

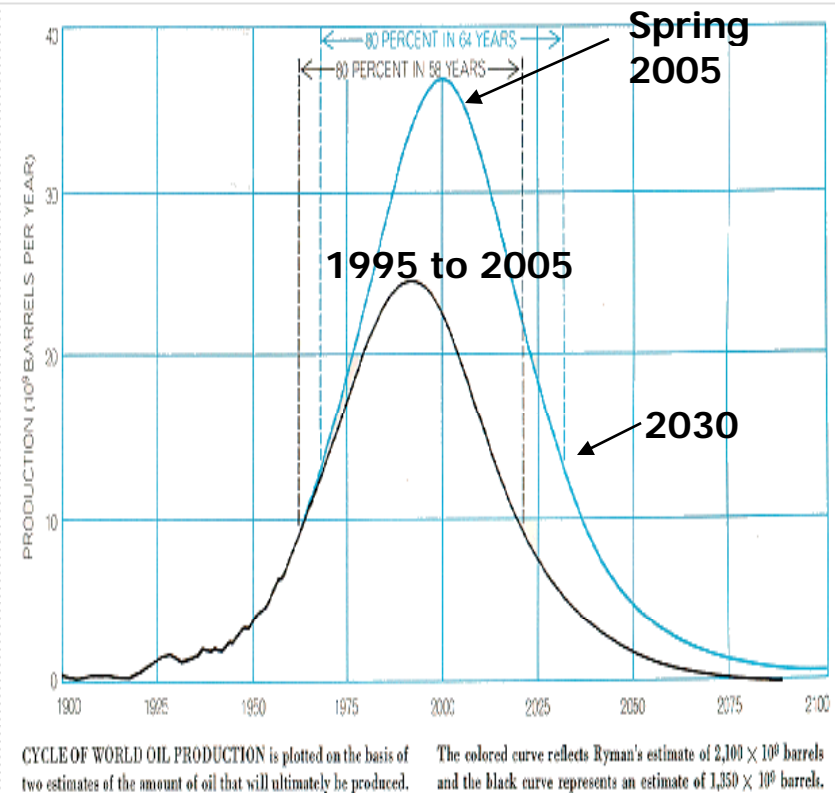
Keys to Energy Management

*Maryland Nursery & Landscape Association
&
Maryland Greenhouse Growers Association*

