2016 Agency Energy Implementation Plan

Background and Statutory Requirements

The State of Vermont is committed to supporting Vermont's transition to a healthy and prosperous clean energy future, by reducing energy use and improving energy efficiency in its own facilities and operations, and by increasing the share of energy it gets from renewable sources.

It is the responsibility of Vermont State government to be a leader in reducing our greenhouse gas emission through energy conservation and the implementation of renewable forms of energy. As part of an ongoing energy planning process, state agencies are required by statute to adopt implementation plans biennially to assure that programs and actions are consistent with the statewide energy goals outlined in the State Agency Energy Plan (SAEP).

Statute:

3 V.S.A. Section 2291 requires that the Secretary of Administration with the cooperation of the Commissioners of Public Service and of Buildings and General Services (BGS) develop and oversee the implementation of a State Agency Energy Plan for state government. The plan shall be adopted by June 30, 2005, modified as necessary, and readopted by the secretary on or before January 15, 2010 and each sixth year subsequent to 2010.

3 V.S.A. Section 2291a asks that all state agencies engage in a "continuous planning process" that is "coordinated in a manner established by the Commissioner of BGS" to assure that programs and actions are consistent with the goals established in §2291 and

3 V.S.A. Section 2291b requires that each state agency adopt an implementation plan on or before August 31, 2010 to ensure compliance with the state agency energy plan. Each agency shall readopt and file its implementation plan biennially with the commissioner to ensure that the implementation plan remains compatible with the state agency energy plan.

The following document serves as the Department of Buildings and General Services' (BGS) 2016 Agency Energy Implementation Plan (AEIP) and is intended to establish responsibilities and strategies that will help BGS meet the goals put forth in the 2016 State Agency Energy Plan.

Introduction

BGS is committed to reducing our carbon footprint through the implementation of energy efficiency, energy conservation and renewable energy projects and practices. Over the past two years since the 2014 BGS agency energy implementation plan was adopted we have continued to work hard to accomplish our commitments.

Goals:

The 2016 SAEP includes clear and measurable energy goals for state government in three areas: a) reductions in total energy consumption across all facilities and operations; b) expansion of the share of state energy that comes from renewable sources such as solar, wind, high-efficiency biomass, and hydroelectric power; and c) reductions in state government emissions of greenhouse gases that cause climate pollution.

BGS adopts the goals set forth in the 2016 State Agency Energy Plan.

- Reduce total energy consumption by 20% by 2025, and by 25% by 2030.
- Meet 35% of the remaining energy need from renewable sources by 2025, and 45%by 2030.
- 40% reduction of greenhouse gas emissions below current levels by 2030.

Energy Team:

The lead team member responsible for overseeing the goals of the 2016 BGS AEIP is Daniel Edson, State Energy Program Manager. Daniel oversees the BGS Energy Office comprised of Eric Sharp, State Energy Program Coordinator; Peter Hooper, Energy Project Manager; and Rick Hoermann, Energy Project Manager; The BGS Energy Office reports directly to Julie O'Tool Gutgsell, Operations Chief of Facilities and Property Services. Additional Energy Team members whose duties more regularly align with the goals of this Plan are Mike McArdle, Buildings Engineer II; and Teigh Southworth, Buildings Engineer II. The Energy Office works closely with all BGS Offices and Divisions. Ultimate responsibility lies with the Commissioner of Buildings and General Services.

Energy and Emissions Tracking

BGS utilizes the Environmental Protection Agency's ENERGY STAR Portfolio Manager®, an online tool used to measure and track energy and water consumption, as well as greenhouse gas emissions, for building related energy use. The portfolio manager allows BGS to benchmark the performance of one building or the entire portfolio of our buildings, all in a secure online environment. Each building is assessed based on its specific energy consumption per square foot and compared nationally to buildings of similar construction, use and climate zone. With this information BGS can target buildings that aren't performing well relative to energy use and cost of energy to operate.

BGS Fleet Management Services utilizes the WEX Fleet Purchase Card Statements combined with the Fleet Focus MS for tracking energy consumption related to transportation. These two systems combined provide BGS with enough information to track fuel consumption and associated greenhouse gas emissions.

