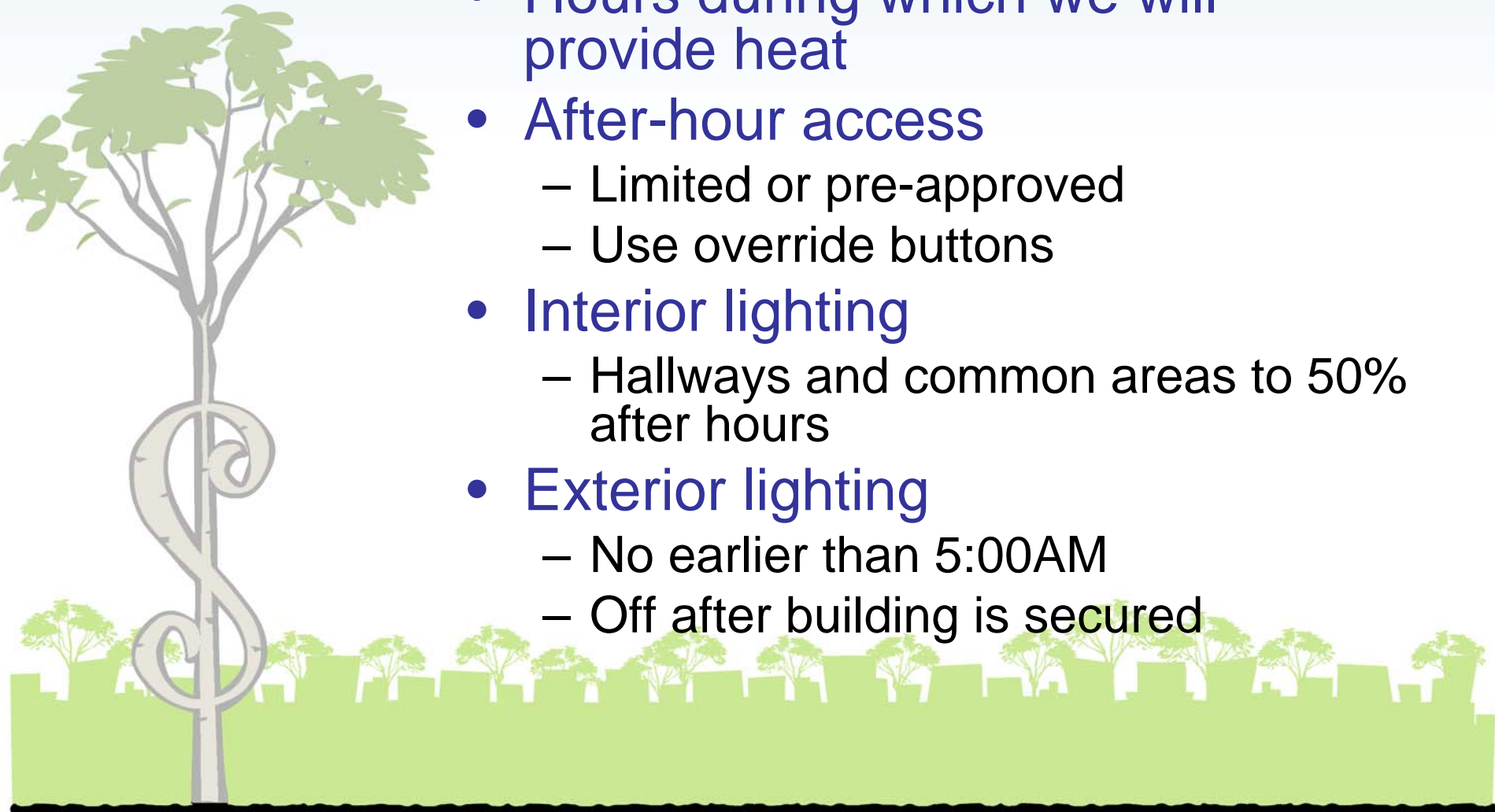
Drafted…

KING COUNTY
Energy & Resource Conservation Program

King County

Energy and Resource Use Guidelines

In support of King County Title 18, the following guidelines are set forth to establish general operating standards for energy and resource consumption in county occupied buildings. Adherence to these standards will reduce county utility expenditures, optimize indoor environmental conditions, and minimize our impact on the environment.

