

Energy Efficiency for Municipalities



PRESENTED BY:

Paul Spiegel, P.E., LEED AP

Practical Energy Solutions



A five year old energy consulting company focused on energy assessments, strategic planning, and conservation & efficiency programs to assist in meeting short and long term energy goals

- Energy audits/assessments
- Financial and technical evaluation of capital projects
- Energy education & awareness programs
- Building operational review and conservation strategies
- Feasibility studies
- Carbon footprint analysis
- Green Building certifications
- Grant writing and implementation
- Measurement and verification of savings from energy upgrades and initiatives

Practical Energy Client List

Municipal Clients:

City of Philadelphia
Chester County
Borough of West Chester
Media Borough
Delaware County
Tredyffrin Township
Plymouth Township
City of Coatesville

Institutional Clients:

West Chester Area School District
Chester County Intermediate Unit
Westtown School
Downingtown Area School District
The Hill School
Overbrook School for the Blind
Arthur Ashe Youth Tennis Center
William Penn School District
Devereux Foundation/School
People's Light & Theater Company
Upper Merion Area School District
Pottsgrove School District

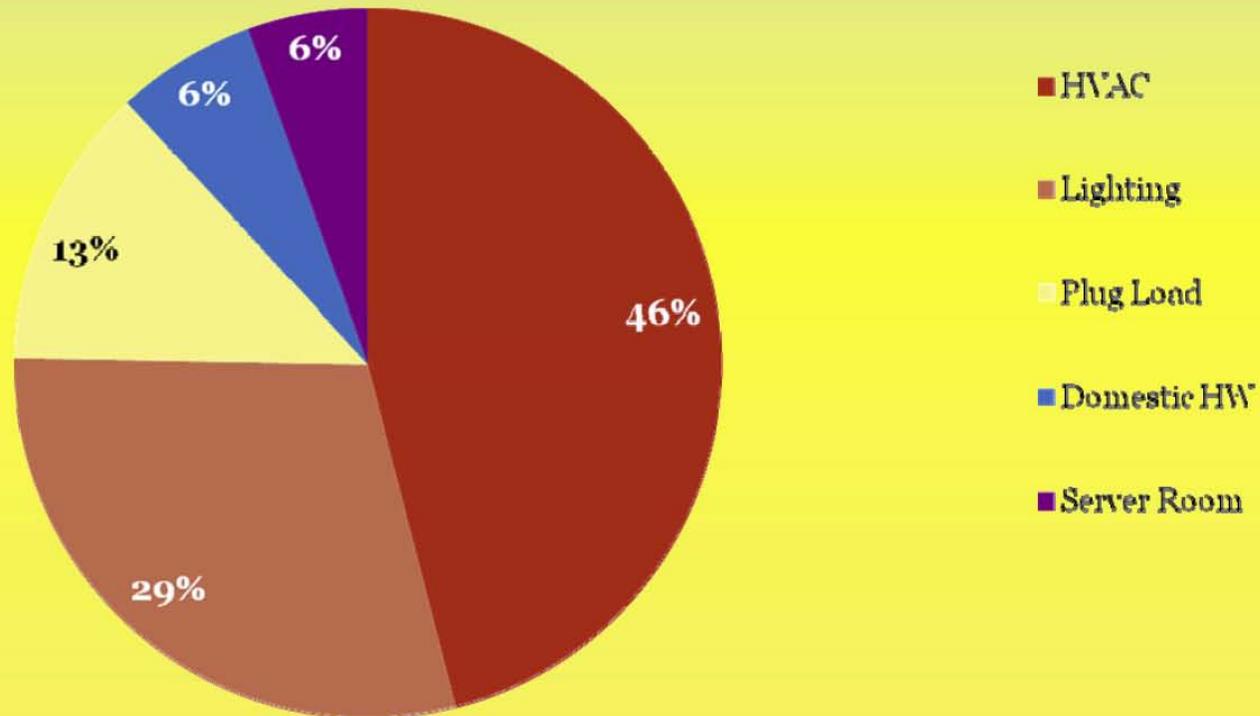
Commercial/Industrial Clients:

Vertex, Inc.
Ballard Spahr
Accu-Weld
Bentley Systems
Sikorsky Helicopter
Chester County Economic Development Council
ING Insurance
Devault Foods