The 2016 State Agency Energy Plan has established state fiscal year 2015 as the baseline year by which to measure success toward our goals. Roughly 87% of the total energy use under BGS responsibility is directly associated with buildings such as lighting and HVAC while 13% is associated with transportation

(Exhibit 1). Even though the majority of energy consumed is associated with buildings operations, roughly 29% of greenhouse gas emissions are released from transportation needs (Exhibit 3). This demonstrates that while the majority of energy consumption reduction and renewable energy usage increases will need to occur in the buildings sector it is equally as important for BGS to continue the great work of the Fleet Management Program. A contributing factor to the higher percentage of greenhouse gas emissions associated with transportation needs is the monumental achievements BGS has made by shifting to renewable wood biomass for heating energy in buildings. Biomass now accounts for 38% of BGS' total energy consumption. (Exhibit 2).

Exhibit 1:

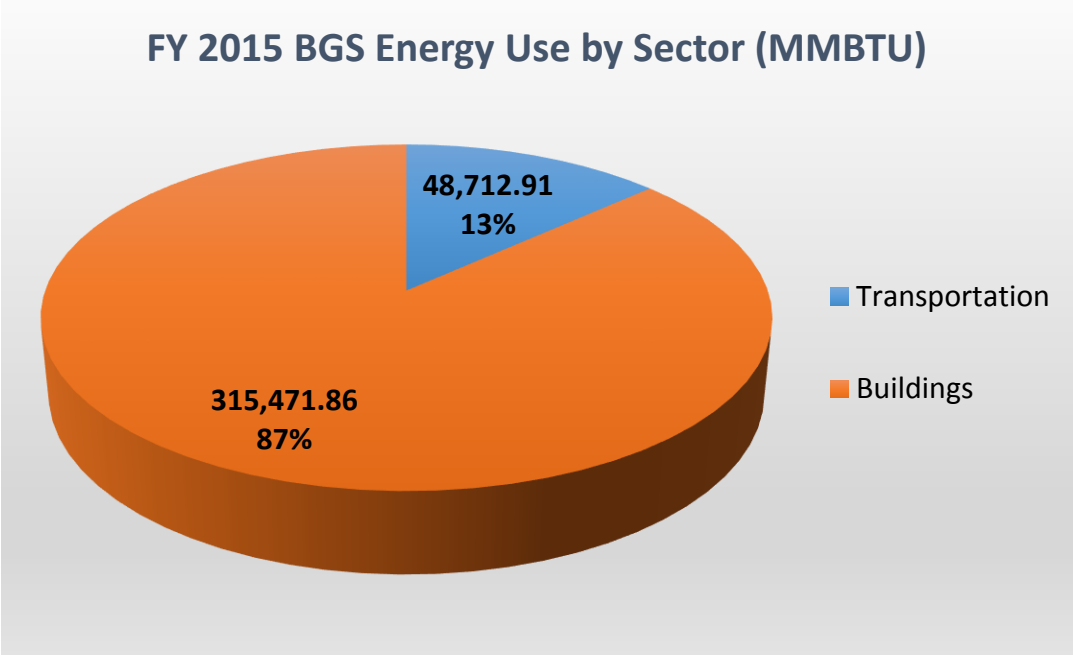


Exhibit 2:

