

SECTION



I. EXECUTIVE SUMMARY

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The Northwest Regional Energy Plan is a pilot project funded by the Vermont Department of Public Service. The intent of the project is to complete in-depth energy planning at the regional level while achieving state and regional energy goals—most notably, the goal to have renewable energy sources meet 90% of the state’s total energy needs by 2050 (90 x 50 goal). In-depth regional energy planning is needed to address three key issues: energy security, environmental protection, and economic needs and opportunities. The Northwest Regional Energy Plan consists of the plan and all plan appendices.

Specific goals to be achieved by this plan include the following:

- Collaboration with Vermont Energy Investment Corporation (VEIC) to create a regional energy model that identifies targets for energy conservation and renewable energy generation
- Creation of specific strategies to help the region achieve state energy goals
- Creation of regional maps prioritizing locations for the development of future renewable generation facilities in the region

The region’s energy supply and consumption are analyzed in Section III to establish baseline energy use. The use of space heating energy, transportation energy, and electricity in the region is specifically examined. Based on the NRPC’s estimates, the region currently uses approximately 2.243 trillion BTUs to space heat residential units each year and about 2.7 trillion BTUs to space heat commercial, industrial, and institutional structures. Regional electricity use totals approximately 1.647 trillion BTUs per year based on 2013 data available from Efficiency Vermont. Regional transportation energy use is greater than 3.1 trillion BTUs per year based on approximate passenger vehicle fuel use in the region. Actual regional transportation energy use is likely greater due to the use of commercial vehicles in the region.

As of January 2017, the Northwest region had the capacity to generate 58.4 MW of electricity through hydro, wind, solar, and biomass technologies, and it had 98.4 MW of total generation capacity from all sources, according to data available from the Community Energy Dashboard.³ The 58.4MW of renewable generation in the region is a “raw” number that does not take “capacity factors, renewable energy credits sold, or ownership of the systems” into consideration. The NRPC has estimated renewable generation in the region to be about 182,190.79 MWh per year when factoring capacity factors for solar, wind, and hydro.

Regional electricity generation is also investigated and catalogued in Section III. Currently, the region has the capacity to generate approximately 98.4 MW of electricity. About 58.4 MW of this electricity comes from hydro, wind, solar, and biomass sources. Approximately 75.211 MW of additional renewable generation has been proposed to be sited in the region.

The NRPC cooperated with VEIC to create targets for energy conservation and renewable energy generation. The energy saved via conservation and improved efficiency is targeted to equal approximately 3.5 trillion BTUs by 2050. Conservation and improved efficiency are planned through a variety of means including increased use of efficient materials during construction and weatherization of existing structures. Most prominently, improved efficiency is targeted through the use of electric vehicles for transportation and electric heat pumps for space heating. The resulting increase in regional electricity demand means that electricity generation in the region will also need to increase. Specific targets for new in-region electricity generation by 2050 include the following: 208.5 MW (711.4 billion BTU/hour) of solar generation, 19 MW (64.8 billion BTU/hour) of wind generation, and 10 MW (34.1 billion BTU/hour) of hydro generation.

Goals, strategies, and implementation steps are established in Section V to guide the Northwest region to achieve the energy conservation and renewable energy generation targets created in Section IV. Goals,

strategies, and implementation steps have been specifically identified for the following categories: electricity conservation, thermal efficiency, and transportation. Electricity conservation, thermal efficiency and transportation are the types of energy conservation that the Northwest Region focuses upon in this section. Achievement of the goals set by NRPC will require the cooperation of multiple regional partners and the efforts of individual citizens.

A substantial part of the Northwest Region's effort to set renewable electricity generations goals involves the creation of regional energy generation maps in Section IV. The regional energy generation maps are meant to guide the development of new solar, wind, hydro, and biomass energy generation facilities in the Northwest region. The NRPC Regional Energy Committee was actively involved in this effort. The maps inform and help guide the siting of new renewable energy generation facilities in the region. The maps provide a macro-scale look at different factors that impact the siting of renewable generation facilities including generation potential. The objective of the NRPC Regional Energy Committee was to allow for sufficient renewable electricity generation in the region while avoiding undue adverse impacts upon known and possible constraints (these resources are specifically identified in Appendix B).

Section VI assesses the feasibility of meeting regional goals and outlines challenges to plan implementation. Regional energy generation goals are attainable while still allowing for the protection of known and possible constraints. The identified conservation goals and strategies may be more difficult for the NRPC to implement given that implementation is heavily reliant on the choices of individual consumers in the region. The thermal efficiency goals and strategies are similar. The NRPC can aid the efforts of other organizations to increase conservation and thermal efficiency in the region, and it cannot accomplish the goals and implement the strategies in the plan alone.

Achieving transportation-related energy goals is more straightforward. One of the NRPC's core functions is coordinating transportation planning for the region. The NRPC is well suited to achieving goals and implementing strategies for transportation. Progress on transportation-related implementation actions will be prioritized.

There are several challenges to successful plan implementation. Some of these challenges pertain to how the electric grid operates. This includes the need to balance "baseload" and "intermittent" electricity generation to ensure grid reliability and challenges related to the infrastructural capacity of the regional grid. Other challenges exist due to geography. Inclement weather is common in the region and can threaten electricity service. The Northwest Region's proximity to Chittenden County may create challenges related to the equity of renewable generation siting. Other challenges include:

- Environmental issues when developing new hydro generation
- Lack of sufficient biofuel or ethanol technologies and research
- Potential reliance on cord wood
- Lack of site specific guidelines for solar and wind generation facilities
- Lack of residential building energy standard (RBES) and commercial building energy standards (CBES) outreach and enforcement
- The limits of regional planning commissions' jurisdiction

Overcoming the challenges to implementation will likely mean bearing both economic and environmental costs. The equity issues related to who will bear those costs is of continuing concern to NRPC.

Appendix A contains the full results of NRPC's cooperation with VEIC to set regional targets for energy conservation and renewable generation. Appendix B contains a list of the known and possible constraints

identified by the NRPC Regional Energy Committee that were used to create the regional energy generation maps. Appendix C contains the regional generation maps to be used in regulatory proceedings (Section 248). Appendix D summarizes the planning approach and process used to create this plan. Appendix E contains a list of acronyms and phrases used throughout the plan. Appendix F is a summary of existing renewable generation facilities in the Northwest Region (by municipality). Appendix G includes a summary of municipal energy analysis and targets.