

Due Diligence of High-Speed Broadband Investment And Business Creation by an Electric Cooperative

Broadband Stretches the Traditional Investment Envelope:

The need for due diligence of high-speed broadband telecommunication investments by electric cooperatives is important. Major technology upgrades such as an expansion of broadband coverage come with significant, and sometimes unprecedented, challenges and costs. The business cases and cost recovery mechanisms are different for so-called “last-mile” deployments in which a cooperative extends broadband communications to homes and businesses in the community compared to operationally driven broadband expansion for internal communication purposes. The purpose of this executive white paper is to provide CEOs and other decision makers at electric cooperatives who are considering significant broadband deployments with a high-level, due diligence framework.

NRECA, NRTC, CoBank and NRUCFC developed this guide to help electric cooperatives vet investment proposals by posing key questions that need to be asked when plans to expand broadband telecommunications and to offer broadband-enabled services are put on the table.

This executive brief is the first step toward a structured, decision-making template for evaluating broadband investments, as well as the operational and administrative burdens associated with offering telecommunication services.

Developed and jointly owned by



National Rural Utilities
Cooperative Finance Corporation



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Acknowledgments

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- National Rural Electric Association (NRECA)
- National Rural Telecommunications Cooperative (NRTC)
- CoBank, member of the Farm Credit System (CoBank)
- National Rural Utilities Cooperative Finance Corporation (CFC)

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- The Rural Broadband Association (NTCA)
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About the Author

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Introduction

Major technology upgrades like the transition to high-speed broadband can come with significant challenges depending on whether the deployment is used for internal communications purposes or for deploying broadband to member premises. Issues to consider and address when assessing investments in broadband include:

- The level of capital commitment and associated budget impact of the project on the cooperative.
- The technology rollout, as well as subsequent operational and maintenance requirements on co-op structure, people and processes.
- Member needs and expectations and the implications to servicing those current and new expectations.
- Business model and impacts these new and unfamiliar models may have on the co-op.
- Legal and regulatory issues; while some are similar to those associated with providing electric energy, many are different.

In its simplest terms, investment due diligence boils down to answering several key questions— *Why is it in our interest to make the investment? What exactly do we want to do? How should we go about doing it? What legal and regulatory constraints exist?* Within these broad categories, more specific questions related to the nature of the broadband project itself need to be asked:

- ***Why does a broadband investment make sense for the cooperative and its members?*** What business or operational applications require the high bandwidth (data-carrying capacity) and low latency (time lag in transmission of data packets) afforded by broadband? In the last-mile scenario, what revenues can be realistically expected from bundled service offerings to members, taking into account likely customer “take” (adoption) rates, “churn” (turnover of customers due to competition), and market demographics? Are federal, state or local grants or other sources of support available to underwrite part or all of the investment? Are those grants or other support enough to both justify initial investment and also to enable the ongoing provision of services at affordable rates in the face of potentially high operating expenses?
- ***What technology choices and investment level are appropriate?*** Is it the co-op’s intent to connect broadband to substations for data backhaul from a distribution automation system, for example, or to extend the broadband network to members’ homes to offer bundled TV, Internet and telephone services (or both)? What sort of telecommunications network will best fit local conditions and budget constraints—fiber optic, microwave, private radio, cellular, or something else? How are considerations relating to cost, latency, and life expectancy of networks weighted? Is the co-op prepared and has it accounted for the substantial “middle-mile” and Internet peering/transit costs that are required to connect the last-mile network to “the rest of the world” and to handle significant amounts of data generated from activities such as file sharing, interactive video (e.g., distance learning and telemedicine applications), other video streaming (e.g., Netflix and Hulu), and online gaming? What are the costs of acquiring content in connection with a video/TV offering?
- ***How should the investment opportunity be pursued?*** Should the electric cooperative own the infrastructure, create a subsidiary to own the assets or lease facilities? Will partnering with a local telco or ISP (Internet Service Provider) to deploy and operate part or all of the network work better than doing the work alone? The most fundamental question is: Can the cooperative

lawfully pursue the broadband investment, and, if so, how?¹ Deployment strategy is also important— targeting smaller sections of the service area or the business community or doing a pilot project to gain expertise can help minimize execution risk.