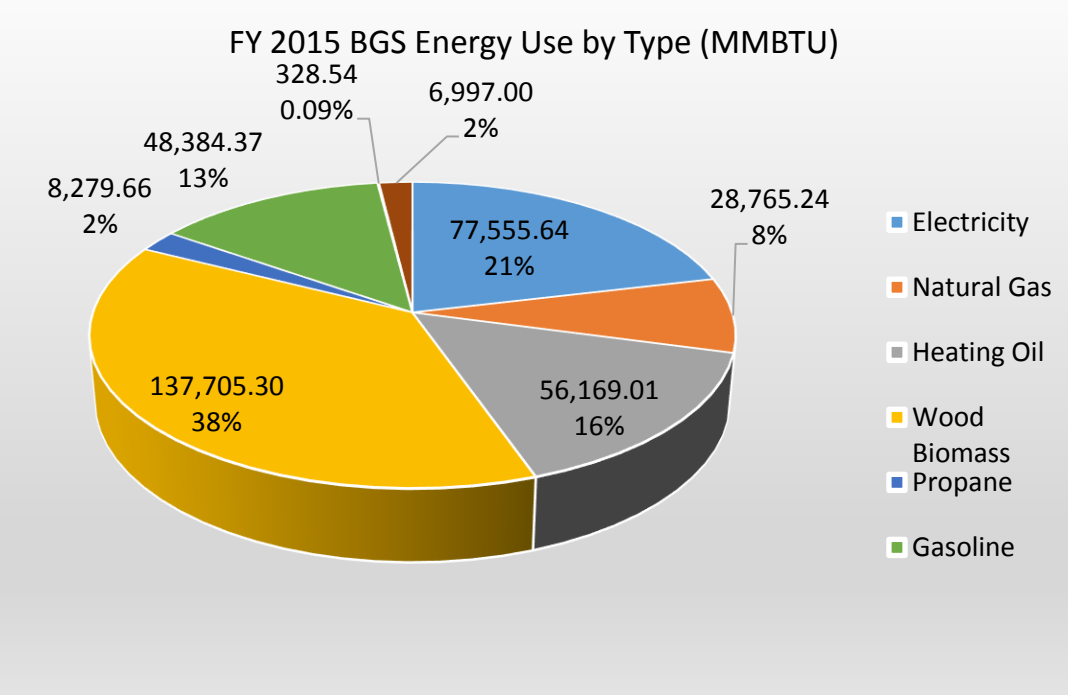
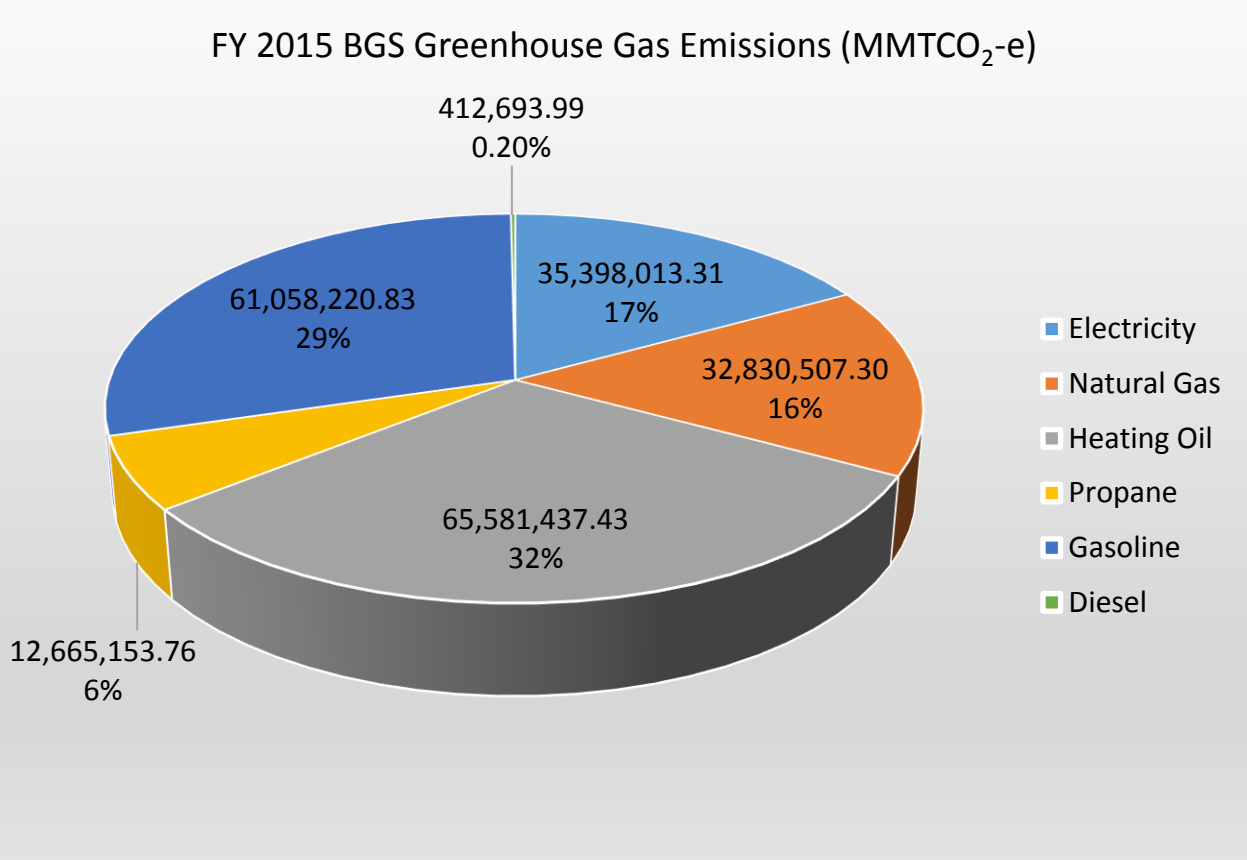