Typical Office Building Energy Use



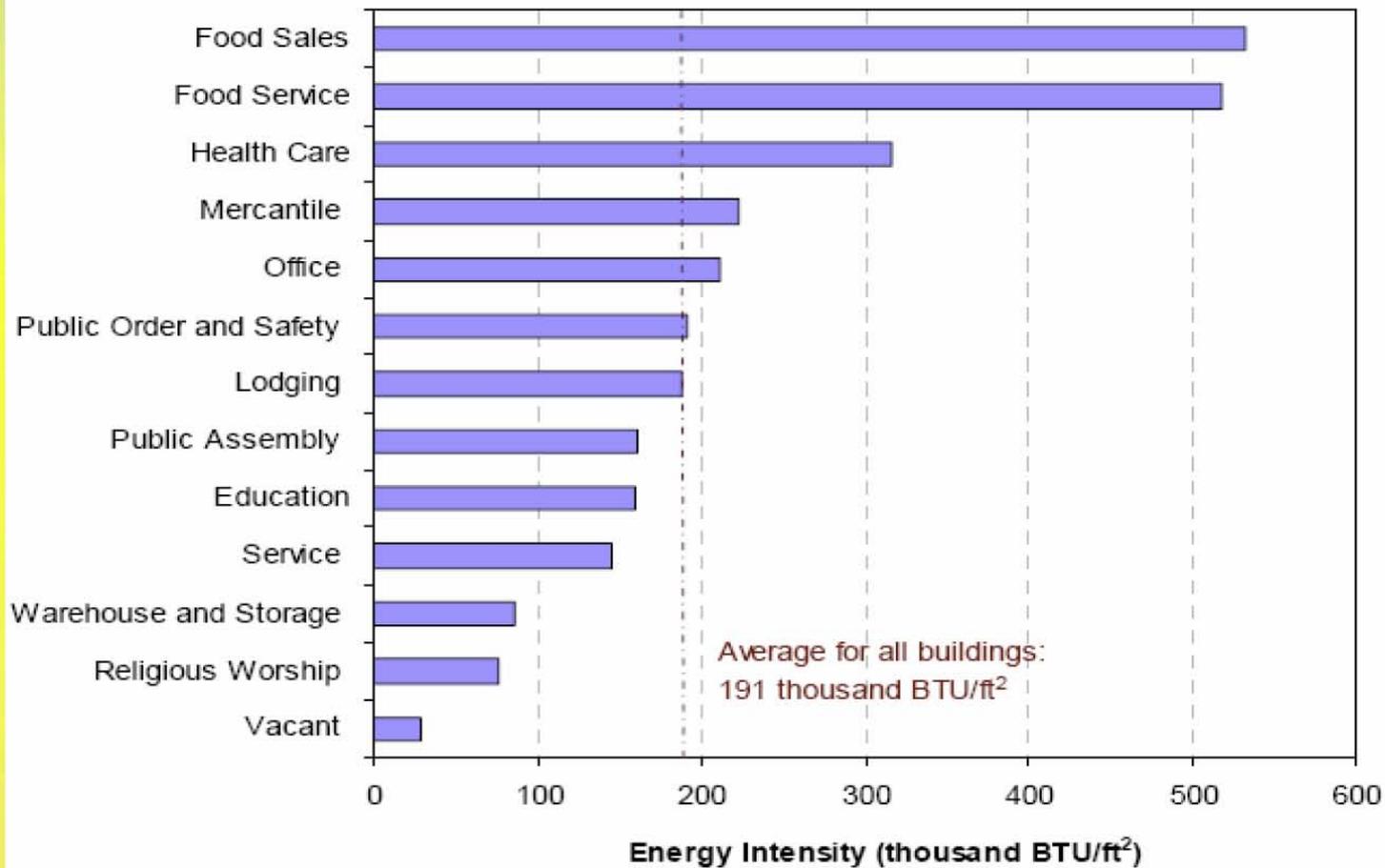
Building Energy Usage



Commercial Building Energy Use



Primary Energy Intensity for U.S. Commercial Buildings (2003)²



- **Chester County Municipal Energy Audit Program**
 - Energy audits for all municipalities that applied
 - ✦ Admin Buildings
 - ✦ Police Stations
 - ✦ Sewage Treatment Plants
 - ✦ Pump Stations
 - ✦ Firehouses
 - ✦ Libraries
 - ✦ Public Works Garages
 - Provide recommendations for operations (plug load and system management) and capital upgrades

Preliminary Results/DOE Rpt



**Chester County Municipal Energy Audit Program
Summary Total Audits and
Annual Energy Savings
Through December 31, 2010**

