



## Municipal Data and Maps for Use in Enhanced Energy Planning: *Explanation of Information*

The following is an explanation of the information displayed in the attached Analysis and Targets Data spreadsheet and the resource maps developed for Lamoille County municipalities.

The intent of the data and the maps is to provide the municipality with data required to ensure compliance with the requirements of Act 174 and “Enhanced Energy Planning” (24 V.S.A. 4352). The Vermont Department of Public Service contracted with regional planning commissions to develop municipal data and maps that can be used by municipalities for their energy planning work pursuant to Act 174. The data is meant to be a starting point for municipalities to begin planning their energy future and to talk about the changes that may need to occur within the municipality to ensure that state energy goals are met. This includes the goal that 90% of all energy demand be met by renewable sources by 2050.

The attached spreadsheet contains data that estimates current energy use and provides targets for future energy use across all sectors (transportation, heating, and electricity). It also sets targets for renewable energy generation within the municipality.

Estimates of current energy use consist primarily of data available from the American Community Survey (ACS), the Vermont Agency of Transportation (VTTrans), the Vermont Department of Labor (DOL), and the Vermont Department of Public Service (DPS). Targets for future energy use are reliant upon the Long-range Energy Alternatives Planning (LEAP) analysis for the region completed by the Vermont Energy Investment Corporation (VEIC). Targets for future energy generation have come from the regional planning commission and DPS.

The targets established here show the direction in which change needs to occur to state energy goals. It is important to remember that the targets established by LEAP represent only one way to achieve energy goals. There may be several other similar pathways that a municipality may choose to take in order to meet the 90x50 goal.

The solar and wind resource maps show areas of Lamoille County that have the resource (sun, wind) and environmental attributes to potentially accommodate solar and wind energy generation projects. The hydroelectric map shows areas of resource potential for renewable energy generation from dams that could be converted into hydroelectric facilities. The maps, and the corresponding data, should be used to inform energy planning efforts by municipalities. They may also be used for conceptual planning or initial site identification by those interested in developing renewable energy infrastructure. They should not, however, take the place of site-specific investigation for a proposed facility, and should therefore not be thought of as “siting maps.” The step-by-step analysis used to develop these maps may be conducted specifically for any site where renewable energy development has been proposed, and in that sense, these maps provide a model for the process that should be undertaken when evaluating renewable energy development.

## Explanation of Data needed for Inclusion in the Municipal Enhanced Energy Plan

### 1. Population, Household and Passenger Vehicle Projections

This table uses data from the American Community Survey (ACS) and LCPC population projections to calculate population, household and passenger vehicle projections for years 2025, 2035 and 2050.

### 2. Current Energy Use

#### Table 2a: Current Residential Heating Energy Use

This table displays data from the ACS that estimates current municipal residential heating energy use.

#### Table 2b: Current Commercial Heating Energy Use

The table uses data available from the Vermont Department of Labor (DOL) and the Vermont Department of Public Service (DPS) to estimate current municipal commercial establishment energy use in the municipality.

#### Table 2c: Current Transportation Energy Use

This table uses data from the American Community Survey (ACS) and Vermont Agency of Transportation (VTTrans) to calculate current transportation energy use.

#### Table 2d: Current Electricity Use

This table displays current electricity use within the municipality. This data is available from Efficiency Vermont (EVT).

### 3. Existing Renewable Energy Generation

This table shows existing renewable generation in the municipality, in kilowatts and kilowatt hours, based on information available from the Vermont Department of Public Service.

### 4. LEAP Targets

#### Table 4a: Use of Renewables

This data displays targets for the percentage of transportation, heating and electricity energy use coming from renewable sources during each target year. This data was developed using the LEAP analysis and using information from Efficiency Vermont.

#### Table 4b: Residential Thermal Fuel Switching Target – Wood Systems

This table provides a target for wood heating systems for residential in the municipality for each target year. This target was calculated using data from LEAP and ACS.

