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EXPANDING RURAL BROADBAND ACCESS IN VERMONT

PRESENTED TO VERMONT HOUSE ENERGY AND TECHNOLOGY COMMITTEE

Representative Timothy Briglin, Chairman

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TABLE OF CONTENTS

EXECUTIVE SUMMARY

Nearly 42 percent of Vermonters lack access to high-speed internet,[2] posing a challenge for the economic prospects of the state. Furthermore, as electricity management is becoming increasingly dependent on internet access in order to organize and allocate distribution, low connectivity levels will greatly impact the long-term energy outlook of the state. With 61 percent of Vermont residents living in rural areas,[3] improving broadband access for these Vermonters would have important future implications for the state. This report to the House Committee on Energy and Technology addresses the potential benefits of a convergence between electric utilities and broadband services, explores potential concerns that may arise, and presents possible solutions to these issues. In this report, we analyze the current landscape of broadband in Vermont, consider how there is a space for this convergence of electric utilities and broadband services, and look at several case studies of how peer states have leveraged existing infrastructure and actors to successfully expand rural broadband access. We hope our findings will inform the House Committee on Energy and Technology on pathways to encourage this convergence by fostering cross-sector collaboration between utility providers, addressing various regulatory concerns, and exploring several fiscal options.

1 INTRODUCTION: A NECESSITATED CONVERGENCE

Broadband internet access is becoming increasingly essential in Vermont.[4] Internet speeds lie at the foundation of e-commerce growth, labor force training, online education, telehealth, and numerous other facets of the development of the state. Furthermore, as the COVID-19 pandemic has swept across the United States, individuals are working, learning, and shopping predominantly online. As a country, we are now more than ever reliant on the internet as a means of personal growth, productivity, and communication. Vermont, however, has notably fallen behind national standards for broadband connectivity.

Nearly one-quarter of Vermont citizens lack access to broadband internet,[5] defined by the Federal Communications Commission (FCC) as a minimum download speed of 25 megabits per second and minimum upload speed of 3 megabits per second (25/3 Mbps)[6]. This issue becomes even more concerning when examining the distribution of broadband connectivity across the state. While the urban centers, such as Burlington and Montpelier, widely use high-speed internet on a daily basis, rural municipalities in Vermont have significantly lower levels of broadband access. Traditional internet service providers (ISPs), such as commercial wireless or access suppliers, have little economic motivation to invest in the more rural areas. With the rugged terrain and harsh winters of Vermont, traditional ISPs do not view rural towns as a profitable place to expand infrastructure and allocate personnel, particularly considering the low population densities within these areas. As 61 percent of Vermonters live in rural areas,[7] it is vital that state governmental agencies work to expand broadband access in these areas.

One promising way to do this is with the help of electric cooperatives, which are independent not-for-profit electric utilities owned by their customers. In states such as New Hampshire and Alabama, cooperatives have expanded from utility providers into the broadband space, successfully increasing broadband access. Of the approximately 900 rural electric cooperatives within the United States, nearly 100 are already offering broadband access, and an additional 200 are researching the feasibility and necessity of doing so in their local communities.[8] The convergence of electric cooperatives and broadband expansion may be a mutually beneficial mechanism for improving internet services across Vermont, especially in rural areas. While state citizens would receive better connectivity, electric cooperatives would also be able to provide electricity in a more efficient and effective manner to their members, as energy technology is becoming increasingly reliant on high-speed internet access. However, there are also numerous concerns, both regulatory and fiscal, that must be addressed in order to facilitate this convergence within Vermont. States such as North Dakota and South Dakota can be looked to for best practices surrounding encouraging collaboration among various types of stakeholders, implementing appropriate legislative solutions, and identifying effective federal and statewide funding mechanisms. By evaluating the internal conditions of broadband access and learning from other states, Vermont may begin to structure a successful convergence of utility provision and internet provision.

2 BACKGROUND: CONTEXTUALIZING CONCERNS

To address the convergence of electric utilities and rural broadband connectivity in the state of Vermont, the current landscape of each field must be explored. In this section, we will provide an overview of the energy industry within Vermont, a summary of the present availability of internet services, and an introduction to how these two sectors overlap.

2.1 ENERGY IN VERMONT

Generation of electricity within Vermont has seen a notable decline in the past decade. Until the end of 2014, when Vermont Yankee Nuclear Power Station closed, the plant was responsible for over 50 percent of power production in Vermont, and it further accounted for almost 80 percent of net electricity generation.[9] After its closure, due primarily to economic circumstances, the proportion of energy consumption within Vermont that was generated in-state decreased sharply. Today, the electricity used by Vermonters is predominantly imported from across the United States and from Canada.[10] Currently, the major agents in the energy sector are electricity distributors. The distributors of electric utilities, considered as monopolies with a "certificate of public good" by the Vermont Public Utility Commission, are regulated by the Vermont Public Service Department.[11] Presently, there are three main kinds of electric providers in the state: investor-owned utility companies (Green Mountain Power, the largest provider in the state and the only one of its kind), municipal electric utilities, and rural electric cooperatives. By understanding the makeup of the energy sector of Vermont, the role these entities can potentially play within the area of broadband expansion can then be explored.

2.1.1 GREEN MOUNTAIN POWER

Green Mountain Power is the sole investor-owned utility in the distribution sector in Vermont. As an investor-owned utility company, Green Mountain Power is a privately and independently owned entity that focuses on providing access to particular in-demand resources. Having merged with Central Vermont Public Service Corporation in 2012, Green Mountain Power serves 220,000 citizens with electricity[12] (See Appendix A for a map of Vermont local electricity supply, color coded by distributor). The organization owns and manages an extensive network of electricity cabling and wiring, with over 22,000 miles of power lines, 1,005 miles of sub-transmission lines, and 185 distribution substations.[13]

2.1.2 MUNICIPALITIES

There are 14 municipal electric utilities within the state of Vermont, each serving as the power distributors within their exclusive jurisdiction. Cumulatively, they serve about 47,000 customers.[14] These utilities differ greatly in size, with the Burlington Electric Department serving over 19,600 customers[15] and the Village of Orleans Electric Department reaching approximately only 700 individuals.[16] Within each of these 14 entities, power transmission lines are owned and operated by town governments themselves, allowing for rates set independently by these municipalities (with approval from the Vermont Public Utility Commission). These municipal electric utilities also draw their electricity from a variety of places, transmitting from VELCO and all of its associated power sources.

