TOWN of BRANDON
EST. 1761 VERMONT

BRANDON'S ENHANCED ENERGY PLAN

August 26, 2019

Vermont Energy Goals

- By 2050, 90% of energy comes from renewable sources

- Reduce greenhouse gas emissions to:
  - *40% reduction below GHG levels in 1990 by 2030, and*
  - *80% to 95% reduction below 1990 levels by 2050.*

Town of Brandon's Energy Goals & Policies

- Decrease overall energy consumption through conservation and efficiency
- Reduce reliance on fossil fuels and imported energy sources
- Develop renewable energy resources locally

In other words…

- Conservation & efficiency
- Fuel switching
- Generation of energy

Energy Overview

Energy can be grouped into three major sectors:

- Transportation
- Heating & Cooling
- Electricity

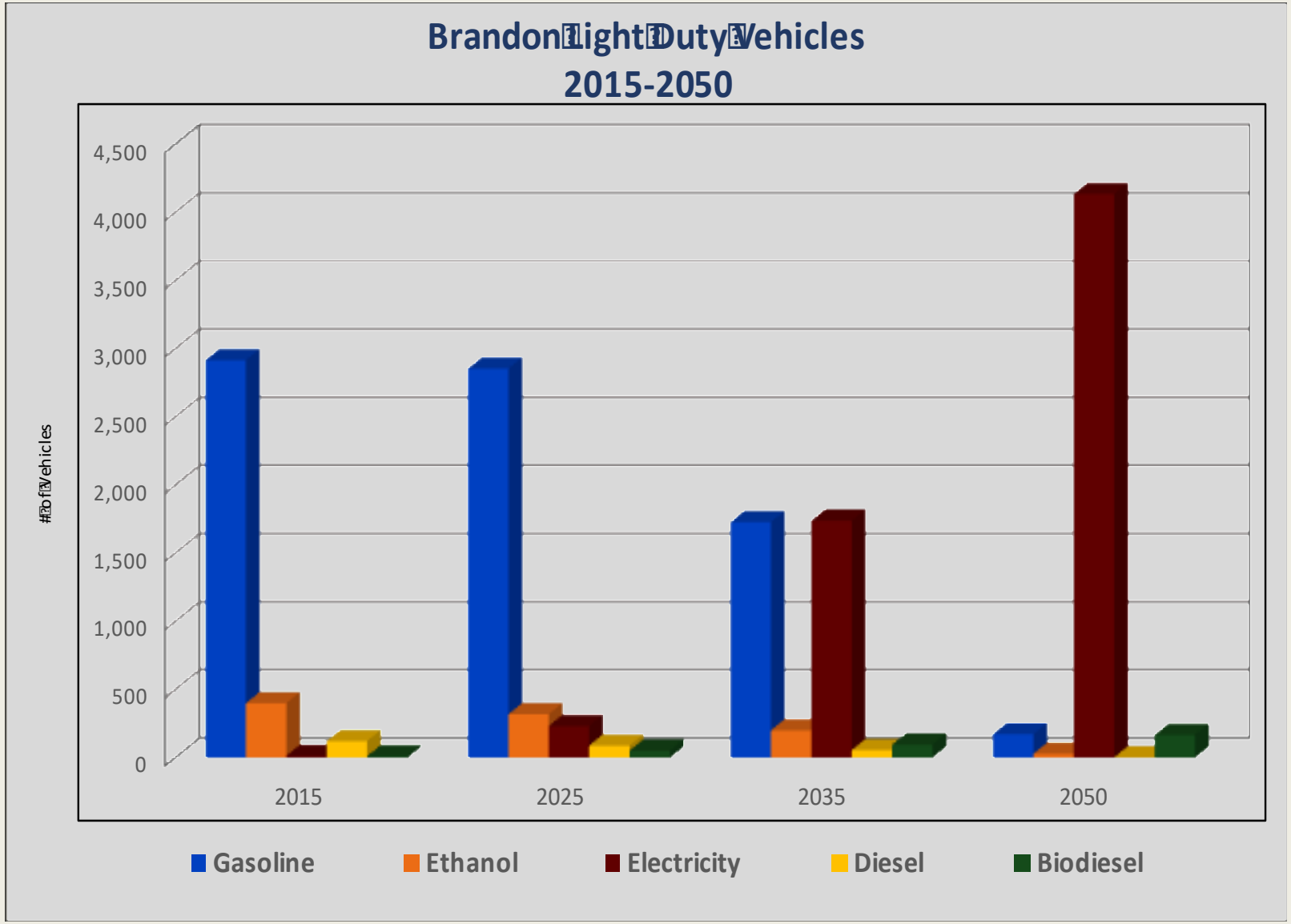
What control does one town have on overall energy use and meeting the state's goals?

