

SECTION



VII. FEASIBILITY AND CHALLENGES

A. FEASIBILITY

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A. FEASIBILITY

Combined with the LEAP model results, the analysis of existing energy demand and supply provides a framework for discussing the region's energy present and future. From that framework, the NRPC has developed goals, strategies, and implementation actions for both conservation and generation that will help the region achieve the CAP Mitigation Scenario. Despite challenges posed by grid limitation and by site-specific siting issues, the generation goals and strategies, guided by the LEAP generation targets, are feasible for the region to achieve in terms of both the amount of electricity needed to reach projected demand and the amount of land required to generate the electricity.

The identified conservation goals and strategies may be more difficult for the NRPC to implement. Energy conservation goals will require changes by individual consumers in the region. The NRPC can facilitate and help coordinate the efforts of other organizations in the region (e.g., public utilities, Efficiency Vermont, CVOEO) but has little influence in the area of electric and thermal energy.

The third area of conservation—transportation—is different. One of the NRPC's core functions is to coordinate transportation planning for the region. Combined with the NRPC's experience in land use planning—a discipline inextricably linked to transportation planning—the commission is well suited to implement transportation goals and strategies. Progress on transportation implementation actions will be prioritized, though electric and thermal goals will continue to be pursued.

B. IMPLEMENTATION CHALLENGES

The NRPC faces several challenges in achieving the CAP Mitigation Scenario. Many cannot be resolved by the NRPC alone and will require the cooperation and coordination of the federal government, state government, and private sector. Other challenges, such as those posed by Chittenden County's future electricity demand, will require the NRPC to make policy decisions that will have an impact on the achievement of state energy goals. Key implementation challenges include the following:

- **High Upfront Costs** – While efficient technologies such as heat pumps and electric cars are more affordable to operate, they also tend to have higher up-front costs. Incentives have been created to help Vermonters, especially low-income Vermonters, access these technologies. Unfortunately, many residents still find a gap between the subsidized cost and the amount they can afford. Increased incentives, especially for middle income households, as well as the quickly improving technology could help to alleviate this barrier for the region's residents. There is also a need to substantially increase the capacity of existing programs for low-income residents, such as the low-income weatherization programs to reduce wait times.
- **Complex and Intertwined Systems** – The ways in which we heat our spaces, fuel our vehicles, and power our homes are complex and can impact each other in surprising ways. Installing heat pumps or other electric technologies can often require expensive panel upgrades. Heating technologies like heat pumps are often only efficient if a home has been sufficiently weatherized, which can be a complicated and expensive undertaking. The expense of systems also means that residents will often only upgrade their furnace or other equipment when their current one fails. This slow rate of change, along with the complex upgrades often needed can be a barrier to implementation, but additional funding could encourage residents to make these improvements sooner and in an order that enables increased efficiency, such as weatherization before heat pump installation.
- **Split-Incentives** – in many rental housing options, the landlord is responsible for building maintenance while the tenant is responsible for utility bills. Typically, utility bill costs are not disclosed to future renters

prior to signing a lease. As a result, the landlord may not have a strong financial incentive to invest into home improvements such as weatherization or heat pumps. As a result, renters may face high utility costs with few options to address them. This is a particular problem given that in the Northwest Region the median renter household has half the income of the median owner-occupied household. Finding new ways to incentivize both landlords and tenants as well as provide targeted outreach and education on this topic could help to alleviate this issue.

- **Baseload vs. Intermittent Electricity** – Solar and wind generation technologies create electricity intermittently: when the sun is shining and when the wind is blowing, respectively. Unfortunately, the times when these generation sources are operating do not always correspond to the times when electric demand is at its peak. “Baseload” electricity, or electricity that is available on demand, is needed to ensure that peak demand can be met at any time. At present, baseload electricity is typically generated by fossil fuel, nuclear, or hydro generation sources; this may change in the future. Research indicates that solar and wind generation often complement each other, and increased solar generation in the region has helped the region address peak loads. Still, reaching the 2050 goal will require the development of alternative technologies such as more efficient and large-scale batteries, which will enable renewable technologies to supply baseload electricity. Biomass from farm and landfill gas as well as run-of-the-river hydro can be used to generate energy more consistently than solar or wind, providing a more reliable baseload. Each option comes with potential environmental & siting impacts that will need to be carefully considered to create a balanced system.
- **Grid Limitations** – The Vermont electrical grid was developed to have a one-way flow of electricity and distributed renewable generation can impact the function of the electrical grid. As with the rest of the United States, Vermont has historically depended on a small number of centralized power plants—the vast majority of which are located outside of the state.

