BENNINGTON COUNTY REGIONAL COMMISSION (BCRC)

NORTHWEST VERMONT REGIONAL PLANNING COMMISSION (NVRPC)

TWO RIVER-OTTAUQUECHEE REGIONAL COMMISSION (TROC)

THE VERMONT PUBLIC SERVICE DEPARTMENT (PSD)

VERMONT ENERGY INVESTMENT CORPORATION (VEIC)

REGIONAL ENERGY PLANNING INITIATIVE

THE PROJECT

The ***2015-16 Regional Energy Planning Initiative***, funded by the ***Vermont Public Service Department***, involves the development of three pilot regional energy plans in the ***Bennington, Two Rivers-Ottauquechee, and Northwest Vermont regions***. Following the first round of pilot plans, additional RPCs will join the process. The goal is to develop energy plans for all 11 regions that are built on ***local and regional input*** yet also lay a ***clear, specific, and coordinated path towards achieving Vermont's statewide energy goals***—chiefly, the goal of producing 90% of all energy from renewable sources by 2050.

This display presents some of the general data (such as energy scenarios and mapping analyses) on which the fundamental assumptions of the work are based, such as the rate by which Vermont must decrease its use of fossil fuels (shown in the graph to the right). The core goal of this initiative, however, is to develop ***regionally-specific action strategies***, involving local citizens in the process.

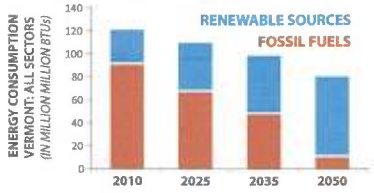
The project team includes staff from Bennington County Regional Commission (BCRC), Northwest Vermont Regional Planning Commission (NVRPC), Two River-Ottauquechee Regional Commission (TROC), the Vermont Public Service Department (PSD), and Vermont Energy Investment Corporation (VEIC).

The project team has also received significant support from various other organizations, including: Energy Action Network (EAN), Vermont Center for Geographic Information (VCGI), Vermont Electric Company (VELCO), and many others.

Getting to 90 x '50

The chart below projects a scenario by which Vermont could accomplish its goal of 90% renewable energy by 2050 (referring to all energy sources and sectors). Laying out a path by which communities could navigate this transition is the fundamental challenge of the regional planning initiative. Generally, strategies will be focused in one of three ways:

1. Decreasing total energy use.
2. Transitioning away from fossil fuel energy inputs.
3. Establishing new renewable production and generation.



ENERGY PROJECTIONS: LEAP SYSTEM

The future energy use projections and scenario modeling used in this project were generated by VEIC staff using the Long-Range Energy Alternatives Planning system (or, LEAP system)—a widely used energy analysis tool that was developed by the Stockholm Institute.

ELECTRICITY

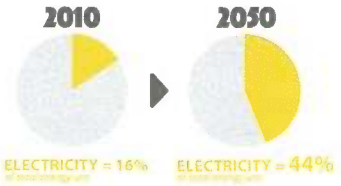
Vermont's energy transformation in the next 35 years will rely largely on electricity. Vermonters will need to shift more uses of energy to electrical sources, expand electricity production from renewable sources, and improve electricity efficiency.

Currently, despite being the focus of much attention, electricity is a relatively small part of Vermont's energy portfolio. In order to meet the state's energy goals, the amount of electricity used by Vermonters will need to increase considerably, as more uses that were traditionally non-electric (especially space heating and transportation) come to rely on renewably generated electricity.

Regional electricity strategies will focus on energy efficiency efforts, household electricity generation, and household transition to electricity from non-renewable energy sources.

VERMONT ELECTRICITY USE | 2010 vs 2050

The graphic below shows electricity as a percentage of Vermont's overall energy use, comparing 2010 data and 2050 projections that achieve the 90 X 50 goal.



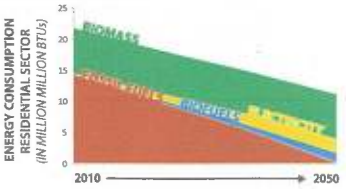
THERMAL ENERGY

The majority of Vermont's current thermal energy use (that is, energy used to produce heat or condition buildings) comes from non-renewable energy sources, such as heating oil and natural gas. In order to avoid fossil fuels, Vermonters will have to use much less energy overall to heat their homes. In other words, although Vermont will likely continue to see modest population growth, the amount of total energy used must go down, and therefore, household efficiency must go up as the transition to renewable heat occurs.

Regional thermal strategies will focus on transitioning buildings away from fossil fuel inputs (predominantly to electricity and modern biomass systems), improving thermal energy efficiency (e.g., through weatherization), and identifying opportunities for more efficient resource use through physical and economic infrastructure (e.g., district heat systems and fuel delivery services).

