



Department of Buildings and General Services Environmental Accomplishments (2002 to 2010)

The State of Vermont is a recognized leader in managing its consumption of energy resources and minimizing its environmental footprint. The state has responded to the cyclical reoccurrence of shortfalls in the availability of energy resources through legislative and administrative initiatives over the last several decades. These initiatives allowed the state to reduce its consumption of our natural resources and to more efficiently use the energy required to sustain state services and governmental operations. The re-adoption of the State Agency Energy Plan (SAEP) provides a valuable resource to state government to achieve these initiatives.

The intent of the SAEP is to set a good example of practical use of alternative energy for other large commercial and industrial users in the state. The SAEP will also provide a resource for all staff in state government to better understand Title 3 V.S.A. § 2291. The seven objectives, outlined in this plan on page 2, are detailed in the seven chapters that follow. The chapters address education, implementation, and reporting for the energy and environmental focuses outlined in the statute. State government can effectively change the traditional way it conducts business through further efficient use of resources, improved energy efficiency, and reduced emissions to the environment. This approach will enable the state to 'get the job done' in a cost effective, technically-sound manner that will meet the objectives of the SAEP as well as the Department of Buildings and General Services Agency Energy Implementation Plan.



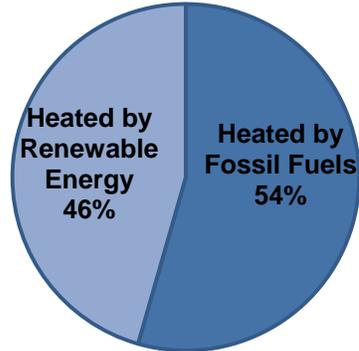
Infrastructure

The state infrastructure footprint is evaluated for efficient use of space as well as efficient use of energy and level of emissions. The overall building condition is considered when evaluating its use and future projects involving the building. As the needs of state government change, each agency gives additional consideration to the added maintenance burdens of new infrastructure prior to requesting different or additional space. The state footprint is diverse in sources of heating, cooling and electricity. Careful consideration of the building use and location are the driving factors to which technology will best serve the building.

Renewable Energy:

The energy use is tracked based on the british thermal units (BTU). The current inventory of technologies in operation consists of various renewable alternative sources. The wind turbine is net metered which means the electricity generated from the wind turbine is sold back to the utility company. The solar photovoltaic and collector arrays are not on a net meter program; the energy is used directly from the system. The geothermal system uses the temperature difference between the groundwater and the building water to heat and/or cool the building through the transfer of the heat between two pipes. The biodiesel is soy based oil that is filtered so it can be used in a heating system as a fuel. The various biomass fuels are different forms of wood product. The forms include chips, pellets and chunk. Each form requires a different type of storage system and boiler to heat the building.

FY 2009 Thermal Energy Use by Building (MMBTU)



Wood chip combustion for thermal energy:

- Montpelier - Capitol Complex
- Waterbury - State Office Complex
- Pittsford - Training Academy
- Newport - State Office Building
- Middlebury - Mahady Courthouse

Wood chunk combustion for thermal energy:

- Derby – Derby Welcome Center
- Fair Haven – Fair Haven Welcome Center

Geothermal heated and cooled facilities:

- Bennington - Downtown State Office Building
- Bennington - Vermont Veterans' Home
- Sharon – Northbound Information Center

Biodiesel heating fuel facilities:

- Brattleboro - State Office Building

Wood pellet combustion for thermal energy:

- St. Albans - Public Safety Field Station
- Randolph – Randolph Southbound Information Center

Solar photovoltaic arrays for net metering:

- Middlesex – General Services Building

Solar collectors for water heating:

- Montpelier – 133 State Street
- Montpelier – 6 Baldwin Street

Wind Power Generation:

- Alburgh – Alburgh Welcome Center

Demand Response Program:

There are two different programs for demand response, through ISO New England (the regional grid) and the local utility (the electric company that serves the building). Depending on the type of program, the grid or utility will contact the owners of the building during a critical time electrical use. There will be a request to turn off or use generators to power electrical equipment. This prevents brown out conditions or the grid or utility having to purchase emergency electricity at a higher price.

