BGS Energy Efficiency and Resilience Programs

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BGS Energy Efficiency and Resilience

The Creation of the State Energy Management Program (SEMP)

2014: Act 178 Capital Bill established the SEMP.

- State Energy Revolving Fund
- State Resource Management Revolving Fund

2016: Act 58 Big Bill augmented the SEMP for four years.

Efficiency Vermont reimburses SOV for three full-time employees.

- BGS and Efficiency VT are required to save $150,000 in energy savings annually.
- BGS works with state agencies and the Climate Cabinet to generate the State Agency Energy Plan.

2022: Act 172 Municipal Energy Resilience Program augmented the SEMP for four years.

- Within the expansion of services to municipalities, the existing SEMP is extended through 2027.

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BGS Energy Efficiency and Resilience

Creating partnerships with Efficiency Vermont (EVT) to achieve climate goals

Since 2016 BGS's partnership with EVT has included:

- Staffing for 3 positions (2 project managers and 1 coordinator)
- Program training and technical support
  - Annual Better Buildings by Design conference
  - Implementation of a lighting tool
- Measurement and verification
- Project and equipment incentives
- Joint annual reporting

Efficiency Vermont

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BGS Energy Efficiency and Resilience

Implementing Energy Efficiency Projects

- Energy Use Tracking
- Investment Grade Energy Audit
  - BGS Maintains 3 Million Square Feet of owned facility space
- Project Scope Development and Funding
  - SEMP contains 2 Revolving Loan Funds
  - Project Managers develop Statement of Work and oversee construction

ENERGY STAR® Portfolio Manager®

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BGS Energy Efficiency and Resilience

Implementing Energy Efficiency Projects

Energy Conservation Measures

- Installation of energy-efficient buildings and building systems
- LED lighting with sensor technology
- Weatherization & insulation
- Renewable heating and cooling systems
- Optimizing building automation systems
- Battery backup systems
- Maximizing reliance on renewable energy generation
- Flexible load management strategies

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BGS Energy Efficiency and Resilience

Implementing Energy Efficiency Projects

State Energy Revolving Fund (SERF)

- $8M credit facility under State Treasurer
- 7-year payback requirement started in 2018 and was raised to 15-year in 2023 by Treasurer Pieciak

State Resource Management Revolving Fund (SRMRF)

- $1.5M account under BGS Commissioner
- Payback tied to life of the equipment

BGS Energy Efficiency and Resilience

Program Highlights

- Flexible load management at BGS facilities
- Biomass heating for Middlesex Central Services
- Mahady Courthouse advanced lighting and controls
- Barre Courthouse & Rutland Multi-Modal Transit Center LED conversion
- Recirculation pumps, boiler replacement, and solar PV for fish culture stations (ANR)
- AOT Central Garage lighting
- NSCF lighting, SSCF energy improvements, MVRCF project planning underway (DOC)

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BGS Energy Efficiency and Resilience

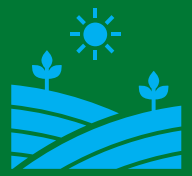
Results

The Big Picture

$6.3 million invested

87 projects funded

$5.8 million saved



24,084 MTCO2e emissions avoided

State Resource Management Revolving Fund (SRMRF)

- $2,992,652 invested across 72 projects
- $3,642,871 in avoided energy costs to date
- $547,145 available balance for future energy efficiency projects

State Energy Revolving Fund (SERF)

- $3,327,889 invested across 15 energy projects
- $2,188,757 in avoided energy costs to date
- $5,383,474 available for approval to fund future energy projects

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Electrical Vehicles Charging Equipment (EVSE) Infrastructure

Supporting the adoption of EVs and workplace and public charging

Electric Vehicle and EVSE Deployment

Telematics Data Collection	Primary parking location (state-owned, lease space or home-based) Travel destinations and patterns Miles traveled, trips and number of stops, speed, idling, fuel consumption	
Use Considerations	Tow/haul frequency % Off-Road Use Emergency response	
Vehicle Selection	Hybrid vs. Plug-in Hybrid vs. All-Electric EV range – Extended vs. Standard Battery Cost of Ownership and Model Availability	
Charging Infrastructure	Building electrical supply capacity Dedicated parking and proximity to electric supply	Sitework/Installation costs Permitting/construction schedules