#### Table 4c: Residential Thermal Fuel Switching Target– Heat Pumps

This table provides a target for heat pump systems for residential structures in the municipality for each target year. This target was calculated using data from LEAP and ACS.

**Table 4d: Commercial Thermal Fuel Switching Target – Wood Systems**

This table provides a target for wood heating systems for businesses/institutions in the municipality for each target year. This target was calculated using data from LEAP and ACS.

**Table 4e: Transportation Fuel Switching Targets – Electric Vehicles**

This table displays a target for switching from fossil fuel based vehicles (gasoline and diesel) to electric vehicles. This target is calculated by using LEAP and ACS data.

**Table 4f: Renewable Electricity Generation Targets**

Renewable generation targets, expressed in megawatt hours, provides information about total electrical output to be generated from renewable resources. The LCPC used the regional renewable target as a baseline and proportioned the regional target to towns based on the region's share of population and share of existing renewable energy generation.

**Table 4g: Electricity Efficiency Target: Housing Units equipped with upgraded electric appliances**

Data in this table displays a target for increased electricity efficiency and conservation during the target years. These targets were developed using regional LEAP analysis.

**Table 4h: Thermal Efficiency Target: Housing Units Weatherized**

This table displays targets for thermal efficiency for residential structures based on a methodology developed by DPS using data available from the regional Long-range Energy Alternatives Planning (LEAP) analysis and ACS. The data in this table represents the percentage of municipal households that will need to be weatherized in the target years.

**Table 4i: Thermal Efficiency Target: Commercial Establishments Weatherized**

This table shows the same information as Table 5i, but sets a target for commercial thermal efficiency. Information from the DOL is required to complete this target.

**5. Sufficient Land?**

This table shows whether or not there is sufficient land in the municipality to meet the renewable generation targets based on the renewable generation potential in the municipality.

Johnson: Analysis and Targets Data for Use in Enhanced Energy Planning

1. POPULATION, HOUSEHOLD AND LIGHT VEHICLE PROJECTIONS

	2015	2025	2035	2050
Johnson				
Population*	3,512	3,652	3,793	4,164
Households	1,133	1,178	1,224	1,343
Vehicles	1,917	1,994	2,070	2,273

\*Annual population growth projection of 0.4%

2. CURRENT ENERGY USE

2a: Current Residential Heating Energy Use

\*\*Includes coal, solar, heat pumps, etc.

	Fuel Oil	Propane	Wood	Electricity	Other**	No fuel used	Total
# of Households	519	199	282	98	16	19	1133
% of Households	46%	18%	25%	9%	1%	2%	100%
Usage in million BTUs	61,089	21,256	32,697	7,403	0	0	122,445

2b: Current Commercial Energy Use

	Fuel Oil	Propane	Wood	Electricity	Total
66 establishments					
% of businesses	28%	18%	9%	45%	100%
Usage in million BTUs	12,936	8,316	4,158	20,790	46,200

2c: Current Transportation Use

# of Vehicles	1,917
Total Miles Driven	30,672,000
Usage in Gallons	1,311,228
Usage in million BTUs	158,034

2d: Current Electricity Use

	kWh	million BTUs
Residential	12,437,275	42,436
Commercial & Industrial	12,040,288	41,081

**3. EXISTING RENEWABLE ENERGY GENERATION**

Generation facility	Number of sites	Capacity as of 1/31/17 (kW)	Output (kWh)
Hydro	-	-	0
Solar	27	576	706,406
Biomass digester	-	-	0
Residential Wind	2	5	10,950
<b>TOTAL</b>	<b>29</b>	<b>581</b>	<b>717,356</b>

**4. LEAP TARGETS**

**5a: Use of Renewables**

	2015	2025	2035	2050
Heating	26%	34%	45%	73%
Transportation	8%	20%	38%	86%
Electricity	27%	53%	73%	94%

