

2015 Update to the Vermont Comprehensive Energy Plan

The Public Service Department (PSD) will complete an update of the Vermont Comprehensive Energy Plan (CEP) and Electric Plan by the end of 2015. The Comprehensive Energy Plan is required by 30 V.S.A. § 202b and the Vermont Electric Energy Plan is required by 30 V.S.A. § 202. Both are required to be complete and adopted by January 1, 2016, and updates are required every six years thereafter. The most recent completed CEP and Electric Plan were published in late 2011.

The PSD is coordinating closely with other state agencies, via the Climate Cabinet and other means, to ensure that the CEP advances policy objectives across multiple areas. In concert with these efforts, the Department of Buildings and General Services is coordinating an inter-agency process to update the State Agency Energy Plan, which will be integrated with the CEP and illustrate how the government of Vermont will lead by example.

PUBLIC INPUT THROUGH WRITTEN COMMENTS AND MEETINGS

The PSD expects to publish a draft of the 2015 CEP in late summer. In order for this draft to reflect current understanding of the state's energy challenges, opportunities, and direction, the PSD is soliciting public, expert, and stakeholder input between now and July 24, 2015. This public input will take the form of written comments, public meetings, and smaller meetings with individuals and stakeholders with a wide variety of perspectives. Public input will continue to be welcome after July 20, but the PSD requires input by that date in order to inform the draft CEP. Following publication of the draft CEP update, the PSD will coordinate further public input, including through further public meetings and written comments focused on the published draft.

Written comments are welcome at any time at <http://www.energyplan.vt.gov/>.

The PSD plans a series of public meetings this summer to hear from Vermonters so that a wide range of views and experiences can inform the draft CEP. These meetings will be of two types: 1) half-day topic-focused meetings and 2) regional meetings on the CEP as a whole.

Topic-focused meetings:

The PSD plans half-day meetings on each of these four topics:

- energy efficiency,
- energy supply resources,
- transportation, and
- the electric grid and utility planning.

In order to identify interested participants in these meetings, the PSD welcomes emails to PSD.ComprehensiveEnergyPlan@state.vt.us by June 12, 2015 with the subject line "meeting participant." Each email should identify the meeting or meetings which the individual would like to attend. Meetings will take place in the Montpelier area. The meetings on energy efficiency and the electric grid are tentatively scheduled for June 24, while the meetings on energy supply resources and

transportation are tentatively scheduled for June 30. The dates and times for each meeting will be sent to all interested participants and posted on the CEP website as soon as they are set.

Regional meetings:

The PSD plans evening meetings to solicit input on the upcoming CEP in general, and the questions identified below in particular, in four or five geographically diverse locations around Vermont this summer. These meetings will be hosted in part by town energy committees and the Regional Planning Commissions in each region. In order to capitalize on an ongoing collaboration in energy planning, the summer public meeting regions will include Northwest (e.g. St. Albans); Two Rivers/Ottawaquechee (e.g. Woodstock); and Bennington (e.g. Bennington). Following publication of the draft CEP in late summer, the PSD plans additional evening public meetings in other regions of the state.

Locations, times and dates for each of these meetings will be posted at <http://www.energyplan.vt.gov/> as soon as they are available.

FRAMING QUESTIONS FOR PUBLIC INPUT

Throughout the spring and summer, the PSD is particularly interested in public input on the following questions. These questions will frame discussions at the meetings described above and the PSD welcomes written comments at <http://www.energyplan.vt.gov/> by July 24 on these topics, as well as on any other issue.

Document structure updates and learning from recent studies

- What aspects of the [2011 CEP](#) are in need of updates? What has changed, in particular, over the last four years that requires an update to any of the goals, recommendations, or policy directions established by the 2011 CEP? Volume 1 of the 2011 CEP provides a concise summary of the themes and recommendations of that plan, while Volume 2 provides detailed recommendations and supporting context.
- Since the 2011 CEP was published, the PSD and others have completed these projects, processes, or reports, among many others:
 - [Thermal Efficiency Task Force](#)
 - [Vermont Energy Generation Siting Policy Commission](#)
 - [Total Energy Study](#)
 - Net metering:
 - [Evaluation of Net Metering in Vermont Conducted Pursuant to Act 125 of 2012](#)
 - [Evaluation of Net Metering in Vermont Conducted Pursuant to Act 99 of 2014](#)
 - [Building energy labeling working group reports](#)
 - [Vermont Energy Assurance Plan](#)
 - 2012 and 2013 Clean Energy Finance Summits
 - [Improving Vermont's Smart Growth Designation Programs \(Act 59 of 2013 and following\)](#)
 - [Strengthening Vermont's Economy by Integrating Transportation and Smart Growth Policy](#)
 - [Vermont Zero Emission Vehicle Action Plan](#)

How should the CEP build on the results of these processes? What particular aspects of these past activities should be incorporated into or otherwise inform aspects of the 2015 CEP?