- **What legal and regulatory considerations must be factored in?** Will the co-op need to start offering voice services, including access to E-911 and emergency services, if it offers broadband services to home subscribers? If the co-op will not offer voice, how will the co-op's members get voice services if the incumbent telco effectively exits the area in the face of the co-op's entry into telecom services? Is there a requirement to obtain "communications carrier" state and/or federal telecommunications certification, perhaps in connection with any grant or support received or services offered? Are there implications with respect to use of poles and rights of way for an affiliated communications business? What, if any, compliance and reporting duties follow from state or federal telecom regulation? For the co-op to have legal authority – the state enabling statute, the co-op's own bylaws and policies must allow for it and there must be no other state impediment to providing the service.

Table 1 highlights (page 5) some of the myriad issues for investigation when a major broadband investment, and possibly a new business, are being considered by an electric cooperative.

¹ Management will need to address the fundamental question of whether the co-op has the right authority to use fiber for non-electric purposes to be able to answer the question, "Can the cooperative engage in the broadband business or own an entity engaged in broadband?" This is a threshold question requiring analysis of state law.

Building the Broadband Business Case			
System Demographics	Metering Infrastructure	Service Area Topography	Presence of Broadband to the Substation
Economic Drivers	Competition/Partners	Take Rate / Churn Rate Projections	Grants / Funding Opportunities
Legal and Regulatory Concerns	Right of Way Limitations	Federal and State Laws and Regulations, e.g., FCC, state PUC, etc.	Limitations Imposed by Existing Contracts

Creating or Updating the Technology Plan			
Fiber Backbone	To the Substation	To the Home	Capacity / Speed Needed
Utility T&D Benefits	Fiber Backbone Already Present, e.g., Connecting Substations	Prospective Utility Benefits	Non-Utility Benefits
Middle Mile/Internet Connectivity Last Mile	Cost of middle-mile connections to higher-tier ISPs and the Fiber Optic	Costs of Transit at the Tier 1 Internet POPs Microwave/Radio	Coaxial Cable
Tech Life Cycle	10-year Components	20-year Components	30-year Components

Adopting a New Governance and Business Model			
Governance Structure	Direct Cooperative Service	Cooperative Subsidiary	Non-affiliated entity
Asset/System Ownership	Purchase and Own	Hybrid / Shared Ownership	Leased Facilities
Partnerships	Go it alone	Work with ISP, Telco	Work with Municipality
Service Offering	Telephone	Internet	Cable
Financing	Debt Finance	Project Finance	Equity, Other
Depreciation Model²	20 years	10 years	39 Years
Grants	Earmarked for Business Applications, e.g., Smart Grid	Grants for expansion of rural broadband – special requirements	
Take Rate	<25%	35-50%	>50%

Table 1. Issues Cooperatives Should Consider Before Making a Broadband Investment.

² Depreciable life is different, and often varies greatly, for the various components of a broadband network: fiber, electronics, customer premise equipment, cable TV converter box, etc.

Building the Broadband Business Case

Justification for a large-scale investment in high-speed broadband comes in the form of a well-thought-out business case, starting with the key business objectives to be met and examining the legal and regulatory issues involved. **The business case is an essential management tool that helps uncover the real nature of investment choices being made. The very process of developing a business case requires the planning team to delve deeply into a project's details, and this reduces risk and uncertainty.** In some instances the business case is how a project makes it into the co-op's overall Technology Plan. Some projects create measurable value by enhancing performance or improving operational efficiency, others by enhancing the member experience. The most effective way to document the value of technology projects, including broadband telecommunications, is by developing a business case (also called "business justification") and feasibility plan.

