

Vermont Clean Energy



2014
Industry
Report



Prepared for the
Vermont Clean Energy Development Fund
by:

[bw] RESEARCH
PARTNERSHIP

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 **VERMONT**
CLEAN ENERGY DEVELOPMENT FUND
DEPARTMENT OF PUBLIC SERVICE

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Letter

We are pleased to share this first report from the *Clean Energy Development Fund* describing the status of Vermont's clean energy industry. The survey conducted for this report shows just how many Vermonters—now about four percent of the state's workforce—are part of the transition to a clean energy future. This growing sector includes firms and organizations researching, developing, manufacturing, distributing, or selling goods or services related to clean energy.

This report, which represents a collaborative effort between the Public Service Department, the Agency of Commerce and Community Development, the Department of Labor and industry representatives, identifies substantial clean energy activity in Vermont with expansion over the past twelve months at 3.4 percent. A solid majority of this growth consisted of new hires, with the balance being current employees given new clean energy responsibilities. These clean energy workers fill a range of positions across the full value chain of firms from research, design and engineering to installation and professional services, with nearly 40 percent in the installation segment alone. Employers surveyed indicated interest in adding over 1,800 additional employees in the coming year. With a robust set of educational institutions including the University of Vermont and the members of Vermont State College system, the state is well positioned to offer technical education to the clean energy workforce of the future.

For many years now, the State of Vermont has earned a reputation as a leader for its innovative energy policies. Last year, the state was ranked #1 in solar jobs per capita by The Solar Foundation and #7 in the State Energy Efficiency Scorecard by the American Council for an Energy-Efficient Economy. This report provides further evidence regarding the extent of clean energy activities in Vermont. The state's forward-thinking businesses, citizens, communities and utilities, coupled with strong support for clean energy by State government, continue to provide opportunities for companies to grow.

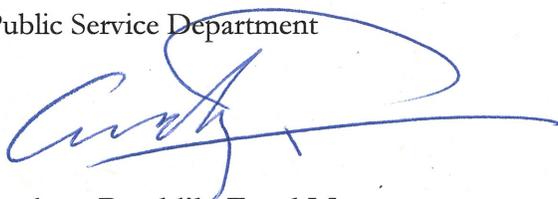
The Clean Energy Development Fund at the Public Service Department provides a key element in the state's financing picture helping to support deployment of renewable energy systems. Established in 2005 by the Vermont Legislature, the Fund provides grants, credit enhancements and incentives for projects that build renewable energy capacity and foster job growth in this sector. The Fund is one of the department's vehicles for implementing finance strategies to achieve the renewable energy goals put forward in the 2011 Comprehensive Energy Plan along with the state's goals for greenhouse gas reduction. This study helps the CEDF work to meet these goals.

Progress toward these goals requires the existence of companies capable of delivering quality products and services at cost-effective pricing. Until now, the state has lacked a clear picture of the number of jobs and firms conducting business related to clean energy in Vermont. This report provides the basis for characterizing this market and will allow us to track changes over time in this rapidly evolving sector. The department has contracted to repeat this survey for at least two more years. Insights gained from this undertaking will be used to improve and sharpen the effort next year. The PSD will continue to monitor the contribution of this emerging industry in the state and report on its progress. We welcome feedback and suggestions for supporting the state's clean energy enterprises.



Christopher Recchia, Commissioner

Public Service Department



Andrew Perchlik, Fund Manager

Clean Energy Development Fund



Acknowledgements

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The report represents a collaboration between the Public Service Department, the Agency of Commerce and Community Development, and the Department of Labor. The PSD gratefully acknowledges the contributions and assistance from Ken Jones (ACCD) and Mathew Barewicz (DOL) as members of the project team.

PSD convened an advisory group to offer input into development of this report and to help identify prospective clean energy companies to survey. We thank the following advisory group members for their time and contributions:

Andrea Cohen	Vermont Businesses for Social Responsibility
Paul Costello	Vermont Council on Rural Development
Alex DePillis	Vermont Agency of Agriculture, Food and Markets
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Mark Whitworth	Energize Vermont

The PSD and CEDF would especially like to thank all the employers in the state who responded to the survey. Your thoughtful input provided essential data upon which to build in the years ahead.

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Are you interested in learning more about a career in the clean energy industry?

If so, please visit these websites:

<http://www.vermontgreencareers.org>

<http://cleanenergyeducation.org>



Introduction

Clean energy—defined for the purposes of this report as renewable energy, energy efficiency, clean transportation, and greenhouse gas management and accounting—has become big business, changing the way in which consumers and companies produce and use electricity and fuel for transportation and heating. While many consumers see positive environmental impacts as an added benefit of clean energy goods and services, lowering costs over time drives most decisions made by consumers.¹ Whether it is to reduce monthly electric bills or heating costs or hedge against increasing fuel costs in the future, economics drive the clean energy cluster.²

Vermont has positioned itself to be at the forefront of the clean energy economy, which is evident in recent legislation intended to foster clean energy, including, for example, a recent expansion of the allowable in-state distributed net metered renewable electricity generation. Since 2011, Vermont has more than quadrupled the amount of solar electric generation on the grid with nearly 60 MW of installed projects as of the publication of this report. In addition to this installed capacity, more than 60 MW of projects are currently pending.³ The first to institute a statewide energy efficiency utility program in 1999, Vermont continues to work with its utilities to implement policies and pass legislation that benefit all stakeholders to advance the state's clean energy goals.⁴

The state's commitment to pursuing a clean energy future is demonstrated in its 2011 Comprehensive Energy Plan (CEP). The target in the CEP is to obtain 90% of the state's total energy needs (electric,

¹ See generally, *National Solar Jobs Census 2013*, at p.27, The Solar Foundation, available at: www.thesolarfoundation.org/research/national-solar-jobs-census-2013,

² The term cluster is used throughout this report to capture the various technologies and value chain activities conducted by clean energy companies in Vermont.

³ Vermont Public Service Department

⁴ State Energy Efficiency Policy Database, American Council for an Energy-Efficient Economy, available at <http://www.aceee.org/energy-efficiency-sector/state-policy/vermont/217/all/191>

heating/cooling and transportation) from renewable sources by 2050.⁵ This ambitious goal has set the stage for Vermont to continue encouraging utilities, businesses, and homeowners to strengthen the state's clean energy portfolio.

A review of the Bureau of Labor Statistics Green Goods and Services (GGS) survey revealed a growing green economy in Vermont.⁶ As of 2011, the GGS data showed over 12,000 green workers in Vermont. Also revealed in that survey, these green jobs pay a premium, as “wages in green occupations average approximately four dollars more per hour than the state average of all occupations, and jobs with green enhanced skills average almost six dollars more per hour than the state average.”⁷

Despite the state's strong commitment to clean energy, little has been known about the size and breadth of the clean energy cluster in Vermont. Existing labor market data does not categorize clean energy firms⁸ or workers separately from their traditional economy counterparts, and as a result no baseline data on the clean energy workforce exists.

To fill this information gap, the Vermont Public Service Department's Clean Energy Development Fund commissioned a research study by BW Research Partnership, Inc. to replicate studies done in several other states that rely on direct employer feedback through a representative survey effort. This report presents the findings from that research.

The data presented in this report result from direct feedback from over 1,450 Vermont employers

This effort required more than 10,000 telephone calls and 1,200 emails to employers in Vermont. The level of sampling has generated highly reliable data, with a margin of error of approximately +/- 2.25 to 3.89%

⁵ Vermont Public Service Department, http://publicservice.vermont.gov/topics/renewable_energy

⁶ Ainsworth, et al., *Analysis of Green Jobs Sector in Vermont*, Vermont Department of Labor; Economic & Labor Market Information Division, 2013, available at: <http://www.vermontgreencareers.org/wp-content/uploads/2014/01/Analysis-of-Green-Jobs-Sector-in-Vermont.pdf>. Note that there is overlap between the “green economy” and “clean energy economy,” but these terms are not synonymous. “Green” has been used to include conserving energy as well as reducing waste and limiting non-renewable resource use. See Section 1 for relevant definitions. For the purposes of this report, clean energy is limited to renewable energy, energy efficiency, clean transportation, and greenhouse gas management and accounting.

⁷ *Id.*, at p. 9.

⁸ For the purposes of this report, the terms “firm” and “establishment” are used interchangeably and refer to any Vermont business location with employees.

at a 95% confidence interval, which is considerably more reliable than the industry standard for survey research.⁹

The survey instrument used for this study was based on similar studies conducted in Massachusetts, Illinois, and at the local level in numerous states, and was modified to be relevant for Vermont. The development was an iterative process with many stakeholders, and the final survey instrument is substantially similar to those used in other states. This allows for the collection of important Vermont-specific data points while maintaining comparability across states.