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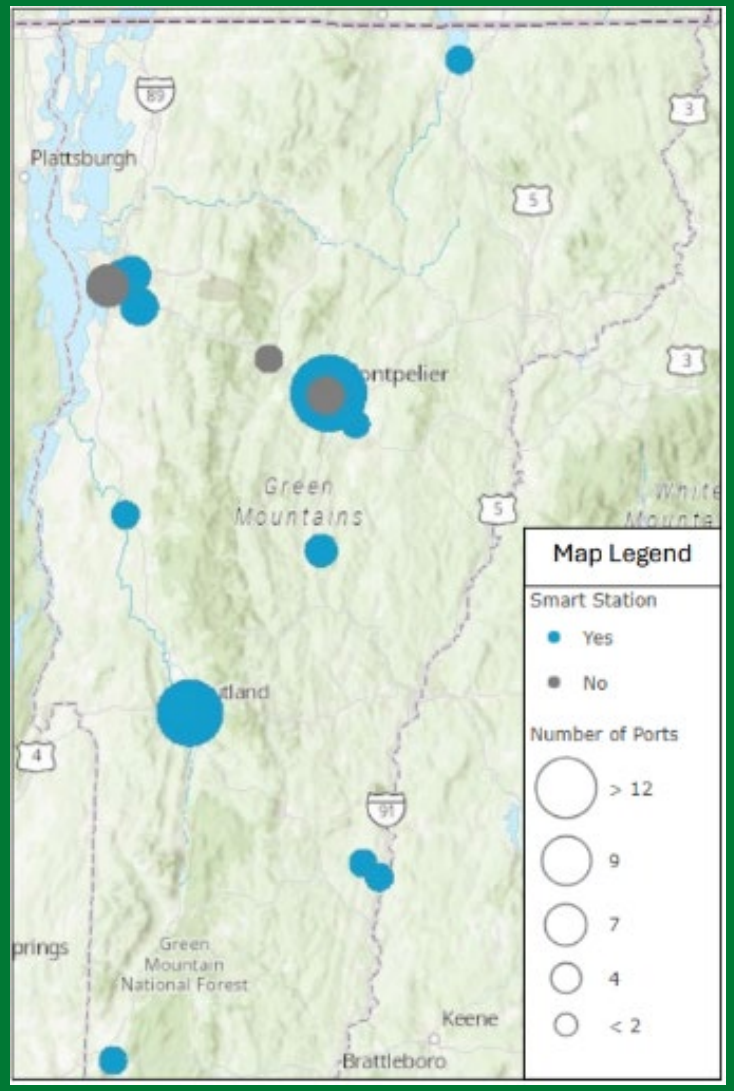
EVSE Infrastructure

BGS-Owned Charging Stations



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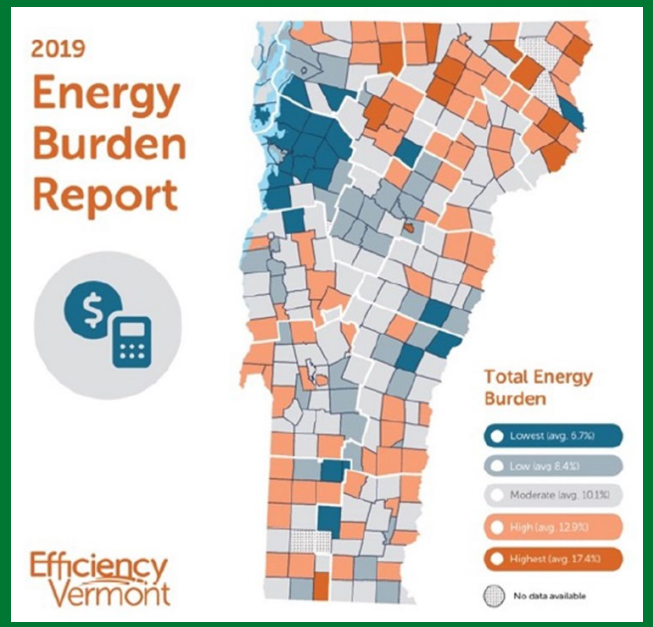
BGS Energy Efficiency and Resilience

Municipal Energy Resilience Program (MERP)
Extending technical expertise and funding to make municipal buildings more efficient and resilient