With growth in distributed renewable generation, the way in which electricity is generated has changed. In some parts of the region, the grid may not be fully capable of allowing the placement of all scales of renewable energy generation facilities in every community. According to Green Mountain Power, its portion of the regional grid should be able to deal with additional solar generation, but there is less information available from VEC, the Village of Swanton, and the Village of Enosburg Falls. If the region and state are going to become more reliant on distributed solar generation, or even become a net exporter of renewable energy, Vermont public utilities and Vermont Electric Power Company (VELCO) will need to increase the pace of system-wide upgrades. This may be a difficult task to complete without directly impacting ratepayers and the cost of electricity in the state and the region. Proposed investments by GMP and VELCO would add an estimated 108 MW in increased voltage limits.

- **Inclement Weather** – Increased reliance on electricity for regional heating and transportation energy needs could be challenged by the region’s weather. Winter storms and high winds often threaten the region’s electrical distribution infrastructure. Downed power lines could impact the ability of some regional households to produce heat or to have a means of transportation if the household is solely reliant on electric heat pumps and/or electric vehicles. Although this challenge may be addressed through increasingly concentrated regional development and improved battery technology, households might still need to have a secondary means of heating their homes (and carry the cost of maintaining a secondary heating source). Other means of overcoming the challenge of inclement weather include creating grid redundancy, creating microgrids (i.e., grids that can disconnect and operate when the main grid is not functioning), and developing more accurate weather prediction tools such as VELCO’s weather analytics tool.
- **Difficulty in Developing New Hydro** – As mentioned, it is difficult to develop new hydro power sources,

even at existing dam sites. Achieving the LEAP target of hydro generation in the region may be difficult if not impossible. Due to the relatively high-capacity factor associated with hydro generation, “replacing” the need for hydro with more solar generation will be difficult. Run-of-the-river hydro has less ecological impacts and could offer more year-round power for the region. Understanding and supporting the implementation of newer, more efficient and less disruptive renewable generation will help the region gain the benefits of renewables with less of the drawbacks.

- **Issues with Biofuels, Ethanol, Renewable Natural Gas, and Heat Pumps** – The LEAP targets are very reliant upon biofuels and ethanol as an energy source for heavy vehicles. Current technology and economics would make a transition from diesel to biodiesel and ethanol unlikely. Significant technological advances will be necessary to make the use of biofuels on such a large scale possible and truly renewable (currently, biofuels production requires considerable fossil fuel inputs). There may also be major infrastructural challenges to creating a supply chain to distribute and sell biofuels in the region and the state. This plan does not support the use of ethanol as an alternative fuel due to the high environmental and energy costs of producing ethanol.

Manufacturing biodiesel fuels locally may be an economic opportunity for local farmers. UVM Extension has successfully worked with Borderview Farms in Alburgh to grow crops that are converted to biofuels. It remains to be seen if this success story can be replicated on other farm in the region or on a commercial scale.

The LEAP analysis does not factor in the potential use of “renewable” natural gas by VGS in the future. VGS has started to purchase renewable natural gas from farms. The gas is produced by processing cow manure in an anaerobic digester to create natural gas. The economic viability of renewable natural gas, its impacts on climate change, and its classification as a “renewable” resource should be analyzed in future updates to this plan.

The LEAP analysis only factors in the energy use of heat pumps for heating. It does not factor in the use of heat pumps for cooling. Use of heat pumps for cooling may have a substantial effect on electricity demand in the summer, especially given the potential warming effects of climate change on the region. This issue should be addressed in future revisions to the LEAP analysis.