ISO New England:

2009 to 2010:

- Waterbury – Waterbury State Office Complex
- Montpelier – 133 State Street

Burlington Electric Department:

2002:

- 32 and 108 Cherry Street buildings (no longer participating)

CVPS:

2002:

- Southern State Correctional Facility (no longer participating)

Projects:

The following projects are energy and environmentally driven to improve the overall performance of the building. Some are minor additions to existing systems while others are new approaches to design and construction. The following information outlines these projects with the approximate year of the start date. Multiple years signifies the implementation taking more than one year.

2010 to 2011 (in progress):

- **Bennington District Courthouse and State Office Building** – major renovation and addition with geothermal heating and cooling system using Leadership in Energy and Environmental Energy design (LEED) process and American Recovery and Reinvestment Act federal funding
- **Statewide** - solar installations in Waterbury State Office Complex plus efficiency upgrades to nine facilities using American Recovery and Reinvestment Act federal funding

2011:

- **South Burlington Chittenden Regional Correctional Facility** - upgrade to light emitting diodes (LED) lighting
- **Burlington Costello Courthouse** - upgrade efficiency to LED lighting
- **Williston Southbound Information Center** - installation of VFDs on motors
- **Colchester Building 1705 Maintenance Shop** - upgrade efficiency to LED lighting
- **Burlington Zampieri Office Building** - upgrade lighting systems
- **St. Albans State Office Building** - upgrade to LED lighting

2010:

- **Waterbury State Office Complex Forensic Laboratory** – major renovation and addition with high efficient envelope
- **Plymouth Calvin Coolidge Museum and Education Center** - new construction with efficient mechanical and lighting systems
- **Pittsford Fire Safety Training Building** – new construction using LEED process
- **Brattleboro District Courthouse** - renovation to mechanical and lighting systems
- **Springfield Southern State Correctional Facility** - upgraded lighting funded through State Resource Management Revolving Fund (SRMRF)
- **Windsor Southeast State Correctional Facility** - upgrade variable frequency drives (VFD) on motors and lighting systems
- **Swanton Northwest State Correctional Facility** - renovate facility and upgrade efficiency to include LED lighting
- **Middlesex State Archives** - well-insulated addition to existing building with heating and cooling system by heat pumps

2009:

- **Pittsford Training Academy** - replacement of existing woodchip boiler with new woodchip boiler funded through SRMRF
- **Williston Northbound Information Center** - installation of VFDs on motors funded through SRMRF
- **Newport State Office Building** - installation of occupancy sensors funded through SRMRF and lighting upgrades
- **Newport Northern State Correctional Facility** - upgrades to lighting, refrigeration, motors, and drives funded through SRMRF
- **Springfield State Office Building** - major renovation and efficiency upgrade
- **St. Albans District Courthouse** - upgrade parking garage lighting to LED lighting with controls
- **Rutland Marble Valley Regional Correctional Facility** - upgraded chiller system for efficiency
- **Rutland McKinley Complex Headquarters** - upgrade the mechanical system
- **Burlington Zampieri Office Building** - upgrade efficiency of motors
- **Guilford Welcome Center** - upgrade lighting
- **Middlesex State Archives** - upgrade lighting
- **Essex Woodside Juvenile Facility** - upgrade lighting

2008 to 2010:

- **Bennington Vermont Veterans' Home** - renovation and addition of geothermal heating and cooling system

2008 to 2009:

- **Capitol and Waterbury State Office Complex** – sub-meter installation for electrical and condensate readings

2008:

- **Burlington Costello Courthouse** - upgraded motors to a more efficient belt system

2007:

- **New Haven Public Safety Field Station** - new construction with efficient design
- **St. Albans Public Safety Field Station** - new construction with wood pellet heating system, passive lighting (light tubes), lighting controls and efficient design
- **Essex Woodside Juvenile Facility** - upgrade to more efficient cooling system

2006 to 2009:

- **Waterbury State Office Complex** – insulation and exterior shading upgrade

2005 to 2006:

- **Middlesex State Police Field Station** – window upgrade
- **Bennington Downtown State Office Building** - major renovation and reuse of downtown building with addition of geothermal heating and cooling system
- **Review of Building Conditions** - Vermont Information Center Division environmental assessments were conducted targeting the top five users of energy, greenhouse gases, and costs per square foot and top five visitations per year. The top users were 10 of the 20 buildings in the inventory. Walk-throughs were conducted and a report of the findings was filed. Electrical heating sources were discontinued, controls were added to vending machines, and lighting was upgraded.

2004:

- **10 courthouses and eight correctional facilities** - ReBuild America Federal grant for audit
- **Waterbury State Office Complex** – window upgrade
- **Waterbury State Office Complex** – instrumentation upgrade
- **Capitol Complex** – instrumentation upgrade
- **Alburgh Welcome Center** – install wind turbine
- **Sharon Northbound Information Center** - horticulture assisted wastewater treatment

2003:

- **Utility Assistance** – State begins relationship with Efficiency Vermont and strengthens relationship with Burlington Electric Department and Vermont Gas Systems to improve state energy efficiency.
- **Barre McFarland State Office Building** - major renovation and reuse of downtown building with efficient mechanical and lighting systems, improved envelope and use of natural daylight

2002 to 2004:

- **Statewide** – begin installation of DDC systems in all new air handling systems and upgrade of old systems

Performance Contracts:

Performance contracts are done to accomplish projects that would not normally be able to be funded. Companies enter into contracts with the owner to review the buildings in an audit, submit a report of recommendations, fund the projects and then oversee the improvements. The companies are paid through the estimated savings outlined in the contract for a given amount of time. Some of these contracts involve occupant behavior change only while others involve equipment and structural changes.

2006 to 2016 (in progress):

- **Waterbury State Office, Capitol and Middlesex Complex** - Performance contract awarded for energy and water conservation audit and installation.

2005 to 2006:

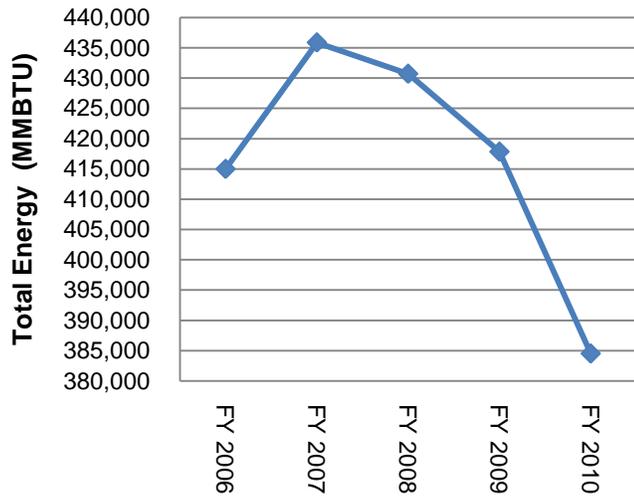
- **Middlebury** - Mahady Courthouse energy conservation project reduces energy use through change in behavior.