- What other resources, reports, or other publications should the Department reference when developing the CEP, and why?
- The 2011 CEP was structured around four main sections: Electricity, Thermal, Transportation/Land Use, and State Agencies. Since 2011, there have been significant changes in how electricity is used for transportation (electric vehicles – ZEV mandate and planning) and for building heating (cold climate heat pumps). As such, some reorganization of the CEP may be required. Attached to this publication is a potential Table of Contents for the 2015 CEP. What changes would you suggest to this structure for the 2015 document?

Energy goals

The 2011 CEP established a goal of virtually eliminating Vermont's dependence on petroleum by meeting 90% of the state's energy needs in 2050 with renewable energy. In 2015, the PSD estimates that Vermont will meet approximately 16% of our energy needs with renewable energy. PSD modeling indicates that achieving the 90% renewable energy goal would be sufficient to allow the state meet the energy sector's share of the 2050 greenhouse gas goal established in Vermont statute of a 75% emission reduction from 1990 levels. The possible additional goals, along with the sector-specific examples, discussed below were established through analysis of the modeling results developed for the Total Energy Study.

- The definition of the 90% by 2050 target in the 2011 CEP did not directly include energy efficiency. Should the state adopt an energy use reduction, energy conservation, or energy efficiency goal? For example, the 2015 CEP could establish a goal of reducing total energy consumption by 1/3 or more by 2050, from our current level, through increased efficiency in energy production and use. For context, Vermont's total energy consumption has declined about 7% from a peak in 2004.
- The PSD is considering establishing interim goals for the increased use of renewable energy. Would you support establishment of interim goals? The PSD is considering goals of 25% renewable by 2025 and 40% renewable by 2035. Are these appropriate goals? Please consider the following aspects and example scenarios when developing your response:
 - The PSD is also considering establishing 2025 goals by sector. The buildings (residential and commercial combined) and industrial sectors are each approximately 20% renewable in 2015, and could have (separate) goals of 35% renewable by 2025. Transportation is currently about 6% renewable could have a goal of 10% renewable by 2025. Meeting these three sector goals would be sufficient achieve the 25% economy-wide goal.
 - The PSD plans to assume that Vermont's electricity supply will become more renewable at the pace set by the recently passed H.40: 55% in 2017, rising to 75% by 2032. This implies that roughly 2/3 of Vermont's electricity will come from renewable sources in 2025.
 - Separate goals could be defined for heat used in buildings and industry (such as 30% of heat from renewable sources in buildings and 25% in industry), recognizing that heat is distinct from other (almost entirely electric) end uses in both buildings and industry. An energy service goal, such as these heat goals, could include both electric and non-electric means of delivering that service.
 - Sector-level goals for later dates (such as 2035 or 2050) face much greater uncertainty and may add little value.
 - In order to evaluate the appropriateness of establishing such goals, please consider the following summaries of what each sector and the state's energy sources and use as a whole could look like in 2025 if Vermont were to achieve a 25% renewable share of its total energy supply. Please recognize that each of these scenarios is just

one possible mix that the Department has estimated would likely meet hypothetical 2025 goals for renewable energy by sector.

- **Buildings:** 35% renewable overall and 30% renewable heat could look like:
 - Maintain electric use for purposes other than heat at current level (while the number and total size of buildings grow).
 - Improve the energy efficiency of building shells so that the required heat delivered falls by 14% on average.
 - Use 35,000 cold-climate heat pumps (using an assumption that each displaces the equivalent of 350-400 gallons of heating oil per year).
 - Increase use of renewable bio-derived fuels by 20%, though a mix of increased use of wood and increased use of liquid biofuels blended into heating oil. (If this were met only with wood it would imply a roughly 20% increase in the use of wood for heat; if met with liquid bioheat it would imply the use of bio blends on average of between 8% and 10%.)
- **Industry:** 35% renewable overall and 25% renewable heat could look like:
 - Increase electric use for purposes other than heat by 10% (while production grows by more than 10%).
 - Maintain the current demand for heat.
 - Increase use of renewable bio-derived fuels by 35%, though a mix of increased use of wood and increased use of liquid biofuels blended into heating oil. (If this were met only with wood it would imply a roughly 35% increase in the use of wood for heat; if met with liquid bioheat it would imply the use of bio blends on average of between 8% and 10%.)
- **Transportation:** 10% renewable
 - Keep vehicle miles traveled flat at current levels (while population and the economy grow).
 - Any one or a combination of:
 - Use 15% ethanol in gasoline and 5% biodiesel for heavy-duty vehicles, with 10% of all light-duty vehicle miles driven on electricity (e.g. approximately 56,500 EVs out of approximately 565,000 vehicles).
 - Use 12.5% ethanol and 8% biodiesel, with 15% of all light-duty vehicle miles driven on electricity (e.g. approximately 85,000 EVs).
 - Use 15% ethanol and 10% biodiesel, with no EVs.
 - Use 10% ethanol and 10% biodiesel, with 18.5% of all light-duty vehicle miles driven on electricity (e.g. approximately 105,000 EVs).