2.1.3 RURAL ELECTRIC COOPERATIVES

Electric cooperatives are nonprofit entities owned by the consumers they are intended to serve. Financed by the rates paid by their members, electric cooperatives offer a community-based mechanism for power distribution, often in rural or remote areas where traditional service distributors have not established operations.[17] The revenues made by these cooperatives are then customarily reinvested into the organization or returned to members via a payback system, specific to each cooperative. In Vermont, there are two major electric cooperatives that play an important role in electricity transmission across the state: The Washington Electric Cooperative, which serves about 10,000 customers, and the Vermont Electric Cooperative, which serves roughly 34,000 customers.[18] Washington Electric Cooperative takes earned revenue from paid rates and, after reinvesting part of this profit in accordance with pre-approved growth plans, deposits them into capital credit accounts associated with each member of the organization. By joining this cooperative, individuals are able to participate in the strategizing for capital investment, reap associated monetary benefits, and, primarily, gain access to localized power. Similarly, members of the Vermont Electric Cooperative direct organizational revenue towards developments such as infrastructure growth, reserve augmentation, appropriation credit allocations, or other community-oriented programming.

2.2 BROADBAND IN VERMONT

In this section, we will provide an overview of internet accessibility within Vermont, highlighting the inequalities among rural and urban households. This information will contextualize the need for targeted broadband expansion efforts across the state.

2.2.1 PRESENT ACCESSIBILITY

The state of Vermont is experiencing a great digital divide. As seen in Table 1, over 22 percent of citizens do not have access to a base connectivity speed of 25/3 Mbps, which is considered the standard for broadband. As only 17.5 percent of citizens conversely have access to very high-speed internet (100/100 Mbps), broadband is an issue of great inequality in Vermont (see Appendix B for a map of broadband coverage in Vermont).[19]

This separation is prominent primarily within rural Vermont. As seen within Appendix B, urban centers, like Burlington, are serviced with 25/3 Mbps (or better) by fibers and cables routed along their roads. In more remote locations, such as Eden Mills, there is significantly less access to high-speed internet or even internet connectivity.

Additionally, satisfaction levels surrounding internet connectivity within Vermont are fairly low. A 2020 telecommunications survey, given to a random sample of Vermonters, found that over 50 percent of respondents were not at all satisfied or were only slightly satisfied with internet connection speeds and reliability, particularly throughout the COVID-19 pandemic.[20] With the majority of Vermont citizens based in rural locations, these figures reflect a general dissatisfaction with broadband access both across the state and particularly within rural areas.

Table 1: Broadband High-Speed Internet Availability in Vermont

SPEED TIER	NUMBER NOT SERVED	PERCENT NOT SERVED
100/100 Mbps	254,305	82.5%
25/3 Mbps	69.899	22.7%
4/1 Mbps	20,978	6.8%

2.2.2 CURRENT EXPANSION PRACTICES

The Vermont state government offers recommendations aimed at addressing this digital divide. These guidelines include towns contracting service from existing ISPs, creating a public-private partnership where the town owns the fiber, or extending cable lines using a cost-sharing formula.[21] Rural towns are also encouraged to consider participating in a Communications Union District (CUDs). CUDs involve two or more municipalities partnering to construct shared telecommunications infrastructure. In 2016, ECFiber became the first CUD in Vermont.[22] They are becoming increasingly popular across Vermont.[23] There are now nine different CUDs across the state.[24]

2.3 CONVERGENCE OF BROADBAND AND UTILITIES

While electricity and internet are two fundamentally different services, there are multiple reasons to address the two in an overlapping manner. Broadband service provides benefits for electricity networks, and there are cost-savings that can be found when there is a coordinated delivery of the two.

2.3.1 BENEFITS OF CONVERGENCE

Broadband not only benefits the consumer by providing internet access to the home, but it also allows for more efficient allocation of energy, leading to savings to both the utility provider and the consumer in the long term. Additionally, efficient-use tactics, which are possible due primarily to internet connections in the electric grid, reduce the use of energy. The consequential decrease in emissions can have important environmental effects. This ability to allow for more efficient resource allocation makes broadband particularly useful and increasingly necessary for utility providers.

Another key benefit of the convergence of electric and broadband networks is that installation and service costs in rural areas are reduced, as compared to operating two completely separate networks. For example, fiber cabling can be laid using existing electric poles. Furthermore, instead of scheduling two trucks to drive long distances to rural areas in Vermont for service on both electric and fiber networks, one truck can do both processes in a single trip, reducing costs by around 20 to 25 percent

for broadband expansion. This allows for the budgetary break-even point of broadband installation to be cut from about 12 customers per mile to around six customers per mile.[25]

Utility providers and cooperatives in particular have some notable advantages to address. Utility providers already have assets, including electric, poles in their networks, and they are further presented with a long-term benefit by increased broadband access. This benefit does not necessarily need to come from service provided all the way to customers' homes; consumers still reap the rewards created by broadband allowing for more robust and efficient electricity networks. Considering both the existing infrastructure and the network benefits, utility providers, including electric cooperatives, may be particularly incentivized to play a role in delivering broadband to rural areas that presently lack service.[26]

2.3.2 DRAWBACKS FOR UTILITY PROVIDERS

Despite the reasons that may encourage utility providers to play a role in this convergence, the providers themselves have many reasons to avoid entering into broadband services on their own. Provision of electricity and internet services are quite different, and, accordingly, the existing actors have expressed hesitancy towards stepping into this new sector.[27] Green Mountain Power and both cooperatives have already indicated their lack of interest in becoming internet service providers.[28] Furthermore, there are cost concerns that merit consideration. As the electric utility industry is one with heavily regulated pricing structures, it may not be possible to fund expansion into this new field without raising rates for existing services and without providing a justifiable direct benefit to consumers in the short term.

3 PEER STATE COMPARISONS

To determine potential avenues for rural broadband expansion within the state of Vermont, we conducted research on how peer states have improved broadband access with the use of cooperatives and the convergence of electric utilities and internet delivery services. The selection criteria for these peer states included determining states that had similar rural population demographics to the state of Vermont and better rural broadband connectivity than the state of Vermont. Within this section, we summarize our findings surrounding rural broadband access within the states of New Hampshire, South Dakota, North Dakota, and Alabama.