2004:

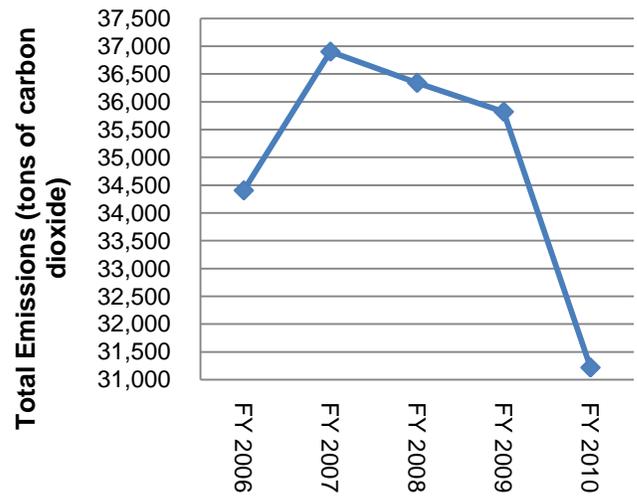
- **Investigate** - BGS investigates contracting with service providers for instituting energy conservation measures on a site by site basis. Similar to ESCOs, costs are funded through savings but on one or two year term basis.

Five-Year Trends from Building Projects Completed

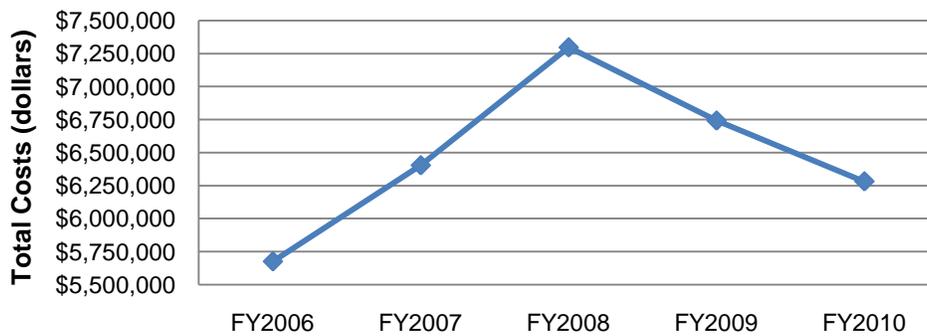
BGS Energy Totals



BGS Emission Totals

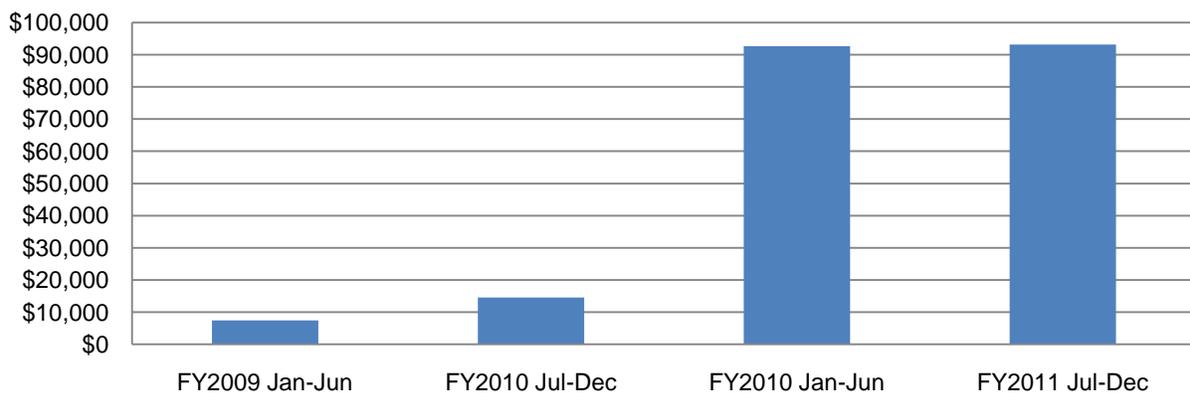


BGS Cost Totals



Two-Year Trend from Qualified Projects Completed

Efficiency Incentive Amounts Reported



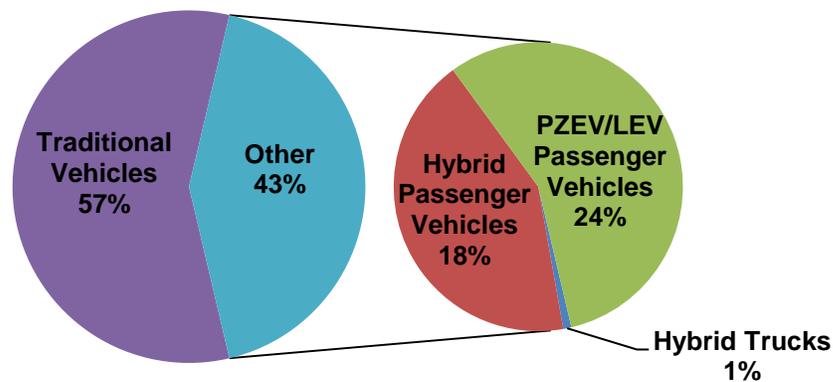


Fleet

State government transportation needs include the use of public transportation, ridesharing, and vanpools has been increasing in recent years. Use of these alternatives also increases with enhanced marketing and transit systems tailored to commuters' work schedules. Business travel energy use is manageable through supervisors better evaluating the need to travel, use of conferencing technology, and making sure the right sized vehicle is used for the job. The BGS Fleet Management Program making various types of vehicles available for business travel.

- **BGS Fleet Management Program** – use partial zero emission vehicles (PZEV), low emission vehicles (LEV) and hybrids

Total Number of Fleet Vehicles



Commodities

The most effective way to conserve and reduce the waste generated by the state is to properly specify the product to be purchased. Creating a well researched specification ensures the most efficient and environmentally preferred purchasing (EPP) product is being used. This enables agencies to make purchasing decisions that are informed and in conformance with the statutes and policies in place for various energy and environmental initiatives.