CQI Associates

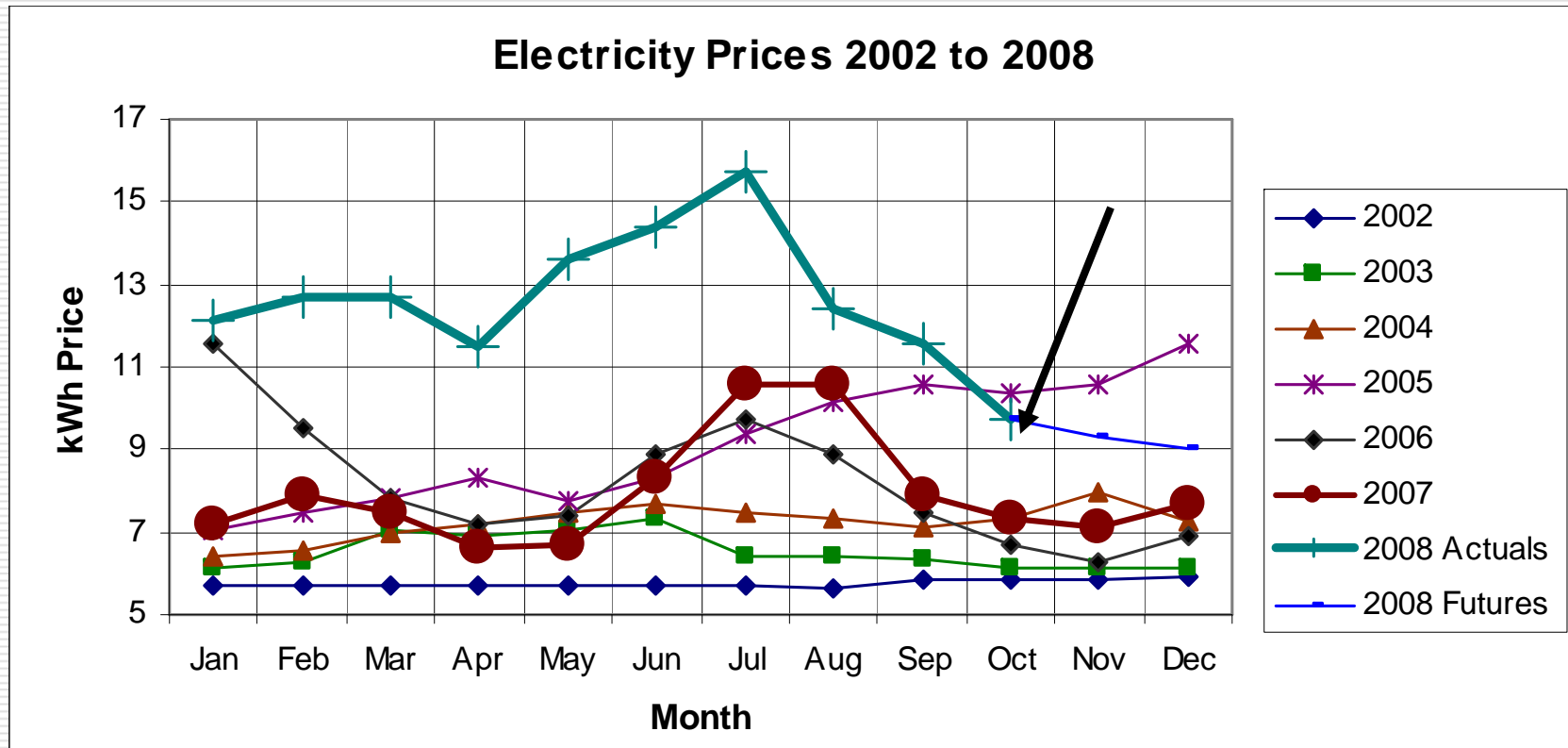
Oil & Market Impact

- **Dr. M. King Hubbert**, geophysicist, is well known as a world authority on the estimation of energy resources and on the prediction of patterns of discovery and depletion.
- Applied the principles of geology, physics, and mathematics to project **future oil production from the U.S. reserve base**.
- Prediction **in 1956** that U.S. oil production would **peak in 1995** and decline thereafter was scoffed at then but his analysis has since proved to be remarkably accurate.
- **Actual Peak Spring 2005**