The county's annual utilities budget currently exceeds 22 million dollars. With a minimum program goal of reducing utility costs by 5%, savings achieved through the implementation of these guidelines can be significant; over 1 million dollars.

The county is committed to continually improving the efficiency of all systems in our buildings. To help achieve a standard level of efficiency and to optimize our efforts, all county staff and visitors will be expected to follow the guidelines herein set forth.

A one-page summary of these guidelines will be provided for posting in county buildings. Individual building control points will be realigned each year in September to meet these standards.

HEAT & VENTILATION

Allowances & Responsibilities

Building Occupants	• Adjust occupied space temperature by 3 degrees • Use push-button overrides for pre-authorized after-hour use • Keep materials away from/off of HVAC vents
Maintenance & Operations	• Setup and maintain HVAC schedules including holidays and events • May modify occupied space temperature by 3 degrees for spaces without DDC controls

Operating Schedules

Heating systems should be operated in the most economical and efficient way possible; i.e. they should operate for the minimum amount of time required to provide the approved climate for a specific area and activity.

• Start times shall be set to achieve occupied temperatures no earlier than 7:00 AM, unless standard operating hours precede this time. Most building control systems have intelligence that determines when to start heating to bring a space to its set temperature by the "occupied

Feedback

Monthly Performance for 02/2002 Vs. 02/1998

Utility Service	Current Usage	Comp Yr Level	% Chg	Current Cost	Comp Yr Cost	% Chg	Cost/ SqFt/Yr	Cost/ Occupant	Monthly Savings	YTD Savings
Electricity	83,186	103,697	- 19.8	$4,420	$5,363	- 18.1	$0.35	$51.09	$1,065	$9,430
Natural Gas	1,452	1,800	- 19.3	$1,182	$803	+ 47.3	$0.06	$8.74	$283	$2,545
Water	72	139	- 48.4	$342	$436	- 21.6	$0.04	$5.48	$288	$1,546
Irrigation	2	N/A	N/A	$37	$16	+ 134.5	$0.13	$19.35	N/A	$0
Sewer	72	139	- 48.4	$333	$615	- 45.8	$0.03	$4.86	$312	$1,573
Refuse	5	79	- 93.7	$719	$629	+ 14.4	$0.07	$10.81	($90)	($702)
Demand	438	573	- 23.6	$2,410	$3,163	- 23.8	$0.18	$26.68	$753	$2,342
Recycling cost	N/A	0	N/A	$110	$110	+ 0.5	$0.01	$1.51	($1)	$227
Totals				$9,554	$11,134		$0.89	$128.53	$2,610	$16,961

Comparison Year ends 08/1998

Savings for Electricity based on current use per sqft vs. comp yr
Savings for Natural Gas based on current use per sqft vs. comp yr (adjusted for hdd)
Savings for Water based on current use vs. comp yr (adjusted for students)
Savings for Sewer based on current use vs. comp yr (adjusted for students)
Savings for Refuse based on current cost vs. comp yr

Year to Date Performance for 6-Month Period Ending 02/2002

Energy Usage Breakdown (MBtu)

Natural Gas 593
Electricity 1,597

2,190 MBtu Year to Date Total

Energy Cost Breakdown

Natural Gas $4,860
Electricity $38,179

$43,038 Year to Date Total
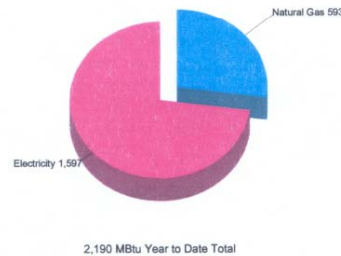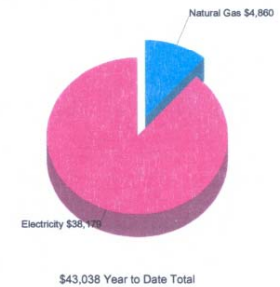
Cost Breakdown - All Utilities

