ENERGY RESILIENCE IN NORTHERN NEW MEXICO

Energy Storage Opportunities for Electric Cooperatives and Municipal Utilities in the Northeastern Region of New Mexico

Andrew Rodke Research Assistant for the New Mexico State Energy Department in partnership with Sandia National Labs Energy Storage Group and Clean Energy States Alliance andrew.rodke@gmail.com









What is Regional Energy Resilience?

Resilience- a sustainable distributed regional energy portfolio that includes: Biomass/ Wood Gasification, Photovoltaic, Wind, Pumped Hydro

Task:

- Interview Rural Electric Cooperatives about Energy Storage Solutions
- Kit Carson Electric Cooperative
- Springer Electric Cooperative
- Raton Public Service Municipality owned utility

Regional assets-

- 270,0000 acres of Private land with over grown forest with a 50 year sustainable thinning cycle
- Solar
- Wind
- Hydroelectric
- Unemployment higher than national average by 20%





(83)

84

64

56

Santa Fe



Luis Reyes- CEO Current Status

KIT CARSON ELECTRIC CO-OP

- Radial Feeders that serve long rural runs
- 13 Substations 25kV Lines
- 30,000 customers
- \$0.08 per kWh \$.29 per kWh demand



- Town of Taos largest load is the waste water treatment plant
 - Demand charge can be up to 60% of power bill
 - 2026 expiration of contract with Tri-State G&T
- 4 MW Cooperative owned solar arrays
- Three I MW Power Purchase Agreements in the locations of
 - Eagle Nest
 - Picuris Pueblo-looking into islanding and energy storage
 - Angel Fire
- I MW are desirable because of existing Regulations

Challenges

Kit Carson Electric Co-op

- Net-metering benefits the user but not the Cooperative
- Would like to have a firm power at \$0.07/kWh
- Rolling blackouts
- Heating climate
- **Opportunites**
- Goal is cover 35 MW Summer peak load with renewable energy
- 60 MW Winter peak energy difference purchased from the Grid
- Load sampling every 15 minutes for WWTP to analyze profile
- Five IMW arrays planned
- I MW are desirable because of existing regulations
- Plans for two natural gas peaking plants potential energy storage substitution

SPRINGER ELECTRIC CO-OP

David Spradlin - General Manager Springer Electric Cooperative Facts:

- Miles of Line: 1,818
- Consumers Served: 1,934
- Numbers of Meters: 2,728
- Date Incorporated: 1946
- Date Energized: 1947



http://springer.coopwebbuilder2.com/content/residential

Current Status

• 80% of usage- 3 industrial companies

Springer Electric Co-op

- Remaining 20% is split fairly evenly with commercial and residential.
- Day time Rate \$0.13/kWh, 7 AM-8 PM
- Night time rate \$0.07/kWh 8 PM-7 AM
- Power Purchase Agreement expires with Tri-State in 2050
- Currently own two 115kV lines
- Several 69kV older lines
- I MW Solar Array
- Currently billed on energy peak demand basis

Springer Electric Co-op

Challenges

- Colfax County suffering unemployment that is 20% higher than national average
- Renewable generation limited to 5% of system capacity
- Limited communication and coordination in Northeastern NM
- Third parties "cherry picking" the large consumers for Qualified Facility generation
- Springer Electric Cooperative desires to own their own assets
- Limited staff
- Demand is not large enough to warrant wind turbines

Opportunities

Springer Electric Co-op

- Solarized truck stops
 - Semi-trucks could plug in and turn off their engines
 - Potential energy storage for night time load
- RFP for two IMW PV Array at Substations in Raton and Cimarron
- Willing to take a look at PPA for biomass if \$0.07/kWh or below

- Interested in energy storage if Tri-State approves
- Economic development in sustainable local jobs

Raton Coal Fired Powered Plant Produced Power 1919-2006



RATON, NEW MEXICO

Robert G. Walton General Manager

Current Status

Raton Public Service

- Municipality owns its distribution lines
- Low customer base approximately 5,000 members
- \$.074 per kWh
- Raton produced its own power with a coal plant until 2006
- Twin Eagle is current energy provider

Challenges

- Many low income customers
- Old Infrastructure
- Declining population



Opportunities

• Microgrid potential on a town scale

- Hydro retrofit 484 feet of elevation difference between reservoir and town
- Surrounded by vast amount of private land with over grown forest

- 4.3 MW GE Natural Gas Generator being installed
- Power purchase agreement expires in 4 years
- Collaborating on planning a viable renewable energy portfolio with:
 - The Santa Fe Community College
 - New Mexico Energy Office
 - New Solutions Energy Inc.

Examples of Biobased energy storage systems in New Mexico



AGPower Roswell, New Mexico

Multiple dairies formed a Cooperative to convert their waste streams through anaerobic digestion into methane then to send to California via the natural gas infrastructure.