Act 172 of 2022, “An act relating to municipal energy resilience initiatives”

- $45M ARPA funding for communities
- Scope:
  - Conduct building assessments
  - Education and outreach
  - Energy resilience improvement projects



bgs.vermont.gov/municipal-energy-resilience-program

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BGS Energy Efficiency and Resilience

MERP

- Results
  - Mini-grants of up to $4,000
    - 147 awarded applicants to date
    - $582,000 funded to date
    - Applications still being accepted

RRPC

COMING TOGETHER TO LEARN ABOUT ENERGY RESILIENCE

MERP FLYER

DECEMBER 2023

"BUTTONING UP" THE TOWN OF CHITTENDEN

On November 1st, the community gathered at The Mountain Top Inn for an evening of learning, food, and fun. "Button Up" events are nothing new in Vermont, rooted in the state's annual campaign to raise awareness around weatherization projects and benefits. RRPC teamed up with Efficiency Vermont and the Town of Chittenden to deliver a unique program educating residents about energy resilience – on both the municipal and individual level.

The event had a healthy showing, with over 60 in attendance. Maggie O'Brien (RRPC) kicked off the evening by explaining the purpose and significance of MERP, as well as the benefits the program can provide for the Town. Jeremy Gildrien (RRPC) showcased some alternate funding sources for projects like solar, battery storage, and EV chargers. And Bekah Kuster (Efficiency Vermont) gave residents the tools they need to improve their homes (DIY or professionally).

Mountain Top Inn provided an excellent venue for dinner, dessert, and a raffle for energy efficiency prizes. The lucky winners received a range of products, including a battery-powered leaf blower, a Smart thermostat, and a prepaid gift card to Noble Ace Hardware. (There were plenty of LED light fixtures to go around, too!) All of this was made possible by funding from the State. Using their $4,000 Community Capacity Grant (or "mini-grant") from BGS, the Town didn't need to spend a dime.

Want to do something like this in your community? We can host or facilitate a community event **at no cost** to your Town. Contact Jeremy Gildrien at **Jeremy@rutlandrpc.org** or Maggie O'Brien at **Maggie@rutlandrpc.org** to learn more.

GET IN TOUCH (802) 775-0871 RUTLANDRPC.ORG

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Chittenden, VT

Community engagement in the energy transition has multi-pronged benefits: lower emissions, lower costs, and greater comfort—especially in places like Vermont, where winters are tough and heating costs can be volatile. With their MERP Mini Grant, the Town of Chittenden partnered with Efficiency Vermont and the Rutland Regional Planning Commission to host a highly attended "Button Up" event for residents, promoting the benefits of weatherization projects as the foundation for building energy efficiency improvements—and how MERP, along with other funding, can make those projects a reality. Attendees came for dinner, dessert, and knowledge sharing. Some even left with raffle prizes, including a battery-powered leaf blower and Smart thermostat! See this RRPC flyer for more details.

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BGS Energy Efficiency and Resilience

MERP

- Results
  - Assessments fully funded from $5M allocation
    - 237 applicants
    - 665 buildings applied for
    - Close to 250 site visits completed to date

"We heard about the MERP assessment grants through our RPC and BDA. Being in an economically distressed area, we are always looking for ways not to burden the taxpayers – to cut our budget and use other money. This was one of the easiest and most straightforward grant applications I've filled out. And once we submitted it, the support was great – we were able to understand exactly what was needed. It took a month to get approved, if not less than that. The assessment itself was straightforward – I didn't have to do much – and it was an eye opener to see where the gaps were. We're definitely going to apply for an implementation grant to cover any upgrades we need for energy efficiency." - Zach Brown, Town Clerk/Treasurer, Canaan