Exhibit 3:



BGS Owned and Operated Buildings

Explanation of Goal:

BGS acknowledges the intent of ACT 40, Section 47 to reduce energy consumption in state government operations by 5% annually. Although a 5% percent reduction annually is not feasible, the intent is in alignment with the goals set forth in the 2016 SAEP. Therefore BGS is committing to the new goal established in the 2016 SAEP to reduce total energy consumption associated with transportation and buildings under its jurisdiction by 20% by the year 2025. In order to achieve a total energy consumption reduction of this magnitude BGS will aspire to achieve a 12% reduction in energy use from 2015 numbers by 2020 in building infrastructure alone. This means that we expect to see a 6% reduction by the year 2018 when we are required to readopt this plan.

Action Plan:
BGS will achieve this reduction goal through the implementation of improved energy efficient construction practices in BGS projects overseen by our dedicated project management staff and the efforts of the State Energy Management Program (SEMP).

BGS has developed Design Guidelines to be utilized by design teams when contracted by the state for new construction and major renovation projects. BGS strives to adopt higher standards wherever possible given project budgets. BGS works closely with local municipalities to find suitable downtown location for state government operations when considering new construction, if appropriate. This promotes shared resources, use of public transportation and contributes to downtown economic growth in Vermont.

BGS works directly with Efficiency Vermont and architectural and engineering firms to assess the life cycle cost benefit of potential energy improvements during concept and design phases.

The SEMP oversees two revolving loan funds to provide low-cost financing for energy management measures in state buildings and facilities. The State Resource Management Revolving Fund (SRMRF) and the State Energy Revolving Fund (SERF) are available for resource conservation measures, energy efficiency improvements, and the use of renewable resources. These funds were created to eliminate barrier of expensive up-front costs of efficiency improvements that yield significant cost savings once completed. The energy projects funded through SEMP revolving funds are making progress toward energy savings goals and saving Vermont taxpayer dollars.

The State of Vermont through the BGS Energy Office seeks to invest $4 million of revolving fund monies in energy improvements over the next four years from the two revolving loan funds. If this target is reached, state government could save an estimated $800,000 annually over the next 20 years - roughly $16 million in total energy savings. If the SEMP meets this investment target, the projected energy savings could result in a building energy consumption reduction of 12% from 2015 totals. BGS estimates that the SEMP could invest an additional $4 million by 2025 above these initial goals.

In 2015 the Vermont Legislature passed ACT 58, Sec. E.112, Energy Efficiency; State Building and Facilities, which requires BGS (with support from Efficiency Vermont) to scale up work performed by the SEMP for a preliminary period of four years to deliver energy and dollar savings to state government. Efficiency Vermont is providing adequate funding to support the creation and maintenance of BGS's SEMP team (including three full-time positions) over the four-year preliminary period. In accordance with ACT 58 Sec. E.112, BGS and Efficiency Vermont have agreed to deliver $150,000 in energy savings in fiscal year 2016, and a cumulative amount of not less than $300,000 in fiscal year 2017. The three full-time positions have been filled as of July 25, 2016. The BGS SEMP team includes one electrical engineer, an experienced project manager with over 35 years in the construction and energy industry and an invaluable program coordinator who has commercial, residential and renewable energy construction experience.