**5b: Residential Thermal Fuel Switching Target: Housing Units Heated With Wood**

	2015	2025	2035	2050
# households	282	485	581	892
% households	25%	41%	47%	66%

**5c: Residential Thermal Fuel Switching Target: Housing Units Heated With Heat Pumps**

	2015	2025	2035	2050
# households	6	37	89	192
% households	0%	3%	7%	14%

**5d: Commercial Thermal Fuel Switching Target: Businesses/Institutions Heated With Wood**

	2015	2025	2035	2050
% of establishments	9%	12%	17%	25%

**5e: Transportation Fuel Switching Target: Electric Vehicles**

	2015	2025	2035	2050
# vehicles	5	219	807	2,023
% vehicles	0%	11%	39%	89%

**5f: Renewable Electricity Generation Target**

	2016	2025	2035	2050
Total Output (MWh)	717	7,874	15,827	27,755

**New output needed by 2050**

New Output (MWh)	27,037
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**5g: Electricity Efficiency Target: Housing Units Equipped with Upgraded Electrical Appliances**

	2015	2025	2035	2050
# of households	91	460	795	1,303
% of households	8%	39%	65%	97%

**5h: Thermal Efficiency Target: Housing Units Weatherized**

	2015	2025	2035	2050
# households	57	247	600	1343
% households	5%	21%	49%	100%

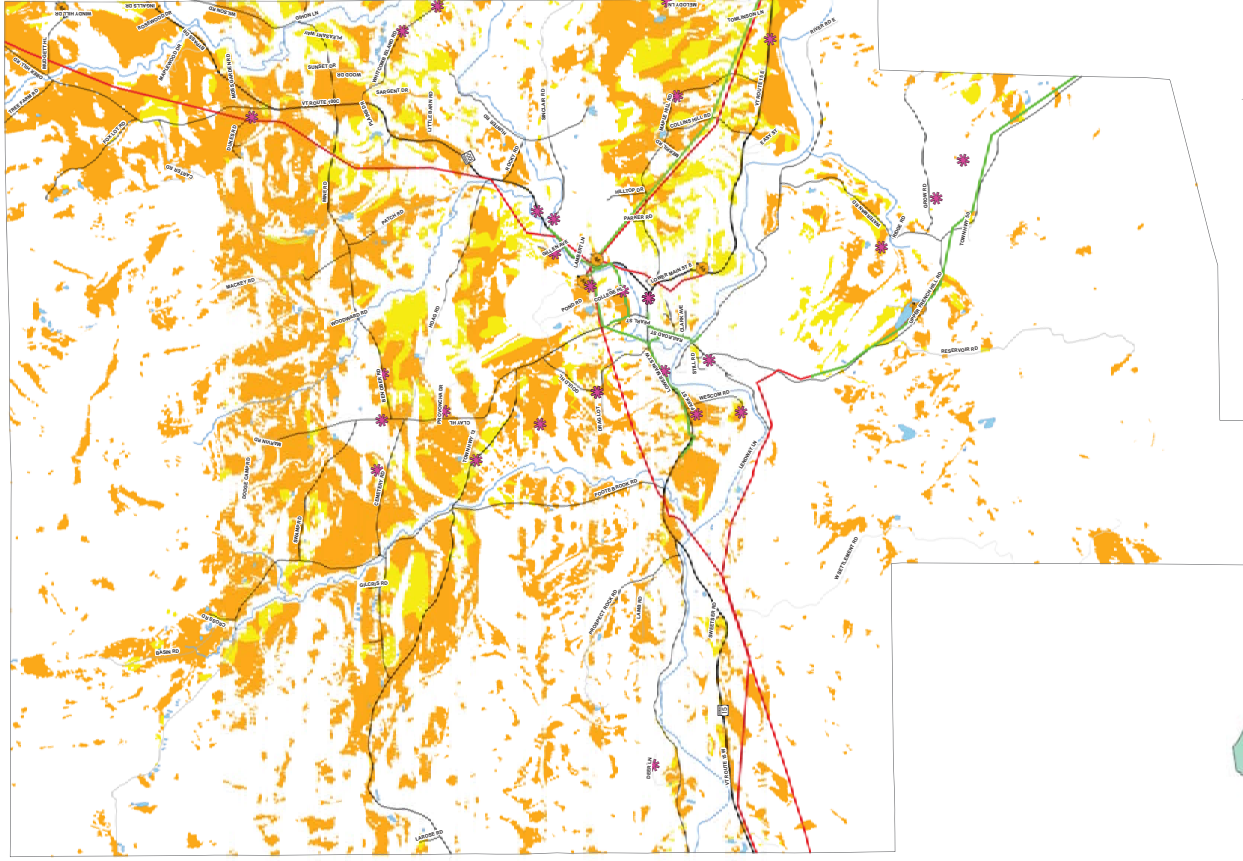
**5i: Thermal Efficiency Target: Commercial Establishments Weatherized**

