energy tips
FOR INSTITUTIONS
Institutions and non-profits have the best track record for incorporating green technologies into their facilities. They usually have more concern for maintenance and image issues than just the initial upfront costs. They often have the advantage of being able to consider the total spectrum of technologies when planning for their energy needs. In addition to the numerous conservation and efficiency measures, institutions can often tap into the complete range of energy measures including:

- Cogeneration
- Micro Turbines
- Fuel Cells
- Biofuels
- Green Roofs
- Geothermal
- Photovoltaics
- Wind
- Hydro

GRW Environmental Conservation Center - Architects, Primary Group with Steven Winter & Associates  massaudubon.org

RESOURCES

Building America  
www.eere.energy.gov  
www.newbuildings.org  
www.buildinggreen.com

Green Guide for Health Care  
www.gghc.org

Geothermal Consortium  
www.geoexchange.org

SBIC Sustainable Buildings Industry Council  
www.sbicouncil.org

National Technical Information Service  
www.ntis.gov.

Center for Renewable Energy & Sustainable Technologies-  
www.crest.org

Facilities Manager Magazine

Photovoltaic Modules with a Heliotronics Data Monitoring System installed at Worcester Polytechnic Institute.

Medical Area Total Energy Plant located in the Longwood Medical Area serves steam, chilled water, and electricity to 9 million sq feet of LMA facilities.
Some noteworthy institutional and non-profit building

UNIVERSITIES
- Harvard University - PVs, Geothermal, 50 LEED certified projects
- Worcester Institute of Technology - PVs
- Northeastern - Curry Student Ctr. - PVs
- Tufts Sophia Gordon Hall Dorms - Solar HW & PVs

HOSPITALS
- Longwood Hospitals, Boston - Cogeneration
- Bay State Health Center, Springfield - LEED Silver CDQ dehumidification system

NON-PROFITS
- Artists for Humanity, S. Boston - PVs, Natural light
- Doyle Conservation Center, Leominster - PVs, Geothermal wells, Efficient windows
- Audubon Nature Center, Mattapan - Geothermal heat pumps, PVs
- Gilman Ordway Bldg at the Woods Hole Research Ctr, Falmouth - PVs, Geothermal
- MATCH Charter High School, Boston - PVs, Efficient lighting & Windows
- Lowell Quilt Museum - Geothermal system

Grants

COMMONWEALTH SOLAR
$.45/K DC to $2250 for solar PVs

NATIONAL GRID - Gas & Electric Retrofit,
HVAC, Hot water, Equipment, etc.
Custom Retrofit 50% to $10K
Direct Install - 70%, Lighting & Controls.
New Construction - 70%, Electric; 50%, Gas.
masssave.com
Cogen - $750/kWh 781-907-2196
Special issues and concerns arise when trying to retrofit an older historic building to meet today’s power and energy requirements.

Although upgrading appliances, lighting, and heating systems is often readily accomplished, tightening the building envelope, providing circulation for the HVAC systems, and other processes can create many challenges. Often historically significant structural and mechanical components do not meet today’s standards and/or codes.

Older sturdy masonry buildings do provide a lot of thermal mass which can even out loads in the summer, but in the winter their position on the skin of the building can often just accelerate the rate of conductance of heat to the outside of the building.

The sometimes tall windows provided lots of natural daylight, but the single panes hemorrhage BTUs to the outside of the building.

Often the architect will specify the necessary insulation on the interior of the building to maintain the integrity of the building envelope.

Many window manufacturers now offer energy efficient windows in historical styles.

By exploring innovative alternatives, it is possible to upgrade these valuable resources to meet today’s stringent energy requirements.

**SOME APPROPRIATE TECHNOLOGIES**

- Insulation: blown in cellulose insulation
- Sealing air leaks, controlling moisture
- Energy efficient windows/interior storms
- High efficiency boilers
- Geothermal heat pump
- Perimeter indirect florescents
- Rooftop photovoltaics
The greening of some historic buildings

Trinity Church, Boston - Geothermal heat pumps
Anwelt Manufacturing Complex, Fitchburg - Huge array of photovoltaics and geothermal heat pumps. Mixed income apartments, charter school, and office space
Cambridge City Hall Annex (Leed gold) - PVs, Geothermal heat pump, Efficient lighting
Lawrence Community Works (Leed gold)- Energy efficiency & PVs
Chase Mill, Burlington, VT - Efficient heating & cooling, Fans, Pumps, & Lighting
Monarch Mills, Lawrence, MA- Geothermal
Whitin Mill Redevelopment, Whitinsville - Mechanical systems, Envelope & Hydro power

PVs on trellis structures at Fitchburg Mill’s Anwelt Heritage Apartments power its geothermal pumps.
mass.innovation.com

LIST of RESOURCES & INFORMATION

Massachusetts Historical Commission www.sec.state.ma.us/mhc
Energy Efficient Rehab Advisor http://rehabadvisor.pathnet.org/
Whole Building Design Guide www.wbdg.org
Assoc.for Preservation Technology NEast www.aptno.org
National Trust for Historic Preservation www.nthp.org
Lowell Historic Board www.historiclowell.net

Grants, Rebates, Credits

COMMONWEALTH SOLAR - to $.85 K DC to $4250; 25%, Solar hot water.
MASSACHUSETTS HISTORIC COMMISSION-Mass.Preservation Projects Fund Round 19
FEDERAL, STATE, UTILITIES funding
See specific land use category
Government entities and agencies have a lot of control and options of how they can impact energy use in their district. Many agencies within the Federal Government have energy related policies, including the Army, Navy, and Air Force, GSA, State Dept, and the Dept of the Interior, together with DOE & EPA. Many require LEED certification for any new facilities constructed for them.