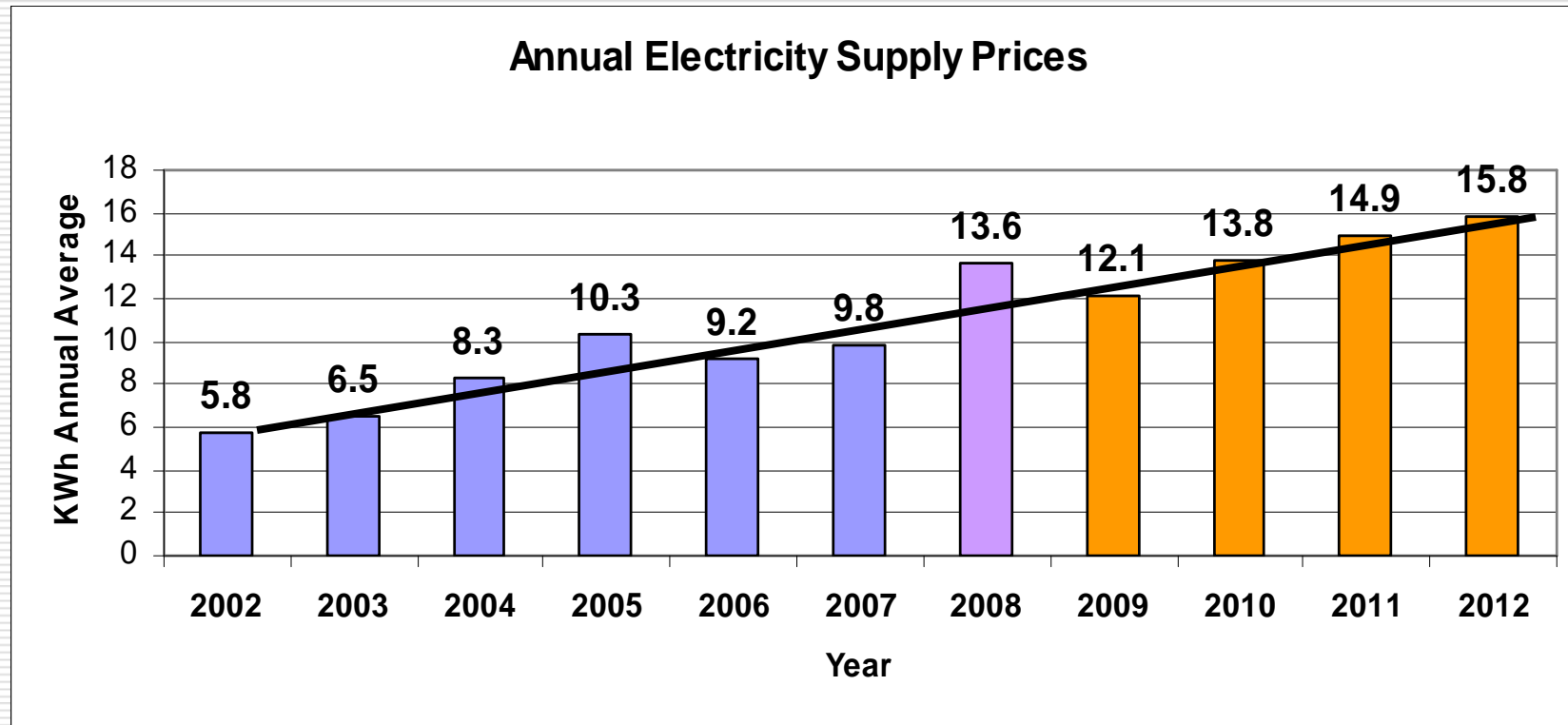


Electricity

Average Increase 14% per Year



Wholesale Electricity Price - Bar Chart

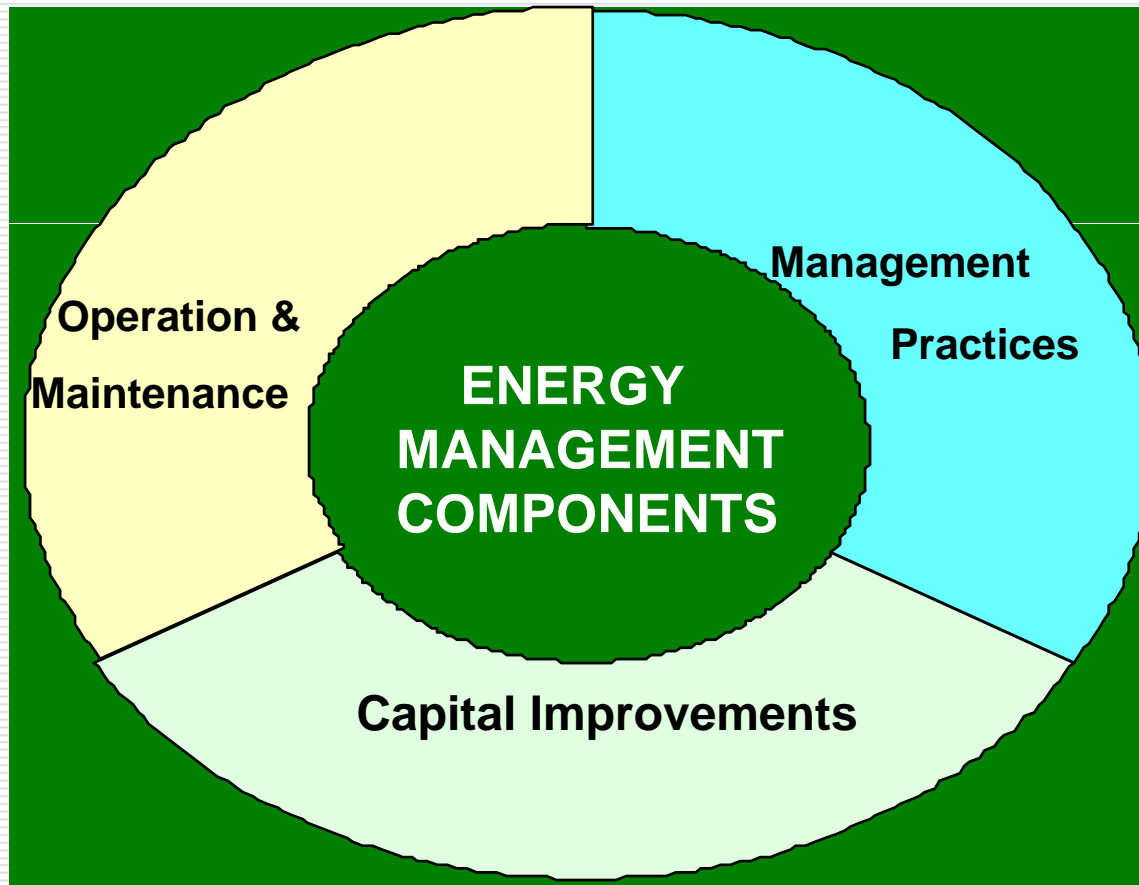


Feb. 2008 to July 4, 2008

Market Overvalued

- Why have prices improved:
 - Olympics is over in China
 - End of Hurricane Season
 - End of estimated period for economic recovery from stimulus program
 - Stronger Dollar
 - Economic Crisis
 - Next Event Elections

