

# Green Building Workshop Series Eco-City Alexandria Initiative



## Workshop 9: Greening Your Congregation

September 23, 2012

2:00 pm – 5:00 pm

Grace Episcopal Church

Alexandria, Virginia

# Welcome

Erica Bannerman, Senior Environmental Specialist, Transportation & Environmental Services, Office of Environmental Quality, City of Alexandria

# Eco-City Alexandria

## **Eco-City Charter Principles**

- Land Use and Open Space
  - Water Resources
    - Air Quality
  - Transportation
    - Energy
  - Building Green
    - Solid Waste
  - Environmental Health
- Emerging Threats & Climate Change
  - Implementation

## **Environmental Action Plan**

# Energy Efficiency and Conservation Block Grant Projects

Energy Conservation (Green Building Phase II)

Energy Audits and Energy Efficiency  
Retrofits for City Buildings

Green Fleet

Green Jobs Training

Green Loans

LED Traffic Signals/LED Street Lights

Renewable Energy Installation at City Facility

# Workshop Overview

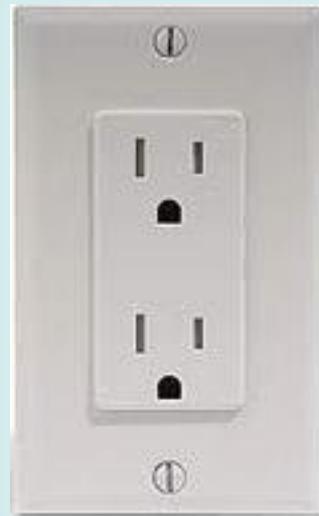
1. Background of Eco-City Alexandria and Green Building Workshop Series
2. Introduction of Speakers
3. Tools for greening your congregations
4. Examples from Alexandria and Northern VA



MD • DC • NOVA

**INTERFAITH**  
*Power*  
**& Light**

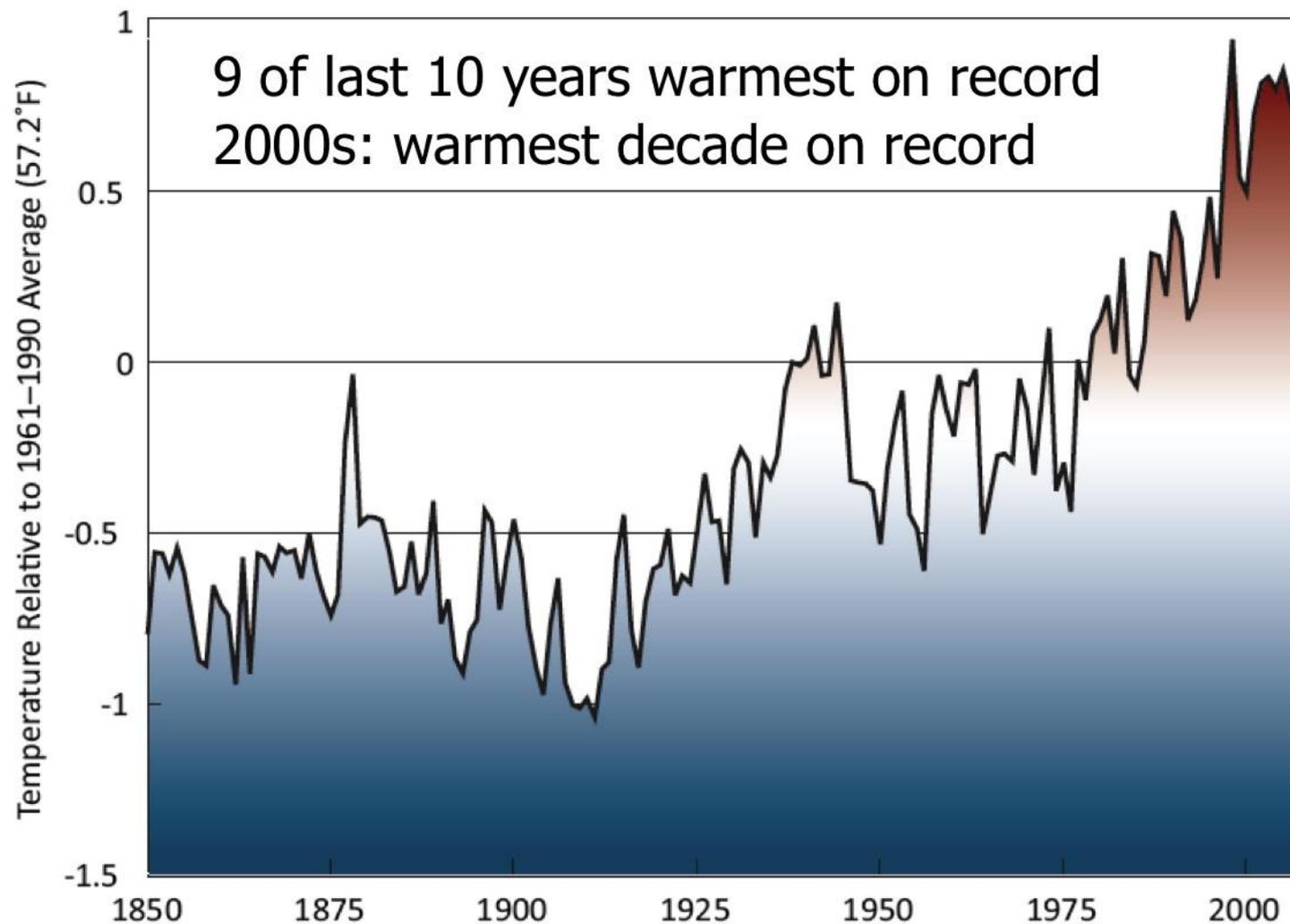
Our religious response to climate change.











*What if ...*





1. Learn.
2. Go green.
3. Speak out.



## 2. Go green.

Energy efficiency

Renewable energy

Food

Transportation

Grounds

Paper & Office Supplies

Banks/Financial

Clothing



Waste reduction

Role in community

Role in members' practices

# 2. Go green.

Energy efficiency

Renewable energy

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Clothing

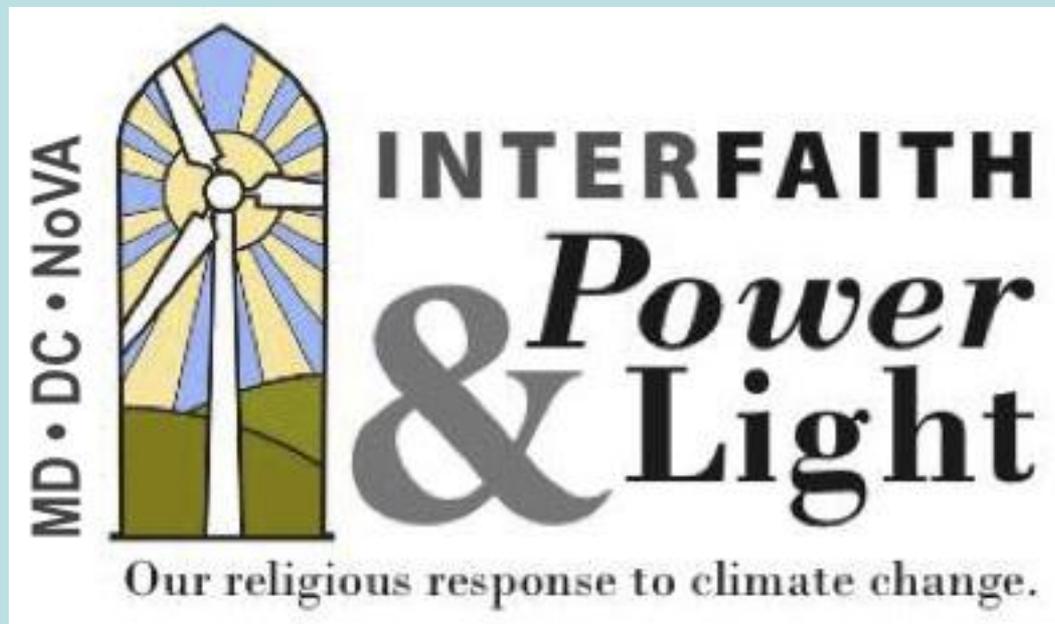
Waste reduction

Role in community

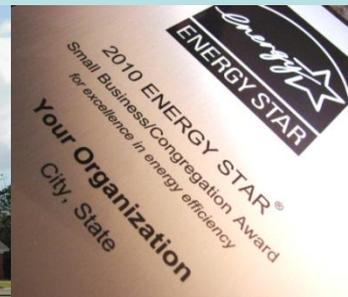
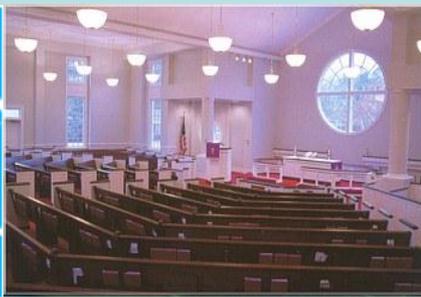
Role in members' practices



Green congregation guides & certifications



[www.GWIPL.org](http://www.GWIPL.org)