The survey was conducted through online and telephone methods. It was administered to a list of “known” employers in Vermont, including those who are members of industry associations (such as Renewable Energy Vermont) or otherwise identified by the State and its stakeholders. It was also administered to a representative sample of employers in various traditional industry categories (such as manufacturing of Turbine and Turbine Generator Set Units Manufacturing, electrical contractors, etc.), for which there was no formally known association with clean energy activities. Data collection occurred between February 24, 2014 and March 21, 2014. Telephone surveys were administered by Castleton Polling Group in Rutland, Vermont. (For more detail on the methodology, refer to Appendix A.)

⁹ A range is provided for the margin of error because not all questions are answered by every respondent.



Industry Overview

Vermont is home to a large clean energy cluster

The Vermont Clean Energy cluster employs 15,286 workers at 2,684 employment locations throughout the state, which represents approximately 4.3% of the state’s workforce.¹⁰ Vermont has a higher concentration of clean energy work per capita than many other states, including Massachusetts and Illinois, both of which have strong clean energy clusters (and use a very similar methodology for calculating their states’ clean energy employment)¹¹. Of these 15,286 workers, 73.8% spend a majority of their time and 52.2% spend all of their time conducting clean energy work. The size of the cluster is impressive, and indicates a healthy environment for growing and sustaining clean energy businesses.

“Vermont has created a cluster of clean energy companies that is competing, and winning, business around the country and indeed around the world. That means jobs for Vermonters – energy auditors, technicians, manufacturers, installers, and a whole range of skilled professions...”

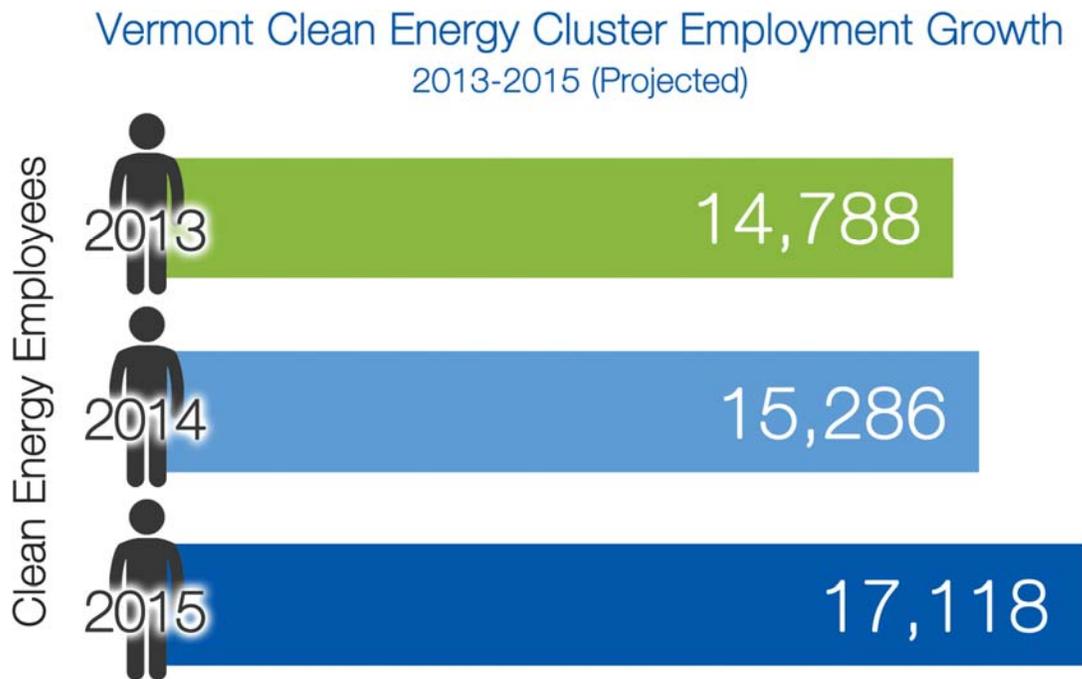
Scott Johnstone, Executive Director
Vermont Energy Investment Corporation
(VEIC)

¹⁰ Economic Modeling Specialists, Inc. (EMSI) Class of Worker, Q1 2014. Note that EMSI data include a wider set of workers than official “covered employment” estimates from the Bureau of Labor Statistics and Vermont Department of Labor, including self-employed/sole proprietors among others. Given the inclusion of self-employed workers in the survey sample, we believe EMSI is a more appropriate comparison set.

¹¹ See page 29 for additional discussion.

The Vermont clean energy cluster is growing

The clean energy cluster's expansion outpaced the overall state job growth over the past 12 months (3.4% v. 0.2%).¹² Of the workers that were hired over the last 12 months, 81% were new employees, while 19% represented existing employees that were given new clean energy responsibilities. The cluster is projected to add 1,832 workers over the next 12 months, representing an overall growth rate of 12%.¹³



The cluster's growth over the past 12 months and the optimism of current employers about anticipated growth are clearly good signs for the industry. When digging deeper into the data, however, a few important trends emerge. First, nearly all of the growth over the past 12 months has been in sales and distribution, with little growth across other categories. Optimism for job growth is greatest for renewable energy firms, bolstered in particular by the recent positive experiences of the solar industry in the state.

¹² Economic Modeling Specialists, Inc. Class of Worker, Q1 2014.

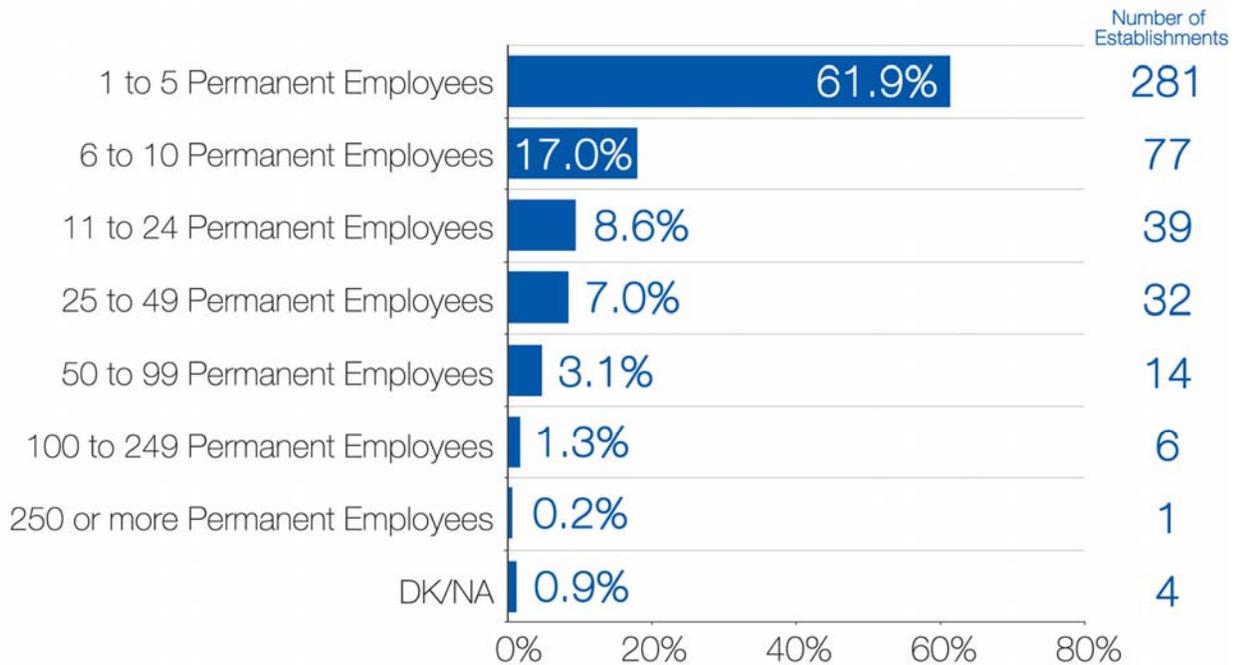
¹³ This projection is based on surveyed employers' reported growth expectations over the coming 12 months and is typically higher than year-over-year employment gains at the specific companies. However, because clean energy represents consistent start-up growth and expansion within traditional industry clusters, the reported expected growth has mirrored actual growth in several similar studies across the U.S.