	2015	2025	2035	2050
% of establishments	7%	16%	31%	61%

**5. SUFFICIENT LAND?**

Yes	
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# Town of Johnson Renewable Energy Potential: SOLAR



## Methodology

This map shows areas of resource potential for renewable energy generation from solar, 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.

## Prime Solar

Areas with high solar potential and no environmental constraints.

## Secondary Solar

Areas with high solar potential and environmental constraints that may pose an obstacle to development. These areas are shown on the map and include the following constraints:

- Agricultural soils (local, prime and statewide classifications)
- FEMA special flood hazard areas
- Protected lands
- Act 250 agricultural soil mitigation areas
- Deer wintering yards
- Highest priority forest blocks
- Hydric soils

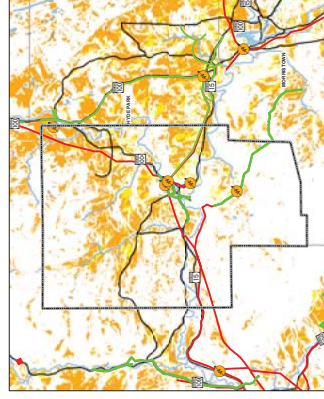
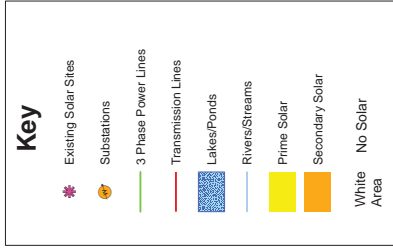
## No Solar

Areas with low solar potential or environmental constraints likely to prohibit development. These areas have been removed and are not shown in any way on this map. These environmental constraints are:

- FEMA floodways
- River corridors
- Federal wilderness areas
- Natural Communities and Rare, Threatened and Endangered Species
- Vernal pools
- Wetlands class 1 and 2