# ENERGY STAR<sup>®</sup> Congregations

**Greening your Congregation  
September 23, 2012**

**Sierra Stoney (contractor)  
ENERGY STAR Congregations**

# ENERGY STAR® is...



**Helps  
organizations  
save money  
and protect  
the  
environment**

**Voluntary  
climate  
protection  
partnership  
with EPA**



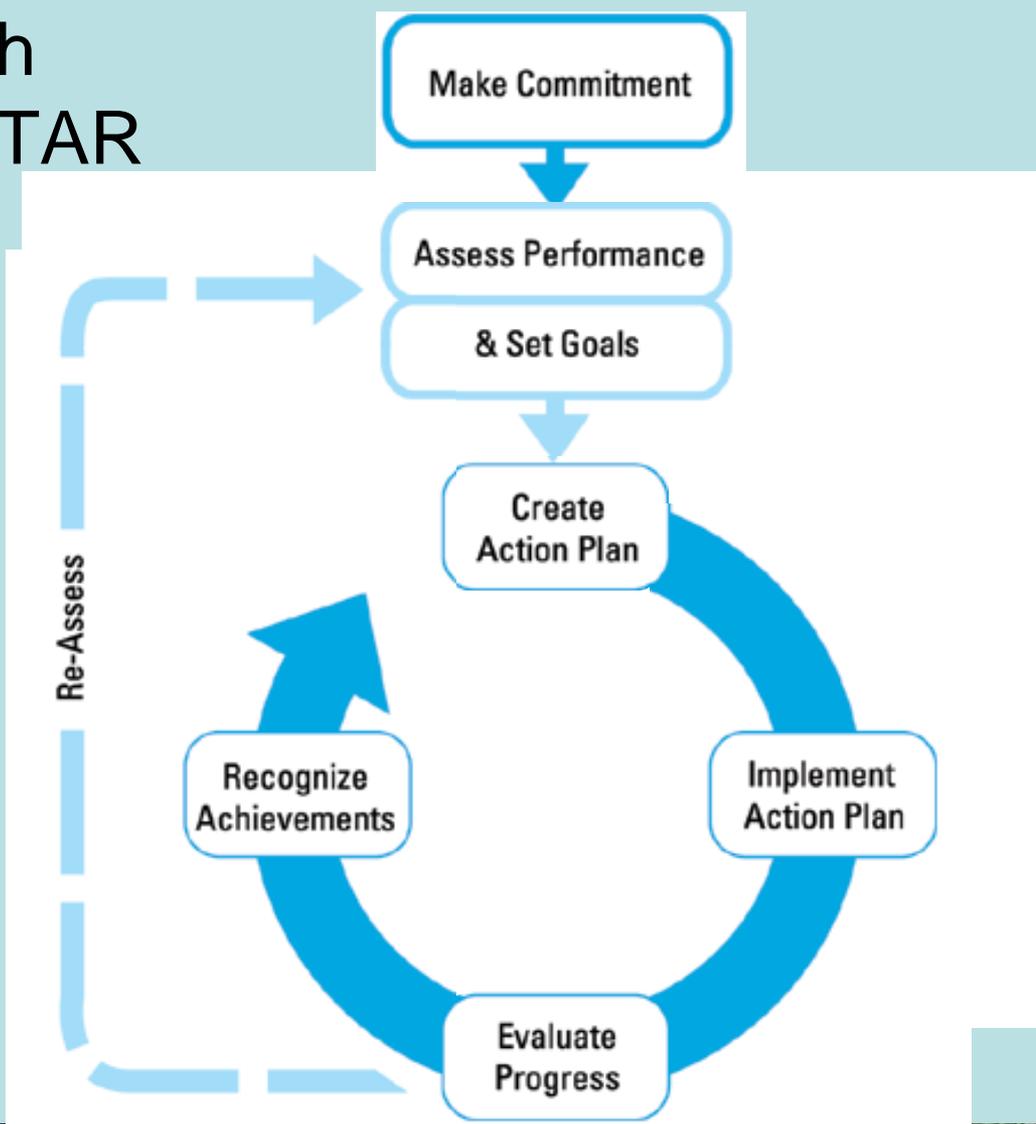
**Strategic  
approach to  
energy  
management**

**Brand  
recognized by  
over 80% of  
American  
households**

## Why Leverage the ENERGY STAR More?

- *Unbiased*: Trusted source of research and technical analysis
- *Best Practices*: Develops, collects, and highlights industry best practices for building owners/managers
- *Carbon Mitigation*: Manage environmental impact
- *Free Market Tools and Resources*: Verify and easily communicate environmental and financial benefits

# Working with ENERGY STAR



# Benchmark & Track Energy Use



- **Portfolio Manager**
  - Free, online, password protected
  - Track energy/water use on multiple meters - track dollar savings
  - Weather-normalized source energy
  - Report summarizes CO<sub>2</sub> emissions
  - Set energy performance target
- **Initial benchmarking**
  - Data collection - up to 1-2 hours
  - Data input - 15-30 minutes
  - Monthly updates - 5 to 15 minutes

[www.energystar.gov/benchmark](http://www.energystar.gov/benchmark)



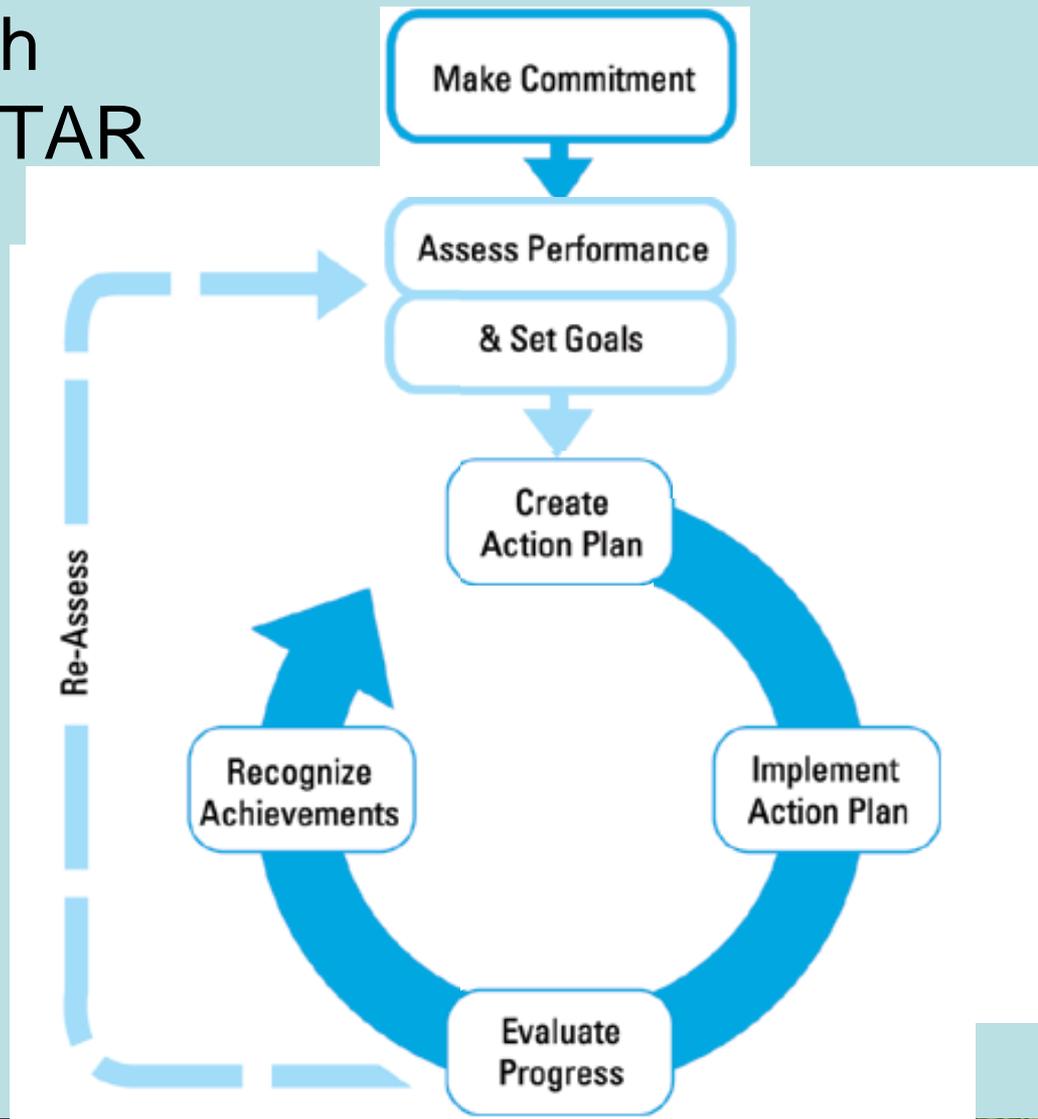
# Determine your Energy Goals with Target Finder



Target Energy Performance Results (estimated)			
Energy	Design	Target	Average Building
<u>Energy Performance Rating (1-100)</u>	40	75	50
<u>Energy Reduction (%)</u>	N/A	27	0
<u>Source Energy Use Intensity (kBtu/Sq. Ft./yr)</u>	117	76	105
<u>Site Energy Use Intensity (kBtu/Sq. Ft./yr)</u>	96	62	86
<u>Total Annual Source Energy (kBtu)</u>	1,315,705	854,298	1,175,464
<u>Total Annual Site Energy (kBtu)</u>	1,078,726	700,426	963,744
<u>Total Annual Energy Cost (\$)</u>	\$ 12,435	\$ 8,074	\$ 11,109
<b>Pollution Emissions</b>			
<u>CO2-eq Emissions (metric tons/year)</u>	70	45	63
<u>CO2-eq Emissions Reduction (%)</u>	-12%	27%	0%

[www.energystar.gov/targetfinder](http://www.energystar.gov/targetfinder)

# Working with ENERGY STAR



# Online Resources Designed for Congregations



**ENERGY STAR for Congregations** En Español

Most congregations can cut energy costs by up to 30% by investing strategically in efficient equipment, facility upgrades and maintenance. With free, unbiased information and technical support from ENERGY STAR, your congregation can more easily improve stewardship of your budget's energy dollars, and of the earth by reducing energy waste and energy costs, while protecting the environment.