Small businesses are critical to the cluster

The majority of clean energy establishments are small, with 61.9% having five or fewer employees. Only 1.5% of the firms surveyed have 100 or more total workers. From an economic development perspective, this means that policies tailored to small businesses may be more effective at accelerating job growth, and the needs of firms in this cluster may not closely align with those of the larger corporations that often engage in policy discussions.

The heavy concentration of small businesses also impacts workforce development. When dealing with many small firms, large cohorts of similarly trained workers are often not as valuable because each company is looking for the right mix of generalists and specialists to round out their employment teams. At the same time, engagement and outreach is significantly more involved, since each firm might hire only one or two people per year. Often, small employers note that they need generalists, while larger firms often seek specialists. Education and training programs should be sure to allocate sufficient resources to employer engagement and customized training to meet these employers' needs.

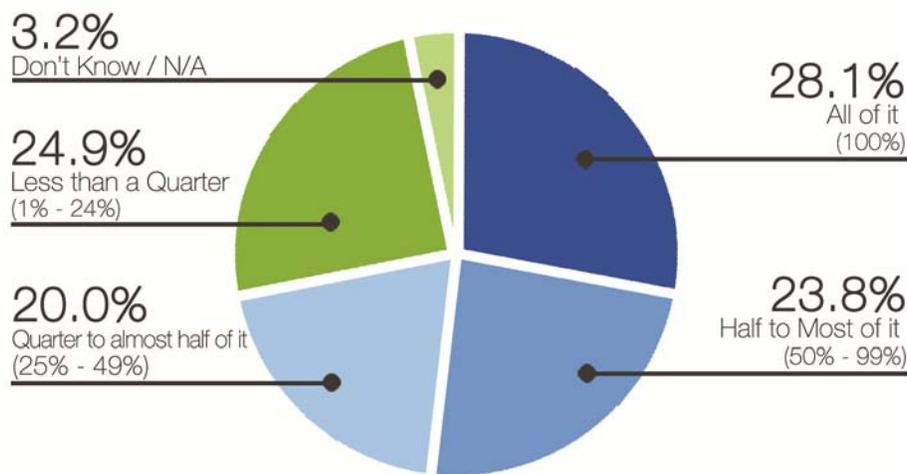
Percentage of Firms by Company Size



Clean energy activities represent only a portion of revenues for many companies

Among responding firms, the proportion of revenue generated by clean energy activities followed a fairly even distribution, with roughly the same number of firms reporting all revenues from clean energy as those reporting only a quarter of revenues from clean energy.

Percent of Revenues from Clean Energy



The breadth of these responses illustrates the cross-cutting nature of clean energy. As opposed to being an altogether new industry, it is clear that much of the clean energy cluster simply represents a new, “clean energy” way of doing business in many traditional industries such as manufacturing, the building trades, and professional and technical services. Whether firms focus completely on clean energy or for only a portion of their business, these activities are clearly providing an important revenue stream to companies in Vermont.

“Vermonters’ overwhelming support for clean energy is revealed by the results of this report—not only are Vermonters choosing to purchase and install local energy, our elected officials are also setting the stage by placing policies that make clean energy entrepreneurship a viable market opportunity in the Green Mountain State.”

Gabrielle Stebbins, Executive Director
Renewable Energy Vermont

The Vermont clean energy cluster includes many different types of goods and services

Firms were asked to select their specific clean energy focus areas from a list of energy efficiency, renewable energy, clean transportation, greenhouse gas management and accounting, or support services, or they could specify other focus areas. Firms that engage in activities across more than one focus area were then asked to allocate their employees based on where they spend the majority of their time. Slightly more than half of the cluster's employment is focused on energy efficiency, as seen in the table below.

Employment by Clean Energy Focus

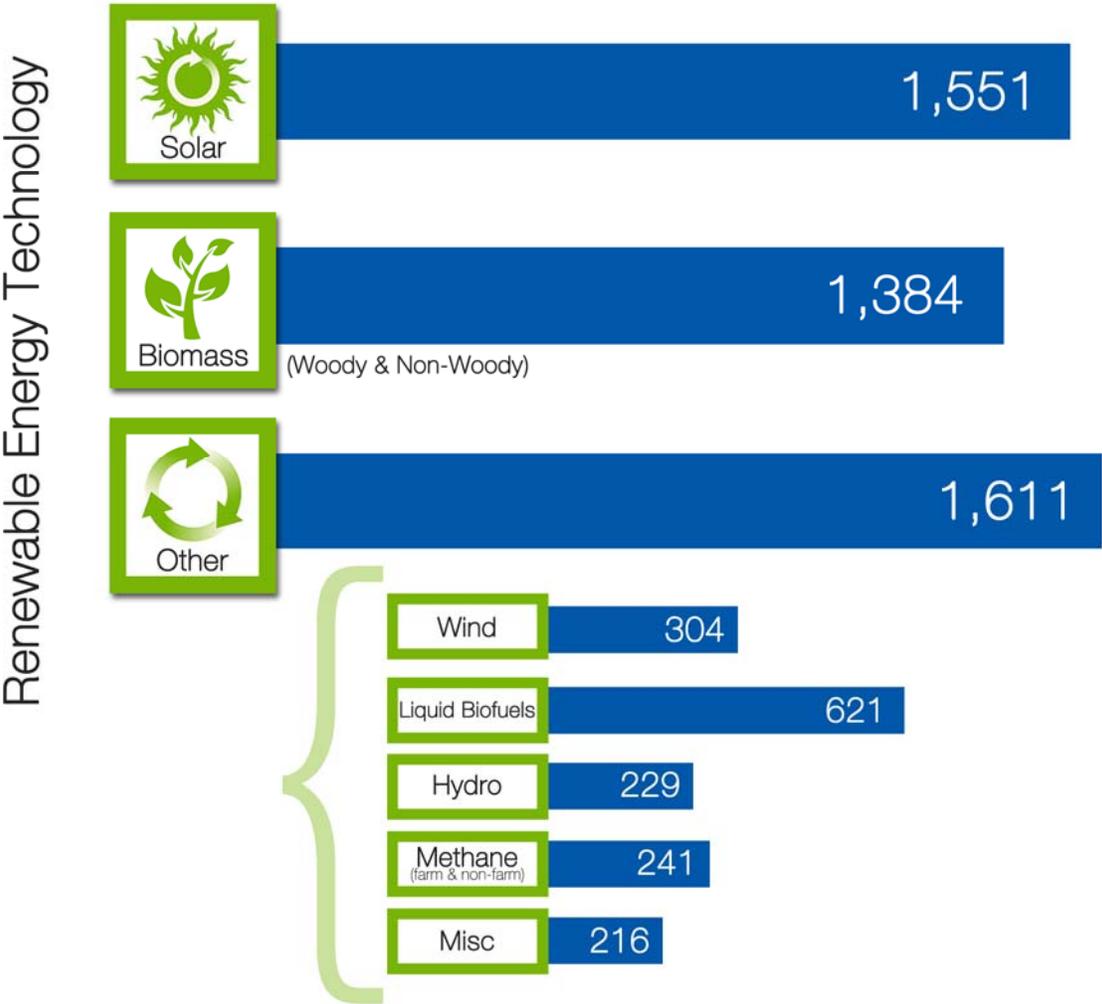
Clean Energy Focus	Current Employment By Worker Activity (as reported)	% of Total CE Employment By Worker Activity (as reported)
Renewable Energy	4,546	30%
Energy Efficiency	7,800	51%
Transportation	666	4%
GHG Management	171	1%
Professional Services	956	6%
Other	1,147	8%

Solar leads renewable energy employment in Vermont

Each of the major clean energy focus areas included firms that overlap among various technologies, meaning that some firms are working in energy efficiency and renewable energy, and some firms are working across multiple specific technologies, such as solar and wind. To understand the activities within these companies, firms from each major focus area were asked to allocate their employees by the specific technology (such as solar, wind, etc.). Renewable energy employment is quite diverse in Vermont, with

responses that included employment in solar, wind, biomass, liquid biofuels, hydropower, agricultural methane, landfill and/or non-farm methane, and other sources. The data allow us to produce accurate employment estimates for three of these technologies. Vermont firms currently employ 1,551 solar workers, 1,384 biomass workers, 304 wind workers¹⁴, and 1,307 other renewable energy workers.

Current Employment by Renewable Energy Technology (as reported)



¹⁴ Note that the wind, biofuels, hydroelectric, and methane workforce data within the “other” category are generated from smaller sample sizes (n=14-19) and therefore have a significantly larger margin of error than calculations for other technologies. The larger margin of error can have an oversized impact on the estimates, so the data in these “other” categories should be considered an approximation only.