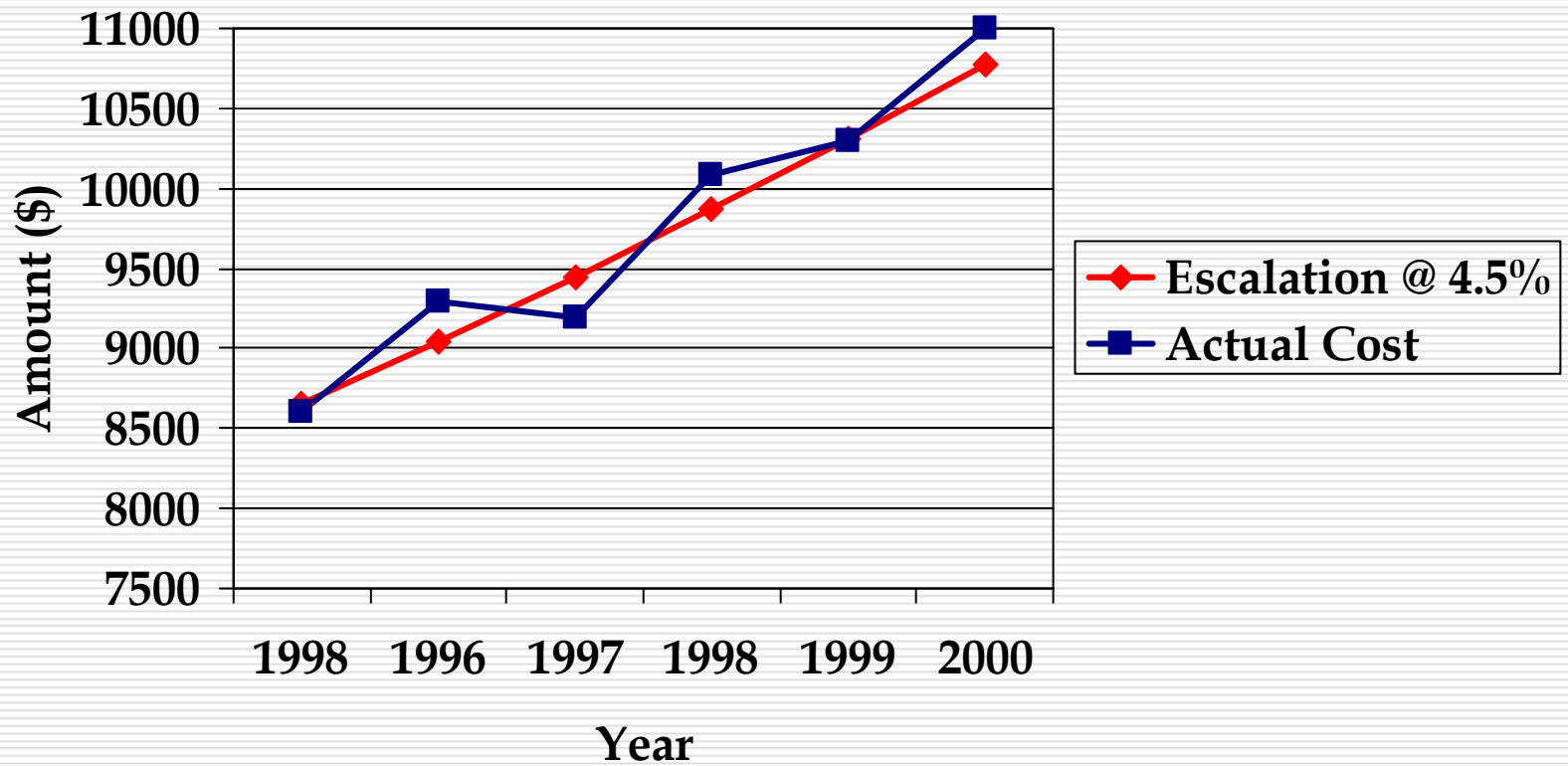
Energy Management Components



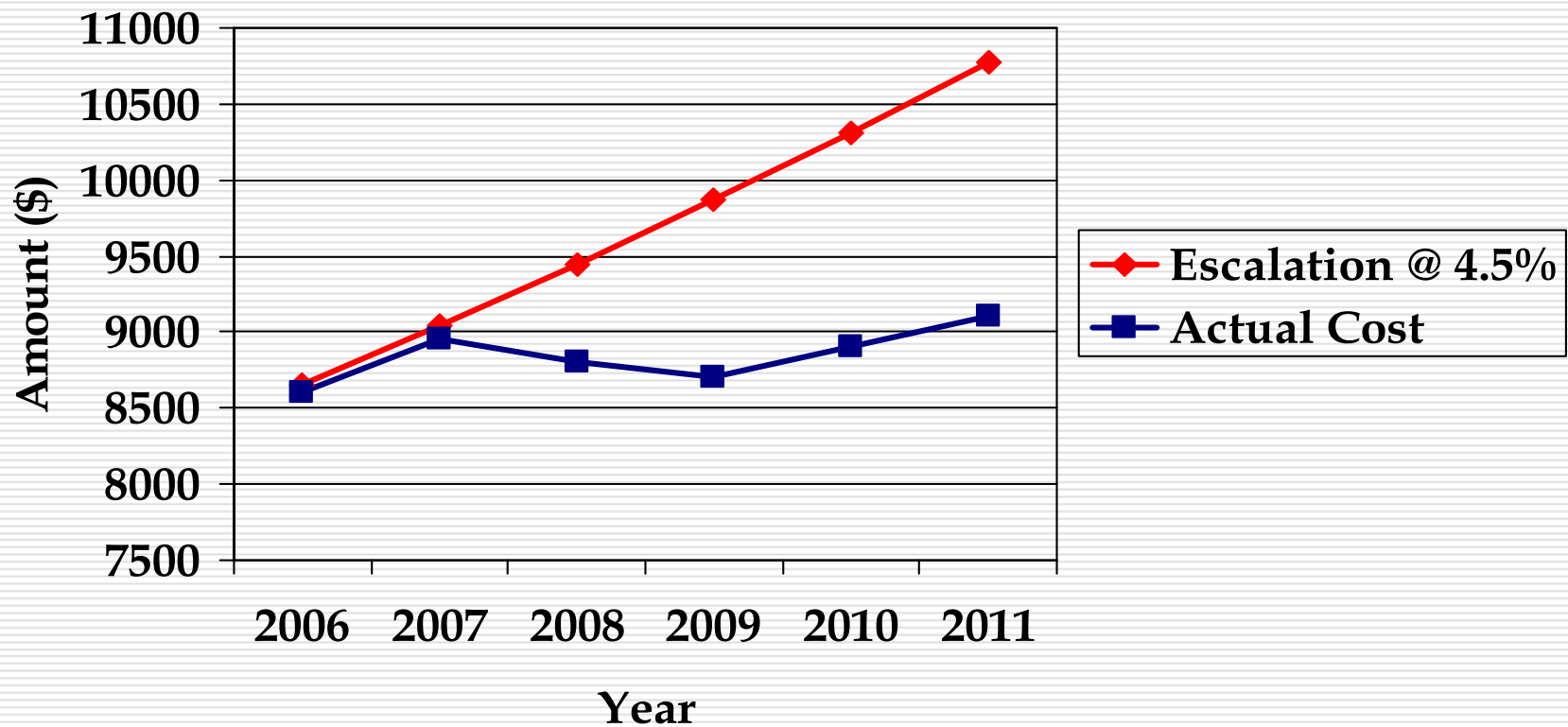
Energy Management Program

- Plan
- People
- Performance
- Projects
- Procurement

Energy Cost - No Program



Potential Program Results



Hours of Operation

- Do not turn everything on at the same time
- Establish realistic hours of operation
- Work with occupants to manage times and use of space
- Consolidate space use based on system design
- For every hour a system can be set back significant reductions in consumption will be achieved

Simultaneous Startup - Mornings

- ❑ To control energy use and cost two elements need control
 - Startup
 - Ongoing operation
- ❑ Start-up is measured in demand charges to turn on light and HVAC equipment
- ❑ Demand is the peak set in anyone two 15 minute periods of the 30 day billing period
- ❑ To control demand start systems over an hour in 15 minute cycles

Simultaneous Heating & Cooling

- In Maryland we will have days that we must heat in the morning and cool in the afternoons
- However the HVAC systems should not be heating and cooling at the same time thus fighting each other
- Review control programs and settings to adjust to function properly
- You can have zones within the building heating and others cooling – just not both within the same zone
- Report malfunctions

Air Flow – Supply & Return

- HVAC equipment needs adequate air flow to work
 - Equipment near air ducts and vents
 - Equipment that produces heat next to supply and especially return ducts
- Should be relocated
- Air flow will allow the unit to be more efficient and space comfort

Temperature Control

- ❑ Thermostats should be checked monthly for proper settings and function
- ❑ Thermostats located near doors, windows and equipment may need additional attention
- ❑ Night setback temperatures and times are important
- ❑ Temperature control during occupied and un-occupied times of the school day will contribute to the greatest savings potential

Temperature Setting – Occupied

- ❑ Optimize the energy used to provide a comfortable temperature setting
- ❑ A setting too low or high will be countered by the occupants with measures that will increase consumption
- ❑ Find an acceptable operating balance

Un-Occupied Schedule

- At the end of the work day
 - Reduce temperature settings
 - Change air flow – Damper settings
 - Turn of lights
 - Turn of non-essential equipment
 - Close windows & doors
 - Lower and close blinds or shades
- Night setback is the second most important opportunity to reduce consumption
- Establish operating practices for:
 - Occupied
 - Cleaning
 - Un-occupied
- Concentrate on weekends and holidays