The state must continually evaluate the options available in today's market to ensure that it purchases the most cost effective products necessary to conduct state business. Consideration of energy, environment (to include recycled and mercury content) and length of life of the product through the use of state contracts is part of the process whenever practical. BGS is moving towards standardization of purchases involving contracts despite the challenges that occur as the process becomes more complex. The BGS Environmental Engineer continues to provide technical assistance in research of products.

2005 to 2006:

- **Standards** – Establish energy efficient standards for certain appliances related to power generation, lighting and heating.

2004:

- **Guidelines** – Establish BGS Design Guidelines for in-house and contract use. Principals of LEED used as resource and objective of buildings operating at 30% above energy code requirements.
- **Utility Assistance** - Integrate Efficiency Vermont in project review at the earliest possible point of opportunity.

2002:

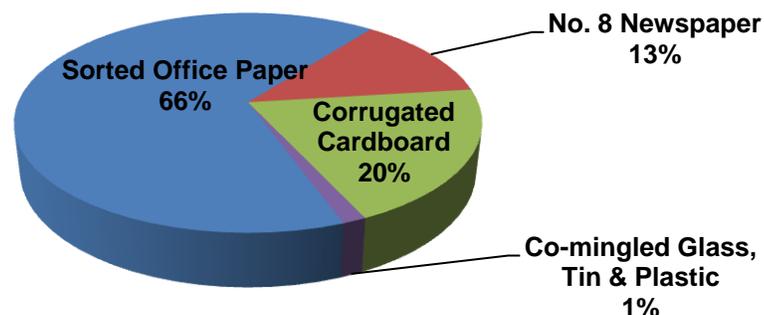
- **Executive Order** - Establish Climate Neutral Working Group and sets goals for GHG emission reductions. The objectives are from baseline 1990 data: 25% by 2012, 50% by 2028 and 75% by 2050.
- **Policy** - Develop a detailed Energy Management Policy.
- **Tracking** - BGS begins tracking total energy consumption by fiscal year



Recycling

Re-use of natural resources is the last stop for many resources before the landfill. As technology and staff operations change, products become obsolete. At this time, the products have been paid for and used but still have some life left. Other agencies may need these products or BGS Surplus could sell them to the public. This gives the products a second chance at life and delays the final step. The last step is recycling and disposal. Recycling is a way for the equipment or materials to take on a new life as another product or as a newer version of its former self. Disposal means the product is placed in a landfill where time and money is spent trying to store, manage, and monitor its deterioration (if possible) to ensure it does not contaminate the natural resources surrounding it.

