Supporting Rural Livelihoods, Education and Community at Smokey House Center in Danby, Vermont

Photo courtesy of smokeyhouse.org

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Project Overview

Over the course of the spring academic quarter, April to June 2018, members of Environmental Problem Analysis and Policy Formulation (ENVS 50) at Dartmouth College had a unique opportunity to work alongside SHC's Executive Director, Jesse Pyles, Board of Directors, farm educator, Yoder Farm, Dorset Peak Jerseys, and other members of the community to explore and contribute to the conservation, agriculture, and education efforts of Smokey House Center (SHC) in Danby, Vermont. For over forty years, SHC has worked with young people and the community to steward 5,000 acres of forest and farmland in southwestern Vermont. A pioneer in work-based learning in our region, much of Smokey House's history has involved community enrichment and personal development through a crew-based model of mentoring and integrated learning for area teenagers least likely to thrive in the conventional classroom. SHC is in a unique period of organizational evolution and development. The 29 students in the class divided into six subgroups: rural livelihoods, agriculture, legal analysis, conservation, renewable energy, and communication. This document provides an in-depth analysis of the research and recommendations from each group.

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Introduction

This report is an overview of the efforts of Dartmouth's ENVS 50 class, a culminating experience course for Environmental Studies majors. The major goal of the course is for students to further the efforts of the Smokey House Center (SHC), a non-profit organization committed to serving not only the local community of Danby, Vermont, but citizens across the entire county. SHC aims to build up individuals of all ages through their work, which focuses on conservation, agriculture, and education. It owns and operates 5,000 acres of forest and farmland in southwestern Vermont, where they oversee various programs designed to engage the local community, specifically the local youth, to provide learning experiences beyond the classroom.

Students worked in subgroups of 3-5 people over the course of the 10 week term, with each group focusing on a different aspect of SHC. They communicated with their community partners in order to better understand SHC's operating vision, and to determine how our class could contribute to that vision over the course of this partnership. As a class, we divided into six teams centered around the topics of rural resilience and livelihood, agriculture, legal, conservation, renewables, and communication.

Rural Resilience

Vermont faces many demographic challenges that have serious implications for the rural, working poor, and particularly young people. Affordability and economic opportunity are limited in many rural areas. Our Rural Resilience and Livelihood team explored the challenges and opportunities for young people in Danby and the surrounding area. This group analyzed how SHC can play a role in identifying and testing models for rural economic prosperity and resilience, particularly in relationship to the concept of "working landscapes" and engagement of young people.

Agriculture

In this section, the agriculture group offers analyses of SHC's current agricultural programs and provides an overview of potential improvements and further actions SHC can pursue in order to increase community impact and improve agricultural education. The agriculture group targeted two major areas for development within SHC: community farm operations, with the addition and expansion of value-added products, such as blueberry jam and poultry, as well as a potential farm incubator program or farmer training program.

The agriculture group analyzed current programming offerings and assessed the impact of the community farm, the feasibility of adding new opportunities in the future, such as value-added products, and the viability of increasing community impact through education. Next, the group investigated farm incubator viability on the SHC property. To do this, they researched traditional incubator models by conducting interviews with three local programs and compiling case studies on existing six incubator models. The group concluded that additional value-added products would both enhance the visitor experience and educational benefits, and that an education-focused farm incubator program could be a viable means through which SHC can educate the next generation of farmers. Lastly, the group researched the viability of an innovative incubator model by first combing through state and federal funding, and exploring investment opportunities. The group determined that SHC has the ability to become a leading example of farm incubation innovation within the U.S. by incorporating an equity-based model that would reduce financial burden on new farmers.

Legal

The legal team focused on SHC's use of innovative legal approaches to conserve local land, while also advocating for the viability of local farmers. The primary tool SHC has used for their conservation efforts are forest and agricultural easements, which are guaranteed in perpetuity. These easements prevent development activity from occurring on the land while allowing for sustainable forestry and agricultural practices. Additionally, SHC has implemented an innovative retirement plan in the form of an equity fund, and is intended to financially support their on-site dairy farmer by providing him with the opportunity to obtain the necessary capital for a comfortable retirement. The team conducted two case studies: one analyzing the conservation easements, and the other examining SHC's equity fund to determine its viability as a retirement plan. The legal section concludes with a discussion of the effectiveness of their legal framework and of recommended next steps in their implementation.

Conservation

The conservation team focused on three categories: carbon sequestration, wildlife habitat management, and management strategies for invasive pests through the lens of forestry practices relevant to the New England Area. These foci are important because the environment is not a static entity, but rather a dynamic system that requires Smokey House Center to continue adapting in terms of its mission and conservation strategies. Ultimately, conservation is not solely about maintaining a piece of untouched land but exercising strategies and practices that holistically look at the greater ecosystem and further the resilience of the environment.

Renewables

The renewables team covered five potential avenues for energy efficiency and renewable technology at SHC: wind, solar, micro-hydro, weatherization, and aquaponics. The team did a deep dive into the industry trends, costs, payback periods, and financial incentives (state or federal loans and grants) for each. The team conducted a site assessment to evaluate the feasibility of implementing renewable technology on usable SHC land not protected by conservation or forest easements. Wind, weatherization, and aquaponics were chosen as the three most viable technologies for SHC, mostly as a function of cost and total land-use.

Communication

The communication group worked with SHC to help them better engage former program participants, as well as new supporters, by developing outreach and communications materials geared towards fundraising. In addition to doing research about communication theories, message framing theories, outreach strategies, and interview techniques, they also reviewed a few case studies of non-profit organizations that have the same mix of capital costs and program ambitions as SHC. This allowed them to effectively decide the most suitable methods of outreach communication, enabling them to frame our outreach materials with a compelling message that resonates with their intended audience. They created material that 1) specifically advertised SHC's participation in Vermont Gives Day, a 24-hour day of giving that raises money and recognition for Vermont's non-profits, and 2) more generally aims to increase local community involvement with SHC, and therefore, builds their fundraising base to allow them to be able to financially support their future growth. In order to achieve success with SHC's Vermont Gives Day fundraising campaign, they produced a newspaper ad, a press release,

SHC's profile page on the VGD website, social media posts, a video, and new graphics. Their outreach materials that aim to enhance SHC's general fundraising strategy include the creation of the SHC Alumni Facebook Group, and our proposal to SHC to create a donor recognition board.

Their outreach materials aimed to communicate SHC's conservation, agriculture, and education efforts, placing an emphasis on their educational programs to evoke more interest from the audience by sending the message that SHC is not only committed to sustainable food production and long-term land conservation, but also providing meaningful, hands-on, experiential education. They then analyzed the effectiveness of the outreach materials used for Vermont Gives Day, and summarized the findings for SHC to implement in their 50th anniversary fundraising campaign. Overall, they recommend that SHC remain persistent in sharing the importance of their work with the local community, and that they hire young social media-savvy interns to modernize their outreach strategies.

Chapter One
Smokey House Center and Rural Livelihoods of Vermont

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1.1 Introduction

For over four decades, the Smokey House Center has operated within the community of Danby, Vermont, utilizing their 5,000 acres of forest and farmland to serve the residents of southwestern Vermont. Smokey House's core principles of conservation, agriculture, and education have fostered innovative youth stewardship programs, focusing on teenagers in the local area. Historically, these youth mentoring programs employed a work-based learning approach that cultivated vital interpersonal skills and self-confidence, while also building students' technical abilities in forestry, farming, and land management practices. These popular Smokey House programs were available to students facing barriers to success in a traditional classroom setting.

Recently, Smokey House has experienced a significant decrease in funding for youth programs and staffing requirements, significantly limiting their capacity to interact in the Danby community. Smokey House Center is now in a transitional phase, seeking a concrete strategy to reestablish their role and impact on the community. Smokey House is ready to build upon their proud history and find innovative new ways to share the incredibly unique opportunities available throughout the extensive conservation easements.

This project aims to provide a comprehensive overview of previous Smokey House youth programs, identifying the distinct aspects that led to the enduring success of the initiative. This includes recognizing the hard skills developed through work-based learning, but also contextualizing this experience through a broader lens to illustrate the soft skills developed through this program and the beneficial impact this had on crewmembers moving forward.

In this chapter, we evaluate relevant case studies of successful, work-based, rural resilience programs in similar communities across the country. By analyzing different

approaches to similar programs, we aim to uncover a variety of options for Smokey House youth programs moving forward. Our goal is to maintain the core principles of the Smokey House Center, yet modernize future youth programs to address economic, cultural, and social barriers facing teenagers in Danby today.

In the final section of this chapter, we provide a brief overview of Smokey House's current endowment and funding stream, as well as analyze potential opportunities to secure additional funds that would significantly increase Smokey House's capacity to launch a successful youth program in the future. We will identify the pros and cons of pursuing state and federal funding, as well as develop a strategy focusing on attracting private investors to get involved with future youth programs.

Overall, this project will serve as an information guide to highlight the proud history and tradition of Smokey House Center, articulating the unique opportunities available to serve the Danby area. Furthermore, we will assist board members and potential investors in clarifying a comprehensive vision for the future of the Smokey House Center. A modernized, example-based blueprint for a youth program at Smokey House will help break through this transitional phase and attract the funding required to rebuild their central role in this community.

1.2 Project Statement

1.21 Central Questions

How can we help Smokey House Center move past its transitional phase and transform into a modernized organization? Our primary goal to facilitate Smokey House Center through this process will ultimately help the organization become an entity that can drive community in the local area and youth engagement. We have decided to ask a few questions that will guide our research. These questions are presented below.

First, we ask and examine the feasibility of our goal to bring Smokey House Center into a modern setting. Historical performance of Smokey House Center has demonstrated little reason to suggest that the baseline program once ran would not be possible. Even so, can such an archaic model be maintained? We, as a group, have decided that Smokey House Center must engage more actively with the community in its setting and must pursue more adequate sources of funding outside of their current endowment. If these two conditions are satisfied, the plans that we outline should be able to last.

This leads well into our second question regarding the funding of Smokey House Center. Specifically, how can Smokey House Center acquire funding from either public or private sources to better operate as a traditional non-profit organization? The history of funding for the organization has been met with difficulty since the turn of the century. Before the formal creation of Smokey House Center, the land was initially owned by a family from the New York City area. Over time, the use of this land by the family stopped. They did, however, continue to give funding to the area which accumulated into Smokey House Center's current endowment. This original endowment, still existing today, is what developed into the summer farm programs and school programs for the youth in the local communities. In 2008, however, during Great Recession, much of the endowment vanished under the circumstances. Many programs had to be shut down as a result. It is important to note that the organization still has some of the original funding. With some financial restructuring and a new source of income, Smokey House Center should be able to solve its financial issues, which will solve other problems for them.

Next, how can the youth in the community be more involved with Smokey House Center? Much like the feasibility of Smokey House Center's endeavors, this question has already been answered to some extent. Youth can still be involved as they were involved in the past on

community farm programs. The only change we would make to the agenda is to add a modern background to the work. Soft skills such as leadership and teamwork can still be taught under the context of farm work at Smokey House Center. Our research, however, has indicated that many of those working in the local area wished that they had received some training on hard skills during their youth. These skills include financial literacy, business strategy, and organization. Such concepts can also be taught under the concept of farm work, but all of these skills are transferable to careers outside of farming. With some of the other projects being pursued by other teams in this paper, concepts such as conservation and sustainable energy can be incorporated into the program in addition to the soft skills and hard skills previously discussed.

Lastly, how can Smokey House Center engage more with the community? In recent years, without the existence of camps and programs to engage the youth, Smokey House Center has not been as involved with the community as it has historically been. Providing more programming for the youth in the area will provide a significant effect by connecting people within the community. Much like how schools in central Vermont are currently pivotal to community building, Smokey House Center will build community in Danby, Vermont by providing a place for the youth of families to gather. This will likely have a spillover effect on bringing the overall community closer together which will, in turn, benefit Smokey House Center. Ensuring that the local community stays involved with the initiatives that Smokey House Center is trying to make will be vital for the continuation of the programs we seek to implement.

1.2.2 Methodology

First, we looked at three different community centers in situations related to Smokey House Center. All three programs highlight success stories of a local, non-profit organizations functioning as a community center. Each of these individual situations provide an aspect or a

strategy that we believe Smokey House Center can follow to achieve their goals of increased community engagement. These case studies are presented and explored below.

Additionally, we examined social media to enforce our evidence on the positive impact brought to youth in central Vermont by Smokey House Center. Combining these research sources, we put together a snapshot of what Smokey House Center can look like in the future. This is a model that they could attempt to pursue and we will provide steps toward reaching this model's end product.

1.3 Community Snapshot

Danby is located in Rutland County, Vermont. Danby is a relatively small town with a few small businesses, but mostly consisting of agricultural work (People Keep). Danby faces unique circumstances due to its location that affects the town demographics. The locals of the community face adversity when it comes to education and economic opportunities. Danby's location makes it hard for families to send their children to high school and to find jobs outside of the agricultural realm. Because of this, there is an outflow of Danby residents to other surrounding towns or even to different parts of New England. This becomes a problem for Danby economically because 1) there is a lack of younger individuals in Danby, 2) there is not a population to support economic success in Danby, 3) the lack of economic opportunity makes it hard for individuals to come back to Danby and live a successful life. This makes Smokey House Center an essential resource to the Danby community. Smokey House's continued existence and plans for the future will help the community youth by opening programming opportunities. However, for Smokey House to do so, it is important to understand the demographics of their community.

According to the 2016 Census, Danby has a total population of 1434 individuals. Danby's population is made up of 98.53% white, .54% Native American, .23% Asian, and .62% Hispanic or Latinx (Figure 1.1). Out of the total population, only about 9% of the population was age fifteen to eighteen while the median age of Danby is 42 years of age. Most of the population in Danby is older. Without the input of a younger generation, the town population could start to shrink. Due to Danby's lack of young individuals, which can be due to the moving of families and individuals in pursuit of jobs and education, creates a complicated situation for the future of Danby and its economy. Danby also faces other circumstances that disadvantaged youth and young adults. First, there is a lack of economic development in the community, limited high school options, and lack of resources for individuals to seek out in the community. Due to the lack of economic development, about 3.7% (approximately 53 individuals) of Danby lives below the poverty line while the total Vermont poverty rate is 11.9%, which makes Rutland county very poor in comparison to the rest of the state (2017 Vermont Report, and Wissman).

The outflow of families and young individuals is caused by the lack of high schools in the area. Currier Memorial School is located in downtown Danby. Currier Memorial is an elementary and middle school, meaning it only services grades Kindergarten through eighth grade (Town of Danby Annual Report 2017). According to the 2017 Town of Danby Annual report, there is a total of eighty-six students attending Currier Memorial School; seventy-four student hail from Danby and the rest come from the neighboring town of Mt. Tabor. Because of Danby's inability to provide higher education beyond grade school many families and young people move out of the community to surrounding communities to pursue high school and beyond. Danby is a sending town to more prestigious institutions like Burr and Burton, and Long Trail School which require tuition to attend. Sending towns pay the total tuition of the institution

so that individual students from Danby can attend these institutions free of charge (Town of Danby Annual Report 2017).

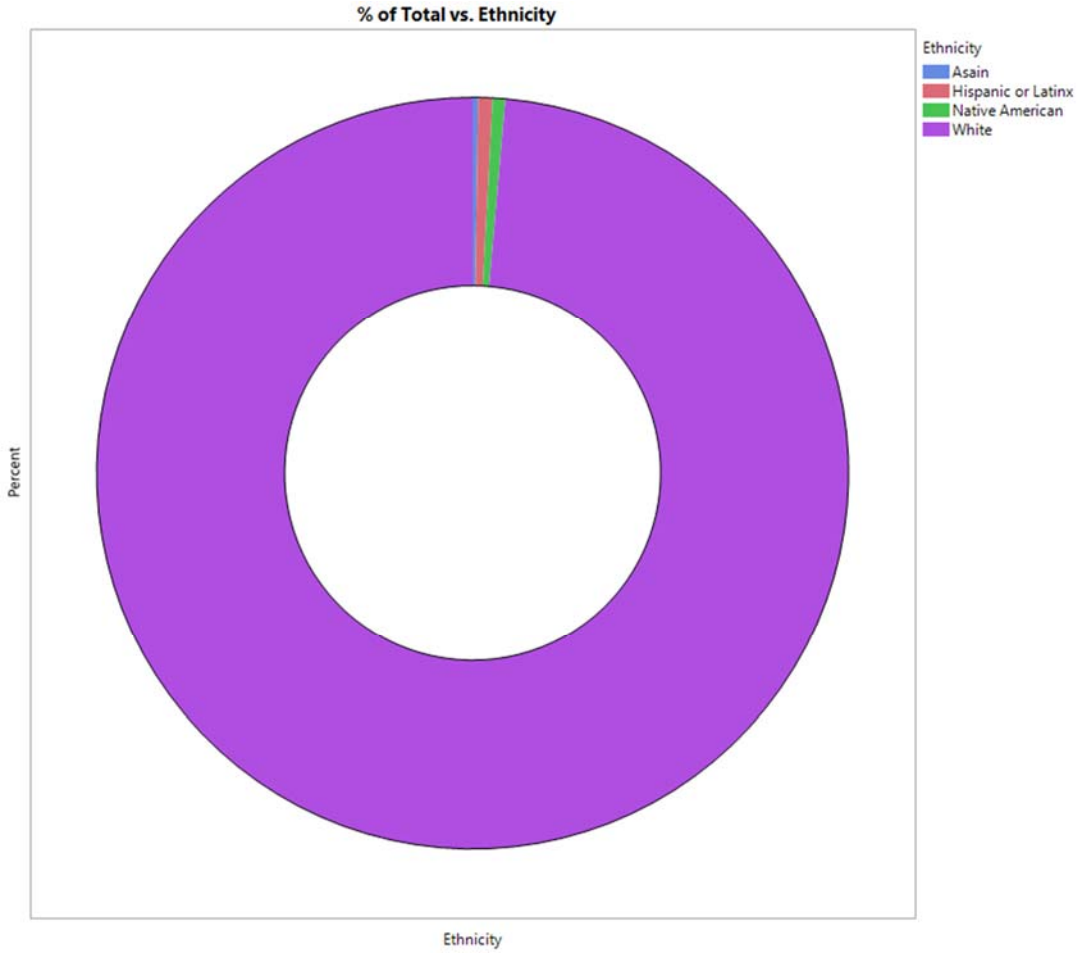

Figure 1.1: *A breakdown of Danby Demographics. 98.53% of the population identifies as white, .54% Native American, .23% Asian, and .62% as Hispanic or Latinx. The total population of Danby is 1434 individuals.*

Manchester, Vermont, approximately fifteen miles south of Danby, has a well-developed economy and schools that serve Kindergarten through twelfth grade. Burr and Burton Academy is an independent institution with a "public mission." Tuition to attend Burr and Burton is a total of $18,065 and $17,065 for sending towns (Burr and Burton). Burr and Burton, because of its public mission belief in which it was founded, allows students from sending towns to attend free of charge. Instead of families paying Burr and Burton tuition, finances are settled

between the school and the town. At the start of the fiscal year, the town of Danby agrees to pay Burr and Burton tuition so that the youth from Danby can attend Burr and Burton if they wish. Burr and Burton has a total enrollment of 713 students which includes 44 students are from Danby (Figure 1.2). Long Tail School is a college preparatory school located in Dorset, Vermont. The net tuition to attend Long Trail is $18,805. The total enrollment of Long Trail is 198 students and 18 of them are from Danby (Figure 1.2).

Other public schools in the area are other options for Danby students. These public schools include Manchester Central High School and Mill River Union High School. Manchester Central High School is located in Manchester, VT, which makes it relatively close to Danby. A total of 10 Danby students attends Manchester Central out of 2,100. Mill River Union High School, located in Clarendon, Vt. Mill River has a total of 22 Danby students currently enrolled; Mill River has a total student enrollment of 1531 (Mill River, Manchester Central).

Vermont Adult Learning is also an option for Danby residents. It allows individuals, sixteen and older, to earn their GED from a local high school while also offering classes that prepare individuals for jobs, college transitions, basic education skills, and English classes for non-English speaking Vermont residents. Vermont Adult learning is nonprofit located in White River, VT, but has multiple campuses in different counties of Vermont. The Rutland County campus, which includes Danby, served 223 individuals in Rutland county out of the statewide number of 1,790 (Town of Danby Annual Report 2017).

Danby residents that are in search of new work and educational opportunities must leave their hometown. By understanding the town demographics and the unique school system of Danby, Smokey House Center can come up with programs that outreach to specific populations. Smokey House can also find new partners in the surrounding school systems to create programs

that will continue to develop learning and work skills in the town youth. Smokey House, in the future, can also create some economic opportunities for locals by employing or providing internships with the local youth. Smokey House in its transitional period can create economic opportunity that can benefit its local community.

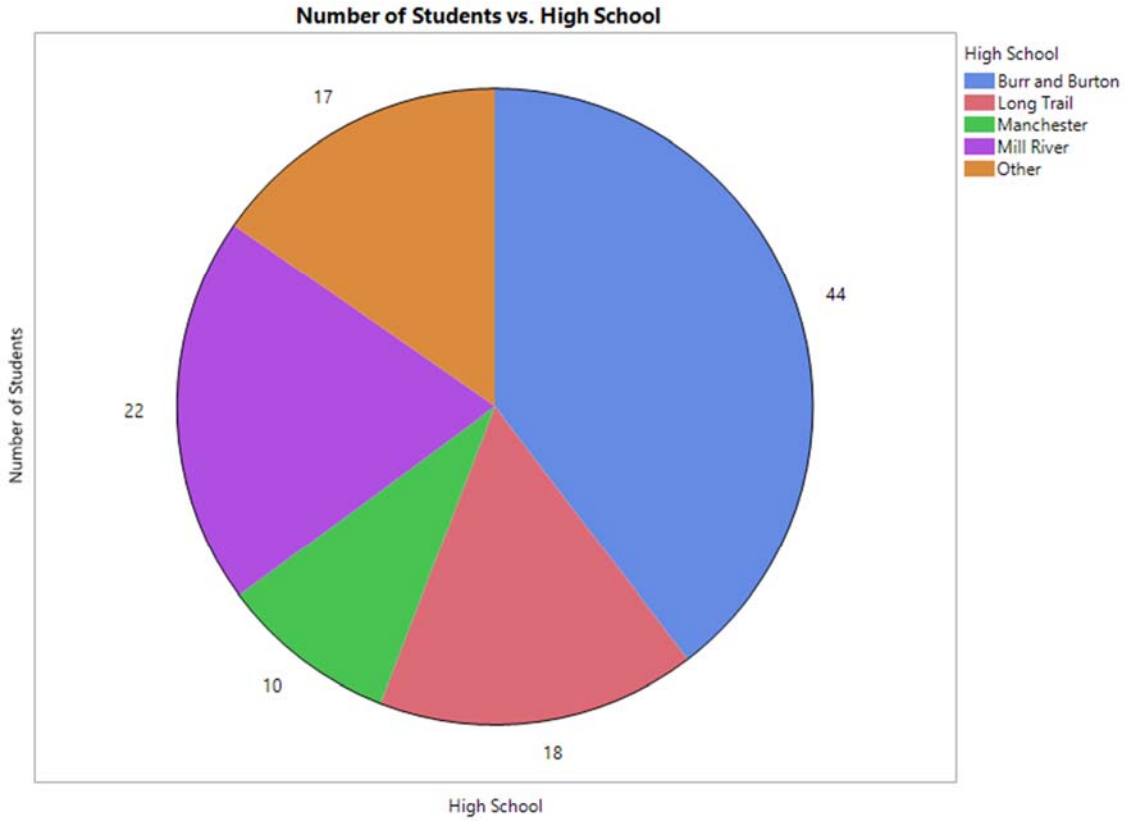

Figure 1.2*: Shows the total students from Danby that are enrolled in High Schools surrounding Danby. High Schools include; Burr and Burton (Manchester, VT) with a total enrollment of 713 students, Long Trail (Dorset, VT) with a total enrollment of 198, Manchester Central High School (Manchester, VT) with a total enrollment of 2,100, and Mill River Union High School (Clarendon, VT) with a total enrollment of 1,531.*

1.4 Community Role of Smokey House Center

Our goal is for Smokey House Center to engage in the rural livelihood of Danby VT effectively. This is not a new goal for Smokey House Center. In fact, many years ago, Smokey House had an established youth program. Students came to the Center to learn many skills and

life lessons. They would work in the field, tending crops and taking care of the buildings. They would often be sent home with the food they helped grow. An added benefit of the youth program was that students were able to receive class credit. Many of the students who enrolled in the program struggled in a typical classroom setting. The alternative setting of Smokey House allowed them to learn in a new and creative way.

Jesse Pyles, the Smokey House Center Executive Director, reflected on the importance of such a program. He explained that many of the skills learned through the program had their apparent benefits. Learning the ins and outs of farming in a farming community taught these students many skills that they would be able to take with them into the workforce in the years to come. Jesse also mentioned many of the soft skills that the students learned. While these are easy to overlook, they are vital to adolescent growth. Students learned the value of hard work. They learned what it takes to help provide for a family. They learned the importance of showing up to work on-time and every day.

1.5 Case Studies – Rural Prosperity Programs

Smokey House Center is one of many that have created youth programs in the local area. In fact, many other centers in the area have been very successful in organizing and implementing programs to help students overcome adversity. Smokey House Center should look at the following case studies as guides to help improve the Rural Prosperity Programs: The Thunder Valley Community Development Corp, the Cobscook Community Learning Center, and the Vermont Youth Conservation Corps.

1.5.1 Thunder Valley Community Development Corp

Thunder Valley CDC is a (501c3) nonprofit based out of Sharps Corner, South Dakota on the Pine Ridge Indian Reservation. Thunder Valley works toward the development and

empowerment of Indigenous Lakota Youth, as well as the surrounding local communities. Thunder Valley started out as a small grassroots organization that relied heavily on traditional ceremony and local leadership (Tilsen). Many of the organization's leaders wanted to create change on the Reservation for the future generation. In an area where there is severe poverty, substance abuse, poor economics, a weak and dispersed school system, and lack of necessities, Thunder Valley saw an opportunity to help youth overcome adversity through educational and cultural programs.

Thunder Valley created programs that would help them achieve their goals and help the youth on the Pine Ridge Reservation. Some of the youth programs include the Youth Leadership Development Program, sports sponsorships/tournaments, agricultural programs, financial literacy classes, lifestyle classes and the Youth Build Project. All of these programs are aimed to help the younger generations and to open opportunities to them that may not be available through school or other institutions. Thunder Valley also works in other areas of community development, some of the programs include housing, food sovereignty and education, Lakota Language revitalization, arts, and workforce development (Thunder Valley Website).

The Youth Leadership Development Program

The Youth Leadership Development Program is a rewarding program to both mentors and students. On this program, students participate in academic situations and field trips regarding environmental justice, history and culture, political education, community organization, and healthy lifestyles. The program is set up like an internship with a stipend, and the program takes during June. As a result of this program, participants can open their own bank account, learn to use direct deposit, and put their new financial literacy skills to work. As the students gain and develop new skills, they can take them back to benefit their community and the

reservation as a whole. This type of program can also open educational opportunities and goals. The Youth Leadership Development program gives students educational tools to help them in their journeys and future organization and activism.

YouthBuild Project

The Youth Build Program teaches young adults how to build sustainable housing. They take classes as well as getting on hand experience by working with Thunder Valley. This program offers financial literacy classes, basic carpentry and building, and project-based learning. The goal of this project is to decrease homelessness on the Reservation, as well as create sustainable and environmentally friendly housing. Many of the houses, including new buildings on Thunder Valley property, are built from straw bales, mud, have composting toilets, and efficient heating and cooling systems that only rely on the heating/cooling of the seasons, sun patterns, and geothermal heating systems in the winter to efficiently utilize energy.

Food Sovereignty Programs

The Food Sovereignty Program is used to create affordable food items in a food desert and combat unhealthy lifestyles and diabetes. Thunder Valley works with communities to create gardens and offer classes on gardening, preserving, cleaning, and raising livestock. Recently, Thunder Valley has installed a greenhouse based after the only citrus growing greenhouse in the Northern Plains, based out of Alliance, Nebraska. Thunder Valley pursues many grants that would benefit the organization. One of the biggest awarded to them is a $2,249,987.00 grant from the Administration for Native Americans; which was awarded for the 2018 year. With this funding, Thunder Valley operates as "a fiscal sponsor for other non-profits" (Tilsen). The organization is also always working to pursue small grants from other foundations.

Thunder Valley and Smokey House Center

The Thunder Valley Youth Program has many unique examples that Smokey House Center may be able to utilize. Similar to a Smokey House Center, the Thunder Valley region is in the area with a dispersed school system. One of the main goals of the Thunder Valley Youth Program is to keep youth in the area and on the reservation. The youth program gives students the tools and the incentives to do so. By acting like an internship, and giving the students a stipend, it helps prepare them for the future. In the past, Smokey House Center was able to grant students in their youth program class credit. Recently, Smokey House Center has struggled to get students involved in their programs because it is entirely on a volunteer basis. However, if students were able to receive credit again or were able to list the program on their resume in the form of the internship, they may feel as though they are getting tangible value out of the program and may be more likely to participate.

1.5.2 Vermont Youth Conservation Corps

The Vermont Youth Conservation Corps (VYCC) is a non-profit and education program that connects local youth to the land and community. The VYCC has a campus that sits on 400 acres of land in Richmond, VT. The VYCC's mission is to teach young people to take responsibility for their community, for their land, and for themselves. The VYCC has had great success, engaging more than 6,000 young people in large projects that help to better their communities (Vermont Youth Conservation Corps). The project-based learning is centered around conservation and food and farming.

Conservation Program

The goal of VYCC's Conservation Programs is to promote working, learning, and growing with Vermont's natural landscapes. The program breaks into smaller crews, which allows students to develop teamwork skills while still allowing them to receive the individual

attention they need. The projects vary and include tasks such as backcountry trail building, watershed restoration and resilience, state park infrastructure, universally accessible and multi-use trails, and wildlife habitat and forest enhancement (Vermont Youth Conservation Corps). The VYCC proudly boasts that they have helped over 300 Vermont youth and have an extensive list of the many projects completed across the entire state. One VYCC alumni touches on the powerful impact the conservation program has had on her:

> "Before VYCC I was only marginally aware of myself as a part of a greater natural world – cities were my life. I feel more comfortable interacting with other people, and I realized that everyone has an interesting story if you ask the right questions. VYCC has changed the way I think about being human – that we are not isolated, and that this planet is not only ours." (Vermont Youth Conservation Corps).

Food and Farm Program

The Food and Farm Program at the VYCC plants and grows a wide variety of crops and delivers them across the state of Vermont. Some of the critical skills that students involved in the program learn are organic vegetable production, livestock management, nutrition education, and off-site gleaning (Vermont Youth Conservation Corps). Besides learning how to farm, students also take valuable soft skills away from the program, such as how to interact with other co-workers, how to show up on time dressed and ready, and how to be a good employee (Vermont Youth Conservation Corps). One unique component of the Food and Farm Program is the gap semester initiative. This program is set up for students who are disengaged and struggle in a typical classroom setting. It offers workforce development on the farm and real experience in agriculture. This program allows high school students to receive class credit as well as being considered an internship.

Vermont Youth Conservation Corps and Smokey House Center

There are many reasons why the VYCC has had so much success, and Smokey House Center should look at these reasons as they prepare for their future. Similar to the Thunder Valley program, The VYCC has a program setup granting students class credit. Again, this incentivizes them to participate. Students gain hands-on experience with project-based agricultural learning that is not taught in a typical classroom setting. When looking at the different occupations in the Danby Vermont area, agriculture is common. Preparing students with the skills they may use is imperative.

The VYCC also has substantial involvement and support from outside members in the form of partnerships, governmental funding, and team members. Smokey House Center's website does not list a single partner. In comparison, on the VYCC website, there is an extensive list of partners that help the corps achieve their broad goals. Regardless of if it is the lack of an actual list or the lack of partnerships in general, Smokey House Center must prioritize establishing these relationships. Later in this chapter, Smokey House Center's funding opportunities are highlighted. Finally, the impressive amount of team members at the VYCC are incredibly higher than those at Smokey House Center. It takes many influential minds in a program such as this one to be so successful. Unfortunately, Smokey House currently only has board members and a few other youth leaders that help with summer programs. Developing these roles by increasing the number of people involved should be a priority For Smokey House Center.

1.5.3 Cobscook Community Learning Center

The Cobscook Learning Center (CCLC) is a hub focused on improving community opportunities in the easternmost part of Maine. The Center began in 1999 and had been continuously growing ever since. The campus sits on 50 acres of land nestled against forest land in Trescott Township, Maine. With four main buildings, extensive hiking trails, indoor and

outdoor classrooms, a community garden, and an outdoor stage, the CCLC is a space for many different activities. The CCLC's mission is "to create responsive educational opportunities that strengthen personal, community, and global well-being" ("Welcome to the CCLC"). The CCLC seeks to help all members of society, regardless of class, socioeconomic status, or background. The CCLC has a wide variety of programs for high school students, educators, guests, and the community as a whole.

Cobscook Experimental Program for High School Students

Calais High School initiated the Cobscook Experimental Program, of which any student who participates in the program receives class credit and a diploma upon graduating ("Welcome to the CCLC"). The program gets students outdoors and engages them in service projects and classes that help build on academic and personal skills. The program is designed for students who want to learn more about their community, for those who thrive in small group settings, and for those who want to make a positive impact on others. The program utilizes the natural surroundings by going on expeditions such as visiting the Maine wilderness, using the winter landscapes, and visiting historical and political sites. As mentioned, the experimental program works with Calais High School. Students are enrolled in 8 courses per year that follow the Maine Learning Results and The Common Core Standards ("Welcome to the CCLC"). The program focuses on experimental learning, which helps students attempt challenges and reflect on their work both in the classroom and out. The Cobscook Experimental Program has seen great success with high participation rates and positive feedback from its students.

Transforming Rural Experience in Education (TREE)

The TREE Initiative is new to Cobscook and focuses on schools in low performance and high-poverty areas. The CCLC notes that 26% of children in the county live in poverty, and 65%

of children receive MaineCare ("Welcome to the CCLC"). One educator in the TREE program touches on this crisis, stating,

> "Long ago I became an educator because I believed education had the potential to be an equalizer. I thought in our free democratic society, a good education was the road out of poverty and hopelessness. Now I am saddened to see education has not opened that road. My dream is to help education live up to its potential." ("Welcome to the CCLC").

TREE's goal is to help students overcome these obstacles rather than ignoring them. TREE's platform uses a pyramid structure to do this. The program is rooted in community engagement at its base and focuses on meeting the community's basic needs. At the top of the pyramid, the TREE program pushes to support student development and to improve instruction and leadership ("Welcome to the CCLC").

Community Education

Besides an impressive program for high school students, the CCLC also offers classes and workshops to all members of the community. The CCLC has a scholarship program to help everyone have access to his or her classes, regardless of his or her ability to pay for them. Classes include Monday Night Music Circle, an eight-week Pottery Class, and Wednesday Writers Group ("Welcome to the CCLC"). Hosting workshops for all allows the CCLC to act as a common meeting place for the entire community.

The Cobscook Community Learning Center and Smokey House Center

Smokey House Center should follow the CCLC's lead by working with the entire community. As mentioned in the TREE program breakdown, learning how to engage with the community positively is the first step in setting an impactful example for our youth. The students will look to role models in their community as they continue to grow. The CCLC is a place for everyone in Trescott Township, Maine to come together and share common interests. It may take many years for Smokey House Center to develop their youth education program fully. However,

they do currently have the means to promote community workshops and events that would bring residents of Danby, Vermont together as well. While there are programs in place at Smoky House Center, they should continue to develop these soon.

1.6 Funding Opportunities

In 1967 the "Smokey House Farm", created by Stephan and Audrey Currier, was passed to the Taconic Foundation, a New York City based philanthropic organization. Following a few successful years of the innovative YouthWorks program piloted by the Taconic Foundation, they established the Smokey House Project in 1978, with an independent board of advisors. In 1995 the Taconic Foundation generously gifted the land and a sizeable endowment to the Smokey House Project, allowing it to run the organization autonomously. The majority of the yearly budget comes from financial gains from the endowment, however the market crisis in 2008 put financial strains on Smokey House and has since limited funds for full-time staffers and community outreach funds.

Smokey House Center is classified as a 501(c)(3), qualifying it as a tax-exempt, public charity. This allows Smokey House to access the majority of state and federal grants for rural resilience programs, although these programs often have a painfully specific list of requirements and qualifications, making it very difficult and time consuming to pursue and secure these grants.

The Vermont Department of Labor allocated a total of $804,000 to the Workforce Education and Training fund in FY 2016, spread throughout 12 programs (Vermont Department of Labor 2016). Each program was clearly focused on developing industry-specific technical skills, aiming to equip local residents with the training needed to secure available employment opportunities.

The Brattleboro Development Credit Corporation received $18,000 to establish a "Sustainable Workforce Economics" course at Windham County schools. This course, taught alongside tradition curriculum, providing personal career education planning to participating students. This program aims to increase credentialing and post-secondary enrollment at local institutions and to place workforce ready graduates in employment opportunities with local partnering businesses. This program serves as a state-funded example of a crucial element of future Smokey House youth programs, as Vermont funding objectives place a clear emphasis on building technical skills to fill existing workforce demands.

The State Workforce Development System Report released in 2017 lays out a new vision for the state program with the overarching goal of efficiently transitioning high school graduates to qualified job applicants either through continued education via state institutions or targeted technical skills programs (Vermont Department of Labor 2017). This new vision prioritizes high school age youth demographics and the current portfolio of state-funded programs illustrates increased opportunities for youth-focused programs in the coming years. For this section, we have researched and analyzed various public and private organizations, as well as their respective funding sources. These case studies provide a sizeable list of potential donors and partner organizations for the Smokey House board to consider regarding future SHC programs.

The Vermont Community Foundation is a family of hundreds of funds and foundations serving Vermonters and their charitable goals. Their mission is to inspire giving and bring together people and resources to make a difference in Vermont. Collaboration, equality, and diversity are the core principles that guide this foundation's mission, allowing a wide range of charitable organizations to qualify for support. This community foundation invests and administers over 700 charitable funds each year. In 2016 the Vermont Community Foundation

awarded $13.8 million through 2,546 separate grants across the state (Vermont Community Foundation). Below is a list of the most prominent funds in this foundation:

Fostering Community	Supporting our Neighbors in Need	A Love of the Kingdom
Deep Loss Leads to Giving	Giving Back is a Family Value	The Sport for a Lifetime
A Different Path	A Love of Learning	A St. Johnsbury Gem
Building Community	Deepening Connections	Accidental Philanthropists
Inspiration, Conserved	A Legacy Preserved	Libraries: The Lifeblood of the Community
Open Curiosity	Advising Generations	The Kingdom Supporting the Kingdom
Remembering Senator Gannett	Stowe Rescue Squad	In Tune with Their Giving
An Old Soul		

The Vermont Youth Conservation Corps (VYCC) is another example of a state program with programs closely aligning with Smokey House's mission. VYCC is a non-profit conservation and education organization seeking to teach young people personal responsibility and leadership skills through meaningful work that connects them with the land and surrounding community (Vermont Youth Conservation Corps). Similar to past SHC programs, the VYCC operates a food and farm program on their 400-acre campus in Richmond, Vermont, offering paid full-time and internship positions, as well as a credit-earning, gap semester opportunity for local high school students. In 2016 VYCC received their annual fund of $976,000 and their associated farm activities produced total revenue of $2.8 million. VYCC received contributions of $20,000 or more from the 14 charitable sources listed below (Vermont Youth Conservation Corps 2016 Annual Report):

Canaday Family Charitable Trust
GDS Legacy Foundation
George W. Mergens Foundation
High Meadows Fund
Jane's Trust
Johnson Family Foundation
Lookout Foundation
Lucius & Eva Eastman Fund
Lyman Orton & Janice Izzi
Sid and Cecelia Lance Family Foundation
The Estate of David Babbott
University of Vermont Medical Center

YouthBuild Vermont offers a youth education program in Burlington, which allows participants ages 14-24 to earn their high school diploma and gain technical skills and certifications in a work-based environment through various constructions projects. YouthBuild emphasizes workforce development, environmental stewardship and poverty relief as their core principles, which directly align with Smokey House's mission. In 2016, YouthBuild USA received $2.3 million in charitable donations, including the seven organizations that donated over $100,000 listed below:

JP Morgan Chase Foundation
Schultz Family Foundation
W.K. Kellogg Foundation

Marguerite Casey Foundation
Charles Stewart Mott Foundation
Oak Foundation
New Venture Fund
The Prudential Foundation
Conrad N. Hilton Foundation
Saint-Gobain Corporation

Despite opportunities to secure federal and state funding, focusing Smokey House fundraising efforts towards private donors might prove more beneficial due to the autonomy and flexibility allowed with private donations. While public sources provide strict mandates regarding the purpose of allotted funds to enhance institutional accountability, the bureaucratic red tape attached to these funds is often cumbersome and counterproductive. Private donations allow the board and Smokey House staff members to make informed funding decisions, adapting to the emerging needs of the institution.

While the cost of future Smokey House youth programs will vary widely depending on the size and scope on-campus activities, our group roughly estimates that insurance, property taxes, and land maintenance will incur an annual cost of $190,000. On top of that, any future program will likely provide the annual salaries of an executive director and program director, as well as seasonal wages for crew leaders and crewmembers. This ballpark estimate will be helpful when analyzing potential funding opportunities. We hope that this compilation of donors and public organizations can provide valuable funding leads to SHC. Future Dartmouth student

groups should continue to shape SHC's message to donors and "funding pitch" as the vision for future programs become more clear.