The entire value chain of activities is well represented in Vermont

In addition to their clean energy focus, firms were asked about their specific value chain activities, such as research, design, and engineering; manufacturing; sales; etc. As with their focus area, firms engaged in multiple activities were asked to allocate their workforce to each value chain activity. Installation is clearly an important segment in Vermont, representing nearly 40% of the cluster’s employment.

Employment by Value Chain Activity

Industry	Current Employment By Worker Activity (as reported)	% of Total CE Employment By Worker Activity (as reported)
Research, Design & Engineering	2,682	17%
Manufacturing	1,005	7%
Sales & Distribution	1,955	13%
Installation	5,833	39%
Energy Generation	760	5%
Tax, Consulting, Legal	1,591	10%
Other *	1,457	10%

* Other industry category includes firms that meet the clean energy definition used in this report, but did not fit into one of the provided categories.

Viewing how employment is distributed across activities shows that clean energy in Vermont permeates the entire value chain.



Employer Preferences

In addition to calculating the employment trends of clean energy firms in Vermont, respondents were also asked a series of questions about doing business in the Green Mountain State. The following pages provide summaries of their responses.

Clean energy companies are hiring in many categories and at many education levels

As the overall number of “clean energy workers” in Vermont indicates, the state’s clean energy industry is a significant employer. In their answers to questions about recent hiring, respondents demonstrated that the industry’s need for people spans a variety of occupations and educational levels.

Given the significant number of very small businesses delivering direct services in local markets, it was not surprising that the highest level of recent hiring was for people in production/technician/installation (52.2%). This is an encouraging sign that clean energy firms are delivering jobs for Vermonters inside buildings, on the roof, in the field, and on the production line.

While hiring for installation-level employment was by far the highest, a strong 26.1% of recent jobs went to managerial and professional positions. This is in keeping with the finding that the clean energy industry involves a wide range of financial, legal, architectural, engineering, business management, information technology, and other professions. The wide variety of job opportunities is one of the factors that makes the clean energy industry attractive as a growing cluster for Vermont’s overall economic development.

Finally, as in any other industry, the clean energy firms need and hire administrative, sales, and marketing staff. Respondents said that recent hiring in sales and marketing workers and administrative staff each represented 8.9% (totaling 17.8% of new hires).

When asked whether previous experience in similar work was required for recent hires, 60% said yes. This is a somewhat lower percentage than reported by clean energy employers in other states, including those in nearby Massachusetts.

The fact that fully 40% of Vermont respondents felt that previous related work experience was **not** a requirement to be hired suggests that Vermont employers may be more willing than others to give new employees an opportunity to learn additional needed skills on the job, and/or be trained by incumbent workers and supervisors. It also may reflect that many of the very small, local businesses in the Vermont clean energy industry have a preference for hiring locally, even if this means selecting people who lack directly related work experience.

Twenty-one percent of employers said that some form of post-secondary certificate was required for recent hires. This response is worthy of additional investigation to determine whether such certification (for instance, in the construction trades) would be expected to accompany work experience; or whether formal education leading to a certificate would alone be sufficient to hire a person.

Regarding educational attainment, “only” 40% of clean energy employers said that a bachelor’s degree or more was required for recent hires. This is supported by the fact that 52.2% of recent hires were in production/technician/installation jobs that are unlikely to require a four-year college degree; and that just under 18% of hires were in sales, marketing, and administrative careers, which can often be entered without a college education.

Even after acknowledging these facts, however, the relatively low level of employers requiring a bachelor’s degree or above, may also reflect (again) the willingness of Vermont clean energy firms to interview and hire people whose other skills and assets (including local interest and availability) more than make up for less formal education – or alternatively it could speak to employers making do with workers that have less than ideal educational qualifications.

Vermont companies see strong value in the “clean energy” brand

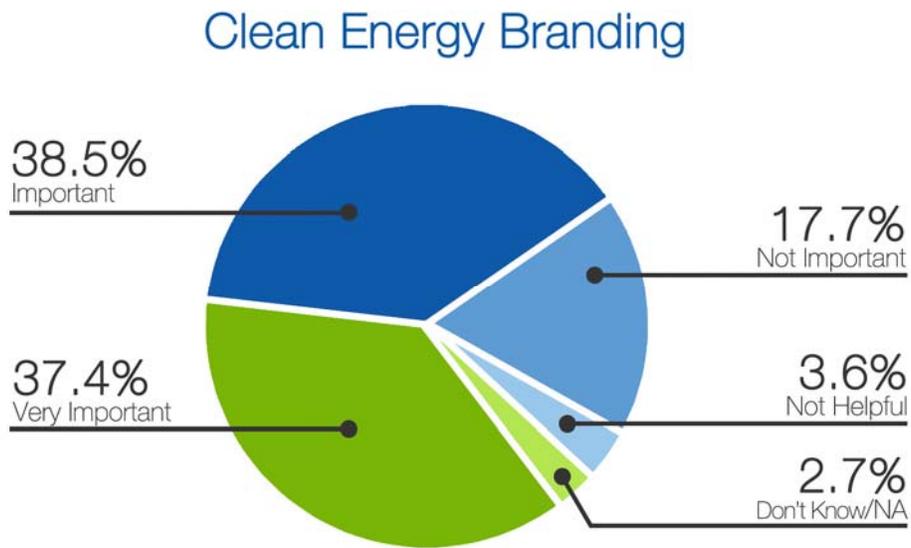
As we have seen, the clean energy industry in Vermont includes a variety of different sectors, including solar, wind, biofuels, energy efficiency, and more. Each of these sectors has unique product and service

offerings that differentiate it in the clean energy space, and in the larger energy economy. In some cases, clean energy firms compete against each other for customers and investment.

With this in mind, respondents were asked to reflect on the importance of promoting a “brand” for an overarching clean energy industry, that the component sectors are all a part of. Those surveyed were given options from “very important” to “not helpful.”

The results provide support for efforts to clarify and widely promote the clean energy industry “brand” within Vermont, and possibly the idea of a uniquely Vermont clean energy brand for promotion outside of the state. Certainly, Vermont’s clean energy firms feel comfortable promoting themselves as part of a larger clean energy industry.

Specifically, 75.9% of respondents felt that the “clean energy” brand was either very important or important. Only 17.7% selected “not important,” while just 3.6%¹⁵ said that the clean energy brand was “not helpful.”



Support for the “clean energy” brand might also be read as support for the use of “clean” as an adjective for the energy options in this report, as opposed to other terms sometimes used, such as “advanced,” “alternative,” “renewable,” or “green,” which could be studied for future reports. In addition, it may be helpful in the future to determine whether there is specific value by adding “Vermont” to the brand.

¹⁵ Note that due to rounding issues, totals throughout the report may not equal 100%.

Education, environment, public safety seen as top strengths for Vermont

It's no secret that states compete with each other in efforts to attract and retain businesses, and to create vibrant and growing industry clusters. It's important to identify the strengths and weaknesses of a state or region, and one of the best ways is to ask existing businesses to assess the state against common performance criteria.

Adequacy of public infrastructure is one of those criteria. Clean energy companies in this study were asked to consider six public infrastructure factors and rate those items on a scale from "major strength" to "major weakness" from the point of view of companies doing business in Vermont. Respondents were also given the option of saying that the factor was neither a strength nor a weakness.

The six factors for rating were:

- K-12 Education
- Environmental Protection
- Public Safety
- Economic Development/Business Assistance
- Roads/Bridges
- Public Transportation

It's important to remember that respondents were not being asked to rate these items as general strengths and weaknesses of Vermont as a place to live, but only to rate the factor as a strength or a weakness for operating and growing a successful clean energy company. This helps explain the relatively high number of respondents who selected "neither strength nor weakness" across the board, from 19.0% for environmental protection to 34.8% for public transportation. Selecting "neither" on these items is not the same as saying "unimportant to Vermonters."