- **Proximity to Chittenden County** – Although the LEAP generation targets appear to be achievable in the Northwest region and for most of the state, it may be much more difficult for neighboring Chittenden County to attain its LEAP generation targets. Chittenden County’s existing electricity demand is larger than that of the Northwest region, and the electric demand in Chittenden County is growing at a faster rate than in the rest of the state. There will likely be pressure on the regions surrounding Chittenden County to “help” meet its generation targets. The NRPC specifically expects there to be pressure to develop additional solar in southern and western parts of the region due to these areas being adjacent to Chittenden County. This is especially true given grid limitations that exist in Addison County and Washington County. The NRPC will need to decide whether or not it is appropriate for the region to be an energy “exporter” to Chittenden County. The effects of additional generation in the region will need to be weighed against the potential monetary benefits that additional generation may have for some of the region’s landowners, as well as the positive impacts that it may have both in helping the state achieve the CAP Mitigation Scenario and on the overall state economy. Many regional residents rely on Chittenden County for employment.
- **Reliance on Cord Wood and Biomass** – While reduced from original modeling, the LEAP model still depends heavily on cord wood use as a single-family home heating source (and for commercial and

industrial heating, too). The NRPC has some questions about how this increased demand will be met regionally and about the potential environmental impacts of increased reliance on wood—particularly with regard to climate change.

The continued reliance on cord wood for heating and its impacts on greenhouse gas emissions as well as the sustainability of its harvest in the region should be monitored. As the impacts of climate change on the Northwest region become clearer, the widespread use of cord wood should be reassessed to ensure that its use continues to be in the best interest of the region and the state. In addition, information from the Biomass Energy Research Center indicates that the region has less low-grade wood that can be used for biomass heating than other regions of Vermont. This may limit efforts in the region to expand the use of biomass for heat and electricity generation. Biomass generation that utilizes farm or landfill gas can help to meet renewable generation goals without threatening our forests.

- **Lack of Site-Specific Guidelines for Solar and Wind Generation Facilities** – The energy generation maps in the plan address which conservation resources should be protected from development of renewables and which conservation resources should be subject to mitigation if impacted by development of renewables. This plan does not provide site-specific guidelines for how solar or wind should be placed on a site if it is deemed appropriate for development. The issues of screening, stormwater management, fall distance, sound levels, and aesthetics have not been addressed in this plan. The NRPC did not address these issues directly in this plan primarily due to the unique challenges that each particular site poses to renewable development, but these factors are considered by the Project Review Committee.

The legislature has developed setback requirements for solar facilities and has enabled municipalities to develop solar facility screening ordinances, but concerns persist about whether enough has been done to protect the state’s working landscape. Sentiment is even stronger in the state regarding the need for siting standards for wind generation facilities. Of particular concern to the NRPC are the possible economic inequities that can result through the siting of large generation facilities in the region. The NRPC advocates for changes to the Section 248 process ensuring that the economic benefits provided by a developer are distributed equally to all municipalities that are impacted by a proposed facility.

- **Impacts on Local Energy Companies** – The changing energy landscape may have negative impacts on local energy companies, such as heating fuel and gas stations, that cannot evolve their business model. In the short term, this may hinder regional citizens from accessing new, innovative heating and transportation technologies locally. In the long term, it may lead some local energy companies to disband, with lost jobs as a consequence. There are several programs in the state and region to help retrain workers who currently work in the fossil fuel industry. Certain sectors, including weatherization and green technology installation, will require additional labor and can provide careers for those transitioning out of fossil fuel industries.
- **Lack of RBES and CBES Outreach and Enforcement** – Although Efficiency Vermont has provided some outreach to local contractors and the general public regarding the requirements of Residential Building Energy Standards (RBES) and Commercial Building Energy Standards (CBES), there is still a lack of knowledge about the programs. The state also lacks the ability to enforce the code. Combined, this could slow regional and statewide weatherization efforts. Increased education and outreach on these standards and the benefits of higher standard builds could help to increase implementation of RBES and CBES.
- **Limits of Regional Jurisdiction** – There are limits to how much the NRPC can do to ensure that the 2050 goal is accomplished. The commission can influence state policy and implement projects that fall within RPC’s jurisdiction in state statutes, but many of the changes that will be required will need to happen on

a macro scale (i.e., federal and state policy) and on a micro scale (i.e., the choices of individuals in the region). The NRPC will need to be cognizant of its limitations when implementing this plan.

Despite the challenges involved in implementation, it is important to remember the key issues this plan hopes to address: energy security, environmental protection, economic need/opportunities, and equity. Without making significant changes to how the Northwest region generates and uses energy, our energy future will be less secure, our environment less healthy, and our economic situation potentially dire. The NRPC finds that any and all progress toward the goals of this plan is important. A lack of action at the state, regional, and local levels may have calamitous consequences.