Summer Afternoons

- ❑ When outside temperature exceed 90 degrees and 90% humidity levels.
- ❑ Usually 2:00 pm just as the school day is ending
- ❑ Try to perform the un-occupied day tasks earlier
 - Reduce temperature settings
 - Change air flow – Damper settings
 - Turn of lights
 - Turn of non-essential equipment
 - Close windows & doors
 - Lower and close blinds or shades
- ❑ Demand charges are the highest
 - Control systems could be set to raise temperatures or reduce equipment use by one degree for two hours
- ❑ This task requires the full support of the principal and staff

Lighting

- Let the occupants turn lights on in the morning
- Encourage occupants to turn lights off anytime they leave the classroom, office or work area
- Replace burned out bulbs
- Be sure lights are off during un-occupied times
- Number one way to reduce consumption

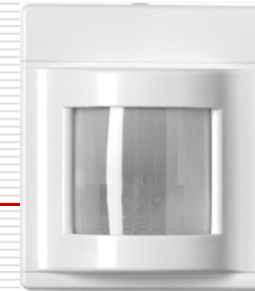
Lighting Technology

- Lighting
 - T-12 to T-8
 - HID to T-8 (T-5)
 - Halogens – Eliminate
 - Compact Fluorescents for Incandescent
 - LED fixture options
 - Controls
 - Timers
 - Photocells
 - Occupant Sensors
 - Ambient Sensors
- LED Exit Fixtures



T-12 Lights & Fixtures

- Government Regulation Require
 - Fixtures and ballast manufacture ended in 2008
 - Bulb production ends in 2010
 - Government Facilities were to be converted to T-8 or compatible fixtures in 2010
- By 2011 bulbs may be hard to find



Occupancy Sensors



Computers & Equipment

- Staff can assist by participating in a “**turn it off**” campaign
 - Lights, computers, equipment, fans
- Turning off all computers and related equipment from 6 pm to 7 am M-F **saves \$80.00 per work station**
 - User should turn of unit
 - Inform and encourage
- Turning off lights from 8 pm to 7 am M-F saves 7% to 12% per year
- One degree reduction in temperatures for a year saves 5% per year

Preventative Maintenance

- Perform the Equipment Maintenance Practices
 - Spring/Fall Preventive Maintenance Cycles
 - Filters, belts, settings, lubrication, control settings
- Develop un-occupied period operating standards and monitor settings monthly
- Set controls to “really” work – Review settings monthly
- Develop a philosophy about keeping systems clean
- Preventative maintenance can improve efficiency by 5%

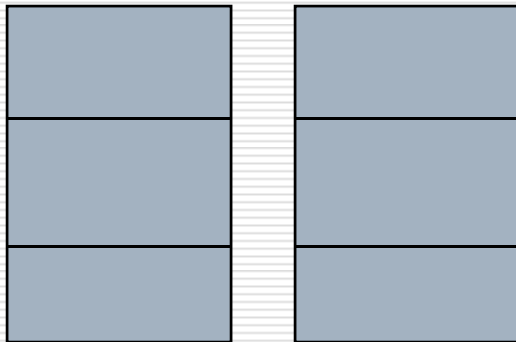
Procurement

Procure smart

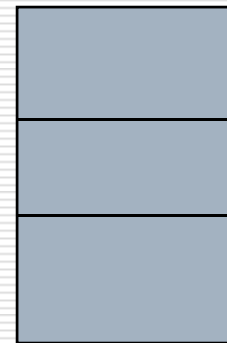
- Default service is not the long-term solution
- Contract for budget stability
- Go long: 36 months or more
- Be in contract for at least 24 months looking to add 12 to 24 months
- Monitor the market and be ready to purchase
- Supplier provided contracts can save **6% to 15%** per year

Two for One?

Two Barrels of Oil



For One Barrel of Oil



Renewable – Green Energy

Solar

- ❑ Most renewable energy comes either directly or indirectly from the sun. Sunlight, or solar energy, can be used directly for heating and lighting homes and other buildings, for generating electricity, and for hot water heating, solar cooling, and a variety of commercial and industrial uses. Photovoltaic panels convert the sun's radiation into electricity.

Wind

- ❑ Wind turbines of varying sizes are used to generate electricity, for the national grid or for isolated communities.

Biomass

- ❑ The organic matter that makes up plants is known as biomass. Plant material can be burned or fermented and used to generate electricity or heat. The CO₂ released is the same amount as was removed from the atmosphere during the plant's lifetime, so biomass is considered carbon neutral.

Bio Fuels

- ❑ Use of plant related material to mix with fossil fuel to reduce consumption up to 20%

Renewable – Green Energy

Geothermal

- ❑ Not all renewable energy resources come from the sun. Geothermal energy taps the Earth's internal heat for a variety of uses, including electric power production, and the heating and cooling of buildings. The Earth's temperature remains constant 1.5 meters below the surface, can be used to heat and cool buildings.