3.1 NEW HAMPSHIRE

Like Vermont, New Hampshire is also experiencing a digital divide. More urban areas of New Hampshire, such as communities in Manchester and Concord, have reliable, high-speed internet, while rural areas largely do not have adequate broadband access. Over 10,000 people within New Hampshire, 10.4 percent of all households across the state, have no internet access at all, from either wired or wireless providers.[29] More than 25,000 additional residents, predominantly living in rural communities, do not have a level of connectivity that adheres to the definition of broadband outlined by the FCC.[30]

However, New Hampshire has seen some notable success in helping expand internet connectivity in certain areas of the state, with the help of electric utilities. On December 15, 2020, New Hampshire Electric Cooperative completed broadband access pilot projects, connecting approximately 900 cooperative members across four separate towns with high-speed internet.[31] Furthermore, the municipality of Chesterfield, New Hampshire, successfully worked with Consolidated Communications to provide every town resident with internet via fiber optic cabling.[32] In New Hampshire, a unique combination of legislative changes, funding mechanisms, and public-private partnerships have helped expand rural broadband access.

3.1.1 LEGISLATIVE OVERVIEW

New Hampshire has recently adopted several laws to facilitate broadband development across the state. In 2018, the New Hampshire State Senate passed SB170, which allowed towns to issue bonds for the expansion of broadband infrastructure.[33] This increased the financial options of municipalities considering investing in internet capabilities. Similarly, in 2019, SB103 was enacted into law, permitting several towns to conjointly issue bonds for broadband infrastructure.[34] Furthermore, HB1111, passed in July 2020, makes it simpler for towns to identify areas lacking in internet connectivity and permits the formation of Communication Union Districts (CUDs).[35]

3.1.2 FUNDING MECHANISMS

The successful passage of SB170 allowed the town of Chesterfield to fund the construction of fiber optic cabling that brought high-speed internet connectivity to every resident and premises within the municipality. Approximately 40 percent of the construction cost, which totaled to $4.3 million, was covered by municipal bonds; additional costs assumed by the town are covered by a minimum subscriber fee of $10 per month.[36] SB170 allowed Chesterfield to provide broadband access to its residents without an increase in taxes and only a $10 monthly fee to broadband subscribers.

Federal funds provided other fruitful funding mechanisms for broadband projects in New Hampshire. In June 2020, responding to the need for internet access during the COVID-19 pandemic, the State of New Hampshire Office of the Governor announced that $50 million of the CARES Act Coronavirus Relief Fund was to be allocated towards internet connectivity projects through the Connecting New Hampshire—Emergency Broadband Expansion Program.[37] New Hampshire Electric Cooperative was able to finance its pilot broadband projects through funds from Connecting New Hampshire.[38] Additionally, the town of Bristol, New Hampshire, was awarded $1.8 million from the Connecting New Hampshire Emergency Broadband Expansion Program to construct an additional 24 miles of fiber optic cabling.[39] Several more million dollars of this fund were allocated across thousands of properties in New Hampshire to expand broadband access.[40] In addition to the CARES Act, New Hampshire has received federal funding, via the E-Rate program, for the New Hampshire School Connectivity Initiative. This program helped build fiber optic cabling to bring reliable internet access to K-12 schools and public libraries across the state.[41]

3.1.3 PUBLIC-PRIVATE PARTNERSHIPS

Public-private partnerships have played a salient role in the success New Hampshire has experienced in rural broadband expansion. In order to successfully connect 900 of its members with broadband, New Hampshire Electric Cooperative collaborated with Tilson, a private infrastructure corporation.

Tilson constructed and laid the fiber that brought internet access to the homes of the New Hampshire Electric Cooperative members involved in the pilot projects.[42] Similarly, to bring broadband to all of its residents, the government of Chesterfield partnered with Consolidated Communications, a national telecommunications company. Consolidated Communications built cabling across the town of Chesterfield, allowing households across the municipality access to reliable, high-speed internet.[43]

3.2 NORTH DAKOTA

North Dakota provides another example of successful convergence between existing cooperatives and broadband service: over 60 percent of North Dakotans have access to broadband through fiber optic cabling, compared to an average of 24 percent of households across the Midwest.[44] The convergence occurred in the late 1990s through the formation of the Dakota Carrier Network, a coalition of broadband cooperatives. Today, the cooperatives maintain a network of fiber optic cabling throughout rural parts of North Dakota that serves 164,000 residents, over a fifth of the state.[45] This example illustrates the ability of cooperatives to build and maintain a sustainable broadband business in rural communities.

Like New Hampshire, the progress in rural broadband access in North Dakota is due to legislative changes to support cooperative expansion, funding mechanisms for state programs, and public-private partnerships and oversight.

3.2.1 LEGISLATIVE OVERVIEW

The legislature in North Dakota has benefited from sustained attention to expanding rural broadband access in the state. Since 1999, North Dakota has passed four bills specifically designed to expand broadband access in rural areas in the state, including SB 2040, a tax exemption for investments into telecommunications infrastructure. This tax cut was in effect from 2009 to 2017 and cost North Dakota $1.7 million in biennial tax revenue, which was below the $3 million projected to be lost. However, the exemption paved the way for $115 million in telecommunications infrastructure to be built in the state.[46]

The success of North Dakota in rural broadband access is also due in part to a public-private partnership from two decades ago. SB 2043, passed in 1999, established the North Dakota Information Technology Department and provided a model for expanding rural broadband capabilities in the state. The bill also created a State Information Technology Advisory Committee with members representing various interest groups within the state, including the telecommunications cooperatives.[47] This advisory committee provides recommendations for which major state agency information technology projects receive funds, creating a public-private partnership that determines the locations for investment in infrastructure in the state.[48]

3.2.2 FUNDING MECHANISMS

North Dakota has used both state and federal funding to accelerate the development of rural broadband capabilities. In the last decade, North Dakota has successfully been granted over $330 million in USDA funds alone.[49] North Dakota has also invested heavily at the state level to support public safety and education. In March 2020, North Dakota announced a 100 Gigabit plan that would, among other goals, ensure every K-12 district in the state has access to 1-gigabit levels of broadband, the highest level across any state in the country.[50]

Cooperatives in North Dakota, and other ISPs, have invested heavily as well to update their networks to support an expansion of rural broadband services. In the last decade, the group of cooperatives which compose the Dakota Carrier Network invested a total of $1.3 billion to support their fiber infrastructure.[51] This investment came after other large investments in the late 1990s when cooperatives in the state individually took out tens of millions of dollars in loans to replace expiring copper wiring with fiber optic cables.[52] However, one must note that the transformation of cooperatives into ISPs occurred fully within the telecommunications sector, as it was telephone cooperatives, rather than electric cooperatives, which supported this convergence.