**What You Get**

- Free, accurate, unbiased information
- Technical support through our [Email a Technical Question](#) service and [Technical Resources](#)
- ["How-to" guide](#) for analyzing and upgrading your facility
- An even more detailed guide, the [Building Upgrade Manual](#) is available
- Energy equipment and service contractors and utilities
- Information about ENERGY STAR labeled products
- National and local recognition
- [Public relations materials](#) to promote your efforts
- [Marketing Resources](#)

**What You Can Do**

- [Prepare an Energy Strategy for the Future](#)
- [Join ENERGY STAR for Congregations](#)
- Download the no-cost ENERGY STAR for Congregations Guide: [Putting Energy into Stewardship](#) (1.3MB) and use our [Technical Resources](#) to learn ways that your congregation can achieve energy efficiency
- [Benchmark your facility with Portfolio Manager](#); take advantage of [Licensed Professionals who have volunteered to work with Houses of Worship to Receive an ENERGY STAR Label](#)
- Download the [Portfolio Manager Quick Reference Guide for Worship Facilities](#) (907KB) and the [Portfolio Manager Data Collection Worksheet for Worship Facilities](#) (42KB) to assist you in benchmarking your facility.
- Get expert help for remodeling, upgrading or expanding your facilities from [Professional Engineers](#) or [Service &](#)

**News**

[2012 Congregations News Room](#)

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**Selected Resources**

[Putting Energy into Stewardship](#) (1.3MB)

[Energy Stewardship Action List](#)

[Stewardship Mini-Poster](#) (152KB)

[Purchasing & Procurement](#)

[Service Providers Directory](#)

[Challenge Toolkit](#)

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**Did You Know?**

If America's more than 370,000 houses of worship cut energy use by 10 percent...

- Nearly \$315 million would be saved for congregations' missions and other priorities.
- More than 1.8 billion kWh of electricity would be available without additional cost and pollution.

- **Energy Management Guidance**
- **Congregation Success Stories**
- **Outreach Materials**
- **Technical Support**

# Putting Energy into Stewardship: Congregations Guide

- Find energy savings opportunities in YOUR House of Worship

**Energy STAR**

Putting Energy into Stewardship  
**Congregations Guide**

**Guide for Congregations**

This Guide is designed to educate and assist the faith community in taking advantage of the benefits of energy efficiency. Your house of worship typically needs lighting, heating, air conditioning, power for office equipment, and other services to serve your mission and members' needs. This Guide can help you identify building equipment and systems that can be upgraded and maintained to save you money, as you prevent pollution.

*We call this energy optimization; you will just call it smarter stewardship.*

Get Started	▶
Sure Energy Savers	▶
Larger Opportunities	▶
Sanctuary/Worship Space	▶
Calculate Savings	▶
Green Your Congregation	▶

- **Choose affordable projects**
  - Sure Savers
  - Low cost/ No cost
  - Larger Investments
- **Prioritize projects**

# Research ENERGY STAR Qualified Products



The image shows a navigation menu for ENERGY STAR products. It features four main buttons: 'Find ENERGY STAR Products', 'How a Product Earns the Label', 'Save Energy at Home', and 'Join Our Movement'. Below these is a 'Features' section with a collage of images and a list of links: 'ENERGY STAR Products 20th Anniversary Retrospective', 'Learn about Tax Credits', 'Make A Change', 'Heating & Cooling Efficiently', and 'Programmable Thermostat Tool'. A text block at the bottom provides information about the 20th anniversary retrospective, including a link to download it and an option to order a hard copy.

**Find ENERGY STAR Products** ▶

**How a Product Earns the Label** ▶

**Save Energy at Home** ▶

**Join Our Movement** ▶

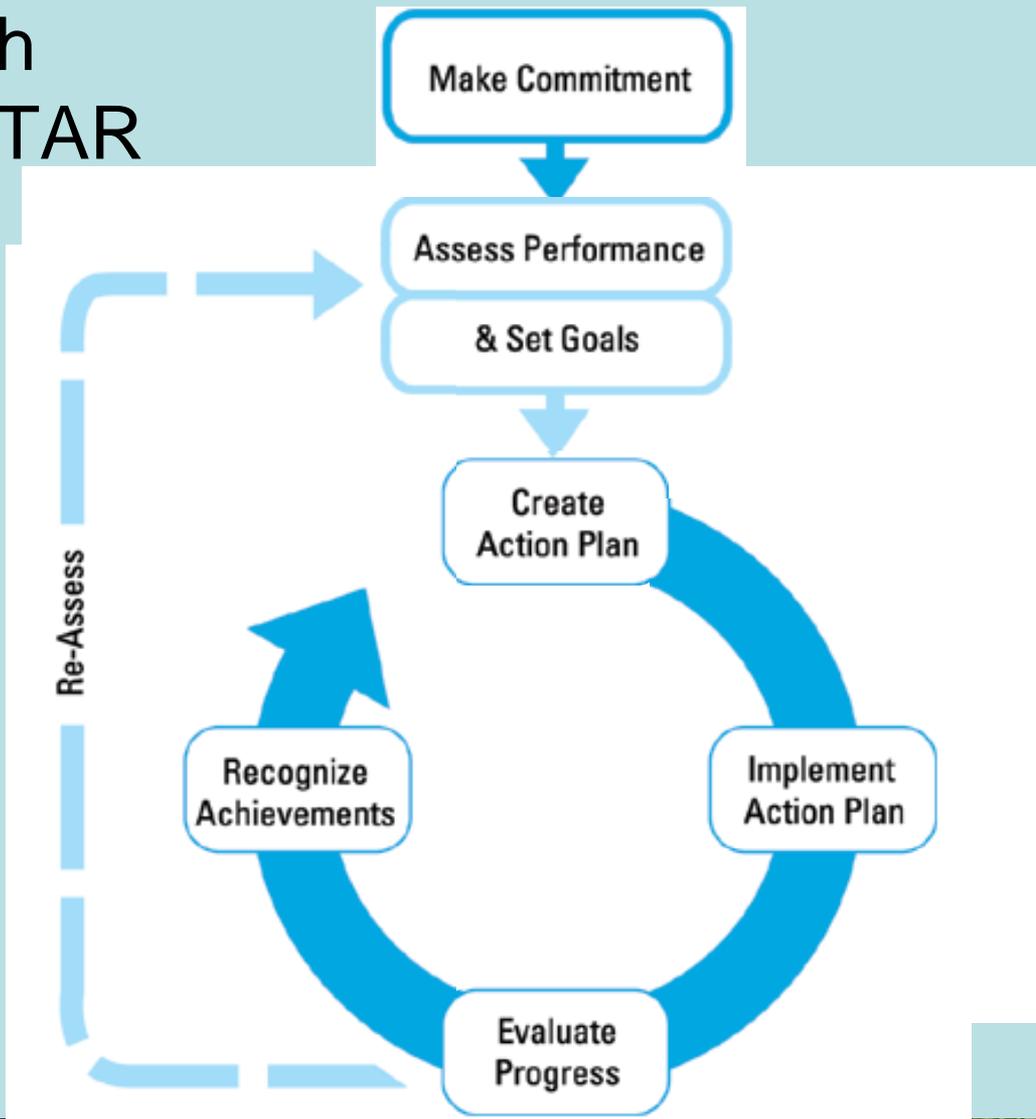
### Features

- ◀ ENERGY STAR Products 20th Anniversary Retrospective
- ◀ Learn about Tax Credits
- ◀ Make A Change
- ◀ Heating & Cooling Efficiently
- ◀ Programmable Thermostat Tool

**ENERGY STAR PRODUCTS**  
20 YEARS OF HELPING AMERICA SAVE ENERGY  
SAVE MONEY AND PROTECT THE ENVIRONMENT

For 20 years, ENERGY STAR products have helped Americans save energy, save money and reduce their carbon footprints. Explore this compelling retrospective on the powerful public-private partnership that built a globally recognized consumer brand and transformed the market for energy-efficient products. Download the [Retrospective](#) (3.1MB) or [order a hard copy](#).

# Working with ENERGY STAR



## Earn Recognition from ENERGY STAR

- **ENERGY STAR Congregations Success Stories**
  - Recognition for **IMPROVED** Energy Performance
- **ENERGY STAR Labeled Building**
  - Recognition for **SUPERIOR** Energy Performance



### Bring Your Green to Work with ENERGY STAR

Did you know that the energy used by a building to support just one office worker for a day causes more than twice as many greenhouse gas emissions as that worker's drive to and from work? Explore the tools on this page to learn how you can fight climate change while you're at work.