Ocean

- ❑ The ocean can produce thermal energy from the sun's heat and mechanical energy from the tides and waves

Hydropower

- ❑ Flowing water creates energy that can be captured and turned into electricity. This is called hydroelectric power or hydropower

Hydrogen

- ❑ Hydrogen also can be found in many organic compounds, as well as water. It's the most abundant element on the Earth. But it doesn't occur naturally as a gas. It's always combined with other elements, such as with oxygen to make water. Once separated from another element, hydrogen can be burned as a fuel or converted into electricity.

2006 - 18% of Global Consumption came from Renewable Energy

- ❑ 13% Traditional biomass, such as wood-burning
- ❑ 3% Hydropower was the next largest renewable source
- ❑ 1.3% Hot water heating
- ❑ 0.8% Modern Technology Renewable Energy: geothermal, wind, solar, and ocean energy

Renewable Applications

- ❑ Wind power is growing at the rate of 30 percent annually, with a worldwide installed capacity of over 100 GW, and is widely used in several European countries and the United States.
- ❑ Photovoltaics industry reached more than 2,000 MW in 2006, and photovoltaic (PV) power stations are particularly popular in Germany
- ❑ Solar thermal power stations operate in the USA and Spain, and the largest of these is the 354 MW SEGS power plant in the Mojave Desert.
- ❑ The world's largest geothermal power installation is The Geysers in California, with a rated capacity of 750 MW.
- ❑ Brazil has one of the largest renewable energy programs in the world, involving production of ethanol fuel from sugar cane, and ethanol now provides 18 percent of the country's automotive fuel.

LEED – Green Buildings

Leadership in Energy and Environmental Design

U.S Green Building Council's Green Building Rating Systems

A voluntary, consensus-based national standard for developing high-performance, sustainable buildings aimed to improve occupant well being, environmental performance and economic returns of building using established and innovative practices, standards and technologies.

LEED or “High Performance Building Standards”

- ❑ LEED applies to new construction, existing buildings, and commercial interiors renovations
- ❑ **Seek a Silver level or designation**
- ❑ High Performance Building Standards – Allies LEED standards used as an alternative to obtaining certification
- ❑ **Green buildings consume 10% less than a traditional buildings**

Washington-Baltimore LEED Certified Buildings

- ❑ Chesapeake Bay Foundation Headquarters, Annapolis
- ❑ U.S. Green Business Council Building, DC
- ❑ Herman Miller National Design Center, DC
- ❑ Sidwell Friends Middle School, DC
- ❑ National Association of Realtors Headquarters, DC
- ❑ Shady Grove Education Center, University of MD
- ❑ World Resources Institute, DC
- ❑ USCBC National Headquarters, DC
- ❑ Maryland Department of Transportation, MD
- ❑ Nusta Spa, Washington, DC
- ❑ Great Seneca Elementary School, MD
- ❑ Environmental Defense Fund, DC

Regional “Green” Policies

Montgomery County	LEED Silver for public buildings over 10,000 square feet.
Baltimore County	100% property tax credit for LEED Silver. Expanded to establish different levels for different degrees of environmental performance. Includes existing buildings
Baltimore City	<ul style="list-style-type: none"> • LEED Silver for public buildings over 10,000 square feet.
Howard	<ul style="list-style-type: none"> • LEED Silver for public buildings over 10,000 square feet. • Most private buildings over 50,000 square feet must achieve LEED certified
City of Annapolis	<ul style="list-style-type: none"> • Private buildings over 10,000 square feet must achieve LEED certified
Arlington	<ul style="list-style-type: none"> • All buildings contribute to green fund.
District of Columbia	<ul style="list-style-type: none"> • Private commercial buildings over 50,000 square feet must achieve LEED NC

Green - Codes and Standards

Energy/Green Codes are being “ratcheted up” at the same time as green building mandates

- Significant interest in ASHRAE 189.1 as the base green building standard.
- DC Green Building Council has recommended implementing the energy section of ASHRAE 189.1 before the final consensus based standard is finalized.
- Advanced commercial and residential codes and standards becoming available. (30% improvement).

LEED EB - Platinum Certified Buildings

- ❑ Adobe Systems Tower Complex, San Jose, CA
- ❑ SMUD Consumer Service Center, Sacramento, CA
- ❑ California Department of Education Building, Sacramento, CA
- ❑ Armstrong World Industries Headquarters, Lancaster, PA
- ❑ William J. Clinton Presidential Center, Little Rock, AR
- ❑ Joe Serna California EPA Headquarters Building, Sacramento, CA
- ❑ **Discovery Communications Headquarters Building, Silver Spring, MD**