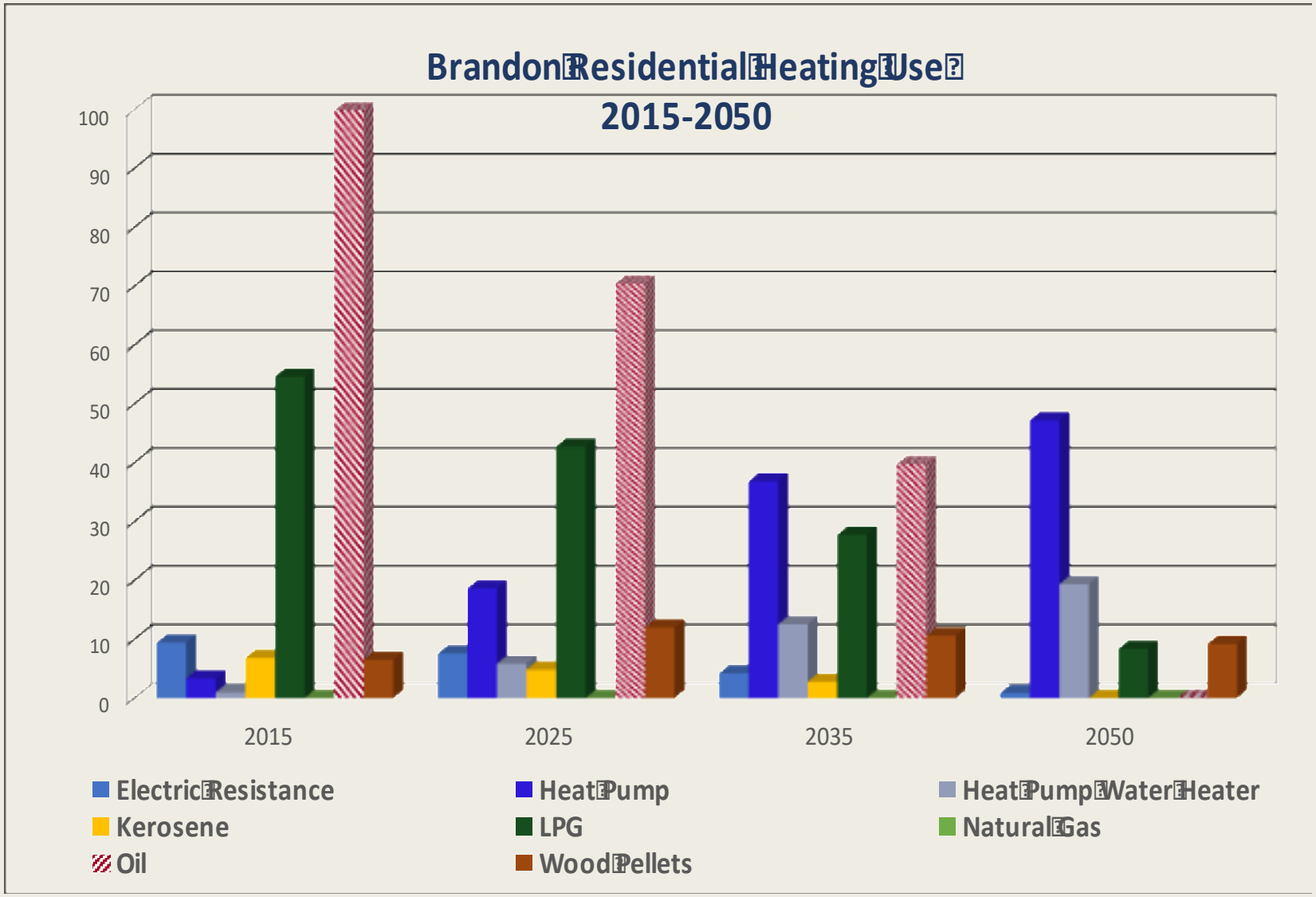
- This plan lays out how our town can make an impact by concentrating on light-duty transportation, residential and commercial heating and electricity use.