Other $2,755
Water $2,275
Natural Gas $4,860
Refuse $4,968
Irrigation $5,084
Electricity $38,179

$58,120 Year to Date Total

Savings by Category

Electricity
Natural Gas
Demand
Sewer
Water
Recycling cost
Refuse

-2000 0 2000 4000 6000 8000 10000

$16,961 Year to Date Net Total
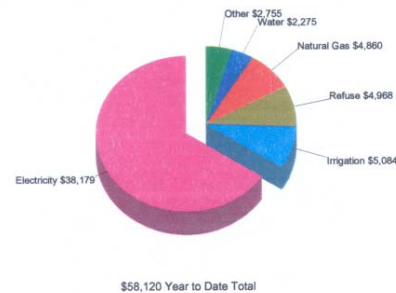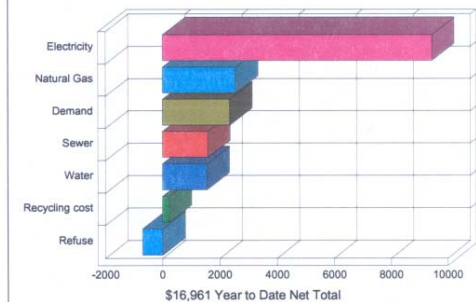
Signs & Labels

- Small reminders

Heat to 68F, Cool to 76F

SAVE ENERGY…
reduce pollution and operating costs
Copyright © KSD. Email conserve@kent.k12.wa.us
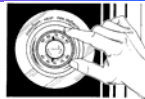
TURN OFF THE LIGHTS

and turn on The SAVINGS!
Copyright © KSD. Email conserve@kent.k12.wa.us

SHUT THIS COMPUTER DOWN

at night or if it will be idle for more than 2 hours.
SAVE ENERGY
Copyright © KSD. Email conserve@kent.k12.wa.us

KEEP THIS COMPUTER ON

This **machine is a server** and needs to remain on at all times.
The monitor can be turned off to save energy
Copyright © KSD. Email conserve@kent.k12.wa.us

TURN THIS COPY MACHINE OFF AT NIGHT

to SAVE ENERGY
and reduce operating costs
Copyright © KSD. Email conserve@kent.k12.wa.us

TURN ME OFF AT NIGHT
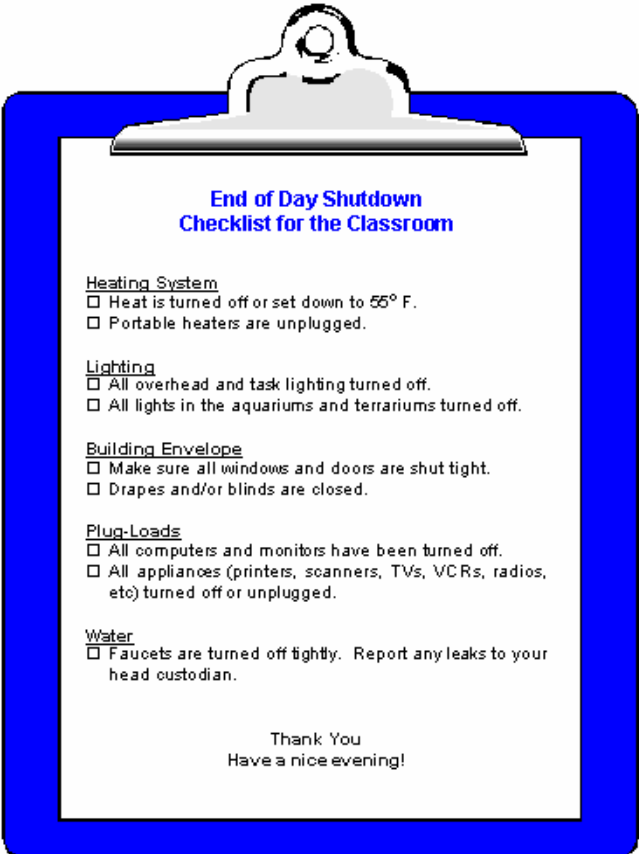
to SAVE ENERGY
and reduce operating costs
Copyright © KSD. Email conserve@kent.k12.wa.us

Checklists for Daily Shutdown

- Distribute to each area
- Assign responsibility

End of Day Shutdown
Checklist for the Classroom

Heating System
☐ Heat is turned off or set down to 55° F.
☐ Portable heaters are unplugged.