1.7 Moving Forward

Our plan moving forward is to ultimately see a revitalized Smokey House Center with a new land-based education program much like the program in place during the latter half of the twentieth century. This new program will contain many aspects as the original farm-based education program did including the ability to learn soft skills such as teamwork and leadership, skills applicable to almost any career field that the youth of Danby wish to pursue in the future. In addition to including characteristics of the original farming program, we wish to incorporate a new, modern curriculum that adds in critical items and factors that we discovered through our research within the community. These factors, we believe, reflect a large part of what the farm-based educational program in Danby, VT combined, Smokey House Center will be able to benefit the local community and its youth in an enriching way for generations to come.

We have split the goals we wish for Smokey House Center to proceed upon into two categories. The first set is the long-term goals. Under this category, we placed the securing of future funding for Smokey House Center and creating a modernized educational farming program. In the long term, funding should be a goal. Losing the majority of the grant money during the Recession years has been one of the biggest detriments to the continuation of the programs. Acquiring funding would be in our best interest in addition to the reconstruction of the program that was lost. As we discussed in the sections above, there are many ways for Smokey House Center to do so. With funding, programs that have been previously discussed can also be implemented. Funding and program building, however, will come with time, and therefore will be the long-term focus of what we wish to pursue.

In our other category, we have short-term goals of which we wish for Smokey House Center to accomplish. In this category, we placed the items of gaining interest from community members in Danby and, specifically, gaining interest from youth community members in Danby. These items are essential as it provides the basis for the way that the community interacts with Smokey House Center. As always, the community will be a strong source for the way that the program continues. Before we manage to create programs for youth in the area or acquire funding for the creation of these programs, there should be noticeable interest from the community. For one, more community involvement can help facilitate the redevelopment of farming programs that need to be brought back. In addition to that, groups in the future pursuing the same goals as the rural livelihoods group within the 2018 class should take note of the goals listed above. For future groups, we have identified and condensed our main points into three tasks we believe to be vital for Smokey House Center. These points are listed below:

1. Help Smokey House Center design a new farming program with elements that they once had and new modern ideas.
2. Help Smokey House Center find a source of funding for their operations.
3. Help Smokey House Center find important community connections so that they can maintain a stable program throughout the years.

Smokey House Center has a unique resource in that the farm it owns and the land that it occupies. While one can open a trade school in almost every city or town in Vermont that can perform the tasks of teaching students how to cook or construct buildings, the farming and agricultural lifestyle is something quickly disappearing from the United States. Being here in rural Vermont, we can utilize the appeal of the small farm to its fullest potential, just as the founders saw the appeal in this rural landscape.

1.8 Conclusion

Smokey House Center has great potential to benefit the local community and its residents. In this transition period, Smokey House has the ability to create new programs that will transcend past programs, and cater to its community. The newly founded relationship between Smokey House Center and the Dartmouth Environmental Studies Department proves beneficial to their respective communities. Even though this relationship is new, it has great potential to catalyze the realization of Smokey House's goals.

To continue being successful, Smokey House and the Dartmouth students that work with them must set some long and short-term goals. A clear and concise mission statement could help attract funders and locals to Smokey House. Along with this, Smokey House can also create theoretical budgets, keep track of financials, and start being proactive in researching funding opportunities. New or renewed partnerships with other organizations can also provide programming and funding for Smokey House, especially if Smokey House looks to revitalize its youth internship program from the 1990s. This could be facilitated, for example, by partnering with programs like the Vermont Youth Conservation Corps or the Vermont Adult Learning center in Rutland county. By working with these other organizations, Smokey House can modernize its program to benefit youth and provide opportunities that may not be available in traditional school settings. By helping the future generations of Danby, Smokey House in it will see the community prosper and play a vital role in Danby's success.

As Smokey House moves forward in time, it can continue to set goals that will contribute to the organization's prosperity. Smokey House must become proactive in its outreach to other organizations and future funding opportunities. The goal of this report is to provide Smokey House officials with the adequate tools to make them a competitive and outstanding association.

Smokey House can use its position in the community to make changes and provide for the individuals that look to Smokey House for hope and guidance.

Chapter Two
Agriculture

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2.1 Introduction

Vermont has a very large agricultural population that depends on farms for food and jobs. The Smokey House Center (SHC) has identified this dependence and aims to assist these farmers in their need for land and a greater understanding of the land they wish to farm on. In this chapter, we offer analyses of SHC's current agricultural programs, focusing on the SHC Community Farm Project, as well as improvements and further actions they can pursue in order to increase community impact, agricultural education, and farm equity. These foci will include value-added products and chickens, which would both enhance the visitor experience and provide educational benefits to the young people that comprise the majority of visitors of the SHC. Another area we focus on in this chapter is farm incubator models we believe are viable options to help improve agricultural education and community interaction in Danby, VT and the greater New England region.

2.2 Background Information

2.2.1 Smokey House Center Agriculture Overview

The goal of the SHC agriculture program is to keep farming alive and well in Danby by providing land leases, housing, and retail spaces for farmers. These address some of the biggest challenges facing new farmers who wish to pursue a career in agriculture today. Currently, the SHC oversees the operations of two commercial farms, which welcome new students eager to learn more about agriculture and gain experience as a farmer in this region. Dorset Peak Jerseys is a dairy farm in Danby that is run by Caleb and Jessie Smith who tend to some 140 Jersey cows They use these cows to produce both high quality milk and beef. Yoder Family Farm is the other commercial farm supported by the SHC, where Rachel and Ryan Yoder grow a variety of

products, including grains, fruits, chickens, and vegetables. The products from both of these commercial farms are available every day at the SHC Farmstand from 8am to 8pm.

In addition to overseeing the work of the commercial farms, SHC is also committed to a Community Farm Project, which attempts to engage the local community and youth in farming and agriculture. The Community Farm Project relies on the work of volunteers and visiting education groups from the surrounding area to meet its goal of providing food for those in need. In order to pay for the expenses of farm upkeep and maintenance, as well as provide a salary for a farmer-in-residence (FIR), SHC relies primarily on funding received at the start of this project and donations made by community members who wish to keep the community farm thriving. Funding SHC has received in the past includes $45,000 from the Lookout Foundation charity and non-profit organization, $15,000 from an SHC board-related foundation, and $5,000 from the Stratton Community Foundation All of these donors were motivated by their desire to support the cause of providing local community members with food from this Community Farm Project. SHC also receives annual funding from other sources for the Community Farm Project, including $25,000 from the Alcyon Foundation and the Johnson Family Foundation, among other fundraising initiatives. Overall, the Community Farm Project is designed to help a community in need with support from people and foundations that have the same goal in mind.

2.2.2 Methodology

We used a variety of methodologies in order to conduct our research. These techniques included phone interviews with several informants, on-site interviews, document analysis, and literature reviews. Our main contact with SHC was Jamie Lombardo, the lead farmer at SHC, as well as Jesse Pyles, executive director of all SHC programs. Throughout our research for SHC, we attempted to keep up a weekly communication either through phone calls or emails to update

the center on our progress and gain feedback on the direction in which we were heading with our deliverables. We also visited SHC two times throughout the term to gather further information from the entirety of the SHC board. While visiting, we took pictures of areas around the farm to have reference points on the layout and activities conducted at SHC.

Our interviews with outside contacts included Athol Farm School, Intervale Center, and Glynwood. Each interview ranged between 20 and 45 minutes depending on availability of the informant. We attempted to have two group members present for each interview, but it did range between one and five members depending on the time of each interview. One member would be in charge of asking the main questions we prepared beforehand, while another member would write notes on the informant's responses. After initial questions were answered, any member with additional questions would speak to clarify concerns. Each interview was then synthesized and entered into this paper.

We finished our research with document analysis and literature reviews in order to get a better understanding of past programs in similar situations to SHC that have had relative success. These sources included peer-reviewed academic articles, private organization websites, and government websites that offered additional information into program history and application. Furthermore, we collaborated with other groups in Dartmouth's Environmental Problem Analysis class in order to create a cohesive analysis of SHC and their agricultural programs.

2.2.3 Regional Farming Comparative Analysis

The main goal of this paper is to provide SHC with new ideas and practices that could potentially be used to improve agricultural practices and programs at SHC, both in the near and far future. In order to accomplish this goal, this paper will run through case studies and interviews of various programs and agricultural systems, mainly based out of the northeast

United States, that face some of the same challenges the SHC agriculture department experiences.

We will also take a look at how agricultural practices and production at SHC compares to that of others in Vermont and the greater New England area. In general, the farms at SHC are very similar to most farms in this region. However, there are currently two main structures to these farm schools that are used. One type of educational farm offers short term programs where new, motivated farmers can learn the basic skills of running a farm in the New England area. These usually require an application process and last no more than a year. They offer different focuses such as vegetable, poultry, dairy, etc. The other type of farming program is longer-term, usually 3 to 5 years. The tenants lease land from the centers, where they work for a specified period of time on the land in order to take advantage of resources, such as equipment and experience, offered by the permanent members at the center. These programs are utilized so that farmers can get their foot in the door and gain a financial record to be used for their own personal farms once they complete their stay in the program.

SHC's current farming program is similar to the long-term lease programs, as residents spend several years on SHC land in order to establish themselves as farmers and take advantage of the equipment and knowledge of SHC. SHC could also benefit from having a short-term program that is more classroom focused like the programs mentioned above. Although these programs vary in length, they offer the same objective: increase new farmer's education and experience in New England farming. Some programs are much larger and more successful than others, but they all have a similar goal to SHC's three pillars. Further in this paper we will provide a detailed description of each program and the variety of different features they include in their programs.

2.3 Community Farm Project

2.3.1 Current Programming and Impact

SHC's community farm aims to engage visitors and volunteers to grow food for hunger relief and community programs, while also supporting new farmers in developing their technical skills by serving as FIRs, in order to ultimately create a vibrant farm education center where people of all ages and backgrounds can participate in farm and land-based learning.

Currently, SHC and its community farm face several challenges that hinder their ability to maximize their impact on the local community.

1. SHC's traditional market audience of at-risk high school youth has fallen, and current student numbers are lower than projected, while other alternative programs serving SHC's traditional core group have emerged.
2. In terms of resources, funding for youth agricultural programs is also falling, and SHC has limited staff to dedicate to educational programs.
3. In terms of existing programming, many potential partners want to see different, more short-term opportunities, such as one-time events, while existing partners seek a more holistic, diverse farm-based experience that includes components such as small livestock and Christmas tree farming.
4. Although SHC has a positive reputation, it lacks local community visibility and recognition, as it has historically served students from outside of the immediate Danby region.

However, SHC and its community farm are also encouraged by several promising trends and new engagements.

1. There is an emerging community food focus in the local area, with a Vermont Foodbank warehouse in Rutland, the expansion of the VYCC Community Health Share to Rutland County, and farm movements, such as the Vermont Gleaning Collective and Northshire Grows' Farm to School initiative, which have recently gained traction in the region.
2. The Vermont Food Bank's COO has stated that there is a significant need for produce statewide, particularly for storage crops in Rutland, and wants SHC's help; they are willing to pay a Value Added Production (VAP) payment to cover the handling of the donated products.
3. Currier Memorial School, where 72% of pupils are under the poverty line, has expressed strong interest in local and nutritious food, and wants to be involved with SHC; this partnership will further SHC's goal of providing nutritious food for community members in need.

In order to assist the Vermont Food Bank, SHC has decided to focus on storage-friendly crops that are also conducive to community involvement, such as crops that require late spring seeding and fall harvests that coincide with the school year, such as carrots and potatoes. In 2016, SHC determined that their crop production would focus on carrots, cabbage, potatoes, squash and onions, and that agricultural production would be primarily aimed at supporting the VT Foodbank site in Rutland.

SHC set these following goals for the 2016 growing season:

1. Produce 3,000 – 5,000 lbs. of food for the Vermont Foodbank; goal is dependent on commitment of field space for other potential partners
2. Engage 150 volunteers in this food production, from visiting and resident school groups, individual student work placement, gleaners, businesses and others

SHC has achieved marked success: regarding the first goal, SHC currently produces 5,000 pounds of food annually to be donated to the Vermont Foodbank. In order to achieve these goals, SHC implemented a structural change and established a new FIR position, who is a beginning farmer who has had some formal farm experience and is committed to education. Their responsibilities include growing storage crops for community food programs, facilitating farm education activities, and site and facilities maintenance. The FIR's contract is renewed annually, and their tenure is not intended to exceed two years. The FIR receives support from a mentor farmer, Ryan Yoder, whose responsibilities are to support the FIR and their production goals, to provide technical and equipment support, and to work with SHC and the FIR to continue to develop and refine the position. Working with an FIR has proven to be a successful means to achieve SHC's 5,000-pound production goal, while also achieving the SHC mission objectives of engaging new education partners to grow food and to extend education offerings to new farmer training.

Overall, SHC has stated that their vision of their community farm includes a focus on vegetable production, of crops that can be easily stored and distributed through hunger relief and health program channels. SHC has also stated that in the future, they could expand their community farm by including gardening or growing plots for community groups or school programs, expand programmatic components such as livestock, which would serve the on-site farm stand with products such as eggs, partner with additional schools beyond Currier Memorial School, and also serve partner and community events, such as the fall community harvest meal. The community farm could also manage blueberries, sugar bush, and Christmas trees in order to generate additional revenue and offer more diverse farm opportunities.

Feasibility Analysis for New Opportunities

The Smokey House Community Farm (SHCF) is central to SHC's mission. Not only does the SHCF donate approximately 5,000 pounds of storage crops to VT Foodbank annually, but the SHCF is also at the heart of much of SHC's educational programming. Community members and students from local schools, especially Currier Memorial School in Danby, get exposure to agriculture and food systems through volunteer days and school visits to the SHCF.

As discussed previously, though, SHCF relies on foundation support (~$25,000 in FY2017) to balance its operating budget. Therefore, increasing the income generated through the SHCF, without accompanying amounts of expense increases, would improve SHC's overall financial strength. Such changes also provide SHCF the opportunity to amplify its educational and community impact by incorporating different production methods or aspects of the food system. Thus, this feasibility analysis, which explores several different models and opportunities, takes a dual approach of analyzing both the financial and educational impacts of any potential changes to the structure of the SHCF.

2.3.2 Value-Added Products

SHCF currently generates approximately $4,000 in blueberry sales and $1,000 in Christmas tree sales. Value-added products, such as jams and salsas, can enhance the value of the raw goods from which they originate, while also allowing students and community members the opportunity to participate in the production process. SHC has a small kitchen on-premises that would be suitable for the small-scale production of such value-added goods. Producing at a relatively small scale would also exempt SHC from many of the regulations and requirements for food safety and permitting in Vermont (Pyles 2018).

After discussions with SHC about their product mix, we co-determined that blueberry jam would be the most feasible value-added product. SHC has a well-established and large blueberry patch with the capacity to divert some fresh blueberries for jam production (Pyles and Lombardo 2018). Focusing on blueberry preserves would allow SHC to most easily implement a value-added product program without adjusting their SHCF cropping patterns. They also have sufficient on-farm freezer capacity (and access to other freezer facilities). Therefore, jam production could occur during the winter months when staff time may be more flexible.

Value-added products would also allow to have four-season food and farm education programs, as the production of value-added goods could be done during the winter. This would also enable students and community members to develop a more rounded view of the food system, falling in line with national trends in farm to school programming toward a greater emphasis on cooking (Hersch et al. 2014).

Another option is to work with the Currier Memorial School to produce these value-added products on school premises. Currier already participates in the Vermont Harvest of the Month program, showing that they have a demonstrated interest in incorporating cooking and food education into their programming (Lombardo 2018). The production of value-added products with Currier would allow SHC to apply for farm to school funding from organizations, such as Vermont Farm to School or the USDA Farm to School Grant Program.

However, one of the remaining questions to explore is whether there would be a large enough market for these products and whether partnering with Currier directly on a cooking program would preclude SHC from profiting from the sale of the products. Even if making these products has profound educational value for students and community members, they must at

least not hurt SHCF's financial outlook, as SHC does not have the financial flexibility to support expanded programming with its current revenue streams.

Another important consideration for the development of SHC-branded value-added products is that their production does not displace or hurt other local farmers and producers. Promoting rural livelihoods is a vital part of SHC's mission, so they want to ensure that any improvements to SHC's revenue streams do not come at the expense of the local community. However, Jesse and Jamie did express a willingness to sell such products at the Smokey House Center Store (Pyles and Lombardo 2018).

Based on these factors, we recommend that SHC pilot a blueberry jam program and sell these products at the Farm Store. While this product will not represent a significant revenue, we believe that the incorporation of such a program would improve SHC's agricultural education programming while not incurring further losses for the SHCF.

2.3.4 Feasibility Analysis: Incorporating Poultry

SHC has also expressed an interest in including small-scale chicken production as part of the SHCF. Chickens present an exciting opportunity for improving SHCF's on-site soil fertility, educational impact, and financial strength. Ecologically, chickens are "input-drivers and fertilizer applicators" (Algiere 2017). According to the Rodale Institute, chickens can enhance soil fertility by incorporating their manure into the soil, and they can help manage crop pests by grazing on weeds and insects (Bare and Ziegler-Ulshe 2012). Chicken manure is particularly rich in calcium and can raise soil pH (SARE 2012). While this can provide soil health benefits, it is also important to not keep chickens in the same area for too long, as they can over-concentrate soil nutrient while also compacting the soil (SARE 2012). At a larger scale, integrating crop

production areas and animals can yield significant environmental benefits, such as increased soil carbon, reduced on-farm fertilizer use, and reduced water footprints (DeLonge 2017).

The first main consideration is to determine whether laying hens or meat birds fit better into the structure of the SHCF. The following table summarizes the potential benefits and drawbacks of both laying hens and meat birds.

Table 2.1: Benefits and Drawbacks of Different Chickens

	Benefits	**Drawbacks**
Laying Hens	● Get eggs year-round ● Very educationally compelling ● Laying hens eat less (and cost less) ● Less aggressive animals	● Slower to mature ● Need to winter them ● Larger start-up cost and long-term investment ● Greater labor requirements ● Need for a year-round egg market
Meat Birds	● Quicker to maturity (9-13 weeks) ● No need to over-winter ● Easier to deal with processing (one-time) ● Fewer labor requirements	● Meat birds tend to be more aggressive ● Ethical & logistical challenges around slaughter ● Perhaps less compelling educationally

While laying hens are compelling educationally, will consistently provide eggs, and are less aggressive than meat birds, they also have a much larger start-up cost, as they require greater infrastructure. Their year-round provision of eggs could also be a drawback, as this would require SHC to find year-round access to paying customers.

Meat birds, on the other hand, may be less educationally-valuable (they are more aggressive and less docile), but their fast maturation means that SHC would not need to invest in a sophisticated coop. Processing meat birds has both benefits and drawbacks--unlike for laying

hens, meat birds do not require daily access to markets. However, raising animals for meat may also generate both ethical and logistical challenges. The small-scale of production, though, may enable SHC to process the meat birds outside of the regulated slaughterhouse network, as 6 V.S.A. § 3312 allows farmers raising fewer than 1,000 birds/year to sell uninspected poultry at farmers' markets and to restaurants (as whole birds only), in addition to selling poultry from the farm, so long as they include a label that the bird was not inspected (6 V.S.A. § 3312).

As has been described, laying hens and meat birds offer different benefits—it will be up to SHC staff to determine which option makes the most sense for their operations, based on their future vision of the SHCF and their willingness and ability to make relatively large start-up investments. Based on our preliminary analysis, we believe that it would make most sense for SHC to begin with a small flock (around 50) of meat birds. That experience could serve as a lower cost way to determine the feasibility of raising animals at SHC, both in terms of labor demands, cost, and soil health.

Based on our preliminary recommendation, we conducted a basic financial feasibility analysis for a 50 meat-bird flock, with a lifespan of 13 weeks (a very conservative rate of growth). Our output estimates the cost/bird to be around $35, an extraordinarily high figure. However, we attribute that both to our conservative estimates as well as our inclusion of potentially long-term assets (such as the brooder, coop, and poultry net starter kit). While breaking down the cost of these assets over their life expectancy might be a more typical accounting approach, we chose to attribute their full cost to provide a better expectation of the start-up costs for such a production system. The future cost of production for meat birds would certainly be lower, as SHC would not need to re-purchase these assets.

Our accounting also does not include any benefits from chicken production, such as increased soil fertility, educational benefit, or the potential sales of chicken meat. It also does not factor in labor costs. Thus, this analysis is intended as a jumping-off point for the further study of the feasibility of chicken production at SHC. Table 2 is below.

Table 2.2: Estimated budget for 50 meat birds (Durham 2018)

Item	**Cost per unit**	**Units**	**Total Cost**
Day-Old Chicks	$5/chicken	50 chickens	$250
Brooder	$100	1	$100
Chick Starter (50 lbs)	$40	2	$80
Heat Lamp and Bulb	~$25	1	$25
Feeders and waterers	~$50	1	$50
Layer pellets, scotch grains, wood shavings, straw, sawdust, miscellaneous	~$50		$50
Coop	Wide range (~$150)	1	$150
Poultry Net Starter Kit[1]	~$450	1	$450
Additional Feed (5 lbs/bird/month)	$20/50 lbs	15 (5/month for 3 months)	$300
Processing[2]	$6/chicken	50	$300
Total Cost			**$1755**

[1] Priced based on: https://www.premier1supplies.com/p/poultrynet-plus-48-inch-starter-kit?cat_id=190

[2] Durham 2018 (conversation with the authors)

2.3.5 Increasing Community Impact: Education & Community Engagement

SHC has a very clear focus outlined in their three pillars; conservation, agriculture, and education. Unsurprisingly, these three objectives overlap quite a bit at SHC. Although the main focus on education and community engagement will come in the communications section of this report, we thought it was important to highlight some of the agriculturally-focused aspects of their education and community engagement programs.

The main role of SHC in the area of Danby, VT is to engage in rural livelihood in the area. Years ago, the SHC hosted a youth program that allowed student in the community to visit the center and learn more about agriculture, farming, and their community in general. They would tend crops in the field and then bring some of the food they grew home with them. It was a great way to engage the local youth, especially for those who struggled in a typical classroom setting. It allowed for increased interaction among community members while also offering an educational aspect. Unfortunately, this program was unable to continue due to funding constraints (Pyles 2018). SHC would like to reintroduce a program with a similar objective.

In order to gain a better understanding of how these educational programs work, organizations such as Thunder Valley Community Development Corp and the Intervale Center were investigated. The overarching theme of Thunder Valley is empowering the youth through the development of vital skills. One of the programs that Thunder Valley sponsors in the Youth Leadership Development Program, which offers agricultural programs, financial literacy classes, lifestyle classes, etc. (Thunder Valley CDC 2016). Similarly, the Intervale Center has educational programs associated with the financial aspects of farming as well as general skills necessary for any farmer. However, the Intervale Center is less community-focused than Thunder Valley, which works more exclusively with the local area (Intervale Center 2018).

Hosting an adult-focused program that included financial skills involved with owning a farm would be a very helpful and advantageous offering. During this program, there could be a children-focused farming activity that parents could drop their kids off while they are attending the financial seminar. This would both help the current financial situation in Danby as well as create community engagement, as there would be direct interaction with local community members of all ages.

Through researching these programs and many others, we found that the most important aspect of any of these programs is funding. Many of the interviews we conducted emphasized the large costs involved with running these community engagement programs. Fortunately, there are many funding opportunities available and mentioned throughout this paper that offer some insight into next steps. In order to validate the creation of these programs, SHC also needs to create a larger community interest before establishing any new programs. Luckily, the area of Danby, VT offers a very unique experience compared to most other farm schools. SHC needs to emphasize this unique agricultural lifestyle to the community and specifically target the youth, as they will be the next generation to determine the future of agriculture at SHC and in the United States.

2.4 Incubator Viability: SHC's Role in Supporting the Next Generation of Farmers

2.4.1 Traditional Incubator Model Overview

Farm incubator programs have become increasingly popular as a means to train farmers by not only teaching technical farming skills, but also additional business acumen, mentorship, financing and capital support, and land access assistance. Farm incubator programs differ from farm schools in terms of their length, level of autonomy, and educational focus. Incubator programs typically involve longer-term tenures than farm schools, as incubators typically last

from three to five years compared to a one-year farm school program. Incubator programs also often provide more autonomy and independence to farmers-in-training relative to farm schools; instead of providing a strict curriculum, many incubator programs offer assistance as needed, rather than a solidified class schedule or mandatory workshops or lessons. Also, while farm schools tend to focus solely on technical skills, farm incubator programs provide a more holistic curriculum that also addresses business planning, financial obstacles and land access issues; farm incubator programs are suited for people who have the intention of starting their own farm, while farm schools serve people who want technical training and may not yet be committed to or interested in starting their own farm. Incubator programs can be run independently of farm schools, but they can also serve as a post-farm school complement by serving farm school graduates who want to continue their training.

This section will explore SHC's role in supporting the next generation of farmers by examining the possibility of establishing a farm incubator program at SHC. First, we will explore the current incubator landscape through several case studies of local, existing farm incubator programs, which includes summary information on program sizes, curricula, and fees. Then, we discuss main takeaways and findings from interviews that we've conducted with staff from several farm incubator programs. We then move to recommendations on how a farm incubator program can be best tailored to SHC's strengths, existing programming, location, and competitive niche, where we explore strategies on designing an optimal farm incubator program for SHC.

2.4.1.1 Case Studies: Local Farm Incubators

Athol Farm School

Program: Learn to Farm Program

Length: Year-long, from October to September

Founded: 2002

Participants: 12-16 participants every year

Education:

- *What:* Areas of farm production: forestry, animal husbandry, carpentry, mechanics, business planning, homesteading, marketing, cooking, organic vegetable production
- *How:* Student farmers learn to farm by farming, supported by formal coursework, in-field mentoring from our staff and instruction by regional experts; field work is the primary mode of instruction; small discussion-based classes are balanced with long hours in the greenhouses, fields, forests and barns. The training is rounded out with field trips, conferences, reading and assignments, and an independent project
- *Where:* 12 acres of Mixed Organic Vegetables, 60 Acres of pasture for raising pigs, sheep, beef and dairy cows, and laying hens, 200 Acres of woodlot, and 2 Acres of gardens and orchards

Cost: $18,500 (all-inclusive, room and board is included)

Funding sources: Tuition, farm productions and donors

Additional: Clear website; rely on internet presence to reach out; intensive, year-long curriculum; selective admissions process; most students receive financial aid; rely on fundraising and donors

Glynwood Center

Program: Apprenticeship Program

Length: Vegetable apprenticeship (8 months), livestock apprenticeship (10 months)

Participants: 3 vegetable, 3 livestock

Education:

- *What:* Formal training in the safe operation of farm machinery; curriculum geared toward farm management
- *How:* Hands-on education and fieldwork, comprehensive classroom curriculum

Cost: Paid $490 weekly stipend (vegetable), $420 weekly stipend (livestock); includes private on-site residence, workers compensation insurance

Program: Hudson Valley Farm Business Incubator

Length: 4 farming seasons; minimum 2 years

Participants: 4 farms

Founded: 2014

Education:

- *What:* Technical assistance, mentoring and advanced practical skills workshops for new farm businesses, in addition to low-cost land, equipment, infrastructure and housing at our leased property in New Paltz, NY. Program includes off-site farm businesses who benefit from the same technical support provided to on-site participants, tailored to their specific needs.
- *How*: Workshops and technical assistance as needed, provide access to land, equipment, infrastructure
- *Where*: Both off-site farms and on-site – 900-acre parcel, with 300 acres for incubator

Cost: $5000: farmland, housing & training / $2500: farmland, training (living off site) / $1000: training only (farming and living off site); liability insurance not included

Additional: No mentor farms built into this model

Intervale Center

Program: Farm Incubation

Length: Five years, then Intervale transitions them out; participants sign a year-to-year lease

- Farm Service Agency: government lender wants at least 3 years of actual financial history
- Receive subsidized use of resources (at 80% price) for first three years

Founded: 1990

Participants: 8 farm businesses; 2 mentee farms and 6 mentor farms

Education:

- *What*: Provide physical space and physical infrastructure, such as access to farm equipment, coolers, washers, irrigation systems, with technical training and business assistance as needed; financial planning assistance, help accessing loans, farm business consulting
- *How*: Hands-off approach; assistance is provided as needed with no mandatory classes; presence of mentor farms to assist beginner farmers, and mentor farms allocate 20 hours per growing season to mentorship; each mentee farm is assigned a mentor; each farm sets yearly financial and production goals, and are assessed at the end of each year
- *Where*: Intervale leases out 120 acres out of their 350 acre plot to lease out to tenant farmers

Cost: Complex rates; incubator farms: $168/acre; additional for water, land management fee, propane, greenhouse lot, cooler pallets, hay, corn crib, bunker, metal barn, etc.

*Funding sources***:** 60% funded through earned revenue (food sales, tree sales, land rentals, wedding rentals), leases to farmers are a small portion; 1/3 comes from grants, 10% from private donors/community farmers

Additional: Passive approach to recruitment; mostly through word of mouth; maintain a strong, informational website for recruitment

Maine Organic Farmers and Gardeners Association

Program: Farm Apprenticeships

Length: 1 year

Education:

- *What:* MOFGA's Farm Apprenticeship program connects people wanting to learn organic farming with experienced farmers willing to share their expertise.
- *How:* The typical arrangement involves an exchange of labor for room, board, a stipend, and informal, intensive training and experience in farming. Farm Apprenticeships provide opportunities for training in:
  - Organic vegetable, herb, and flower production at many different scales
  - Marketing techniques, including direct marketing strategies such as Community Supported Agriculture
  - Raising livestock, including cattle, goats, sheep, horses, pigs, and poultry
  - Using draft animals for cultivation and woods work
  - Homesteading skills, including house-building, food preservation, and alternative energy
  - Dairy farming and cheese making with cows, goats, or sheep
  - Maple sugaring, orchard pruning, cider pressing, and meat processing

- Seed saving
- Making value-added products with farm resources
- Grass-based and intensive rotational grazing farm systems

- *Where:* These opportunities to gain farm experience in a variety of different fields are available at over 100 farms scattered throughout Maine.

  Cost: Some farms will pay a cash stipend in addition to any accommodations exchanged for the labor of the apprentice.

  Additional: MOFGA also offers many opportunities throughout the year for apprentice networking and supplemental learning, including the Farm Training Project, and several day-long and multi-day educational events.

New Entry Farm School

Program: Incubator Farm Program

Length: Maximum 3 years; year-by-year basis

Education: Must have completed 7-week farm business planning workshop to be eligible

- *What*: We provide ongoing feedback and technical assistance for farmers on their business and production plans, and provide help ordering seeds and equipment, getting permits and insurance, keeping records, and accessing credit
- *How*: Field workshops, technical assistance, marketing assistant
- *Where*: Farm incubator plot

  Cost: $718/acre or $180 for a ¼ acre plot

- Fee includes: Spring/Fall plowing, field scale fertility and pH applications, landowner fees, sanitary facilities, access to irrigation & electricity, fall cover crop seed, field trainings, unheated greenhouses, storage sheds, small equipment, produce wash stations
- Additional fees:
  - One-on-one technical assistance - $26/hr. or $308 for a full season of TA sessions
  - Custom tractor work - $47/hr.
  - Equipment fee - $154/season
  - Pesticide fee - $57/season
  - Cooler use - $180/season

Additional: New Entry helps farmers who have graduated from incubator with farm business planning, finding farmland, recommending farm equipment, providing examples of lease agreements, advising on farm practices, applying to USDA programs, contacting custom farm services, applying for permits, etc.

Other programs: Explore Farming (basic, 2-hour free workshop) where participants learn about agriculture in MA/New England, learn about food system and ways to get involved, connect with a local farmer, learn about New Entry Sustainable Farming Project's courses and services, discuss & identify next steps to get started

University of Vermont

Program: New Farmer Training Program

Length: Six Months

Education: Hands on, skill-based learning in sustainable agriculture

- *What:* This program is designed for people interested in immersing themselves in sustainable, local food systems in a hands-on educational setting. Candidates include, but are not limited to: new and beginning farmers, urban and community gardeners, farm educators and students interested in deepening their understanding of sustainable farming systems in an intensive and focused learning environment.
- *How:* An innovative curriculum provides trainees in this program a chance to learn both through work in the classroom, and work with real, successful local farmers. They cover a variety of important topics in agriculture, including Organic Crop Production, Marketing, and Farm Business Management.
- *Where:* 10-acre Catamount Educational Farm, University of Vermont, Burlington, VT

  Cost: Tuition: $6,300 (Not including housing or meals)

  Housing: $500-$800 per month

  Meals: $100-$400 per month

  Tools: Around $200 total

  Limited number of scholarships are available to some of the 25 students accepted into the program.

2.4.1.2 Interview Findings: Local Farm Incubators

Athol Farm School

In order to gain a better understanding of the viability of an incubator program at SHC, our group conducted interviews with several farm schools around the area. The first resource we reached out to was Athol Farm School in Athol, MA. We spoke to Patrick Connors, their Learn to Farm director. Athol Farm School has several learning opportunities for those interested in

understanding the practice of farming. The two programs we were interested in were their year-long training program for adults and their 3-day learning experience for school groups.

While speaking with Athol, they emphasized the importance and necessity of fundraising in order to keep these programs alive. The year-long program requires a very selective admissions process that results in 12-16 applicants total. Their tuition is about $18,500, but most of the selected applicants receive financial aid or scholarships that significantly reduce the price of the program. Throughout the program students live on the farm and learn by doing. It requires a lot of hands on work reinforced by coursework and class discussions. They cover a wide range of skills areas, such as forestry, animal husbandry, business planning, marketing, organic vegetable production, etc. (Connors 2018).

The 3-day program that Athol offers, is focused more towards the student-age population. Depending on participation of each school in the federally funded school lunch program, tuition is charged on a sliding scale. These programs, much shorter than the year-long training program, are offered to up to 40 children at a time. The goal of this program is to teach children about the benefits of the earth, create a sense of community and appreciation for their homes, and show students the value in real work through activities and games. This program has been very successful for Athol and they typically have a very full schedule throughout the season (Connors 2018).

Overall, the biggest takeaways Patrick had for us are that Athol aims to engage people in meaningful work, where they feel those involved gain an appreciation for their community and can benefit the world through their work. Furthermore, they hope to build confidence in these new farmers, so that they can continue to spread these important skills to others in their communities.

Intervale Center

The next farm school we interviewed was the Intervale Center in Burlington, VT. This non-profit organization offers a farm incubation program similar to what we are interested in implementing at the Smokey House Center. We spoke with Maggie Donin, their Beginning Farmer Specialist, who offered some further information on how Intervale executes their incubator program. She informed us that Intervale mainly focuses on their larger scale farm viability program, which focuses on consulting, but the incubation program does act as a smaller aspect of Intervale.

Much like Athol, there is a rigorous application process that is very selective in order to become an incubator farm with the Intervale Center. In terms of farm incubation programs, Intervale considers themselves a very hands-off model. Their main goal is to offer these beginning farmers physical space, infrastructure, and business assistance as needed; however, they do offer classes that farmers are welcome to attend if they wish. Typically, the mentor farms offer 20 hours per growing season of mentorship. They currently lease out 120 of 350 acres of their land to 8 farm businesses, 3 of which are considered incubator farms. They lease out their land for 5 years because this allows farmers enough time to understand their land and resources, as well as satisfies the Farm Service Agency's requirements, which requires at least 3 years of financial history. A problem Maggie emphasized Intervale has struggled with is transitioning these farmers off of their land. Currently, they have not had a new tenant in over 5 years (Donin 2018).

Financially, 60% of Intervale is funded through earned revenue through programs like their Food Hub, tree sales, land rentals, wedding barn, and leases to farmers. A third of their funding comes through grants and another 13% is from private donations and community

partners. They do not currently have any equity or profit share with any of their tenant farmers. They sign year-to-year leases with their tenant farmers and they are billed every 6 months. The lease structure for the tenant farmers is a plan-to-pay lease with half a million dollars in lease liability insurance. The equipment that these tenant farmers use is also not owned by Intervale, but instead is given to them through a partnership with an LLC. These resources are subsidized for the farmers for the first 3 years at 80% normal price (Donin 2018).

Intervale has had relative success with their incubation program; however, they did express their concerns over farmers transitioning off their land. This is an important aspect to consider when examining the viability of an incubation farm at SHC. It will be encouraged to review the land access in Danby, VT, as well as the surrounding area of Rutland County.

Glynwood Center

Glynwood's mission "is to ensure the Hudson Valley is a region defined by food, where farming thrives" (Glynwood Center 2018). While the Hudson Valley is certainly a very different place from Danby, VT, our conversation with Glynwood highlighted the importance of understanding the area and context, as well as SHC's role in the agricultural economy there.

Glynwood has a well-respected apprenticeship program that gives six young farmers both hands-on experience and classroom-based knowledge for a career in farm management or in the food system. Glynwood also launched their Hudson Valley Farm Business Incubator on 300 acres of leased land in New Paltz, NY in 2014. However, they are in the process of switching their farm incubator program into a fully off-site program where Glynwood provides bespoke technical assistance, mentoring, and other practical skills to new farm businesses who have their own land (either owned or leased). They did so because, according to Dave Llewellyn, Glynwood's Director of Farm Stewardship, access to land in the Hudson Valley is relatively

easy. However, young farmers still covet the technical assistance and connection to Glynwood's resources and programming (Llewellyn 2018).

The fact that Glynwood's on-site incubator program failed to attract widespread interest does not preclude the success of an incubator model at SHC. Rather, it illuminates the importance of understanding the niche that SHC can fill, both within its community and the larger farmer training landscape. Young farmers either from Southwest Vermont or interested in working in less of a suburban and economically-strong environment, may be attracted to SHC's location and educationally-focused mission. We plan on developing with Jesse a farm incubator model where a young farmer can be mentored by Jamie Lombardo and/or Ryan Yoder, while also serving as an educator in their farm-to-school educational programming [and receiving a stipend for this work]. SHC must also acknowledge its resource limitations and that it does not have the same financial support as centers such as Glynwood. These considerations are important to be mindful of as we have more in-depth conversations with Jesse about this model.

2.4.1.3 Recommendations

Our research and conversations with existing incubator programs have helped inform our recommendations for a potential incubator program at SHC, which we believe must be differentiated from other current programs: A potential incubator program at SHC could establish its competitive niche through highlighting SHC's mission of maintaining a "working landscape that promotes sustainable agricultural and forestry practices while engaging people in meaningful ways", and its focus on local agricultural education, and incorporating them into the incubator program. In this way, SHC has a unique purpose of not only supporting the next generation of farmers, but also supporting the local Danby community. For forty years, SHC has had a strong focus on education and played a vital role in training local youth in achieving

personal, academic and skill development -- SHC can meaningfully differentiate itself from other farm incubator programs by taking advantage of this focus on education, and tying local engagement and youth education into farmer training programs. They can make this focus on education explicit in an incubator program in order to attract people who are passionate about the local food movement, or have a particular interest in farm education and outreach. For instance, the Intervale Center, which has a strong focus on farm-to-farm mentorship, employs a structure where multiple (currently eight) mentor farms support two beginning incubator farms, and they do so by incentivizing mentor farms through a contract agreement that says each mentor farm will devote a minimum of twenty mentor hours per growing season. SHC could echo this structure by incorporating a minimum education engagement clause in leases or contracts, where farm incubator participants would devote a certain number of hours at the community farm in engaging local youth and the broader Danby community. This would serve a dual purpose of increasing resources towards supporting educational programming at the community farm, while also differentiating SHC in order to attract incubator participants who are interested in education.

Another strength of SHC lies in its vast land holdings, which could help potential farmers and farm incubator participants address issues of land access. However, the promise of land access may not itself be sufficient in attracting incubator participants: our discussion with the Glynwood Center revealed that they had transitioned to an off-campus model farm incubator program, where they provided remote technical and business support to local beginning farms rather than serve from a central campus from which incubator participants leased land. Glynwood does so because they found that land access was not a problem in the Hudson Valley, yet there was sufficient demand from beginner farmers for assistance that their off-campus program succeeded in drawing local interest. If the Hudson Valley has ample land access, so that

beginner farmers saw no need to lease land from an incubator campus, it may be unlikely that land access in the Danby region is so sought-after that a farm incubator program without some competitive niche or differentiation would succeed in attracting ample participants. However, clear regional differences exist: the Intervale Center, located in Burlington, has been very popular and attracted many applicants for its on-campus farm incubator program. Intervale has had trouble transitioning incubator farms off their land after graduation, as many farms would like to stay in the region and face some degree of land shortage in Burlington. Overall, more analysis of local land demand is necessary to conclusively assess land access issues in the Danby area.

We believe that a farm incubator program would be more suited to SHC's capabilities and infrastructure than an apprenticeship or farm school, as apprenticeship programs tend to be more resource-intensive and time-consuming for both the participant and education provider. The Athol School hosts a one-year farm apprenticeship program with a clear in-class curriculum, and detailed and diverse field workshops, whereas incubator programs tend to be more hands-off and instead provide technical and business support as needed; incubator programs often also involve a mentorship structure, like that of the Intervale Center, so mentor farms or previous incubator participants can also provide assistance to new, beginner farms, which further alleviates the burden on the incubator-provider organization. The SHC's current staffing, capabilities and resources may not currently be suited for an intensive farm school curriculum, but its ample land holdings, strong community engagement and focus on education may instead be more suited for a farm incubator program, with support from the farmer-in-residence and the Yoder Farm in terms of technical and business support.

Before SHC pursues a farm incubator program, more research should be done in gauging local interest and demand for land access, and whether there's interest in a farm incubator program; in SHC's current capabilities and infrastructure, and whether or not it has sufficient resources and support in order to create a robust incubator program; in potential markets for produce or farm products from incubator farms, and determining where these might be sold; and in potential funding and ways to finance a farm incubator program. Farm incubator programs are often expensive, beyond the cost of tuition or program fees paid by participants, and non-profits organizing the incubator often rely on external donors and additional fundraising to fully meet program costs; for instance, the Intervale Center said their tuition fees covered two-thirds of their incubator costs, and the rest came from donors, grants, and fundraising. While farm incubator programs play a vital role in supporting new and beginner farmers, which suits SHC's mission of promoting a working landscape with sustainable agriculture, additional research is required into whether or not a farm incubator program would be beneficial and feasible in serving SHC's mission and promoting agricultural and economic livelihoods in the local Danby region.