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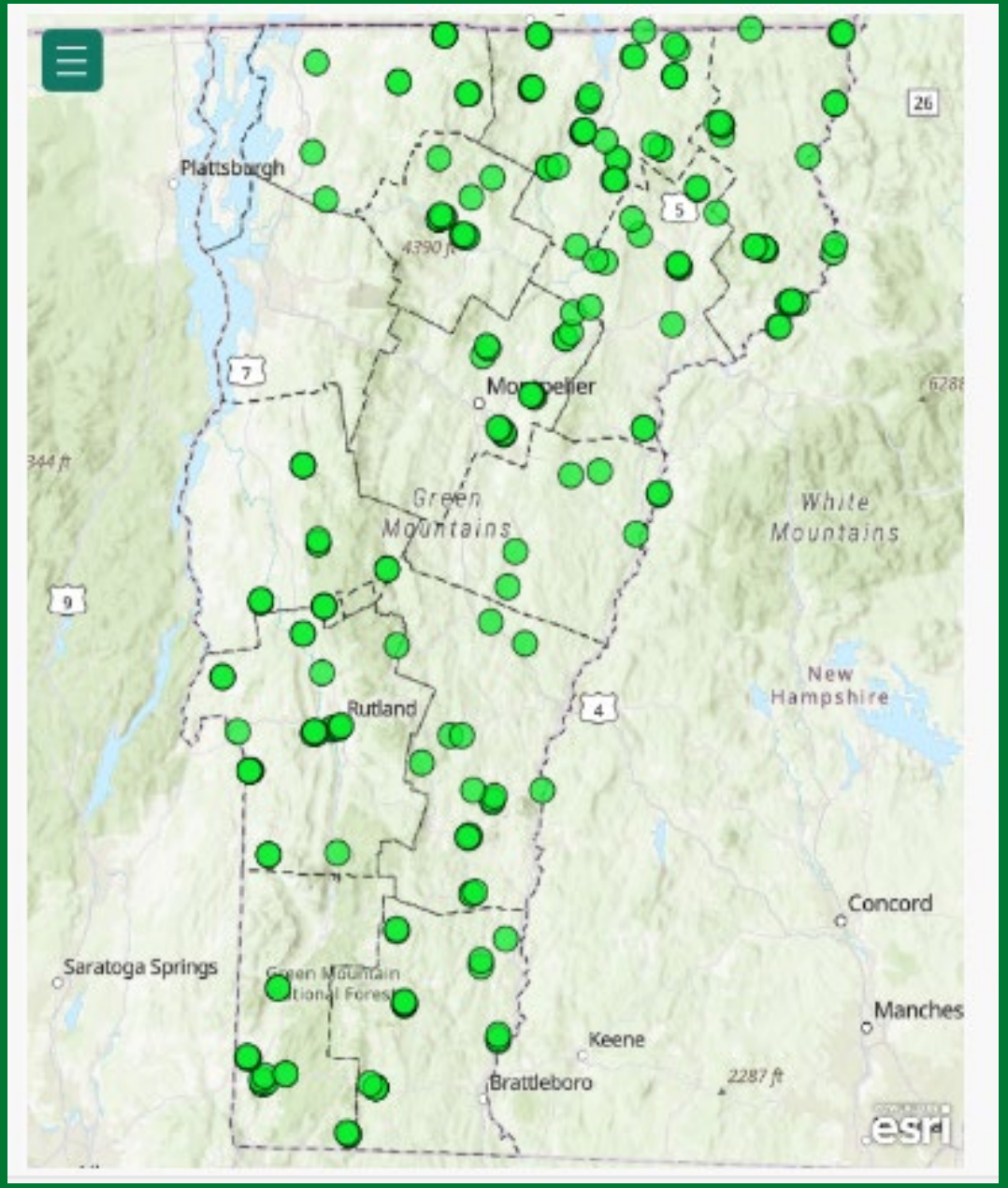
Completed MERP Assessments



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BGS Energy Efficiency and Resilience

MERP

- Next Phase: Implementation Grants
  - Up to $500,000 per applicant
  - $35M in total funding
  - Planned application opening this spring
  - All awards finalized by December 31st

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BGS Energy Efficiency and Resilience

Design and Construction Projects - Statutory Language

Act 51 of 2013

Sec. 49. RENEWABLE ENERGY AND ENERGY CONSERVATION POLICY

(a) The Department of Buildings and General Services shall incorporate the use of renewable energy sources, energy efficiency, and thermal energy conservation in any new building construction or major renovation project in excess of $250,000.00 unless a lifecycle cost analysis demonstrates that the investment cannot be recouped or there are limitations on siting.

(b) On or before January 15, 2014, the Department of Buildings and General Services shall contract for a desk audit to examine and report on the feasibility of installing renewable energy devices on up to 20 properties owned by the State.