#### Start in Your Workplace



Join green guru Danny Seo behind the scenes, and learn what makes a building energy efficient.

**PLAY** →



Think you know how to go green at work? Take this quiz and find out!

**TAKE** →



Save energy and fight global warming

**EXPLORE** →



Tour a manufacturing plant —and find ways to save energy!

**TOUR** →

# Share Your Success

Show your congregants how they can save money and energy at home and at work

# Share Your Success

Teach young congregants how to be good energy stewards

Join the **LORAX**

And Help Protect the Environment!

Save water! And Save the Truffula Trees!  
Make sure the washing machine is full when you turn it on!

**GAMES**  
Be a Super Sleuth!

Color the Stars of the Lorax!

Find the Hidden Words!

The **LORAX**  **KIDS**  
BE AN ENERGY STAR!

TM & © Dr. Seuss Enterprises

# Thank You



[www.energystar.gov/congregations](http://www.energystar.gov/congregations)



## Mount Vernon Unitarian Church

1909 Windmill Lane

Alexandria, 22308

System operational August, 2011

## Been there, done that...



**For St. Mark's Lutheran  
Church in Springfield, a  
Miracle From Underground:  
A Geothermal System**

*By Emma Brown Washington  
Post Staff Writer Sunday,  
August 23, 2009*

# Been there, done that...

## Learning from Greater Washington's Leading Solar Congregations



*photo by Ragnar Thoresen*

Congregations with **installed solar photovoltaic electricity systems** as of July 17, 2011:

<b>14 kw</b>	St. Alban's Parish	<i>Cathedral Heights, DC</i>
<b>22 kw</b>	University Park Church of the Brethren	<i>University Park, MD</i>
<b>17 kw</b>	Lutheran Church of the Reformation	<i>Capitol Hill, DC</i>
<b>44 kw</b>	Adat Shalom Reconstructionist Congregation	<i>Bethesda, MD</i>
<b>10 kw</b>	Florida Avenue Baptist Church	<i>LeDroit Park, DC</i>

Congregations currently **under contract**:

<b>25 kw</b>	Mount Vernon Unitarian Church	<i>Alexandria, VA</i>
<b>17 kw</b>	Western Presbyterian Church	<i>Foggy Bottom, DC</i>

# Toward Net-Zero: MVUC's experience





# What is Net-Zero?

Electricity Used

Electricity Produced



# What is Net Metering?

**Net metering:** As defined in Sect. 1251 of the U.S. Energy Policy Act of 2005, “service to an electric consumer under which electric energy generated by that electric consumer from an eligible on-site generating facility and delivered to the local distribution facilities may be used to offset electric energy provided by the electric utility to the electric consumer during the applicable billing period.”

## Been there, done that...

- Energy audit
- Geothermal
- Solar
- Water

# Toward Net-Zero

Four ground-source heat pumps

- Two 6-ton units for the chapel
- Two 3-ton units for the rest
- Approx. 12,000 ft underground piping
- Approx. 30-40% less energy demand than conventional systems



# Geothermal Loop Options

## Horizontal



## Vertical



# Toward Net-Zero

## 110 Photovoltaic Panels

- Each rated at 235 W
- System rated at approx. 25kWh
- Largest array in Fairfax County\*



# Toward Net-Zero

Historical Generation



Historical Generation



## How did MVUC afford this system?

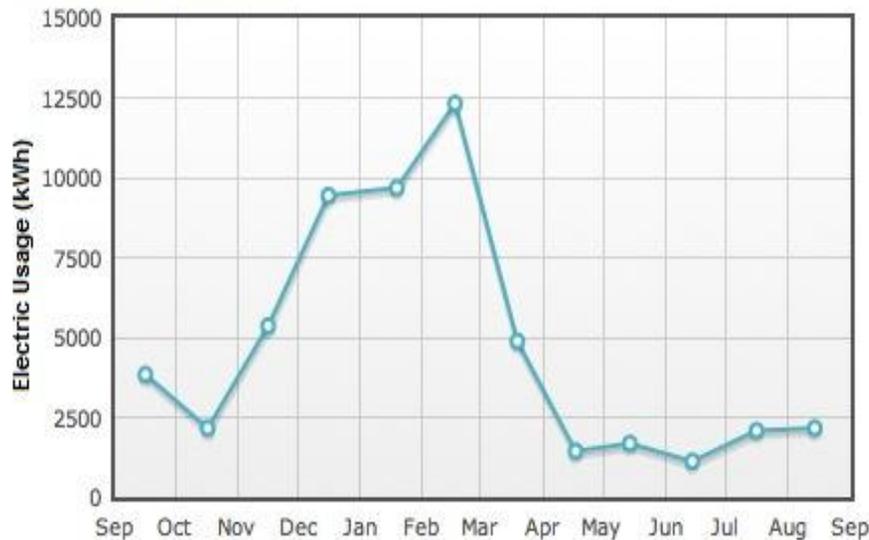
- We don't own it.
- Energy Services Performance Contract (aka PPA) with Shenandoah Sustainable Technologies.
  - 20 years
  - Fixed monthly cost with inflation adjuster

# Toward Net-Zero?

Yes, but not as close yet as we hoped...

- Problem with GSHPs over winter
- Additional efficiency and conservation items
- Expanding the conservation mindset

Your Energy Usage



Historical Generation



# Toward Net-Zero: A Journey for All of Us



# *Healing Our Earth*



# The Unity of Fairfax BayScape Project

**Actions taken to clean and reduce  
stormwater runoff from our campus**

## *Healing Our Earth*

- **For the past five years, Unity of Fairfax developed our campus in ways that promoted the health of the Chesapeake Bay and its watersheds while establishing a haven for wildlife.**
- **These actions included the creation and enhancement of riparian buffers, pollinator gardens, a sponge garden, a vegetative roof, and a National Wildlife Foundation certified wildlife habitat.**

## ***Healing Our Earth cont.***

**Additionally, we:**

- **Implemented a policy to ban use of chemicals on the land**
- **Began composting**
- **Installed river jack stones to reduce erosion by redirecting stormwater runoff**

***The following slides show projects that serve to improve the health of the Chesapeake Bay watershed.***

## **Wildlife Habitat**



**Here is a National Wildlife Federation certified wildlife habitat, which doubles as a meditation garden.**

**It provides the four basic elements for wildlife to survive, including food, water, cover and places to raise young.**

**Most plants in this garden were rescued from land being bulldozed. Additionally, we added many native plants.**



# Rock Wall Garden

**In the Fall of 2007, an 81 foot long retainer wall was built on a hillside behind our church to prevent soil erosion.**



## Rock Wall Garden

**By backfilling the wall, it provided another location for native plants.**



## Riparian Buffer

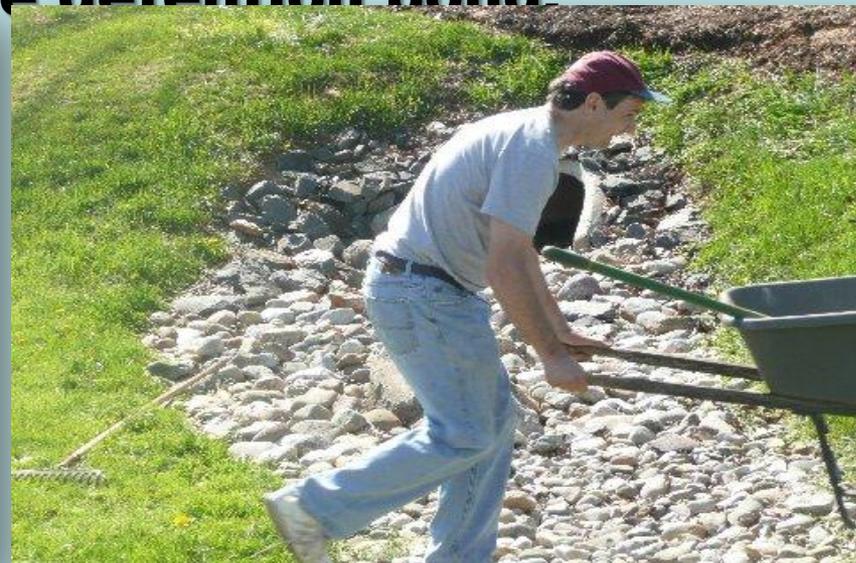
**Riparian buffers are vegetated areas along bodies of water such as streams and rivers.**



- As we develop land for human use, buffer zones are often destroyed.
- These are the last line of defense against stormwater runoff and water pollution.
- We acted to renew buffer zones on our campus to slow stormwater runoff coming from nearby parking lots.