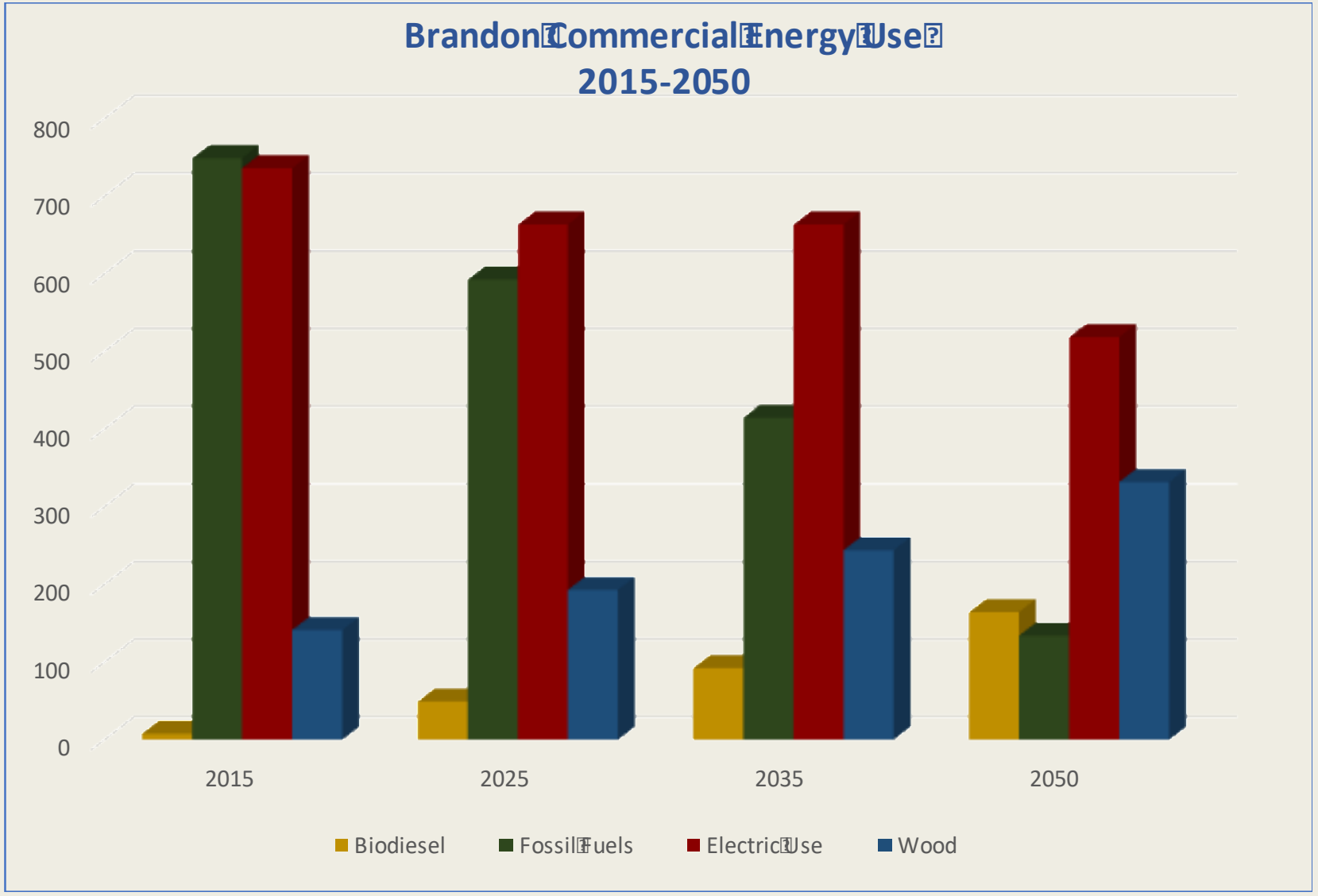
LEAP Modeling

(*Long-range Energy Alternatives Planning)*

- By 2050, Brandon achieves a 33% increase in energy savings.
- By 2050, electric vehicles comprise more than 90% of the light-duty fleet.
- By 2050, more than 90% of heating energy use comes from renewables.
- Throughout this process, we continue our commitment to conservation.


Brandon Light Duty Vehicles
2015-2050
# of Vehicles
4,500
4,000
3,500
3,000
2,500
2,000
1,500
1,000
500
0
2015
2025
2035
2050
Gasoline
Ethanol
Electricity
Diesel
Biodiesel


Brandon Residential Heating Use
2015-2050
100
90
80
70
60
50
40
30
20
10
0
2015
2025
2035
2050
Electric Resistance
Heat Pump
Heat Pump Water Heater
Kerosene
LPG
Natural Gas
Oil
Wood Pellets


Brandon Commercial Energy Use
2015-2050
800
700
600
500
400
300
200
100
0
2015
2025
2035
2050
Biodiesel
Fossil Fuels
Electric Use
Wood

Brandon's Renewable Energy Potential

- Currently, Brandon has about **2.86 MW** of total renewable energy generation (or 3414.3 MWh).
- The town's total renewable energy generation potential is **1,648 MW** (or 2,627,102 MWh).
- The town's target of **14,369 MWh** by 2050 is a fraction of the town's renewable generation potential of **2,627,102 MWh**.

Renewable Energy Mapping

Prime Resource Areas

- High resource potential; no state constraints

Secondary Resource Areas

- High resource potential; at least one state potential constraint

Resources mapped

- Wind*
- Solar
- Biomass
- Hydro

* Utility scale wind is unsuitable for Town of Brandon

Known Constraints

- Vernal Pools
- DEC River Corridors
- FEMA Floodways
- State-significant Natural Communities and Rare, Threatened, and Endangered Species
- National Wilderness Areas
- Class 1 and Class 2 Wetlands

TOWN of BRANDON
EST. 1761 VERMONT

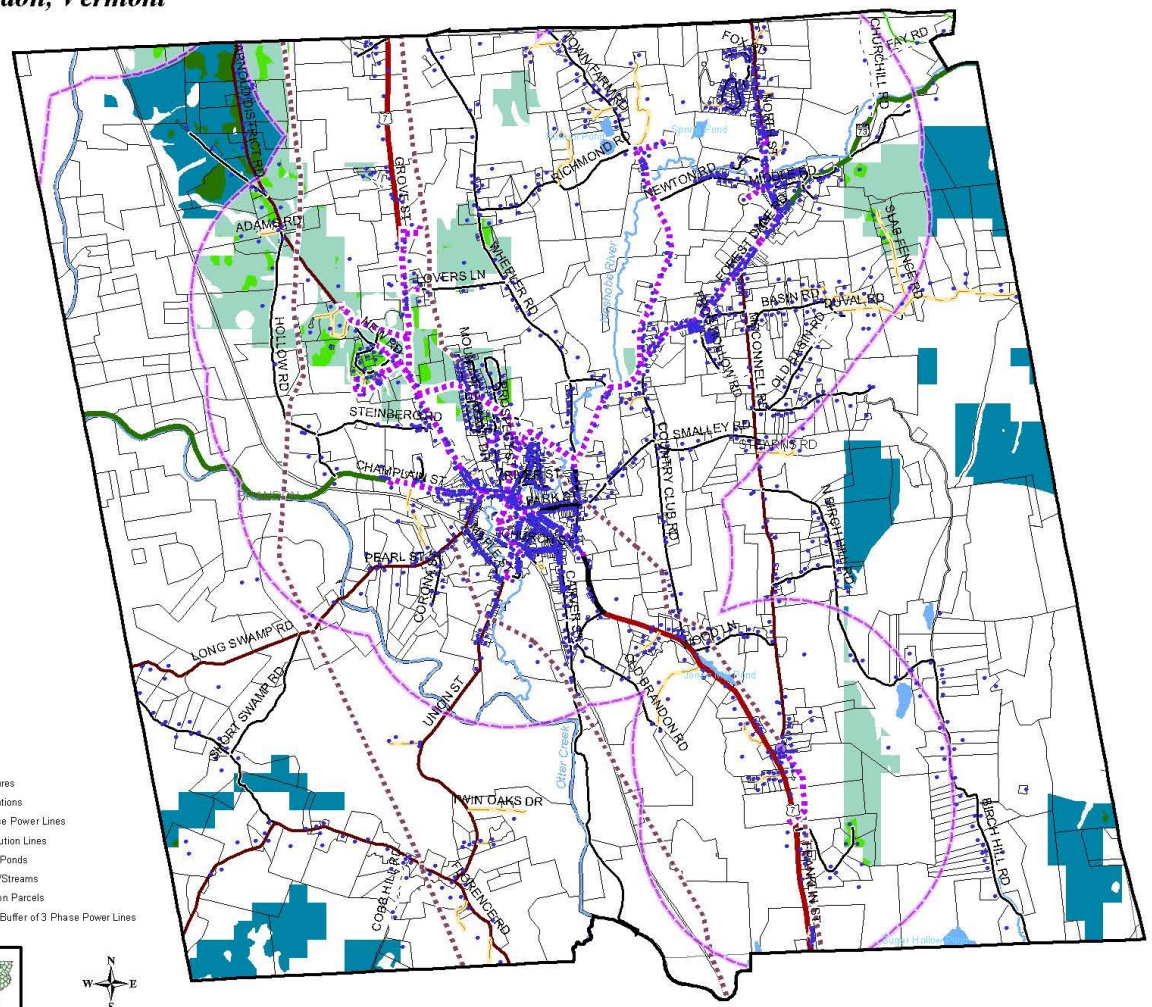
Possible Constraints

- Agricultural soils (prime farmland, additional farmland of statewide importance, and additional farmland of local importance)
- FEMA Special Flood Hazard Areas
- Protected Lands (State fee lands and private conservation lands)
- Act 250 Agricultural Soil Mitigation Areas
- Deer Wintering Areas
- ANR's Vermont Conservation Design Highest Priority Forest Blocks (Habitat Blocks 9 & 10)
- Hydric Soils