2.4.2 An Innovative Way Forward: Exploring an Equity Financing Model for Smokey House

In the United States there is a diverse array of funding opportunities available to both novice and advanced farmers to enhance their agricultural operations. First, we will examine public funding and resources provided by the United States Government, and then we will investigate private sources of funding in order to see whether there are any gaps where a more innovative, beneficial financial model could exist. Next, we will give a brief introduction of private equity and venture capital, an explanation of how these financing models may be used innovatively for farming, and a case study of an existing program that incorporates these models.

Finally, we will conclude with several equally viable financing recommendations for the SHC organization.

2.4.2.1 Federal Funding

Much of the federal government's agriculture funding exists in the form of grants which pass through the states as *formula* and *block* grants (USDA. 2016). Block grants provide states with funding for a particular purpose (e.g. sustainable farming) whereas formula grants provide funding to specified grantees on the basis of a specific formula (e.g. per capita income, mortality, or morbidity rates) which have been outlined in legislation or regulations (USDA 2016). In addition to these pass-through grants, the U.S. government provides three types of grants which can pass directly to a business, individual, or organization: research grants, demonstration grants, and project grants[3] (USDA. 2016):

- Research Grant: Support investigations aimed at the discovery of facts, revision of accepted theories, or application of new or revised theories
- Demonstration Grant: Demonstrate or establish the feasibility of a particular theory or approach
- Project Grant: Support individual projects in accordance with legislation that gives the funding agency discretion in selecting the project, grantees, and amount of award

2.4.2.2 Farm Bill:

[3] Note that any organization seeking federal funding must first request a DUNS number on the web at http://fedgov.dnb.com/webform or by calling 866-705-5711

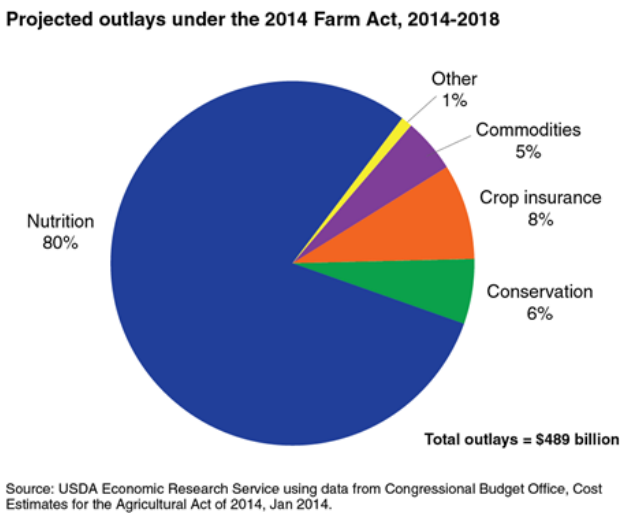

Figure 2.1

The United States Farm Bill, or most recently known as the Agricultural Act of 2014, addresses agricultural and food policy through a variety of federal programs, including commodity support, nutrition assistance, and conservation (USDA Economic Research Service 2018). The Agricultural Act of 2014 set aside $489 billion for federally funded agriculture programs, and will remain in force until 2018 or, in the case of additional provisions, past 2018. The Act outlines the percent distribution between *commodities*, *crop insurance*, *conservation*, *nutrition*, and *other* as depicted in Figure 2.1 (USDA Economic Research Service 2018).

To explain in detail every program outlined by the Farm Bill would be beyond the scope of this project, however, it is important to portray the major categories of funding provided by the bill. These include loans, grants, incentives, contract guarantees, easement assistance, partnerships, insurance (e.g. revenue insurance to protect against low yields and price drops), safety training, community projects, extensions, educational materials (e.g. sustainable and organic production topics) and technical assistance.

2.4.2.3 State Funding

State funding opportunities vary from state to state. As such, we will investigate agriculture funding opportunities provided by the state of Vermont in order to provide more focused information to the SHC organization. Vermont's Agency of Agriculture offers a plethora of funding opportunities and incentives, both direct and indirect. These programs aim to achieve

a variety of agricultural goals, such as the promotion of safety, sustainability, local consumption, etc. (Agency of Agriculture 2018):

Best Management Practices (BMPs): Assist farmers with on-farm improvements designed to abate non-point source agricultural waste discharges into the waters of the state of Vermont.

- Priority Due Date for BMP Applications: April 1st
- The State's BMP program maximum cost share in a calendar year is $75,000 per farm, not to exceed $150,000 in a 3-year timeframe.

Water Quality Grant Opportunities: Provide funding for farmers, nonprofit organizations, regional associations, and other entities for the development and implementation of locally-led agricultural water quality programs, projects, as well as research.

- Request for Proposals typically released in November
- All proposals must be submitted electronically via email to AGR.WaterQuality@vermont.gov at the beginning of January

Farm to School Grant Program: Provides Vermont schools with funds to integrate local foods into school cafeterias, classrooms and communities.

- Proposals are due in November of the year prior to the implementation year
- Up to six applications will be awarded at $15,000 each

Local Food and Market Development Grants: Provides funds to increase Vermont producers' access to institutional and wholesale markets, promote consumption of local food, and encourage scaling up through new market development opportunities across Vermont.

- Typically due in mid/late January
- Contact Alissa Matthews, Agriculture Development Coordinator, at 802-505-1661 or alissa.matthews@vermont.gov for more information

Vermont Produce Safety Improvement Grants: Assists Vermont produce growers to make improvements that help prevent or reduce known produce safety risks on their farms.

- Requirements: Applicants must grow, harvest, pack, or hold "covered produce" as defined by the U.S. Food & Drug Administration's (FDA) Food Safety Modernization Act (FSMA) Produce Safety Rule (PSR) and have average annual produce sales of greater than $25,000 over the past three years.
- Enroll in the Vermont Produce Portal at https://cloud.agriculture.vermont.gov/FSMA/Pages/Login.aspx to receive immediate updates when new funding is available.

Specialty Crop Block Grant Program: Funds enhance the competitiveness of specialty crops including fruits and vegetables, honey, maple, hops, Christmas trees and nursery crops.

- The deadline to submit a Letter of Intent (LOI) is typically late February
- In 2017, VAAFM awarded grants totaling $254,117 for seven projects to benefit Vermont producers of fruits, vegetables, herbs and spices, maple, wine grapes, and value-added products and to increase consumer access to locally produced food.

Trade Show Assistance Grants: Expand sales and networking opportunities for Vermont agriculture and forestry businesses to attend trade show both nationally and internationally

- Application period opened November 1st, 2017
- Minimum grant amount: $1,000; Maximum grant amount: $2,500

Fairs & Field Days: Capital Grant & Operational Stipend: Provides an opportunity for fairs and field days can now apply for funds for 20-year capital improvements as well as a stipend for operational expenses.

- Grant programs coming soon

- Visit http://agriculture.vermont.gov/producer_partner_resources/fairsfielddays for more details

Working Lands Enterprise Fund: Fund agriculture and forestry projects that enhance Vermont's communities, economy, and culture.

- Business Application Deadline: letters of intent typically due in early November
- Service Provider Grant Deadline: letters of intent typically due in early December

- Service Provider Partnership Pilot (up to $250,000 for multiyear projects): pre-qualification apps due early December

2.4.2.4 Private Investment

The Center for Rural Affairs (2018) highlights three private investment options for agriculture spanning both debt and equity. Firstly, farmers of all experience levels can partner with *local banks* to seek financing, while some banks even offer financing initiatives that link beginning farmers with a special lending pool. For young and beginning farmers specifically, the Farm Credit Services of America offers a "Young & Beginning" loan program for producers under 35 years of age or with 10 or less years of experience. This program spans real estate loans, operating loans, and insurance. Farm Credit Services of America also offers "Business Education Reimbursements" for business courses and financial management tools, "Youth in Agriculture Loans" for students (up to $2,500), and college scholarships. Lastly, the most customizable funding opportunity is *private contracts*, which can be tailored to the specific needs of the parties involved.

Through private contracts farmers can contract directly to acquire assets such as land, machinery, livestock, etc. Private contracts are the most versatile funding option because they can encompass everything from cash deals to share-rent opportunities to work-in arrangements

and more. One such example of an innovative private contract structure includes a "Gradual Ownership Transfer" where new farmers can manage and operate land while the landowner gradually transfers equity (such as a farrow, a litter of pigs) to the owner while reducing the farmer's salary. By the end of the contractual agreement in this example, the beginning farmer would own the entire sorrow and rent all of the farm ground- providing the farmer with enough income and equity to work the land owner on an agreement to purchase the entire farm.

2.4.2.5 Private Equity / Venture Capital Overview

To put it simply, private equity is capital that is not listed on a public exchange (Investopedia 2018). For the purposes of this research, private equity is composed of funds and investors that directly invest in private companies. These funds are generally used to develop new technologies, make acquisitions of new assets, expand working capital, and to bolster a balance sheet.

Venture capital is a subset of private equity that specifies that financing or funding is provided to early stage, or startup companies and small businesses, that have long term growth potential. Additionally, venture capital can come in the form of managerial and technical expertise in addition to capital. Typically, venture capital is a riskier form of private equity where the potential for above average returns are prevalent on successful outcomes. Venture capital tends to come from high net worth individuals, investment banks, and other financial institutions that can focus on private equity.

2.4.2.6 Case Study

ANZ Bank New Zealand (ANZ) has developed "Equity Partnerships" as a form of private equity specialized for the agriculture sector. ANZ defines this financing model as, "A

joint venture between individuals who have come together to pool their capital and possibly skills to enable the partners to obtain revenue and growth from their investment. Generally, one of the partners is employed as the farm manager" (ANZ 2018). These Equity Partnerships have several objectives to benefit farmers and investors alike:

1. Provide farm ownership opportunities to skilled managers
2. Access benefits of large scale farming while not being a large scale operator
3. Attract the best farm managers with proven large-scale success
4. Increase wealth and income without taking on a greater workload
5. Spread risk beyond existing farm operations
6. Expand network within the industry and develop business management skills

Equity Partnerships are typically set up with a standard farming company constitution in which all assets are owned directly by the business. Shareholding is determined by the amount of share capital contributed by each investor. Acquisition of new assets are funded by shareholders' capital and debt financing (often from a bank). Lastly, a binding Shareholders' Agreement is signed by all shareholders. This sets out how the joint venture will operate and will include clauses on the following: objectives of the joint venture, authority to make commitments on behalf of the company, share transfer and exit clauses, etc.

Figure 2.2

Figure 2.2 (ANZ 2018) illustrates what an Equity Partnership may look like. In this example, three shareholders with varying levels of equity investment have pooled capital together, in addition to debt equity from ANZ, to purchase a farm. Partner 3 is clearly outlined as the "Equity Manager" who will run the business operations. Additionally, it is important to note that

equity shareholding can be assigned in a manner directly proportional to percent of capital per investor (as depicted in Figure 2.2) or in any manner that the investors agree upon. For example, since Partner 3, the Equity Manager, will be running business operations, he or she may be able to put up less capital and gain a larger amount of equity due to the agreement that this person will be operating the business.

2.4.2.7 Smokey House Innovation Recommendation

Ultimately, we are providing an innovative financing model recommendation that may reduce the burden on the SHC staff while allowing farm operations to flourish and increasing revenues, giving the center more operating cash and human capital to focus on programming for education, conservation, and community livelihood.

Recommendation: Farm Incubation Equity Model

SHC can use Equity Partnerships to develop and expand a farm incubation program. Through this program, SHC would retain ownership of its land, and new farm incubatees low on capital and resources would be able to operate a plot of land without paying lease fees. Instead, the incubatee and SHC would create a farming company constitution with an equity allotment decided by the two parties. SHC would then own a percentage of the new company, and in return allow the incubatee to use their assets, such as vital farming equipment that are often too expensive for beginning farmers to purchase, and provide property for the incubatee or farm manager to operate. As the business and partnership grows, matures, and begins to produce a profit, SHC would begin to take a percentage of profits directly proportional to their equity share.

Once the farming operations begin to be too large for the SHC property, SHC would help the company find a new property to ramp up growth. If, at this point, SHC wants to sell their

equity in the joint venture to a larger farming operation they may do so with the consent of the incubatee. In the long term, the goal would be to create exceptionally successful agriculture operations with products spanning New England and potentially the United States or the entire globe. Hopefully these companies will be socially, economically, and environmentally responsible as well, such as the region's very own Cabot or Ben & Jerry's. Over time, SHC could amass a portfolio of successful startup farming ventures that they helped turn into self-sustaining agriculture companies. These "graduated" companies would be displayed on all forms of SHC social media, allowing potential future incubatees, and the greater New England region, to see the positive impact of the SHC.

Ultimately, if SHC had even one success on the scale of Cabot or Ben & Jerry's they would be able to greatly expand their program offerings and reach a vastly greater number of people. These successes would also bring great economic vitality to the region. Lastly, we acknowledge that this model would be something new for SHC and that their may be many reservations. However, SHC could ensure that its values are protected by incorporating any of its wishes as stipulations in the original Equity Partnership contracts. If there are any incubated businesses that do not become successful, SHC can reserve the right to sell its shares back to the incubatee or to another buyer, or simply gift the shares back as a potentially tax deductible donation.

2.5 Conclusion

There are many different areas of SHC agriculture addressed in this section, but there are a few key takeaways that should be noted. For instance, value-added products, particularly blueberry jam and chickens, present exciting opportunities for SHC to amplify its educational impact while also securing greater financial security. While neither option will dramatically

change the Community Farm Project, both are broadly feasible and should be considered for implementation, first as part of pilot programs, which will hopefully elucidate whether these products should be a permanent part of SHC.

Furthermore, a farm incubator at SHC could differentiate itself from existing programs and establish a competitive niche through a focus on education; SHC has long focused on community outreach through farm education, and a continued emphasis on education in SHC's farm incubator program could attract beginner farmers with an interest in youth, community engagement or education. SHC could incorporate an education clause in the contracts of incubator participants, where participants would spend certain designated hours per season helping at the community farm or engaging in local education programming. Although SHC's vast land holdings are certainly an asset in establishing a farm incubator program, land access alone may not be sufficient in attracting incubator participants, hence a unique, differentiating focus on education could be beneficial. We believe that SHC's capabilities and resources are more suited to a farm incubator program, rather than an intensive, curriculum-based farm school or apprenticeship program, but additional research is required on gauging demand for land access and local interest in an incubator program; in assessing SHC's infrastructure and whether or not it can currently support an incubator program; in determining markets for products from incubator participants; and program funding and financing. A farm incubator program at SHC could further its mission of supporting local livelihoods and continue SHC's strong legacy in farm education, but more research is required in addressing the questions above before moving forward.

Should SHC decide it wants to grow an institutionalized incubator program, we are recommending two distinctly different options. Firstly, SHC could choose to become a pioneer in the farm incubation sector of the U.S. by adopting an innovative equity model informed by a

case study of ANZ Bank of New Zealand's "Equity Partnership" program. By doing so, SHC would expand its incubation offerings at zero-to-low cost to its incubatees in return for an equity stake in the incubated farm operations. Ultimately, this would result in healthy cash flow for SHC once the operations of the incubatee scale and become profitable. Alternatively, SHC could follow a more traditional incubator model informed by interviews conducted with the non-government organizations Athol, Intervale, and Glynwood.

Overall, SHC has ample opportunities available to them to increase community outreach as well as agricultural education. Although more research is recommended into the viability of many of the options mentioned, we believe we have created a strong foundation for future innovations. With further funding opportunities and increased community participation, SHC has a great opportunity to help shape the Danby community and the future of agriculture in the greater Northeast region.

Chapter Three
Smokey House Center Legal Analysis

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3.1 Introduction

Overview of Smokey House Center & Background of Legal Approaches

The Smokey House Center (SHC), located in Danby, Vermont, stewards over 5,000 acres of forest and farmland while also promoting environmental and conservation education to local youth. The SHC has a multifaceted set of objectives and responsibilities beyond education, including rural livelihoods and prosperity, conservation, agriculture, and sustainability. This chapter, focusing on innovative legal approaches employed by the SHC, intersects both the rural livelihoods and conservation sub-topics. Our ultimate goal is to answer the question "How have the SHC's innovative legal approaches been instrumental in conserving the surrounding land while supporting the economic viability of their small-scale farmers?" To do so, we worked with community partners to determine which concrete deliverables they wanted at the culmination of our project by conducting in-depth literature reviews and interviewing affiliates of SHC.

Our list of deliverables includes:

- Chapter report including two in-depth case studies documenting SHC's innovative legal approaches
    - Agricultural and forestry conservation easements
    - Equity fund for farmers
- Executive summaries of these case studies
- Two simplified digital flyers describing these legal approaches

Our deliverables work in tandem to address three different target audiences. This chapter report and its in-depth case studies are intended for academics and serve to expand scholarly literature. The executive summaries are tools the SHC can disseminate to interested donors, partners, organizations, etc. as an "elevator pitch" to supplement business proposals. The digital flyers intend to educate local youth about SHC's legal achievements.

Chapter Outline

The overarching goal of this chapter is to document legal approaches and strategies SHC has taken to ensure land conservation. The impacts of their innovative legal approach, as explored within this chapter, have had positive, widespread impacts on SHC itself, the surrounding environment, and the farmers and greater local community. In this chapter, we begin by examining the academic literature on the conservation movement, New England farming and livelihoods, and the utility of equity funds to contextualize our deliverables. We then conduct in-depth case studies, beginning with land easements as a tool for conservation, followed by the implementation of the equity fund in SHC. We then extrapolate significant themes and takeaways from these analyses and conclude with a more detailed description of our deliverables and offer recommendations for their use.

3.2 Literature Review

With the goal of better contextualizing our deliverables, we developed three separate, though interconnected literature reviews in the following order: the land conservation movement, New England farming and rural livelihoods, and the utility of equity funds. The first literature review explores the history of the land conservation movement and potential solutions to address its challenges. The second looks at the current state and future of New England farming. The final review examines the ways that three different foundations conserve agricultural land and financially support small-scale farmers. Together, we used these different areas of research as a platform to further our understanding of how SHC both fits into while also deviates from these areas of existing literature.

3.2.1 Land Conservation Movement

To contextualize SHC's efforts regarding conservation, it is first essential to understand the history of three intersecting movements: The North American conservation movement, the environmental movement, and the land conservation movement. The conservation movement emerged during the Progressive Era, spanning from 1890-1920. President Theodore Roosevelt was a leader in the conservation movement, making conservation a cornerstone of his domestic policy (Rome 2003). For the first time, conservation became a matter of national concern. The conservation movement continues in a new form to this day with bipartisan support for wildlife and wildlands conservation. The onset of the environmental movement was catalyzed by the publication of Silent Spring by Rachel Carson in 1962, which documents the deleterious effects of DDT. Silent Spring, coupled with ardent environmental activism in the 1960s and the creation of the National Environmental Policy Act and the US Environmental Protection Agency served as the basis for the environmental movement present today (Rome 2003). Gallup's Earth Day poll in 2000 shows that the environmental movement was one of the most publicly supported movements with bipartisan support. In fact, 83% of Americans in 2000 agreed with the goals of the environmental movement (Dunlap 2000). Lastly, and most pertinent to this paper, is the land conservation movement.

Recently, there has been a push to better assess the support of the land conservation movement. Researchers at the University of Colorado Boulder found that there is a general positive relationship between socioeconomic status (SES) and conservation concern. In other words, low SES individuals often report lower support for and interest in conservation efforts in comparison to their higher SES counterparts (Pampel 2013). This, then, begs the question of why lower SES individuals generally are less invested in and warier of conservation efforts. The

Region	Land trusts		Average (ha)		Increase ha (%)
	1990	2000	1990	2000	
Mid-Atlantic	105	174	183,181	413,737	126
Midwest	119	186	47,450	125,128	163
Northeast	433	497	243,853	702,520	188
Northwest	50	69	75,111	274,450	265
Pacific	79	139	157,174	511,527	225
South central	11	25	2,971	42,883	1,343
Southeast	62	115	43,650	160,539	268
Southwest	26	57	16,350	285,466	1,646

Figure 3.1: *Quantifying the number of land trusts and increases in total hectares conserved by land trusts in the United States by region.*

answer lies, at least in part, in the changing perceptions regarding the conservation movement. Today, the conservation movement is often considered a partisan issue, synonymous with elite technocratic liberalism. Conservation's reputation as a rich white social movement obstructs and inhibits the positive impact the movement can have (Loomis 2016).

In addition to the movement's new image as one wholly catering to the liberal elite, a growing frustration by many with big government further heightens these antagonistic feelings towards conservation. In some ways, these frustrations are not unfounded. Historically, the primary approach to land conservation in the United States has been via government reservation and acquisition (Raymond & Fairfax 1999). However, many find that such government regulations epitomize bureaucracy, gridlock, and insensitivity (Merenlender 2004). Instead, many are touting regional and statewide-based approaches as the more effective and practical solution to land conservation. Moreover, landowners who want to preserve their autonomy tend to favor incentive-based, voluntary conservation strategies. With this in mind, the use of land trusts to conserve land by acquiring conservation easements has emerged as a promising tool for conservation that satisfies the desires of landowners disgruntled by the conventional, federal government-based methods. Formally, a conservation easement is "a contract that divides portions of the land between the landowner, or fee holder, and an easement holder" (Merenlender

2004). Usually, a conservation easement involves the fee holder transferring either development or management rights to qualified entities, such as land trusts. Land trusts are vaguely defined as any organization that acts directly to conserve land, act at the local, regional, and national levels. For this reason, they are more successful in avoiding the bureaucratic inefficiency and gridlock characteristic of federal government initiatives. The growing support for land trusts and conservation easements are shown by the abrupt increase in the number of land trusts in the US between 1990 and 2000 (Figure 3.1). In sum, the use of land trusts to conserve land by acquiring conservation easements is a promising tool for conservation efforts and one that is particularly relevant to SHC.

3.2.2 New England Farming & Rural Livelihoods

3.2.2.1 New England Agricultural and Dairy Industries

A 2012 agricultural census taken from the USDA indicated that the number of farms in New England is growing (Bradley 2014). The most profitable farms by state are in Connecticut averaging $27,072 per farm while Maine ranked last averaging $10,803 (Keough 2012). In general, farmers have to overcome five different categories of risk: 1) Production risks, which hinder any part of the production process, may cause yields to be lower than projected, 2) Marketing risks, which are the potential for losses and failures of marketing, which may involve the receptibility of the products, 3) Financial risks, any risk associated with financing and financial transactions, which involve equity and capital. To maintain success, farmers must develop strategic business plans and maintain diversified retirement options to overcome short-term financial losses, 4) Legal and environmental risks usually involve failing to meet prior contractual obligations, and 5) Human resource risk covers relationships with all of the people involved in the operation from the farm owner to the customers (Sciabarrasi 2018).

A combination of these risks affects New England dairy farmers. For example, dairy farmers are extremely dependent on milk prices. Recently, milk prices have been increasingly volatile because of consumer preferences, changes in export markets, and changes in supply (Laughton 2017). To combat declining prices, New England dairy farmers spent 10% less on feed per cow in 2015 than they did in 2014 and they spent 20% less on fuel per cow (Laughton 2017). Nationwide milk prices are extremely variable, forcing New England dairy farmers to consider costs and improve efficiency to sustain themselves.

Larger farms are not only able to produce more milk, but also yield more efficient production. Farms with 99 cows or fewer sold less than half of the pounds of milk per worker than larger farms of 700 or more cows (Laughton 2017). This imbalance between production and farm size is yet another challenge that small farms face. However, smaller farms can help combat these difficulties by employing various farming styles and techniques. Farmers that spend more time with their cows were able to maximize milk production and increase the amount of milk sold per worker. Non-Holstein herds, such as jersey cows that produce higher fat content, enable farmers to sell their milk at greater profits than their competitors. Lastly, small-scale farmers in New England were able to better compete with larger farms when they were able to effectively balance production costs and milk production per cow (Laughton 2017). This analysis of the typical New England dairy farmer helps us contextualize the specific experiences and challenges the dairy farmer of jersey cows face at the SHC.

3.2.2.2 Lease Duration and Advantage of Long-Term Leases

According to two national surveys, access to farmland is one of the top obstacles for new and beginning farmers (Farm Seekers 2015). To combat this issue, farmers lease land, as it is cheaper to lease than to buy land outright. Thus, long-term lease agreements can be a financially

viable and affordable alternative as a way to enter the New England farm industry. From the tenant perspective, a long-term lease substantially reduces the up-front development costs by "helping them overcome the high costs of the land" and "pay off the incredibility high mortgage" (Campbell 2018). Furthermore, all rent payments made under the long-term land leases are deductible by the tenant/farmer for federal and state income tax purposes, and therefore may contribute to the financial stability of farms in the long-run when considering the low-profitability of some farms and the lack of incentive for farmers to remain in the farming industry.

3.2.2.3 Future of New England Farms

More than 30% of New England's farmers are likely to exit the farming sector in the next 10 or more years (Vilsak and Clark 2014). Furthermore, nearly 92% of New England's 10,369 senior farmers do not have a farm operator under age 45 working with them (Vilsak and Clark 2014). Looking more closely at Vermont, farmers age 65 and older operate 28% of the state's farms, and of these 2,076 senior farmers, just 9% of them have a working partner under age 45 managing the farm with them. This is due to the large capital necessary to run a farm, as it can take time for farmers to build up sufficient financial means. Additionally, Vermont has 19% fewer young farm operators in 2012 than in 2002. In Vermont, farmers age 65 and older manage 363,600 acres and own a collective $1.2 billion in land and agricultural infrastructure, most of which may transfer ownership in the next 10-20 years (Vilsak and Clark 2014). Thus, with such a prevalence of older farm owners and operators, farm transfer to a younger successor is crucial. Farm transfer is defined as "the process of passing a farm business and/or farm property from one generation or owner to the next" (Farm Legacy 2016). However, the situation is dire, as farmers age 65 and older plan to transfer only 23% of their owned land due to a combination of

lack of successors and financial concerns (Bigelow et al. 2016). The land that retiring farmers are unable to transfer is in jeopardy of being sold and then developed either for residential or commercial purposes. In sum, these trends in both New England and Vermont ultimately suggest that the future of the farming industry is uncertain, if not in crisis.

3.2.3 Utility of Equity Funds

Land conservation, land access, and land tenure/succession are all challenges of Vermont and the greater New England small-scale farmland economy. The Castanea Foundation, Inc. in its 2009-2011 Project Report states that "According to the Vermont Farm to Plate Strategic Plan, nearly 41,000 acres of agricultural land in Vermont were converted to non-farm uses between 1982 and 2007" (Castanea Foundation 2011). This trend compounds the land transfer statistics in the previous section. Once a piece of farmland has been converted to some form of commercial or residential development, there is no turning back; thus, the need to conserve land and support farmers' economic livelihoods is now.

This imperative need is the driver of many land conservation organizations that, through several innovative programs, strive to preserve the existing agricultural land in the New England region, particularly within Vermont. Examples include the Equity Trust, Land for Good, and the Castanea Foundation. The Equity Trust is "a small, national non-profit organization committed to changing the spirit and character of our material relationships" and works to help communities gain ownership interests in land and other local resources (Equity Trust 2018). Part of this organization is its equity trust fund, defined as a "revolving loan fund capitalized through gifts and loans from socially motivated donors and lenders, primarily individuals and families, but also including religious orders, land trusts, nonprofits and other organizations" (Equity Trust 2018). Through low-interest loans, typically between $5,000 and $150,000, the Equity Trust

targets the following purposes: 1) to assist in the permanent protection of land and/or buildings for agriculture, affordable housing, community economic development or other community needs, 2) to support the economic vitality of Community Supported Agriculture (CSA) farms or the economic success of projects protecting the affordability and use of land and/or buildings for community benefit, and 3) to directly or indirectly enable land reform and promote alternative ownership models (Equity Trust 2018). Founded in 1991 and as of 2016, the Equity Trust Fund issued 116 loans for a total of $7,904,405, financing more than 100 projects (Equity Trust Annual Report 2016).

Land for Good (LFG), a farm-aid grantee founded in 2002, is a charitable organization that works to ensure the future of farming in New England by securing land for farmers. Through innovation, education, and advocacy and consulting, LFG focuses on three main projects: the Farm Legacy Program, the Working Lands Program, and the Farm Seekers Program. The Farm Seekers Program recognizes the need to protect land from development while addressing the problem that "access to farmland is a top obstacle for new and beginning farmers, according to two national surveys" (Farm Seekers 2015). That being said, this program "puts farmers on the land by helping them access farms and farmland through traditional and innovative methods," including the issuance of grants and leases (Farm Seekers 2015). The Working Lands Project addresses the biggest problem for farmers, which is getting access to farms and farmland. By utilizing traditional and innovative sale and lease models, LFG works with private, organizational and public non-farming landowners to enact sound land use decisions and agreements to ultimately make more land available for farming (Working Lands 2016). Finally, the Farm Legacy Project acknowledges the issue of farm transfer and the embedded need for a retirement plan for farmers. Through this project, LFG keeps farms in farming by working

directly with farmers and farming families to plan, prepare, and more smoothly navigate through the farm transfer process (Farm Legacy 2016). LFG explores new models and methods for this process as detailed in the following figure:

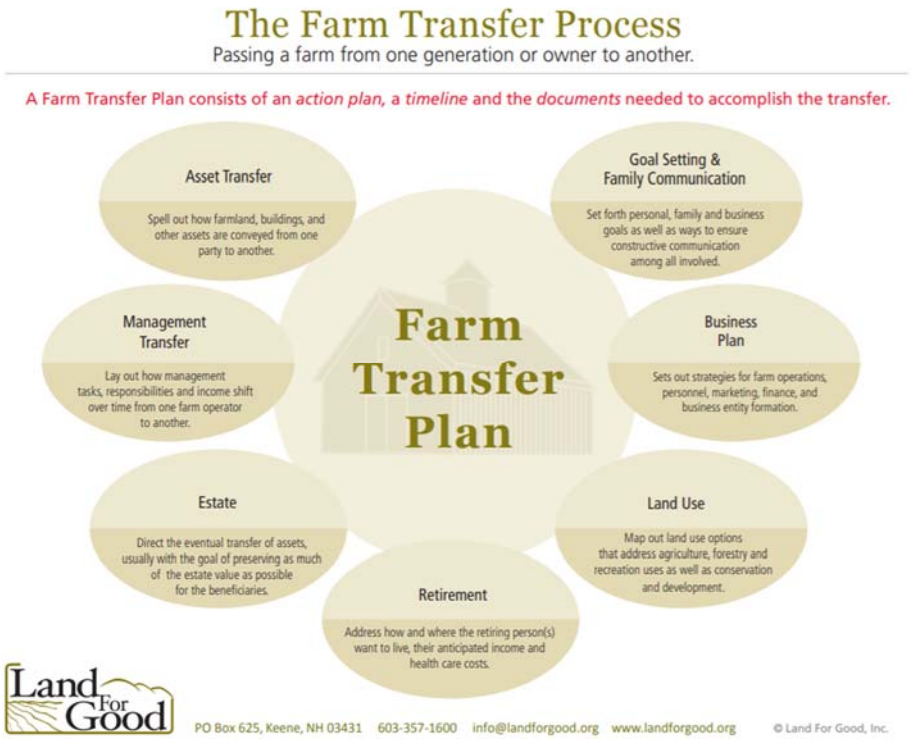

Figure 3.2: This graph details Land for Good's Farm Transfer Plan by laying out the distinct steps involved in passing a farm from one generation to the next.

The Castanea Foundation is a non-profit organization founded in 2005 by its current executive director Tim Storrow with the goal "to conserve important agricultural and environmental resources in Vermont and neighboring areas in New York" (Castanea Foundation 2011). Castanea recognizes the growing problem that more farmland and environmentally important areas are being sold and repurposed for development and that action must be taken to protect these vital areas. Thus, Castanea strives to achieve their goal of land protection in two ways. First, Castanea focuses on environmentally significant land that is "clearly in transition due to factors such as the owner's age, retirement, financial stress or an estate settlement"

(Bigelow et al. 2016). They then purchase the land, dually protecting it with legally binding conservation easements and selling it to new owners, such as prospective farmers or caretakers, at a price consistent with the agricultural value of the land (Bigelow et al. 2016). The creation of these easements is an essential part of the process, as land in New England is often valued at a higher price than its potential agricultural value. Moreover, by first removing the development rights with such an easement, Castanea can then sell this land to a farmer at a fairer price reflecting its true agricultural potential and creating the affordability means for "the next generation of farm owners to implement their vision for the future" (Bigelow et al. 2016).

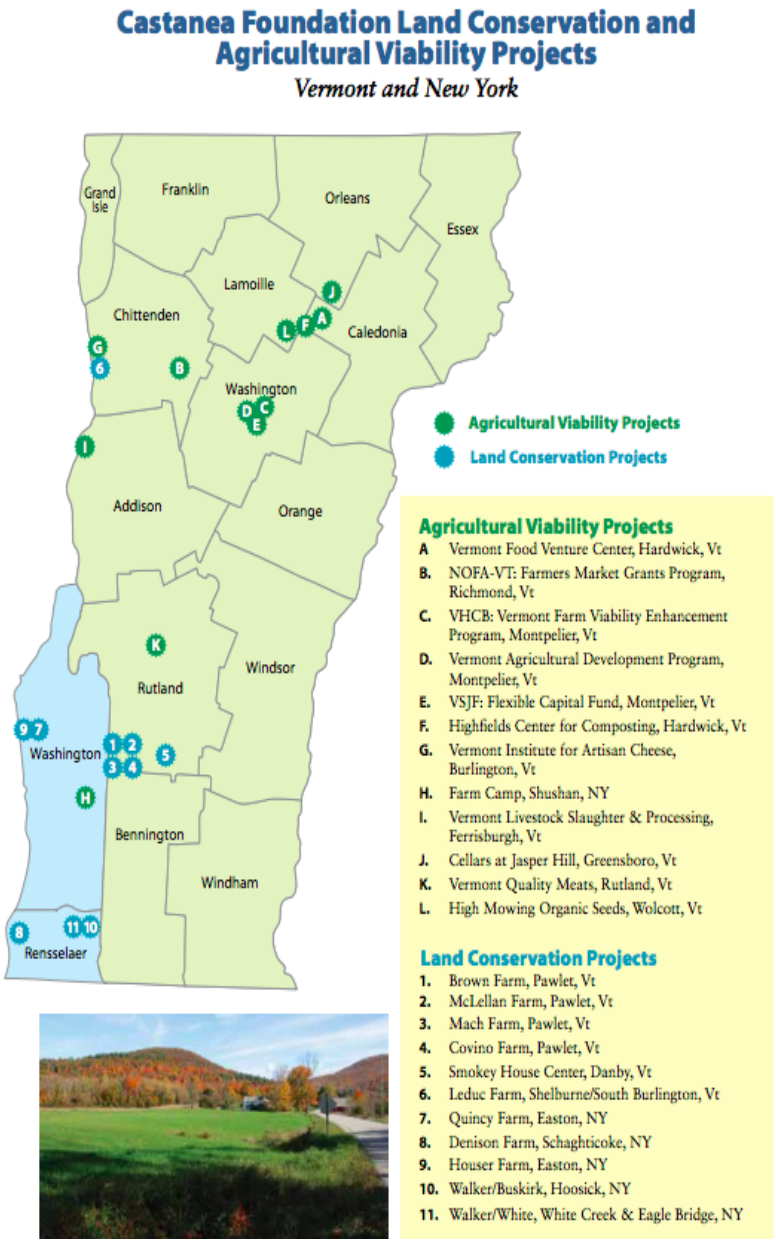

Figure 3.3: *This map details all of Castanea's current projects by geographic region in Vermont and New York on the country scale. The blue designates land conservation projects while the green designates agricultural viability projects.*

In their second approach, Castanea acts "as a financial bridge" for landowners seeking to conserve their land through the aforementioned mechanism,

selling their development rights to a state-run farmland protection program (Castanea Foundation 2011). Paying the landowner for their "development rights" permanently protects the property while at the same time makes the land more affordable for farmers. These program deals can take up to two years to be finalized, and Castanea supports this drawn-out process by offering low-interest loans to transitioning landowners, thus ensuring these projects happen. Castanea is currently involved with 12 agricultural viability projects and 11 land conservation projects across Vermont and southeastern New York (Castanea Foundation 2011). Figure 3.3 is a map illustrating the geographic focus of their current initiatives.

This brief sample of selected foundations and organizations demonstrate the different methods of lending a figurative financial-hand to farmers and private landowners with the intention of saving and conserving agricultural land in New England. Farmers can partner with these organizations to seek financial backing, support, and advice to overcome the affordability impediment in farming the land and continuing farming operations. Nevertheless, there is an apparent gap in the literature in successfully combating and meeting the need to create, safeguard, and guarantee retirement plans for farmers, particularly small-scale dairy farmers. While equity funds, grants, loans, and donations help sustain the viability of farmers and the associated farmland, there is still the much-needed assurance of a funded retirement plan to keep the land undeveloped and the farming legacy alive.

3.3 Methodology

We used a mixed methods approach, including structured phone interviews with key individuals, participant observation, and document analysis. We established regular communication with one key informant in particular, John Whalen, the current attorney and senior board member of SHC. This communication involved weekly telephone conversations and

ongoing emails. From these conversations, we used snowball sampling (Lewis-Beck 2004) to create a focused list of contacts, including the following: Tim Storrow, the Executive Director of the Castanea Foundation, Donald Campbell, the Regional Director of the Vermont Land Trust, Whitney Beals, the Senior Project Manager of the New England Forestry Foundation, Caleb Smith, the operator of the Dorset Peak Jerseys Dairy Farm, and Ryan Yoder, the operator of the Yoder Family Farm. We used John Whalen and his guidance to best reach out to each informant, and we were considerate of their busy schedules by only asking for one brief phone interview. Ultimately we conducted interviews between 30-60 min based on their availability. During each interview, at least two group members were present, one to ask questions and the other to write down detailed notes and critical quotations. We visited the Smokey House Center both for an initial visit and a return trip to attend their board meeting as a means for further collaboration. We received several digital copies of SHC's legal documents, including the conservation easements, sitemaps, and an equity fund template. For our literature review, we utilized both peer-reviewed academic articles as primary sources and published web pages of private organizations and foundations. Additionally, we collaborated closely with other class groups, including the agricultural and rural livelihoods group to avoid information overlap.

3.4 Case Study of Conservation Easements

Conservation easements transfer future development rights to a non-property holder that hold these rights in perpetuity: these development rights typically involve the right to conduct commercial and/or residential development. These easements restrict the land use but enable the land to be privately held (Zhang 2004). To enable a conservation easement, landowners have two general options: they can either sell the development rights in the form of a conservation easement, or donate the easements to a land trust, the government, or other "qualified entities"

(Whalen 2018). Landowners may also donate lands for pure public benefit and/or reduced property, state, and federal taxes (Zhang 2004). In the case of a sale, the respective qualified entity determines land prices by accounting for which parts are permanently protected from development (Whalen 2018). The purpose of these easements ultimately revolves around the restriction of development rather than the enhancement of the fair market value of the land.

3.4.1 Description & Analysis of the Land Easements

In 1967, Stephen and Audrey Currier died in a tragic plane crash. Before this accident, they purchased over 4,417 acres of land that eventually transferred to the Taconic Foundation and ultimately to SHC. The easement ultimately restricts SHC to forestry, certain agricultural practices, and educational activities on the land. SHC has worked closely with New England Forestry Foundation (NEFF), a nonprofit organization whose mission is to conserve New England's working forests through conservation and ecologically sound management of privately owned forestlands. Together, they have modified the conservation easements throughout their partnership, culminating in two iterations in the last 15 years.

There are two main easements associated with the SHC. The first set are the forestry easements and were formulated in June 2002; the second set are the agricultural easements and were implemented in 2003. Though they are distinct easements, they complement one another in helping SHC fulfill their goals of land conservation. Here, we analyze the language of both of these easements together, as they are similar, if not, in places, identical. The nuanced differences between them will be noted in subsequent sections. While minor revisions and addendums to these easements have occurred, they form the basis of our analysis for two reasons: 1) their comprehensiveness and 2) easy availability and accessibility. These easements are split into three major sections: purpose of the easements, restricted uses of easement areas, and rights reserved

from restrictions, along with a variety of other minor sections. A particular focus will be placed on these three major sections to better understand the easements at SHC.

For a nominal sum, SHC transferred to NEFF the development rights of 4,417 acres of their land in 2002. Next, the purposes of the easements are outlined. Their overarching purpose is to protect, promote, and manage the conservation of land. However, their more specific objectives are threefold: 1) To preserve Vermont's scenic natural resources and wildlife habitat, 2) Promote economically viable, yet environmentally sustainable practices within the easement area, and 3) Further the SHC's agenda of conservation education to local youth and families (Whalen 2002).

Within the easements, there is a thorough outline of restrictions on the land. In general, the easements restrict any industrial, commercial, or residential activities to occur on the protected land. With specific regard to the commercial and residential aspect, "there shall be no construction of dwellings, tennis courts, swimming pools, docks, landing strips, towers, mobile homes, or other structures of improvements of any kind on the easement areas" (Whalen 2002). To further ensure that residential and commercial activity is disincentivized on the land, the easements explicitly restrict the construction of any driveways, roads, or utility lines, and also prohibit the placement of signs, billboards, and erected outdoor advertising of any kind on the protected property. There is a genuine concern for the environmental health of the land with the specific diction that "no removal, filling, or other disturbances of the soil surfaces or any change in topography, surface, or subsurface water system, wetlands or natural habitat shall be allowed on the Easement Areas" (Whalen 2002). Moreover, the easements prohibit any dumping, burying, or storing of environmentally hazardous material on the protected areas delineated by the forestry easement.