## Riparian Buffer

**The first step in restoring the buffer zone was to remove the invasive plants in the valley swale. Then we brought in large amounts of river jack stones to slow stormwater, reduce erosion and contain and direct runoff to the detention pond.**



## Riparian Buffer

**Once we stabilized the erosion and removed invasive plants we replaced them with native trees and shrubs.**



# Detention Pond

**In December 2008, we created sponge and pollinator gardens in the pond and on its banks. The gardens filter the rain water and delay downstream storm surge. This further reduces erosion**



**Before**



**After**

# Detention Pond

**To prepare the pond area, we hired a professional company to blow in a three-inch mixture of organic compost to provide a bed to receive native plants and shrubs. Within the mixture was placed a variety of native northeast wildflower and annual rye se**



## Annual Rye Grass

**Mature rye grass helps prevent washout of native flower seeds and adds organic nutrients to the soil.**



# Detention Pond

**When a heavy rain flooded the basin, we feared a washout of compost and seed - a very expensive loss. We unclogged the overflow drain to let the water escape into the sewer**



## Detention Pond

**To our great relief, when the water drained, very little damage to the compost soil was evident. Within a few days, the annual rye**



## **Detention Pond**

**In addition to wildflowers and rye seed, blue flag, Joe-pye weed, New York asters, wild columbine, cardinal flower, great blue lobelia and black-eyed Susan were planted to provide variety and to**



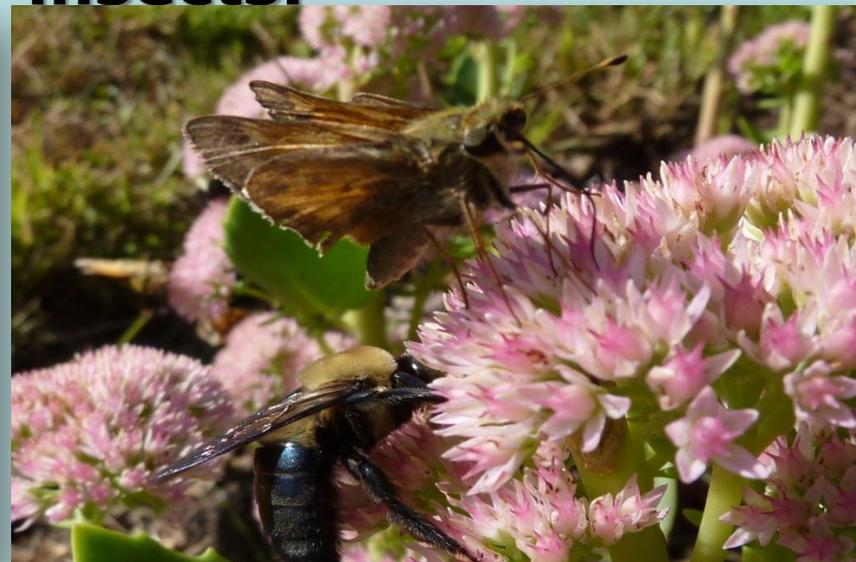
## Pollinator Garden



- **Without pollinators, most of the world's plants would disappear, including some of our favorite fruits and vegetables.**
- **Bees pollinate more flowers than any other creature, but bats, hornets, wasps and other animals also help pollinate.**

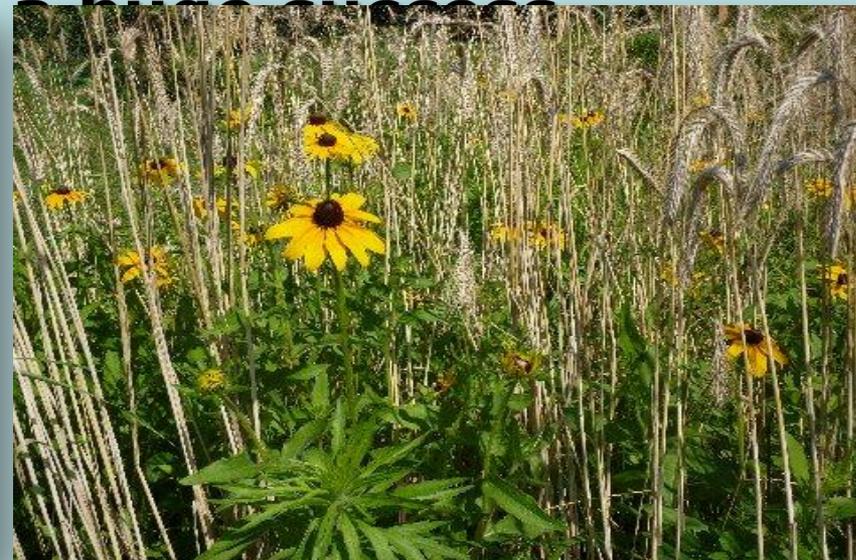
## Pollinator Garden

**Milkweed pods burst open in the Fall to propagate more plants and is the host for the Monarch butterfly. Phlox attract bees and butterflies and other insects.**



## Pollinator Garden

**Wild flowers blossomed all Summer and attracted many species of birds, insects and butterflies. The garden was a huge success.**



## Pollinator Garden

**Because we do not use pesticides, herbicides or chemical fertilizers on our property, the wildlife thrived.**



To encourage birds to nest on our campus, we installed Blue Bird boxes. Within days, a family claimed their box and started a family.



# **Blue bird chicks waited to be fed and soon outgrew their little box.**



## Sponge Garden

**As the name suggests, the sponge garden's purpose is to act like a sponge to absorb stormwater and slow it's downstream flow all the way to the Chesapeake Bay.**



## Sponge Garden

**As Summer advanced, the grasses thrived and filled the garden, establishing deep roots and dropping seeds for next Spring.**



## Educational Component of Project

One hundred and fifty plant identification signs were designed, purchased and installed throughout the project areas as information for the self-guided tours.



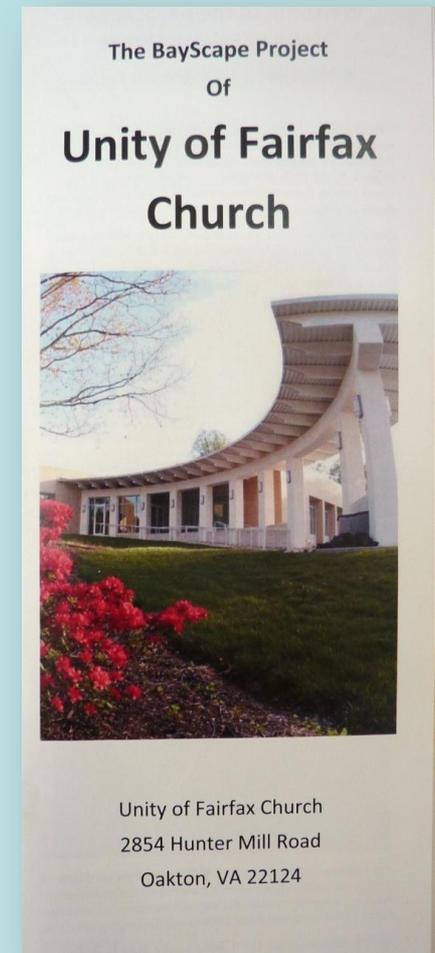
# Educational Component of Project

**Educational signs were designed, constructed and located in each of our six project areas to be used as part of our self-guided tour of the site.**



# Educational Component of Project

**In addition to an informational sign at each project site and plant identification markers, we have designed and printed a full color 11 page interpretative brochure. It will provide further information on the BayScaping techniques as visitors tour the grounds.**



## Project Workforce

**As with all of the BayScape projects, work in developing and installing the educational signs was accomplished with volunteers. These signs were constructed as part of an Boy Scout Eagle project by one of our church youth members.**



## Project Workforce

**Over a thousand hours have been devoted to this project by dedicated volunteers.**

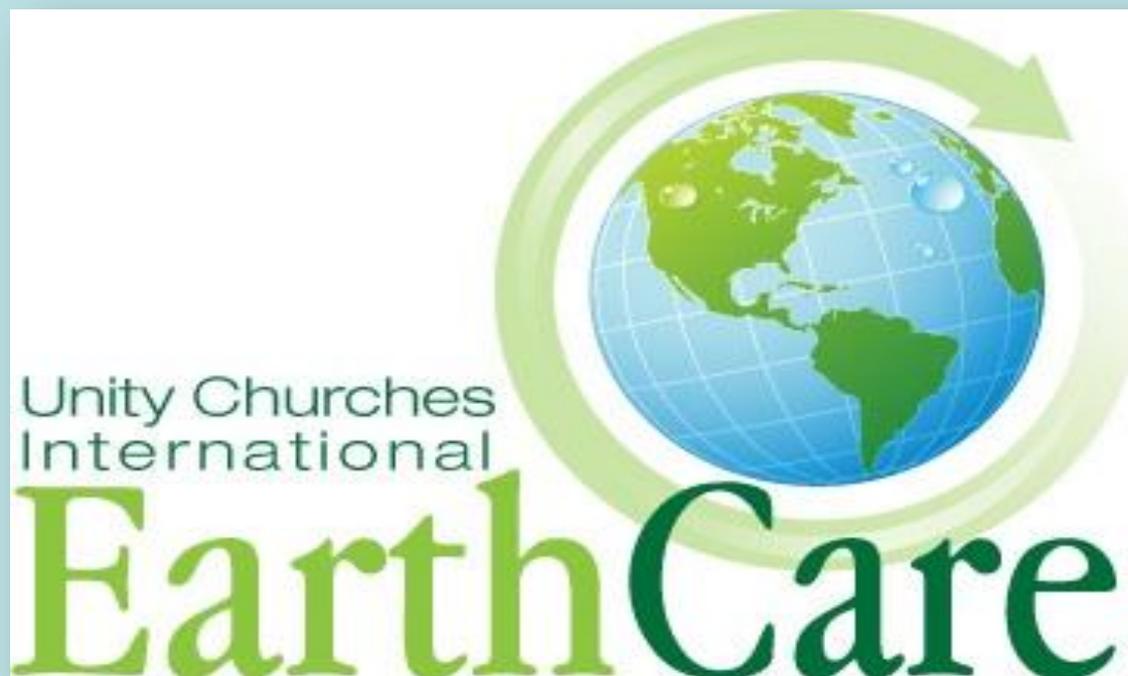


**In addition to semi-annual campus maintenance days and BayScaping project work, we have developed a volunteer “Adopt-a-Spot” program for members who want to take**

**care of so many garden sites on our campus**



**An EarthCare ministry was created in 2009 to support the ongoing maintenance and expansion of this BayScaping project as part of their mission.**



## The Green Roof

- In May 2008, a new green (vegetative) roof was installed on one of the buildings on our campus with nine different varieties of sedum for a total of 3,000 plants. Sedum was selected for its hardiness and ability to adapt to weather extremes. It is also a low maintenance plant.