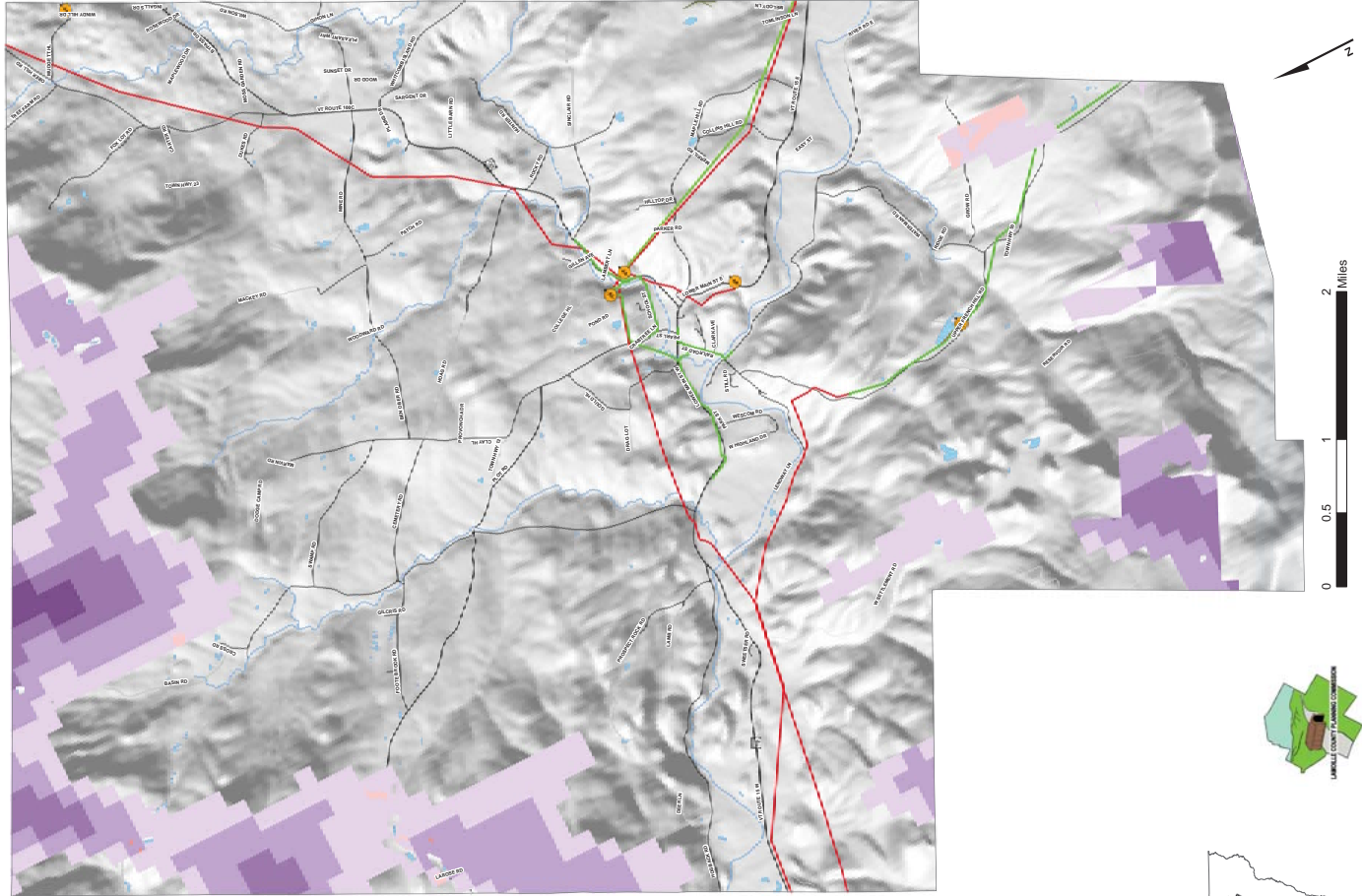
This map was created as part of a Regional Energy Planning Initiative being conducted by Vermont Regional Planning Commissions and the Vermont Public Service Department.

Created: Lamolle County Planning Commission, April 2017.





# Town of Johnson Renewable Energy Potential: WIND



## Methodology

This map shows areas of resource potential for renewable energy 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.

## Prime Wind

Areas with high wind potential and no environmental constraints.

## Secondary Wind

Areas with high wind potential and environmental constraints that may pose an obstacle to development. These areas are shown on the map and include the following constraints:

- Agricultural soils (local, prime and statewide classifications)
- FEMA special flood hazard areas
- Protected lands
- Act 250 agricultural soil mitigation areas
- Deer wintering yards
- Highest priority forest blocks
- Hydric soils

## No Wind

Areas with low wind potential or environmental constraints likely to prohibit development. These areas have been removed and are not shown in any way on this map. These environmental constraints are:

- FEMA floodways
- River corridors
- Federal wilderness areas
- Natural Communities and Rare, Threatened and Endangered Species
- Vernal pools
- Wetlands class 1 and 2

This map was created as part of a Regional Energy Planning Initiative being conducted by the Regional Planning Commissions and the Vermont Public Service Department.

Created: Lamolle County Planning Commission, April 2017.