3.2.3 FUTURE POTENTIAL

While the 100 Gigabit plan was recent and not fully realized yet, there are also other areas where North Dakota agencies continue to invest time and energy to stay at the forefront of rural broadband access expansion. While the FCC has only provided notice of potential rulemaking so far, North Dakota has considered TV White Space technology to expand rural broadband access in a more affordable manner.[53] North Dakota is also waiting to determine the level of success of the FirstNet broadband project for public safety in the state, which may also be expanded to support further broadband expansion efforts.[54]

3.3 SOUTH DAKOTA

South Dakota offers a useful example of how Vermont may go about improving rural internet access. South Dakota is a largely rural state, with over half of its population living in cities and towns with fewer than 50,000 residents.[55] Even with its rural nature, South Dakota has reached high levels of broadband access–not only in its larger cities but in rural areas as well. Over 75 percent of its rural population has access to broadband service, compared to an average of only 61 percent nationwide.[56] The relative success of South Dakota in rural broadband access is due to recent and significant efforts. From the beginning of 2013 to the end of 2017 small ISPs invested roughly $400 million in improvements to rural broadband infrastructure,[57] a very significant investment considering that the GDP of the s rural areas in the state is approximately $22.9 billion.[58]

Shared resources and collaboration across providers and telecommunications companies have played a key role in the successful rollout of broadband to much of rural South Dakota. South Dakota Telecommunications Association (SDTA) is an advocacy group that provides government relations services for 18 member companies.[59] These 18 providers vary in their structure (with cooperatives, small commercial providers, municipalities, and tribal telecommunications companies all represented by the group), but are all small providers that cover the rural parts of the state. Notably, 12 of the 18 are cooperatives.[60] Together, they cover 76 percent of the state (as seen in Appendix C), and generally

offer broadband service to the rural parts of the state, providing access to broadband internet for more than 75 percent of their customers.[61] This equates to around 300,000 people, roughly one-third of the population of South Dakota.[62]

SDN Communications is an internet service provider (ISP) that is owned by 17 different member communications companies, many of whom are also SDTA members.[63] SDN uses the networks of its members, creating a large, connected network of 50,000 miles of fiber across South Dakota and into Iowa and Minnesota.[64] SDN provides internet that connects all six of the public universities in the state and services many of the hospitals, schools, libraries, and public safety facilities in South Dakota.[65] The SDN network is comparable to an interstate highway system, with its member providers using the main fiber line to serve smaller areas and the farms and communities of rural South Dakota.[66]

3.3.1 HISTORY

Many of the SDTA and SDN member companies have been around for over a century. According to SDTA Director of Industry Relations Greg Dean, while they started as telephone companies, these cooperatives have evolved to the point where they are broadband providers first and foremost.[67]

Cooperation among telecommunications companies in South Dakota dates back to the creation of what would become SDN Communications in 1989.[68] At the time, customers wanted national long-distance service, but national companies would not bring facilities into the small rural communities where the local providers were located. These small providers determined that if they integrated the networks to bring customers to one point, the larger city of Sioux Falls, it would be much more attractive for larger companies to come in and establish national long-distance service.[69] Since then, SDN Communications has slowly pivoted towards broadband, as its members have established fiber that follows this same principle. These providers came together, knowing that they had the same mission, but different service areas, and as such, they were not in direct competition with each other.[70] In addition, their very nature as small providers, mostly member-owned, meant they were more focused on providing key services to their communities, rather than profits.[71]

3.3.2 FUNDING MECHANISMS

Due to the economic challenges of installing broadband outside of metropolitan areas, the development of broadband in South Dakota would not have been possible without extensive federal funding. While it is less expensive to install a mile of fiber in a rural part of the state, the low density of rural areas means that the per-person cost is far more expensive than in urban areas, like Sioux Falls. On average, the cost of fiber installation amounts to $3,500 per resident per mile of fiber in rural areas, as compared to $25 per resident in the city.[72]

South Dakota has been able to expand broadband access despite these costs by taking advantage of federal funding for rural broadband from multiple sources. The Department of Agriculture Rural Utilities Service (RUS) and its ReConnect program provided $122.5 million in loans and grants to SDTA member companies from 2010 to 2017.[73] South Dakota companies have been very successful at taking advantage of these opportunities. For example, in 2017, South Dakota rural telecommunications providers received $116.7 million from USDA loans, 17 percent of all funds distributed nationally by ReConnect.[74] In addition, it has also used the FCC Universal Service Fund

(USF) to meet the demands of rural broadband infrastructure. In 2016, USF distributed a total of $8.75 billion, with telecommunications companies in South Dakota receiving almost $100 million in funding.[75] Ample federal loans, grants, and guarantees have made the infrastructure expansions taken by SDN and SDTA members economically feasible and have allowed for the expansion of rural broadband access in South Dakota to occur.

While the ReConnect program has strict criteria, funding only very sparsely populated areas, South Dakota has taken advantage of this program for eligible service locations. According to Dean, the USDA has given seven ReConnect awards over the past two years in the state. One of the difficulties with USDA ReConnect funds is that they require a very extensive, and thus very costly, application, detailing both the proposed project and its effects in depth. According to Dean, a competitive application costs between 200 and 300 thousand dollars (to finance research into expected environmental impacts and pre-engineering details) and may not even lead to a grant award. The state has assisted by writing letters of support for applicants from its economic office and has even created its first-ever state broadband report—something that gives projects bonus points in the application process.[76]

Universal Service Funding has been critical in getting broadband deployed. Without it, deployment in many areas simply would not have been possible, according to Dean. For example, in a very sparsely populated portion of Western South Dakota (with less than one-half of a subscriber per line mile), Golden West Telecommunications (one of the SDTA member coops) was able to develop broadband for 70 subscribers, across an area of about 150 miles in length. Without funding, there is no way for it to be feasible to serve this sparsely populated area.[77]

South Dakota is also prioritizing broadband deployment in its own budget. In 2019 Governor Noem included the announcement of a five-million-dollar fund for broadband development grants—no small amount for a small state with typically small budgets—which the legislature approved.[78] Governor Noem has made further commitment to this Connect South Dakota program, announcing in December that she was asking for $100 million in new funding over the next six years for broadband in the form of public-private partnerships.[79] This represents the single largest appropriation request in the history of the state, and the program will be able to fill in the gaps where rural areas have not been able to utilize the narrowly tailored federal programs.[80] According to Dean, the hope is 100 percent broadband connectivity by the end of the decade. [81]

In total, between two rounds of Connect South Dakota funding, two rounds of USDA ReConnect, funds, and $7 million from the CARES Act, as well as the investments made by cooperatives, private companies, and other ISPs, there has been over $90 million spent on broadband infrastructure over the past five years.[82] This is projected to generate a 5:1 return on investment.[83]