## The Green Roof

**This roof is expected to have a positive impact on our Difficult Run Watershed. The congregation raised over \$57,000 to partially fund the roof's installation.**



## Advantages of a Green Roof

- ❖ **Significantly reduces stormwater runoff**
- ❖ **Conserves energy**
- ❖ **Provides insulation qualities**
- ❖ **Suppresses noise**
- ❖ **Extends the life of the roof**
- ❖ **Restores ecological value to open spaces**



# The Green Roof

**Shortly after planting  
plugs  
May 2008**

**Summer 2009**



## Future Plans for the BayScape Project

- **We obtain additional grants from governmental and non-profit agencies and donations from ecologically concerned business sponsors who support the “Greening of Oakton”.**
- **With the funds, we will construct an observation platform for the green roof. This will permit tour groups, including school children, to see the roof up close so they can appreciate it’s beauty and utility.**
- **We plan to brief our project to local schools and businesses to educate them on the need for, and value of, ecological projects such as this.**

## Future Plans for the BayScape Project cont.

- **We will also be constructing a visitor's kiosk near the entrance to our campus that will contain information about our project site. It will have a small live green roof to alert passers-by of this local environmental project in the community.**
- **Additional native plants will be added to the gardens in the detention pond and small trees and shrubs will be placed on the edge of the pond to increase wildlife habitat.**

## Major Partners

These projects were created through the efforts of the Unity of Fairfax congregation; students; private, public and non-profit organizations; and conservation professionals.

These are many of our major partners. Like our native plants, this list grows every year.

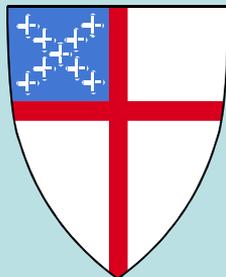


# Acknowledgements

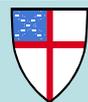
- **This project would have never been undertaken had it not been for the higher environmental consciousness of the Unity congregation who fully supported, and continue to support, this project with their financial and human resources.**
- **The cooperative efforts of Lands and Waters, Inc. and EcoStewards Alliance, Inc. provided the combination of education and experience to develop this project as a significant landmark to educate the community on practical ways to make a positive environmental impact.**
- **The Virginia Department of Conservation and Recreation and Fairfax Water provided considerable incentive for these projects through grant funding of \$31,600. This represents 30% of the total project cost of \$105,000.**

## **Acknowledgements cont.**

- **Expressed gratitude to Mr. Ron Tuttle in the Department of Public Works and Environmental Service, Fairfax County Government. His expertise and experience in stormwater management provided timely information on design, rooftop and pond plants, and soils during the overall project development.**
- **A special thank you to the local Boy Scouts of America troops in the community. Three scouts from Unity of Fairfax earned their Eagle status having contributed their leadership, enthusiasm and financial support to these landscaping projects.**



**Immanuel Church on the Hill  
Alexandria, VA  
Zabriskie Chapel and Parish Hall Facilities  
Upgrades  
and Impact Over Next Four Years**



## Zabriskie Building Description Parish Hall & Sanctuary

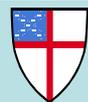
- Chapel and Parish Hall - approximately 16,500 sq. feet
- Chapel
- Parish Hall
  - Offices for Rector, Assistant Rector, Church Office, Deacon's Office, Choir Office
  - Twelve Sunday School and meeting rooms
  - Parish Hall
  - Kitchen



## Zabriskie HVAC Basics

### HVAC Equipment:

- Boiler (1998 – repaired 2006)
- Chiller
  - Original installed 1991
  - New chiller installed August 2010
- Direct Expansion (“DX”) Systems
- A/C Ducts
- Fan Coil Units (but piping original)



## Utility Costs Triggered ICOH Energy Upgrades

- Electricity (used for everything but heat):
  - Averaged 108,000 kWh/\$8,500 per Year (2003 – 2006)
  - Use spiked in 2007 to 146,400 kWh/\$11,200
  - 2007 added daily/evening community Yoga/exercise classes in Parish Hall and increased building use by other worship communities
- Gas: Averaged \$7,000 per Year (2003 – 2006)
- Energy bills were \$18,000 in 2007



## Immanuel's Response - Invest in Energy Efficiency

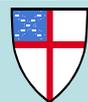
- During 2008, ICOH Creation Stewardship and Facilities Team worked together to educate parish on upgrades and payoff in reduced carbon emissions and reduced utility costs
- Facilities model provided a roadmap and estimated costs
- Generous bequest funded insulation upgrade



## Energy-Saving Capital Investments

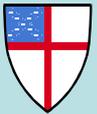
- New Energy Efficient Windows - \$50K
  - Parish Hall (2007) and Sanctuary (2009)
- Lighting Upgrade (2008) - \$10K
  - T8 ballasts in basement
  - Motion detectors in Sunday School rooms/restrooms
  - Compact florescent bulbs
- Programmable Thermostats (2008) - \$5K
- Spray Foam Building Envelope Insulation (2008) -- \$40K

Total: approx. \$100,000

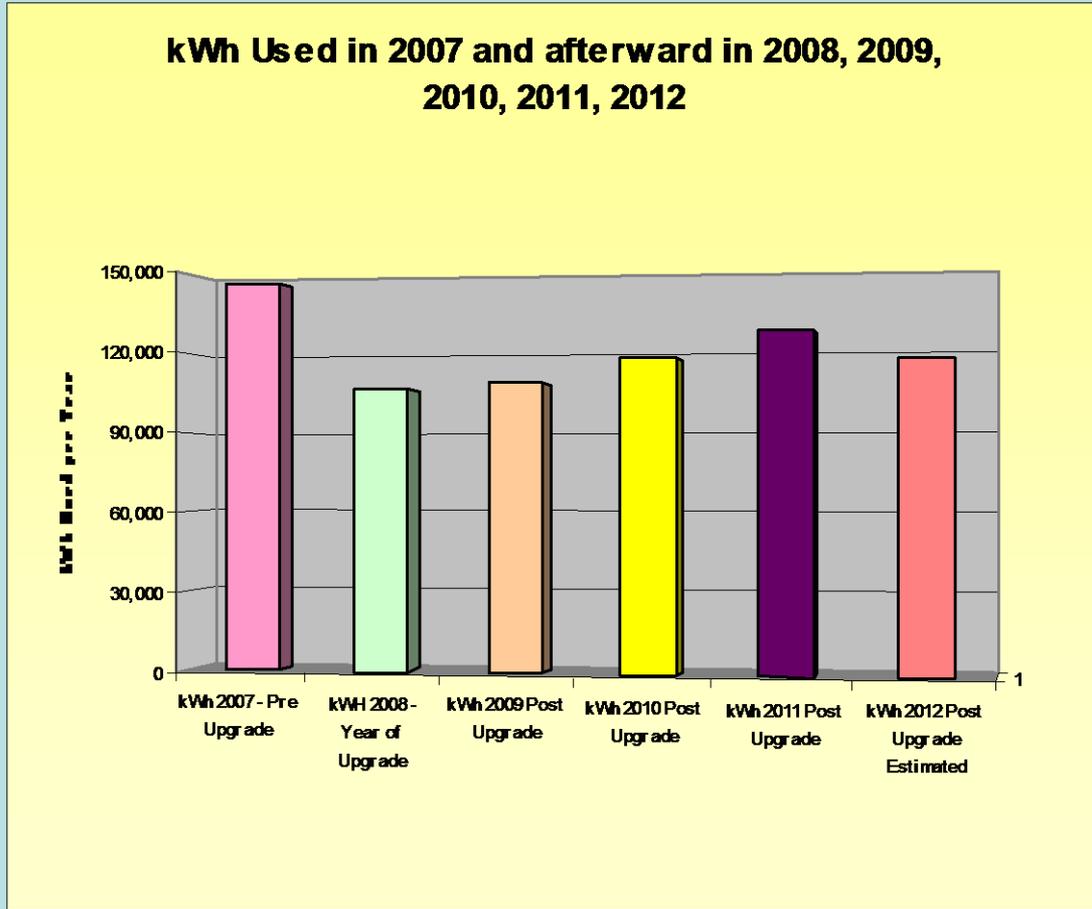


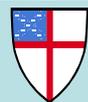
## Utility Bills Showed the Results

- 21% drop in annual electricity kWh consumption
- 25% drop in annual gas consumption
- Combined gas and electricity cost for 2007 exceeded \$18,000
  - Average annual post-upgrade cost for 2009 – 2011 reduced by \$3000+
  - Estimated reduction for 2012 is \$4500+