WIND ENERGY POTENTIAL

Based on Public Service Department Requirements

Brandon, Vermont



Methodology

This map shows areas of potential electricity generation from wind, i.e. locations where renewable energy generation would likely be most feasible according to the natural conditions of an area. This map also considers various other conditions, such as ecological zones, that may impact the feasibility of renewable energy development. These conditions are referred to as constraints. Areas of prime wind potential exist where the natural conditions make development feasible and no Known or Possible constraints exist, as determined by the Vermont Public Service Board.

Known Constraints

Areas with conditions that are likely to be hazardous or encounter significant obstacles to development, and therefore are very likely to make renewable energy generation development unfeasible, are considered Known constraints. These areas have been removed and are not shown in any way on this map.
Known constraints include:
FEMA floodways,
DEC River Corridors,
Federal Wilderness Areas,
Rare and Irreplaceable Natural Areas (RINAs),
Vernal Pools,
Wetlands Class 1 and 2.

Possible Constraints

Areas that may pose some obstacle to development, but where development is still likely to be feasible, are considered Possible Constraints. These areas ARE shown on the Map, wherever they overlap an area that has potential for solar development. The map only shows where these conditions overlap an area that otherwise has potential for renewable energy development.
Possible Constraint include:
Deer Wintering Areas
Public water sources, a 200 foot buffer added around the well head.
FEMA Special Flood Hazard Areas
Hydric Soils
VT Agriculturally Important Soils (prime, statewide and local classifications).
Act 250 Agricultural Soil Mitigation areas
Protected Lands (State fee lands and private conservation lands)
Habitat Blocks only includes areas of 2,000 acres or greater of contiguous forest and other natural habitats that are unfragmented by roads, development, or agriculture.
ANR's Vermont Conservation Design Highest Priority Forest Blocks (Habitat Blocks 9 & 10),
Regionally or Locally Identified Critical Resources

Legend

Prime Wind, w/in 1 mile of 3 Phase power lines.

Prime Wind

Areas with high wind potential and no identified constraints (known or possible).

Secondary Wind, w/in 1 mile of 3 Phase power lines.

Secondary Wind

Areas with high wind potential and no known constraints, but where at least one possible constraint exists.

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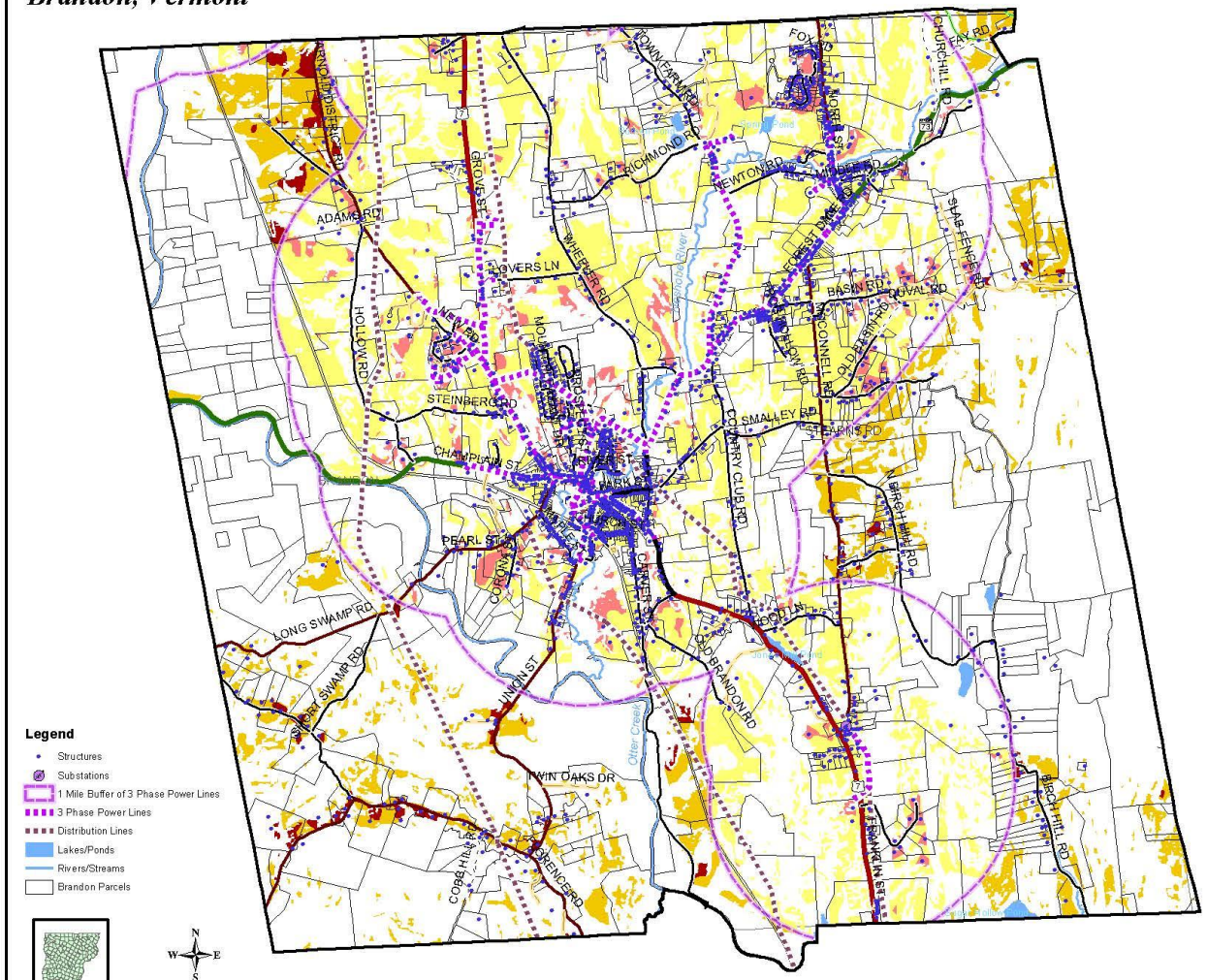
SOLAR ENERGY POTENTIAL