BGS and Efficiency Vermont have committed to collaboratively supporting and managing the SEMP. By working in close partnership, BGS and Efficiency Vermont will leverage each organization's strengths, experience, and resources toward meeting the established goals. The SEMP team has established a systematic approach to achieving energy efficiency and energy conservation in state buildings. The process includes five key parts:

#1 Project Identification

BGS and Efficiency Vermont developed and maintain a list of energy projects that will achieve at a minimum the annual electrical and thermal energy savings necessary to achieve the financial savings required of the SEMP in ACT 58. Project Identification shall proceed as follows:

1. Efficiency Vermont documents identified opportunities in the Efficiency Vermont database
2. BGS reviews the Energy Star Portfolio Manager® ("ESPM") list of properties, identifying and prioritizing specific buildings to address based on the Energy Utilization Intensity (kBtu/sq. ft.) and energy cost intensity ($/sq. ft.)
3. The BGS Energy Office meets weekly to discuss current projects. BGS and Efficiency Vermont meet bi-weekly regarding urgent issues, how to improve process, reporting and project collaboration.
4. BGS periodically reviews the major maintenance list to identify energy saving opportunities therein.
5. In accordance with Section 24 Title 29: 157 VSA (a) (3), following the procedures developed by BGS with the support of Efficiency Vermont, ASHRAE Level II energy audits are performed on a minimum of 10% of BGS owned building square footage.
    a. Through the fair bid process BGS has contracted the services of four firms experienced in providing these services
    b. BGS and Efficiency Vermont will review the energy evaluation reports as follows:
        i. Identify questions and concerns, flagging anything unusual or potentially incorrect from an energy efficiency perspective
        ii. Evaluate potential custom work scope of recommended Energy Conservation Measures. This evaluation shall be comprised of:
            1. Life-cycle cost analysis
            2. Return on investment calculations
            3. Technical review of identified projects
            4. Assessment of savings and cost estimates, and
            5. Assessment of measurement and verification needs
    c. If needed, BGS shall provide feedback to the energy auditor and request a revised report. BGS and Efficiency Vermont shall repeat the review process until the energy evaluation report is approved by BGS.

#2 Project Development, Planning and Scoping

BGS will assign approved projects to the SEMP Project Managers for project management. The SEMP Project Managers will determine each project's scope, budget and timeline and select an implementation contractor(s) following BGS's standard contracting procedures. BGS and Efficiency Vermont will conduct Project Development, Planning and Scoping as follows:

1. Upon request, Efficiency Vermont will review Request for Proposals (RFP) to aid BGS in the efficient procurement of project contractors, such as electrical, mechanical, and controls professionals.
2. BGS and Efficiency Vermont will participate in Project Development Meetings, reviewing opportunities established through the project identification process described above, and agreeing on exact tasks and responsible team members for completing each task in the development of each opportunity reviewed.
3. With Technical Assistance from Efficiency as needed, BGS SEMP Project Managers shall finalize each project's scope of work.
    a. BGS and Efficiency Vermont will work together to establish estimated energy and dollar savings for each project.
    b. Efficiency Vermont will enter savings estimates in the Efficiency Vermont database.
4. BGS will post RFPs and proceed with contractor procurement according to State requirements.

#3 Project Execution and Management

Once a project is selected and approved, BGS will provide overall Project Management during project execution with support from Efficiency Vermont as follows:

1. Upon receipt, BGS will share the selected contractor's quote with Efficiency Vermont.
2. Within two weeks of quote receipt, Efficiency Vermont will create and send an Incentive Agreement to BGS. The Incentive Agreement will show:
    a. Estimated Cost of Efficiency Improvements
    b. Efficiency Vermont Incentive, if applicable
    c. Net Cost After Incentives
    d. Estimated First-Year Energy Savings
    e. Estimated Simple Payback Period
    f. Estimated Average Lifetime of Efficiency Improvements
    g. Estimated Rate of Return on Investment
3. BGS will include the Incentive Agreement and any other necessary documentation in the project loan package when using SERF and SRMRF funding.
4. BGS will sign and return the Incentive Agreement prior to work beginning on the project.
5. Upon request, Efficiency Vermont will review invoices, equipment specifications, and other project documentation provided by project contractors to BGS during project implementation.