# Results: 21% Drop in Annual Electricity Consumption over Next 5 Years



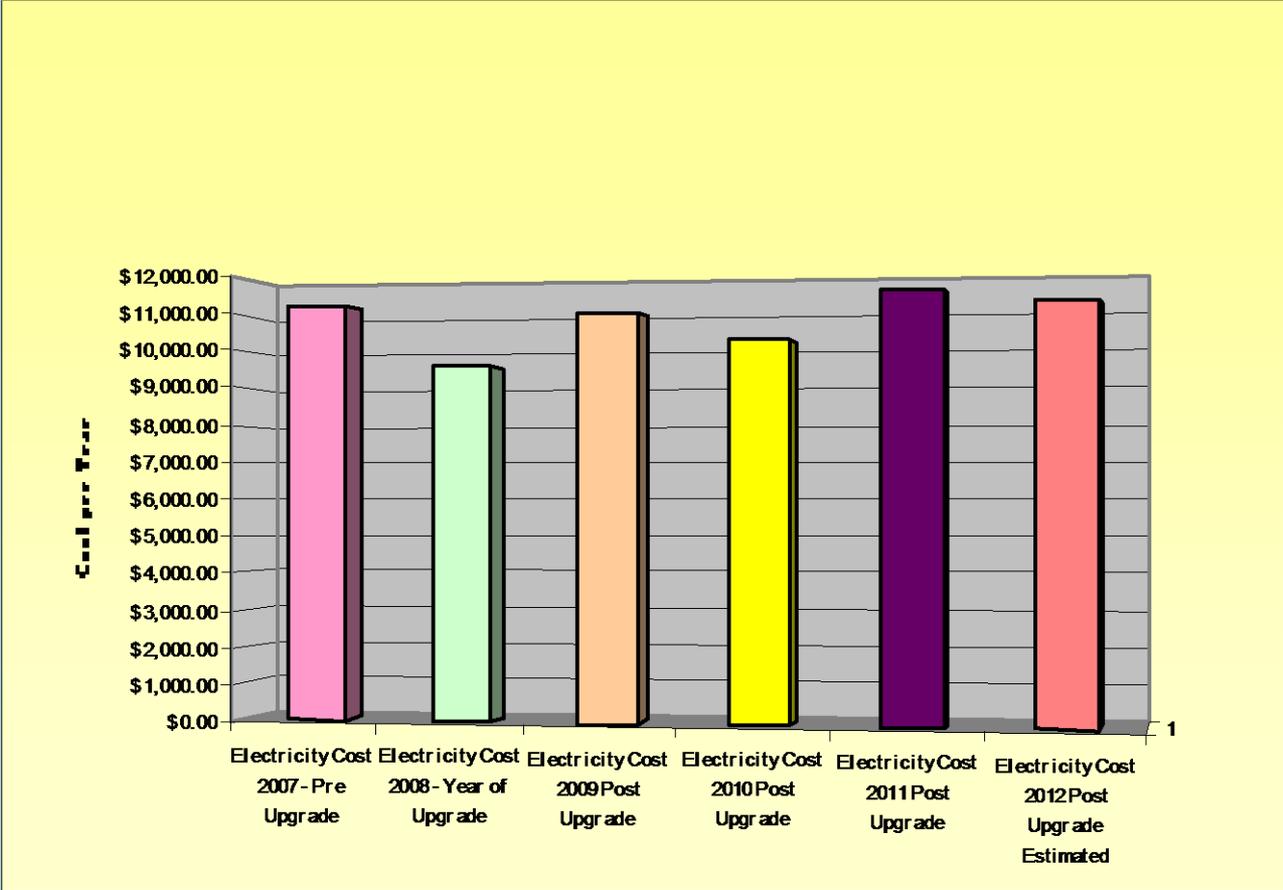


## Factors Affecting Electricity Usage

- Hottest July on record for D.C. region
  - Summer 2010
  - Summer 2011 exceeded heat records set in 2010
- Aging chiller gave out in August 2010 – replaced with more efficient model
- Virginia Theological Seminary Chapel – home to two of our three weekly services – destroyed by fire October 2010 with all services (Sunday services, weddings, funerals, etc.) relocated to Zabriskie Sanctuary/Parish Hall – heavily used building now gets more use



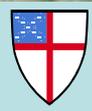
# Electricity Costs Reflect Rate Hikes



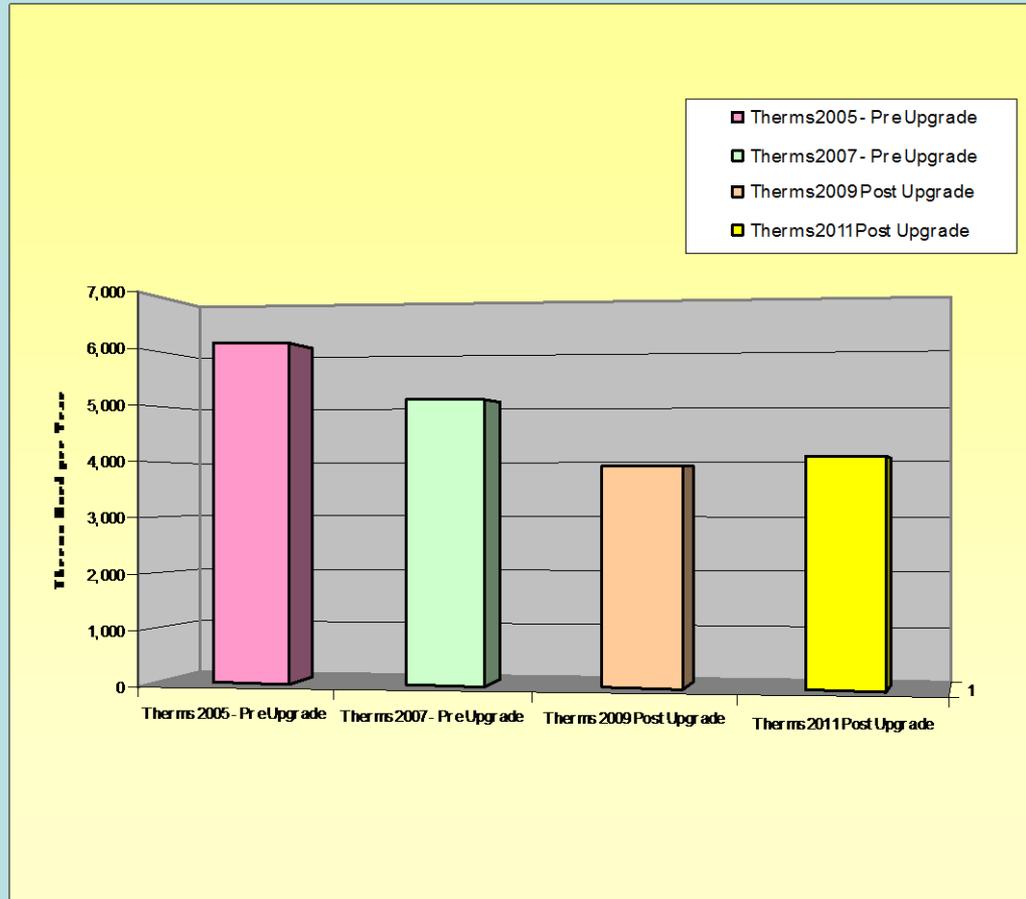


## Factors Affecting Electricity Costs

- Current electricity costs same as 2007 even though average kWh usage is 21% less
- Dominion Power levied rate increases in 2008 and 2011
- Today, we use our building even more heavily than we did in 2007
- Estimated cost of 2007 electricity usage at 2012 rates is over \$14,000/Yr (\$3,000/Yr more than we've been paying)