(c) As used in this section, the “lifecycle cost” of each new building construction or major renovation project shall mean the present value purchase price of an item, plus the replacement cost, plus or minus the salvage value, plus the present value of operation and maintenance costs, plus the energy and environmental externalities’ costs or benefits.

BGS Energy Efficiency and Resilience

Design and Construction Projects - Statutory Language

Act 180 of 2022

Sec. 25b. REDUCING CARBON INTENSITY; STATE BUILDINGS; STATE ENERGY MANAGEMENT PROGRAM; INTENT

a) It is the intent of the General Assembly that the Department of Buildings and General Services implement strategies as soon as practicable to reduce carbon intensity in buildings under the jurisdiction of the Department. These strategies may include the use of:

    1) non-fossil-fuel alternatives when installing or replacing any space conditioning or water heating systems; and
    2) carbon-storing and least-embodied-carbon materials, as evidenced by appropriate documentation from contractors and suppliers, when constructing, renovating, or substantially repairing a building or facility.

b) It is also the intent of the General Assembly that the Department of Forests, Parks and Recreations and the Agency of Transportation use the technical assistance of the State Energy Management Program, created in 29 V.S.A. § 168, for eligible projects.

BGS Energy Efficiency and Resilience

Building Heat Sources

Fuel Type	Number of Buildings / Complex
No. 2 Fuel Oil	34
No. 4 Fuel Oil	1
Geothermal	4
Natural gas	12
Propane	17
Wood	10

Building / Complex	Multi Fuel Types
Northern State Correctional Facility	Chunk Wood /No. 2 Oil
Hebard State Office Building	Wood Chips / No. 2 Oil
Northeast Regional Correctional Facility	Chunk Wood / No. 2 Oil
St. Albans Public Safety	Wood Pellets / Natural Gas
Vt. Psychiatric Care Hospital	Wood Chips / Propane
Montpelier Complex	Wood Chips / No. 2 Oil
Waterbury Complex	Wood Chips / Propane
Middlesex VSARA	Wood Pellets / Propane

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BGS Energy Efficiency and Resilience

Life-cycle Cost Analysis Case Study

Newport: Northern State Correctional Facility Boiler Replacement

Fuel Type	Fuel Unit Price	Energy Content	Cost to provide one million Btu's
Propane (gallon)	$1.58/gal	91,333 Btu/gal	$20.16
Fuel Oil (gallon)	$3.85/gal	138,690 Btu/gal	$33.05
Wood Pellet (ton)	$300/ton	15,500,000 Btu/ton	$24.81
Dried Chips (ton)	$175/ton	12,990,000 Btu/ton	$17.49
Bole Chips (ton)	$65/ton	9,000,000 Btu/ton	$10.62
Air Source Heat Pump	$0.18/kWh	3,413 Btu/kWh	$19.54