- The Total Energy Study identified the uncertain potential of liquid biofuels as a fundamental uncertainty for the state’s energy portfolio in the coming decades. How should the 2015 CEP address liquid biofuels? Should it identify particular sectors or end uses where policy should encourage or rely upon these fuels? If so, which sectors or end uses?
- How should the 2015 CEP update address the use of natural gas? How should the plan differentiate between policies regarding the use of this fossil fuel and policies regarding construction of pipeline infrastructure that can carry both fossil natural gas and other gaseous fuels such as renewable natural gas?
- How should the 2015 CEP reflect the differences in fleet or stock turnover and infrastructure lifetime between different energy-relevant technologies? (For example, how should the CEP address buildings, which may last for generations, but can be improved after construction, differently from vehicles, which last for a decade before replacement?) Should the 2015 CEP identify particular sectors, end uses, or technologies for which different policies are required to encourage early adoption vs. adoption at scale?
- What are the particular sectors, end uses, or technologies for which public investment in new infrastructure makes more sense than consumer investment?
- How should the 2015 CEP reflect the interactions between Vermont’s energy (or other) policies and those in neighboring states, the nation as a whole, and internationally?
- How can the PSD acquire quantitative information regarding the fuel use, potential for changes in fuel, and efficiency potential in Vermont’s manufacturing sector?

Access to and mobilization of capital

- What new or expanded financing programs or policies may be required in order to meet the state’s goals?
- Given a limited capacity to provide financing support to clean energy initiatives, should the state support enterprises with innovative clean energy solutions seeking investment capital; continue providing support to help finance individual projects; or both (and in what proportion)? If the first, in which sectors does it currently make sense for the state to invest in enterprises?

Transportation

The 2011 Comprehensive Energy Plan addresses the transportation sector through 2 primary focus areas:

- One is through “demand management” or gaining energy efficiency by providing mobility through more energy efficient modes such as transit, ride share or walking and biking and increasing the overall efficiency of the cars and trucks on Vermont roadways.
- The other is replacing the fossil fuel powering transportation with renewable fuels such as bio-fuels or electricity generated from renewable sources.

Transportation Energy Demand Management

- A “smart growth” or “concentrated mixed use” development patterns, like we see in many Vermont cities, towns and villages, help greatly in making transit, walking and biking more viable as transportation modes, thus increasing more efficient transportation choices. Does your community include land use as an important energy consideration when undertaking land use planning or engaging locally on energy issues? What should state government be doing to encourage the smart growth energy connection?
- Technology, social media, and other advances are increase ridesharing, carshare and other opportunities that lessen Vermonters dependency on vehicle ownership. Do you use Uber and other tools when seeking rides outside of the state? Would you use it if available in Vermont? Would you be interested in reducing the number of vehicles in your household if you could share a community car?
- The Vermont Agency of Transportation supports existing transit service. Would you ride a bus if it were available in your area? If you currently use transit would you be willing to pay more in bus fares if it meant service improvements?

Switching to Renewable Fuels in the Transportation Sector

- Have you considered purchasing an electric vehicle? What should the state be doing to encourage electric vehicle purchases (such as creating a purchase incentive program, making public charging more available, and/or working with manufacturers to make more EV models available in Vermont showrooms)?
- See also the question above (from the Total Energy Study) regarding biofuels.

General Question

- Policy makers are facing a dilemma. As vehicles are becoming more efficient, people are switching to more efficient modes and powering their vehicles with fuels other than gasoline or diesel, gas tax revenues are declining. This trend will be exacerbated in the years ahead as the state makes strides in reaching its energy and GHG reduction goals. Increased transportation revenues are sorely needed not only to keep Vermont’s roads and bridges in a state of good repair, but also to increase transit service, build sidewalks and bike facilities and make other energy smart transportation improvements. What should Vermont be doing to lessen its dependence on the gas tax? Are there alternative transportation revenue sources the state should be pursuing?