3.4 ALABAMA

Alabama offers another example of the potential of the convergence between electric cooperatives and broadband. Central Alabama Electric Cooperative (CAEC) currently serves more than 42,000 members[84] over 5,000 square miles in rural areas of the state.[85] In 2018, CAEC created the subsidiary Central Access to offer broadband services to members through a 400-mile fiber optic ring.[86] As of October 2020, nearly 2,000 customers have been connected through CAEC's first stage of construction, and further stages are ongoing.[87]

3.4.1 FUNDING MECHANISMS

CAEC has benefited from both state and federal support to overcome the high upfront costs of creating a broadband network. In 2018, the Alabama state government provided financial assistance for the expansion with $200,000 in grants for Central Access to include an additional 70 homes and businesses.[88] In 2020, in response to school and business closures from COVID-19, the Alabama state government provided over $4.1 million in grants from the Alabama Broadband Accessibility Fund to support another expansion to over 4,500 households and 200 businesses.[89] The federal government, through the USDA Broadband ReConnect Program, also provided $8.6 million for Central Access to expand to another 13,853 people, 149 farms, and 77 businesses.[90]

Central Access also used community input and investment in order to fund building the network. Central Access created a survey to determine what communities were most interested in gaining broadband access and required a $25 investment from participants. As the project is moving forward, this initial investment from participants will take the place of a connection fee. For any areas that will not be served originally, the survey cost will be refunded.[91] Using the results from the survey, Central Access built their network around interested customers, leading the program to currently have a take rate of 33 percent. In order to remain profitable, Central Access only needs a take rate of 35 percent, a level they expect to reach as they continue building out their service.[92]

3.4.2 LEGISLATIVE OVERVIEW

Alabama Governor Kay Ivey introduced executive changes designed to increase broadband development beginning in 2016 with Executive Order 704, which "established the Alabama Department of Economic and Community Affairs as the agency to assume all powers, duties, responsibilities, authority, and obligations belonging to the Office of Broadband Development."[93]Governor Ivey also signed the Alabama Broadband Accessibility Act in 2018, which created the Alabama Broadband Accessibility Fund to support broadband expansion projects.[94]

Governor Ivey also signed a pair of laws in 2019 to hasten broadband expansion—Act 2019-327, which amends the Alabama Broadband Accessibility Act and increases the minimum service threshold and state funds available for broadband grants,[95] and HB400, which will allow electric cooperatives to use their existing electric easements and infrastructure for broadband deployment.[96] Most recently, Governor Ivey allocated $100 million in CARES Act funds to increasing broadband connectivity for students in the state.[97] This new legislation and funding will allow CAEC to use facilities that they already have in place for broadband purposes, and to help manage costs.[98]

3.5 KEY INSIGHTS FROM CASE STUDIES

In this section, we note three key insights from the previous four case studies. We hope that this set of identified attributes will provide areas of potential emulation for Vermont to continue improving rural broadband service.

3.5.1 COOPERATION AMONG VARIOUS PUBLIC AND PRIVATE ENTITIES

One of the common threads across all four of these cases is the importance of cooperation among different entities in order to successfully deliver rural broadband services. Whether it is multiple cooperatives working together or the formation of public-private partnerships, collaboration is

necessary in order to reduce costs, when possible, by sharing infrastructure networks and by providing the funding needed to make projects feasible.

3.5.2 FINANCIAL COMMITMENT TO BROADBAND

Each of the four states in our case studies has prioritized broadband by simultaneously taking advantage of federal funding programs and by making significant investments a part of its own state budget. Policymakers in these states understand that without government funding there are some areas that not-for-profit cooperatives cannot serve, due to the extremely high costs of providing rural internet services. Supporting expansive and well-designed state programs, in combination with leveraging the USDA ReConnect grants and the FCC Rural Digital Opportunity Funds, is critical to ensuring that cooperatives can offer broadband access to rural areas.

3.5.3 NONPROFIT ADVANTAGE

The electric and telecommunications cooperatives in these case studies serve areas that would otherwise lack access to broadband, due to a lack of profitability. While commercial ventures are not viable in these spaces, cooperatives are able to operate as long as they can break even. Furthermore, the lack of need by cooperatives to turn a profit enables them to use revenues from profitable areas to support their efforts in very low-density rural areas, which inevitably operate at a loss. Private companies, with an incentive to make profits in all locations, do not operate in this same space.

4 ENCOURAGING CROSS-SECTION COLLABORATION IN VERMONT

The convergence of electric utilities and rural broadband expansion presents an exciting opportunity for growth. However, this venture could potentially be a significant investment and risk for any type of organization (electric utility, electric cooperative, CUD, or other) that chooses to undertake it. With this in consideration, cross-sector collaboration may be the best avenue for improving internet connectivity across Vermont.

The various entities that may pursue broadband programming each have their unique strengths and weaknesses related to this issue. Large electric utility providers in Vermont, such as Green Mountain Power, have vast existing infrastructure assets in cabling and poles. Electric cooperatives maintain community-based buy-in and support, contributing to largely successful programming efforts. Similarly, CUDs present the salient benefit of having no profit obligations. This allows them to provide inexpensive broadband services without the need to bring in a specified amount of revenue, unlike a traditional investor-owned utility. By working in collaboration, all of the agents in the Vermont utility landscape can reduce organizational risk, combine existing institutional advantages, and begin to address the multifaceted problem of rural broadband access in Vermont.

However, it is likely that these different groups may be initially hesitant to work together. This may be due to past legislative and fiscal barriers that organizations have encountered when exploring internet connectivity. To encourage cross-sector collaboration, the state of Vermont may need to critically examine the legal landscape and funding pathways that electric utilities, electric cooperatives, and CUDs must navigate.

5 REGULATORY BARRIERS AND SOLUTIONS

One major area of concern for potential ISPs in Vermont is the current regulatory climate. While Act 79, passed in 2019, paved the way for CUDs to offer broadband services throughout the state, other regulations which discourage electric cooperatives and other actors from investing in their own broadband provision persist. This section will examine these regulatory concerns.

5.1 REGULATORY CHALLENGES

Vermont, like many states, currently has regulations that prevent cross-subsidies for non-electric services (V.S.A. §3047).[99] These regulations hinder the ability of cooperatives and other possible non-traditional ISPs to invest in broadband services. At the same time, cross-subsidization may cause upward rate pressure, as the electric cooperatives direct excess funds to new broadband services rather than returning them to their members.

An additional regulatory concern for Vermont includes legislation surrounding rights-of-way policies. As electric utilities, electric cooperatives, and CUDs explore potential broadband programming, the construction of new telecommunications infrastructure and the use of existing utility poles are important factors in bringing fiber-optic cabling to premises across the state. Land ownership and management of rights-of-way policies in Vermont thus, accordingly, become salient legal considerations for these various organizations.