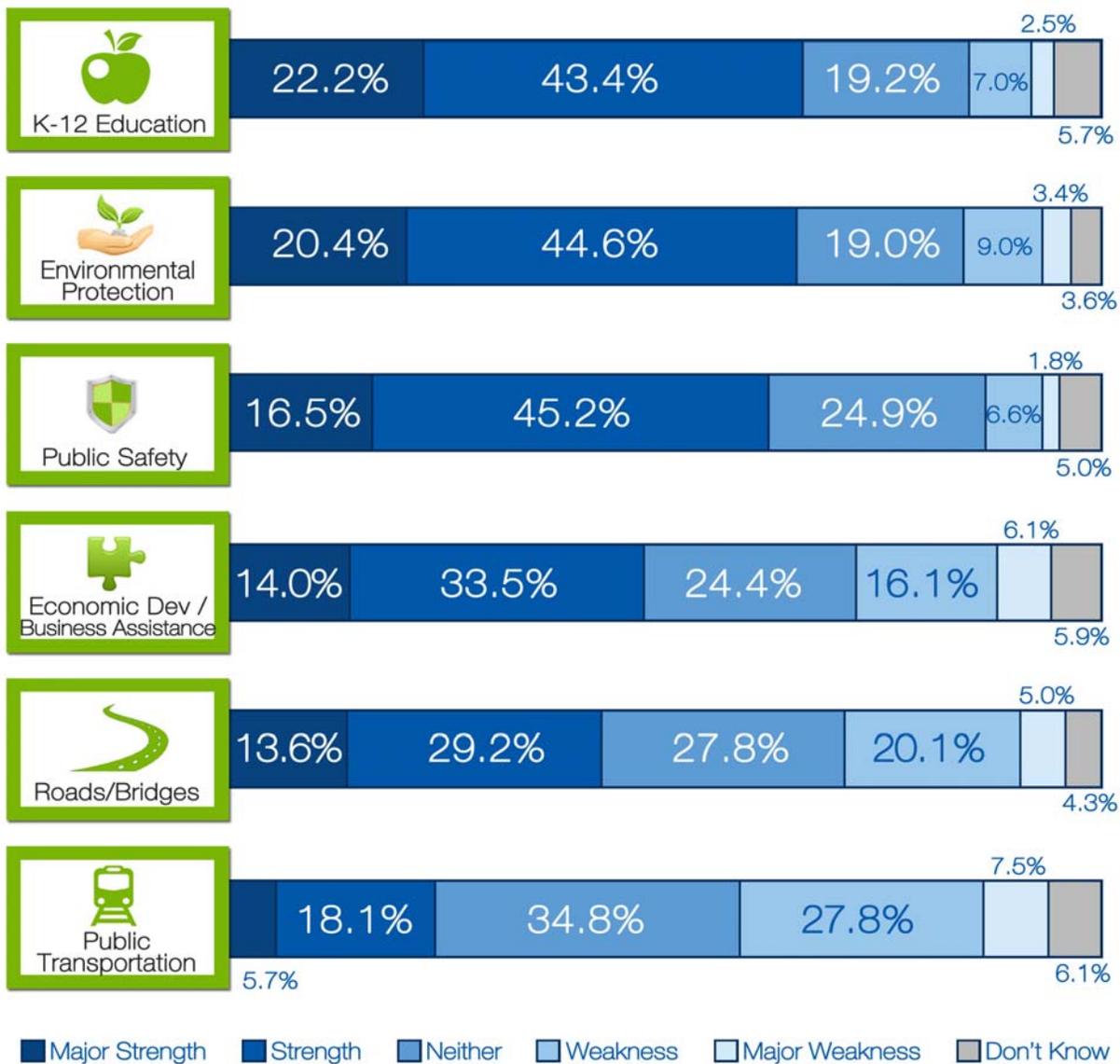
What are Vermont's strengths, then, as perceived by clean energy industry firms? Three factors are grouped together at the top. K-12 education was seen as a strength by 65.6%, environmental protection by 65%, and public safety by 61.7%. In each case, the remaining percentage of the responses was mainly in the "neither strength nor weakness" category. In all three cases, less than 13% of respondents viewed any given factor as a weakness.

These responses indicate strong support for maintaining, and even strengthening, Vermont's well-earned reputation as a state with good schools, excellent protection of the natural environment, and a low crime

rate. These turn out to be strengths that not only assure a high quality of life for all citizens but also provide a strong basis for supporting clean energy businesses.

Vermont’s economic development and business assistance programs received a more mixed rating. While a healthy 47.5% felt that these support systems were a strength for Vermont’s clean energy industry, 24.4% said that they were neither a strength nor a weakness. Since these programs are specifically offered to be helpful to businesses, it is notable that near a quarter of the targeted audience from the clean energy industry selected the “neither” option, especially coupled with the 22.2% of respondents who said that current economic development/business assistance was actually a weakness.

Perceived Strengths and Weaknesses



Transportation infrastructure received the lowest positive scores, the highest “neither” scores, and easily the highest “weakness” scores. For example, while 42.8% of respondents rated Vermont’s roads and bridges as a strength, nearly a quarter said that they were a weakness. In a possible indication that transportation issues (commuting, distribution, travel time to project sites, etc.) are not limiting factors for many clean energy businesses, 27.8% said that roads and bridges were neither a strength nor a weakness.

Ratings of public transportation as a strength or weakness suggest a need for further investigation. While a small percentage (23.8%) said that public transportation was a strength, a large plurality (34.8%) seemed to suggest that this was not a big concern by selecting “neither strength nor weakness.” However, fully 35.3% of respondents said that Vermont’s public transportation system was a weakness for them as clean energy businesses. This was by far the largest area of weakness in the public infrastructure perceived by respondents, and suggests that a significant number of clean energy representatives seek improvements to public transit. The state has recognized the importance of public infrastructure, and this year passed landmark legislation authorizing over \$685 million—the largest investment in transportation infrastructure in state history—via the FY 2015 Transportation Bill signed in June 2014.¹⁶

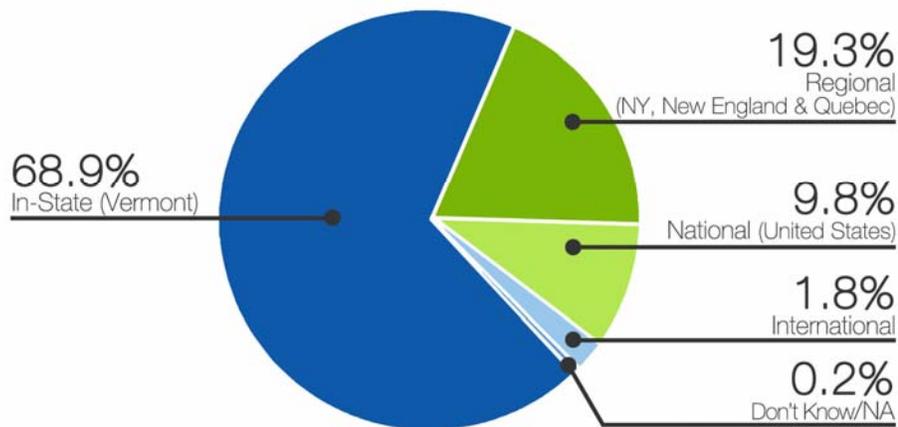
Vermont’s clean energy industry is heavily built around in-state customers

68.9% of the total customer base for Vermont’s clean energy industry is located in Vermont. A deeper analysis demonstrates just how fully the industry is built around in-state customers. For example, 72.3% of respondents said that 75-100% of their customers are Vermont individuals and enterprises, and 83.6% reported that more than half of their customers were Vermonters.

These are striking and important findings, and they represent a “good news-bad news” story for Vermont clean energy companies. On the positive side, the exceptionally high numbers of Vermont customers (coupled with the fact that the state’s industry has many small businesses and sole proprietors) indicates that Vermonters are interested in receiving the advantages of clean energy goods and services, and are demonstrating that interest through their purchases. Moreover, the responses show that clean energy businesses and customers are tightly integrated at the local economy level, stemming the flow of capital out of Vermont, and supporting local businesses and jobs.