Lighting
☐ All overhead and task lighting turned off.
☐ All lights in the aquariums and terrariums turned off.

Building Envelope
☐ Make sure all windows and doors are shut tight.
☐ Drapes and/or blinds are closed.

Plug-Loads
☐ All computers and monitors have been turned off.
☐ All appliances (printers, scanners, TVs, VCRs, radios, etc) turned off or unplugged.

Water
☐ Faucets are turned off tightly. Report any leaks to your head custodian.

Thank You
Have a nice evening!

Building Audits & Recomissioning

- A picture says it all…
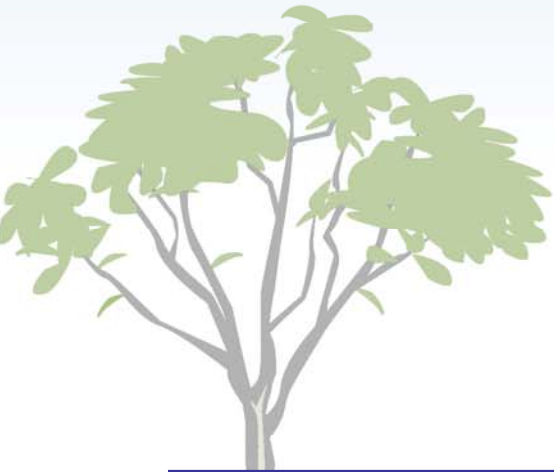
Recognize Efforts

"Staff member activates power management feature on all building printers"

# Equipment Upgrades

Requires labor and budget

Low Cost (In-House)

- Typically use maintenance staff
  - Add light switches
  - Rewire circuits
  - Install photocells, time-clocks, occupancy sensors, and other controls
  - Retro-commission
 - Verify/adjust OSA dampers
  - Install aerators

Capital Improvements

- **Utilize contractors**
  - Lighting upgrades
  - Control upgrades
    - DDC systems
    - Variable speed drives
    - Demand ventilation
  - Boiler and HVAC replacements
  - Efficient water fixtures
    - No-water urinals
    - Low-flow toilets
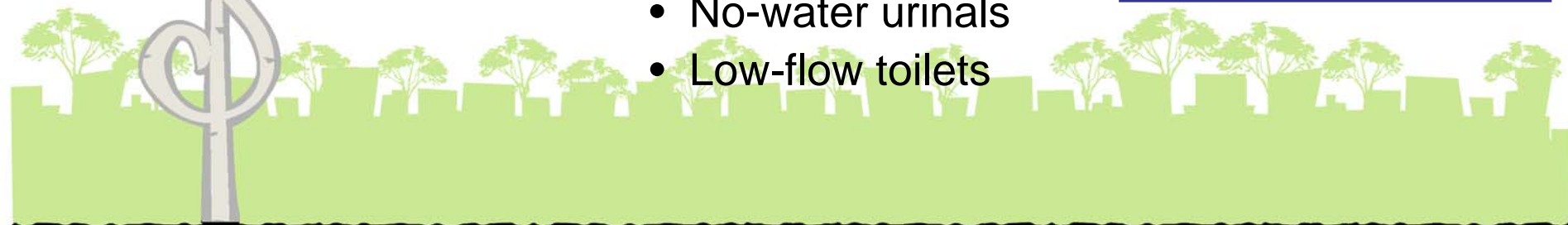
Current Totals (approximate)