In the case of last-mile broadband projects, the feasibility plan and full business case must reflect projected revenues as well as upfront and ongoing costs over the technology's life-cycle. For example, the overhead costs of initiating and servicing customer accounts, troubleshooting and problem solving, and billing must be reflected. In most cases, new billing systems and tax software will be required. New staff resources must also be considered, as customer service and technician capability must be prepared to address different network equipment, including managing interoperability with many devices "brought by the consumer" and used within the premises to leverage the broadband network.

Moreover, developing revenue estimates can be tricky, especially where the cooperative lacks prior experience selling services in a competitive market. Revenue estimates are built up from pricing and take rates. This may sound simple until one realizes that varying service bundles are likely to be offered (at least those comparable to what local competitors offer) and that market penetration and pricing assumptions over a period of years must be disaggregated enough to reflect this. With respect to adoption, it is important to note that, while some estimates indicate that Internet usage could be as high as 75% in urban areas, adoption rates in many rural areas tend to be lower – and high-speed broadband adoption tends to be a lower metric than "Internet usage." It is also important to recognize that the "local competitor" is in fact the "telecom incumbent," many of whom may themselves just now be receiving increased federal support to upgrade their networks to provide more broadband coverage. Customer "churn" (turnover due to competition) as high as 2% per month must also be taken into consideration.

A detailed and thorough competitive analysis and market study by the cooperative is critical to helping get realistic projections to these key questions. This analysis should include a review of the incumbent local exchange carrier, the type of regulation it is subject to and whether it receives support from the Connect America Fund (CAF) or other universal service fund programs in the co-op's targeted broadband market. Other carriers should be reviewed as well, including cable television, wireless, satellite, etc.

If video services are planned, the cost of video content acquisition is a *very significant* factor that cannot be overlooked. Based on the experiences of other telecom providers, some cooperatives can expect to break even, at best, on video; for others it is likely to be a slight to significant "loss leader."

Questions CEOs Need to Ask:

- What level of confidence does the cooperative have in the reliability of its revenue and cost estimates, especially where last-mile is concerned? Is the cooperative's assumed take rate realistic within the specific community to be served given the demographic data and the competitive landscape? What is the minimum number of members who must sign up for break-even? How long might it take to reach that level? How will the cooperative differentiate itself from the competition?
- Have target members been surveyed to ascertain their likely level of demand for various services that can be delivered via broadband? What value can be created and what revenue levels can be expected from seasonal homes? Are customers likely to be receptive to their co-op providing broadband services?
- Does the business case take into consideration potential regulatory compliance requirements for each of the services to be offered, such as registering to become an Eligible Telecommunications Carrier (ETC)? What other regulations will apply, depending upon the scope of planned service offerings (e.g., voice vs. video vs. broadband)?
- Does the cooperative need to offer other communications services in addition to high-speed Internet access for voice and/or video? If voice services are planned, have the costs of operating such systems, including providing resilient network access to E-911 and emergency services, been factored in?
- Will the cooperative's existing member services and billing infrastructure be able to handle the new, broadband billing and payments regime? Can the utility's billing system be used for broadband services under local, state and federal laws and regulations?
- How will the capital and operating expenses associated with the broadband initiative impact the cooperative's budgets in future years?
- What are the tax implications of non-electric revenues, profits and losses?

Technology Planning and Broadband Technology Selection

Given the magnitude of potential impacts on the cooperative and its members, the CEO’s imperative is to “get it right” when vetting a broadband investment proposal. This means communicating to the board that the investment has been fully vetted and is necessary for operational reasons, to meet member service requirements or to fulfill the cooperative’s responsibility to the community as implied by Cooperative Principle #7.³ Availability of high-speed communications and Internet access in areas served by electric co-ops has today become as critical to the health and prosperity of rural communities as availability of electricity service was in the 1930s.

The best way to provide such assurance is through a systematic process known as strategic technology planning. A five-year Technology Plan or roadmap that results from this process should be used to capture the business drivers of technology projects, winnow down technology choices to those that are most feasible and economic, and consider the obsolescence life-cycle of technologies being deployed.⁴ Such a plan ensures that business requirements are fully understood, appropriate sourcing decisions are made for technology applications and supporting communications systems are properly specified, as generally illustrated in Figure 1. Some electric cooperatives, however, have not yet created their first Technology Plan—a broadband investment proposal serves as an excellent impetus for doing so.