Completed Building Audits (All Audits Since Inception)			
Totals Since Inception	Quantity		8
Total Audited Floor Space (sf)	Square Footage	86,150	
Unit Type (#)	Food Service	0	
	Food Sales	0	
	Mercantile (non mall)	0	
	Mercantile (enclosed, strip malls)	0	
	Warehouse and Storage	0	
	Office	0	
	Public Assembly	0	
	Religious Worship	0	
	Public Order and Safety	8	
	Service	0	
	Education	0	
	Health Care (Inpatient)	0	
	Health Care (Outpatient)	0	
	Manufacturer	0	
	Lodging	0	
	Other (Industrial, Agricultural, Other)	0	
	Vacant	0	
Projection of Energy Savings by Source	Electricity (kWh)	283,195	
	Natural Gas (DTH)	126	
	Heating Oil, #2 (gallons)	594	
	Heating Oil, #6 (gallons)	-	
	Propane (gallons)	-	
	District Steam (mmBTU or klbs)	-	
	Waste Oil (gallons)	-	
Projection of Energy Savings - Total	Total (mmBtu)	1,175	
Projection of CO2 Savings (pounds)	CO2	384,946	
Projection of Criteria Pollutant Savings (pounds)	SOx	2,769	
	NOx	537	
	PM - Total	52.9	
	CO	246	
	Lead	0.0394	
Projection of Energy Cost Savings	Total Maximum Cost Savings	\$ 46,387	

- **Delaware County Energy and Environmental Plan and Action Strategy**
 - **Assessment and Strategy for County Operations**
 - ✦ Compile existing data
 - ✦ Operational strategies & policies
 - ✦ Capital upgrades
 - ✦ Fleet management
 - ✦ Awareness program
 - **Assessment and Strategy for Municipalities**
 - ✦ Sample Community Data Review
 - ✦ Model ordinances
 - ✦ Energy Strategies and policies

- **Delaware County Energy Efficiency Grant Program**
 - **Prescriptive Program**
 - ✦ Tailored after PECO Smart Ideas program
 - ✦ Rebates/grants for energy related projects
 - ✦ Higher efficiency elements receive highest rebates
 - **Custom program**
 - ✦ Custom rebate applications will be reviewed on a case by case basis

- **City of Philadelphia**
 - **Greenworks Small Business Efficiency Grant Program**
 - ✦ For businesses and institutions in Philadelphia
 - ✦ Up to 50% of project costs
 - ✦ Maximum \$10,000 rebate
 - **Greenworks Energy Efficiency Loan Program**
 - ✦ For businesses and institutions in Philadelphia
 - ✦ Loans of \$100,000 - \$2.5 million
 - **EnergyWorks Energy Efficiency Loan Program**
 - ✦ For municipalities, businesses, and institutions in the 5-County metro area (Bucks, Chester, Delaware, Montgomery Counties, and City of Philadelphia)
 - ✦ Also a residential component being managed by ECA