¹⁶ Shumlin Signs \$685.7 Million Transportation Bill. VermontBiz.com, www.vermontbiz.com/news/june/shumlin-signs-6857-million-transportation-bill-largest-vermonts-history

Customer Distance

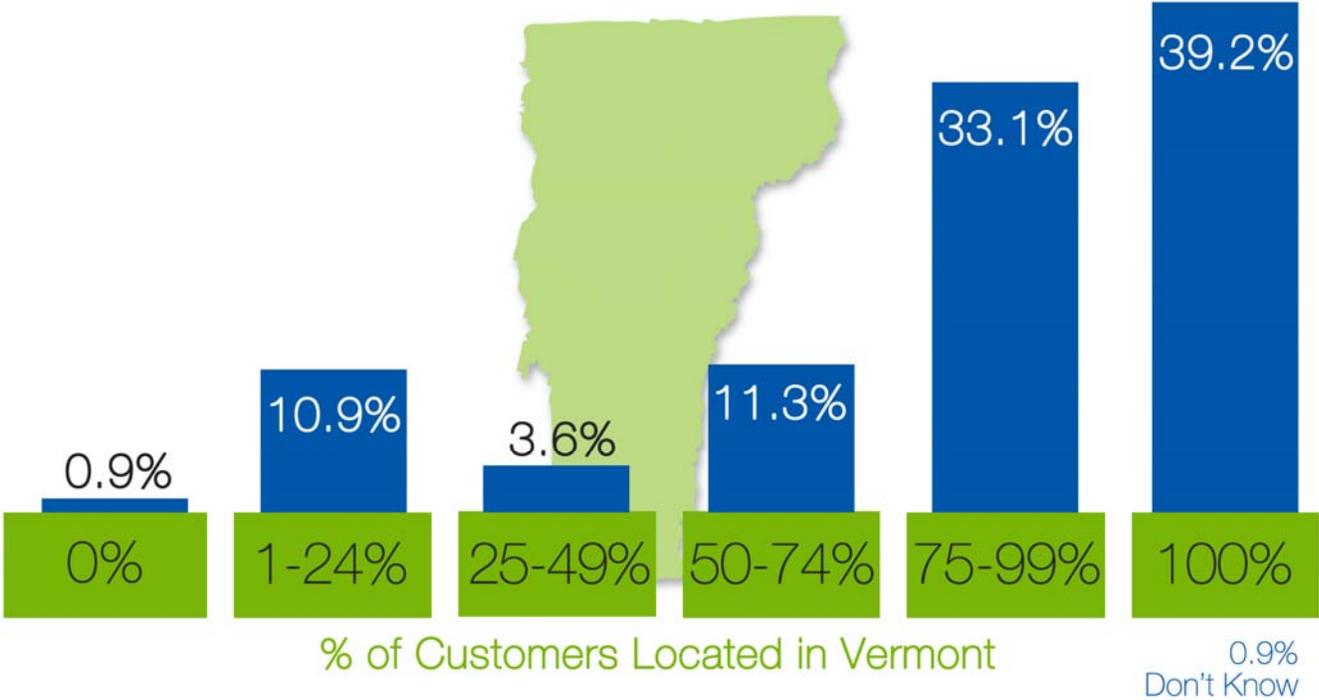


However, on the negative side, the fact that Vermont is a very small state raises some cautionary signs for the industry's future growth prospects. The possibility exists that as Vermont's relatively limited market for energy efficiency improvements, solar installations, and related items saturates, companies will see shrinking sales (if they receive most or all of their revenue from clean energy), or reduced revenue as a percentage of all revenue (if clean energy is a slice of their total business). However, the state remains far from reaching its clean energy goals, and distributed renewable energy constitutes only a small fraction of the energy portfolio, leaving ample room for growth. As the demand for clean energy products and services grows over time, the data suggest there may be opportunities to connect Vermont's clean energy companies to broader markets outside the state.

One obvious source of out-of-state customers is the greater New England area, New York State, and the Canadian province of Quebec. Currently 19.3% of Vermont companies' customers come from this larger region and Vermont companies should be well-positioned to raise this percentage as the market for clean energy goods and services strengthens overall in the Northeast.

Beyond the greater New England region, the Vermont clean energy industry has a very small foothold, with only 9.8% of customers coming from other parts of the United States, and 1.8% from international sources. For the many very small businesses in Vermont’s clean energy industry, these markets are probably not a prime target, and local dependence is not a concern. However, a subset may find potential niches, especially in the northeastern U.S. For medium and larger companies, dependence on local (and even regional) customers may serve as a brake on long-term growth.

Percentage of Customers in Vermont

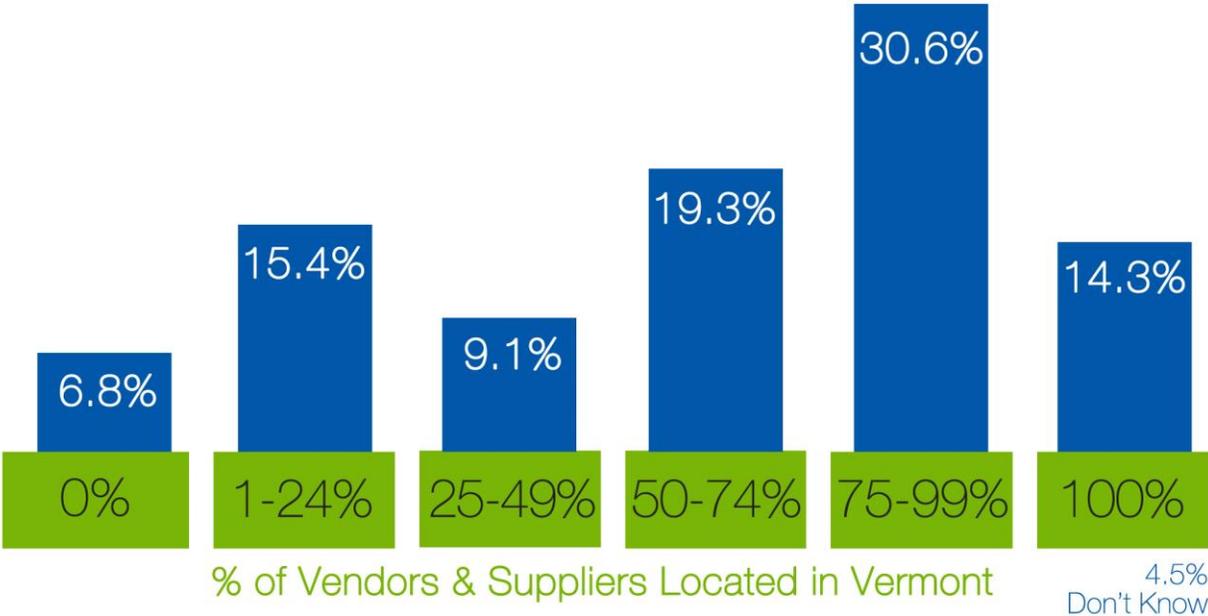


Vermont’s clean energy industry supports local vendors and suppliers

Clean energy businesses depend on a large and diverse supply chain of goods and services to deliver energy efficiency improvements, solar power, biofuels, wind energy, and more. They can be a significant contributor to overall economic health in Vermont by selecting in-state vendors and suppliers.

Respondents indicate that they are doing just that through their purchases. Over 64% of Vermont’s clean energy businesses report that over half of their vendors and suppliers are located in Vermont, a somewhat surprising figure given Vermont’s small size and proximity to other states with abundant supply chain competitors.

Percentage of Vendors & Suppliers in Vermont



"There is no better place to run a values-led business than Vermont. Our growth and success has been driven by our ability to hire smart, skilled, and passionate staff who care deeply about the communities they are working in and the clean energy economy they are part of creating."

James Moore, Co-President,
SunCommon

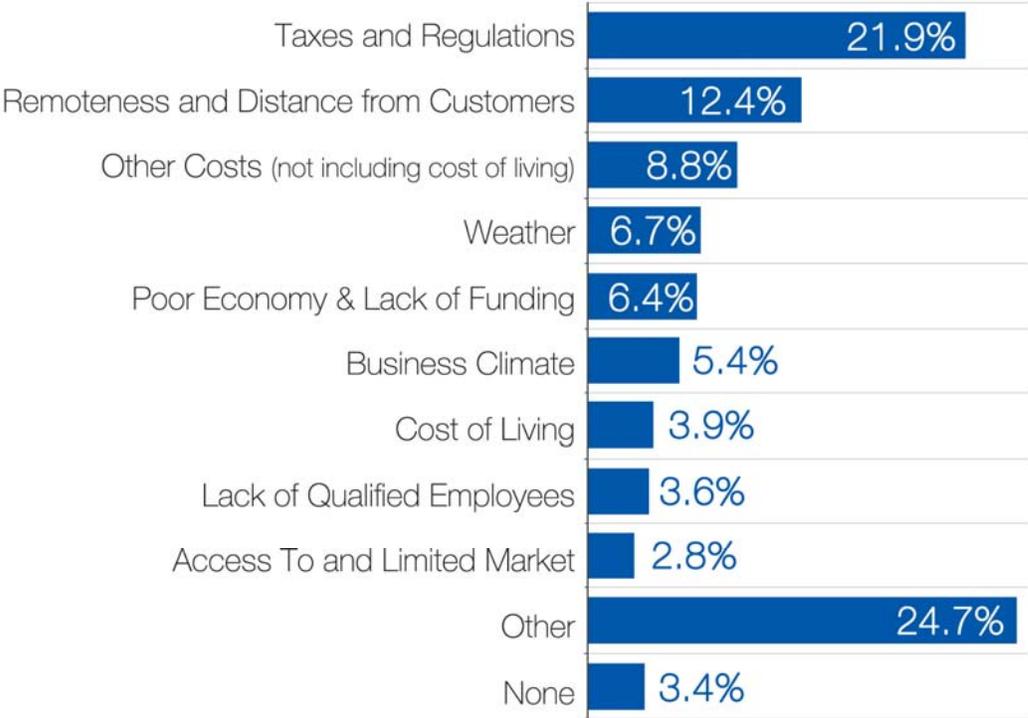
If Vermont’s clean energy industry can retain its relatively high level of integration with in-state suppliers while increasing the percentage of customers coming from outside of Vermont, it can increase its economic development contribution to the state’s economy.