Electricity - kWh

	2004	2005	2006	2007
Jan	1,256,627	1,288,054	1,220,664	1,304,051
Feb	1,313,400	1,237,749	1,107,368	993,451
Mar	1,268,400	1,285,873	1,142,583	1,081,258
Apr	1,165,800	931,583	1,110,569	985,414
May	1,189,392	1,085,281	1,084,488	952,819
Jun	1,165,200	1,090,616	1,105,668	912,742
Jul	1,165,358	1,118,395	1,067,876	898,345
Aug	1,102,091	1,132,908	1,235,243	851,882
Sept	1,144,741	1,188,774	1,098,565	
Oct	1,144,080	1,143,317	1,060,689	
Nov	989,437	836,191	1,021,615	
Dec	1,112,998	1,167,856	1,023,997	
Annual	14,017,524	13,506,597	13,279,325	7,979,962

Water - Gallons

	2004	2005	2006	2007
Jan	437,000	375,000	514,000	472,000
Feb	485,000	604,000	477,000	496,000
Mar	476,000	420,000	456,000	507,000
Apr	525,000	482,000	677,000	528,000
May	795,000	815,000	849,000	707,000
Jun	1,036,000	1,228,000	818,000	1,187,000
Jul	847,000	835,000	884,000	1,235,000
Aug	1,203,000	1,239,000	1,360,000	741,000
Sept	1,037,000	1,158,000	1,228,000	
Oct	802,000	859,000	772,000	
Nov	694,000	504,000	651,000	
Dec	448,000	514,000	408,000	
Annual	8,785,000	9,033,000	9,094,000	5,873,000

Program Results

The primary results from the implementation of the program are:

- Reduce Energy Consumption
- Reduce Energy Costs by Avoiding ongoing prices increases
- Provide Long-term energy cost forecasts for budget stability
- Improve building system operating performance
- Invest in building system retrofit projects that will reduce consumption and costs and new technology advances come to the marketplace
- Reduce environmental impacts to control costs and limit liability
- Maintain a safe and healthy workplace

What will the situation look like in 2020?

- ❑ Developing countries will demand 35% of the world's production
- ❑ Significant demand will be placed on the combined US/Europe consumption rate
- ❑ The impact will increase prices by 30% and reduce supply by 15% (DOE Report)
- ❑ Production in the U.S. will continue to be hampered by the lack of refining capacity
- ❑ Exploration will increase as a result of the energy legislation and add 3%
- ❑ Conservation will provide relief in the short term, 10% to 12% estimated (Need 20%)
- ❑ Technical advances are required

Challenge

- ❑ With the decline of oil in 40 to 50 years
 - ❑ Major changes in our life style will occur
 - ❑ The next generation – the students will be faced with solving these problems by 2020 for our
 - Homes
 - Businesses
 - Transportation Systems
-

Top 10 List

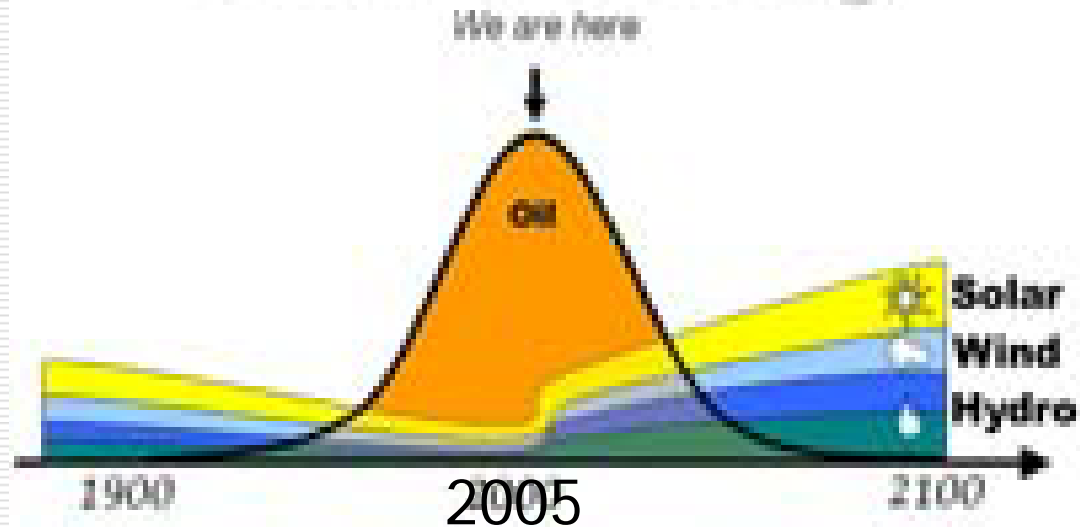
- Focus on the major energy uses
- Schedule equipment startups
- Air flow is important
- Do not heat when you cool or cool when you heat
- Lighting can be controlled

Top Ten List

- Control Systems Work**
- Green is not a fad**
- Get everyone involved**
- Keep it clean**
- Turn it off**

Hubbert's Peak

Get ready



www.oilcrisis.com