KIT CARSON ELECTRIC COOPERATIVE, INC.
Fiber to the Home (FTTH) Broadband Project Update

1

Presentation to the Science, Technology and Telecommunication Committee

Kit Carson Electric Cooperative, Inc.
Presented by Luis A. Reyes Jr, Chief Executive Officer
August 22, 2016

Kit Carson Electric Cooperative, Inc (KCEC)

- Member-owned, non-profit electric distribution co-op
- Formed in 1937 and incorporated in 1944
- One of 17 distribution co-ops serving rural New Mexico communities
- Serves 29,484 members in Taos, Colfax and Rio Arriba counties including 2 tribes, Taos Pueblo and Picuris Pueblo, 6 Municipalities (Taos, Questa, Red River, Eagle Nest, Angel Fire and Village of Taos Ski Valley)

Our Services

- Electric, Telecommunications and Propane

- Solar Power. Own and operate 6 MW DG solar energy or approximately10% of capacity is solar powered and operates an advanced smart green grid system, with an additional 3MW to 7MW under consideration

- Current project. Fiber-to-the-Home – High Speed Broadband. This network is a 2500 mile network serving 29 communities.

Transforming to become an integrated provider is critical to securing future economic prosperity

"Owned by those we serve"

8/23/2016

FTTH Project Objectives

- Enable North Central New Mexico communities with affordable and accessible high-speed broadband service. Create a Future Proof Scalable carrier class 10 Gb telecommunication network. Kit Carson has built and operates a fiber telecommunications network capable of delivering in the excess of 100 Mbps to residents scalable to 1 Gb and 1 Gb to anchor institutions such as hospitals, schools and government scalable to 10 Gb.

- Create a model for rural communities to enable communities to bring forward more Economic Development opportunities including TeleWork via our high speed fiber network.

- Design and deploy a Grid Modernization strategy utilizing the fiber network. KCEC Smart Grid goals are to use information and communications technologies to manage electricity more efficiently.

- Partner with local school districts, UNM-Taos, private companies, professional organizations to enable distance learning and enhance more technical and non-technical career opportunities.

- Enable rural communities access to the network for public safety facilities to monitor all facets of emergency response in times of disaster and homeland security situations and position rural communities access to NG911 and First Net.

- Telehealth & Telemedicine

- Support Native American Pueblos – Ensure that all local Pueblos and their members have access to high speed connectivity that will enhance education, medical and economic development opportunities for our Pueblos and their members

8/23/2016

Transforming to become an integrated provider is critical to securing future economic prosperity
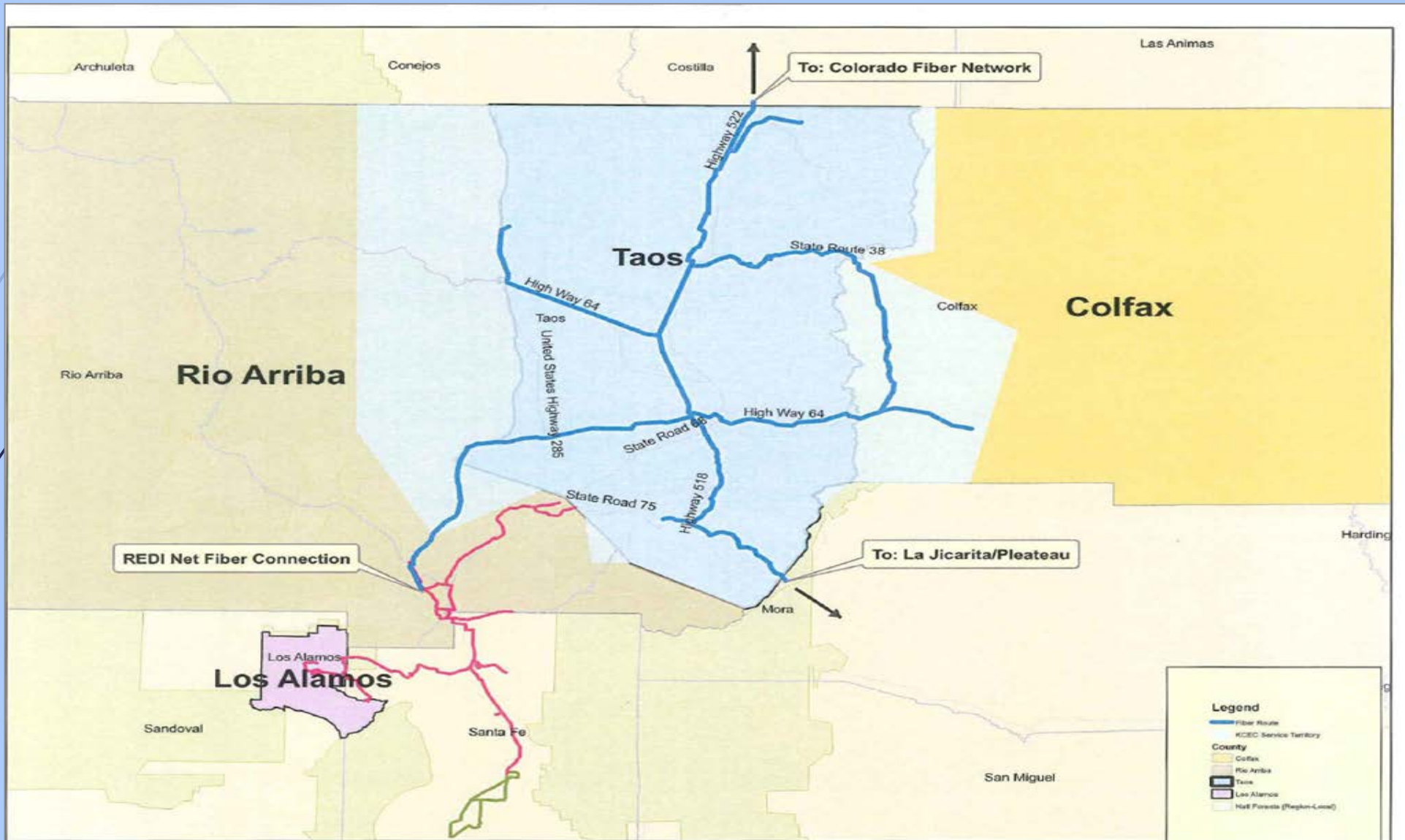
Key Elements of the FTTH Network