Based on Public Service Department Requirements

Brandon, Vermont



Legend

- Structures
- Substations
- 1 Mile Buffer of 3 Phase Power Lines
- 3 Phase Power Lines
- Distribution Lines
- Lakes/Ponds
- Rivers/Streams
- Brandon Parcels

N W E S

May 6, 2019

Miles

0 0.25 0.5 1 1.5 2

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Setbacks

Under H.40, passed in 2015, minimum setback requirements for in-state, ground mounted solar generation facilities approved under Section 248 are:
From a state or municipal highway - 100 feet for a facility with a plant capacity exceeding 150 kilowatts and 40 feet for a plant capacity between 15 and 150 kilowatts.
From each property boundary that is not a state or municipal highway - 50 feet for a facility with a plant capacity exceeding 150kilowatts and 25 feet for a facility with a capacity between 15 and 150 kilowatts.

Methodology

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Vernal Pools,
Wetlands Class 1 and 2.

Possible Constraints

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Act 250 Agricultural Soil Mitigation areas
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ANR's Vermont Conservation Design Highest Priority Forest Blocks (Habitat Blocks 9 & 10),
Regionally or Locally Identified Critical Resources

Legend

Prime Solar, w/in 1 mile of 3 Phase power lines.

Prime Solar

Areas with high solar potential and no identified constraints (known or possible).

Secondary Solar, w/in 1 mile of 3 Phase power lines.

Secondary Solar

Areas with high solar potential and no known constraints, but where at least one possible constraint exists.

TOWN of BRANDON
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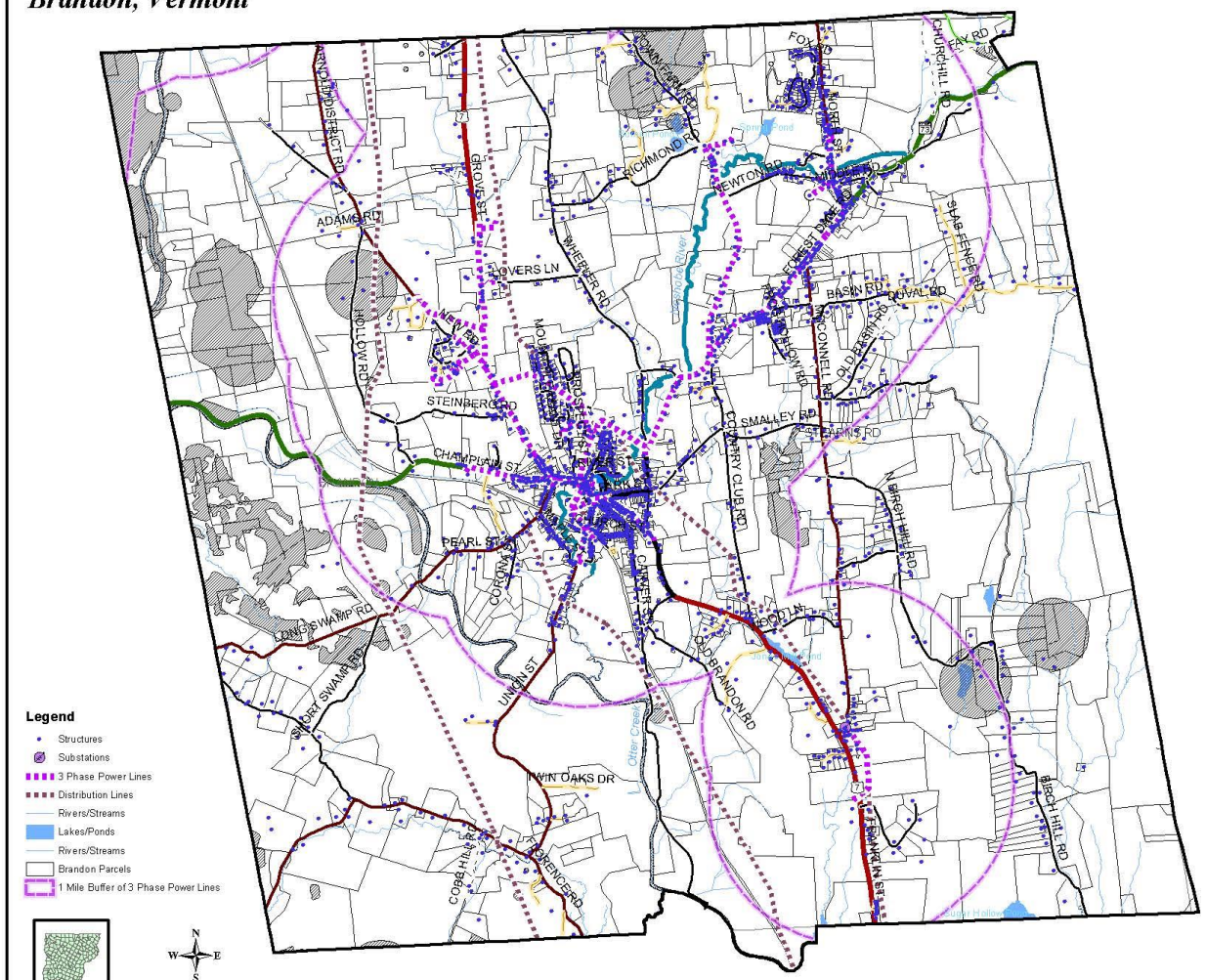
HYDRO ENERGY POTENTIAL