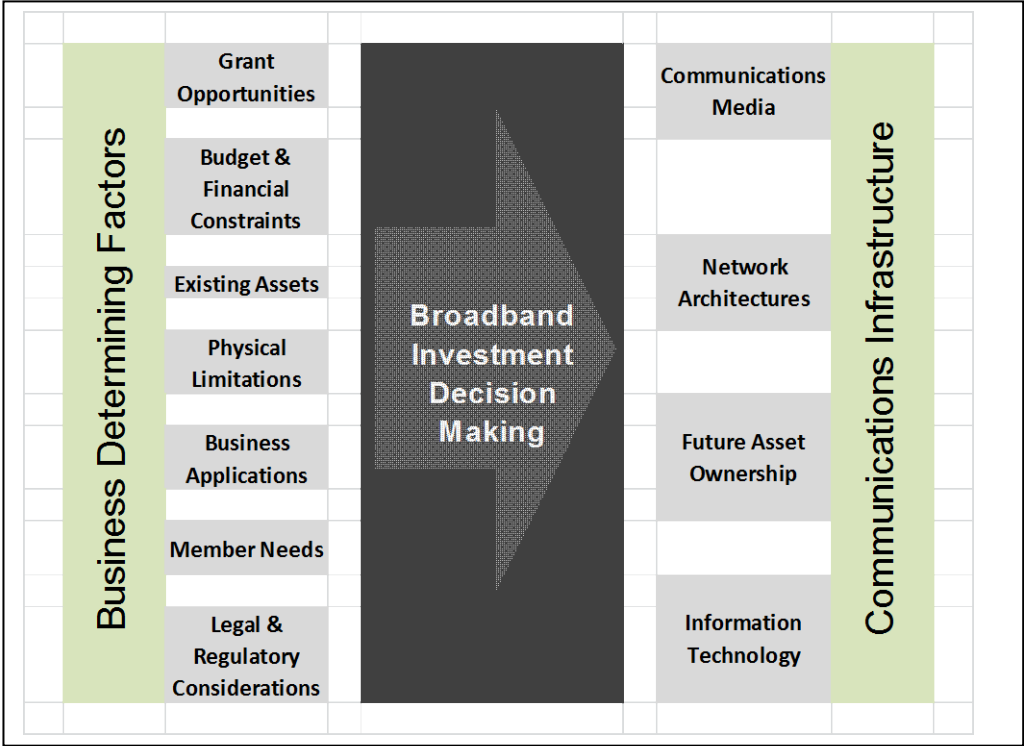


Figure 1: Generalized Approach to Broadband Decision Making Embodied in Technology Planning

³ Cooperative Principle #7 states that cooperatives work for the sustainable development of their communities through policies supported by the membership.

⁴ Some co-op CEOs who have overseen combined electric and telecom operations for many years emphasize the number of technology iterations they have lived through.

In the case of broadband communications, there is no “one-size-fits-all” technology architecture. Fiber-optic solutions are widely accepted as “future proof” and enabling the highest-capacity, lowest-latency solutions. In some areas, however, fixed or mobile wireless solutions may be necessary to overcome terrain or other challenges. In all cases, wired and wireless solutions warrant consideration in tandem and, where appropriate, in combination, in order to develop a comprehensive network and user experience. The goal is typically a unified system of complementary technologies.

Investment feasibility also hinges on whether current and planned communications networks can grow to keep up with new requirements down the road (scalability) and whether the networks will actually talk to each other (interoperability). **Selection of the right broadband communications option needs to be carefully and systematically approached, starting with the specific and detailed business requirements to be met.** Communications planners call these “throughput” requirements. For a distribution automation application for example, these requirements must specify the amount of data per message, scan rates, round-trip latency (delay) time, and device density.⁵ Not all broadband communications technologies are capable of meeting the specific requirements of business applications being deployed. Broadband power line carrier communication, for example, may be less expensive to deploy but the technology is unlikely to be able to meet the near-real-time requirements of distribution automation, much less broadband services to the home.