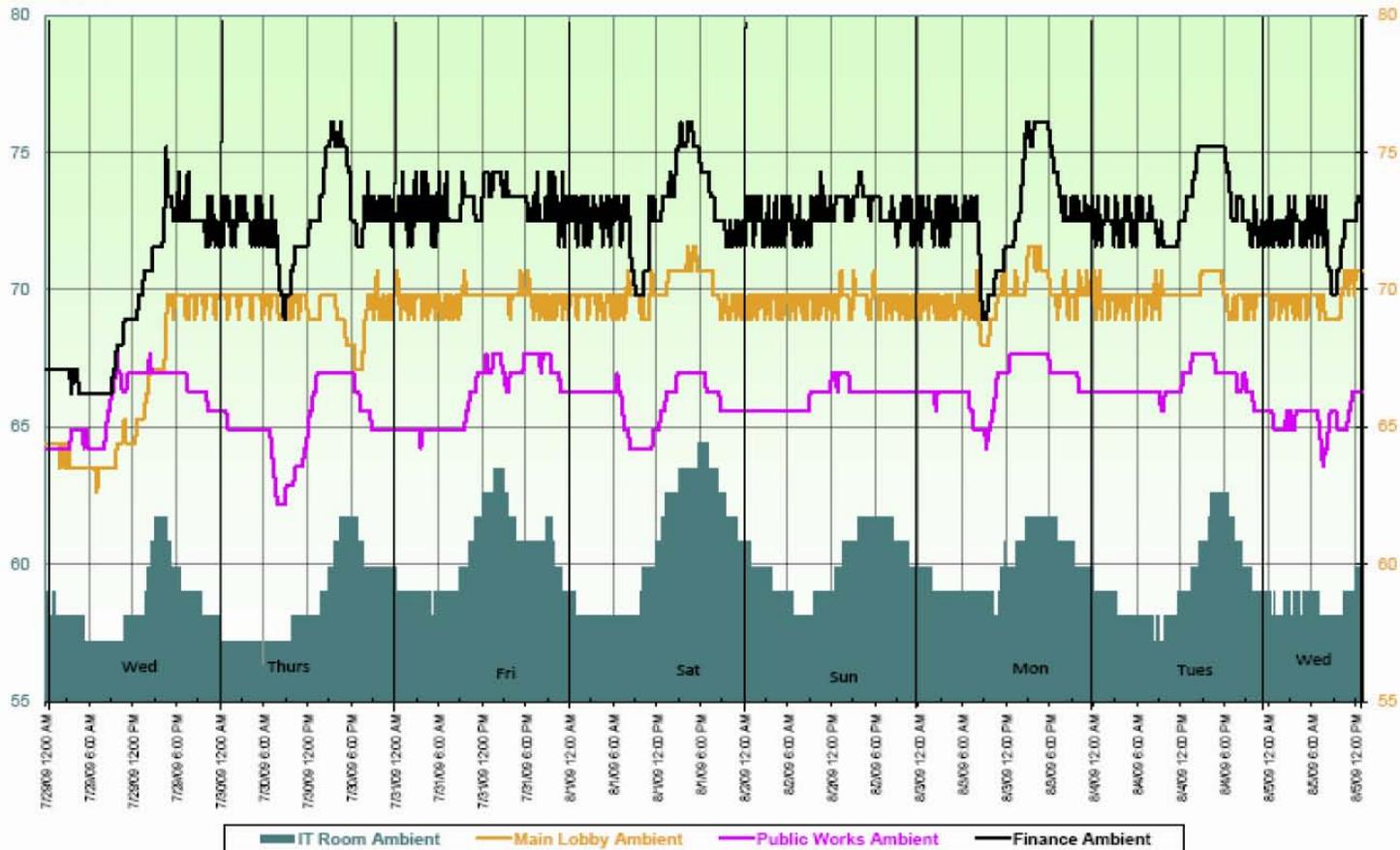
Starting an Energy Initiative

- **First step – baseline assessment (benchmark & goals)**
- **Second – implement conservation strategies, and operational and policy-driven best practices**
- **Next - implement efficiency upgrades**
- **Look at renewable energy projects**
- **Track your energy consumption and report your reductions!**

- **Conservation**
 - Education of Occupants
 - ✦ In-person training and motivational programs
 - Education of maintenance staff
 - Management of systems – Controls (lighting, HVAC)

- **Efficiency**
 - Renovation of building envelope – Windows, Insulation, Roofing
 - Replacement of systems – Lighting, HVAC, Hot Water, etc.

Case Studies – Controls



Primary Capital Investments



- **Lighting**
- **Building Envelope**
- **Office Equipment Upgrades**
- **Heating and Air Conditioning**

Lighting



- Lighting retrofits can be the most cost-effective capital improvement with the shortest payback period – usually 5 years or less.
- Primary ways to save: reduce amount of energy used when lights are on, and reduce the amount of time lights are on
- Occupancy sensors are perfect for common areas that include restrooms, conference rooms, and supply and copier areas

Type of Space	Range of energy savings from sensors (%)
Private office	13 - 50
Open-plan office	20 - 28
Classroom	40 - 46
Conference room	22 - 65
Corridors	30 - 80
Storage areas, closets	45 - 80

Building Envelope



- **Insulation: walls, floor, and ceiling or roof**
 - Heat moves through each of these elements, into the building in the summer and out of it in the winter.
- **Weatherstripping**
- **Gaps in interfaces between different materials**
- **Window replacements, window films**
- **May allow you to reduce capacity of HVAC**

Heating and Air Conditioning



- HVAC (heating, ventilating, and air-conditioning) accounts for 40% to 60% of the energy used in U.S. commercial buildings
- Duct sealing and insulating: 10 to 20 percent of the air from an HVAC supply fan may be wasted through leaks in commercial buildings – conditioning space above drop ceilings
- Proper sizing and set up (lighting, building envelope affect this)

Challenges and Barriers

- Capital vs. operating budgets
- First cost vs. life cycle cost
- Lack of buyer/owner experience related to energy or environmental issues
- Lack of information about building energy use and costs
- Financial – how to pay for it (EnergyWorks, PECO SmartIdeas, EECBG funding)

Why Participate in an Energy Initiative?



- It saves the organization money
- It reduces the environmental impact of operations
- It conserves irreplaceable energy producing resources
- It can show leadership in environmental awareness and action

Steps to Reducing Energy Use



- **Baseline assessment by independent entity**
 - Analysis of energy bills, energy using systems, and building envelope
- **Examine operations for conservation opportunities, educate staff**
- **Equipment & Retrofits**
 - If financial resources are limited, look at fastest payback investments first, and use savings for additional projects
 - Establish budget for your energy initiative, and then set acceptable payback parameters
- **Measure and Report Results**
 - Track your energy savings in financial and environmental terms to generate support for current and future initiatives

For More Information:



Paul D. Spiegel, P.E., LEED AP
President

Practical Energy Solutions

770 E. Market Street, Suite 250

West Chester, PA 19382

Phone: 610-430-1382

pspiegel@practicalenergy.net