This is reducing a major source of methane emissions and creating local jobs

Albuquerque Southside WWTP



http://www.abqjournal.com/298117/turning-waste-into-energy.html

LOCATION: Albuquerque, NM MARKET SECTOR: Wastewater treatment FACILITY SIZE: 76 million gallons per day (MGD) design, 120 MGD peak FACILITY PEAK LOAD: 7.4 megawatts (MW) FACILITY AVERAGE LOAD: 4.5 MW EQUIPMENT: Two 1.1-MW biogas-fueled Cooper engines & two 2.2-MW natural gas-fueled Caterpillar engines OPERATION: 30% of load supplied by biogas CHP, remainder from natural gas CHP or grid depending on price USE OF THERMAL ENERGY: Heating digesters; building heat ENVIRONMENTAL BENEFITS: Use of a

renewable fuel, reduced fossil fuel use, high total efficiency

OPPORTUNITIES

- Diversified portfolio for energy resilience that creates lasting local jobs
- Forest overgrowth is a concern for Federal, State, and private lands
- Woody biomass to energy- community support through regional jobs
- PV and Storage are not sustainable jobs because work is primarily done in the development phase
- Waste streams to energy
- Bio-based economies
- Energy independence through diversified energy production and storage

Thanks to: Dr. Imre Gyuk of DOE/OE for funding Clean Energy States Alliance New Mexico Energy Office Sandia National Laboratories for supporting this work.

<u>Contact</u>: Andrew Rodke, Research Assistant New Mexico Energy Office <u>Andrew.rodke@gmail.com</u>









Regional Opportunities for Energy Resilience in Northern New Mexico

Andrew Rodke **Research Assistant** New Mexico **Energy Office** Andrew.rodke@gmail.com

What is a Regional Resilience?

Utilization of Regional Resources through Sustainable Stewardship Food- Local production, controlled environment green houses **Reduced transportation** Water- Hydro Power

Energy- Diverse locally powered bio-based energy portfolio Biomass, Wind, Solar, Hydro and Municipal Waste

Kit Carson Electric Cooperative



Luis Reyes- CEO **Current Status**

Radial Feeders that serve long rural runs 13 Substations 25kV Lines 30.000 customers \$0.08/kWh \$.29/kWh demand Town of Taos biggest user is the WWTP 4 MW Cooperative owned solar arrays 3 one MW Power Purchase Agreements Demand charge can be up to 60% of power bill for Taos WWTP I MW are desirable because of existing regulations Tri-State Generation and Transmission Association energy provider

Challenges

Net-metering benefits the user but not the Cooperative Would like to have a firm power at \$0.07/kWh **Rolling Blackouts**

Opportunites

Goal is to cover 35 MW Summer Peak with Renewable energy 60 MW Winter peak energy difference purchased from the Grid Load sampling every 15 minutes for WWTP to analyze profile 5 one MW arrays planned I MW are desirable because of existing regulations

Plans for 2 Natural Gas Peaking Plants- Energy Storage Substitution





Raton Power Plant

Raton Public Service

Robert G. Walton General Manager

Current Status

Municipal Utility owns its distribution lines Customer base approximately 5,000 members \$.074/kWh

Raton Public Service produced its own power with a coal plant until 2006

Twin Eagle current energy provider

Challenges

Many low income customers

Opportunities

Power Purchase Agreement expires in 4 years

Hydroelectric retrofit over 484 ft. elevation difference between reservoir and town Surrounded by vast amount of private land with over grown forest

4.3 MW GE Natural Gas Generator being installed Collaborating with the Santa Fe Community College, New Mexico Energy Office

and New Solutions Energy Inc. on planning a viable renewable energy portfolio

Springer Electric Cooperative

David Spradlin- General Manager **Current Status** 80% of usage- 3 industrial companies Remaining 20% is split fairly evenly with commercial and residential. Customer base of 1.934 Day time rate \$0.13/kWh 7 AM-8 PM Night time rate \$0.07/kWh 8 PM-7 AM PPA with Tri-State is up in 2050 Own two 115kV lines and several 69kV older lines



Challenges

Colfax County suffering unemployment 20% higher than national average Falling trees and branches on power lines is a real concern No internal engineers Renewable generation limited to 5% of system capacity Lack of communication and coordination in North Eastern New Mexico Third parties cherry picking the large consumers for QF generation Important for Cooperatives to own assets Renewable generation is problem when you over produce local demand Demand is not larger enough to warrant wind turbines

Opportunities

Solarized truck stops where semi trucks could plug in and turn off engines RFP for two IMW PV Arrays at Substations in Raton and Cimarron Would consider PPA for biomass if \$0.07/kWh or below Interested in energy storage if Tri-State approves **Economic Development**

Thanks to: Dr. Imre Gyuk of DOE/OE for funding Clean Energy States Alliance for supporting this work.



September 27, 2016