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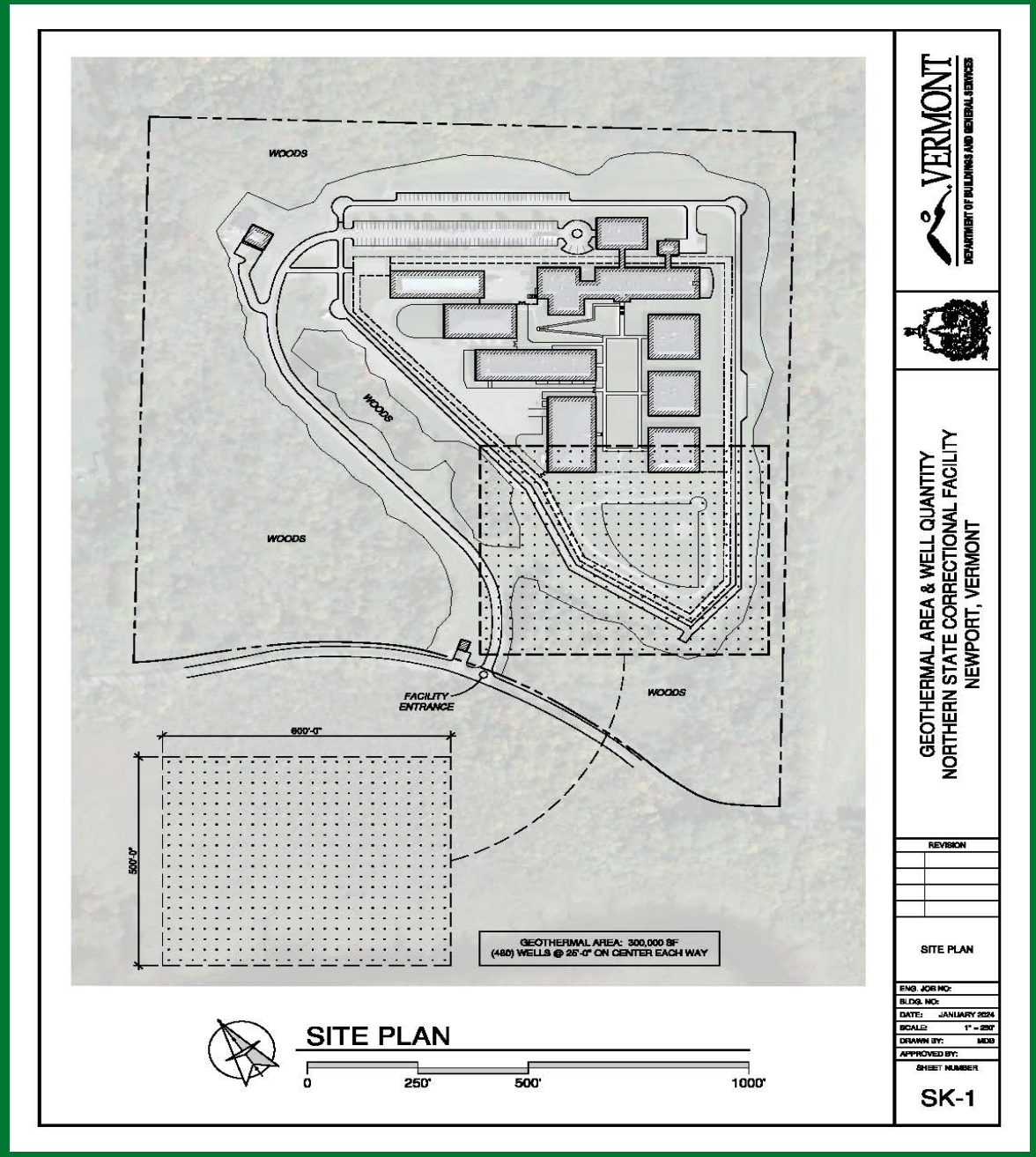
Life-cycle Cost Analysis Case Study

Newport: Northern State Correctional Facility Boiler Replacement



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Life-cycle Cost Analysis Case Study

Newport: Northern State Correctional Facility Boiler Replacement

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Carbon Dioxide Emissions Associated with Each Space Heating Strategy				
System	Fuel Type (Unit)	Expected Annual Fuel Use (Unit)	CO2 Emissions for Each Fuel Type (pounds CO2 /unit)	Annual Carbon Dioxide Emissions (pounds CO2)
Wood Chip (ton)	Green Bole Chips (ton)	1,518	0.00	0.0
Air Source Heat Pump + Oil	Electricity (kWh)	933,090	0.66	615,839.4
	#2 Fuel Oil (gallon)	5,948	22.33	132,813.4
Existing Cord Wood + Oil	Mixed Hard Wood (cord)	132	0.00	0.0
	#2 Fuel Oil (gallon)	63,452	22.33	1,416,825.4
New Oil Boiler	#2 Fuel Oil (gallon)	79,798	22.3	1,779,495.4

System	25 – Year Costs			
	Initial Capital Cost	Annual Fuel Cost	Annual Maintenance and Repair Cost	Total
Air Source Heat Pump	$3,455,000	$4,650,037	$0	$8,105,037
Green Bole Chip Boiler	$1,475,000	$2,461,935	$273,750	$4,210,658
New 4MMBTH Oil Boiler	$350,000	$5,235,007	$0	$5,585,007
Geothermal Heat Pump	Not viable			