The electric grid

Analysis conducted for the Total Energy Study, among others, indicates that Vermont is likely to increasingly use electricity for building heat and for transportation, displacing some of our direct use of other fuels, as the state moves toward meeting its energy goals. This could result in a significant net increase in the amount of electric energy consumed in Vermont, which could place new stresses on our electric grid. At the same time, new distributed energy resources (DERs, including demand-side, storage, and generation resources) have the potential to provide new services to the grid.

- How should Vermont approach the challenge of seeking the least-cost overall electric grid (including central and distributed generation, transmission, distribution, distributed storage and demand-side resources, and fuel-switching savings) in both the near term (next 10 years) and over the longer term (e.g. to 2050)? How should we identify the least-cost set of resources or upgrades to deploy, and when they should best be deployed?
- Given changes in overall load, load shape and controllability, how much more electric service can we provide to VT customers with our existing grid, or with minimal upgrades?
- What are the “no regrets” or “few regrets” grid upgrades we might consider making today to enable future grid transition that would also provide some kinds of value today? (For example, should we consider building out more three-phase lines or enabling circuits to have two-way flow today, or will future DERs, including storage, on those circuits mean those near-term investments would have a high risk of becoming stranded costs?)

Economic development

A 2014 PSD survey indicates that more than 15,000 Vermont jobs are at least in part clean energy jobs, amounting to 4.3% of the Vermont workforce. This includes jobs providing clean energy solutions to Vermont and also jobs exporting clean energy products and services to other states and around the world. The 2014 Comprehensive Economic Development Strategy identifies clean energy as a key potential growth sector for the state. At the same time, Vermont firms and residents face higher per-unit energy costs than in many other jurisdictions.

- Vermont’s clean energy markets, while potentially significant, are small on a national, much less global, scale. How should the CEP address the potential for fostering through state policy and programs breakout clean energy firms that can export their products and services? Are there conflicts between such the needs of such firms with those focused on Vermont as a primary market?
- How can energy policy best improve the competitiveness of Vermont businesses?
- When advancing energy policies, how should the state balance support for deploying commercially mature technologies developed outside the state with state support for research and development by promising firms with breakout potential?
- How can energy policy best protect and enhance the quality of life for Vermonters with little or no discretionary income?

2015 Comprehensive Energy Plan

Possible Outline

- 1 Preface**
 - Objectives/Goals/Process
- 2 Progress Since the 2011 CEP**
 - Processes complete, policies adopted, changes in the energy system
- 3 Overview of Energy Supply and Demand (Total Energy perspective)**
 - If interim goals, introduce and discuss/model them here
 - Cross-cutting challenges; introduce leverage points
- 4 The Impacts of Energy**
 - Economic**
 - Cost of doing business; volatility
 - Growth sector
 - Energy assurance/resilience
 - Energy justice/poverty/cost of living
 - Agricultural and forest economies
 - Environmental**
 - Climate/GHGs
 - Land use (siting; sprawl)
 - Forest health
 - Water quality
 - Health**
 - Health in all policies
 - Air pollution
 - Active lifestyles
- 5 Energy Financing**
- 6 HEAT FOR BUILDINGS AND INDUSTRY**
 - Summary/introduction
- 7 Building heat**
 - Building shells
 - Heating systems
 - Efficiency
 - Technology/fuel choice
 - Comprehensive building efficiency (buildings as systems)
- 8 Industrial process heat**
- 9 TRANSPORTATION**
 - Summary/introduction
- 10 Mobility demand and mode choice**
 - Land use/Smart growth
 - Modes (bike/pedestrian/transit/carpool)
- 11 Efficient and Renewably-powered vehicles**
 - ZEV action plan; Federal policy context (CAFE)
 - Freight/heavy duty vehicles
 - Fuel choice

- 12 POWER**
 - Summary/Introduction
- 13 Managing Electric Demand**
 - Efficiency
 - Load management
 - Storage
- 14 Meeting Electric Demand**
 - Utility portfolios and planning
 - Regional markets
 - Land use/siting
 - Resilience
 - Planning for the grid of the future

- 15 ENERGY SUPPLY RESOURCES**
 - Summary/Introduction
- 16 Renewables:**
 - Solar (PV and hot water)
 - Wind
 - Solid biomass
 - Liquid biofuel
 - Bio- and landfill methane
 - Hydropower
- 17 Non-renewables:**
 - Petroleum
 - Natural gas
 - Nuclear

- 18 STATE ENERGY ACTION**
 - Lead by example