▪Network Capacity of 10 Gb and 2 separate 1 Gb connections. A 2nd 10 Gb is in the process of being built with a future potential of a 100 Gb network. Built a GPON carrier class network.

▪Redundant paths with 3 other distinct networks.

▪Products currently offered include data, voice and in the near future video

▪Deploy high speed internet services to critical "Anchor Institutions" including schools, hospitals, health facilities, E-911 and community institutions

▪Flexible network utilizations. Smart Grid to Bridging the Digital Divide

Transforming to become an integrated provider is critical to securing future economic prosperity

8/23/2016

The Carrier Class FTTH Network

POPs and Handoffs at 505 Marquette and 111 3rd Ave

Transforming to become an integrated provider is critical to securing future economic prosperity

8/23/2016

Kit Carson Electric Cooperative: The Case for Broadband

Economic Development

- Job creation
- Business opportunities
- Sustainable economies
- Broadband-based companies

Reliable Electric Grid

- AMI applications
- Smart grid services
- Efficient energy usage
- Enhance Reliability
- DG Integration (Renewables)

Taos Pueblo

Kit Carson Electric Cooperative

High-Speed Advanced Infrastructure

- Medical community
- Research & education
- Local businesses
- Members choice
- Real-time power monitoring

Bridge the Digital Divide

- Online learning
- Telemedicine
- Affordable access
- Public safety deploy NG911

Transforming to become an integrated provider is critical to securing future economic prosperity

Kit Carson Electric Cooperative, Inc.
A Touchstone Energy® Cooperative
The power of human connections®
Electric • Propane • Internet • Telecommunication
"Owned By Those We Serve!"

Public Safety

- Enables rural community public safety facilities to have access to NG911 and First Net.

- Red River E911 along with NCIC and New Mexico State Police, Department of Public Safety, have taken advantage of fiber services available to them

- We provide redundancy service to Taos County E911

- Currently negotiating with a local security company to enhance security options via our fiber network for home and business security
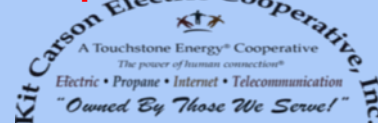
Transforming to become an integrated provider is critical to securing future economic prosperity

8/23/2016

Economic Development Opportunities

- iHub – An iHub is a high tech incubator. KCEC has a partnership with Angel Fire Corporation and the Village of Angel Fire. The partnership would provide the basis for a compelling case study on how fiber optic access will lend to accelerated economic development related to the high tech economy

- Data Centers - KCEC has applied for 4 data centers through the State of New Mexico Economic Development Department. The data centers could be located in KCEC's service territory because of the access of a high speed broadband network and the renewable energy (Solar) program offered by KCEC

- KCEC is in preliminary discussions with a pueblo in creating an ISP

- San Ildefonso – KCEC is assisting the Pueblo with developing a fiber network infrastructure and strategic plan for fiber services. It would serve about 2,000 residential and community units located within the exterior boundaries of the Pueblo

- Home security solution – a local business is negotiating access to our network which will create more local installation, sales and marketing jobs by accessing the broadband network

- Franchise Agreements with 6 municipalities

Transforming to become an integrated provider is critical to securing future economic prosperity

Kit Carson Electric Cooperative, Inc.
A Touchstone Energy® Cooperative
The power of human connections®
Electric • Propane • Internet • Telecommunication
"Owned By Those We Serve!"