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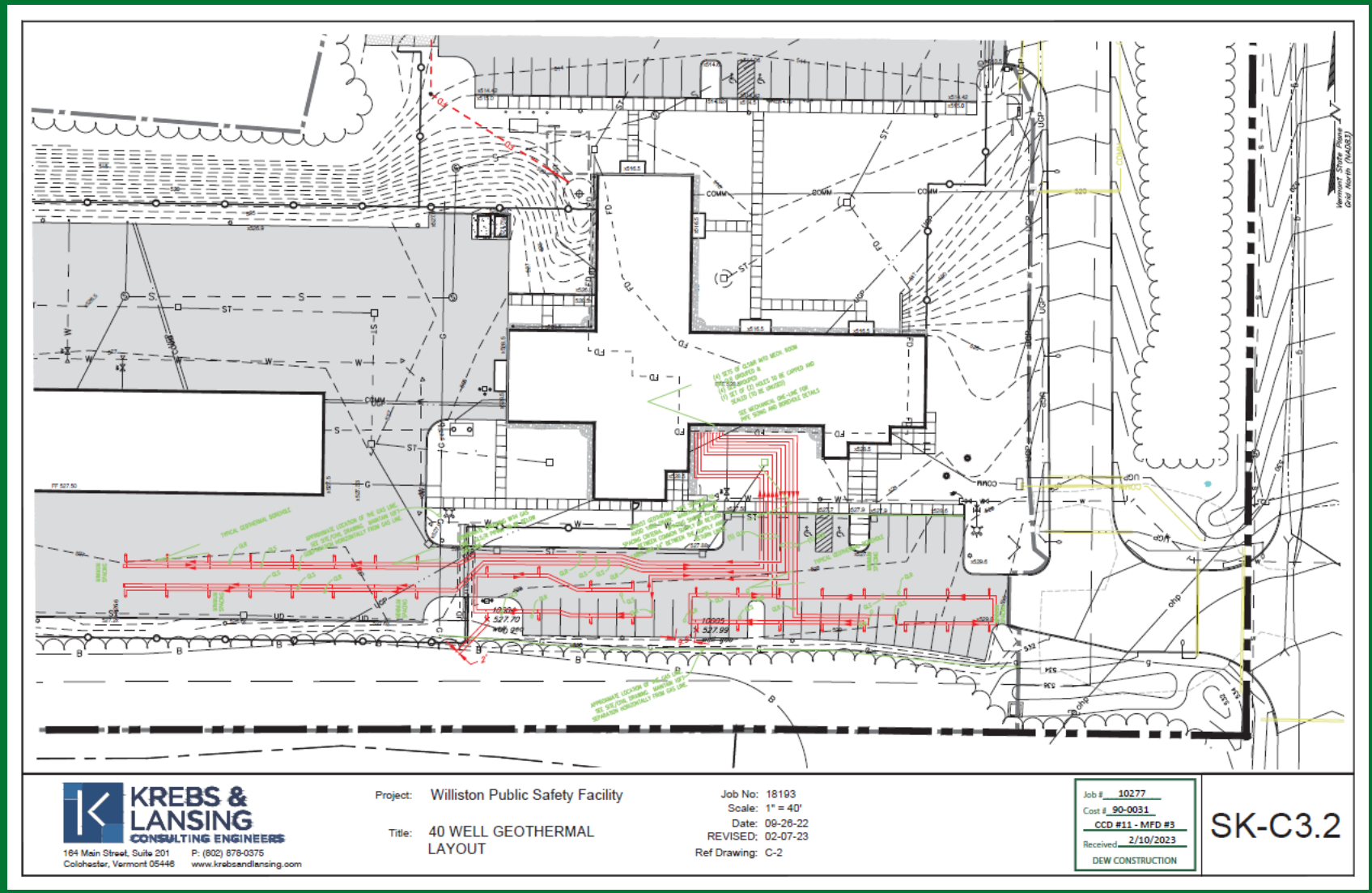
Case Study - Williston Vermont State Police (VSP) Barracks: Geothermal



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Case Study - Williston VSP Barracks: Geothermal

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BGS Energy Efficiency and Resilience

Case Study - Williston VSP Barracks: Geothermal

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BGS Energy Efficiency and Resilience

Creating a Culture of Energy Efficiency

- Energy Office PMs embedded into the Design and Construction Division
  - Allocating technical resources
  - Assessing all projects for energy efficiency opportunities
- WIMS: Workplace Integrated Management System
  - Central location for Facility Condition Assessments and energy assessments
  - Better anticipating HVAC needs → time to explore options
  - Opportunity to match funding appropriations