The task of providing broadband does not begin and end at the “last mile.” The best, last-mile network can be (and often is) impaired by a lack of sufficient connectivity to the Internet. Cost-effective, middle-mile transport facilities and robust, affordable connections (with redundancy for purposes of resiliency/disaster recovery) are needed to reach distant Internet gateways where “transit” must be procured to provide retail Internet access services. The increasing predominance of capacity-consuming applications such as file sharing, interactive video (e.g., distance learning and telemedicine applications), other video streaming (e.g., Netflix and Hulu), and online gaming makes planning for the costs and capacity management of middle-mile and upstream network all the more important. Even where sufficient capacity is in place, the costs of such capacity can affect the profitability/break-even measure of providing retail broadband Internet access services.

Each business or operational application needs to be translated into these throughput requirements or specifications in order for the best technology choices to be made. Table 2 provides a high-level view of the tradeoffs inherent in the telecommunications decision.

	Latency	Reliability	Bandwidth	Capex	Opex
Fiber Optic	Low	High	High	High	High
Power Line Carrier	High	Medium	Low	Low	Low
RF Mesh	Medium	Medium	Medium	Medium	Medium
RF Point-to-Multipoint	Low	Medium	High	Medium	Low
3G Cellular	Low	Medium	Medium	Medium	Low

Table 2. Tradeoffs Inherent in Communications Technologies⁶

⁵ More detailed discussion of this can be found in: Maurice Martin and Rick Schmidt, “[Communications: The Smart Grid’s Enabling Technology](#),” NRECA-DOE Smart Grid Demonstration Project, Initial Findings Report, November 15, 2013, p. 21.

⁶Source: “Building a Resilient Smart Grid Communications Network, A Sensus Whitepaper,” Copyright © 2013 Greentech Media Inc., p.11.

Questions CEOs Need to Ask:

- What local operating conditions such as hilly terrain, cellular dead spots, tree heights and other physical factors could degrade data and voice communications of some of the broadband technologies being considered? Also, what overhead structures (such as transmission towers) are currently in place that could host communication system devices? Are rights-of-way located in places that naturally support planned communications paths?
- What potential exists for currently installed communication systems to become “stranded,” e.g., no longer used and useful prior to their full cost recovery? Are existing communications assets being leveraged to the extent possible for the new business applications? Does the cooperative have the necessary rights to use existing communication assets for the new business applications?
- Are there high-density areas within the service territory that lend themselves to a specific type of broadband, e.g., commercial cellular or other wireless solution?
- Is the communication system for the new or expanded business application dedicated or shared? If dedicated, will a parallel and possibly redundant communication path be created?
- What are the cost and capacity impacts of securing sufficient “middle-mile” and upstream Internet access facilities (e.g., transit services) to provide retail broadband Internet access services that connect to the broader Internet ecosystem?
- What legal and regulatory requirements exist as business determining factors? Does the cooperative, for example, have the easement rights to lease or sell the excess capacity of previously laid fiber for external communication purposes?

Governance and Business Model

The motivations for an electric co-op's entry into telecom vary widely. In some cases, a grant opportunity makes it much more affordable to address the needs of an underserved population. In others, major providers have exited, or announced plans to exit, a local area, e.g., AT&T is no longer willing to support dial-up or DSL in a rural, low-density area. Or the electric cooperative has built a fiber ring to backhaul data from its substations and the ring has the capacity to also serve as the backbone of a community broadband network.

An equally varied set of business models and governance structures have been adopted by electric cooperatives entering the broadband telecommunications arena. Some have partnered with a local telecom company or cooperative; others have spun off a for-profit subsidiary; some have partnered with Pulse Broadband, NRTC's provider of fiber broadband services; still others have gone it alone, at least initially. The common theme in all these experiences is that life is not the same once an electric cooperative launches a broadband services business. Serious consideration needs to be given to how the cooperative will operate when it invests in broadband and offers related telecommunication services. Again, in many cases, the form in which the cooperative can operate, if at all, is dictated by legal authority provided by state statute.