8/23/2016

- The FTTH project created over 350 jobs during the mainline construction phase.
- Infused $40 million in local labor and associated services i.e. lodging, food, recreation
- Currently, KCT is utilizing 7 contractors which employ approximately 52 employees to complete fiber to the home drops.
- KCI has thus far created 24 permanent installation, maintenance, customer service representative and administration positions to operate the fiber network.
- Creation of Angel Fire iHub

High bandwidth fiber is the best technology available to create, enhance and sustain these and other jobs for business, medicine and education. That's not only economic development, its community development.

Transforming to become an integrated provider is critical to securing future economic prosperity

- KCEC has implemented a strategic vision by developing a modern power grid via distribution automation and smart-grid functionality that is capable of handling intermittent power from renewable energy sources and empowering its members to track and manage their real-time energy consumption.
- KCEC has started an innovative demonstration project to convert high-penetration photovoltaic (PV) generation into an on-demand, dispatchable power source through its distribution grid using broadband-enabled distribution automation with real-time smart-grid functionality.
- Fiber technology enables smart grid/green grid energy efficiency for residents and communities.
- Substations have been automated for SCADA and use fiber as backhaul.
- AMI uses fiber as backhaul and in the future will allow for demand side management
- Fiber will help isolate and detect outages and will assist with outage restoration using AMI technology.
- Team project with Picuris Pueblo and Los Alamos National Laboratory to develop a 1 MW solar project and incorporate micro grid technology for self sustainability
  - Develop a mathematical model and interface for an advanced design support tool for off-grid microgrids to determine the optimum mix of Demand Energy Response (DERs)
  - Tool Features include: AC/DC microgrid architectures, constraints on fuel availability, component library, active/reactive power flow constraints, network design capability, and component load efficiencies

Transforming to become an integrated provider is critical to securing future economic prosperity

Distance Learning Opportunities

- KCEC is working with the local University to be able to deliver 1GigE, significantly upgrading the University's bandwidth capabilities and reducing its current circuit bandwidth costs.
- Enhances access to quality education via distance learning programs i.e. via online learning modules and the ability of relevant content from any location
- School districts in our territory have taken advantage of fiber. It will enhance elementary, middle, high school and colleges to enable on-demand e-textbooks for students
- Improves the effectiveness of instruction and enhanced learning by allowing student to engage in interactive activities
- Encourages innovation on how education is delivered
- Enables a wider array of professional development opportunities for educators and learners
- Broadband expands access to educational resources for teachers, creates efficiencies in the administration of education, and bolsters efforts to collect and analyze student performance data

Transforming to become an integrated provider is critical to securing future economic prosperity

Kit Carson Electric Cooperative, Inc.
A Touchstone Energy® Cooperative
The power of human connection®
Electric • Propane • Internet • Telecommunication
"Owned By Those We Serve!"

Tele-health/Tele-medicine

- Broadband to Medical facilities for advanced quality of care for all Northern New Mexicans. Broadband fiber connections provided by KCEC will enable hospitals to become the tele-health/tele-medicine centers for all surrounding area communities.

- Broadband connections will link to remote clinics for testing and diagnosis for residents living in impoverished and geographically challenged rural locations

- KCEC is currently working with Holy Cross Hospital, Presbyterian and Clinics

Transforming to become an integrated provider is critical to securing future economic and future prosperity

Minimum Residential and Small Business Speeds

Residential Customer
- 30/30Mbps
- 50/50Mbps
- 100/100Mbps

Residential VOIP Service
(Bundled with Internet)
- Single Line
  Second Line

Residential VOIP Only
- Single Line
- Second Line

Small Business
- 30/30Mbps
- 50/50Mbps
- 100/100Mbps

Business VOIP

Large Scale Commercial SLA

Transforming to become an integrated provider is critical to securing future economic prosperity

8/23/2016

Results YTD

- 3,202 connected fiber members – 30/30 min
- 725 wireless, satellite, dial up & VOIP members
- 7 of 8 School Districts (Taos, Red River, Eagle Nest, Penasco, Angel Fire, Questa & McCurdyMiddle School.
- UNM Taos and SMU (Fort Burgwin)
- 4 Ski Resorts
- Holy Cross Hospital and associated facilites
- Taos Pueblo-1Gbs
- Picuris Pueblo-30Mbps
- Angel Fire Ihub – 1 Gbs

Cellular Companies & Incumbent Carriers
- AT&T
- ComNet
- Verizon

Transforming to become an integrated provider is critical to securing future economic prosperity

THANK YOU

Luis A. Reyes Jr., CEO, Kit Carson Electric Cooperative, Inc.

15