Based on Public Service Department Requirements

Brandon, Vermont



Legend

- Structures
- Substations
- 3 Phase Power Lines
- Distribution Lines
- Rivers/Streams
- Lakes/Ponds
- Rivers/Streams
- Brandon Parcels
- 1 Mile Buffer of 3 Phase Power Lines

N W E S

May 6, 2019

Miles

0 0.25 0.5 1 1.5 2

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Methodology

This map shows areas of potential electricity generation from hydro, i.e. locations where renewable energy generation would likely be most feasible according to the natural conditions of an area. This map also considers various other conditions, such as ecological zones, that may impact the feasibility of renewable energy development. These conditions are referred to as constraints. Areas of prime hydro potential exist where the natural conditions make development feasible and no Known or Possible constraints exist, as determined by the Vermont Public Service Board.

Known Constraints

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Rare andl irreplaceable Natural Areas (RINAs),
Vernal Pools,
Wetlands Class 1 and 2.

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ANR's Vermont Conservation Design Highest Priority Forest Blocks (Habitat Blocks 9 & 10),
Regionally or Locally Identified Critical Resources

Legend

- Dams not on National Wild and Scenic Rivers

Potential Hydroelectric Facilities

- < 50 kW Capacity
- > 50 kW Capacity
- High Hazard with < 50 kW Capacity
- High Hazard with > 50 kW Capacity
- Impaired Waters
- Stressed Waters
- Rivers/Streams
- Designated Outstanding Resource Waters
- Rare and Irreplaceable Natural Areas (RINAs)

TOWN of BRANDON
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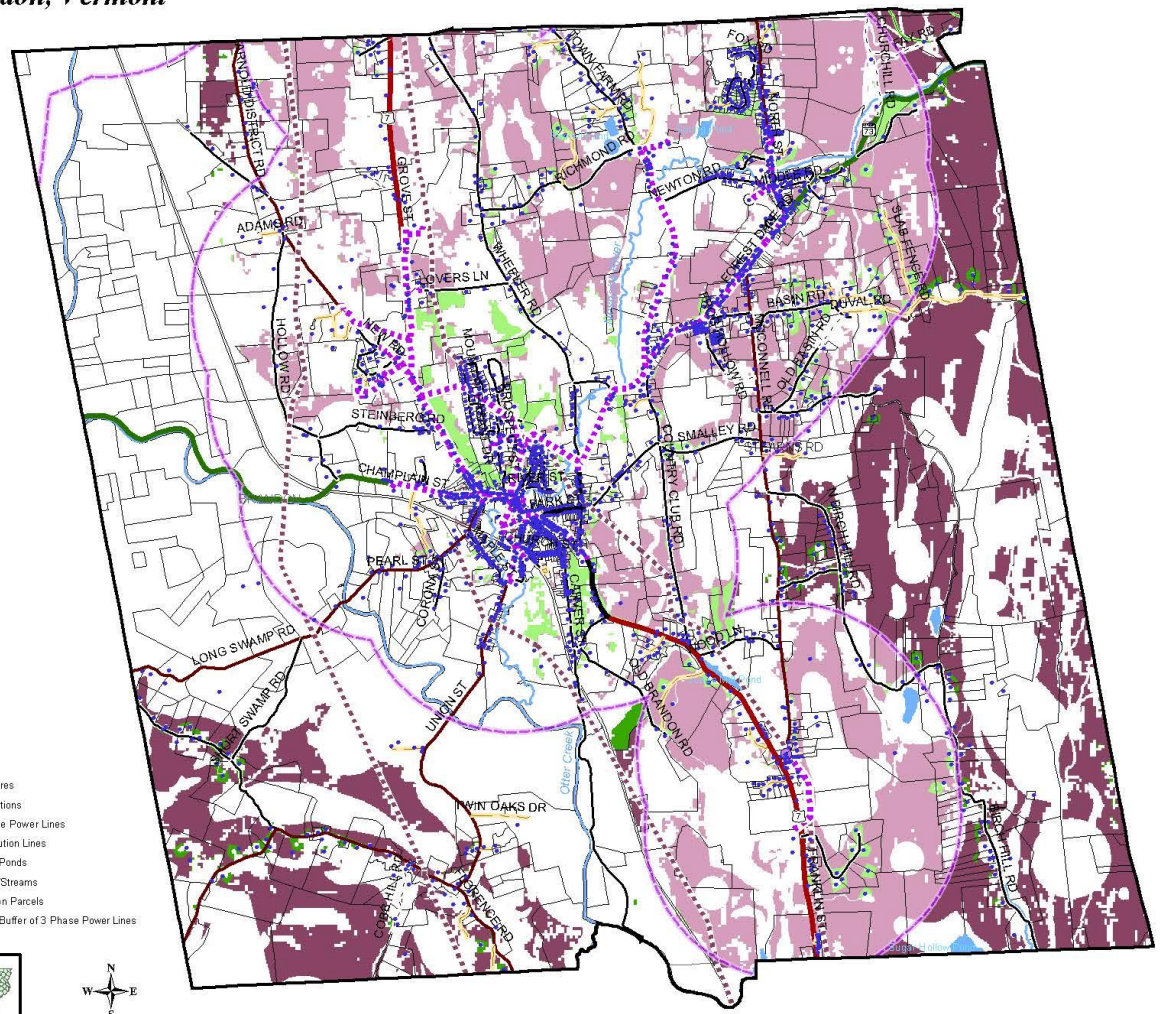
BIOMASS ENERGY POTENTIAL

Based on Public Service Department Requirements

Brandon, Vermont



Legend

- Structures
- Substations
- 3 Phase Power Lines
- Distribution Lines
- Lakes/Ponds
- Rivers/Streams
- Brandon Parcels
- 1 Mile Buffer of 3 Phase Power Lines

N W E S

May 6, 2019

Miles

0 0.25 0.5 1 1.5 2

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Methodology

This map shows areas of potential electricity generation from biomass, i.e. locations where renewable energy generation would likely be most feasible according to the natural conditions of an area. This map also considers various other conditions, such as ecological zones, that may impact the feasibility of renewable energy development. These conditions are referred to as constraints. Areas of prime biomass potential exist where the natural conditions make development feasible and no Known or Possible constraints exist, as determined by the Vermont Public Service Board.