Staffing and training must also be a consideration in the business model – and even in the costs of the business case discussed earlier. In most cases, new staff resources will be required to address network equipment unique to the telecom sector, as well as to resolve co-op member “trouble calls” and the like. Indeed, most telecom operators report that a substantial portion of customer service and technician time in the broadband context is devoted to resolving concerns about interoperability of customer premises equipment (*e.g.*, interaction of smart TVs or routers or tablet devices) with broadband services delivered by the operator.

Once the broadband business case and technology plan have been developed, it is the CEO's job to facilitate the discussion among managers, directors and the board to determine the right business model. Overcoming resistance to change can be a key challenge. An open and transparent planning and decision-making process can help remove fear and foster a positive outlook on the part of employees.

Questions CEOs Need to Ask:

- For the communications technologies that will be used, what is the best ownership model? Does another business entity already have a broadband communications infrastructure in the desired coverage area? Are there opportunities for sharing broadband infrastructure with neighboring cooperatives, the G&T or municipalities?⁷
- How will the telecom business initiative be financed—through debt, grant(s), projected revenues, or a combination of sources?
- Is the composition of the electric cooperative’s current board adequate and appropriate to oversee and govern a telecommunications business? Are there employees of the telecom subsidiary with core competencies and experience in telecommunications? If co-op employees are doing work for the subsidiary, how are costs to be allocated?
- What is the best corporate structure for the combined electric/telecom business under state laws?
- Are there legal or regulatory requirements for separation of the businesses? Can physical assets such as excess fiber capacity or other electric co-op assets be shared? Do easement rights exist to permit use of excess capacity? How will costs be accounted for if resources are shared?
- How is the cooperative gearing up to provide broadband services? Has the community, including key organizations (Chamber of Commerce, economic development agency), been engaged?
- Is the staff prepared to handle the service launch including customer service and device management? (What is meant by device management? Many telecom customer service calls, such as “my router doesn’t work” or “my TV doesn’t work,” turn out to be caused by a flaw in the end-device—or the user’s configuration of it—rather than a problem within the network. Unfortunately, these calls can often take an hour or more of troubleshooting to resolve).

⁷ The co-op may also be required to permit private entities or other types of competing entities to use co-op broadband infrastructure under the antitrust “essential facilities doctrine.” Antitrust considerations may also come into play here.

Risk Management

Any technology initiative that promises to fundamentally change the way a cooperative does business, such as a large-scale plan to offer broadband services, comes with risks—

- The cooperative may be unable to deliver the expected value.
- Costs may be higher than expected and/or revenues may come in lower than expected due to competition or other factors.
- Employees may be resistant to needed changes.
- The technology may not work perfectly.
- The investment may subsequently be undermined by emerging technologies that offer better performance, lower cost, or both.
- Expansion of the communications network may open up additional avenues for cyber-attack.

Mitigation of these risks requires a clear and realistic understanding of the potential challenges ahead and a willingness to plan proactively for contingencies. Both of these should be addressed in the cooperative's broadband business case and project implementation planning. As noted earlier, the process of developing a business case requires the planning team to delve deeply into a project's details, and this reduces risk and uncertainty. Executive leadership is also a key component of risk management—the CEO and his or her leadership team should be directly involved in every step in the process. Risk management should include a process for monitoring actual performance and results against the business plan to measure success and identify issues from the start of construction through the launch of the services and beyond. Project planning is key—as is the development of a viable exit strategy. NRECA offers technical assistance in the particular area of cyber security risk management. Of direct and practical interest to electric co-ops deploying advanced communication and technology systems is the [Guide to Developing a Risk Mitigation and Cyber Security Plan](#).