While there are a variety of stringent restrictions on the use of the land, there are notable exceptions, including three main types of activities. These activities help promote the SHC's goals of preserving natural landscapes, employing economically and sustainably viable forestry practices, and promoting conservation and education to locals. Details of these three reserved activities are below.

3.4.1.1 Forestry Activities

Forestry activities include, but are not limited to, reforesting, planting, growing, cutting, harvesting, and removing forest products and other vegetation. Additional activities include recovering forests after a natural disaster, forest-management planning, and other forest resource evaluation activities. While the land easement outlines many more activities that are permissible under the umbrella term "forestry activities," the major takeaway is that forestry activities are positive and beneficial improvements to the forest landscape. Removing and/or disturbing the soil surface and topography of the land, in stark contrast, involves a deleterious effect on the soil and forest landscape (Whalen 2002).

3.4.1.2 Educational Activities

Education, specifically teaching the local youth about the importance of conservation, is a key objective of SHC. Therefore, it is unsurprising that educational activities are still permitted on the land even with the easements in place. Educational activities refer to "employing and training youths and other persons; teaching forestry, agriculture, environmental sciences, ecology, wildlife studies" and basic scientific procedures such as observation making, data collection, and analysis (Whalen 2002). It is important that SHC is still able to conduct such educational activities on its land, as they are integral to the experiential learning that occurs at SHC and the traditional classroom setting in local schools. This type of educational agenda

informs local youth not only of the importance of the land, but of keeping the land as it is for their generation and generations to come.

3.4.1.3 Conservation Activities

The easements allow for a myriad of conservation activities, including enhancement and protection of the watershed, wildlife management, and non-commercial recreation. While commercial recreation and development are not allowed, non-commercial recreation, such as hunting, fishing, bird watching, and nature observation practices are most certainly permitted. Participation in such activities allows locals to develop an intimate relationship with the forest around them in a sustainable and environmentally-friendly way (Whalen 2002).

The easement grant then concludes by outlining the procedures that are to be taken in the case of a breach of the regulations delineated within the easement. In sum, the easements outline, among other things, their purpose, restrictions, and exceptions. The subsequent sections take a closer look at both the agricultural and forest conservation efforts.

3.4.2 Agricultural Easements

Agricultural easements offer flexibility to SHC while providing a permanent guarantee that the land will not be developed. They allow continued farming and the building of added agricultural facilities on designated farming land. While "NEFF holds development rights for the land property except what is defined under the agricultural easements, SHC retains the rights to conduct agriculture and sustainable forestry" (Beals 2018). Following this right, SHC currently has two farms conducting agricultural practices, including Caleb Smith, the operator of Dorset Peak Jerseys Dairy Farm, and Ryan Yoder, operator of the Yoder Family Farm.

While easements have inherent restrictions, Caleb explained that they do not limit his dairy farming in any way and he remains conscious in raising his herd with the least

environmental impact possible (Smith 2018). Ryan also noted the importance of the conservation easements as they give SHC the incentive to lease him land in order to keep it undeveloped and give him the right to operate the farm (Yoder 2018). Ryan did, however, mention that the easements may prevent him from building a manufacturing facility in the future, but is overall very pleased that he can practice experimental farming on SHC's land (Yoder 2018).

Because easements prohibit residential and commercial development, they essentially reduce the fair market value of the land, thereby diminishing property taxes on a given farm. This is beneficial to local farmers as they are now able to afford to farm the land. Consequently, the easement can, in effect, provide the farmer with liquid capital that can enhance the viability of the farm. In addition to landowners, agricultural easements also benefit the community as a whole. The reinvestment of funds in equipment, livestock, and other farm inputs may stimulate local agricultural economies, and therefore benefit owners of adjacent or neighboring properties, local residents, and local travelers. Non-farmers also benefit from agricultural easements, albeit indirectly, including the production of locally grown food and maintenance and enjoyment of scenic and historic landscapes, open spaces, watersheds and wildlife habitats.

However, it is important to recognize that the decision to conserve land using a land easement comes with implicit opportunity costs. Conservation easements inherently impact the fair market value of the land because they prohibit land development. This could have negative economic impacts on the local community since the prospect of development is diminished. Nevertheless, this situation is complex because it is essentially impossible to assign a monetary value to land conservation and all that the land and its interconnected web of ecosystems intrinsically have to offer. Development, while on the one hand increases fiscal value, at the same time lowers the value and quality of the land from an environmental perspective. The land has meaning without

the addition of development, and an economic valuation does not do the land justice in expressing that significance; moreover, these very different valuation systems oppose each other and cannot be used together in determining the value of land - with or without conservation easements.

3.4.3 Forestry Easements

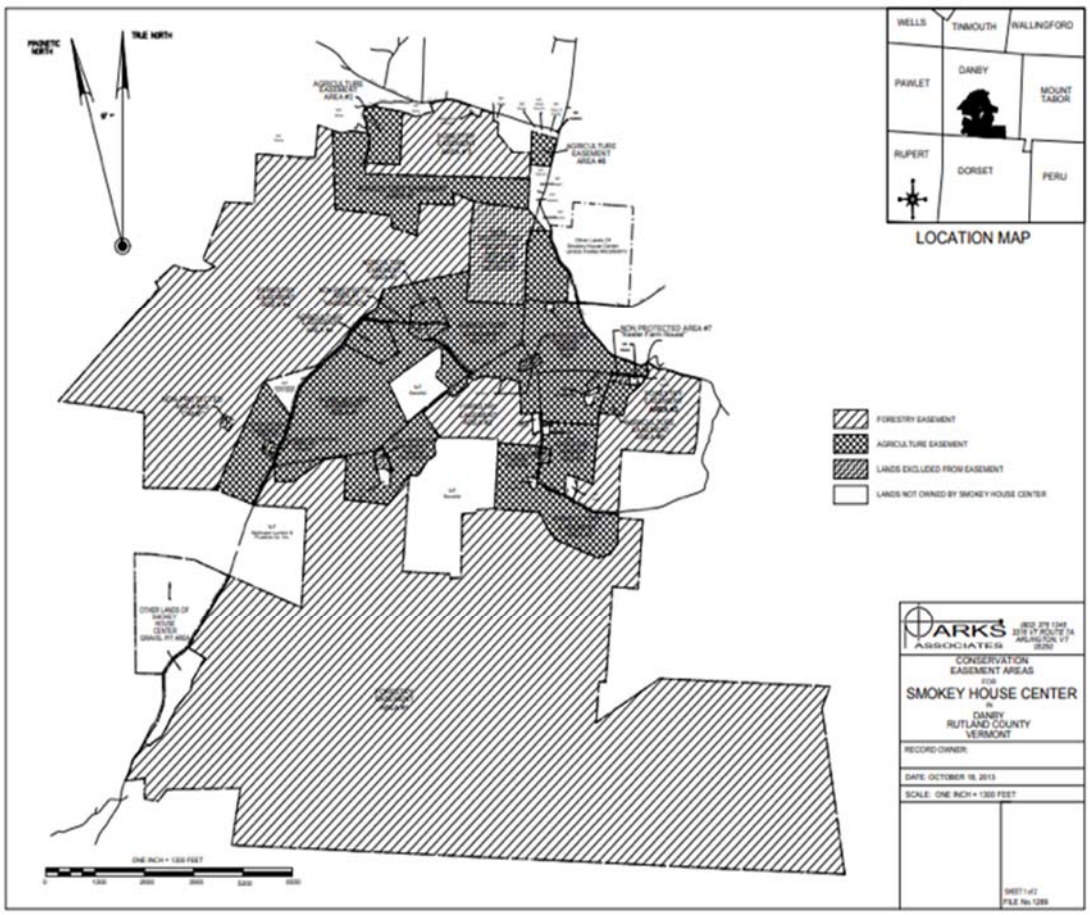

Figure 3.4: *Map depicting land conserved by the forestry and agricultural easements, and also shows lands excluded from the easements and land not owned by SHC. As indicated, SHC conserves a majority of land under the forestry easement.*

There are two notable differences between the agriculture and forestry easements. As shown in the figure above, SHC holds a majority of its land under forestry easements. Secondly,

there are differences in the extent to which the land can be subdivided. The forestry easement permits limited subdivision of land on a majority of the land delineated by the forestry easements. On the other hand, there is no limit on how far one can subdivide the land protected under the agricultural easements. While it is important to consider the similarities and differences between the two type of easements at SHC, it is even more important to understand the forestry easement's long-lasting effects on the local landscape.

In our discussions with John Whalen, he emphasized that the true importance of land conservation go beyond what is visible on this map. In our first meeting, John asked us to look at Dorset Mountain looming over SHC, to which he articulated that "there will never be lights on that mountain – it will always be a [beautiful] black mass" (Whalen 2018). Here, John details the importance of conservation in its truest sense – a landscape devoid of any trace of commercial human activity or development. For many, this is the very appeal of SHC. According to Curtis Rand, "the scale and remoteness of SHC are positive. Yes, it is hard to get to [and] it doesn't have cell service and never will – but that is a positive," and this is what makes SHC so unique in its conservation mission (Rand 2018).

SHC is thus the embodiment of responsible and honest conservation. Through these land easements, SHC works tirelessly to eliminate the pervasive commodity mentality – the idea that the value of forests, or land more generally, lies in its potential to become a commercialized and developed area. In other words, for most, the value of land lies in its transformability as a source of revenue. The work of SHC emphasizes an alternative ideology that the value of land is special in and of itself and has intrinsic value. Thus, the land is worth conserving for future generations. Their work forces us to question whether we owe a responsibility to the land. The members of SHC believe we do and have successfully used land easements as a tool to advocate for

environmental stewardship. We hope that SHC will be seen as the epitome of true conservation and will inspire similar organizations across New England and the country to join them in their commitment to land conservation.

3.5 Case Study of the Equity Fund

3.5.1 Background

On May 15, 2014 SHC announced that "with the benefit of a grant from the Castanea Foundation, SHC has created an equity fund and from it developed the concept of an equity agreement" as a sort of retirement plan for Caleb Smith, the operator of the Dorset Peak Jerseys Dairy Farm (Shearer 2014). More specifically, this agreement provides that every year, "a sum (the amount depending on the investment performance of the equity fund) is earmarked for payment to the farmer at the end of the lease term;" hence, the equity fund is a retirement-like fund, similar to a 401(k), so the farmer can accumulate a sizeable amount of equity on which to fall back (Shearer 2014). SHC identified the historic problem of farmer retirement: "Many farmers at the end of their careers were left with no alternative but the sale of their farmland to developers in order to provide for themselves and their families. If farmers did not own the land they farmed but instead were leasing it, they were frequently left in the unfortunate position of facing their later years with meager resources" (Shearer 2014). In both cases, farmers do not have a stable retirement plan.

With this understanding, the Castanea Foundation, a private organization with the mission to conserve the working lands of Vermont, began its relationship with SHC in 2008 to aid in conservation efforts and provide financial support to its dairy farm. Castanea assisted SHC "in protecting and transitioning one of its working dairy farms to a new young farmer, Caleb Smith" with the donation of $500,000 to Smokey House for the specific designation of

supporting and aiding the dairy farm (Castanea Foundation 2011). $200,000 of this donation was set aside to refurbish and upgrade the farmhouse and dairy barn, enabling Caleb to focus on purchasing his herd of cows to start the dairy. Part of this gift also involved SHC extending the coverage of the conservation easement to two potential developmental parcels that had been previously excluded from the easement. Another $200,000 formed a repair fund for the farm while the remaining $100,000 served as the equity fund (Whalen 2018). Castanea worked closely with SHC to design this equity fund not only as a way to secure tenure for the farmer, but also to provide a way for the farmer "to build equity through means other than land ownership" (Castanea Foundation 2011). As Tim Storrow, the Executive Director of the Castanea Foundation, lamented, there are very few options for retirement for farmers leasing land. While some farms sell developmental rights early on in the form of conservation easements, most are dependent on equity accrued during farming, which unfortunately often amounts to little resources in the latter years of farming (Storrow 2018). SHC and Castanea both had the vision of long-term land stewardship, so they worked together to build a situation where there were incentives to make investments on the land that would accrue benefits both to the dairy farmer and SHC. As tenants of land leasing usually are not incentivized to maintain the property, this equity fund works to align the conservation interests of SHC and the farming interests of the tenant, in this case, Caleb Smith (Storrow 2018). With the problems of farm transfer, farm legacy, and farm succession, this unique and innovative equity fund, which has not been repeated in any other institutionalized organization, is a way to incentivize a farmer to stay farming on the land long-term and secure the land to the next generation of farmers. Thus, this equity fund functions as a "win-win" scenario, keeping the land undeveloped and conserved while sustaining dairy farmers' livelihoods with a secured retirement plan.

3.5.2 Language of the Fund

The equity fund agreement between Caleb Smith and SHC represents an attempt to provide Caleb with a retirement fund. This accruement from the equity fund, as detailed below, is potentially comparable to the standard retirement method practiced by New England farmers, which is liquidating their assets, ergo selling the property, equipment, and animals. The fund agreement itself has language to back up this goal, as it states that the "specific goals of the Equity Fund Model are to… create financial incentives for farmers to farm the FUND HOLDER's (SHC) lands on a long-term basis; and (ii) provide an alternative means for individual farmers farming FUND HOLDER lands to begin to build an individual retirement fund… [and] be a means for farmers to build equity through means other than land ownership and the eventual sale of such land for development purposes" (Whalen 2014). The fund also states a second purpose, which is to assure that farming operations remain "economically feasible" (Whalen 2014). This second goal attempts to ensure the future of dairy farming operations at SHC.

SHC negotiated this equity fund model closely with their financial partner Tim Storrow of the Castanea Foundation with these goals in mind. They created the fund by setting aside $100,000 from Castanea's original $500,000 donation into a portfolio that is managed and invested by an offsite financial adviser. The farmer "has no claim or right to the equity fund," (Whalen 2014) meaning that the fund remains on SHC's books and shall be invested and managed at their discretion only. The original agreement was signed alongside a 5-year lease with a payout from the fund to occur at the end of the lease term as well as an option to renew the agreement. However, this has been altered over the years as Caleb is now operating under a

30-year lease with the option to extend for one or two more 5-year lease terms. Payouts from the fund also now occur annually on March 31, the end of each lease year.

Credits from the fund accrued annually are based on the performance of an index fund or an aggregate of indexes that are selected by the fund holder (SHC): for example, the current agreement's index arrangement is listed as such: "(i) Wilshire 5000 Total Market Index (35%); (ii) MSCI EAFE (5%); and (iii) Barclay's Aggregate Bond Index (60%) (Whalen 2016). SHC is allowed to change this index arrangement at their discretion yet must provide the farmer 30 days notice before doing so. This yardstick measurement helps to ensure that fund payouts remain steady through stochastic market conditions and also represents a balanced approach to judging annual market growth. The farmer is then entitled to a minimum 2% payout annually of the outstanding balance of the equity fund (~$2,000). However, if the pre-selected index funds grow at a rate higher than 2%, then the farmer is entitled to an additional credit based on the performance of the index, with a ceiling set at 5% of the outstanding balance of the fund (Whalen 2016). The farmer is then encouraged to re-invest their returns in a retirement fund of their own, but they are allowed do whatever they wish with their earnings. The farmer will accrue these credits annually throughout the term of the lease, and if they terminate the lease before the 30 year period or either of the additional 5 year lease add-ons, the fund payouts will stop immediately, and the farmer will not accrue credits from the fund for that year of termination (Whalen 2016).[4]

3.5.3 Viability Analysis

To judge the utility of the equity fund as a viable source of capital that could function as a retirement fund, we performed a simplified viability analysis. The first step of the process was

[4] See appendix for the full template of the Equity Fund Agreement

designing and running an excel model to decipher how much money could be made from the fund over the course of a 40-year lease, the maximum scenario of the current agreement that SHC has with the farmer currently under the agreement, Caleb Smith. To run this program, a few educated guesses had to be made: first we modeled the growth of the market using the average interest rate for the United States over the last 200 years, which is 5.18% (Diaz 2016). Secondly, we created four different scenarios based on the percentage of the outstanding balance of the fund that the farmer is allowed to accrue, 2%-5%. We then let the program run for 40 years with the interest rate remaining constant in all scenarios, the only thing that changed in each scenario was the percent taken out annually. The formula we used to track the growth of the fund over time was: R= (I*0.0518 + I) – (B*I), with I = the previous year's balance of the fund, B = percent of the fund granted to the farmer (what is taken out annually), and R = the capital remaining in the fund. We then isolated the credits accrued to the farmer over the 40-year period at each range from 2%-5% and ran a summation to get total earnings over 40 years at each percent and then averaged out the summations to find an estimation of total fund earnings over 40 years, which came to an amount of $196,775. The table below (Table 3.1) displays the total returns accrued by the farmer in each scenario (2-5% annual returns of the total fund capital), the average of all these numbers, and the annual market growth rate that we used in the model.

Table 3.1

% retruns	Total Income:	avg income:	
2%	167023	196775	
3%	199062	Market Growth Rate:	
4%	209747	5.18%	
5%	211266		

It is important to note that this is a rough estimate of the fund's performance as future market conditions are near impossible to predict. The excel model we created also has some

notable shortcomings, such as not including income taxes, or the likely (and currently practiced) scenario that the farmer is re-investing their earnings and therefore allowing for a greater amount of growth. Another flaw in this model is that the total earnings estimate is based on the average of the total returns of the four different scenarios; in practice, the amount withdrawn would change year-to-year, between 2-5%. We attempt to replicate this stochastic behavior by taking an average of the scenarios, however, it cannot be considered an accurate representation of ever-changing market behavior. Despite these shortcomings, we believe that the final result (avg. total income) of the model is a useful number in evaluating the viability of the equity fund as a source of retirement capital.

The next step of the viability analysis is to compare the returns from this fund to the traditional retirement method of New England Farmers, which is liquidating the land. To do this, we tried to find land that was comparable to Smokey House land to get a $/acre estimation. The closest property found was a 155 acres lot in Danby, Vermont that used to function as a dairy farm but has since become residential property. The $/ acre on this lot is $2,500/acre (Land and Farm 2018). Dorset Peak Jerseys operates on 300+ acres of land bringing the estimated value of the land to $750,000. This far outstrips the capital accrued through the equity fund system, but one thing to take into consideration is the conservation easements placed on the land. These restrictions limit the function of the land to farming activities only, prohibiting the construction of new buildings unless related to the agricultural, educational, and conservation goals of SHC. While these restrictions do reduce the fair market value of the land and would drop the $/acre by some amount, we were not able to determine how much the fair market value would decrease and are thus unable to make a direct correlation between the fund and the fair market value of the land.

Overall the equity fund economically seems to be a great tool to gain access to capital that would otherwise be unavailable to the farmer. Another advantage is that the farmer under the equity fund receives pay-outs in small amounts over a long period, enabling him/her to save his/her income annually effectively. With the absence of selling the land as an option, the equity fund guarantees a sum of money that aggregates to an amount that would not exist if the fund were not there in the first place. Furthermore, the equity fund, based on our model, is predicted to amass approximately $200,000, roughly the amount that the median sixty-year-old American has saved for retirement (Elkins 2017). Therefore, provided that farmers, like Caleb Smith, strictly reinvest the annual payout received over the next 40 years from the fund, he will have the same amount of money saved as the average American (Elkins 2017). A final note - it is necessary to conduct a deeper analysis into investment strategies and the effects of the easements on the $/acre of the land, in order to better understand the equity fund's financial impact and overall utility.

3.5.4 Anecdotal Responses to the Equity Fund

Interviewing different members of the community including Caleb Smith, Ryan Yoder, Tim Storrow, and John Whalen have provided a rich understanding of the impact of the equity fund. Caleb Smith provided insight into its direct impact, particularly the strengths and possible concerns from a personal and financial basis. He very much likes the equity fund, especially when there are decent market returns. Caleb Smith noted that he does not know of any other arrangement like this, emphasizing the equity fund's uniqueness. Not only is he close to maxing out his IRA contribution every year, but the fund also has major tax benefits. While initially under a 5-year pay-out, the current equity fund grants a pay-out annually and he then re-invests

this pay-out to supplement his earnings (Smith 2018). Thus, Caleb makes the equity fund his own as he re-invests all that he can of his annual pay-out to further his retirement plan.

Despite his approval and support, he does have some concerns with the equity fund. He states that his biggest concern is that he does not have total control over the money, as SHC's accountant is managing the funds. Caleb wishes the farmer has complete control over the fund rather than SHC. Despite these weaknesses, Caleb believes the equity fund is an effective model in developing a retirement plan and is a great incentive in tying the fund to a piece of property for long-term land stewardship and farming. With the challenges in farming, including land availability, land and operations' affordability, and lack of equity accruement at the end of a land-lease becoming more omnipresent, this equity fund enables Caleb to envision his future at SHC for the full lease term of thirty-five years, if not longer.

Ryan Yoder, the farmer not under the equity fund, offered his views on this innovative retirement approach. He stated that while he has never seen a copy of the legal document, he remains relatively hesitant to the idea of "having a bunch of money in a fund," as he does not consider this to be a safe investment "compared to having land or having working capital" (Yoder 2018). Similar to Caleb, he opposes the idea of not having full control over the money.

Tim Storrow, one of the pioneers of the equity fund, loves not only what it has done, but what the fund stands for. This original and ingenious agreement allows the farmers to perform under the land lease, incentivizing them to practice strong land stewardship and management practices long-term. Tim states that this fund has "been absolutely successful and SHC and Caleb are very happy" (Storrow 2018). Furthermore, he asserts that this equity fund is a legal tool enabling SHC to support younger farmers to enter the agricultural industry with a stable backbone while also conducting good land use. While Castanea has not created an equity fund

for any other institution, John Whalen hopes to establish additional equity agreements for other farms in the future. Both John and Tim stressed that SHC is the only institution to have formulated and implemented this innovative legal tool and aspires for it to be a model for making this retirement strategy more well-known among other conservation-oriented foundations.

3.5.5 On the Future of Dairy Farming

Despite being the bedrock of New England farming, dairy farms, especially small-scale operations, have a future of uncertainty and potentially rampant bankruptcy. From a personal perspective, Caleb Smith lamented that he sees the outlook of small-scale dairy farms as nothing more than bleak, and Tim Storrow added that "farming is in crisis" (Smith, Storrow 2018). They both believe that the US dairy industry caters to the interests of larger farms, and that small and mid-sized farms are under the greatest risk of being swallowed by these larger farms. These statements, along with the aforementioned issues of farming transfer, succession, and affordability, begs the question whether this innovative equity fund retirement plan could play a role in supporting and securing the future of small-scale dairy farming. While our model produces very rough estimates of the total accrued benefits of the equity fund, John Whalen understandably said that this "is encouraging but is worthy of an additional study" into the retirement model's economics. Nevertheless, we believe that this equity fund provides a working retirement model that is a step in the right direction in establishing a sound and stable retirement plan for small-scale dairy farmers like Caleb both in Vermont and across New England.

3.6 Explanation of Deliverables

We will present SHC with three tiers of deliverables, which will get progressively more succinct to appeal to our different target audiences. Our first tier of deliverables is this chapter report with its two fully fleshed out case studies of the conservation easements and the equity

fund agreement. The target audience of this first tier are academics who wish to garner an extensive understanding of the legal framework that outline SHC's conservation efforts. The second layer is an executive summary of each case study, which provides a condensed synopsis of their conservation efforts and equity fund retirement model. We hope that SHC can use these as an "elevator pitch" to supplement business proposals and disseminate them to a target audience of potentially interested donors, business partners, organizations, etc. The final tier of deliverables are two separate digital flyers, one highlighting SHC's conservation efforts and one on the equity fund. These flyers target local youth with the intention of educating them about SHC's legal achievements.

The goal of this three-tier system is to develop a method to educate every potential audience group about SHC's unique legal actions, at an academic level, a professional level, and finally towards locals and youth. This approach allows us to fully and efficiently document SHC's legal practices and strategies in ensuring land conservation by utilizing appealing and persuasive language in each educative layer.

3.7 Conclusion

Analyzing the case studies, we found that SHC has created a legal framework innovative both in its land conservation goals and its commitment to supporting the long-term livelihood of local farmers. Conservation easements are one of the most practical and successful strategies for protecting local agricultural and forestry land from development, commercial and residential, for perpetuity. While we cannot predict the future course of the land conservation movement, we acknowledge the significance of land easements and the meaning behind their restrictions and limitations in protecting the land for this generation and those in the future. At the same time, the agricultural easements are vital to facilitating sustainable economic profits and good land

management practices. Together the forestry and agricultural conservation easements represent SHC's commitment to responsible conservation and valuing the land for its intrinsic value. Not only have these easements led to tangible benefits to local farmers, but they have also exemplified the importance of leaving nature as it is in its untouched state. One such benefit is the establishment of the equity fund which ensures the financial stability through a retirement plan, especially for dairy farmers. SHC is the first institution to develop and implement this innovative model in helping to address problems regarding farm tenure, farm succession, and land accessibility and affordability. Dairy farms are the bedrock of New England farming, and this equity fund helps maintain their viability and integrity in their lifestyles and their stewardship to the land.

The equity fund is part of the solution in creating long-term land conservation, aligning the interests of both the landowners and land-users, and is a working success of a retirement model. We believe that the fund is a tool that will work best for other institutional landowners such as a college, family-owned inherited land, and other private landowners. While this legal strategy is not well known, SHC's successes and ongoing practices highlighted in this chapter report provide the raw materials needed to establish the fund as a model to foster the further formulation and implementation of such agreements throughout New England. The publicity of SHC and its legal approaches can enable other private foundations, like Castanea, to provide the funding needed to formulate similar successful retirement plans, modeled after this equity fund, in the future. Securing a retirement plan under an equity fund can abate the current small-scale New England farming crisis by addressing one part of the affordability issue of running a farm while simultaneously keeping the land undeveloped. Together, increased implementation of conservation easements and equity fund agreements will cement SHC's legacy.

Chapter Four
Current and Future Conservation Measures

Evelyn Bird

Ruben Gallardo

Leslie Gutierrez

Leigh Moffett

Bun Straton

4.1 Introduction

This chapter describes aspects of conservation relevant to the New England climate, landscape, explores Smokey House Center's current practices, and provides information pertaining to carbon sequestration, wildlife habitat management and management strategies for invasive pests through the lens of forestry practices. We hope to inform Smokey House Center's current and future conservation mission and expand their education materials for the Danby, Vermont community, conservations, and environmental stewards in the greater New England area.

In this chapter, we conduct a literature review and a case study analysis to discuss several topics that help compile ideas and provide research to support current and potential new conservation strategies for Smokey House Center. Our foci identify the importance of carbon sequestration, wildlife habitat management, and management strategies for invasive pests in the overarching concept of conservation. We conducted research using online databases including ScienceDirect, Google Scholar and other research guides available to undergraduate students on the Dartmouth College Library website. Our guiding research questions focused on the greater New England area, other local conservation organizations like The New England Forestry Foundation (NEFF), and a broader view on holistic conservation practices to ultimately develop comparable examples to share with Smokey House Center. Ultimately, we will offer suggestions in comparison to other local conservation programs and focus our discussion on why these are important to Smokey House Center's greater mission.

Background Information

As of now, 90 percent of Smokey House Center's land is permanently protected under the Grant of Development Rights and Conservation Restrictions which relate to agricultural

easement areas, forestry easement areas and non-protected areas (Easement Modification NEFF 2014). These conservation easements are designed to uphold Smokey House Center's ecologically sound land management practices that work towards preventing forest fragmentation and maintaining productive agricultural land. In 2014, the Smokey House Center modified their conservation easements to include the New England Forestry Foundation (NEFF), which allows Smokey House Center to permanently conserve the forestland on the property through the NEFF.

As one of the largest contributors to conservation efforts in New England, the NEFF accomplishes their mission to conserve forestland and promote sustainable forestry through purchasing, gifts and bequests of land and easements (NEFF 2016). The organization wants to prepare New England to prosper in the face of climate change to not only ensure the forests are kept healthy, but also contribute to a global environmental solution to climate change (NEFF 2016). As global conservation strategies and education rapidly expand with the help of individuals and organizations like the NEFF, protected areas have become a vital component of a sustainable future. Meyer et al. discovered an acceleration in the "rate of protection and an increase in the proportion of privately owned protected areas" from 1800 to 2010 in New England (Meyer et al. 2014). Using a spatio-temporal database covering 90 percent of protected areas in New England, the study found three periods of significant growth, the largest being from 1990-2010, as conservation easements for protection and sustainably managed resource extraction practices became more popular (Meyer et al. 2014). The findings of this research study conclude that policy development and economic drivers are the main influence in the adoption of protected areas and it is critical to emphasize the value of creating innovative and

efficient strategies for the protection and growth of our ecosystems and resources to ensure conservation (Meyer et al. 2014).

4.2 Smokey House Center Conservation Story

Smokey House Center's conservation efforts currently concern two legal land easements, one of which pertains directly to the forest easement areas and the other to the agricultural easement areas. The purpose of the Conservation Restrictions related to both easement areas is "in perpetuity, in a natural, scenic, forested, agricultural and open condition: to protect, promote and manage the conservation of forests, wetlands, natural watercourses, and wildlife therein; and to protect and enhance the value of abutting and neighboring natural resources, open spaces and conservation areas" (Forest Easement Final 2002).

Smokey House Center's commitment to conservation serves many different endeavors and exemplifies the importance of conservation to wider audiences. Executive Director of Smokey House Center Jesse Pyles, described the organization as a myriad of links to the greater environmental movement. In his first message, Pyles explains that "'conservation' isn't simply about preserving some place untouched. A big part of [Smokey House Center's] conservation effort is to protect agricultural land as working agricultural land, and to keep forestland [as a resource] for the timber and wood products industries" (Pyles, personal communication, 2018). Smokey House Center wants to enable members of the community to grow and harvest food on their purposeful land and their products from harvested timber, such as saw logs and pulp, to move through their interconnected system. The second link Pyles proposes considers the role of Smokey House Center's landscape in mitigating runoff that may negatively impact downstream water quality. Pyles believes that it is critical to think about "a landscape at our scale, with little [to no] pavement, few buildings, and lots of trees," since these aspects of their landscape are all

extremely influential in the holistic approach that conservation entails (Pyles, personal communication, 2018). Lastly, SHC's land is an important component of a wildlife corridor connecting the Green Mountains to the Taconics and Adirondacks. Their conservation practices help maintain this vital corridor for New England wildlife and for maintaining a balanced ecosystem (Pyles, personal communication, 2018).

Overall, these different factors help define conservation beyond the idea of preserving land in a way that leaves it untouched (Pyles, personal communication, 2018). These practices and efforts help pave the way for a much broader view of conservation, one that can provide both knowledge and meaning for audiences outside of Danby, Vermont. Additionally, Pyles suggests that "city folks can see development in a very specific way, and though the development pressures are much different in our rural area, [Smokey House Center's] conservation easements essentially say [that] only development that encourages the work and rural character of this landscape [can occur] -- not houses for their own sake, not strip malls, not manufacturing [or other] industrial facilities" (Pyles, personal communication, 2018). The conservation easements Smokey House Center holds are strongly linked to several scales that influence the larger environmental movement. Clearly, the actions of Smokey House Center positively influence the local community, benefit the greater surrounding ecosystem and support system resilience in the face of climate change.

4.3 Case Studies

4.3.1 Carbon in New England

Over the last several decades, there has been growing concern regarding climate change, particularly the emissions of carbon dioxide (CO_2). CO_2 is commonly produced by the combustion of fossil fuels and it has significant negative implications for the planet in high

atmospheric concentrations. There are several other key greenhouse gases such as, methane, nitrous oxide and fluorinated gases. Even though CO_2 is not the most potent of the greenhouse gases, according to the EPA's Overview of Greenhouse Gas Emissions in 2016, CO_2 accounts for 81 percent of all greenhouse gases emitted (EPA 2018). The vast amount of atmospheric CO_2 has had a serious effect on the planet. There are multiple ways to help reduce emissions, including such actions as implementing new guidelines and regulations regarding the use and combustion of fossil fuels, burning fewer fossil fuels, and switching to renewable energy sources like solar, wind, and hydro. Another way to counteract emissions is through preserving and increasing the amount of carbon sinks, which include the ocean, soils, and trees. These naturally occurring resources have the potential to reduce the effects of high concentrations of CO_2 by sequestering the gas in the atmosphere.

Many businesses, organizations and individuals own large plots of forested land, but the management of their land is a personal decision, not a community one in most cases. Carbon credits incentivize people to preserve forests as carbon sinks by preventing development projects that could cause large scale deforestation and/or forest degradation. In turn, participating individuals are paid a specific amount of money depending on the quantity of carbon sequestered from the atmosphere by their forested land. This type of carbon offsetting is particularly appealing for large businesses and organizations who would rather purchase carbon credits than lower their carbon emissions. As a result, a carbon market has developed in recent years and it is rapidly reaching new markets across the world.

4.3.1.1 Case Study: Hersey Mountain Forest

Hersey Mountain Forest is located in central New Hampshire, between the towns of New Hampton and Sanbornton. Hersey Mountain Forest covers 2,141 acres of forested land and it is

protected by the NEFF and the Northeast Wilderness Trust. The forest encompasses several different elevation gradients ranging from 700 to 200 feet. The terrain varies from steep slopes, gullies, rocky outcrops and ledges to flat depressions in the valley. Some areas in the forest that were previously cut and cleared for roads, homes, fields and pastures have been reverted to their original forms. According to a report by Finite Carbon, the areas that were cut for logging are in "different stages of forest succession" (Finite Carbon 2014). Hersey Mountain Forest also includes areas of "old growth forests," indicating that there are stands within the forest containing trees over two centuries old (Finite Carbon 2014).

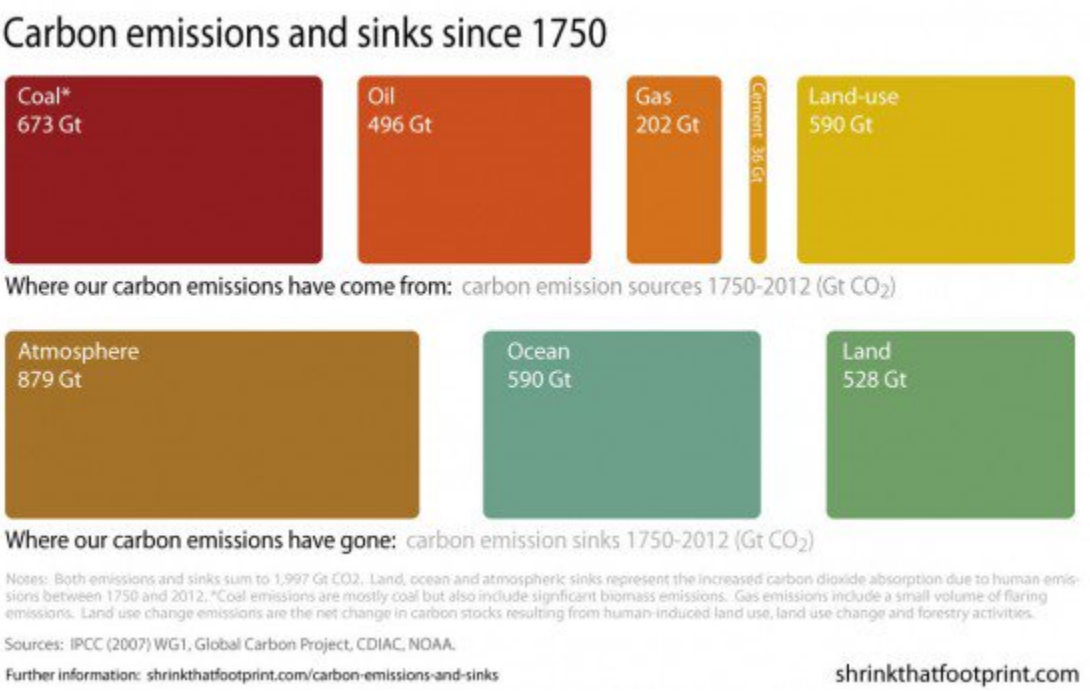

Figure 4.1

The carbon credit operation on Hersey Mountain Forest is run by two different organizations: The Climate Action Reserve (CAR) and Finite Carbon. CAR is a national carbon offsets program, which strives to guarantee "integrity, transparency, and financial value in the U.S. carbon market" (Finite Carbon 2014). CAR has developed both accurate and concise

methods to quantify and verify greenhouse gas emissions reduction projects in the United States. Furthermore, CAR has established specific requirements and guidelines for calculating the total carbon offsets that a forest is able to sequester. These protocols include eligibility rules, risk assessment of sequestered carbon sequestered and approaches for long term project monitoring and reporting (Finite Carbon 2014). As a result, CAR can issue carbon credits, also known as Climate Reserve Tonnes. Finite Carbon is a carbon project developer that specializes in the creation and monetization of forest carbon offsets (Finite Carbon 2014). Finite Carbon facilitates the development and commercialization of forest carbon sinks in the United States with their exceptional project development experience and extensive knowledge of the carbon offset market.

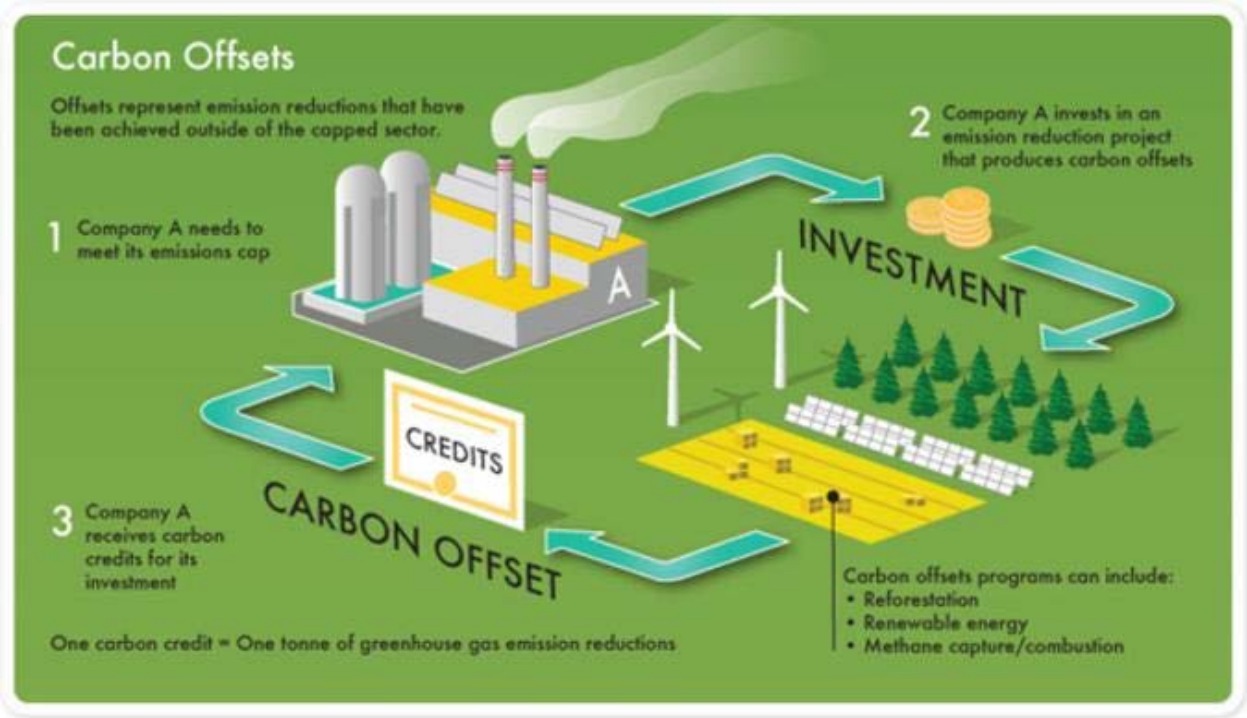

Figure 4.2

The implementation process of a carbon credit system starts by looking into a description of forest management activities. This pertains to the mission statement of the NEFF, which aims to conserve New England's forest through conservation and ecologically sound management techniques. These management techniques include: providing educational resources to local landowners, foresters, businesses in the forest products industry and the public that pertain to the present and future benefits of forest stewardship (Finite Carbon 2014). Similarly, Finite Carbon provides support and encouragement for the development and implementation of ecologically beneficial forest policies and forest practices. Then, Finite Carbon will examine the area's canopy cover by using CAR's Forest Project Protocol (FPP), which requires that the project supports a minimum of ten percent canopy cover. Next, the organization evaluates the composition of the land by using an intense analysis to determine the number of different species of trees within the project site. The evaluation must take into the account factors such as age, population, total area covered, and the percent of area covered compared to all other tree species. Additionally, the FPP requires that project's natural forest management and sustainable harvesting practices "promote and maintain native forests of multiple ages and mixed native species at multiple landscape scales" (Finite Carbon 2014). The project stipulations state that project sites must consist of at least 95 percent of native species of trees. Finally, CAR and Finite Carbon use complex formulas to calculate the amount of carbon available for sequestration.

After speaking with Curtis Rand, the chair of the Board of Smokey House Center, it is clear that Smokey House Center could meet the requirements and regulations required by both the CAR and Finite Carbon. Based on the data sheets of the case study (Finite Carbon 2014), Hersey Mountain Forest generates about $400,000 annually based on the worth of its carbon credits. Since Smokey House Center is approximately four hours away from Hersey Mountain

Forest, it could potentially benefit from the carbon market because it has a very similar tree composition and topography as Hersey Mountain Forest. In addition, since Hersey Mountain Forest has about two times less the amount of protected land than SHC, environmental studies professor at Dartmouth College David Lutz estimated that Smokey House Center could potentially generate $800,000 annually from carbon credits. However, to achieve this level of revenue, SHC must evaluate if it can meet the CAR and Finite Carbon requirements and assess if the benefits of joining the program outweigh the restrictions.