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ANR's Vermont Conservation Design Highest Priority Forest Blocks (Habitat Blocks 9 & 10),
Regionally or Locally Identified Critical Resources

Legend

Prime Woody Biomass, w/in 1 mile of 3 Phase power lines.

Prime Woody Biomass

Areas with high woody biomass potential and no identified constraints (known or possible).

Secondary Woody Biomass, w/in 1 mile of 3 Phase power lines.

Secondary Woody Biomass

Areas with high woody biomass potential and no known constraints, but where at least one possible constraint exists.

TOWN of BRANDON
EST. 1761 VERMONT

Renewable Energy Mapping

Local Possible Constraints

- Conservation Areas (ecological importance)
- Designated Historic Sites
- Scenic Resources (viewshed analysis needed)

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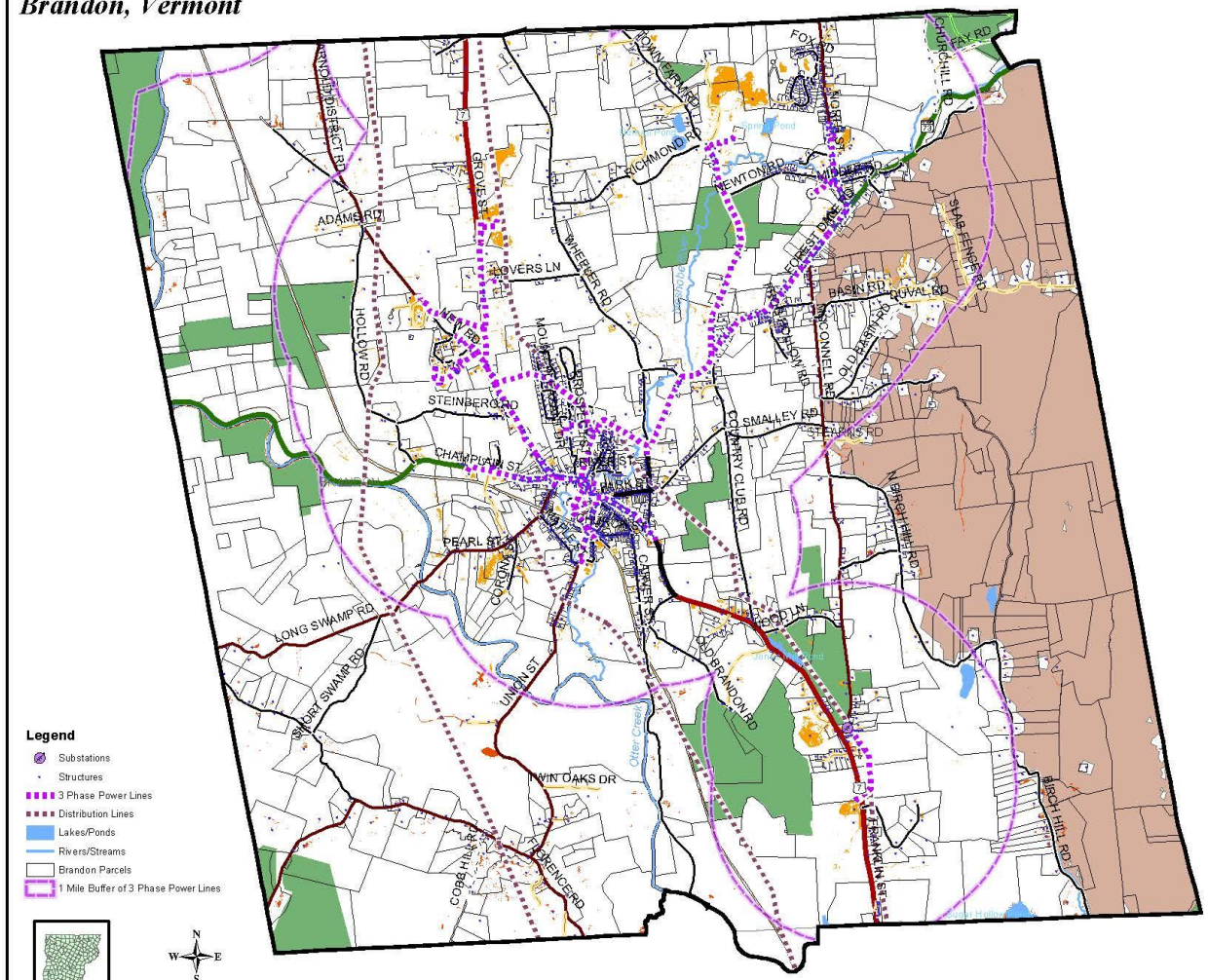
LOCAL CONSTRAINTS

Based on RRPC Energy Committee

Brandon, Vermont



Legend

- Substations
- Structures
- 3 Phase Power Lines
- Distribution Lines
- Lakes/Ponds
- Rivers/Streams
- Brandon Parcels
- 1 Mile Buffer of 3 Phase Power Lines

N W E S

May 6, 2019

RUTLAND REGIONAL PLANNING COMMISSION

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Miles
0 0.25 0.5 1 1.5 2

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ANR's Vermont Conservation Design Highest Priority Forest Blocks (Habitat Blocks 9 & 10),
Regionally or Locally Identified Critical Resources