#4 Project Completion and Closeout

1. BGS will notify Efficiency Vermont when project work is completed.
2. Efficiency Vermont will schedule a verification inspection within two weeks of notification of project work completion, coordinating with appropriate BGS personnel to schedule inspection times.
3. Efficiency Vermont will complete necessary documentation procedures to finalize and document savings in the Efficiency Vermont database within two weeks of completed inspection.
4. Upon request, Efficiency Vermont can assist BGS in assessing need for commissioning or tuning of newly installed equipment.
5. Upon request, BGS will permit Efficiency Vermont to further meter and inspect energy efficiency projects.

#5 Program Tracking, Reporting and Evaluation

BGS and Efficiency Vermont will perform the necessary data collection and analysis to comply with the following reporting requirements of Act 156 Sec. E.112 (d):

> *(d) On or before October 1 of each year commencing in 2016 and ending in 2019, the Department and EVT shall provide a joint report on the implementation of this section.*
>
> > *(1) The report shall state, for the prior fiscal year, the energy savings targets developed, the actions taken to achieve those targets, and the energy savings achieved by each action.*
> >
> > *(2) The report shall project savings and strategies to attain those savings for the next fiscal year and for the remaining fiscal years of the Program.*
> >
> > *(3) The report shall include improvements made toward systems of measurement to achieve the goals of 2011 Acts and Resolves No. 40.*
> >
> > *(4) The report may include recommendations for accelerating the implementation of energy efficiency and conservation measures under the Program and improving the Program's tracking and documentation of savings.*

(5) The report to be submitted in 2019 shall contain an evaluation of the Program authorized under this section and any resulting recommendations, including recommendations related to Program continuation.

BGS has also partnered with the Sustainable Endowment Institute (SEI) by joining the Billion Dollar Green Challenge (The Challenge) in 2014. The Challenge encourages colleges, universities, and nonprofit institutions to invest a combined total of one billion dollars in self-managed revolving funds that finance energy efficiency improvements. The Challenge is coordinated by SEI in collaboration with 15 partner organizations, including the Clean Air – Cool Planet, Clinton Climate Initiative, and Vermont Energy Investment Corporation (VEIC). The State of Vermont is the first State to join The Challenge.

By joining the challenge BGS has gained access to the Green Revolving Investment Tracking System (GRITS). GRITS is an online tracking tool that makes it possible to access and learn from the field-tested work of other institutions, facilitate investments in efficiency projects by enabling BGS to easily and clearly communicate with stakeholders, simplify calculations of project-specific carbon and financial savings on both annualized and estimated life-of-project timeframes, and create customized reports that tell the story of current and anticipated financial and environmental performance associated with our revolving funds.

Employee Behavior Recommendations:

Energy Conservation

- Turn off lights whenever possible. Create an outlook task request or daily calendar event reminding employees to turn off the lights at the end of their work day. If you see an incandescent bulb replace it with an LED.
- Computers can be defaulted to allow monitors to turn off when the computer is shut down. During the workday, computers can be defaulted to hibernate after a specified period of inactivity.
- Create awareness regarding the unnecessary use of lighting. Many offices have enough ambient light from the sun to allow for indoor lighting to be turned-off.
- Identify all plug-loads in your office (computers, printers, fans, task lighting, etc.) and put up signs to remind employees to turn them off when they are not needed. **Especially at the end of the day.** Devices such as smart strips can be purchased to do this more efficiently.
- Office equipment such as copiers, printers and scanners are defaulted to transition into hibernate or energy savings mode after specified periods of inactivity.
- New office printers should be defaulted to duplex (double-sided). Circulate instructions to staff on how to set their computer printing defaults to duplex. As older printers are replaced, new printer purchases should be required to have the duplexing option.
- In collaboration with the BGS Office of Purchasing and Contracting, make sure that purchases of new office equipment (computers, printers, copiers, etc.) are as energy efficient as possible and Energy Star certified when applicable.
- Create centralized kitchenettes to serve multiple employees. Encourage employees to use shared appliances and stop the use of personal kitchen appliances.
- Close windows when you leave the office.