First, the easements for Smokey House Center must meet the requirements set by CAR and Finite Carbon. However, after assessing the easements for Smokey House Center, it appears SHC could potentially join the carbon credit market. Another component to consider before moving forward with the process is the future plans for Smokey House Center's overall strategy as non-profit organization. For instance, if Smokey House Center agrees to the regulations and restrictions of carbon sequestration, the organization would basically sign away some of their current authorities over the land for the next 100 years. In addition, if Smokey House Center breaches the contract, the organization must pay back the amount of money generated from participating in the carbon credit market. An example of a disincentive of joining the carbon market is demonstrated by Dartmouth College who chose not to devote portions of the Second College Grant for carbon sequestration. Since the College did not want to limit the experiences of future Dartmouth foresters, it decided to not commit to the opportunity.

Based on the potential benefits of the carbon market, Smokey House Center has the opportunity to collaborate with Finite Carbon to evaluate the feasibility of the carbon sink project. Finite Carbon will then provide more information about the financial feasibility of the project and evaluate the potential value of forest land managed by Smokey House Center.

4.3.2 Wildlife Management

Forest management directly impacts wildlife management because of the resources forests provide to wildlife species, such as food, water, shelter, and space. Although large areas of wildlife habitat currently exist in Vermont, land development continues to persist as a threat to many wildlife species. For instance, from 1980 to 2000, residents of Vermont used land for development projects at a rate over two times the rate of population growth (VNRC 2018). Fortunately, forested land owners have a variety of options that might help wildlife species thrive including wildlife corridors and forest wildlife habitat management. Wildlife corridors function as areas that connect large tracts of land, allowing wildlife species to move freely across their home range and providing a variety of benefits that guarantee the overall health of the population. Additionally, forest wildlife habitat management also benefits wildlife using forest management techniques that increase the benefits of forested lands for wildlife. Fortunately, Smokey House Center can potentially implement forest management practices that will help wildlife species thrive and can work towards collaborating with neighboring conservation areas to create wildlife corridors.

4.3.2.1 Wildlife Corridors

Wildlife corridors often consist of narrow swaths of wetland along streams, a large swatch of forest or a tunnel under an interstate highway (VNRC 2018). According to the Vermont Department of Fish and Wildlife, wildlife corridors not only allow animals to move freely, but also allow plants and animals to colonize new habitat as ecological processes may force them to migrate. Corridors 1) allow animals to access land that meets their daily and annual life needs, 2) allows young animals to establish new ranges when they leave their parents, and 3) reduces the probability of inbreeding by decreasing the chance of population isolation (VNRC

2018). The Vermont Agency of Natural Resources (ANR) provides the necessary tools and resources for landowners to determine the location of key areas for wildlife corridors. These resources include the development of maps of wildlife territory and movement based on data collected by the agency.

In 2008, the Town of Shrewsbury in Rutland County successfully optimized 32,000 acres of forested land for wildlife habitat by designating the area as overlay zones (VNRC 2008). This overlay zone includes surface waters and wetlands protection areas, deer wintering areas, wellhead protection areas, meadowland, steep slopes, ridgelines and wildlife corridors. The implementation method of wildlife corridors consisted of creating natural resources maps that delineated north-south corridors on the Eastern and Western boundaries of Shrewsbury. The ANR provided data on bear, moose and bobcat and road kill data to determine patterns of movement and to ultimately create accurate maps of wildlife habitats. For those interested in establishing protected areas for wildlife habitat, the Town of Shrewsbury generated the following recommendations: seek assistance from the conversation planning biologists at the ANR, utilize the resources available at the ANR, which include data and map generation tools that incorporate specific goals of the organization, involve the residents of the area in presentations, data collection and public meetings, since they can assist in supporting wildlife corridors and use facts to drive the planning process of designating wildlife corridors. Although the Town of Shrewsbury did not change any ecological factors directly on the ground, the establishment of overlay zones that legally protect specific areas for wildlife species in the forest present an opportunity for landowners interested in establishing similar areas on their land. These legal protections ultimately allow for collaboration between neighbors in the future given the plant and

animal species inventory requirements that provide useful knowledge for landowners that want to positively affect wildlife species residing on their land.

4.3.2.2 General Wildlife Management Practices

The implementation of forest management practices that benefit wildlife requires the development of a management plan that both identifies vegetation cover types and wildlife species that inhabit the areas under consideration (Pierce et al. 2013). Currently, Smokey House Center manages forested areas with the following cover types: northern hardwoods, eastern white pine, sugar maple, eastern hemlock and mixed woods. Given the current cover type composition of Smokey House Center's forested areas, the following three general woodland and forest management practices should be considered. First, protecting forest stands from grazing will benefit wildlife by increasing mast availability and stem density for cover and thus encourage more diversity in the understory. This practice also benefits timber production by preventing soil compaction, improving tree growth, and increasing regeneration and species diversity (Pierce et al. 2013). Another good example of specific wildlife management practices Smokey House Center can implement includes allowing shrubs, vines and fruit producing species to develop along forest edges. This practice increases early successional food and cover for wildlife and cultivates an increase in plant community diversity at transition zones. Transition zones reduce wind and drying effects in timber, which ultimately improves wood quality from areas adjacent to edges (Pierce et al. 2013). Lastly, allowing downed timber or fallen trees to remain along the edges of forest stand provides cover and food sources (e.g. insects) for wildlife. Material from dead and downed trees provide shelter for over 30 percent of New England's mammal species, such as rodents and shrews, 45 percent of amphibians, mostly salamanders and 50 percent of reptiles, primarily turtles and snakes (Elliott 1988, DeGraaf et al. 1992). On the

other hand, downed timber and fallen trees return nutrients to the soil and reduces the costs associated with removal (Pierce et al. 2013).

Structural Diversity

The structural diversity of a forest, which includes different type, size and species of trees, is also an important component for creating a habitat suitable for wildlife species. Some specific recommendations that could increase the diversity of the forest includes preserving masting trees, overstory inclusions, permanent forest openings and retention of snags and den trees.

Mast

Mast refers to the food produced by trees such as nuts, seeds and fruits. Mast is a critical component in forest ecosystems for many wildlife species that depend on these resources for sustenance (DeGraaf et al. 1992). Migrating species such as the wood duck and hibernating species such as bears, and raccoons rely on mast for contributions to their fat stores. In the New England context, certain trees benefit a variety of mammal and bird species by providing food resources during key periods like late summer, early fall or during the winter (DeGraaf et al. 1992). For instance, beech trees produce beech nuts during the fall, which are consumed by black bears, raccoons, red squirrels, ruffed grouse, spruce grouse, wild turkey and rose-breasted grosbeak (Dartmouth College Woodlands 2011). Birches provide seeds for mammals and bird species, especially during the winter because most of their seed crop remains above the snow (Dartmouth College Woodlands 2001). Similarly, softwood trees – white and red pine, white, red and black spruce, hemlock, tamarack, and balsam fir – provide seed resources also available during the winter for mourning doves, chickadees, crossbills, finches, grosbeaks, pine warblers, nuthatches, mice, voles and red squirrels (Dartmouth College Woodlands 2001). In terms of fruit

producing trees, wild apples produce fruit eaten by deer, bear, fisher, grouse and song birds (DeGraaf et al. 1992). Mast producing shrubs including alder, mountain ash, beaked hazelnut, dogwood, blueberry, raspberry, viburnums and elderberry are also critical resources for wildlife species (Dartmouth College Woodlands 2011).

Overstory Inclusion

Overstory inclusions refers to small patches of forest that includes tree species that are different from those found in the surrounding forest (DeGraaf et al. 1992). The preservation of these areas benefits wildlife by providing resources that otherwise would not be available if the forest only contained one species of trees (DeGraaf et al. 1992).

Permanent Forest Openings

Permanent forest openings include areas that are dominated by non-tree plant species such as grasses, forbs, brambles and fruiting shrubs (Litvaitis 2001). These areas are usually at least 10 percent covered by trees. Their importance stems from the increase in habitat diversity that ultimately provides permanent habitats to 22 percent of New England's wildlife species and seasonal habitat benefits to 70 percent of wildlife in the area (Litvaitis 2001). Experts recommend that three to five percent of the land in New England remains as permanent forest openings (Litvaitis 2001).

Snags and Den Trees

Snags are dead or partially dead standing trees, while den trees refer to live trees with existing cavities (Tubbs et al. 1987). The preservation of these trees benefits various bird and mammal species that use the cavities of these trees for nesting, roosting or denning (Tubbs et al. 1987). Some insectivorous bird species that use snags and den trees for shelter also provide benefits to the tree in return. For example, these birds function as a biological insecticide by

helping control the insect populations that may attack the trees (Tubbs et al. 1987). Wildlife management experts recommend landowners to preserve a minimum of six snags or den trees per acre with at least one that exceeds 18 inches in diameter at breast height (DBH) and three that exceed 12 inches DBH (Tubbs et al. 1987). Ultimately, the diversity of tree species and habitats in New England forests increases the opportunities for wildlife species to find food and shelter. The implementation of these forest management strategies by Smokey House Center could further advance the goal of the organization to increase the richness of wildlife species in its forested land.

According to the Smokey House Center's forest stewardship plan, the goals of the organization include generating periodic income from timber production, increasing the richness of wildlife species, protecting water resources, discouraging invasive species, maintaining soil integrity and conserving big trees for aesthetic purposes. These goals, especially those related to wildlife species and timber production, will benefit from the implementation of forest management practices that take into consideration the needs of wildlife species. Ultimately, the execution of these forest management strategies will advance the overall conservation goals of Smokey House Center.

4.3.3 Forest Pest Management

Climate change is expected to cause significant shifts in biodiversity, phenology, species composition and interactions, and ecosystem processes in the future (Hellman et al. 2008). Invasive species of pests will be of particular concern as climate change alters average seasonal temperatures and other biological factors, leading to shifts in the distribution, abundance, and impact of invasive pests (Hellman et al. 2008). In this document, invasive pests are defined as taxa that are non-native to an area and negatively impact native species or overall local

environmental health. Researchers theorize that there are three primary consequences when an invasive pest enters an ecosystem including the establishment of other new invasive species, changes in the impact and distribution of existing invasive species, and changes in the effectiveness of control strategies (Hellman et al. 2008). Combatting any current or new invasive species in both the state of Vermont and the greater New England region will require a collaborative effort between local and regional communities, government agencies, and organizations to integrate effective preventative mechanisms and response treatments.

There are three non-native insects currently threatening Vermont forests: the emerald ash borer (*Agrilus planipennis*), Asian longhorned beetle (*Anoplophora glabripennis*) and hemlock woolly adelgid (*Adelges tsugae*) (Figure 4.3). These invasive pests affect fourteen species of trees including maple (*Acer sp.*), elm (*Ulmus sp.*), horse chestnut (*Aesculus hippocastanum*), hemlock (*Tsuga sp.*), willow (*Salix alba*), multiple species of ash (*Fraxinus sp.*), popular (Populus sp.), and hackberry (Celtis sp.) (Vermont Invasives 2018).

Figure 4.3: *These three non-native insect pests are currently threatening Vermont forests (Emerald ash borer 2012, Adelges tsugae 2005, Asian long-horned beetle 2017). Although Smokey House Center and the surrounding area have not experienced outbreaks to date, predicted climatic warming and environmental shifts will increase the risk of future outbreaks.*

In addition to these non-native pests, shifts in regional temperatures and other biotic factors are also contributing to outbreak populations of several native insect species such as pear

Figure 4.4: *Both of these native insects are considered threatening pests to Vermont forests (Forest tent caterpillar 2011, Pear Thrips n.d.).*

thrips (*Taeniothrips inconsequens*) and forest tent caterpillars (*Malacosoma disstria*) (Figure 4.4). These two native insects primarily damage sugar maple (*Acer saccharum*) and ash (*Fraxinus sp.*) trees, but they also negatively affect beech (*Fagus sp.*), Amelanchier (*Amelanchier sp.*), and black cherry (*Prunus serotina*) trees (Gardescu 2008, Vermont Invasives 2018). The local and regional impacts of these insects primarily depend on a variety of factors such as drought, disease and temperature patterns (Kanoti et al. 2015). Unfortunately, many of the tree species mentioned above are expected to suffer significant population losses as climatic warming trends continue to rise in combination with invasive pests (Dukes et al. 2009, Hellman et al. 2008, Kanoti et al. 2015). Invasive pests are highly sensitive to the temperature shifts that climate change causes. For instance, a slight increase in temperature causes a significant increase in the metabolic rate of insects (Dukes et al. 2009). An increase in an insect's metabolic rate allows the insects to consume more foliage or tree tissue (e.g. phloem, xylem), effectively increasing their rate of development and altering their movement, which then influences population dynamics by affecting survival, generation time, fecundity and dispersal (Dukes et al. 2009).

Furthermore, increases in average winter temperatures in areas of Vermont will allow for the northward expansion of invasive insects. However, if winter temperatures do not reach the insects lower lethal temperature (the point at which the liquid inside the insect's body freezes causing the insect to die), the population is less likely to persist in a region. For instance, the

hemlock woolly adelgid is currently distributed in hemlock trees in areas where the minimum winter temperatures stay above -28.8 degrees Celsius. This indicates that winter temperatures must stay above an average of -5 degrees Celsius to prevent the expansion of the hemlock woolly adelgid (Dukes et al. 2009).

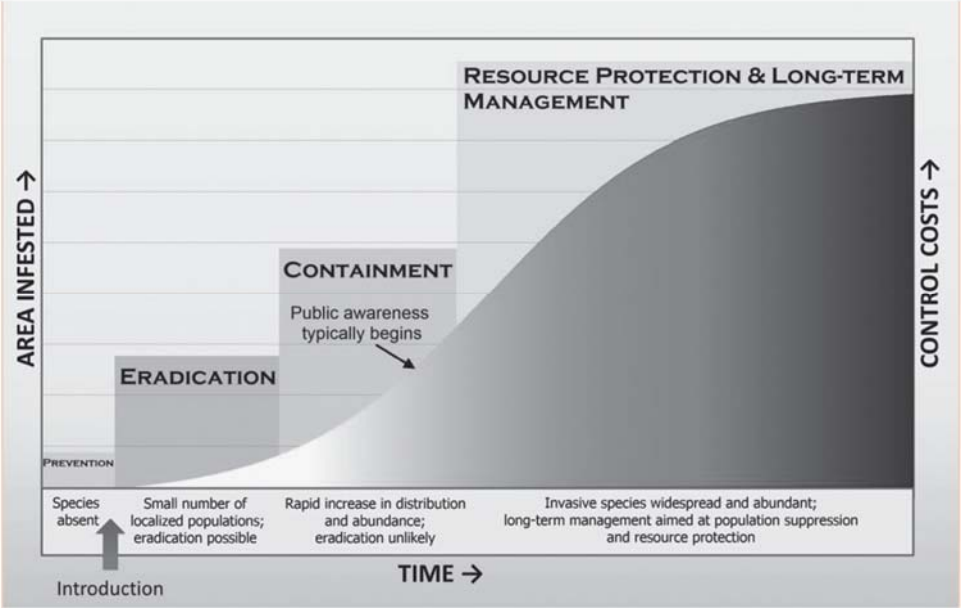

Figure 4.5: *The invasion curve depicts the sequential stages of an invasive species outbreak in a new region. As time goes on, the economic and environmental costs of an invasive species outbreak increases significantly illustrating that prevention is the most cost-effective measure in an invasive species management and prevention plan (Harvey & Mazzotti 2014).*

Invasive species management is a complex process that is dependent on a multitude of dynamic factors. Fortunately, four general categories of invasive species management have been identified and each one represents a new step in the management process (Figure 4.5, Harvey & Mazzotti 2014). The first step in the invasion curve targets preventing the establishment of a new invasive species by using quantitative risk assessments and carefully monitoring regional and international trade. If an invasive species does establish itself in a novel region, the community should band together to eradicate the species as soon as possible. Early detection and a rapid

response are often very effective, but this is often costlier than prevention (Harvey & Mazzotti 2014). Next, if the species is not eradicated soon after introduction, complete eradication may not be feasible any longer. Therefore, the community should shift their efforts towards containing the invasive species and mobilizing the public to help prevent future population expansion. Lastly, if an invasive species is too widespread for containment or control, long-term management plans need to work towards reducing populations and preserving high-value resources (Harvey & Mazzotti 2014). Overall, the invasive species curve illustrates that the associated costs increase and the chances of eradication decrease as an invasive species spreads over time. One possibility involves surveying forested areas that are potentially at risk for invasion, which has been proven as an effective preventative measure (Kanoti et al. 2015). Different types of invasive species require slightly different survey protocols, but overall the science behind the procedures are simple enough that volunteer citizen scientists and private landowners can contribute to the active prevention of invasive insect outbreaks by identifying small populations of invasive insects (Kanoti et al. 2015). Additionally, the biological control of invasive pests is also becoming an increasingly feasible option. This alternative form of control utilizes the use of natural predators to help decrease an outbreak population of either an invasive or damaging native species of pest (Kanoti et al. 2015). However, this is an expensive management option and requires collaboration with state forest health officials to ensure that the forest stand in question has the adequate characteristics to make it eligible for biological predator release (Kanoti et al. 2015).

The US Forest Service provides a management and control strategy outline specifically for the hemlock woolly adelgid in the state of Vermont, but this plan may be adapted for other species as well (Kanoti et al. 2015). The Forest Service recommends beginning with three steps

in the case of an infestation. First, the private landowner or organization must assess the infestation and determine the size and impact, among other factors, of the pest. Secondly, a management plan needs to go into effect. A few management plan options include cultural control, silvicultural options or not doing anything at all to potentially preserve any remaining genetic diversity or heritable resistance within the tree population. Finally, once the management plan has been carried out and the invasive has been treated, a follow-up treatment should also be applied (Kanoti et al. 2015). Furthermore, heavily damaged trees can often be removed (depending on the type of pest in question) and replaced with more resistant tree species to help maintain the health of the ecosystem (Hu et al. 2009). Forests containing a high diversity of tree species can help decrease stand ecosystem vulnerability to pests and help suppress any outbreaks. For instance, trees that are typically resistant to invasive pests have less commercial value and grow more slowly in comparison to trees that are more susceptible to pests. In order to cultivate a healthy forest ecosystem that balances economic and ecological benefits, stands should be composed of a mix of different types of tree species to help decrease the probability of an invasive pest outbreak (Hu et al. 2009). Although management plans directed towards the Northeast do not currently exist for the other two potential invasive species of insects (Asian longhorn beetle and emerald ash borer), plans targeted towards these species will likely closely resemble the Forest Service's recommendations for the hemlock woolly adelgid.

Fortunately, Smokey House Center has not experienced any invasive pest outbreaks in its history. However, as the climate continues to rapidly change and alter the landscape, designing potential management plans will help Smokey House Center establish the capacity to deal with an outbreak. Furthermore, the invasion curve suggests that preventative measures are critical for the protection of at-risk forests, indicating that developing potential preventative management

plans may also help decrease the risk of invasive pest outbreaks (Harvey & Mazzotti 2014). Positive preventative management plans might target not only forest monitoring but also the education of the public and other private landowners while also encouraging them to conduct surveys on their own land. Smokey House Center might focus on conducting periodical surveys of its own forest stands to integrate a preventative measure into their management strategy. Additionally, these pest surveys could also double as a public training for people in the community, so they can begin to monitor their own land.

4.4 Discussion

The conservation practices discussed above, pertaining to carbon sequestration, wildlife habitat management and management strategies for invasive pests through the lens of forestry practices, all lend to conserving land for a purpose. This knowledge, when put into practice produces several motivations for conservation including: aesthetics, education, economic reasons, cultural ties, recreational use and political reasons. These practices are important for conservation in New England as climate change continues to encroach on the region and impacts every facet of the ecosystem.

The forest management strategies of Smokey House Center contribute to the realm of conservation. Smokey House Center has the potential to function as a role model for other local organizations in New England interested in expanding their conservation efforts. One of the benefits of Smokey House Center is the organization's freedom to both conserve the land while selectively utilizing portions of the land for agriculture and timber harvesting. Smokey House Center continues to strive towards conserving the land and providing natural resources to the local community. In addition, education also serves as an important component Smokey House Center's conservation strategy. The organization strives to educate not only the public about

sustainable land use, but it also encourages future generations to partake in sustainable practices, ranging from digging in the dirt to helping generate interest in agriculture to day camps that immerse children in the world of conservation. To expand the impact of these educational efforts, Smokey House Center may want to determine ways to improve and promote its programs. The use of sustainable agricultural and timber harvesting practices both allow the organization to generate revenue and serve as an example for neighboring landowners and organizations. To maintain the viability of Smokey House Center's conservation model, the organization will need to adapt to the changes that climate change will bring to the New England region. Therefore, the suggestions and framework mentioned above will provide future directions for conservation at Smokey House Center. In addition, the organization will need to reach out to other local and regional organizations and landowners to build an integrated model of ideas and methods that combat the environmental changes caused by climate change, while at the same time continuing its productive conservation efforts.

Conservation efforts protect valuable ecosystems from development, whether it may be for aesthetic and recreational reasons or just for maintaining the original form of the land. The dissertation *The New American Conservation Movement: New Strategies, Focus and Organizations for the 21st Century*, "provides evidence of the emergence of a new conservation movement in the United States" (Northrup 2012). Until this dissertation, finding scholarly articles were scarce as there was little to no information on any type of conservation strategy or movement. However, with Northrup's research, she found that the new conservation movement is characterized by three changes: "(1) many of the well-established conservation organizations have largely abandoned their traditional focus on increasing the number of acres preserved; instead a more defensive and fragmented forms of conservation now reign, (2) a dramatic

expansion in the portfolio of issues that the social movement addresses; the once tight focus on land preservation has grown to include other issues never before relevant to conservation, and (3) the emergence of a new class of conservation organizations that, retain a focus on securing new acreage protections, but broaden their base for preservation beyond the U.S. to include threatened lands around the globe" (Northrup 2012).

These three changes in the new conservation movement occurred due to a shift in the focus of conservationists to include a broader selection of issues that one would not necessarily think that should be included in conservation, such as "climate change, energy and new extractive technologies" (Northrup 2012). The new conservation movement, strongly influenced by social and political factors, has somewhat slowed down the process of adopting these new measures into conservation strategies. Unless a species is threatened, or the people's need for more recreational uses increases, the conservation of land is usually placed on the backburner. Social movements and political power are usually the main drivers influencing the advancement of conservation efforts. Especially, since the implementation of these conservation strategies falls under the jurisdiction of the administration that is in executive office at the time (Goodstein & Polansky 2014).

Aside from the social and political influences, the introduction of climate change and renewable energy into new conservation strategies forms part of the entire "New American Conservation Movement." According to Northrup, conservation has evolved from selling qualities of a proposed new national park to also include other issues such as creating renewable energy strategies and monitoring air pollution (Northrup 2014). These political, social and natural changes throughout the past two decades have allowed for conservation advocacy

organizations to expand the scope of what is included in their conservation strategies in order to remain effective.

A recommendation that could benefit Smokey House Center's conservation strategies includes expanding these strategies to also address other previously ignored environmental issues. These issues should include, "climate change, energy and new extractive technologies" (Northrup 2012), as previously discussed. The inclusion of strategies that addresses these issues could advance the measures that Smokey House Center implements to combat the impacts of climate change and global warming. These new conservation strategies could also benefit Smokey House Center's agricultural efforts that could ultimately benefit not just the land itself, but also the people who participate in these agricultural practices.

4.5 Conclusion

As Pyles stressed, "conservation" encompasses countless definitions and action that all contribute to environmental stewardship. Smokey House Center works to produce and maintain several purposeful efforts to help secure the longevity of not only the conservation easements managed by Smokey House Center, but also to support to resilience of the region. The information provided by each topic, carbon sequestration, wildlife habitat management and management strategies for invasive pests through the lens of forestry practices relevant to the New England area, all provide knowledge that can further the conservation strategies of Smokey House Center. Based on our research and estimations, we would recommend Smokey House Center to explore the possibilities of carbon credits based on their forest land. To do so, we suggest setting up a meeting with Finite Carbon for them to determine how viable the land is for carbon sequestration. Once Finite Carbon assesses the land, they would be able to give a much more definitive value on the property.

Chapter Five
Renewable Energy at Smokey House Center

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5.1 Introduction

To further Smokey House Center's (SHC) triple mission of education, agriculture and conservation, it is essential for the Center to take a leadership role in energy efficiency and the transition to renewables. In doing so, SHC will save not only energy, but money as well in the form of reduced facility operating costs. This chapter explores the installation and maintenance costs, federal and state financing opportunities, potential payback periods, and macro-trends of four potential investments in energy efficiency and renewables: weatherization, wind, solar, and micro-hydro. In addition, at the chapter's end, a section detailing the feasibility, construction, and costs of small-scale aquaponics will be added for educational purposes in line with SHC's mission.

5.2 Weatherization

5.2.1 Overview

According to the US Office of Energy Efficiency and Renewable Energy, homes and commercial buildings consume approximately 40% of the energy consumed in the US. This consumption, however, is generally inefficient. Approximately $300 out of the $2000 the average American spends on energy annually is lost through drafts, air leaks around openings, and outdated heating and cooling systems (US Department of Energy, 2018). Energy efficiency is particularly important in the state of Vermont, which as of 2017 ranked #10 in overall most

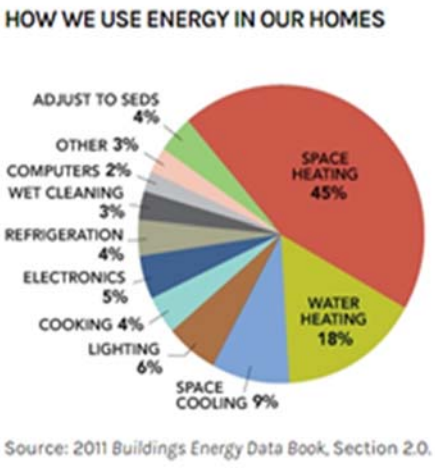


Figure 5.1: *The majority of energy in homes is used and lost through space heating (US Department of Energy, 2018).*

expensive energy costs (Bernardo 2017). Indeed, Vermont's residential electricity rates average 17.01 cents/kWh- 43.18% more than the national average rate of 11.8 cents/kWh (Bernardo 2017).

Weatherization and insulation are two of the most cost-effective measures for increasing energy-savings. On average, the value of weatherization improvements is 2.2 times greater than the costs of its implementation, and on a national level, the process averages savings of 270 gallons of #2 heating fuel per year. If installed properly, roof and wall insulation can provide up to 30 years or more of energy savings, while efficient heating or cooling equipment can provide savings for 10-15 years (US Department of Energy, 2018).

While the total energy usage at Smokey House Center (SHC) is relatively low, the old structures of the buildings are not properly insulated and are thus contributing to a loss of energy. By installing weatherization and insulation to current structures, SHC may be able to reduce their energy consumption up to 22-53% per building improved, saving 2-10 tons of carbon emissions per year, (equivalent to roughly two cars removed from the road annually) (Heat Squad 2018).

Costs

The energy audit conducted by the Heat Squad in March of 2018 assessed the costs and savings associated with SHC undergoing complete insulation and weatherization in three buildings: Fisk House, Herrick House, and Meeting House. The audit presented the opportunities and total costs of implementing energy saving measures. Additionally, the reports demonstrated SHCs rebate eligibility. However, it is important to consider that if SHC decides to only partially implement some of the weatherization efforts in each building, the total amount of rebates SHC can receive will differ. The following tables demonstrate different cost and saving scenarios for SHC and offer a cost-benefit analysis of each scenario.

Heat Squad's energy audit proposed that SHC reduce air leakage by 25% in all three buildings, insulate crawl spaces, insulate basement walls, air seal and insulate attic flat, and install heat pumps. The approximate installation costs and approximate annual savings of these measures vary across buildings. To receive the incentives for the project which are offered through Efficiency Vermont's Building Performance 2018 incentives, SHC must reduce air leakage by 10 percent.

Building	Approximate Costs	Incentives	Total Costs	Estimated Annual Savings	Payback Period
Fisk House	$9,200	$1,557.80	$7,642.29	$842	9 years
Herrick House	$13,500	$1,509.60	$11,990.40	$1,869	7 years
Meeting House	$8,000	$764.80	7,235.20	$367	15 years
Total	**$30,700**	**$3,832.20**	**$26,867.80**	**$3,078**	

Table 5.1: *Implementation of All Suggested Solutions*

The energy audit concluded that SHC could most reduce leakage through the installation of crawl space insulation. The most expensive installation items across the buildings (complete insulation of basement walls, attic flats, crawl spaces) cannot be compromised if the incentives are desired. However, the following table assesses the costs of installation that SHC would incur alone if SHC chooses to implement only portions of suggested solutions.

Installations	Approximate Costs	Incentives	Total Costs	Annual Savings	Payback Period
Basement Walls (in)	$4,500			$586	
Airseal and (in) attic	$5,000			$468 (+561)	
Heat Pump N. Apt	$4,000			$255	
Total	**$13,500**	**$1,509.60**	**$11,990.40**	**$1,869**	**7 years**

Table 5.2: *Herrick house*

Herrick house has the highest upfront costs to undertake but would have the quickest payback period (graphic yet to be created). Implementing all the suggested changes in this home would lead to a total of energy reduction of 36% annually, translating to a carbon savings of 10 tons per year. It is important to note that because the home is over a hundred years old and was not built without any intention of being airtight, it requires insulation all around to reduce leakage. The Herrick house also accounted for 21 percent of total kWh used for 2017, with spikes in energy consumption for the months of August through December (Energy Audit, 2017).

Installations	Approximate Costs	Incentives	Total Costs	Annual Savings	Payback Period
Basement Walls (in)	$2,000			$209	
Airseal and (in) attic	$2,800			$74	
Insulate crawl space walls	$2,000			$105	
Upgrade Water Heater	$2,400			$298	
Total	**$9,200**	**$1,557.80**	**$7,642.00**	**$842**	**9 years**

Table 5.3 *Fisk House*

Table 3 shows the total costs associated with the implementation of all the suggestions made by the Heat Squad's energy audit for the Fisk House. Note that the costs for Fisk House can be lowered by $2,400 if the water heater is not upgraded. However, the annual savings would also decrease by $298 and the incentives offered through Efficiency Vermont may be lessened as a result.

Installations	Approximate Costs	Incentives	Total Costs	Annual Savings	Payback Period
Insulate crawl space walls	$4,000			$82 (+100)	
Upgrade Water Heater	$4,000			$187	
Total	**$8,000**	**$764.80**	**$7,235.20**	**$367**	**15 years**

Table 5.4: *Meeting House*

The Meeting house requires the least amount of upgrading. However, like Fisk House, the costs of the project may be further lowered if the water heater is not upgraded. The most urgent area in need of efficiency upgrading is the insulation of the crawl spaces in the walls.

5.2.2 Financing

In addition to the incentives provided through Efficiency Vermont, SHC can offset the costs of installation through a combination of loans and grants- see below:

New England Grassroots Environment Fund (NEGEF)

This grant is offered annually to institutions that are volunteer-driven, have less then 2 full-time paid staff, and operate under a $100,000 budget. The grant offered is valued from $1000-$3,500 (NEGEF 2017). The funds can be used for general operating stipends, capacity building, and program development. If awarded this grant, the total costs out of pocket for SHC after all suggested installations were made would total $27,200.

USDA Community Facilities Grants

Funding is offered directly through the USDA Rural Development Program and is intended to provide affordable funding for the development of essential community facilities in rural areas. Funds can be used to purchase, construct, and improve essential community facilities, as well as purchase equipment and pay related project expenses (USDA, 2018). In order to be eligible for the loan, SHC must prove that it is located in a rural community having a population of 5,000 or fewer, with the median household income of the proposed service area

below the poverty line or 60% of the State nonmetropolitan median household income (USDA, 2018). As a facility that offers services to community of Danby, SHC may be well situated for qualifying for a grant or loan from the USDA. Additionally, SHC must prove that it has legal authority to borrow money, obtain security, repay loans, construct, operate, and maintain the proposed facilities, as well as show that it is unable to finance the project from own resources and/or through commercial credit at reasonable rates and terms (USDA 2018).

5.2.3 Conclusion

Weatherization and insulation projects are simple and inexpensive methods of improving energy efficiency and reducing energy costs. The old infrastructure of SHC requires immediate attention to address its current inefficiencies. Utilizing the data provided by Heat Squad, we've found that implementing weatherization across three main buildings would cost SHC $30,700 dollars, save SHC approximately $3,078 dollars each year, and help SHC reduce their carbon footprint. Finally, while the insulation of Herrick House is the most expensive, the project nonetheless has the quickest payback period and the highest estimated annual savings. Costs for the project could be offset through local and/or federal grants and loans as well. The Community Facilities Direct Loan and Grant may be the best financing options for SHC to supplement this funding.

5.3 Wind

5.3.1 Overview

By 2020, installed wind power generation is expected to increase over 70% to 760 gigawatts, continuing its steady growth since the start of the 21st century (see Figure 2). Already, wind accounts for roughly 55% of renewable power capacity globally, excluding hydropower, translating to 4% of electricity production worldwide (Son and Ma, 2116). No longer a

pipedream, wind power is steadily seizing market share from big oil. This growth has spurred wide industry investment, product innovation, and healthy competition.

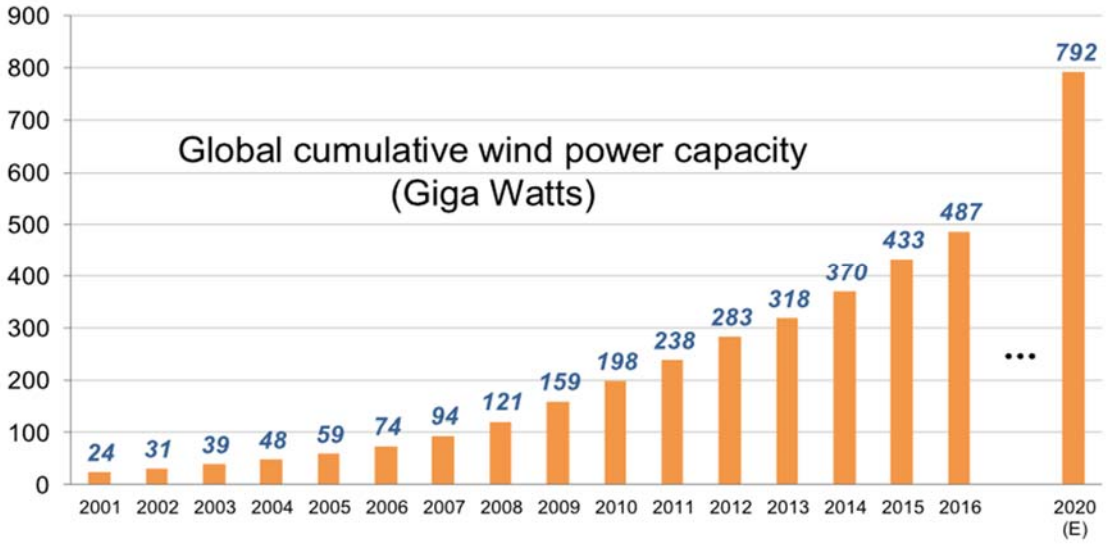


Figure 5.2

In Vermont, a state in which over 13% of its electricity was generated by wind power in 2017 (ranking 13th in the nation for wind energy as a share of total electricity generation), the growing success of wind is particularly evident. According to a recent Vermont Public Interest study, for example, wind could provide 25% of Vermont's energy by 2032 with wind farms on just 4% of the state's ridgelines (American Wind Energy Association, 1). Surrounded by unobstructed ridgelines and constant wind, SHC is in a prime location to experiment in small-scale wind. While the upfront cost of purchasing a turbine may seem intimidating, our research below offers innovative financing solutions.

5.3.2 Costs

By coordinating with Vermont Green Energy Systems (VGES), a local wind installer that has installed a number similar turbines in nearby locations, our group organized and oversaw a comprehensive site assessment for SHC. The assessment covered a variety of vital aspects that

need to be considered when installing a small-scale wind turbine, including location, wind speed, access to power lines, community commitment and service ability. For reference, wind speed is put into a class range from class 1 (the lowest) to class 7 (the highest). In general, a wind speed of class 3 or higher can be useful for generating wind power with large turbines, while small turbines can be used at virtually any wind speed. An extensive area in New England, including Danby, VT, has an annual wind power of class 3 or higher on exposed locations (Bombaci, 2004).

VGES quickly identified the most ideal location for a small-scale wind turbine at Site B (see Figure 3 below), atop the Dorset Peak ridgeline at roughly 3,200 feet. Butting up against the Vermont Land Trust, this location would receive the most consistent wind. Unfortunately, however, this site would also require large investments in powerline infrastructure as the turbine would need to be within 1,500 feet of a powerline to make it economically feasible. Investments in service roads would be required as well, and expensive legal fees could be accrued as such construction could impede on the Vermont Land Trust. Working on the Dorset Peak ridgeline could thus be excessively expensive due to site preparation.

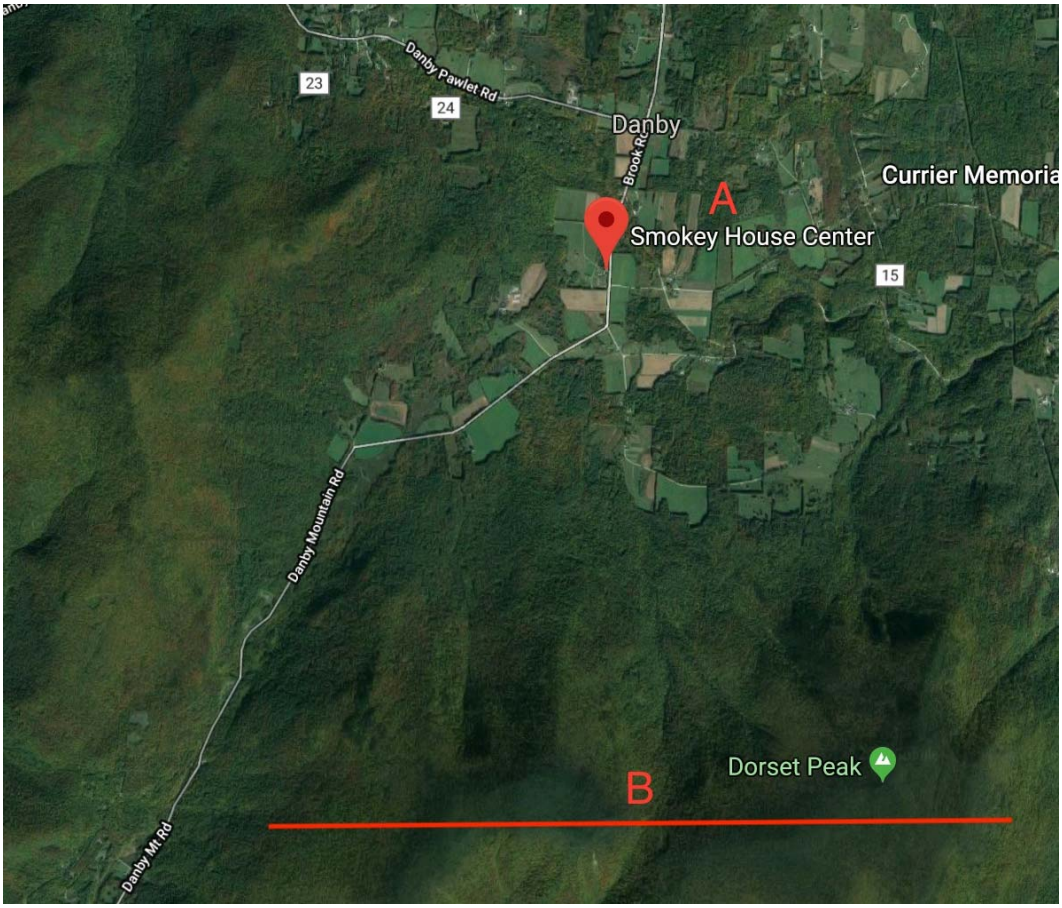


Figure 5.3

After discarding the Dorset Peak idea, we found a second, more viable location for a small turbine (see Site A above, Figure 5.3). Located in the middle of the valley at roughly 1,500 feet, the site would benefit from a strong wind current and is near enough to power lines to negate any significant investment into power connection. With an access road in place, close in proximity to power lines, and consistent wind, this site is optimal for construction. The only barrier to this location is that its currently on a forty-year lease to a farmer affiliated with SHC. It was agreed, however, that since this small wind project would only need .25 acres in total, the leased land could potentially be renegotiated and finalized with its tenant.

With an average wind speed of 12mph and the presence of single-phase energy distribution lines in the area, Vermont Green Energy Systems recommends Star Turbines as an

industrial partner. As such, the full cost of a 25-30 kWh Star Turbine is roughly $150,000. We were able to come to the conclusion that the 25-30 kWh turbine could produce roughly 100,000 kWh annually based on the average local wind speeds and proven efficiencies of the Star Turbine. Based off the Standard Offer Program's 20-year guaranteed buy-back price 25 cents per kWh, we can estimate an annual revenue of $25,000 from the turbines generating power. This leads to a mere six-year payback on the initial investment. In addition to the revenue from the Standard Offer Program, SHC would make an additional $268 per megawatt through the renewable credits they will receive from the energy they create. SHC will be able to hold onto these credits or sell them to another organization.

5.3.3 Financing

Clean Energy Development Fund (CEDF)

The CEDF offers low-interest loans to help finance a wide variety of clean and/or renewable electric energy technologies. The purpose of the program is to promote the development and deployment of cost-effective and environmentally sustainable electric power resources for the long-term benefit of Vermont electric customers. Eligible renewable energy systems include solar photovoltaic, solar thermal, wind, geothermal, farm, landfill, and sewer methane recovery, low-emission biomass, and CHP systems using biomass fuels such as wood, agricultural or food wastes, energy crops, and organic refuse-derived waste.