5.2 POSSIBLE SOLUTIONS

Presently, with the passage of HB958 and HB966, there is no legal barrier preventing electric utilities from offering broadband services.[100] [101] However, there has been hesitancy from both electric utilities and electric cooperatives to explore internet connectivity initiatives. To encourage the convergence between electric cooperatives and broadband access, the state legislature may consider amending cooperative charters, requiring them to support broadband expansion within their regions. Although this recommendation is supported by the Vermont Department of Public Services, such a policy response could cause upward pressure on electric rates. This pressure, however, may be mitigated by an expansion of subsidy programming across the state.

The current statute prevents cross-subsidization of broadband by electric utility providers. This regulation prohibits rate increases of electric utilities, which, although would raise the cost to consumers in the short-term, would eventually lead to significant long-term benefits by creating a smart-grid electric network serviced with broadband internet. Over time, changes in this policy could lead to reductions in electric rates for consumers and expansions of broadband services, by giving providers a chance to use their existing customer base to fund the development of broadband infrastructure. While there are legitimate concerns with adding costs for consumers without immediately improving the services they will receive, this topic does merit further discussion.

Another potential regulatory change that would allow for more collaboration between ISPs and utility providers would be to allow utility providers to cover the costs of make-ready improvements to their infrastructure. This would enable ISPs to lay fiber onto existing poles. ISPs would still bear the costs of installing the cables and operating the services, but utility providers, such as Green Mountain Power or cooperatives, would be able to cover these upfront make-ready costs, making it more viable for the

ISPs to build out their networks in rural areas. The electric utility companies would incentivize broadband development within their region, which is both in their best interest and the best interest of their customers, as this would allow for increased long-run efficiency within their grid systems. Green Mountain Power recently petitioned the Public Utility Commission for this regulatory change, which is currently under review.

6 FISCAL BARRIERS AND SOLUTIONS

Rural broadband expansion is inherently costly. The low population density, combined with often challenging mountainous and rocky terrain, means that many parts of the state present expensive investments that will not come close to breaking even for any provider. Not only would traditional for-profit ISPs need financial support in order to develop rural broadband, but cooperatives and other not-for-profit providers need financial assistance to make covering the cost of operations in rural areas. In this section, we will examine the costs associated with rural broadband expansion, as well as how the state may be able to support efforts to obtain federal funding and effectively implement its own funding.

6.1 EXISTING FISCAL CONCERNS

One of the main reasons that many rural areas of Vermont lack broadband access is that the low density of homes and businesses erodes the profit margin for traditional ISPs. As they are for-profit, these ISPs often build infrastructure for comparatively more densely populated areas while avoiding the outlying areas where the costs of building the infrastructure would approach or overcome the income from customers. Thus, these traditional ISPs currently avoid areas with less than 20 to 30 customers per mile.

Cooperatives and other non-profit groups such as CUDs, however, are often able to build further into these outlying areas as they do not require the same rates of return. Nevertheless, these groups are limited by the costs associated with building out infrastructure–cooperatives and CUDs do need to have financially sustainable operations. The lack of guaranteed territories also relegates the CUDs, cooperatives, and other potential non-traditional ISPs to mostly rural areas, limiting the ability for the non-profit companies to socialize costs and build further into rural communities. Due to this restriction, CUDs and cooperatives likely cannot fund areas with fewer than 12 customers per mile.[102]

Similarly, the infrastructure needed to support broadband service provision requires large investments upfront that take years to offset. Currently, last-mile infrastructure costs as much as $35,000 per mile.[103] Nevertheless, recent technological advances could help lower the costs for electric cooperatives in the state. For example, all-dielectric self-supporting (ADSS) fiber supports both electric and broadband provision and would be placed wholly within the electric space on poles. This ADSS fiber would also leave the expensive make-ready fiber that would otherwise be used for broadband provision unnecessary.[104]

Another way to lower costs and create a more efficient broadband system throughout Vermont is to build off existing networks rather than competing and building redundant networks to reach an access point to the broader internet. While traditional, investor-owned ISPs may be wary, partnerships, for

example, between CUDs and electric cooperatives, would support a more efficient network system that lowers costs for customers.

The need for new technical expertise is also a concern for cooperatives particularly. While broadband provision can be considered an economy of scope for electric providers, electric cooperatives in Vermont have expressed concern about expanding into a field in which have little experience. Both cooperatives have also expressed their desire to keep from becoming an ISP. A possible solution to accommodate the wishes of the cooperatives while also supporting a convergence is to support partnerships between cooperatives and existing ISPs such as CUDs.

One way to offset this restriction is through grants, often through federal agencies like the Department of Agriculture (USDA) or the FCC. Programs like the recent Rural Digital Opportunity Fund are promising in allowing non-traditional ISPs to access funding to support building infrastructure. Recently, the National Rural Telecommunications Cooperative (NRTC) and Consolidated Communications Internet (CCI) both won funding to support infrastructure development in rural areas of the country.

6.2 POTENTIAL SOURCES OF FUNDING

Financing the expansion of broadband will require large upfront investments that electric cooperatives or other non-traditional ISPs may not be able to provide alone. This subsection addresses some possible funding sources and the drawbacks of each.

6.2.1 FEDERAL FUNDS

The largest funding source for broadband expansion is the federal government, most often through the FCC and Department of Agriculture. However, after Vermont Telephone Company (VTel) received $82 million in federal grants and $35 million in federal loans from the Rural Utilities Service (RUS), an agency within the Department of Agriculture, in 2010 to bring broadband service to large sections of the state, RUS declared the areas of the state where VTel had planned to expand as served, making them non-compete areas and limiting the areas in Vermont where groups can use federal funds in projects.[105] While HR 2, the Agriculture Improvement Act of 2018, was expected to alleviate this constriction,[106] groups in Vermont still face obstacles in receiving funding. Also, because the funding comes from federal sources, Vermont ISPs (traditional and non-traditional alike) must compete against other states expanding rural broadband coverage.