- 56 projects since 2000
- $1.9 million utility grants
- $1.3 million/year savings
- Only includes projects done through utility programs
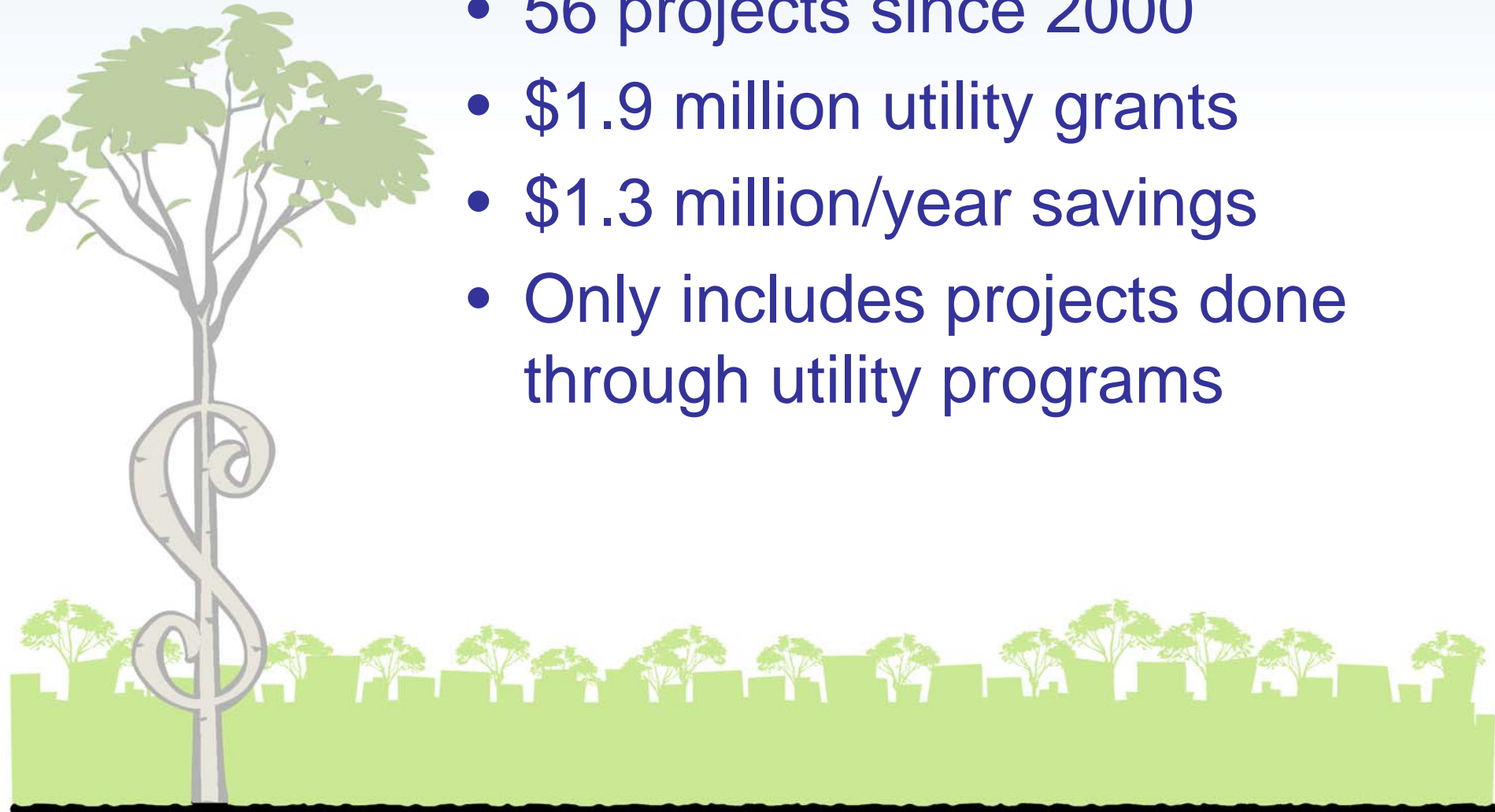
Thank You!

Lori Moen

Energy & Resource Conservation Program Manger

King County DNRP

lori.moen@metrokc.gov

206-263-7145