Investments for eligible projects range from $50,000 to $500,000 with a 2% interest rate (note that loan terms vary depending on project type). Loans may not be used for more than 90% of the cost of a project and all financing must be used for activities or assets directly related to the project. The CEDF is a great resource for SHC if they are looking for low-interest loans for their small wind project.

Rural Energy for America Program (REAP)

REAP helps agricultural producers and rural small businesses reduce energy costs and consumption by providing grants/loans to aid in the purchasing and installation of renewable energy systems and energy efficiency improvements on their property. Eligible systems may derive energy from wind, solar, hydro-electric, ocean, hydrogen, geothermal or renewable biomass (including anaerobic digesters). Renewable Grants range from $2,500-$500,000 (USDA, 2016). These grants are limited to 25% of a proposed project cost, and a loan guarantee may not exceed $25 million (USDA, 2016). The combined amount of a grant and loan guarantee must be at least $5,000 (with the grant portion at least $1,500) and may not exceed 75% of the project's cost. In general, a minimum of 20% of the funds available for these incentives will be dedicated to grants of $20,000 or less. Applications are accepted year round at the Vermont Department of Agriculture Rural Development.

Vermont Economic Development Association (VEDA)

This program consists of two different loan options: the Commercial Energy Loan Program and the Agricultural Energy Loan Program. The Commercial Energy Loan Program provides loans for up to $500,000 to finance 90% of the project with a fixed rate, and loans up to $2,000,000 to finance up to 60% of the project with a low variable rate. This program is open to any corporations (including non-profits) "planning to undertake a project for construction of or improvements to a renewable energy generating facility; to make energy efficiency improvements to an existing facility; and/or to adopt technologies that enhance or support the development and implementation of renewable energy or energy efficiency, or both" (https://www.veda.org/financing-options/vermont-commercial-financing/commercial-energy-loan-program). This program would be an attractive option if Smokey House were to pursue

admission to the Vermont Standard Offer Program because under that agreement, Smokey House would be operating as a commercial energy producer in the state of Vermont.

The Agricultural Energy Loan Program offers loans to eligible farmers to help with the financing of renewable energy generation projects. A farmer or business entity is eligible if they are "a Vermont resident who is engaged in agriculture or forest products businesses within the state and will help expand the agricultural economy of the state" (https://www.veda.org/financing-options/vermont-agricultural-financing/agricultural-energy-loan-program). Unlike the Commercial loan, which is only available to energy sellers, this loan can also go towards the financing of a residential system. This means that, were Smokey House to opt for a smaller system that only covered its own energy demand, financing would still be available through the Vermont Economic Development Authority. Additionally, the portion of the cost of the project that could be financed is negotiable and must be discussed with a VACC loan officer.

Property Assessed Clean Energy (PACE)

This is a financing option that allows property owners to borrow money from PACE to help pay for energy improvements. The money borrowed is generally repaid through an assessment on the property over a period of up to 20 years. This would be a good option if we end up finding that Smoky House does not have a big enough budget to support a wind project but still has the desire to do so.

Vermont Anemometer Loan Program

The mission of this program is to provide anemometer (wind measurement) equipment to Vermont residents who are considering the installation of small wind systems on their property. Smoky House will most likely not need to do this as we are having a wind and solar company

come and do a full assessment of the property. In the case that we do need to, we will be in contact with John Kidder who runs the program.

Vermont Working Lands Enterprise Initiative

While the 2018 applications have been submitted already, this could be an option for 2019. For 2018, there is approximately $750,000 available for investment into farm, food systems, forestry, and forest products enterprises and service providers. Funds will be disbursed in three investment areas: Business Grants, Service Provider Grants, and new this year, a Service Provider Partnership Contracting Pilot. Smoky House fits into the equation here because it would be focused on renewable energy infrastructure development and impact on the larger Vermont community.

Standard Offer Program (SOP)

The Standard Offer Program is a Power Purchase Agreement run by VEPP Inc. "a not-for-profit Vermont corporation that administers two of Vermont's renewable energy programs under contract with the Vermont Public Utility Commission". As part of this role, "VEPP Inc. acquires electric power from Vermont renewable resources and then distributes it to all 17 Vermont utilities on a pro rata basis" (http://www.vermontstandardoffer.com/about-vepp-inc/). In 2018, the Standard Offer Program quoted a rate of 28.5 cents per kilowatts hour for small-scale wind projects. When compared to the net metering program, where you only get 2 cents greater than your current utility rate, the Standard Offer Program has substantially larger incentives and paybacks. The SOP fixes the price that they will pay for the energy you create from your turbine for 20 years. This means that Smokey House would be able to easily forecast their payout period and profits in the future, as even if the market for energy fluctuates they will be locked into their price.

5.3.4 Taxes

SHC is a non-profit organization that is not required to pay any federal or state level taxes; this currently exempts SHC from any tax credits or tax breaks through a renewable energy project. However, SHC does have the opportunity to set up a for profit organization or utilize a current for profit organization (like the Yoder Farm) to legally purchase wind turbine, thus allowing them to reap the benefits of the renewable tax incentives. In this example, the Yoder Farm would apply for financing through the grants outlined above and would purchase the equipment under their name. They would then rent the .25 acres necessary for a small wind turbine from SHC for a minimal amount. SHC would then purchase the wind turbine back from the Yoder Farm in 6 years after the Yoder Farm had collected the tax breaks and incentives.

Vermont Renewable Energy Sales Tax

The Vermont state sales tax exemption applies to eligible renewable energy systems that generate electricity and are up to 250 kW in capacity. The current Vermont sales tax rate in Vermont is 6%.

Federal Residential Renewable Tax Credit

Taxpayers may claim a credit of 30% of expenditures for a renewable energy system that serves a residential dwelling in the United States. These expenditures include labor costs such as on site preparation, assembly and installation, and any wiring necessary to connect a system to the residence. If tax liability is exceeded by the federal tax credit, the excess credit can carry over to the following taxable year.

5.3.5 Conclusion

After VGES' site assessment, we feel confident that a small scale wind turbine is a very viable option for SHC. The Vermont Standard Offer Program (VSOP) would be the strongest

financing program for a project of this scale as it provides favorable fixed rates through a 20 year fixed rate power purchase agreement (with given rates of $0.285/kWh giving the lifetime of the PPA), generating roughly $350,000 in profit over that 20 year timeframe.

5.4 Solar

5.4.1 Overview

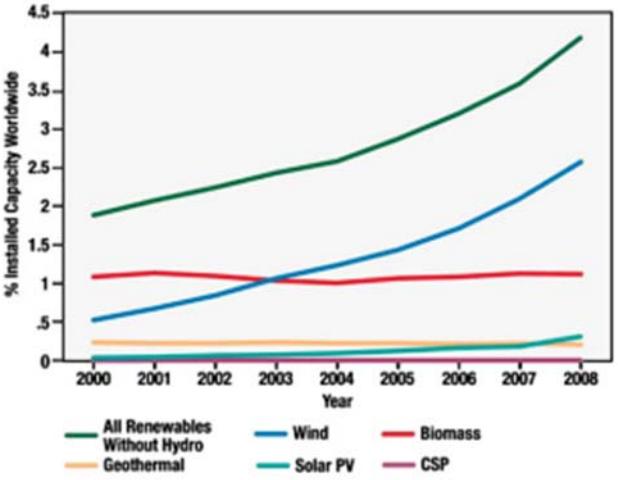


Fig. 1. Renewables as a percent of total installed capacity worldwide. Source: DOE (2009b).

Figure 5.4

Solar photovoltaic (PV) systems are composed of many PV cells, "semiconductor devices that convert solar energy into direct-current electricity. PV cells are interconnected to form a PV module, typically up to 50 to 200 W. The PV modules, combined with a set of additional application-dependent system components (e.g., inverters, batteries, electrical components, and mounting systems), form a PV system" (Ellaban et al., 2014).

While it still trails wind in terms of installed capacity worldwide (Figure 5.4), solar has more recently seen a big drop in its price-point, and thus a massive spike in popularity (see Figure 5). In 2010 alone, "almost 17 GW of new photovoltaic (PV) power was installed worldwide … [which]

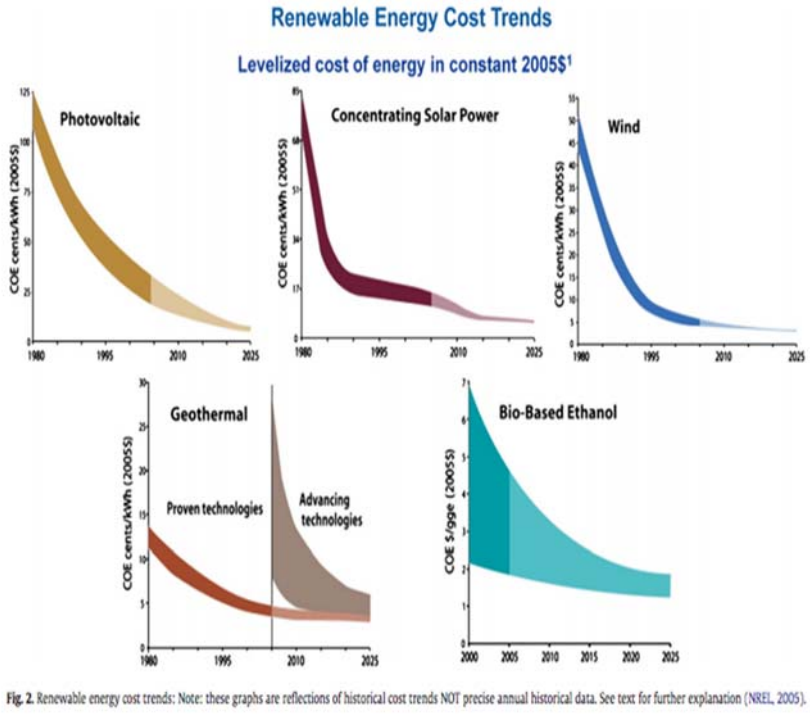


Fig. 2. Renewable energy cost trends: Note: these graphs are reflections of historical cost trends NOT precise annual historical data. See text for further explanation (NREL, 2005).

Figure 5.5

represented a 250% increase relative to 2009" (Reichelstein and Yorston, 2012). Much of this installation is due to the emergence of commercial solar-farms (large operations that produce and sell energy using PV arrays), but the increased popularity (and associated decrease in cost of PV technology) has opened the door for residential solar as a realistic competitor to traditional fuel sources.

At Smokey House, solar has the potential to provide the campus with all of its electricity needs (roughly 35,000 kWh/year) through the use of ground-mounted solar panels. In addition to reducing Smokey House's energy cost significantly, the installation of a solar array on the SHC campus would be accompanied by a number of positive externalities affecting both the environment and local community. For example, by placing the array near the main campus, it would allow for passersby to see that Smokey House Center is entail to provide the campus with all of its electricity needs (roughly 35,000 kWh/year) through the use of ground-mounted solar

panels. In addition to reducing Smokey House's energy cost significantly, the installation of a solar array on the SHC campus would be accompanied by a number of positive externalities affecting both the environment and local community. For example, by placing the array near the main campus, it would allow for passersby to see that Smokey House Center is planning for its energy future, and help to spark a larger movement towards renewables in Danby.

It is important to understand the barriers to entry for solar energy when considering installing solar panels on your property. The price-point of different technologies relies heavily on the incentives and government policies that exist, as well as different market and manufacturing trends. As you can see from the above chart (Figure 5.6), renewable energy expansion depends upon a wide variety of factors, including resource value, utility pricing, government policy, environmental benefits, and most importantly, the financial sector.

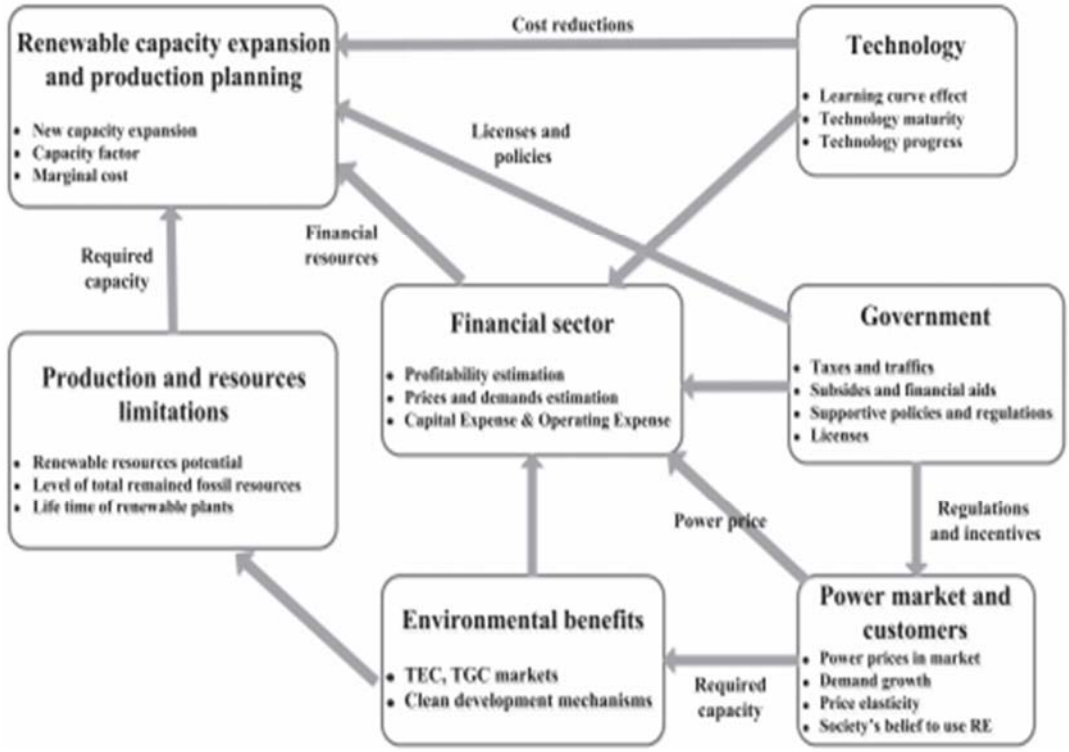


Figure 5.6

5.4.2 Costs

Based on a site assessment done by SameSun solar in 2016, the estimated cost of installation for a ground-mounted array at Smokey House is $3.32/watt of installed capacity. The cost of constructing an 18,000 watt-array (which would produce roughly 20,000 kWh/year, or 2/3 of Smokey House's energy demand) is $59,800. While this is the array-size included in the report by SameSun, Smokey House has ample space to install a larger array, and thus produce greater amounts of energy. Based on the $3.32/watt figure, a 30,000 watt array producing roughly 35,000 kWh/year would cost $102,392.12 to install, but would produce enough energy to cover the entire Smokey House energy demand, as well as additional power in sunnier months (the summer). These quotes include the following in their cost-calculations: cost of equipment, delivery of equipment, installation of panels and inverter (including all electrical wiring), net-meter installation and permit application, as well as any additional permits required for construction. The array constructed by SameSun would be covered by a one year monitoring warranty and a five year guarantee on all work that is not monitoring.

5.4.3 Financing

Vermont Standard Offer Program[5]

While this program does not provide any financing upfront, it would lock Smokey House Center into a 25 year fixed-rate power purchase agreement, meaning that the power produced on the property using solar would be sold to VEPP Inc. at $0.13/kWh for 25 years. Given that the cost of solar production is bound to decrease, and thus net metering rates will fall, a fixed-rate contract could provide Smokey House with a significant profit in the future.

[5] See section 5.3.3 for general information regarding the Standard Offer Program

Assuming that Smokey House opted for the larger array, the payback period would be determined by the amount of energy sold to VEPP Inc., as well as the sale of Solar Renewable Energy Credits (SRECs) in out of state markets (given that VT does not currently have a marketplace for the trading of SRECs). Based on the roughly 35,000 kWh/year produced from a system of this size, Smokey House would generate $4,557.41 annually in energy sales, and $9,380 annually from the sale of SRECs (based on the 2018 price of SRECs in Massachusetts http://www.srectrade.com/srec_markets/massachusetts). This means that a 30,000 watt array would generate $13,937.41 annually in revenue, leading to a payback period of roughly 8 years. After that, Smokey House would benefit from 17 years of fixed-rate energy sales, leading to a lifetime profit of $77,475.97 for the array over 25 years.

VEDA[6]

Given that the VEDA loans are available for both commercial and residential applicants, this could be a good financing option were SHC to decide that solar is the best option. Loans are available for up to $500,000 with a fixed rate to pay for 90% of the project cost, meaning that $92,152.90 of the $102,392.12 could be financed. Given the roughly $14,000/year generated by a system of that size through the Standard Offer Program, Smokey House could repay that loan within 7 years. With net-metering at $0.20/kWh for 10 years, Smokey House could repay the loan within 6 years.

Vermont State Wide Solar Adder

Recognizing the peak power savings of net metered solar, the new law creates a financial incentive to catalyze more net metered solar by requiring utilities to offer a 20-cent credit to solar

[6] See section 5.3.3 for general information regarding VEDA

customers for the energy they produce. Modeled after Green Mountain Power's SolarGMP program, utilities will be required to issue an additional credit on top of the base residential per kWh credit that solar customers already receive (to make a total of 20 cents per kWh).This means that for every kWh your system generates, you get credited 20 cents per kWh. Customers are awarded the per kWh customer credit for a 10 year period.

5.4.4 Taxes[7]

While Vermont does not offer a state tax break for solar PV installations, the federal tax credit still applies, as well as the state sales tax exemption for solar equipment purchases. Assuming that Smokey House were able to work around its non-profit status to claim the federal tax credit, the cost of installation for a 30,000 watt system would go from $102,392.12 to $71,674.48. This system would still continue to generate roughly $14,000 in revenue annually, and thus the payback period would only a little over 5 years. This means that, were Smokey House to enter into the Vermont Standard Offer Program, it would have nearly 20 years of energy sales at $0.13/kWh, and if it were to net-meter, it would have 5 years of guaranteed energy sales at $0.20/kWh.

5.4.5 Conclusion

Though solar has a proven track record of success throughout VT and NH in recent years, we do not think it is necessarily the best technology for Smokey House Center to pursue when compared with the other options we have present in this chapter (specifically, wind and weatherization). Though Smokey House has ample space to construct a ground-mounted solar array that could provide them with energy, the financing options available in Vermont strongly

[7] See section 5.3.4 for a full breakdown of tax credits and exemptions

incentivize wind over solar, with much higher wind prices for fixed rate PPAs. However, it is important to note that, on its own, solar is still a realistic and profitable technology available to Smokey House. For example, if the installation of a wind turbine is problematic for Smokey House due to environmental complications, a ground mounted solar array on the campus could provide Smokey House with over 30,000 kWh annually, leading to a lifetime profit of close to $80,000. Additionally, if enrollment in the Vermont Standard Offer program does not occur, and thus Smokey House does not lock itself into a fixed rate energy sale contract, solar could emerge again as a competitor to wind with regards to net metering rates. With the Vermont Solar Adder program, Smokey House could net meter its additional energy at $0.20/kWh for ten years. Lastly, it is important to note that renewable energy is emerging as a norm throughout Vermont, and by constructing a solar array on its campus, Smokey House could join the thousands of Vermonters who have already gone renewable, furthering its mission of community leadership and innovation.

5.5 Micro-Hydro

5.5.1 Overview

Hydropower is the world's leading renewable energy resource and the oldest method for harnessing clean power—the first waterwheels were used over 2,000 years ago. Today, hydropower represents about 17% of total electricity production and 90% of total renewable power production in the US (IEA, 2017).

Micro-hydro systems generate less than 100 kW and are "run-of-the-river" operations that do not involve large dams or water storage reservoirs, so they create very little impact on the local ecosystem. These installations can provide power to an isolated home or small community, or are sometimes connected to electric power networks, particularly where net metering is

offered. Water from the stream is channeled into a pipeline to gain enough head (vertical drop) to power the system (Cunningham and Woofenden, 41). The water passes through a nozzle, where it accelerates, strikes the turbine wheel and turns the generator shaft. The amount of power produced depends on the "head" and "flow" from the water source, which will be explained in further detail in the 'costs' section.

Hydropower offers a number of economic and environmental advantages as compared to other energy sources. For one, hydropower is fueled by water, so it is a clean fuel source, meaning it will not pollute the air like power plants that burn fossil fuels, such as coal or natural gas. Furthermore, micro-hydropower does not have the manufacturing externalities that other renewable energy options have. For instance, the PV cell manufacturing process includes a number of hazardous materials, most of which are used to clean and purify the semiconductor surface (Union of Concerned Scientists, 2013). These chemicals include hydrochloric acid, sulfuric acid, nitric acid, hydrogen fluoride, 1,1,1-trichloroethan, and acetone. The costs of this pollution are not reflected in the price of solar panels.

In addition to being the cleanest renewable option, the second advantage of micro-hydro is that it is a domestic source of energy, allowing individuals to produce their own energy without being reliant on international fuel sources or the US power grid. Some experts claim that the United States electrical grid is on the edge of failure (Bashan et al, 667). Arguably, hydro projects would not unbalance the load of the grid like solar or wind does. For instance, if the grid collapses the intermittency of solar would make it theoretically less valuable than hydro simply due to its requirement for back up batteries.

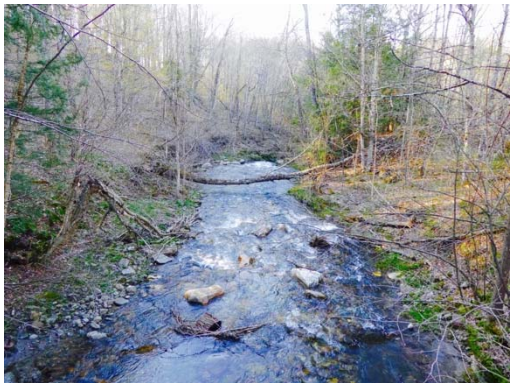
Third, and perhaps the most important thing that separates hydro from other renewable energy options, is that hydro's 24-hour full output power generation. Given appropriate stream

size and flow rates, micro-hydro has a continuous operation day and night under any wind conditions (unlike solar plants or wind turbines) and every day, seasonal changes can be anticipated (more water during the winter season and the spring season, less water during the summer season, for example). For reference, a solar array only has a 6 hour per day average full output. The same wattage installation would produce four times more power than solar—more energy than a household or farm typically uses.

In the past, small hydro was a critical drive for all kinds of small industries (Barg, 1). Vermont itself had many small hydro plants. In 1898, for example, there were 74,376 hydropower water wheels in the state, equal to 55 MW. Most of these plants were providing direct mechanical power to run saw, grain, or weaving mills but some were converted to producing electricity. However, regulation has made it extremely difficult to develop hydropower, specifically small hydro. Hydro is the only renewable with extensive regulatory requirements. Pursuant to section 23(b)(1) of the Federal Power Act (FPA), hydropower projects must be licensed, or granted an exemption from licensing, pursuant to the FPA (FERC, 2018). A small hydro project of 10 MW or less may be eligible for a 10-MW exemption. However, even with an exemption, approval is needed from several agencies, including (Barg, 1):

- Vermont Department of Environmental Conservation—Dam Safety, Water Quality Division, Hydrology Wetlands, Lakes, River Management
- Vermont Department of Fish and Wildlife—Fisheries, Wildlife, Non-game and natural heritage
- Vermont Division for Historic Preservation
- Vermont Public Service Board
- Vermont Department of Public Service
- U.S. Fish and Wildlife Service

At the Smokey House Center, there are multiple sites where very simple stream diversion, open channel canal, and short penstock to a powerhouse could generate 5,000 to 10,000 W. Mill Brook, with a major branch originating on Smokey House owned land, would be a much more valuable investment for hydro power than the Yoder's 2017 micro-hydro project.



The proposed micro-hydro site, Mill Brook

5.5.2 Costs

There are six parameters to consider in an assessment (Yoder Interview, 2018):

1. "Flow" and how it may vary over a year
2. Water storage volume, if any
3. "Head" and estimated friction loss from canals and pipes
4. Distance of generator to the load center or grid connection if net metered
5. Construction issues like slope stability, flood protection, etc.
6. Type of load if not net metered or grid connected

Bob and Ryan Yoder measuring head while conducting a site assessment at Mill Brook (5/7)

The production range is calculated in terms of "head" and "flow" (US Department of Energy, 2012). The higher each of these are, the more power available. Hydraulic "head" is the pressure measurement of water falling in a pipe expressed as a function of the vertical distance the water falls. A drop of at least 2 feet is required or the system may not be feasible. When quantifying head, both gross and net head must be considered. Gross head approximates power accessibility through the vertical distance measurement alone whereas net head subtracts pressure lost due to friction in

piping from the gross head. “Flow” is the actual quantity of water falling from a site. Power can be calculated with the following equation:

$$Power\ (W) = Head\ (ft)\ x\ Flow\ (gpm) \div 10$$

5.5.3 Mill Brook Assessment

An overview of the proposed micro-hydro project at Mill Brook is shown below (Figure 5.7):

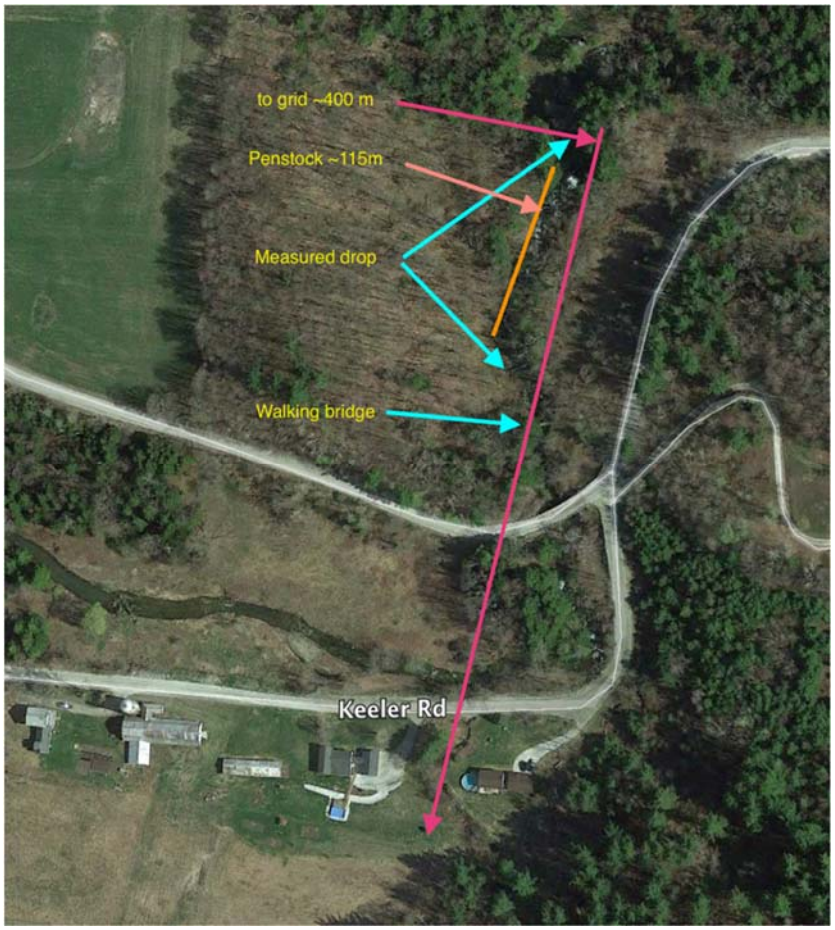


Figure 5.7

We estimate that a micro-hydro project at the Mill Brook site will cost roughly $80,000. Project expenditure is summarized in the table below:

Micro Project (as built cost)	
Penstock Pipe	$1,000
Powerhouse with 2 turbines and generator	$40,000
Powerline and electrical installation and grid sync equipment	$10,000
Design and labor	$20,000
Miscellaneous	$9,000
Total Cost Of Hydro Project + Design & Management	**$80,000**

Table 5.4

We estimate that a micro-hydro project at the Mill Brook site will generate 105,030 kilowatt-hours per year. Projected power generation is summarized in the table below:

Flow		$Power\ (W) = 40ft\ x\ Flow \div 10$			
		W	kW	kWh/day	kWh/month
3 months low flow	2,647 gal/min	10,588	10.6	254.1	7,623
9 months regular flow	3,170	12,680	12.7	304.3	9,129

Table 5.5

$$\boldsymbol{Annual\ Power = (3\ months\ x\ 7,623\ kWh/month) + (9\ months\ x\ 9,129\ kWh/month) = 105,030\ kWh}$$

$$\boldsymbol{Annual\ Savings = 105,030\ kWh\ x \frac{\$0.155}{kWh} = \$16,280}$$

5.5.4 Financing

Unfortunately, micro-hydro systems are not eligible for many of the same financial incentives as other renewable energy systems. One potential avenue for financing, however, is REAP. The Rural Energy for America Program is intended to promote energy efficiency and renewable energy development. Since the proposed micro-hydro project is less than 30 kW and is a diverted run-of-river water system, it could receive a REAP grant. The available funding and loan guarantee terms are outlined below:

- Available funding:

    - Loan guarantees on loans up to 75% of total eligible project costs
    - Grants for up to 25% of total eligible project costs
    - Combined grant and loan guarantee funding up to 75% of total eligible project costs
- Loan guarantee terms:
    - $5,000 minimum loan amount
    - $25 million maximum loan amount
    - Up to 85% loan guarantee
    - Rates and terms negotiated with the lender and subject to USDA approval
    - Maximum term of 15 years, or useful life, for machinery and equipment
    - Maximum term of 7 years for capital loans
- Renewable energy system grant terms:
    - $2,500 minimum
    - $500,000 maximum
- Additional requirements
    - Provide at least 75% of project cost if applying for grant only
    - Provide at least 25% of project cost if applying for loan, or loan and grant combination
    - Projects greater than $200,000 require a technical report

We assume that the Mill Brook project is eligible for a REAP grant that would cover twenty five percent of the project's cost. If Smokey House received a $20,000 REAP grant and energy production was 105,030 kilowatt-hours per year, the payback period would be 3.7 years:

$$Payback\ Period = \frac{\text{Combined Costs}}{\text{Annual Savings}} = \frac{\$80{,}000 - \$20{,}000}{\$16{,}280} = 3.7 \text{ years}$$

Mill Brook has better potential than the Yoder Farm's spring sourced hydro, which generates 8,760 kilowatt-hours per year. In other words, at only 1.8 times the cost of the Yoder Farm's project, we estimate that Mill Brook will generate nearly twelve times the power.

5.5.5 Conclusion

Following the site assessment performed by our group and the Yoders, we estimate that a micro-hydroelectric project on Mill Brook would cost approximately $80,000. Assuming the

project received a REAP grant of $20,000 and our estimated annual power generation of 105,030 kW is accurate, the project would have a payback period of 3.7 years. In addition, at only 1.8 times the cost of Yoder Farm's 2017 micro-hydro project, we estimate that Mill Brook would generate nearly twelve times the power. Despite this, however, we feel the high upfront cost, limited loan/grant programs available, and potential for ecological disruption limit micro-hydro's potential for SHC. When compared to the upfront investment and payback periods of insulation or small-scale wind, for example, the $80,000 cost for micro-hydro is tough to justify.

5.6 Aquaponics

5.6.1 Overview

To further Smokey House Center's (SHC) triple mission of education, agriculture and conservation, the adoption of small-scale aquaponics, the innovative fusion of aquaculture and hydroponics, provides Smokey House with a unique opportunity. While a small-scale system wouldn't generate any noticeable increase in revenue, its presence could serve as an educational exemplar for visiting students and local farmers. A perfect model for the natural, efficient, and symbiotic relationships found in ecologically closed-systems (closed aside from the daily input of fish food, anyway), aquaponics has serious educational potential. Lessons in data measurement, nutrient cycling, photosynthesis, symbiotic relationships, pH monitoring, and closed loop systems are just a few examples of what aquaponics curriculum could entail. In addition, for local farms such as the Yoder Farm, this demonstration could spur larger-scale change.

Indeed, the beauty of aquaponics lies in its scalability. From a single-tank experiment to a commercial-scale operation, careful measurement is all it takes to balance the nutrient production from aquaculture and the nutrient uptake from hydroponics. For the most part, water quality instruments are cheap and accurate; detecting nitrate or ammonia levels has never been easier. Furthermore, while small-scale aquaponics generally caters towards herbs, mints, and microgreens, commercial-scale operations can branch out into larger, more profitable crops such as lettuce and kale (Figure 5.8). For our purposes at Smokey House Center, however, a small-scale, educational system will remain this paper's focus.

Figure 5.8 *Commercial-scale aquaponic system at The Island School, Bahamas*

Aquaponics is currently "experiencing a period of rapid growth… [it] is now being practiced in at least 43 countries around the world and on every continent" (Love, 2014). Remarkably easy to construct, the biochemical mechanics of the closed-loop system are relatively straightforward. In a symbiotic environment, water-cultivated plants (lemongrass, basil, mint, for example) filter the byproducts of marine life (most often tilapia) via nitrification, absorbing vital growth nutrients in the process. That newly filtered wastewater then circulates back to the aquaculture tank by electric pump, providing the fish with clean, ammonia-free water. Compared to conventional farming techniques, this nutrient recycling consistently leads to both higher qualities and quantities of crops. Indeed, higher quality crops are naturally cultivated in nutrient-rich wastewater, thereby stimulating healthy growth without the use of harmful

chemicals that sacrifice sweetness for size. In addition, because aquaponics farms allow for multiple harvests with no risk of soil erosion, the overall level of biomass is greater as well.

Aquaponics' cost effectiveness, however, may prove its biggest advantage over conventional farming techniques. Because traditional aquaculture consistently suffers from an excess of nitrates and ammonia, high filtration and monitoring costs are incurred within months. Hydroponics, with its careful nutrient monitoring, suffers a similar fate. Modeled after the symbiosis of natural ecosystems, however, aquaponics systems solve this issue by allowing the natural nitrification services of plants to alleviate any nutrient (fish waste) buildup, spurring rapid crop growth simultaneously. Thus, by bypassing conventional monitoring and waste management costs, aquaponics has been able to demonstrate its cost effectiveness across the nation (Goodman 2011, Love et al. 2014, Buzby and Lin 2014).

5.6.2 Costs

For a single-tank system, we estimate the initial construction cost at roughly $550. This figure assumes Smokey House Center has none of the necessary materials on hand, and is unable to retrofit any existing structures on the property (old water tanks, piping, cordage, mesh, etc). The cost breakdown is as follows:

1) Water Tank ($400 at Home Depot for a 300-gallon tank)
    a. https://www.homedepot.com/p/Rubbermaid-Commercial-Products-300-Gal-Stock-Tank-RCP4247BLA/206196760?MERCH=REC-_-PIPHorizontal1_rr-_-206196759-_-206196760-_-N
2) PVC Piping ($40 at Home Depot for 20ft, 4in diameter, $3 at Home Depot for 10ft, .5in diameter)
    a. https://www.homedepot.com/p/4-in-x-10-ft-PVC-Sch-40-DWV-Plain-End-Pipe-531103/100156409
    b. https://www.homedepot.com/p/1-2-in-x-10-ft-600-PSI-Schedule-40-PVC-Plain-End-Pipe-530048/100113200?MERCH=REC-_-PIPHorizontal2_rr-_-202280936-_-100113200-_-N
3) Pressure-Treated Wood ($10 at Home Depot for 8ft, 4x4in)

    a. https://www.homedepot.com/p/4-in-x-4-in-x-8-ft-2-Ground-Contact-Pressure-Treated-Southern-Yellow-Pine-Timber-194354/205220341
4) Mesh ($7 at Home Depot for 5x2ft)
    a. https://www.homedepot.com/p/Everbilt-1-2-in-x-2-ft-x-5-ft-19-Gauge-Galvanized-Steel-Hardware-Cloth-308221EB/205960835
5) Gravel ($0)
6) Rope ($7 at Home Depot for 100ft)
    a. https://www.homedepot.com/p/CORDA-1-4-in-x-100-ft-Diamond-Braid-Polypropylene-Rope-DB014100PP/206409453
7) Electric Water Pump ($25 on Amazon for 400GPH)
    a. https://www.amazon.com/gp/product/B003UXBGTI/ref=as_li_qf_sp_asin_il_tl?tag=has00720&ie=UTF8&camp=1789&creative=9325&creativeASIN=B0049XENYS&linkCode=as2&th=1
8) Designated Plants (variable, less than $3 per plant)
9) Designated Fish ($1.25 per Tilapia at Tilapia Depot)
    a. https://tilapiadepot.com/collections/blue-tilapia

Because the bulk of the cost is centered on the water tank ($400), retrofitting an extisting container for the project dramatically lowers its overall cost. In addition, the number and species of plant and marine life chosen will considerably impact the overall cost as well. While this model assumes roughly ten herbs at $3 per plant and roughly ten tilapias at $1.25 per fish, Smokey House may opt for a different strategy. Choosing expensive plants or altering the overall quantity of tilapia will impact the system's cost accordingly.

For a single-tank system geared towards education over commercial viability, we propose an original design. Constructed during a group member's semester abroad at The Island School, Cape Eleuthera, Bahamas, the design effectively blends functionality with hanging-garden aesthetics (see photos below):

Made up of three vertically-strung pipes, the system uses gravity to trickle nutrient-rich water to the tank. Not only does this save energy (only a single electrical water pump is used to bring the tank water up to the highest pipe), but the constant streams of water hitting the tank's surface act as an aeration device, thereby negating the need for an oxygenator air pump. A clear, open-top tank allows for lots of sunlight, and each level of hydroponic plants offers a different herb for students to take at their leisure. While complicated at first glance, this system is actually quite easy to construct. Within a few days, the various components can be assembled. The following step-by-step guide explains how:

Step-by-Step Construction Guide

1) Cut PVC pipes in half, forming three half-cylinders roughly the length of the water tank.
2) Seal pieces of pressure-treated wood to each open end of the PVC pipes to prevent leakage.
3) Drill four to five evenly spaced half-inch holes along the bottoms of the PVC pipes. Seal half-inch PVC piping into these holes to facilitate water drainage between pipe levels.
4) String pipes up with rope vertically hanging over the water tank as depicted below.
5) Fill the PVC piping roughly ¾ full of gravel to facilitate plant growth.
6) Line the bottom of the water tank with a layer of gravel and mesh to allow beneficial bacteria to take hold, serving as a natural bio filter. Cover the top of the water tank with mesh to prevent fish from jumping out.

7) Install the electric water pump from the base of the water tank to the highest PVC pipe.
8) Fill the water tank with water and fish, begin circulating the water, then add in the chosen plants to the PVC piping. Lemongrass, Basil, Mint, Parsley, and other herbs tend to work best.

For its educational value, cost effectiveness, chemical efficiency, and potential for scalability, aquaponics makes strategic sense for Smokey House Center. Across the nation, countless schools have already integrated small-scale systems into their curriculums; we list two institutions below that have successfully maintained aquaponics systems for reference. The first, The Island School, located in Cape Eleuthera, Bahamas, operates both small-scale and large-scale systems to feel their 60+ students and staff. While the large-scale system churns out lettuce and tilapia, the small-scale system provides herbs and microgreens. To reach this school for advice in scaling their own system, Smokey House can call 242-334-8551, or email info@islandschool.org. The second institution we offer is Dartmouth College itself. At Dartmouth's Organic Farm, located roughly ten minutes from main campus, the O-Farm has been practicing aquaponics for years. Boasting a multi-tank (though not quite commercial-scale) system, the O-Farm, like The Island School, effectively grows a variety of lettuce and tilapia. For more information, Smokey House can contact Dartmouth.Organic.Farm@dartmouth.edu or visit the site directly at 102 Lyme Road, Hanover, NH 03755.

5.6.3 Conclusion

As an educational model for energy efficiency, nutrient cycling, and sustainable farming, small-scale aquaponics could prove useful for SHC. At only $550 in total cost, by far the cheapest technology in comparison to insulation, wind, solar, or micro-hydro, aquaponics is economically attractive as well. In addition, that $550 can easily be reduced by recycling farm materials SHC is likely to have on hand; retrofitting an existing tank or finding one at a junkyard

would save roughly $400 alone. Cheap to purchase, simple to construct, and easy to maintain, aquaponics is a clear winner in our minds.

5.7 Conclusion

While the implementation of any of these five technologies would be beneficial to the Smokey House community (defined as the central campus (Hillyard, Herrick, Barn Conference House), the nearby Yoder Farm, and visiting student groups), we believe weatherization, wind, and aquaponics demonstrate the most promise. We have chosen wind over solar and hydro because of its favorable fixed rates offered for energy sale via the Vermont Standard Offer Program (VSOP), as well as the limited amount of land-use necessary for a small-scale wind operation. Because the VSOP offers a 20 year fixed rate power purchase agreement, it is important that SHC chooses whichever technology will provide them the most long-run profit, and given the rates of $0.285/kWh and $0.13/kWh for wind and solar respectively, it makes most sense to choose wind as the renewable energy alternative at SHC. This means that over the lifetime of the PPA, wind would generate roughly $350,000 where solar would generate only $77,000. Additionally, a solar array producing roughly 35,000 kWh annually would occupy a larger amount of space than would a small wind turbine from Star Turbines, which only requires a quarter acre for its concrete pad. Given the conservation driven nature of Smokey House Center, and the importance of the land for agriculture, it is in the best interest of SHC to opt for a technology that leaves more of the ground open to additional usage. Under this assumption, aquaponics and weatherization provide minimal disruption to the surrounding land and ecology. While both technologies achieve different goals (one in education, one in cost savings), their comparably small footprint and fast payback periods make them ideal choices for SHC.