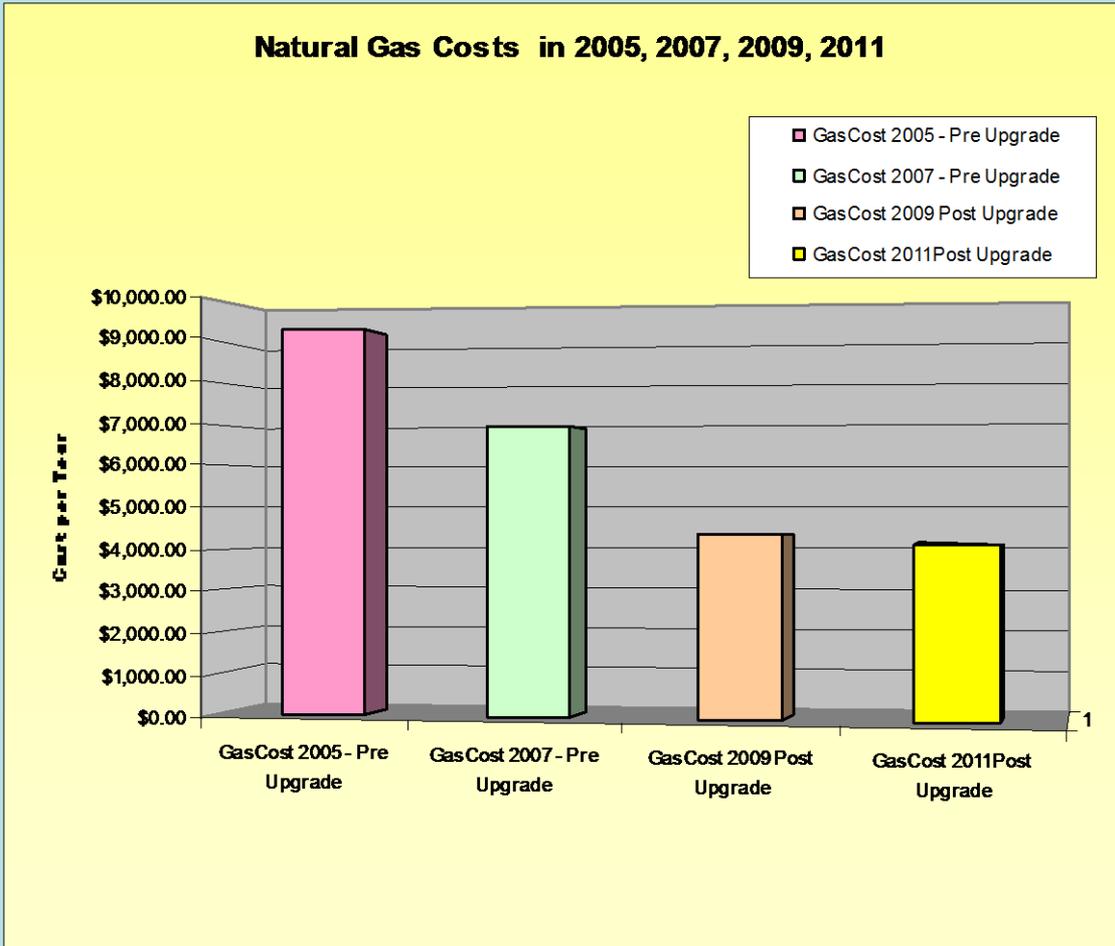


## Results: 25% Drop in Annual Gas Consumption After Insulating Building





# Natural Gas Costs



## Factors Affecting Gas Costs

- 25% lower therms usage reduced our costs
- Gas prices have fluctuated over the past four years – currently down 50% from 2008



## Thoughts After Four Years

- Energy savings investments resulted in
  - Reduced Carbon emissions
  - Reduced Costs
- Financial payback depends on energy costs – which can go down but mostly go up over time
- Maintaining our church building as sustainably as possible is good stewardship and fiscally sensible – it's our small place on this fragile earth our island home

# Grace Episcopal Church

Alexandria, VA

## Summary of Energy Audit & Green Operations Initiatives

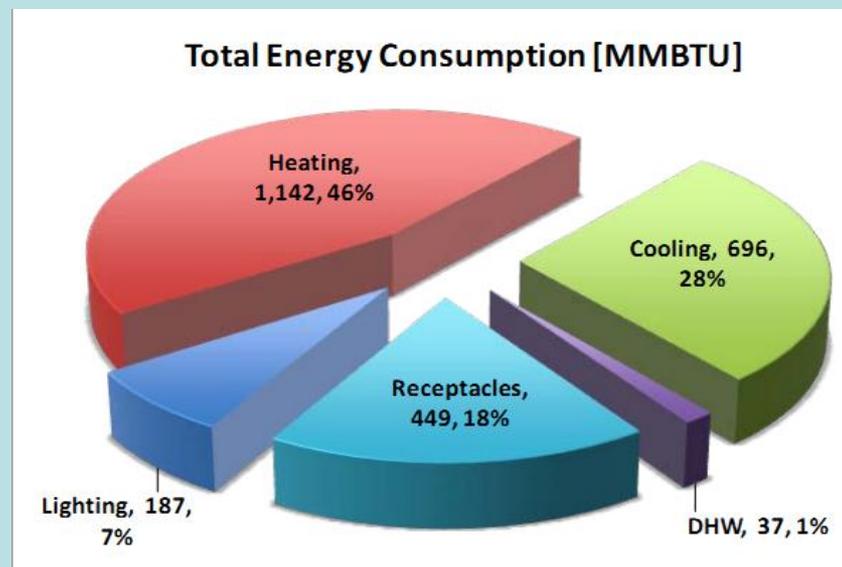


## Existing Conditions

- Constructed in 3 phases over 45 years beginning in 1948
- Comprised of school classrooms, church, and office space
- Most buildings used 4-5 days a week normally
- Most energy use toward heating and cooling

# Utility Analysis

	Grace Episcopal	Average Building	Target
Energy Performance Rating:	38	50	75
Site Energy Use Intensity (kBtu/SqFt/yr):	74	66	50
Total Annual Site Energy (kBtu):	2,509,116	2,238,581	1,701,265
CO <sub>2</sub> -eq Emissions (metric tons/yr):	262	233	177



## Energy Audit

- Aspects of Grace Episcopal building analyzed:
  - Lighting (fixtures, ballasts, floodlight)
  - Water Usage
  - Boiler
  - Heat Pump
  - Appliances

## Recommendations

- 1) Lighting- bulb and ballast upgrade
  - Savings per year \$1,319, total cost \$41,440
- 2) Lighting- LED floodlight upgrade
  - Savings per year \$438, total cost \$16,829
- 3) Water Conserving Upgrades
  - Savings per year \$1,067, total cost \$5,949
- 4) HW Heat Pump
  - Savings per year \$221, total cost \$4,994



St. Paul's Green Team  
Status  
September, 2012

Workshop Deliverables

# Who is Saint Paul's Episcopal?

- Old Town, Alexandria
- Founded 1803,
- Historic Building 1815
- About xxx families
- Young, growing parish
- Day School (100 students)
- Seats xxx in Sanctuary
- Approx. 25,000 sq. feet



## How Green Were We in 2008?

- Not as green as we could be ...
- Cost to Heat and Cool
- Safety, Security, Insurability, Durability, and other items
- Comfort
- August, 2008, we formed a committee ... called .. "The Green Team"



# The Green Team:

- *Mission: to explore the scriptural mandate to care for all Creation and to explore ways that we can live more consciously and compassionately in relation to the Earth and each other*
- Process over Four Years:
  - Researched green practices – 6 locations
  - Built Baseline
    - Professional Energy Audit – Very Valuable
    - Collected Bills – Set us up for EPA’s Portfolio Manager tool
  - Started on Physical Changes
    - Repaired and Caulked windows and doors, started lighting improvements
    - Measured energy with “Kill-O-Watt” meters on appliance
  - Education & Worship
    - Adult Forum, co-sponsored Pat Watkins, sponsored a forum on agriculture and the Bible
    - Newsletter Articles on How to make Thanksgiving, Advent and Christmas “greener”

# The Green Team:

- *Mission: to explore the scriptural mandate to care for all Creation and to explore ways that we can live more consciously and compassionately in relation to the Earth and each other”*
- Process over Four Years (Continued):
  - Community Outreach
    - Cleaned up inside and outside – Adopt A Block Program with City of Alexandria
    - Planted Seven young Trees surrounding the Church
  - Recycling
    - Bought 27 Blue, well-marked recycle bins and placed them in all kitchens, offices, and in the Narthex
    - Introduced recyclable coffee cups, replacing foam cups
- Result: Created an atmosphere recognizing the value of Creation Care

### Maintaining our Property Efficiently

Cost per sq ft	St. Paul's	"Green"
Heating	\$ .50	\$ .30 - \$ .20
Cooling	\$ .39	\$ .10 - \$ .07



## Maintaining our Property Efficiently

- Lighting

- Incandescent energy is 10 % light, **90 % heat**
- Air conditioning system must reduce the heat levels in the Summer
- Over 230 devices can be converted to be more efficient
- The potential savings is **\$1,700** constitutes **half** of the annual electricity for these devices



## So What have we done?

### Anecdotal evidence of the effect we have had

Historic Boiler – not all history is beautiful – gave up it's 9<sup>th</sup> life

- Property committee replaced it with one substantially more efficient
- Took extra time, cost extra money, but we had the baseline

Beautiful Windows – but not energy efficient

- Developed an, over time, updating process to repair and seal them.
- Caulk leaks, repair broken windows, **weather-proof** where possible

Develop Building Use guidelines for all users, (others will own).

## Summary

We have come a long way

We have performed actions on a path

We have increased Awareness, Education

We think that the mission is continuing

*to care for all Creation*

## Green can yield gold ...

- Shining as a Light
  - Just might require getting dirty once or twice

This is creative  
stewardship at its best



Working together to control costs and make St. Paul's Episcopal Church efficiently shine as good stewards of the Earth in our community

# Resources to Green Your Congregation

[www.alexandriava.gov/gbrc](http://www.alexandriava.gov/gbrc)

**Interfaith Power and Light – [www.GWIPL.ORG](http://www.GWIPL.ORG)**

**EPA Congregations – [www.energystar.gov/congregations](http://www.energystar.gov/congregations)**

## **Virginia programs**

-Solar energy equipment tax exemption (residential & commercial) offered by Alexandria City ([www.alexandriava.gov](http://www.alexandriava.gov) – Taxation Website)

## **Federal incentives and programs ([www.energystar.gov](http://www.energystar.gov))**

-Tax credits for renewables and geothermal installations

-Tax deductions for commercial buildings that reduce energy use

**FIND OUT MORE AT**

[www.dsireusa.org](http://www.dsireusa.org)

[www.smartbuildingdirectory.org](http://www.smartbuildingdirectory.org)