Clean energy firms see few disadvantages to locating in Vermont

Clean energy companies in Vermont find significant advantages to operating in the state, including a strong customer base, a diverse network of vendors and suppliers, and generally good public infrastructure. In fact, even when specifically asked to highlight disadvantages to doing business in the state, there were no overwhelming concerns among clean energy firms.

When asked to name the “single biggest disadvantage to operating in Vermont,” no one option garnered more than 25% of all responses. With this in mind, the highest-ranking disadvantage named was “taxes and regulations,” which was selected by 21.9% of respondents. It seems at least as interesting that nearly 80% of clean energy firms did **not** name taxes and regulations as the biggest disadvantage, when given the chance to do so.

Single Biggest Disadvantage to Operating in Vermont



There was a dramatic fall-off, after taxes and regulations, among the disadvantage options selected. “Remoteness and distance from customers,” which was selected by 12.4% of firms, was the only other disadvantage selected by more than 10% of respondents.

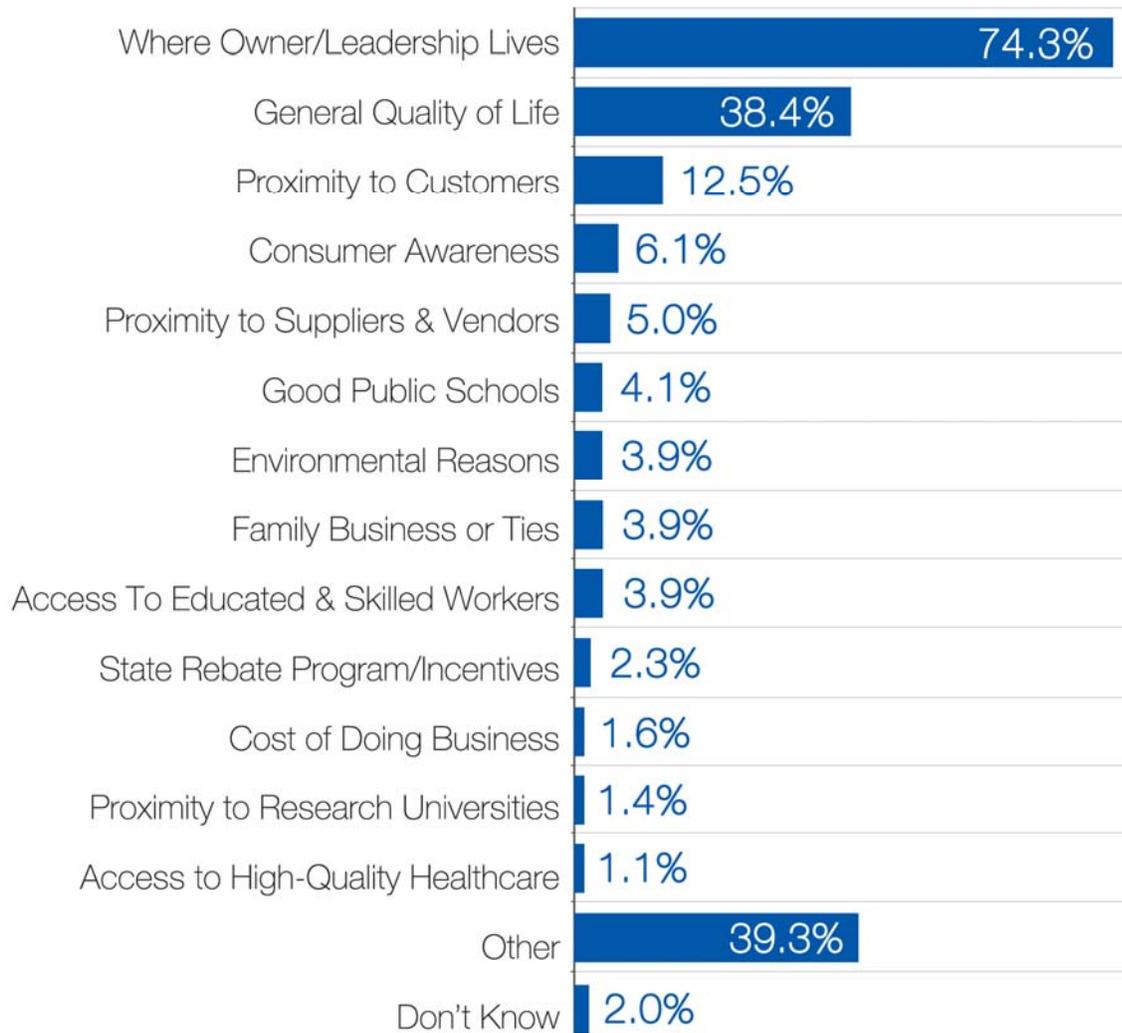
All of the remaining possibilities earned tiny percentages, including 8.8% for costs other than the cost of living, 6.7% for Vermont’s weather, 6.4% for a poor economy, 5.4% for the state’s business climate, 3.9% for cost of living, and 3.6% for lack of qualified employees. Respondents also offered a wide collection of their own ideas, each of which garnered less than a 3% response.¹⁷ Taken as a whole, however, the “other” category actually exceeded all of the options provided, earning 24.7% of respondents.

Firms see strong value in Vermont’s quality of life

Companies were asked to provide their reasons for locating in Vermont. Nearly three in four reported that it is because Vermont is where the owners and leaders want to live, and another 35% reported that it was specifically due to quality of life in Vermont (note that respondents were permitted to select multiple responses, so the total is greater than 100%).

¹⁷ Responses included: “infrastructure”, “lack of internet connectivity”, “lack of work”, “public opinion”, etc., among others.

Most Important Reasons Companies Form/Remain in Vermont

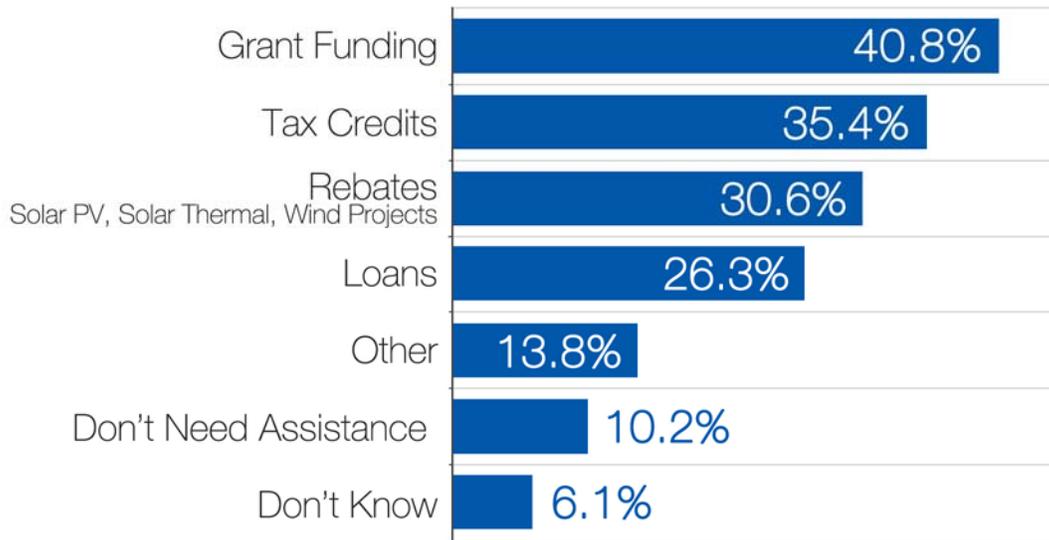


Clean energy firms primarily want financial assistance from the CEDF

The Vermont Clean Energy Development Fund (CEDF) is specifically designed to accelerate the growth of the clean energy industry cluster in the state. Employers represent a key audience that values financial assistance of various kinds from the CEDF. In support of this conclusion, only 10.2% of clean energy companies said that didn't need any support from the CEDF.