6.2.2 STATE-LEVEL FUNDING

Vermont has already funded aspects of rural broadband expansion through Act 79 in 2019, which allocated $1 million to support a range of programs, including: the High-Cost Program of the Connectivity Fund, which supports Vermont-eligible telecommunications carriers (VETCs) in providing low-cost broadband to unserved areas in their region, increasing the take rate, and the Connectivity Initiative of the Connectivity Fund, which provides grants for ISPs to build out infrastructure in order to reach unserved parts of the state.[107]

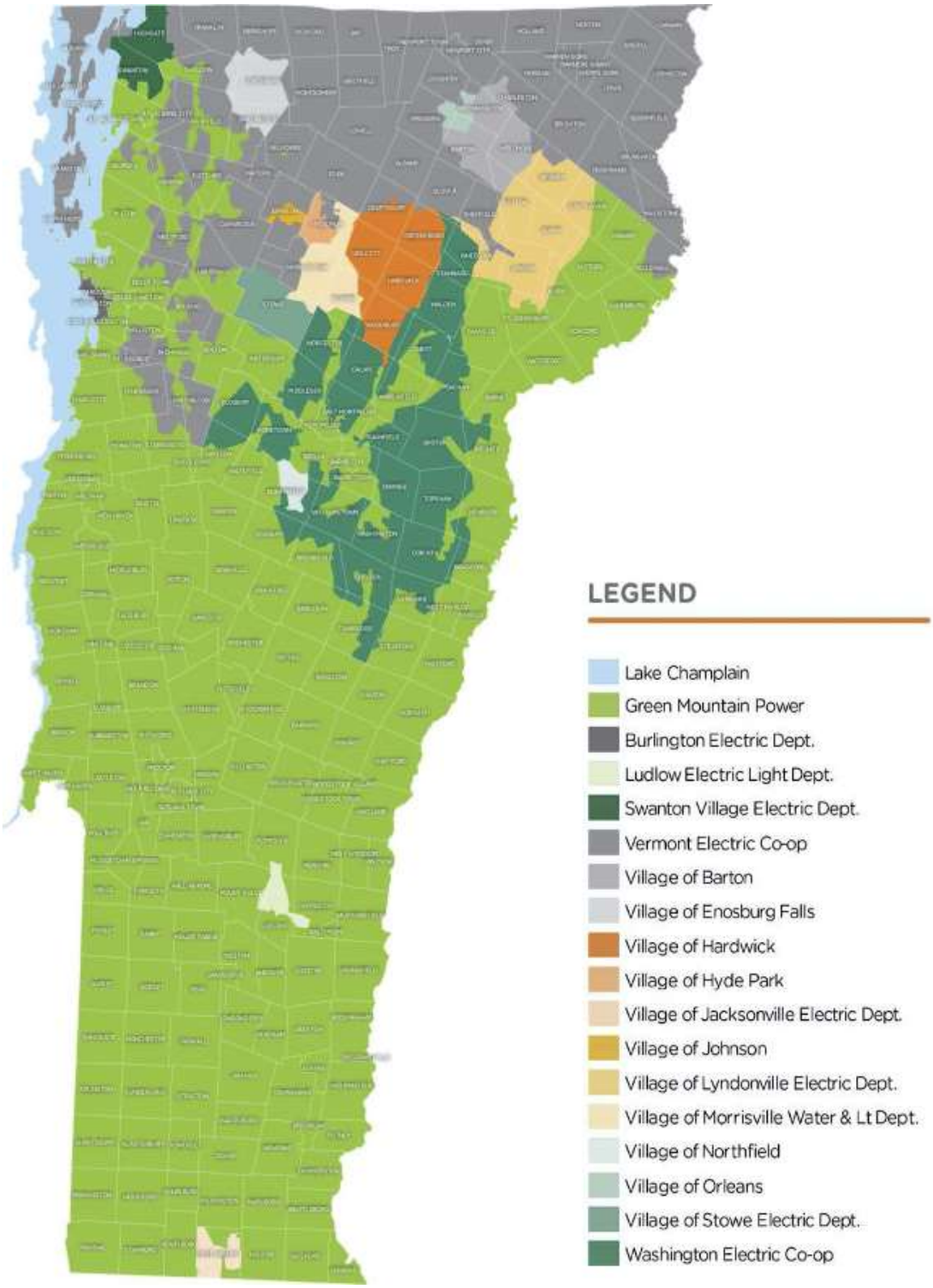
Electric cooperatives could also fund parts of the expansion through two types of bonds to cover portions of the cost of infrastructure. The cooperative itself could issue revenue-backed bonds to raise capital, though this option increases the debt of the cooperatives and may lower its credit rating. The cooperative could also work with CUDs or townships to provide funding, though these solutions hold the same drawbacks as the cooperative issuing bonds itself.

7 CONCLUSION

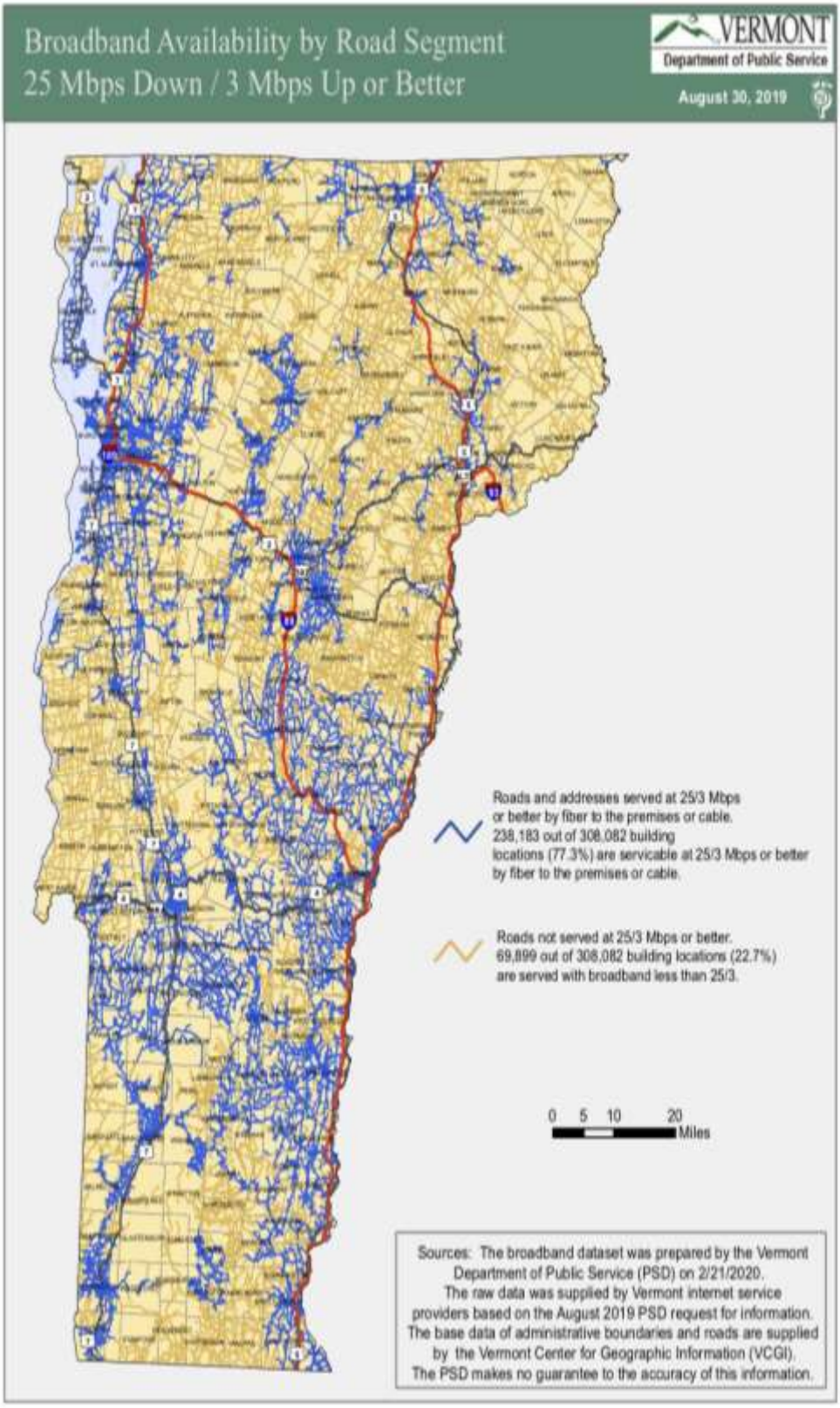
In this report, we outline both the current state of electric utilities and rural broadband access in Vermont, highlighting the wide range of concerns created by a lack of sufficient internet connectivity. We detail the benefits and drawbacks presented by a convergence between these two sectors and explore the potential for this convergence to be used as a means of improving rural broadband access. We provide four case studies of peer states, including New Hampshire, North Dakota, South Dakota, and Alabama, that have seen convergences between cooperatives, both electric and telecommunications, and rural broadband service provision. We highlight the shared factors behind successful rural broadband expansion, particularly emphasizing the value of cooperation among various actors. We also provide a list of regulatory and fiscal concerns that could be considered in order to encourage electric utilities in Vermont to offer internet services. In conjunction, we address potential solutions for each of these issues, which the committee and the legislature may wish to consider in order to support this convergence. We hope that this research will help to inform future policies that may lead to the successful expansion of broadband access in rural Vermont. Through increased collaboration, targeted regulatory adjustments, and meaningful fiscal changes, we believe there is an incredibly promising path to fostering a convergence between the electric utility sector and rural broadband access within the state of Vermont.