Chapter Six
Communicating Smokey House Center's Message

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6.1 Introduction

Since its founding in 1974, Smokey House Center (SHC) has received income from a mixture of public support and large private grants to put towards developing programs and projects for the community. Ever since the land was transferred from the Taconic Foundation, SHC has benefited from regular income from its over $4 million endowment. The 2008 financial crisis caused their annual fund to dramatically decrease, requiring them to vamp up their outreach strategy. It is currently a very crucial time for the livelihood of SHC, as they must begin to operate as a traditional non-profit organization. They have worked to develop a relatively robust fundraising effort that included major donor management, donor databases, and mailings, but then took a 3-year hiatus. In 2013, SHC relaunched their outreach campaign to regain community support, and hired a consultant that helped revamp their website. With the help of a professional photographer and web team, SHC started a print newsletter and annual appeal letter. Smokey House receives a handful of online donations each year, but hard copy letters are the main source of income. Because of this, and because their database software is no longer functioning, they sent their annual appeal letters out as hard copies to their mailing list, which slowly grew from approximately 1700 to about 2500 in 5 years. Because snail mail is not as efficient or modern as online outreach, SHC worked to build up an e-news cadre of about 600 people, with a smaller subset of that group which receives “Community Farm” newsletters. They also have a “Friends of Smokey House” email list with 70 members, whom SHC considers their closest ambassadors and supporters. SHC launched their Community Farm in 2016 and their Summer Camp in 2017 in an effort to not only develop their organization and connect with more community members, but also to increase their fundraising base.

Due to their lack of fundraising experience, SHC never had to develop or publicize a strong mission statement; the majority of their day to day work centered around providing programs for the local community. As such, they are now lacking the level of outreach, materials, and overall vision required to attract donors. With an annual operating budget of more than $300,000, and an annual income of only $15,000, SHC needs more major donors to supplement grants because they are typically restricted to specific projects and are not usually relied on for annual budget relief. They need to make monumental strides in order to achieve their goal of reaching an annual income of $500,000.

Our group worked with SHC to help them better engage former program participants, as well as new supporters, by developing outreach and communications materials geared towards fundraising. At the moment SHC is understaffed, which limits their ability to grow and improve. In light of this, our vision revolved around working with them to build up their communications strategy. In addition to doing research about Community Based Participatory Research theories, message framing theories, outreach strategies, and interview techniques, we also reviewed a few case studies of non-profit organizations that have the same mix of capital costs and program ambitions as SHC. This allowed us to effectively decide the most suitable methods of outreach communication, enabling us to frame our outreach materials with a compelling message that resonates with our intended audience. We created material that 1) specifically advertised SHC's participation in Vermont Gives Day, a 24-hour day of giving that raises money and recognition for Vermont's non-profits, and 2) more generally aims to increase local community involvement with SHC, and therefore, builds their fundraising base to allow them to be able to financially support their future growth. In order to achieve success with SHC's Vermont Gives Day fundraising campaign, we produced a newspaper ad, a press release, SHC's profile page on the

VGD website, social media posts, a video, and new graphics. Our outreach materials that aim to enhance SHC's general fundraising strategy include the creation of the SHC Alumni Facebook Group, and our proposal to SHC to create a donor recognition board.

Our outreach materials aim to communicate SHC's conservation, agriculture, and education efforts, placing an emphasis on their educational programs to evoke more interest from the audience by sending the message that SHC is not only committed to sustainable food production and long-term land conservation, but also providing meaningful, hands-on, experiential education. We then analyze the effectiveness of the outreach materials we produced Vermont Gives Day and summarize the findings for SHC to implement in their 50th anniversary fundraising campaign in 2024. Overall, we recommend that SHC remain persistent in sharing the importance of their work with the local community, and that they hire young social media savvy interns to modernize their outreach strategies.

6.2 Literature Review

While preparing to work with Smokey House Center, our group reviewed the work of several experienced professionals in the communications field. Understanding CBPR theories, message framing theories, outreach strategies, interview techniques, and case studies of other successful non-profit organizations similar to SHC allowed us to effectively frame our outreach materials with a compelling message that resonates with our intended audience, and decide which methods of communication were best.

6.2.1 Community Based Participatory Research

Reciprocity, defined as an ongoing process of exchange with the aim of establishing and maintaining equality between parties, is very important for successful and ethical CBPR (community based participatory research). Most researchers tend to embrace the "expert"

perspective, taking on an objectivist stance, which often hinders social interdependencies between the researchers and the community partners. By taking a reciprocal approach to this partnership, community partners are valued as equal contributors to the research project. Practicing reciprocity emphasizes "active consultation with the goal of establishing a working relationship that can be beneficial to all parties involved (American Anthropological Association, 1998). Although reciprocity has not often been emphasized as an essential part of research, these types of transparent social relationships are fundamental to the success of a project. It is not only necessary to accomplish research in an ethical manner, but it is also invaluable because "the process of negotiating priorities and learning what study participants expect to obtain from cooperating with researchers reveals valuable cultural knowledge" (Maiter, 308). In other words, important cultural knowledge would not be accessible to the researchers without the establishment of a collaborative and reciprocal relationship with the community partners. Reciprocity ensures that the community members benefit from the relationship, in addition to establishing the trust and respect necessary for effective communication and partnership. The researchers must also appreciate the value of the cultural knowledge the community partners hold, particularly knowledge that the researchers cannot attain because of their "outsider" status.

Maiter et al. (2008) emphasizes the importance of taking a collaborative approach, rather than a confrontational approach, because it encourages smooth cooperation and limits tensions between groups, and if tensions do arise, having a collaborative relationship helps to reduce them before they grow. Giving the community partners power within the relationship to define their own terms and have their perspectives not only heard but listened to is crucial.

6.2.2 Message Framing

An effective mission statement describes an organization's fundamental, unique purpose. Uniqueness is important because that is what sets it apart from other organizations with the same general goals. According to Ireland and Hitt (1992), mission statements should 1) indicate what the organization intends to accomplish, 2) reflect the philosophical premises that frame their actions, 3) explain the organization's motivation, general direction, character, and attitude, which shapes their work, and 4) inspire. Once crafted, an organization's mission statement becomes their foundation that provides them a base to build upon.

Most of the well-developed mission statement models come from the private sector, focusing on markets, customers, and competition. These models, however, are not transferable to non-profit organizations for two reasons: 1) they have multiple, non-financial objectives, 2) they rely on revenue from sources other than customer purchases, so there is no risk cushion to fall back on, 3) they cater to multiple groups of people, including people who are often not the ones who donate, 4) they have the option to either collaborate *or* compete with competitors, and 5) they garner more public attention, both positive and negative, than the average business. These are all things that set nonprofits apart from other organizations, which reiterates the idea that it is important for them to deliver a strong, persuasive message to their audience (Gallagher and Weinberg, 2007)

The more people they can reach and persuade with their mission statement, the more their community involvement and fundraising base will grow (Moore, 2000). Non-profit organizations with strong mission statements are typically more successful than those with weak or general missions. A well-designed mission statement is linked to better organizational performance, according to Kirk and Nolan (2010) because "it provides a framework for decision making,

influence over staff and volunteer motivation, and mechanism for signaling organizational legitimacy to stakeholders."

The Message Box, developed by Compass Science Communication in 2017, is a simple, versatile tool that helps communicators sort information into five categories: the issue, the problems, the "so what?", the solution, and the benefits (see Appendix). The "issue" section is a quick and clear statement giving the broad context of what you are trying to address. It is important that the topic is broad enough to allow for discussion, without being so broad that specific problems and solutions cannot be determined. The "problem" section is a place to identify a specific part of the broader issue that the work seeks to address. Most issues have multiple problems, so it is important to prioritize what issues are most pressing for the audience. In order to determine this, a great deal of thought should be placed on the "so what?" section, a place to work through why the work is important and why the audience should care by demonstrating how the work aligns with their interests, goals, and needs. This section requires an understanding of the audience that is best gained by asking them questions and learning what they care about. It is best in this section to stick to 3-5 ideas, so as not to overwhelm the audience or appear disingenuous. Next, the "solutions" box is a place to develop ideas that address the problem. This section can include multiple ideas, provided that they are relevant and concise. The "benefits" box should include the good that can come from implementing the suggested solutions. This section may be similar to the "so what" box and may range from immediate benefits to long-term outcomes. Ultimately, the message box is a useful tool for distilling thoughts to allow for meaningful communication with a given audience. For more information about The Message Box activity: https://www.compasssscicomm.org/the-message-box-workbook.

When an organization is in the process of determining what aspects of their work will persuade the most people to become involved, they must do research about their audience, as mentioned above. The most distinguishing feature of nonprofit organizations is that, unlike businesses, their goal is to generate "social profit" rather than "financial profit." Examples of social profit are education, health, safety, and cultural enrichment. These tend to benefit not only the individual, but also the broader community. After determining what "social profit" they provide for the community, they should use that as the focus for their marketing plans, and grow from there.

As mentioned above, education is one of the "social profits" that communities enjoy and respond well to. Education Next, a policy journal, released its 10th annual large national poll of public opinion on education in 2016, and it revealed that support for the Common Core State Standards (the K-12 math and English standards initially adopted in 45 states) has plummeted quickly. In 2012, 90% of people favored the standards, but by 2016, the number was at 50% (Kamenetz, 2016). An annual poll on national perceptions of education reveals that Americans want to see improvement in services beyond traditional learning, such as career education. Hands on activities activate multiple areas of kids' brains, leading them to be more likely to retain information. A recent report by the Center on Education policy at George Washington University, which analyzed data from the US Department of Labor, found that in order to be ready for the workforce, students need a wide variety of skills beyond textbook knowledge. Maria Furgeson, the executive director of the center, said, "We cannot put this on educators as one more thing for schools to do. This is on all of us. Students develop these skills in class, in their civic engagement, and out in their communities. I think that people get that these skills are important, but they think it's someone else's job to deliver it" (Richmond, 2017). This shows that

education is not only a priority for Americans, but outside the classroom, hands on, experiential education is shown to be more effective, and is growing in popularity.

6.2.3 Modernizing Outreach

Social media provides many opportunities for nonprofits to connect with the public. Zickuhr and Madden (2012) explain that once a nonprofit organization understands that social media platforms provide a large, reliable, and consistent audience, they will be able to use it to their advantage to build upon fundraising strategies, communication efforts, and local community involvement. They note that one half of adults aged 65 and older use the internet, which is significant because there had not been growth for this group in this area for several years. Out of the seniors who use the internet, 70% use it daily, and out of all adult users, that number rises to 82%. Social networking sites have grown in popularity among seniors since around 2010. From 2009 to 2011, social networking site use among senior internet users grew 150%, from 13% in 2009 to 33% in 2011. One out of three online seniors, and two out of three adults who use the internet use social media networking sites, like Facebook, with 48% of adult internet users using it daily.

Many of the people who are being targeted for fundraising are the baby boomers because they are more financially stable than millennials. A study done by DMN3 finds that 82% of baby boomers belong to at least one social media site. They are now more connected than ever before, using Facebook, search engines, smartphones, and other digital devices to keep themselves informed. They typically take action based on what they see on social media in order to find out more information. In fact, more than half of the baby boomers will see something on a social media site and will then visit the company website or continue the search on a search engine after seeing it. The majority of those over 50 that use social media use Facebook, with “leading-

edge boomers" spending 11+ hours per week on it (DMN3, 2018). This is why Facebook is a great platform for nonprofits to extend their network to the older generation, the baby boomers.

One important statistic to note is that 86% of internet users ages 18-29 are using social networking sites. This means that young people are a great target audience for this platform because so many of them have profiles, especially if the organization revolves around activities and opportunities for them. The high percentage of internet users across all age groups using social media makes it evident that building a nonprofit organization's social media presence will touch the majority of the population, and therefore this exposure is a good way to connect with old alumni as well as attract interest from an audience that would have been out of reach before.

Research shows that more than half of social network users would publicly display their support of a nonprofit with their friends, which could potentially spark newfound interest in the organization and also increase awareness about the issues for which they advocate. Social media is an affordable way to help an organization increase its communication with not only members of their community but also with users who are discovering it for the first time. This media outlet also allows organizations to humanize themselves and learn what supporters are saying and sharing about the organization. A Facebook group, for instance, is a great place for members of an organization to share personal stories and give feedback, as well as communicate with other members of the network, bridging the age and geographic gap among these members (Dusome, 2014).

Dusome explains that without people specifically dedicated to an organization's social media goals, it can be very difficult for any progress to be made in this area. Social media users are constantly bombarded by new posts, each one attempting to catch their attention and spark interest. This is why it is crucial to maintain a constant social media presence, consistently

engaging with connected users. This keeps the organization in the back of their minds, unconsciously building the connection between each member and the organization. Therefore, a specific person, or multiple people, should be designated to specific social media tasks to ensure the organization is keeping up with its goals. These people should come up with specific guidelines to keep everyone on the same page and ensure that they remain consistent with the organization's message and delivery. Social media is about building relationships and maintaining them through communication, which is why the role of a social media specialist is crucial (Dusome, 2014)

Facebook is the world's largest social network, and any organization has the potential to reach up to 1 billion people. Nonprofit organizations typically use Facebook to share news, promote events, create groups, increase followers/exposure, make new connections, and encourage conversation. Dusome (2014) explains that people are 51% more likely to support an organization after "liking" them on Facebook. Facebook is a great platform for nonprofit organizations to use because it provides them with free advertisement, it has the potential to create stronger personal connections among followers/members by linking people directly with each other's profiles and posts. Another reason Facebook is an effective platform for nonprofit outreach is that it delivers messages to its online coalition instantaneously, allowing them to quickly build member involvement fairly easily. Once the posts are sent out, the rest of the work is done by users who are connected with the organization and who comment on, like, or share them. This is perfect for nonprofit organizations specifically because they tend to have lower funds, fewer staff, and less developed communications strategies.

In addition to Facebook being useful for updating and connecting members, as well as building the support network, it also is a great tool to use for fundraising. According to Dusome,

raising money for causes through social media has more than doubled in the last five years. Facebook has a feature called "Facebook Causes," which allows nonprofits to easily have the ability to raise funds through their site. In 2008, Facebook posted a brief description of the advantages to using "groups" and "causes." It explains that "groups" best serve communities of individuals wishing to engage around a particular issue and organize themselves around actions or discussions. As long as the group is under 5,000 members, group admins can send messages to the group members that appear in their inboxes. "Causes" is an application that allows users to organize themselves into communities of action that support specific issues, campaigns, or nonprofit organizations. This spreads awareness about their work, recruits new supporters, and creates a space to post fundraising campaigns. Facebook claims that "causes" is the most effective organizing tool available to nonprofits on their site. Between 2006 and 2008, Facebook "Causes" accumulated 30 million members and started 150,000 causes, benefitting 32,000 nonprofits and raising more than 4 million dollars (Facebook, 2008).

6.2.4 Affiliate Marketing

Nonprofits are unique in that they can usually actively cooperate with other nonprofits in a mutually beneficial fashion. In the private sector, competitors typically clash, but cooperation between nonprofits not only benefits the organizations involved, but the community as a whole. Some examples of ways that nonprofits can work together are: 1) sharing the costs and benefits of common subscription drives, 2) creating a passport-type admission arrangement for tourists, and 3) sending joint newsletters to all of their members. Nonprofits should evaluate the potential they have to work with other nonprofits, which can easily be done using a marketing audit that reviews if direct and indirect competition leads to growth for either organization (Gallagher and Weinberg, 2006).

A nonprofit can use affiliate marketing in two ways: 1) by linking to a company, and 2) by promoting specific products that are directly beneficial to the targeted audience. From a fundraising perspective, a nonprofit can increase donations from the community by asking other nonprofits to encourage their audience to donate to it (Hoefer, 2012).

6.2.5 Information Products

Information products are things that inform and inspire the audience to get involved with an organization. These can include written, oral, or video forms. Before the internet gained popularity, information was distributed through physical products, but now, the easiest way to create and spread information is through the internet, using a digital format. The most important step to take when producing digital media is figuring out what message to communicate to the audience that will resonate with them. Once this is done, work needs to be done to identify gaps where the organization needs to grow. If their efforts are not pulling in interest from the community, how else can they grow their organization and market it in a way to gain more support? (Hoefer, 2012).

6.2.6 Interview Techniques

Seidman (2006) offers some advice on ways to effectively interview a subject: 1) listen more talk less, 2) limit your engagement, 3) follow up on what the participant says, 4) ask to hear more about a subject, and 5) avoid leading questions. His advice to listen more talk less, and to limit engagement essentially mean that when interviewing a subject, it is important to listen, and not add too much to the conversation because it may affect the interviewee's representation of their story and facts. Furthermore, open-ended questions that allow the subject to freely speak about their connection with the chosen topic may lead to the interview in a completely new direction, which allows the interviewer to come up with questions on the spot.

Seidman's advice to follow up on what the participant says and to ask to hear more about the subject helps engage the interviewee with questions that show the interviewer is listening and focusing on what they are talking about. Following up about a specific topic the interviewee mentioned opens up doors to further questions, depending on what direction it is going. The last advice Seidman offers is to avoid asking leading questions, which maintains neutrality during an interview. If this occurs, it may affect the interviewee's answer to the question, because they may feel pressured into answering a certain way. This is why open-ended questions are best for interviews.

6.3 Case Studies

Smokey House Center challenged us to find resources about communications and other strategies that groups in their position have used to move from grant and endowment funding to a stronger base of individual and community donors. This section offers direct comparisons between Smokey House Center and successful nearby non-profits. It aims to identify the key differences between Smokey House Center and the other organizations to help us determine how Smokey House Center could benefit from the practices of these places.

6.3.1 Southern Vermont Art Center

Southern Vermont Art Center is a successful small non-profit that Smokey House Center should aim to emulate in various facets. In terms of infrastructure, SVAC currently has a larger staff than Smokey House, which allows them to be able to put on and staff more events. Additionally, the facilities at SVAC are more amenable to hosting events; they function as an arts center, and have a large auditorium and galleries in addition to outdoor space for visitors.

Infrastructure aside, SVAC offers a wider range of services and programs than SHC. One such service that SVAC currently offers that Smokey House could emulate and likely benefit

from is offering parts of their campus to be rented out by parties. This has a couple notable benefits: it brings more income into the organization and brings more people to the campus. Currently, not many people go to Smokey House unless they hold an event. If SHC were to rent out their cabins or areas of their land to outside parties, it would likely bring more traffic to SHC and generate a larger buzz about what it has to offer.

SVAC is also an example of how offering a variety of events can lead to increased popularity. They offer workshops/classes, summer camps, open studios, performances of all types, and rotating galleries and exhibits. Smokey House could adopt some of these practices and add more variety into the events they offer; for example, they could set up events that features musical performances and local art.

Fundraising for the two organizations is similar, but SVAC's methods are more developed. One notable parallel is that SVAC employs a tiered membership system for donors with tailored incentives: they offer membership with different benefits for different donor levels. Their donor levels range from $75 up to $5000 and include incentives such as free tickets to shows and discounts on rental fees, the gift store, and kids' camps. This is currently what we are working towards with SHC; Southern Vermont Art Center's donor levels represents the finished product and a standard that SHC should aim to reach.

6.3.2 North Branch Nature Center

North Branch Nature Center is slightly more similar to Smokey House than SVAC is in what they offer. NBNC is a 28-acre nature reserve that focuses on ecology; the reserve is home to many different species of birds, frogs, and more. In terms of infrastructure, they also have a larger staff than Smokey House, which enables them to run more programs. Additionally, they are in Montpelier, which gives them a lot more exposure than Smokey House gets. Even with

these advantages, they still do a number of things that Smokey House could emulate to grow as an organization.

Firstly, NBNC has a motto that they broadcast. Though this may seem extremely simple, mottos are memorable, and help people gain interest in a cause. NBNC's motto is "Connecting People of All Ages with the Natural World." It is succinct and helps people understand what their goal is; likewise, it also gives a benchmark to the organization to help them focus their events.

Currently, NBNC puts on a lot more events than SHC does; this is because they have the resources to do so. Due to this, they have an up-to-date calendar on their website with all upcoming events and programs. This is something that Smokey House should do, so people can always go check whether there are events and not just be reliant on distributed information (i.e., newsletter, Facebook).

Another thing that NBNC does that aids in expanding their organization is run events outside of their reserve. For example, they are offering a birding tour of Spain in November. Events like these are great for organizations, as the staff gets to use their knowledge to possibly turn a profit and gain more outside attention for the organization. Given that Smokey House has members with agricultural knowledge, they could lead remote events or workshops pertaining to farming (e.g., go to Burlington and run a seminar on agricultural techniques). This would earn them more recognition from outside of the local community.

Finally, NBNC offers incentive to visit campus even when there are not events. NBNC provides maps of hiking trails on their reserve that people can explore. Providing easily accessible maps is something that Smokey House could do to encourage visitors; people love to explore and advertising the land at SHC as explorable would surely bring more attention to the

organization. Smokey House could provide visitors with maps of nearby trails, mountains, or of their own facilities.

6.4 Methodology

6.4.1 Case Study Research

When choosing case studies to focus on, we chose local non-profits that share a similar audience with SHC, but are more successful in fundraising and attracting participants. We assessed how they tell their story for fundraising success, and we have made suggestions to SHC about how to better tell their story in order to build up their donation base, and engage people in their 40 years of conservation, agriculture, and educational successes. We examined the key aspects of each organization (their infrastructure, events, social media, and fundraising) and juxtaposed them with those of Smokey House. This allowed us to make suggestions to SHC based on real successes and failures of cases.

6.4.2 Message Framing

When parsing out the most important pieces of information for our selected audience, we used a tool called "The Message Box," an exercise mentioned in our Literature Review section, to help us identify the issue SHC is facing, problems this issue is causing, benefits of addressing these problems, possible solutions for SHC, and the "so what," the reason community members should get involved with SHC. This exercise strengthened our communications efforts by addressing specific problems SHC is facing in ways that have the greatest impact.

Message framing is an important aspect that we took into consideration when creating and producing SHC's online profile for Vermont Gives Day, and other materials to promote it to the local community. It clearly defined for us what issue we were aiming to address, allowing us to identify and prioritize which specific parts of the issue to address, based on context and our

audience. It helped us look at SHC from the point of view of a Danby community member so we could identify how SHC benefits them. By aligning SHC's work with our audience's interests, goals, and needs, we created new outreach materials aimed to increase meaningful communication with the local community, and to spark new interest and participation in SHC.

6.4.3 CBPR in Practice

Because this group focused on communications work with SHC, we needed to work very closely with our community partners in order to gain deep insight into their personal goals and overall mission for SHC to ensure that our deliverables would be successful both for the purposes of our group and Smokey House's staff. Our relationship with our community partners needed to be close in order for the material we produced remained consistent with their previous outreach materials. For instance, Jesse Pyles made suggestions for our first draft of the press release/newsletter to make it more similar to the other newsletters they sent out.

To ensure that our work continued to remain in line with SHC's vision, we communicated with Jessie, Consie and Laura via email and biweekly conference calls. During each phone call, a designated group member updated them on our progress, received feedback on our deliverables, planned improvements or adaptations, and set goals to achieve before the next scheduled phone call. This communication was invaluable as it allowed us all to gain a better understanding of SHC and kept confidence on both sides that the work we were doing would be appreciated and useful. We also recognize that as college students living in a town over an hour away from Danby, our community partners could provide insight into the Danby area that we simply could not gain ourselves. Without consistent interaction with our community partners, our deliverables would have been far less effective.

6.4.4 Community Outreach

Our group's goals were essentially to communicate, create, fundraise, and engage. To help SHC communicate its mission, we integrated it in all of the advertisements we created for Vermont Gives Day, which includes the SHC profile page on the VGD website, a newspaper ad, a newsletter, social media posts, a video, and new graphics. The video, which I will play for you, displays present as well as historic SHC programs and their impacts on the community, which aims to revive local community and donor interest, and hopefully entice new supporters. It highlights what makes SHC a special place, shows how personable and passionate their staff are about their work, which aims to draw interest from a more emotional perspective. and shows the varied ways it contributes to the community through educational, agricultural, and conservation practices.

When fundraising, it is a good idea to thank donors for their gifts because it lets them know they are appreciated, and it makes it more likely that they give again in the future. This is why Jesse hand sent handwritten thank you letters to all of the people who donated on Vermont Gives Day. In addition to these letters, we also we proposed to SHC the idea of creating a Donor Recognition Board to hang on one of the walls at SHC to recognize their most generous community donors. Formally recognizing these names on the board will portray SHC's appreciation for its donors, and also encourage others who see it to donate.

Fundraising campaigns are most successful when there is a large group of people to target on one effective and efficient platform. This is why we created the SHC Facebook Group, where donors, alumni, and people currently involved with SHC can connect and share stories, and also where SHC can deliver important announcements to people they have individually let into the

group. Upon requesting to join, people must answer questions for SHC to review. This Group allows for more efficient and constant communication between SHC and its members because it is online, where posts are shared in seconds, and also because Facebook is a social media platform that almost everyone uses nowadays. Every time there is a post in the group, every member gets a notification. This serves to keep SHC in the back of people's minds by increasing the frequency they think about it, which will hopefully lead them to reflect upon how great SHC is and encourage them to share it with people who are not yet involved. Because SHC is a non-profit organization, it does not necessarily have the funds to pay for advertising, making outreach via social media a great platform because it is free. Also, the "bio" of the group asks members to invite their friends who have been involved with SHC to join, and as their followers and group members, their level of outreach will also grow, because more and more people will be liking, commenting on, and sharing their content, which will appear on all of their friends' newsfeeds. The group currently has 18 members, which leaves lots of opportunity for growth. We also connected their Facebook profile with their Instagram account, which serves to increase followers on both platforms.

In addition to creating a SHC Facebook Group, we also created a Facebook Event for VGD, and "Boosted" it on the days leading up to the day. This aimed to increase all of their followers' exposure to the message that they should donate to SHC on Vermont Gives Day. We also got in contact with other local organizations with a good social media following and asked them to make posts about SHC's involvement in VGD. This not only spread the word about SHC's participation in VGD, but it also introduced a whole new audience to SHC's mission and vision, which will hopefully get more people involved.

Our other advertisements for VGD include:

- A local newspaper ad that appeared in the *Front Porch Forum, Vermont Newsguide*, and *Manchester Journal,* targeting towns SHC has identified as wealthier areas, Dorset and Manchester. See appendix.
- A newsletter that appeared in the Manchester Journal and the Rutland Herald, two local newspapers, that serves to update community members about current and upcoming events and programs. See Appendix.
- SHC's profile page for VGD, which features "donor levels" with values of $20, $50, $100, and $200, to give Vermonters a good idea of the donation range SHC is requesting. In order to entice potential donors, we paired each "donor level" with a statement that notifies them what their money will be used for. We worked with Jesse to get estimates of SHC's expenses, and came up with the following donation levels.
    - $20 fills a "Currier Supported Agriculture" fall vegetable share for a local student at Currier Memorial School.
    - $50 buys a bundle of work gloves for volunteers on SHC's Community Farm
    - $100 helps SHC send a child in need to our Danby Mountain Day Camp for a week of fun in the fields and forests of Smokey House Center.
    - $200 helps SHC train a local teenager for a job supporting our camp and farm programs.

We decided to create these "donation impact descriptions" by focusing each donation amount on a different SHC project: The Currier Memorial School Vegetable Share Program, the community farm, the Danby Mountain Day Camp, and their teen job training programs. Below, we discuss the specifics about SHC's. Each donation level button was also paired with a relevant

image. The $20 donation level is paired with a photo of beets that adds color and shows an example of a vegetable that could be included in the Currier Memorial School vegetable shares. The $50 level has an image of eleven volunteers working on the land at Smokey House Center to demonstrate the sense of community that Smokey House Center creates with their community farm. The $100 level includes a photo of six children laughing and holding hands at Danby Mountain Day Camp. This photo appeals to the emotions of donors by making them feel that they can be responsible for children bonding and having wholesome, educational fun in the outdoors. The $200 donation level features a photo of six smiling teenagers working at Smokey House Center, and hopefully inspires past Smokey House Center employees to think back fondly on their time at Smokey House and be inspired to donate so that others can have that experience as well. Other images on the page include the profile picture and cover photo. The profile picture is the Smokey House Center Logo, which encourages viewers to associate Smokey House with their logo, allowing for future brand recognition. The cover photo is a photo of the feet of someone wearing boots and holding a garden tool, which speaks to the hard work done by the Smokey House Center volunteers and staff.

An important element of the Smokey House GiveGab profile is the video which emphasized a personal connection the Smokey house center and its staff. The video included interview footage of Jesse Pyles the executive director describing how he fell in love with Smokey House Center, how the programming was the “holy grail of environmental education,” and how beautiful of a place it was to be for community gatherings. This is supplemented with drone footage, and high quality still images and fashioned into a Ken Burns-esque video. This video is meant to serve as an introduction to Smokey House and some of the programing in an accessible way.

For those who do not watch the video, the GiveGab profile's brief paragraph serves as a means of informing donors about the mission and history of Smokey House. The bio reads:

> *"For the past forty years, Smokey House Center has served as stewards of 5,000 acres of working land in Danby, Vermont. Our careful land management, partnership with farmers, and ongoing conservation efforts support a vibrant, productive landscape, supplying local food and resources. We work with local schools and youth organizations to help students gain academic, social, and real world work skills on our farms and in our classrooms. With your help, Smokey House Center can continue to serve as a bridge between Vermont's past and future and remain a force for social and economic vitality in Rutland County."*

This bio came from Smokey House Center's website, which Jesse suggested we use for the sake of continuity, and also because they feel their website does a good job of informing people about their work. The only addition we made to the bio is the last sentence, which encourages people to aid Smokey House Center in achieving their mission, and gives the bio a forward-looking focus.

Since we want to be sure that donors feel appreciated, as this will make them more likely to remain involved with Smokey House Center, we decided to replace the generic "Thank you for donating to Smokey House Center" message with a more custom thank you message that reads

> *"Thank you! Smokey House Center is extremely grateful for your generosity. It is the support of community members like yourself that has allowed us to cultivate healthy land and healthy minds for over 40 years. With your donation, we will be able to expand our partnerships with local schools, farms, and youth organizations. Together, we can make sure that farming, conservation, and education thrive in Danby!"*

This message emphasizes Smokey House's appreciation for their community, tells donors what their funds will be supporting, and creates a feeling of partnership and unity between

Smokey House and their donors. Additionally, we created a video that can be played prior to making a donation that will feature a thank you message from Jesse Pyles, which we hope will promote a more personal connection between donors and Smokey House, to encourage involvement with Smokey House in the future.

On VGD, SHC ended up raising 71% of their goal with $4,395, placing in the top 10 most successful organizations out of the 104, based on donation amount.

6.4.5 Video Production

The creation of the video for Smokey House Center is dependent upon 3 areas: Pre-production, production, and post-production.

Pre-Production consisted of initial contact with representatives of Smokey House Center. This was achieved in class when Jesse Pyles, Smokey House Center's Executive Director, attended a meeting with the class. Initial notes were taken, condensing initial first impressions into a few concrete ideas, forming the foundation for the video. Next, we reached out to Jesse and the rest of the staff at Smokey House Center to request archival material to be used in the next phases of production. Once reviewed, "selects" were chosen, we started the process of drafting a "shot list" and interview questions. To draft a "shot list," location scouting became important. This list takes into account the aesthetic value of locations at the Smokey House Center. Additionally, it became necessary to procure more equipment in order to produce higher quality video, and this was achieved through renting lenses from Jones Media Center, borrowing a drone from a local filmmaker. Finally, given the considerable distance from Hanover to Danby, the location of SHC, we selected a day to produce most of the content for the video. The decided day was the "Day in the Dirt," as there would be locals visiting and working in the fields as well as potential for candid interviews and interactions with visitors of Smokey House Center.

Production began upon arrival at Smokey House Center during the "Day in the Dirt." The most important requirement for the filmmaking process is obtaining consent to film from everybody in the area, as well as developing a relationship with the staff of Smokey House Center and the participants of the event. After introductions, once we discussed the purpose of filming it brought ease to the participants and allowed for a more candid capture of events. During the trip, it became necessary to engage more with the land, to get a feel for the community and how exactly the community engages with Smokey House Center, as well as their view of what it is and what its purpose is. The most valuable footage obtained from the participants was collected during introductions, when interviewees immediately shared their thoughts and opinions of SHC. These impromptu interviews and "b-roll" collected will be combined with interviews with members of the staff. Jesse Pyles (Executive Director) and Jamie Lombardo (Farm Educator) were selected for interviews because of their relationship with Smokey House Center. Jamie Lombardo works specifically with programming of events at Smokey House and its relationships with other local groups.

Post production began with transcription of interviews. Transcribing interviews from audio to text expedites the process of editing by allowing organization of the text thematically and helping to identify important points that are emphasized throughout the interview. Several different methods were used to try and convert the audio to text. The first was a program designed to convert audio to text, however it was completely riddled with errors so it became more work to try and edit out the errors and this method was abandoned. After this, manual typing of the audio was adopted, this was later supplemented through use of dictation software and editing. The amount of interview footage that was transcribed was about forty minutes long, and totaled about 12 pages of text when completed. This was then parsed through and a message

was framed thematically. The next step was cutting the audio to match this theme while also removing unnecessary words. The audio was then edited to have consistent loudness and sonic properties to make it seem as though it was said candidly and succinct. These cuts in the video footage had to be hidden otherwise it would appear as though it were jumping and sputtering. This was achieved by selection of b roll and other visual media. After trying multiple video clips to fill this role (there was about 4 hours of b roll that was edited into selects) it became apparent that the footage did not convey the message as well as archival pictures provided by SHC. These pictures were selected based on quality, color and relevance to the audio. Finally, this was all prepared by adding transitions, visual effects and titling. Aesthetic decisions were selected to reinforce the message of community and work engagement particularly with youth.

6.5 Results

In our efforts to connect Smokey House with the local community, and the broader community, we outlined a communications strategy centered around advertisement for fundraising. Before our class started working with SHC, they had one video online, a website, and a Facebook page, and also sent out an annual appeal letter, as well as a (bi)monthly newsletter to people on their mailing list. SHC is participating in Vermont Gives Day this year, an event hosted by Common Good Vermont that has the purpose of engaging Vermonters, providing them with a list of Vermont-based nonprofits and running a 24-hour long donation platform. Our goal was to target Danby, VT as well as the surrounding communities of Manchester and Dorset, in order to draw donations from those communities, as well as to spread awareness of Smokey House and their mission of cultivating nutritious food, healthy land, a vital local economy, and resilient young community members. Our communications strategy targets

two main groups within the region: community members not already involved with Smokey House, and Smokey House alumni or current participants and volunteers.

We also did work to help Smokey House Center better understand their mission, audience, and obstacles. We did this using the Message Box worksheet, and found that Smokey House Center's issues are that 1) lack of awareness that SHC exists, 2) some individuals only know the organization in name, and aren't aware of their mission and community impact, and 3) some people know a lot about the organization, but don't feel compelled to donate or get involved. The problems that cause a shortage of donations are 1) a lack of marketing materials, 2) a lack of social media presence, and 3) a lack of donor appreciation efforts. The benefits of addressing these problems are that increased knowledge about the Smokey House Center will lead to more donations and allow SHC to better achieve their goals of fostering community togetherness, conserving land, producing healthy food, and educating youth. Possible solutions include the projects that we worked on for Smokey House, including: 1) A Donor Recognition Board; 2) Press Release; 3) Ad for Local Newspapers; 4) Donor Levels and Apparel; 5) GiveGab Profile; 6) Video; 7) Alumni/Donor Facebook Group; 8) Affiliate Marketing; 9) Graphics/Logos. The most important common aspect of these deliverable is that all are geared to spread awareness of SHC's mission, community impact, and appreciation of past donors. The "so what?" section of the Message Box was very important for helping us address the challenge that many people don't feel compelled to donate to SHC, despite knowing about and engaging with it. To answer this question, we considered the priorities of potential donors and concluded that a desire to support children, maintain Vermont's aesthetic value, and aid those facing food insecurity were likely common interests.

We worked to spread SHC's mission to our target audience through social media and had a largely positive response. In the month of May, Smokey House Center's Facebook page increased from have 1173 likes to 1192. Our efforts to get the word out about Smokey House's involvement in Vermont Gives Day brought quite a bit of traffic to the SHC page. The peak page reach– the number of people who had any content from the SHC page or about the SHC page on their screen, which includes posts, check-ins, ads, and social information from people who interacted with the SHC Page– was 2373 on Vermont Gives Day, 5/17. 1580 of these people reached the page organically, through unpaid means such as likes, comments, etc. of friends in their newsfeed, and 980 reached the page through the "boosted" paid advertisements of the SHC Vermont Gives Day Event and the SHC Vermont Gives Day video. This increase in traffic from Vermont Gives Day continued to have a lasting impact. Throughout May, page engagement steadily increased from ~300 to 692 people per day, and continued to increase after Vermont Gives Day. SHC's Instagram account was also used to publicize Vermont Gives Day information, and throughout our time managing the account, SHC got 17 new followers after only following 3 new accounts.

Having a working understanding of SHC's mission, audience, and obstacles was crucial for our work on their Vermont Gives Day Campaign. Smokey House ended up raising $4395 from 29 donors. 3 of these donors gave in-person, while the other 26 donated online. Of the online donors, 10 were referred by the SHC Facebook page, 4 from the SHC Newsletter email, and 1 from the SHC website (we do not have referral information on the remaining donors). 13 of our donors left comments with their donation such as "Smokey House Center is carrying on its wonderful legacy of serving area youth and strengthening community in the Community Garden and Danby Mountain Day Camp. I'm proud to support them" and "I'm excited to support

Smokey House Center because they educate people on the importance of conservation and sustainable agriculture. Smokey House is cultivating the next generation of farmers and environmental advocates.". Donations ranged from $5 to $1000, with the average donation amount being $150.

6.6 Discussion

In this section, we analyze SHC's success on Vermont Gives Day and apply our findings to make future recommendations for their 50th anniversary celebration and for future ENVS classes.

Overall, we believe Smokey House Center's Vermont Gives Day campaign was successful. This is the first year SHC participated in Vermont Gives Day, so ranking in the top 10 out of 104 organizations for donation amount is quite impressive. Although we fell short of our goal, we knew going into Vermont Gives Day that the goal was aggressive, and it only gives SHC room to improve. It is promising that so many donors left comments with their donations, as it shows how dedicated (and therefore likely to continue donating) the Smokey House Center donor base is. Hopefully, even those that did not donate but learnt about SHC through the Vermont Gives Day campaign will be inspired to attend Smokey House Center's events and will become just as passionate about SHC as current donors are.

Regarding social media, seeing that over ⅓ of our donors were referred via Facebook shows us just how valuable of a tool that Facebook is. As Smokey House's community programs continue to expand, so will their reach on social media. Regular postings are important to keep community members engaged. It is also important to balance "asking" posts with "showing" posts. Too many "asking" posts (i.e. those advertising for a fundraiser or requesting donations) will drive away potentially interested community members. We believe this is why SHC had 4

people unlike their page during the month of May, as well as 12 people unsubscribe from their community newsletter. “Showing” posts (those that show what Smokey House Center has been doing with/for the community), on the other hand, have much higher engagement (more likes, comments, etc.) and make individuals feel connected to the organization.

Our additional recommendations for SHC include:

1) Increase the number of personnel involved in communications. As it stands, SHC has a very small staff, and expecting them to balance expanding communication range with all of their other responsibilities is not realistic. Smokey House Center should, if possible within the budget, hire a designated communications specialist, possibly a young professional or skilled college intern: somebody that is consistently advancing the communication framework of SHC via social media, community outreach, and public relations. This person could also have experience in producing digital media, or have the knowledge required to hire a media team to produce certain projects. If hiring a communications expert is unfeasible based on budget, then continually looking to student groups or potentially high school students who would be willing to volunteer as interns to help with communications (which gives them experience with public relations, business expansion/marketing, etc.) would also be a smart decision.

2) Continue to ramp up their social media presence. In this day and age, presence on social media goes an extremely long way. Staying active on Facebook, Instagram, and Twitter is an extremely effective way to remain in the public eye, especially among the younger crowd. Social media trends allow for more viewers, which can help organizations grow. This is especially important for non-profits, which attract community supporters from showing off their mission statements/beneficial work. If the work of a certain non-profit begins to circulate in certain social media circles, they could attract many like-minded supporters very quickly.

3) Strengthen the mission statement. Obviously, Smokey House Center does beneficial work for the community, but they lack a single notable mission. Defining an overarching goal that can encapsulate all of their certain work would have some notable benefits. Firstly, it would make advertising much easier, and they could gain notoriety for their dedication towards achieving the goal in their mission statement. People are attracted to non-profits that are inspired by and driven towards defined goals, and outlining such a goal could attract more supporters. Secondly, defining a mission could open their eyes to new opportunities to benefit the community, which in turn could further increase community involvement and support.

4) Be persistent. As it stands, Smokey House Center is not the most "connected" organization, and this will not change overnight. It takes consistent work and time to build up a name and large community of support for a non-profit. If the methods that SHC are employing are not providing immediate results, this should not lead to discouragement; remaining confident and invested in the methods of improving SHC's communication will be key to their growing as an organization. We encourage them not to abandon any method of outreach/advertisement if they don't appear to be working, as there is no harm in maintaining them; however, they cannot potentially aid the organization if they are discontinued.

5) Define and measure SHC's social profit. Because nonprofits organizations' goal is to generate "social profit" (ex. education, health, safety, cultural enrichment), their accomplishments are sometimes hard to measure. This makes it difficult to make tradeoffs among objectives, and compare the organization with others. That is why it is crucial for SHC to work on defining, measuring, and keeping track of the ways they socially benefiting the local community. This could include tracking the growth the programs they provide for the

community, or polling members of the community every so often to track any changes in their opinion of SHC.

6) Offer larger funders meaningful benefits. SHC should offer local businesses real marketing benefits in return for their donation. That way, when businesses donate, they become "sponsors" and have their names associated with the nonprofit. Businesses do this in order to put their names in front of a new group of people, in the hope that they will receive their support through the transferring of positive attitudes. If SHC were to partner with sponsors, they would need to first understand the sponsor's wants and needs before creating and pricing a sponsorship package and coming up with a strategy to contact and convince potential sponsors.