VERMONT THERMAL ENERGY | 2010 to 2050

The graph shows projections for future thermal energy use for residential buildings in Vermont. (Commercial buildings are not shown, but they will require a similar transition.) Total energy use for renewable sources does not need to increas that significantly, but the number of buildings heating through these sources does. The decrease in overall energy must therefor be gained through improved efficiency.



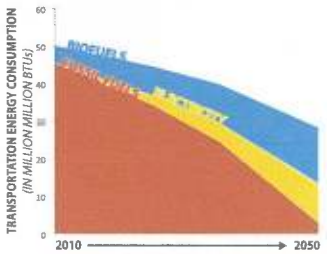
TRANSPORTATION

Perhaps the most challenging component of Vermont's future energy plans relies on transitioning the residential and commercial vehicle vehicle fleet off of fossil fuels. Currently, over 40% of the energy used in Vermont is used for transportation. And of that energy, almost none of it is generated in a renewable way. Excluding ethanol (which is a renewable biofuel, but currently relies on significant non-renewable inputs for production), renewable fuels account for less than 0.1% of Vermont's transportation fuel portfolio.

By 2050, electricity and biofuels (ethonal and biodiesel) will need to account for more than 90% of Vermont's transportation fuel use. And total fuel use will need to decrease dramatically. Although the transition will require dramatic shifts in fuel production, and in some cases lifestyles, it is not out of reach. Regional strategies will focus on promoting electric vehicles and biofuels, creating robust mass transit networks, encouraging alternative transportation options (e.g., walking or biking), and emphasizing land-use and development patterns that will support these changes.

VERMONT TRANSPORTATION ENERGY | 2010 to 2050

The graph below, similar to the thermal graph above, shows the reduction in total use and transition to alternative fuels required related to transportation.



IN-STATE RENEWABLE ENERGY GENERATION

In addition to electricity use, thermal energy, and transportation energy, the fourth major area addressed by the Regional Energy Planning Initiative is in-state renewable energy generation. In order to transition to 90% renewable energy by 2050, Vermont will have to produce significantly more electricity in-state (on top of an increase in imported elctricity), predominately through three sources: Solar, Wind, and Hydroelectric power. Vermont will also have to generate more non-electric fuel, especially biomass and biodiesel.

In order to develop targets and strategies for each region related to in-state production of these resources, the project team used Geographic Information System software to determine the distribution of potential for each renewable generation resource. The initial analysis used in this process was developed by the Vermont Center for Geographic Information (VCGI).

The two sections below provide an overview of the mapping analysis for solar and wind power, along with the statewide generation targets for the year 2050, which are broken down by region in the charts.

The third major electricity generation resource, hydroelectric power will be added only at existing dam facilities and through improved efficiency at existing hydro facilities. In total, the 2050 goal is 100 MW of added capacity.

SOLAR THE GOAL: 1,650 MW by 2050

SOLAR MAPPING

The map to the left displays one output of the regional mapping analysis: prime solar area.

= PRIME SOLAR

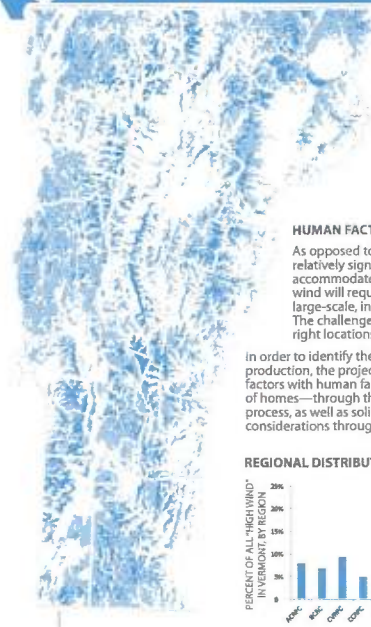
PRIME SOLAR POTENTIAL

Prime Solar refers to areas where natural conditions (e.g., topography) would likely make solar most efficient, and where ecological, physical, cultural, or other locally identified potential constraints to solar development do not exist.

In order to develop needed in-state electricity generation facilities in an efficient way, municipalities, regions, and the state need to work together to create a clear plan for the distribution of those facilities. This analysis is one part of that process.

REGIONAL DISTRIBUTION OF PRIME SOLAR

WIND THE GOAL: 400 MW by 2050



WIND MAPPING

The map to the left displays wind resources based on natural and environmental conditions:

= HIGH WIND
(best conditions for commercial scale wind)

= BASE WIND
(some wind potential)

HUMAN FACTORS

As opposed to solar, which will require relatively significant amounts of land to accommodate necessary production, wind will require only a handful of large-scale, in-state production facilities. The challenge, of course, is finding the right locations for these facilities.

In order to identify the best locations for wind production, the project team is comparing natural factors with human factors—such as the location of homes—through the GIS mapping analsysis process, as well as soliciting local input on siting considerations through public meetings.

REGIONAL DISTRIBUTION OF WIND POTENTIAL