Legend

- Impervious Surface (preferred locations for solar only, within 1 mile of 3 Phase Power)
- Impervious Surface (preferred locations for solar only)
- Habitat Blocks 9 and 10
- Conserved Lands

Renewable Energy Mapping

Local Preferred Areas

Parcel ID	Grand List ID	Total Acres
06-01-08.01	0079-2085	21.52 acres
04-01-19	0101-0182	12.28 acres
02-01-16	0001-0520	42.82 acres
Totals:		76.62 acres

Renewable Energy Mapping

Department of Public Service Preferred Areas

- *Roof-mounted systems*
- *Former brownfield sites*
- *Disturbed areas (gravel/sand pits)*
- *Sanitary landfills*
- *Junkyards*
- *Parking lots*

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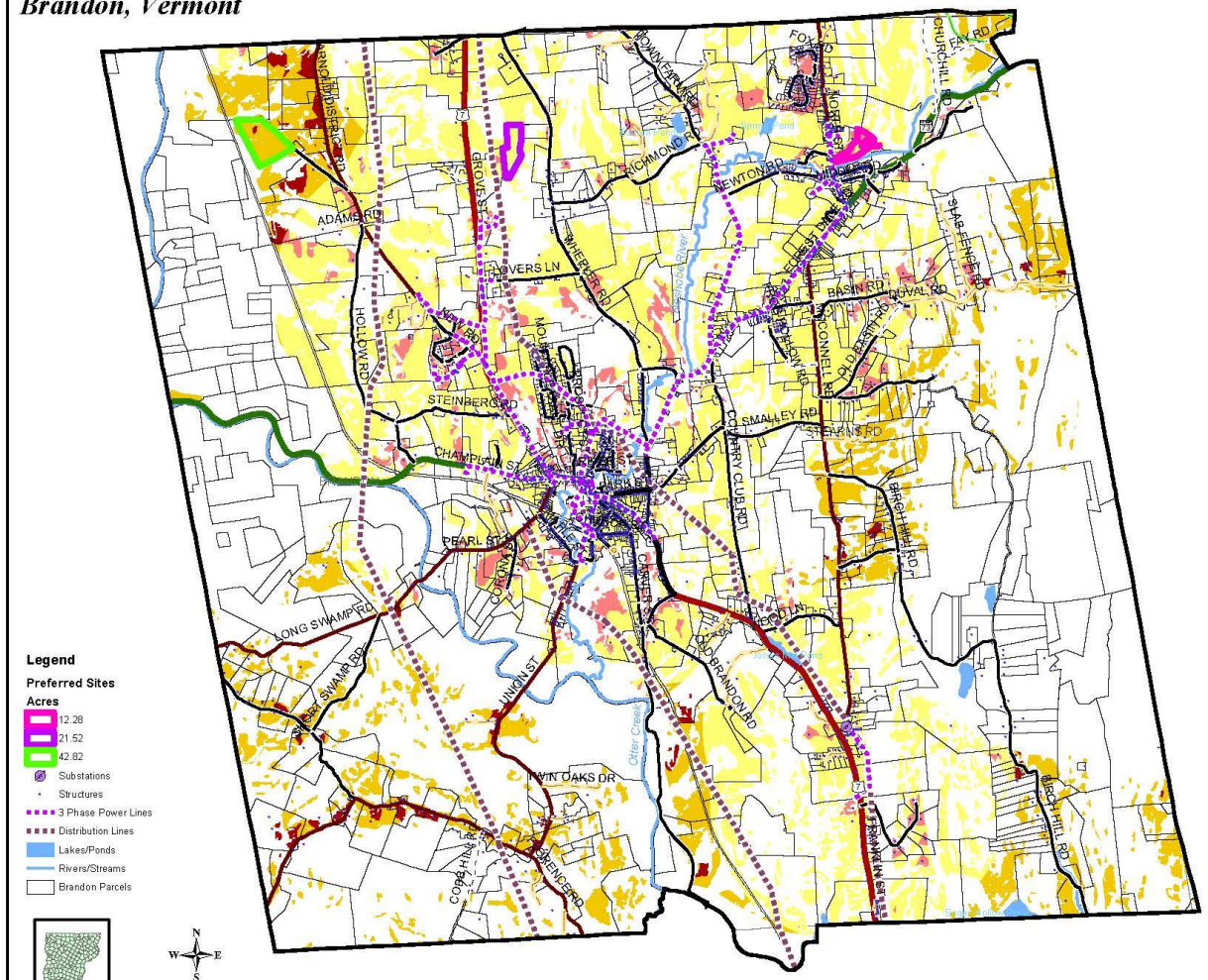
LOCALLY PREFERRED LOCATIONS

Based on Local Energy Committee

Brandon, Vermont



Legend

Preferred Sites

Acres

- 12.28
- 21.52
- 42.82
- Substations
- Structures
- 3 Phase Power Lines
- Distribution Lines
- Lakes/Ponds
- Rivers/Streams
- Brandon Parcels

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May 6, 2019

RUTLAND REGIONAL PLANNING COMMISSION

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Miles

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ANR's Vermont Conservation Design Highest Priority Forest Blocks (Habitat Blocks 9 & 10);
Regionally or Locally Identified Critical Resources

Legend

- Prime Solar, w/in 1 mile of 3 Phase power lines.
- Prime Solar

Areas with high solar potential and no identified constraints (known or possible).

- Secondary Solar, w/in 1 mile of 3 Phase power lines.
- Secondary Solar

Areas with high solar potential and no known constraints, but where at least one possible constraint exists.

Potential Energy Siting Summary

- Local Preferred Areas = 76 acres

Acres Suitable for Solar in Brandon Town = **793.7 acres** of prime solar
(which equates to **128,960 MWh** of generation potential)

Strategies & Policies to Achieve Town Targets

- Energy Committee, in partnership with the Town Manager and Select Board, is responsible for the implementation of strategies and policies for:
  - *Conservation and Efficient Use of Energy*
  - *Transportation*
  - *Land Use*

Thank you!

Contact:

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802.247.4844
Michael.John.Shank@gmail.com