Natural Resource Conservation

- File electronically when permitted. When paper filings are required and/or allowed, prepare double-sided documents. Use electronic versions of documents rather than paper copies. Utilize projectors, large display monitors or interactive monitors such as Smart Boards to review documents in a group when available.
- Encouraged employees to be selective when deciding to print e-mails or other internal documents. Use double-sided printing for these types of documents whenever possible.
- Reuse office supply materials whenever possible (e.g. folders, binders). When ordering supplies, check with all supply areas to determine actual need before placing orders.
- Make sure recycling bins are accessible to all employees. Collaborate with the Agency of Natural Resources (ANR) to provide local recycling guidelines for your location.
- Start a composting system in your building. Resources are available through ANR and BGS.
- Encourage employees to bring in re-usable utensils, cups and dishware.

Transportation Energy Use:

Explanation of Goal:
BGS Fleet Management is committed to meeting the goal adopted in the Vermont Zero Emissions Vehicle (ZEV) Action Plan - to make 25% of light-duty state fleet vehicles electric by 2025. In order to reach our total energy reduction goal established in the 2016 SAEP, the miles powered by electricity in plug-in hybrid vehicles and all-electric vehicles should achieve a level sufficient to displace 10% of the state's current gasoline use by 2020, 25% in 2025, and one-third by 2032. Although this goal will require all agencies to do their part, BGS Fleet Management will be leading the way.

Action Plan:
The Go Green Fleets Initiative launched by BGS Fleet Management Services (FMS) in 2016 is designed to help achieve these goals by adding more electric vehicles (EV), rightsizing the Fleet and educating employees.

The availability of cost effective EVs continues to increase and technology is consistently changing with greater electric mileage range becoming available every year. BGS will add at least five new EVs to the fleet each year. Employees whose trips can be made in EVs will be assigned those vehicles whenever possible.

Maintaining a fleet with high average fuel efficiency – including efficient heavy-duty trucks for which there are no electric models yet– can dramatically reduce fossil fuel use. The Fleet Management Program is reducing the overall cost of employee travel and reducing greenhouse gas emissions by right-sizing its fleet. *Fleet right-sizing* is a management practice that can help vehicle fleet managers build and maintain sustainable, fuel-efficient fleets. Fleet inventories can include vehicles that are highly specialized, rarely used, or unsuitable for current applications. By optimizing fleet size and composition, managers can minimize vehicle use, conserve fuel, and save money. For more information, see www.afdc.energy.gov.

BGS will consider offering Ride and Drive events and employee training to get the state's work force comfortable with new EV models, and to encourage their use. Education about eco-efficient driving practices that reduce fuel use and air emissions, such as avoiding single driver trips, reducing idling, and slowing average highway speeds, is also a top priority.

BGS has obtained a state wide contract for electric vehicle charging stations. This allows BGS to purchase and install charging stations at key locations in order to convert the Fleet. The oldest sedans with greater mileage throughout the fleet will be replaced by EVs. The EVs will be placed in target locations where a round trip on one charge, trips to destinations with a charging stations or charging is along the way is most likely. If older vehicles are currently in less appropriate locations for EVs they will be swapped out for newer non-EVs in the targeted locations. This process has already begun at the Montpelier central motor pool and the Waterbury State Office Complex where we have a total of 20 charging spaces available to Fleet vehicles and an additional four spaces available to state employees and the public. BGS will continue to build charging infrastructure to service the state's growing EV fleet, and make additional infrastructure accessible to the public where possible.

Employee Behavior Recommendations:

On the Job Travel

- Operations staff should continue working with FMS to identify opportunities to add more plug-in hybrids, and new all-electric vehicles with longer ranges, to the central motor pool and to agency fleets where they are well-matched to transportation needs by communicating their transportation needs to FMS.
- Encourage trip planning and mobility practices that reduce fuel use and the associated air emissions.
- Provide and encourage the use of the current statewide webinar, interactive video conferencing and conference calling resources.

Employee Commuting

- Encourage and incentivize employees to use public transit services when available to commute to work. The state Go Vermont program, administered through VTrans, provides commuting alternatives for all employees in Vermont, among which state employees are a big part. Go Vermont connects rideshare participants, administers vanpool programs, and is a convenient portal to state transit programs.
- Staff are encouraged to commute by energy saving methods such as walking, bicycle, carpool, or bus.
- DHR's Wellness Division coordinates challenges throughout the year for all State employees to promote walking, biking, etc. as a healthy alternative.