6.7 Conclusion

The issues facing Smokey House as a whole are complex and require extensive attention. We were only just the initiators of what should be a long, continued process; after all, we were only able to work with them for 2 months, and it takes much longer than that to establish a healthy non-profit organization with an active community of supporters and donors.

However, we made notable strides towards increasing the reach of Smokey House Center's communications. Our deliverables were all aimed at providing concrete support for SHC, giving them materials to broaden their communications and helping them out by setting up means to increase their fundraising platforms. We:

1. Provided them a video that can be used for advertising and fundraising purposes
2. Developed their GiveGab profile to aid in acquiring donations and gain more state recognition
3. Reached a wider audience when promoting for Vermont Gives Day by connecting with other local organizations, getting them to advertise SHC's fundraising effort

on their social media accounts

4. Attempted to broaden their influence in the local community with a press release and newspaper ad
5. Worked on another edition of their newsletter
6. Provided them with graphics for future use
7. Increased their social media presence with an alumni/donor Facebook group
8. Established a framework aimed at incentivizing donations to Smokey House Center.

These deliverables can also be used as a model for possible future actions that employees of SHC or ENVS 50 students could build upon; for example, more media can be produced to showcase what Smokey House Center has to offer; their social media presence and communicative activity could be further increased, fundraising programs could be further developed, and more thought and work could be put into developing strategies to turn SHC into a successful and thriving non-profit.

Going forward, we hope that the foundation we have laid out is further built upon. As mentioned above, our deliverables provide examples of what sort of work could be continued in the future; however, we hope that even more impressive innovations and solutions are created, as Smokey House Center would greatly benefit as an organization from such.

Summary of Recommendations

From this report it is clear that SHC is a multifaceted non-profit organization that serves the town of Danby, VT as well as the Rutland County. Through our six student-led sub-groups, we hope to not only highlight their achievements but also identify various opportunities for recommendations and future changes. One of the most salient problems all six groups identified is the need for SHC to more effectively communicate their mission statement. An in-class activity attempted to brainstorm various elevator pitches as fodder for SHC to use. Below, three of the strongest pitches from the conservation group, legal group, and agricultural group are provided as examples.

Conservation Group

The Smokey House Center works to implement sound land management practices both in forestry and agriculture to further conservation efforts in New England. We protect up to 90% of our forested land, and we also offer agricultural and forestry programs for community members interested in conservation and learning new skills. Our efforts and programs ultimately impact the Danby community by directly combating the effects of climate change by creating awareness of the issue through education and taking action.

Legal Group

The Smokey House Center is a non-profit organization that protects both natural forest and agricultural land to ensure that these remain in their present state for future generations. To achieve this, we have developed a unique conservation strategy using conservation easements, which permanently protect both our forest and agricultural lands. We go beyond land conservation with our innovative equity fund agreement, which secures financial stability and a

comfortable retirement for our farmers. We believe these tools support our overarching goal of accomplishing social and economic vitality in Rutland County.

Agricultural Group

The Smokey House Center is a non-profit organization that aims to conserve New England land, to involve and empower the local community, and to educate youth through experiential agricultural immersion. We achieve this mission through conservation easements, youth summer camps, and community farming. We also run two commercial farms, Yoder Farm and Dorset Peak Jersey Dairy Farm, and are currently looking to attract new farmers. Our community farm is open to the public and support food security at the Currier Memorial School. These areas of focus are crucial to ensure that New England land is secure and usable for years to come, as resources to brighten the futures of current youth for youth to benefit the surrounding community.

From these three examples, it is clear that each group's elevator pitch is biased towards their own group's work. Therefore, none of these pitches as they currently stand are perfectly suitable for SHC to use. However, this exercise helped us to recognize which elements of SHC's identity are common in all three of these groups. SHC should thus focus on the common themes of education and community involvement to better foster effective land stewardship and create a coherent and lasting mission statement. We hope that this report sheds light on the current state of SHC and more importantly, serves as an impetus for the center to reflect on its identity and to expand its role in the greater Rutland County.

Appendix A: Equity Fund Agreement

Template Form

Agreement by and between Smokey House Center, a nonprofit corporation with a principal place of business at 426 Danby Mountain Road, Danby, Vermont ("SHC") and Farmer ("Farmer" or "First Farmer").

WHEREAS, SHC is a non-profit corporation as described in section 501(c)(3) of the Internal Revenue Code with a principal place of business in Danby, Vermont.

WHEREAS, as a result of a grant of $100,000 from Castanea Foundation, SHC funded the Equity Agreement with the goals of: (i) creating financial incentives for farmers to farm SHC on a long-term basis; (ii) generating earnings that accrues to the farmer currently leasing the farm so that he or she can contribute to his/her retirement fund; and (iii) investing the principal of the fund so that, to the extent farming remains economically feasible at SHC, principal shall be available to support farming at SHC in the future ("Equity Fund");

WHEREAS, SHC leases a Farm in Danby, Vermont to Farmer for a thirty (30) year term ("Ground Lease");

WHEREAS, this Equity Agreement by and between the Parties is being executed and incorporated into said Ground Lease and is designed (i) to provide a means for Farmer leasing the Farm to begin to build an individual retirement fund other than through land ownership; and (ii) to serve as a model for landowners who wish to encourage farming and keep their agricultural lands in farming ("Agreement Purposes");

WHEREAS, the Equity Fund shall be valued as of March 31st of each year of the Ground Lease Term for the purposes of calculating annual earning payment to the Farmer as provided herein; such calculation by SHC shall be binding on both Parties hereto;

WHEREAS, SHC and Farmer agree that if the Farmer is in compliance with the Ground Lease at the end of each Lease Year, March 31st, he/she shall, as provided herein, be paid interest from the Equity Fund at the end of such Lease Year;

NOW THEREFORE, SHC and First Farmer agree that in consideration of the Ground Lease, the recitals set forth above, the mutual convents contained herein, and other good and valuable consideration as follows:

1. The Fund:

The Farm Equity Fund shall be internally maintained on the SHC books. The Equity Fund may be co-mingled by SHC with other SHC House investment funds. SHC shall, in accordance with prudent investment practices, invest the Equity Fund as it, in its sole discretion, determines best carries out the purposes and goals of this Agreement. Except as provided herein, Farmer shall have no claim or right to the principal of the Equity Fund. Provided that if Farmer is in compliance with the terms of the Ground Lease at the conclusion of each Lease Year, SHC shall pay him/her earnings on the balance of the Equity Fund as provided hereinafter.

2. Annual Payments to Farmer:

a. Index as Measure of Return: SHC shall select an index (or indexes) which shall serve as a yardstick to measure the annual rate of earnings return payable to the Farmer as provided below ("Index"). The initial Index shall be: (i) Wilshire 5000 Total Market Index (35%); (ii) MSCI EAFE (5%); and (iii) Barclay's Aggregate Bond Index (60%). SHC may change the composition of the Index without modifying this agreement but, prior to doing so, it shall provide Farmer with not less than thirty (30) days' written notice but any such change in the composition shall be at SHC's sole discretion.

b. Earnings Return: Provided that Farmer is in compliance with the Ground Lease at the conclusion of a Lease Year, March 31, then, in such event, SHC shall pay the Farmer earnings as following:
(i) Should the Index have performed at two (2%) percent or less as of the end of the Lease Year, then SHC shall pay two percent (2%) earnings on the principal as of the end of the Lease Year;
(ii) If the Index has performed above a two (2%) percent return level as of the end of the Lease Year, then SHC shall pay Farmer earnings for the Lease Year equivalent to such Index performance level up to, but not in excess of, five (5%) percent of the principal as determined in accordance with the Index.
Payment of credit sums due the farmer shall be made by SHC as soon as is practical after the end of a given Lease Year.

c. Calculation of Annual Payment: The annual payment to the Farmer shall be based upon the Index performance as calculated in 2.b. above applied to the Equity Fund balance as of March 31th and shall be paid out of the Equity Fund.

3. Default:

a. Lease Year(s): Should the Farmer be in default of the Ground Lease at the end of a Lease Year, Farmer shall have no claim for a credit for such Lease Year or any subsequent Lease Years until such time as the default is cured.

b. Farmer vacates premises or SHC terminates Ground Lease: In the event Farmer vacates the premises or if SHC should terminate the Lease prior to the expiration of a Lease Year, the Farmer shall receive no earnings for such Lease Year or any subsequent Lease Year(s).

c. Default of Ground Lease: A default of the Ground Lease shall constitute a default by the Farmer of this Equity Fund Agreement and SHC shall have available to it all the remedies as provided in the Ground Lease in addition to any provided herein.

4. Extension of Lease:

If at expiration of the thirty-year Ground Lease term Farmer is in compliance with the said lease and should elect to exercise the option to extend the Ground Lease for one or two additional five-year periods, as provided in the Ground Lease, the terms and conditions of this document shall remain in full force and effect during such renewal period or periods.

5. Reduction in Principal of Equity Fund:

SHC shall have no liability for decreases in, or reduction of, the principal and/or loss of interest resulting from market factors and/or distributions to Farmer. SHC shall have no obligation to restore principal or pay lost interest in the event of such losses. Farmer agrees to hold SHC and its successors or assigns harmless from decreases or losses of principal and/or interest.

6. Incorporation:

This Equity Fund Agreement is incorporated into the Ground Lease.

SHC:

By: _____ Date:_____

Witness:

_____

First Farmer:

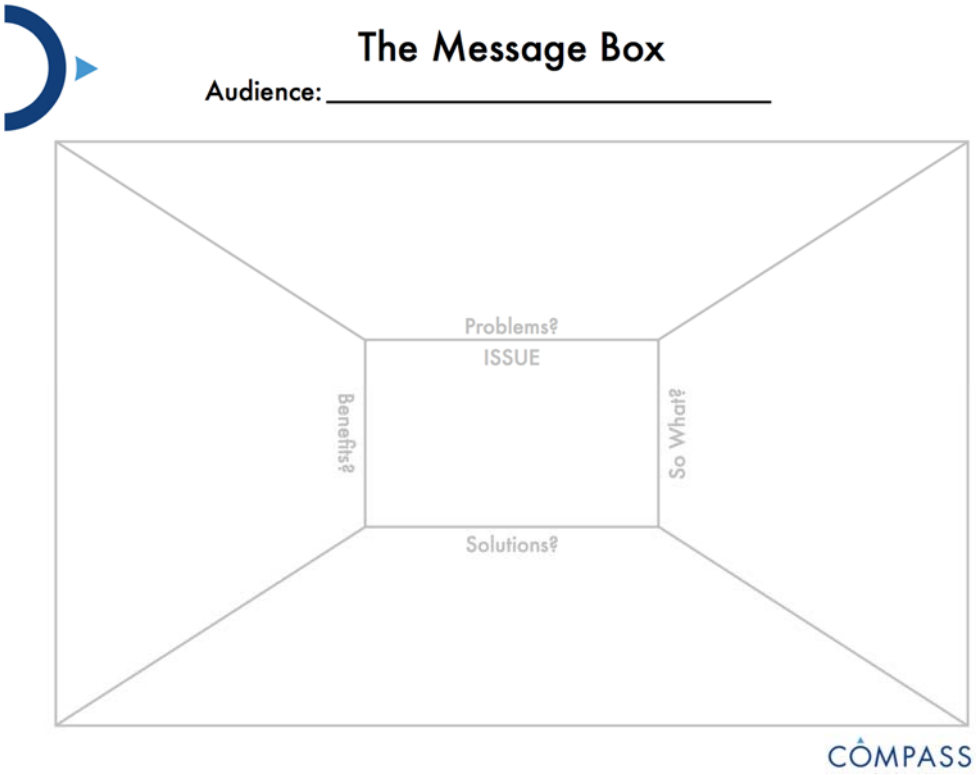
___________________________________ Date:_______________________

Witness:

____

Appendix B: Communication Tools

Message Box



Newsletter/Press Release

"Summer is on its way! With the warmer weather, Smokey House Center is beginning to work on the Community Farm and gearing up for all of the students who will be attending Danby Mountain Day Camp.

The camp program provides time for local children to explore the forests and the Community Farm at Smokey House Center, using a mix of guided activities as well as less structured time for exploration and discovery. Campers build huts, pick flowers, look for bugs, grow and eat food from the garden, watch birds, chase frogs, play games, and generally spend their week outdoors. No handheld electronic devices, no screens, just a summer full of farm and forest fun.

To get your kids involved, sign up online at http://www.smokeyhouse.org/danby-mountain-day-camp/

Last year, Danby Mountain Day Camp served 32 campers ages 7-12 from Danby and the surrounding area, and employed and trained five Youth Leaders to support the Summer Camp and Community Farm programs. Two Youth Leaders were young Danby residents (15 years old) gaining early employment experience with Smokey House.

This past summer The Smokey House Center Community Farm produced 3,227.5 lbs. of produce – carrots, beets, potatoes, cabbage, onions, squash, and more – which was distributed to Danby families with eight weekly shares through our school-based "Currier Supported Agriculture" (CSA) collaboration. An additional 3,866.5 lbs. were distributed through other regional hunger relief and community food channels including

the Vermont Foodbank, the Rutland-based Health Care Share, and Manchester-area Grateful Hearts.

In addition to the Danby Mountain Day Camp and Community Farm, Smokey House hosted multiple spring and fall field trips (May 4, May 25, September 12, and October 5) to engage every Currier Memorial School student in food production at Smokey House Center – including seeding, harvesting, and handling.

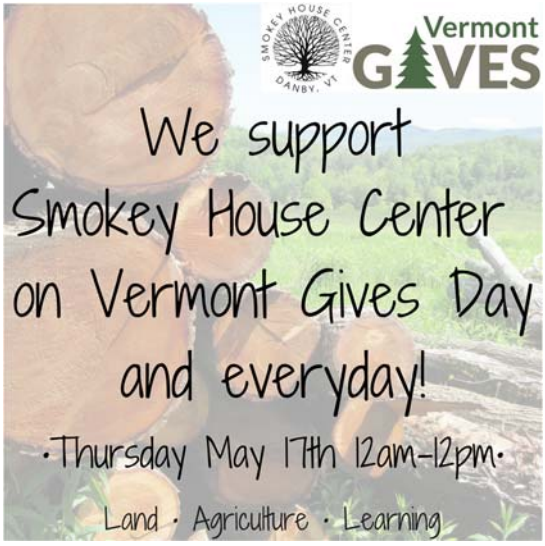
Smokey House Center has been serving Danby and the surrounding community since 1974. The nonprofit is dedicated to conservation, agriculture, and education. This year, to prepare for the coming summer, Smokey House will be participating in Vermont Gives Day, on May 17th. So, to help support Smokey House Center on May 17th, go to this link: https://www.vermontgives.org/organizations/smokey-house-center and help Smokey House continue to cultivate nutritious food, healthy land, a vital local economy, and resilient young community members. Also, consider stopping by our community garden this summer and getting involved!"

Newspaper Ad

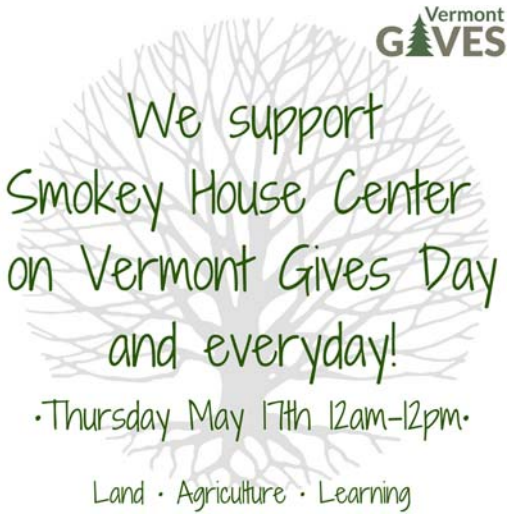
" Vermont Gives Day is approaching! On May 17th, please consider supporting Smokey House Center. We're a local nonprofit dedicated to conserving 5,000 acres of forest and working farm land. We partner with local schools and youth organizations to bring students to our farm and classroom, where they can build academic, social, and real world skills. We also offer an open community farm, so everyone can participate!

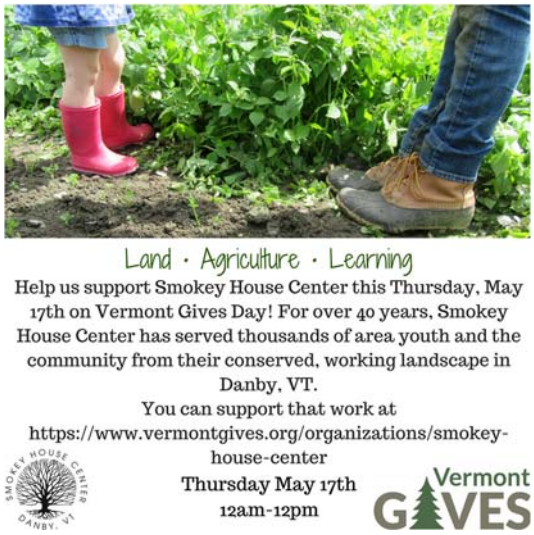
So, to help support Smokey House Center on May 17th, go to this link: https://www.vermontgives.org/organizations/smokey-house-center and help us continue to cultivate nutritious food, healthy land, a vital local economy, and resilient young community members. Also, consider stopping by our community farm this summer and get involved!"

Graphics/Logos




5
Years


Vermont
GIVES
We support
Smokey House Center
on Vermont Gives Day
and everyday!
·Thursday May 17th 12am-12pm·
Land · Agriculture · Learning


Land · Agriculture · Learning
Help us support Smokey House Center this Thursday, May 17th on Vermont Gives Day! For over 40 years, Smokey House Center has served thousands of area youth and the community from their conserved, working landscape in Danby, VT.
You can support that work at https://www.vermontgives.org/organizations/smokey-house-center
Thursday May 17th
12am-12pm
Vermont
GIVES


SHC

Works Cited

2014. Recipe for successful aquaponics. Alternatives Journal [Internet]. [cited 2015 Oct 29]; 40(4), 53. Available from:

[Adelges tsugae] (2005). Retrieved from https://en.wikipedia.org/wiki/Hemlock_woolly_adelgid.

Agency of Agriculture. 2018. "Food & Markets." Accessed May 12, 2018. http://agriculture.vermont.gov.

Algiere, J. 2017. "Stone Barns Poultry School 2017." Accessed May 12, 2018. https://www.stonebarnscenter.org/resource/poultry-on-a-vegetable-farm/.

American Wind Energy Association. (2017). Wind Energy in Vermont. American Wind Energy Association. http://awea.files.cms-plus.com/FileDownloads/pdfs/Vermont.pdf

ANZ Bank of New Zealand. 2018. "Equity Partnerships in Farming." Accessed May 12, 2018. https://www.anz.co.nz/resources/6/0/60e2ad69-1803-4c8b-9344-16b77a7f5321/Equity_Partnership.pdf?MOD=AJPERES.

"Apply." *Vermont Youth Conservation Corps*, Vermont Youth Conservation Corps, www.vycc.org/join/?gclid=Cj0KCQjw0a7YBRDnARIsAJgsF3NZlEC5Nz40n-PUNvwmrgjt8ap13P68TPAN-iSQcdHBnc4iHIxnsFAaAjy_EALw_wcB.

[Asian long-horned beetle] (2017). Retrieved from http://www.sunburynews.com/news/5069/asian-long-horned-beetle-found-in-clermont-county.

Athol Farm School. 2018. "The Farm School." Accessed April 26, 2018. http://farmschool.org.

Bare, M and Ziegler-Ulsh, C. 2012. "Establishing a small-scale, sustainable, pastured poultry operation." Rodale Institute. Accessed May 10, 2018. https://rodaleinstitute.org/establishing-a-small-scale-sustainable-pastured-poultry-operation/.

Barg, L. (2007). The Undeveloped Hydroelectric Potential of Vermont. Retrieved from http://dec.vermont.gov/sites/dec/files/wsm/rivers/docs/shw_bargslides.pdf

Bashan, A., Berezin, Y., Buldyrev, S., & Havlin, S. (2013). The extreme vulnerability of interdependent spatially embedded networks. *Nature*, 9, 667-672. Retrieved from https://www.nature.com/articles/nphys2727

Beals, W. (2018). [Telephone interview].

Bernardo, Richie. (2017, July). 2017's Most & Least Energy-Expensive States. https://wallethub.com/edu/energy-costs-by-state/4833/.

Bigelow, D., Borchers, A., & Hubbs, T. (2016, August). U.S. Farmland Ownership, Tenure, and Transfer. *United States Department of Agriculture*. Retrieved May 7, 2018.

Bombaci, Jared. 2004. The Vermont Legislative Research Shop. Wind Power. The University of Vermont. https://www.uvm.edu/~vlrs/Energy/WindPower.pdf

Bradley, P. (2014). U.S. Agriculture Census Shows More Farms In New England. *Connecticut Public WNPR*

Burr and Burton: Tuition Fees and Financial Aid. (n.d.). Retrieved April 27, 2018, from https://www.burrburton.org/page/admissions/tuition-fees-and-financial-aid

Buzby, KM, and LS Lin. 2014. Scaling aquaponic systems: Balancing plant uptake with fish output. Aquacultural Engineering [Internet]. [cited 2015 Nov 11]; 63 : 39-44. Available from: http://www.sciencedirect.com/science/article/pii/S0144860914000910

Campbell, D. (2018). [Telephone interview].

Castanea Foundation Report 2009-2011. (2011). Retrieved May 7, 2018.

Center for Rural Affairs. 2018. "Transfer Strategies for Beginning & Retiring Farmers." Accessed April 26, 2018. http://www.cfra.org/resources/beginning_farmer/success_stories#5.

Center for Rural Affairs. 2018. "Beginning Farmer Funding Sources and Financing Options." Accessed April 26, 2018. https://www.cfra.org/resources/beginning_farmer/fundingsources#banks.

Cogbill, C. V., Burk, J., & Motzkin, G. (2002). The forests of presettlement New England, USA:

Connors, P. 2018. [Telephone interview].

Cunningham, P., & Woofenden, I. (2007). Microhydro-Electric Systems Simplified. *Home Power, 117*, 41-45. Retrieved from http://microhydropower.com/Articles/MicroHydroSystems.pdf

Dartmouth College Woodlands. (2011). Forest management plan for a property known as the Second College Grant owned by Dartmouth College. Retrieved from http://forestguild.org/model_forest/Dartmouth/DartmouthMgntPlan.pdf

DeGraaf, R. M. (1992). Technical guide to forest wildlife habitat management in New England. UPNE.

DeLonge, M. 2017. "Reintegrating Land and Livestock." Union of Concerned Scientists. Accessed May 6, 2018. www.ucsusa.org/landandlivestock.

Diaz, A. (2016, Nov. 18). 200 Years of US Interest Rates in One Chart. *CNBC*. Retrieved May 5, 2018.

Donnin, M. 2018. [Telephone interview].

Dukes, J.S., Pontius, J., Orwig, D., Garnas, J.R., Rodgers, V.L., Brazee, N., … Ayres, M. (2009). Responses of insect pests, pathogens, and invasive plant species to climate change in the forests of northeastern North America: What can we predict? *Canadian Journal for Research* 39: 231-248.

Dunlap, R. E. (2000, April 18). Americans Have Positive Image of the Environmental Movement.

Durham, G. 2018. [Telephone discussion].

Dusome, C. (2014.). *Social Media and the Keys to Nonprofit Success* (Rep.). Retrieved https://familyvio.csw.fsu.edu/wp-content/uploads/2010/05/IFVSSocialMediaGuide.pdf

Elkins, K. (2017, April 7). Here's how much the average family has saved for retirement at every age.

Ellabban, O., Abu-Rub, H., & Blaabjerg, F. (2014). Renewable energy resources: Current status, future prospects and their enabling technology. *Renewable and Sustainable Energy Reviews,39*, 748-764. doi:10.1016/j.rser.2014.07.113

[Emerald ash borer: Dorsal view of adult with elytra and wings spread] (2012). Retrieved from https://en.wikipedia.org/wiki/Emerald_ash_borer.

EPA: Inventory of U.S. Greenhouse Gas Emissions and Sinks. (2018, April 16). Retrieved from https://www.epa.gov/ghgemissions/inventory-us-greenhouse-gas-emissions-and-sinks.

Equity Trust. (2018). Retrieved May 7, 2018.

Equity Trust Annual Report. (2016). Retrieved May 7, 2018.

Facebook. (2008, December 12). Pages, Groups, and Causes: How are they different? Retrieved https://www.facebook.com/notes/nonprofits-on-facebook/pages-groups-and-causes-how-are-they-different/43952236636/

Farm Legacy. (2016). Retrieved May 7, 2018.

Farm Seekers. (2015). Retrieved May 7, 2018.

Federal Energy Regulatory Commission. (2018). Small/Low-Impact Hydropower Projects. Retrieved from https://www.ferc.gov/industries/hydropower/gen-info/licensing/small-low-impact/get-started/exemp-licens.asp

Finite Carbon, (2014). Project Design Document: CAR672 Finite Carbon – NEFF Forest Carbon Project (Climate Action Reserve's Forest Project Protocol Volume 3.2. Retrieved from https://www.arb.ca.gov/cc/capandtrade/offsets/issuance/arb_offset_credit_issuance_table.pdf

Fitzsimmons, A. K. (1999). Defending Illusions: Federal Protection of Ecosystems. *Lanham: Rowman & Littlefield Publishers*.

Foreman, D. (2006). Take Back the Conservation Movement. *International Journal of Wilderness*, 12(1), 4-8.

[Forest tent caterpillar] (2011). Retrieved from http://ectotherms.wikia.com/wiki/File:Forest_tent_caterpillar_kt.jpg.

Foster, D. R. (1992). Land-use history (1730-1990) and vegetation dynamics in central New England, USA. *Journal of ecology*, 753-771.

Gallagher, K. and Weinberg, C. B. (1991, Fall). Coping with success: New challenges for nonprofit marketing. Sloan Management Review, 3, 27-42

Gardescu, S. (2008). Sugar Maple and the Pear Thrips. *Insect Diagnostic Laboratory Cornell University*.

Goddek S, Delaide B, Mankasingh U, Ragnarsdottir KV, Jijakli H, Thorarinsdottir R. 2015. Challenges of Sustainable and Commercial Aquaponics. Sustainability [Internet]. [cited 2015 Oct 29];7(4):4199-4224. Available from: http://www.mdpi.com/2071-1050/7/4/4199/htm

Glynwood Center. 2018. "Glynwood: Cultivating a Vibrant Hudson Valley." Accessed April 3, 2018. https://glynwood.org.

Goodman, Elisha Renee. 2011. Aquaponics: community and economic development. PhD diss. Massachusetts Institute of Technology [Internet]. [cited 2015 Nov 13]. Available from: http://dspace.mit.edu/handle/1721.1/67227

Goodstein E., Polansky S. (2014). Economics and the Environment, 7th ed. *Hooken, NJ: John Wiley & Sons, Inc,*. 529

Heat Squad. (2018, March). Energy Audit.

Hellman, J.J, Byers, J.E., Bierwagen, B.G., and Dukes, J.S. (2008). Five potential consequences of climate change for invasive species. *Society for Conservation Biology* 22(3): 534-543.

Hendee, J. C., & Dawson, C. P. (2001). Stewardship to Address the Threats to Wilderness Resources and Values. *International Journal of Wilderness*, 7(3), 4-9.

Herms, D.A., McCullough, D.G., Smitley, D.R., Sadof, C.S., and Cranshaw, W. (2014). Insecticide options for protecting ash trees from emerald ash borer. *North Central IPM Center Bulletin* Second Edition, 16 pp.

Hersch, D., Perdue, L., Ambroz, T., & Boucher, J. L. (2014). "The Impact of Cooking Classes on Food-Related Preferences, Attitudes, and Behaviors of School-Aged Children: A Systematic Review of the Evidence, 2003–2014." Preventing Chronic Disease 11 (19). doi:10.5888/pcd11.140267. Accessed May 7, 2018. http://www.healthvermont.gov/sites/default/files/documents/2016/12/REG_good-manufacturing-practices-for-food.pdf.

Hoefer, R. (2012). From Web Site Visitor to Online Contributor: Three Internet Fundraising Techniques for Nonprofits. Social Work, 57(4), 361-365. doi:10.1093/sw/sws002

Hu, J., Angeli, S., Schuetz, S., Luo, Y., and Hajek A.E. (2009). Ecology and management of exotic and endemic Asian longhorned beetle *Anoplophora glabripennis*. *Agricultural and Forest Entomology* 11(4): 359-375.

International Energy Agency. (2017). *Renewables 2017 Market Report*. Retrieved from https://www.iea.org/media/publications/mtrmr/Renewables2017ExecutiveSummary.PDF

Intervale Center. 2018. "Intervale Center." Accessed May 5, 2018. https://www.intervale.org.

Interview with Mark Tilsen [Telephone interview]. (2018, April 22).

Ireland, R. D., & Hitt, M. A. (1992). Mission statements: Importance, challenge, and recommendations for development. *Business Horizons*, 35(3), 34-42. doi:10.1016/0007-6813(92)90067-j

Kamenetz, A. (Writer). (2016, August 23). Americans Like Their Schools– Just Not Yours [Television series episode]. In Common Core. NprEd.

Kanoti, A., Lombard, K., Weimer, J., Schultz, B., Esden, J., Hanavan, R., and Bohne, M. (2015). Managing hemlock in northern New England forests threatened by hemlock woolly adelgid and elongate hemlock scale. *United States Department of Agriculture: US Forest Service.*

Keough, Gary. (2012). Trends in New England Agriculture. *National Agricultural Statistics Service. New England.*

Kirk, G., & Nolan, S. B. (2010). Nonprofit mission statement focus and financial performance. *Nonprofit Management and Leadership*, 20(4), 473-490. doi:10.1002/nml.20006.

Kumar, Yogesh, Jordan Ringenberg, Soma Shekara Depuru, Vijay K. Devabhaktuni, Jin Woo Lee, Efstratios Nikolaidis, Brett Andersen, and Abdollah Afjeh. "Wind energy: trends and enabling technologies." *Renewable and Sustainable Energy Reviews* 53 (2016): 209-224.

Land and Farm (2018). Retrieved May 7, 2018.

Laughton, C. (2017). Northeast Dairy Farm Summary 2016. *Farm Credit East*.

Lewis-Beck, M. S., Bryman, A., & Futing Liao, T. (2004). *The SAGE encyclopedia of social science research methods* Thousand Oaks, CA: SAGE Publications Ltd

Litvaitis, J. A. (2001). Importance of early successional habitats to mammals in eastern forests. Wildlife Society Bulletin, 29(2), 466-473.

Llewellyn, D. 2018. [Telephone interview].

Lombardo, J. 2018. [Telephone interview].

Loomis, E. (2016, Dec 5). Towards a Working-Class Environmentalism.

Long Trail School. (n.d.). Retrieved May 24, 2018, from http://longtrailschool.org/about-lts/about-long-trail/

Love DC, Fry JP, Genello L, Hill ES, Frederick JA, Li X, et al. 2014. An International Survey of Aquaponics Practitioners. PLOS ONE [Internet]. [cited 2015 Oct 29]; 9(7): e102662. Available from: http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0102662

Maine Organic Farmer and Gardeners Association. 2018. "Maine Organic Farm and Gardeners Association." Accessed May, 8, 2018. http://www.mofga.org.

Maiter, S., Simich, L., Jacobson, N., & Wise, J. (2008). Reciprocity: An ethic for community-based participatory action research. *Action Research*, 6(3), 305-325. doi:10.1177/1476750307083720

McConnell, G. (1954). The Conservation Movement. Past and Present. *The Western Political Quarterly,* 7(3), 463-478.

Merenlender, A. M., Huntsinger, L., Guthey, G., & Fairfax, S. K. (2004). Land Trusts and Conservation Easements: Who Is Conserving What for Whom? *Conservation Biology*, 18(1), 65-76.

Meyer S., Cronan C., Lilieholm, R., Johnson, M., & Foster, D. (2014). "Land conservation in northern New England: Historic trends and alternative conservation futures." *Biological Conservation* 174: 152-160.

Mill River Union High School. (n.d.). Retrieved May 27, 2018, from http://millriverschools.org/mru/about-us/mill-river-school-profile/

Miller, A. D., Bastian, C. T., McLeod, D. M., Keske, C. M., & Hoag, D. L. (2010). Factors impacting agricultural landowners' willingness to enter into conservation easements: A case study. *Society and Natural Resources*, 24(1), 65-74.

Moore, M. H. (2000). Managing for Value: Organizational Strategy in for-Profit, Nonprofit, and Governmental Organizations. *Nonprofit and Voluntary Sector Quarterly*, 29(1_suppl), 183-204. doi:10.1177/0899764000291s009

National Sustainable Agriculture Coalition. 2018. "Farm Bill Programs & Grants - Overview." Accessed May 5, 2018 http://sustainableagriculture.net/publications/grassrootsguide/farm-bill-programs-and-grants/.

NEFF. (2016). "Our Mission." Retrieved from http://newenglandforestry.org/about/our-mission/
Northrup A. (2012) "The New American Conservation Movement: New Strategies, Focus and Organizations for the 21st Century." *UNLV Thesis Dissertations, Professional Papers, and Capstones.*

New England Grassroots Fund. (2018). Grow Grants. https://grassrootsfund.org/dollars/grow-grants.

New Entry Sustainable Farming Project. 2018. "New Entry Sustainable Farming Project." Accessed April 17, 2018. https://nesfp.org.

Pampel, F.C. (2014, Mar 1). The Varied Influence of SES On Environmental Concern. *HSS Public Access*, 95(1), 57-75.

Paulson, N.D., and G.D. Schnitkey, G.D. (2013). "Farmland Rental Markets: Trends in Contract Type, Rates, and Risk," *Agricultural Finance Review* 73(1):32-44.

[Pear Thrips] (n.d.). Retrieved from https://www.forestpests.org/vd/images/5021015-SMPT.jpg.

Pierce, R. A., Stelzer, H. E., & Dwyer, J. P. (2013). Integrating Woodland and Wildlife Management Practices on Your Property.

Pyles, Jesse. (2018). Personal communication emails.

Pyles, J. 2018. [Telephone interview].

PowerSpout. (2014). System Design and the Advanced Calculator for PowerSpout. Retrieved from http://www.powerspout.com/assets/Published/public/PLT/PLT-Manuals/PS-Advance-Calculator-Jan-2014.pdf

Ramankutty, N., & Foley, J. A. (1999). Estimating historical changes in land cover: North American croplands from 1850 to 1992. *Global Ecology and Biogeography*, 8, 381–396

Reichelstein, S., & Yorston, M. (2012). The Prospects for Cost Competitive Solar PV Power. *SSRN Electronic Journal*. doi:10.2139/ssrn.2182828

Richmond, E. (2017, August 29). What the Public Wants From Schools. Retrieved from https://www.theatlantic.com/education/archive/2017/08/what-the-public-wants-from-schools/538335/

Rome, A. (2003, Jan 16). Conservation, Preservation, and Environmental Activism: A Survey of the Historical Literature.

Rural Energy for America Program, 76 C.F.R. § 21109 (2011). Retrieved from https://www.federalregister.gov/documents/2011/04/14/2011-8460/rural-energy-for-america-program

Sciabarrasi, M. (2018). The Big Five Risks Faced by Farmers. *New England Vegetable Management Group*.

Shearer, D. (2014, May 15). Pioneering an Innovative Equity Fund for Farmers. Retrieved May 7, 2018.

Smith, C. (2018). [Telephone interview].

Smokey House Center. (2017). Energy Audit.

Smokey House Center. 2018. "Smokey House Center." Accessed May 9, 2018. http://www.smokeyhouse.org.

Smokey House Center. "Forestry." Retrieved from http://www.smokeyhouse.org/conservation/forestry/

Smokey House Center. 2002. "Grant of Development Rights and Conservation Restrictions on Forestry Easement Areas." Retrieved from Smokey House Center Google Drive folder.

Smokey House Center. 2014. "Smokey House Center and New England Forestry Foundation Inc.: Modifications of Grant I and II of Development Rights and Conservation Restrictions: and Release of Two Acres from Restrictions." Retrieved from Smokey House Center Google Drive folder.

Son, Jung-Young, and Ke Ma. 2017. Wind energy systems. Proceedings of the IEEE 105 (11): 2116-31.

Spatial and compositional patterns based on town proprietor surveys. *Journal of Biogeography*, 29, 1279–1304.

Storrow, T. (2018). [Telephone interview].

Sustainable Agriculture Research & Education (SARE). 2012. "Environmental Benefits." Accessed May 8, 2018. https://www.sare.org/Learning-Center/Bulletins/Profitable-Poultry/Text-Version/Environmental-Benefits.

The Equity Trust Loan Fund: A Vehicle for Responsible Investment. (2014). Retrieved May 7, 2018.

Thunder Valley CDC. 2016. "Thunder Valley: Native Youth on the Move." Accessed May 13, 2018. http://www.thundervalley.org.

Town of Danby Annual Report 2017 (pp. 1-65, Rep.). (n.d.).

Tubbs, C. H., DeGraaf, R. M., Yamasaki, M., & Healy, W. M. (1987). Guide to wildlife tree management in New England northern hardwoods. Gen. Tech. Rep. NE-118. Broomall, PA: US Department of Agriculture, Forest Service, Northeastern Forest Experiment Station. 30 p., 118, 1-30.

Union of Concerned Scientists. (2013). Environmental Impacts of Solar Power. Retrieved from https://www.ucsusa.org/clean_energy/our-energy-choices/renewable-energy/environmental-impacts-solar-power.html#references

United States Department of Agriculture. 2016. "A Guide to Funding Resources." Accessed May 13, 2018. https://www.nal.usda.gov/ric/guide-to-funding-resources#federalfunding.

United States Department of Agriculture, Economic Research Service. March 19, 2018. "Agriculture Act of 2014: Highlights and Implications." Accessed May 14, 2018. https://www.ers.usda.gov/agricultural-act-of-2014-highlights-and-implications/.

United States Department of Agriculture Rural Development. (2018). Community Facilities Direct Loan & Grant Program in Vermont, Program 101. https://www.rd.usda.gov/programs-services/community-facilities-direct-loan-grant-program/vt.

U.S. Department of Agriculture. (1999). Agricultural Economics and Land Ownership Survey.

U.S. Department of Energy. (2012). Planning a Microhydropower System. Retrieved from https://www.energy.gov/energysaver/planning-microhydropower-system

U.S. Energy Information Administration. (2017). Vermont State Energy Profile. Retrieved from https://www.eia.gov/state/print.php?sid=VT

USDA - Rural Energy for America Program (REAP) Grants. (2016, February 11). Retrieved from http://programs.dsireusa.org/system/program/detail/917

UVM New Farmer Training Program. 2018. "UVM Extension New Farmer Program." Accessed April 12, 2018. http://newfarmerproject.wordpress.com.

Vermont Community Foundation. "By the Numbers." 2016.

Vermont Department of Health. 2016. "Good Manufacturing Practices for Food Rule." Accessed May 7, 2018. http://www.healthvermont.gov/sites/default/files/documents/2016/12/REG_good-manufacturing-practices-for-food.pdf.

Vermont Department of Labor. 2016. Workforce Education and Training Fund: Awards FY 2016. http://labor.vermont.gov/wordpress/wp-content/uploads/WETF-2016_001.pdf

Vermont Department of Labor. 2017. State Workforce Development System Report of Findings & Recommendations. http://labor.vermont.gov/wordpress/wp-content/uploads/S.135_WorkingGroup_WorkforceDevelopment_FinalReport_Legislature.pdf

Vermont Green Energy Systems. (2018, May). Site Assessment.

Vermont Invasives. (2018). Invasives on Land. *University of Vermont Extension*. Retrieved from http://vtinvasives.org.

Vermont Natural Resources Council. (2008). Wildlife Corridor Overlay Zone - Shrewsbury. Retrieved from http://vnrc.org/resources/community-planning-toolbox/case-studies/wildlife-corridor-overlay-zone-shrewsbury/.

Vermont Natural Resources Council. (2018). Wildlife Corridor Protection. Retrieved from http://vnrc.org/resources/community-planning-toolbox/issues/wildlife-corridor-protection/.

Vermont Report - 2017. (n.d.). Retrieved May 22, 2018, from https://talkpoverty.org/state-year-report/vermont-2017-report/

Vermont Youth Conservation Corps. 2016. 2016 Annual Report. https://issuu.com/vycc/docs/annualreport_layoutdraft_1

Vilsak, Tom and Clark, Cynthia. (2014) 2012 Census of Agriculture: Summary and Statistics. *United States Department of Agriculture, National Agricultural Statistics Service*.

"Welcome to the CCLC." *Cobscook Community Learning Center*, Cobscook Community Learning Center, www.thecclc.org/.

Whalen, J., & Beals, W. (n.d.). *Grant of Development Rights and Conservation Restrictions* (Rep.).

Whalen, J. (2018). [Telephone interview].

Whalen, J. (2014). *Equity Fund Template*.

Wissman, L. (n.d.). 2017 Federal Poverty Level Guidelines. Retrieved May 22, 2018, from https://www.peoplekeep.com/blog/2017-federal-poverty-level-guidelines

Working Lands. (2015). Retrieved May 7, 2018.

Yoder, B. (2018, May 4). Email interview.

Yoder, R. (2018). [Telephone interview].

Youth Leadership Development Program. (n.d.). Retrieved April 30, 2018, from http://www.thundervalley.org/

Zhang. X. (2004). The Effects of Conservation Easements on Land Values. *Virginia Polytechnic Institute and State University*

Zickuhr, K., & Madden, M. (2012). *Older Adults and Internet Use* (pp. 1-23, Rep.). Pew Research Center.