Volume of Recycling in Waterbury State Office and Capitol Complex (tons)



Education

A recognition program is an important component to the survival of the implementation of this plan. Recognition programs can be on a department wide basis to an individual basis. Submitting articles and comments for the Energy Newsletter gets the attention of other agencies as well as the public that regularly reads the newsletter on the energy website. Provide a single statewide contact, BGS Environmental Engineer, as a resource for all the Energy Staff selected in the various agencies/departments. The BGS Environmental Engineer provides information on upcoming conferences, trainings, and workshops to develop the knowledge base of the Energy Staff.

Periodic meetings are held as necessary for hands-on training or presentations. Web, phone, or teleconferencing is used whenever possible for other meetings. The BGS Environmental Engineer keeps in touch with the energy community to identify what information and presenters necessary for the trainings and presentations.

Resources

- **Energy and Environment Website** – for use by the state government.
- **Energy Newsletter** - posted every other month to provide new technology information, results of energy projects, and highlight the accomplishments of different state staff.
- **Past Energy Newsletters** - archived on the website for future access.
- **Brochures** - posted to provide tips on saving energy in various work settings.
- **State Agency Energy Plan** - available for viewing on the website



Pilot Programs

2010:

- **LEED review** – Comparison of BGS Design Guidelines to LEED process during the new construction of the Fire Safety Training Building at Pittsford Academy
- **LEED Certified building** - The Fire Safety Training Building at the Pittsford Academy is the first state building in Vermont to receive LEED-NC (for New Construction) Certification. The building received 35 out of 52 possible points, giving the building a Silver Rating.

2006:

- **Biodiesel study** – BGS conducted a study of the effects of blending various percentages of biodiesel with no. 6 fuel oil at the Waterbury State Office Complex.

2005:

- **Reduce quantity of waste from information centers** – BGS utilized horticulture as part of the wastewater treatment process at Sharon Northbound Information Center.
- **Biomass study** – BGS partnered to study the availability of biomass resources in the state and surrounding area.
- **Biodiesel for heat** - BGS starting using a biodiesel blend for heating at Brattleboro State Office Building.

2001:

- **LEED checklist** – BGS incorporates features from the LEED checklist into a major renovation project at McFarland State Office Building.



Awards

Recognition for the work towards energy efficiency and the environment is growing with over half the awards from national organizations from the energy efficiency community and the governmental peers. Over the years, BGS has worked on the energy and environmental improvements without the expectation of recognition. The unsolicited awards are examples of a fraction of the work done and the example of the work to come.

2010:

- **Pittsford** - Fire Safety Training Building received LEED-NC Silver Certification by the United States Green Building Council (USGBC)
- **Plymouth** - Calvin Coolidge Museum and Education Center received the Advanced Buildings Core Performance[®] designation by the New Buildings Institute

2007 to 2009:

- **State of Vermont** – Ranked in top 12% for the State Energy Efficiency Scorecard from the American Council for an Energy-Efficient Economy

2006:

- **Bennington** – Bennington Downtown State Office Building awarded Honorable Mention for Better Buildings by Design Celebrating Excellence in Energy Conscious Building Design
- **State of Vermont** – Recognized for the participation in the Way To Go Week! Commuter Challenge by Way To Go! Organizers including Agency of Transportation

2005:

- **State of Vermont** – Award in Energy and Environment: State Programs by the Council of State Governments Innovations Award

2004:

- **Barre** - McFarland State Office Building awarded Honorable Mention in the Places to Work - Large Building category by the Northeast Sustainable Energy Association

2003:

- **Barre** – McFarland State Office Building recognized for Better Buildings by Design Celebrating Excellence in Best Integrated Design for Energy Efficiency in a Major Renovation