Renewable Energy

Explanation of Goal:

BGS is committed to helping state government meet 35% of the remaining energy need, after efficiency improvements, from renewable sources by 2025, and 45% by 2030. This goal will be achieved primarily through the conversion of diesel fuel to bio-diesel by the Agency of Transportation. BGS doesn't control the majority of diesel consuming vehicles in state government fleets so it is the primary goal of BGS to focus on continuing to convert heating systems to woody biomass, entering into more net-metering

contracts to offset electricity use with solar and converting fleet vehicles to electric as described in the previous section.

Action Plan:

Solar

The state is currently under contract with AllEarth Renewables to provide a cost-effective strategy to increase the state's renewable energy portfolio. Through this contract, BGS and the Department of Corrections have entered into 10 group net metering contracts that, when completed, will create almost five megawatts of solar power capacity and reduce greenhouse gas emissions by over 4,000 tons of carbon dioxide. BGS currently offsets roughly 8.5% of its electrical consumption in owned properties excluding correctional facilities with renewable solar power. With the construction of an additional 500 kW capacity system slated for the fall of 2016 this number will rise to 12%.

BGS will continue this work with the release of a new request for proposals focused on projects that can be installed on the built environment such as rooftops or carports. BGS will wait until the new Net-Metering Rule has been passed which will help define the financial model used to accomplish projects of this type.

Bio-mass

The Comprehensive Energy Plan includes new goals for promoting the use of woody biomass in modern heating systems; however, the plan also emphasizes that this resource must be harvested in a sustainable way to ensure that the increased use of biomass does not harm the health of Vermont's forests.

On January 15, 2015, the commissioner of the Department of Forests, Parks and Recreation (FPR) adopted a set of voluntary harvesting guidelines for private landowners to help ensure long-term forest health and sustainability. The guidelines were developed in response to Act 24, which was passed by the Vermont Legislature in 2013.

For the 2015-2016 heating season much of the wood fuel used by the Montpelier District Heat Plant and the Waterbury State Office Complex was locally sourced from a timber sale on state-owned land in Topsham. The fuel was harvested as part of a wildlife habitat management project conducted on the VT Department of Fish and Wildlife's, Pine Mountain Wildlife Management Area under the direction of foresters from the Department of Forests, Parks & Recreation. The project is designed to improve habitat for Ruffed Grouse as well as to promote the production of hard and soft mast crops (beech nuts and black cherry) for wildlife. Catamount Forest Products LLC of Groton, VT purchased the standing timber through a competitive bid process. The company harvests standing timber throughout central and northeastern Vermont for a variety of forest products ranging from high value sawlogs and veneer logs used for lumber and production of wood products, to pulpwood used to make paper and the wood chips used for heat and electrical generation. On an annualized basis, Vermont's forests grow roughly twice as much wood volume as is harvested or lost to mortality. A significant portion of this volume is of low quality which is not suitable for use as sawlogs, or other high value products, but which needs to be harvested to make room for higher quality trees. Markets for this low-grade wood are critical to accomplishing forest management goals. "Energy wood" (including wood chips, firewood and wood for pellet manufacturing) has become an increasingly important low-grade wood market for Vermont's

loggers as well as public and private landowners, especially in light of recent contractions in the paper industry in New England. (Information provided by Paul Frederick, Wood Utilization Forester, Department of Forest Parks and Recreation).

BGS will continue to convert buildings burning #2 fuel oil to wood biomass as aging boilers require replacement and consider wood biomass in new construction wherever practical.

Energy in Leased Space

In Act 178 of 2014, Section 40, the legislature asked that the Commissioner of Buildings and General Services develop a set of criteria and guidelines to evaluate and, where appropriate, incorporate the use of energy efficiency measures, thermal energy conservation measures, and renewable energy resources in buildings and facilities leased by the State. In response to this request BGS has developed procedural guidelines for property management to use when considering State leases.

BGS will consider gathering utility information when available in order to maintain an inventory of energy usage data for full service lease agreements where BGS pays the utility bill, the leased space is greater than 5,000 square feet and the total term of the lease is five years or greater. After the State Energy Management Program preliminary four year funding period has concluded BGS will assess the availability of resources to pursue additional energy efficiency actions in lease space.