Questions CEOs Need to Ask:

- Are there ways to minimize financial and operational risk by implementing a logical, phased approach? Can a fiber backbone ring to support broadband between substations be constructed first, then implement last-mile solutions where financial and operational risks are minimized? Can the entire service be grouped into smaller phases to increase speed to market to generate revenue to subsidize future expansion?
- Are investment assumptions about life expectancy of the technology components realistic? Will fiber really last 50 years? What assumptions are being made as to the expected life of the electronic network components and software?
- What levels of uncertainty as to costs and benefits are reflected in the broadband business case? What threshold conditions have been identified beyond which the investment would be uneconomic? Has a sensitivity analysis been performed?
- Does the planning process involve periodic updating of rank-and-file employees to gain buy-in? Is employee training around the new business processes and activities planned and budgeted?
- Does the construction plan include installation and oversight by professional firms in the broadband industry?
- Will an emergency recovery plan be developed and tested prior to rollout of the expanded broadband network?

Financial Considerations

Cost, financing and tax implications are all essential parts of the due diligence process. Generalizing the cost of a proposed broadband infrastructure can be difficult because each cooperative's business situation and starting point conditions will invariably be different. Each cooperative must develop its own cost estimates and projections—for initial rollout, ongoing system maintenance and customer service overheads—to reflect its specific conditions. Here, for illustrative purposes, are listed a few broadband-related cost drivers that may be atypical for a pure-play electric business.⁸

- **Planning**
 - Market survey and customer acceptance analysis
 - Feasibility study
 - Competitive analysis
 - Investigating easement rights and negotiating and acquiring additional rights where needed
 - Engineering design & deployment plan
 - Potential tax implications of non-electric or non-member income
- **Construction**
 - Fiber-optic cable (e.g., backbone fiber, backbone to terminal, customer drop)
 - Electronics
 - Customer premise equipment (Optical Network Terminals, Routers, Cable Converter Boxes)
- **Operations**
 - Sales and marketing (advertising)
 - Sales incentives/promotional discounts
 - Staffing (telecommunications skills – CSRs, technicians, maintenance, accounting)
 - Programming, re-transmission and franchise fees (Video / CATV service)
 - Billing / accounting
 - Regulatory compliance
- **Working capital** (cash to cover current operating expenses and/or losses)

⁸ This is by no means an exhaustive list.

Questions CEOs Need to Ask:

- How will broadband income impact the electric cooperative's tax treatment. For example, will the income be member, non-member, excluded, patronage, and/or unrelated business income?
- What is the condition of poles and crowding of other communications? How much will make-ready costs impact the capital required?
- What ground conditions exist that might increase the cost of buried plant? (Costs vary by conditions of terrain, size of build, bore vs trench, and additional rock drilling)
- What terrain conditions exist that might increase the cost of aerial plant?
- What are the costs of investigating easement rights and negotiating and acquiring additional rights where needed? If the cooperative opts to rely on existing rights, what would the potential damages be in a trespass action?

Due diligence templates being developed as a follow-on to this high-level framework will include sample budgets, cost analyses and forecasts as well as average costs for buried and aerial fiber and considerations for adjusting them to be reflective of a particular cooperative's situation. Each cooperative should make its own business decisions whether and how to use the templates.

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Disclaimers

This work contains findings that are general in nature. Readers are reminded to perform due diligence in applying these findings to their specific needs, as it is not possible for the NRECA, CoBank, NRTC, and CFC or its contributors to have sufficient understanding of any specific situation to ensure applicability of the findings in all cases. The information in this work is not a recommendation, model, or standard for all electric cooperatives. Electric cooperatives are: (1) independent entities; (2) governed by independent boards of directors; and (3) affected by different member, financial, legal, political, policy, operational, and other considerations. For these reasons, electric cooperatives make independent decisions and investments based upon their individual needs, desires, and constraints. Neither the authors nor contributors assume liability for how readers may use, interpret, or apply the information, analysis, templates, and guidance herein or with respect to the use of, or damages resulting from the use of, any information, apparatus, method, or process contained herein. In addition, the authors and contributors make no warranty or representation that the use of these contents does not infringe on privately held rights.

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