Of the nearly 90% who did want financial assistance, respondents were allowed to select more than one option from among those offered, which accounts for the fact that the total percentages add up to more than 100%.

Clean Energy Development Fund Requests



These results suggest significant support for current and future CEDF programs.

Vermont compares favorably to other states in many areas

As initially evidenced by the #1 solar jobs per-capita ranking in *The National Solar Jobs Census 2013*,¹⁸ Vermont has a large clean energy cluster for a state of its size. The cluster represents 4.3% of all jobs in Vermont, which is more than double the concentration in Massachusetts (1.9%) or Illinois (1.5%),¹⁹ though some of the difference is attributed to Vermont's inclusion of woody biomass in the definition (woody biomass was excluded in other comparison states). Vermont's projected growth in clean energy

¹⁸ <http://thesolarfoundation.org/solarstates/vermont>

¹⁹ These states were selected for comparison because they are the only states that employ an accounting with similar methodology. *Massachusetts Clean Energy Industry Report*, Massachusetts Clean Energy Center (MassCEC), available at: http://images.masscec.com/uploads/attachments/2013/09/MassCEC_2013_IndustryRpt.pdf & *Clean Jobs Illinois: An In-Depth Look at Clean Energy Employment in Illinois*, Clean Energy Trust (CET), available at: <http://info.cleanenergytrust.org/clean-jobs-illinois-downloads>

employment over the coming year is similar to the 2013 employment projections in Massachusetts (12%) and Illinois (9%).

At the same time, compared to those same states, a smaller portion of the Vermont clean energy workers are committing a majority of their time to clean energy activities. For example, in Massachusetts, 87% of included workers spend a majority of their time on clean energy activities and 79% spend all of their time on clean energy activities, whereas in Vermont, the figures are 73.8% and 52.2%, respectively.

From the industry and market perspectives, Vermont has companies across the entire value chain, but is less focused on manufacturing and research and development than other major clean energy states such as Massachusetts²⁰ and California²¹. This finding again underscores the importance of the local market to the cluster, as many of the clean energy workers and firms are serving the local population, as opposed to contributing to broader export markets.

²⁰ See generally, *Massachusetts Clean Energy Industry Report*, at p. 11, Massachusetts Clean Energy Center (MassCEC), available at: http://images.masscec.com/uploads/attachments/2013/09/MassCEC_2013_IndustryRpt.pdf

²¹ See generally, *California's Green Economy: Summary of Survey Results*, at p. 17, California Employment Development Department (EDD), available at: <http://www.labormarketinfo.edd.ca.gov/contentpub/GreenDigest/CA-Green-Economy-SummarySurveyResults.pdf>



Conclusions

This study is the first comprehensive analysis of the size and composition of Vermont’s clean energy cluster. The results are clear that Vermont has a large and growing clean energy cluster that is a significant contributor to the state’s economy, and employers are optimistic that further growth lies ahead. With employment of over 15,000 workers at nearly 2,700 locations, clean energy accounts for roughly 4.3% of Vermont’s total workforce.

“Vermont’s clean energy cluster has developed into an important part of our economy, and serves as a solid foundation upon which to build. Developing more clean energy jobs and expanding the markets for Vermont’s energy entrepreneurs will serve us well in both improving our economy and helping us meet our clean energy goal of obtaining 90% of our energy from renewable sources by 2050.”

Christopher Recchia, Commissioner

Beyond its growing numbers, Vermont’s clean energy industry is fairly diverse across clean energy focus areas like energy efficiency, solar energy, and biofuels; and across value chain activities such as research, installation, distribution, and more. In addition, sales of clean energy goods and services contribute revenue (and employment) to firms in a wide variety of traditional economic sectors.

This diversity is a source of strength, and helps ensure that Vermont’s growing clean energy cluster is not dependent upon the ups and downs of any one or two major employers or technology segments. Maintaining, and even increasing, overall industry diversity should be a

goal for Vermont’s industry leaders and policy makers.

One of the most striking features of Vermont’s clean energy industry is how deeply rooted it is within the state’s boundaries. When examining the source of customers, vendors, suppliers, or employees, a picture of Vermonters doing business with fellow Vermonters often emerges. The industry’s Vermont focus is not completely surprising, since the cluster is overwhelmingly made up of small businesses. Nearly 80% of

clean energy establishments in the state have ten or fewer employees, and only 1.5% are establishments with more than 100 workers.

The local nature of Vermont's industry is also illustrated in responses from clean energy firms about why they are located in Vermont. An overwhelmingly majority noted that one of the primary reasons was the simple fact that the owner or management team lives in the Green Mountain State. This is a clear sign of an industry that is growing from the inside out through the efforts of dozens of small entrepreneurs.

As noted elsewhere in this report, the industry's strong roots in Vermont are primarily a positive, since an integrated industry keeps money circulating in the state and supports local jobs. Vermont's clean energy cluster presents real opportunities to grow the economy. The diversity of activity in state and local markets provides a solid base upon which to build toward obtaining 90% of the state's energy needs from renewable sources by 2050. There is still plenty of room for firms to grow clean energy business lines in Vermont, primarily using Vermont customers, suppliers, vendors, and employees.

To ensure long-term success, however, more of Vermont's clean energy businesses will need to become successful competitors in regional, national, and even international markets. Vermont firms would appear to be particularly well-positioned to increase their footprint in New England, New York, and nearby Canadian provinces. Seeking out market opportunities beyond Vermont's borders at a time when in-state business is strong will position Vermont's clean energy industry for steady growth over the next several years.

The data in this report illustrate several important opportunities for future research and consideration. These include highlighting the needs of small businesses to determine whether they seek support that is general to all smaller companies, or whether cluster-specific small business programs are required. While this can be addressed in the 2015 data collection, it is recommended that initial conversations with small businesses begin now.

There is also an opportunity to explore workforce development needs more fully. While many smaller businesses seek generalists to fill their positions, larger firms tend to have more specialization of labor and therefore seek experts in one specific area. It will be important to ensure that any trends that emerge are properly communicated to the education and training community.

Finally, the environment for grants, tax, and other incentives for clean energy goods and services will need to be monitored very closely. These financial supports were reported as being very important and most desired by companies, and are interwoven into their optimistic growth projections. Changes in the incentive landscape would likely have significant impacts to the growth projections included in this report.

The extent of the clean energy industry provides good news for the state. While there is much more work to be done, Vermont has a solid foundation upon which to build.

Appendix A: Methodology

In February and March of 2014, BW Research Partnership conducted a survey of clean energy businesses in Vermont. To be included in the survey, participants were required to answer a number of screener questions to ensure that their organization: a) conducts activities directly related to the clean energy cluster; and b) employs workers in Vermont who spend at least some portion of their time conducting clean energy-related activities.

For the purposes of this report, a clean energy firm is defined as being directly involved with researching, developing, producing, manufacturing, distributing, selling, or implementing components, goods, or services related to renewable energy, energy efficiency or conservation, energy storage, greenhouse gas emission accounting/sequestration, and/or clean transportation (electric, hybrid, or biofuel vehicles) including supporting services such as consulting, finance, tax, and legal services related to clean energy.

Clean energy employees are defined as full-time and part-time permanent employees who support the clean energy portion of the business, including administrative staff and excluding interns and other temporary workers.

In order to accurately capture data from the sector, surveys were administered online and by telephone to a list of known employers as well as to a representative, clustered sample of companies from the NAICS industries identified by the Bureau of Labor Statistics and BW Research Partnership as being potentially related to the renewable energy, energy efficiency, and alternative transportation sectors. This NAICS listing is similar to those used in Massachusetts and Illinois, with a few minor modifications to reflect the uniqueness of each state's economy.

The research team attempted over 10,000 telephone calls and sent over 1,200 emails to employers. The survey effort, with an overall combined margin of error for employment questions of approximately +/- 2.25% to 3.89% at a 95% confidence interval, yielded 1,464 survey responses with an average of 14.5 minutes in length per completion.

Online surveys were programmed using Qualtrics survey software and were administered by BW Research Partnership to a list of businesses that were identified by Renewable Energy Vermont, various state agencies, and other advisory team members (the "known universe"). Telephone surveys were administered to the known universe and to a random sampling of businesses identified by NAICS code by Castleton Polling Group in Rutland, Vermont.