Municipalities can require ENERGY STAR or LEED in their own buildings and many encourage the private sector to do the same.

Boston provides grants to new projects for green feasibility studies, and implemented one of the first green building codes.

Lowell entered into a EPC (Energy Performance Contract) with Ameresco for $20 million of energy retrofits on 50 of its buildings. An energy service company (ECSO) funds the capital expense of energy efficiency improvements and then makes its profits in the energy savings achieved over a specific period of time.

The Metropolitan Area Planning Council selected Ameresco as the regional Energy Services Company. Now 14 cities are signing contracts to upgrade their municipal facilities.

RESOURCES & CONTACTS

US Department of Energy - doe.gov
Energy Efficiency & Renewable Energy eere.energy.gov
Energy Information Admins. - eia.gov
energycodes.gov
energsavers.gov
Mass Office of Energy Resources - DOER
Mass Energy & Environmental Affairs - “Clean Energy & Climate Plan for 2020”

Green Communities Act 2007 - www.greencommunities.com
Municipal Climate Action Plan www.massclimateaction.org
Mass, Municipal Assoc. www.mma.org

About 40 states have energy sections in their building codes and almost 20 require LEED certification in all new State buildings. Many have additional regulations that affect utility companies operating within their region. Some buy green energy. Many offer grants and/or tax credits to residents & businesses for alternative energy installation.

The Lowell Justice Center is aiming to be energy neutral
Government and Public Buildings

FEDERAL GOVERNMENT
- EPA Headquarters, Chelmsford - PVs, Lighting, Geothermal
- GSA rehab of McCormick PO/Courthouse with a Green roof, PVs, daylight use, etc.
- National Parks - 700 PV installations

STATE GOVERNMENT
- DCAM’s Justice Centers in Worcester & Fall River
- Mt. Wachusett Community College - Biomass heat & power, PVs & Wind
- UMass Amherst - PVs, Cogeneration
- Worcester Medical Center - Cogeneration

MUNICIPAL FACILITIES
- Boston - LED street lights
- Cambridge City Hall Annex - PVs, geothermal
- Franklin Regional Transit Center - Net zero.
- North Adams Library - Geothermal, PVs

PUBLIC SCHOOLS
- Cambridge Rindge & Latin School - PVs, Wind.
- Carlton Elem School, Salem - PVs, Wind
- Capuano Early Childhood Center, Somerville - PVs, Skylights, Wind turbine
- Whitman-Hanson Regional High School - PVs, Efficient condensing boilers, Exterior insulation.

Grants & Incentives

COMMONWEALTH SOLAR
$.45/W/DC to $2250 for PVs, 25% for solar thermal.

NATIONAL GRID offers free audits and efficiency incentives.

Worcester Smart Grid: a network for electricity transmission and distribution that uses 2 way communications, advanced sensors, & specialized computers to improve the efficiency, reliability, & safety of electricity delivery & use.
It can be very confusing and difficult for the average layman to invest in alternative energy. The easiest way to start is with one of the clean energy mutual funds.

Four funds that offer a diversified “green” portfolio are:

- **PBW** Power Shares Wilder Hill Clean Energy
- **WGGFX** Winslow Green Growth Funds
- **NALFX** New Alternatives Fund
- **GAAEX** Guinness Atkinson Alternative Energy Fund

The Massachusetts Green Energy Fund invests in Massachusetts energy companies. Their portfolio includes:

- KONARKA - Lowell, thin film PVs
- PROTONEX - Southborough, Fuel Cells &
- LILLIPUTIAN SYSTEMS - Woburn, Fuel Cells

Some active companies located in Lowell include:

- KONARKA - A UML spinoff located in the Boott Mill who have a “Power Plastic” patent and specialize in thin film photovoltaics.

- METABOLIX - Bioplastics; biobased chemicals; crop based technology

Some of the more notable companies located in Massachusetts include:

- **Photovoltaics**
  - Stellaris - Andover
  - Spire - Bedford
  - SPIR

- **Fuel Cells**
  - Nuvera - Billerica
  - Protonex - Southborough
  - Lilliputian - Woburn
  - Ztek - Woburn

- **Wind & Hydro**
  - Solectria Renewables - Lawrence
  - Louis Berger - Boston

- **Batteries**
  - Schaefer, Inc. - Woburn
  - Battery & Capacitor Technology Co. - Worcester

- **Inverters**
  - Schaefer - Hopkinton
  - RWE Schott Solar Inc. - Billerica
  - Solectria Renewables - Lawrence

- **Cogeneration**
  - Ze-gen - Attleboro

**NOTE:**
MTC provides an extra allowance for utilizing products made in Massachusetts