8 APPENDICES

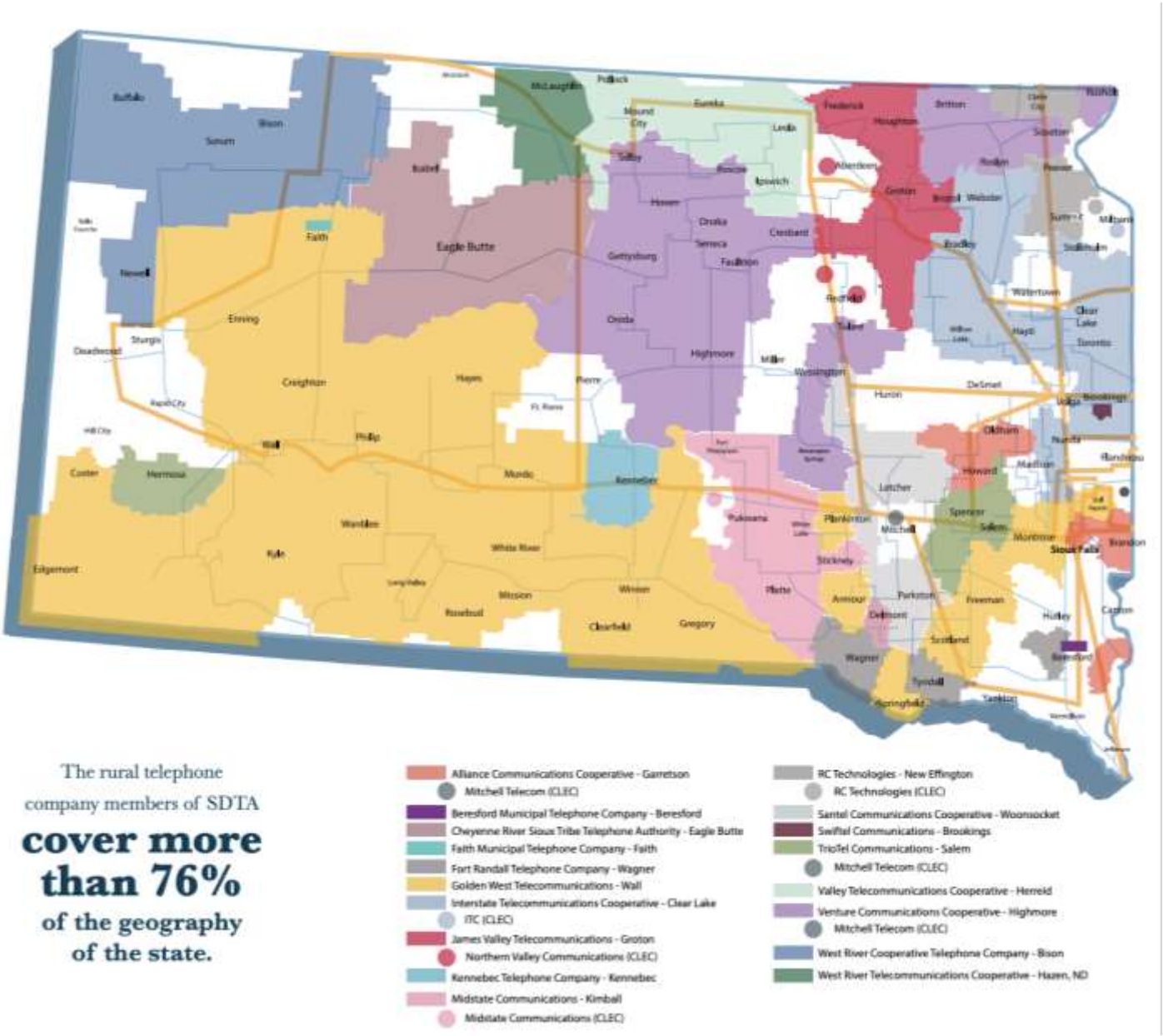
Appendix A: *Vermont Local Electricity Supply Colorized by Distributor*[108]



Appendix B: *Broadband Available by Road Segment 25 Mbps Down/3 Mbps Up or Better*[109]



Appendix C: *SDTA Member Company Service Areas*[110]



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