A RENEWABLE ENERGY FUTURE FOR COLORADO COMMUNITIES SERVED BY THE MUNICIPAL ENERGY AGENCY OF NEBRASKA

VOLUME II

March 18, 2019

Aspen, Delta, Fleming, Fort Morgan, Glenwood Springs, Gunnison, Haxtun, Holyoke, Julesburg, Lyons, Oak Creek, Wray, and Yuma

Sustainable Development Strategies Group
116 N. Taylor Street
Gunnison, CO 81230

ABOUT SDSG

Sustainable Development Strategies Group is a tax-exempt nonprofit organization established under the laws of the State of Colorado to conduct research, education, and implementation in support of improved management of natural resources. SDSG works in many countries. While this study is subject to copyright, we authorize free use of the contents subject to the sole condition of appropriate attribution. SDSG is solely responsible for the contents of this report.
www.sdsg.org

CORE GROUP OF AUTHORS

This study was prepared by Frances Bursch, Victoria Jarosh, Luke Danielson, Hunter Edberg and Vince Calvano, with suggestions, support and advice from many colleagues and fellow researchers in numerous institutions.

ACKNOWLEDGMENTS

We thank Michael Brenneman and Jason MacMillan for their assistance with research, and Veronica Sparks for help in the production of this report.
We thank the Municipal Energy Agency of Nebraska, and the officials of the towns on which this study focuses for their help and assistance with data requests, and in many cases for sharing their perspectives.

This report was prepared with support from Ralph E. Clark III, the Cornet Creek Foundation, and the Western Conservation Foundation

Table of Contents

SECTION I 1

MORE ABOUT MEAN AND THE MEAN SYSTEM 1

A. About the Municipal Energy Agency of Nebraska ("MEAN") 1

B. The Advent of the RTO System 2

C. Public Power and Local Power 5

D. The Western Area Power Administration (WAPA) 7

E. Aridity, Drought and WAPA 8

F. The Role of MEAN 10

(1) Power Supply Contracts Issued by MEAN 10

(2) Bond Obligations 10

(3) The Electric Resource Pooling Agreement ("ERPA") 11

SECTION II 13

CASE STUDIES OF SELECTED COLORADO MEAN MEMBER COMMUNITIES 13

The Town of Lyons 14

The City of Fort Morgan 21

The City of Glenwood Springs 26

The City of Delta 34

The City of Gunnison 38

The City of Aspen 43

The City of Wray 47

Case-Study Conclusions 49

Power Purchase Agreements 51

SECTION III 52

CHECKS AND BALANCES: REGULATION OF THE MEAN ELECTRICAL SYSTEM 52

The State 52

Public Utility Regulatory Policies Act of 1978 (PURPA) 56

Closing Discussion 57

List of Figures 58

List of Tables 59

VOLUME II
SUPPLEMENTAL INFORMATION

Introduction

On February 4th, 2019, SDSG released Volume I of this Report, *A Renewable Energy Future for Colorado Communities Served by the Municipal Energy Agency of Nebraska.* That report is available at https://www.sdsg.org/mean-study.

In that Report, we focused on the existing contracts and policies applicable to the 13 Colorado communities that obtain wholesale electric power from MEAN. We also identified places where these agreements may either support or inhibit adoption of renewable energy by local municipalities, independent power producers, and retail customers. In summary, these contracts and policies create a number of barriers to renewable energy. The most prominent among them are:

- a limit on distributed energy generation by municipalities, restricting them to 2% of their total energy needs;
- a fixed fee, designed to pay off MEAN's pre-existing debt, that is charged to each community called the "fixed cost recovery charge;"
- A policy that increases a community's share of the fixed cost recovery charge if citizens, or the municipality itself, add renewable energy capacity;
- an unnecessarily low buy-back rate on locally-produced energy--the "avoided cost rate;"
- a moratorium policy which required municipalities to obtain MEAN's permission (an "exemption") for any added generation, which has been in effect since 2005; and
- Lack of clarity about what a municipality has to do to qualify for an "exemption."

Volume II of the Report is written for the purpose of deepening the information available to readers about this complex and multifaceted system.

The contents include a more detailed background on the MEAN system and how it operates, including additional contractual information (Section I), case studies of several of the Colorado MEAN communities (Section II), and an orientation to the regulating entities of the electrical energy system (Section III).

We intend for Volume II to build on the content of Volume I, and ultimately offer a deeper understanding of the MEAN system. We hope our research and commentary offers support for communities, their residents, businesses interested in renewables, and others, who would like to utilize more renewables but need to develop more capacity to take on this complicated issue. The profiles of the communities described in section II speak to the principle underlying purpose of this study, which is action at the local level. We hope readers will find useful policy details in each case-study, and will see the larger potential for renewable energy growth in rural Colorado communities

SECTION I
MORE ABOUT MEAN AND THE MEAN SYSTEM

A. About the Municipal Energy Agency of Nebraska ("MEAN")

MEAN is a wholesale electricity supplier headquartered in Lincoln, Nebraska. Like all power providers in Nebraska, it is publicly owned.

MEAN serves 68 communities across Nebraska, Iowa, Colorado, and Wyoming. MEAN was formed in 1981 and operates in coordination with the Nebraska Municipal Power Pool.

> "MEAN was created for the purpose of planning, acquiring, financing and operating facilities to generate and transmit electric power and energy."[1]

Before the national transition to Regional Transmission Organizations (RTOs) began in the early 2000's, MEAN was able to generate substantial revenue from buying and selling power across the Eastern and Western interconnections.

Today, each MEAN member is allowed to elect one municipal officer to sit on the MEAN Board of Directors, which is the governing body of MEAN. Each director serves a three-year term and is entitled to one vote. There is an Executive Committee of the Board.

Fig 1.[2] **Source: NMPP**

[1] 2017 MEAN Integrated Resource Plan. (2017). Page 2.
2 NMPP Energy. Retrieved from https://www.nmppenergy.org/

B. The Advent of the RTO System

The Federal Energy Regulatory Commission (FERC) some years ago encouraged a shift to a new form of wholesale power market, operated by Regional Transmission Organizations, or RTOs. MEAN operates in the territories of three regional grids, two of which are RTOs. These are the Southwest Power Pool[3] and the Midwest Independent Service Operator.[4] The third part of the MEAN territory seemed that it was about to become an RTO, to be called the Mountain West RTO, but last minute disagreements among participants prevented this development, which still seems likely to occur at some future point. The fact that MEAN operates in several different regional environments leads it to forecast loads and calculate peaks separately for each.

The Regional Transmission Organizations provide markets in which electrical energy is constantly bought and sold, at near instantaneous prices. An entity such as MEAN is both a buyer and a seller in these markets. It sells energy when MEAN owned generation resources can economically provide it at the RTO determined price, and buys energy when the price offered on the RTO is competitive with other options. To an increasing degree, electricity is available on these markets at prices lower than MEAN is able to generate it.

Power providers selling on the RTO markets may be able to offer lower prices because they can develop renewable resources that today are simply cheaper than fossil fuel generation. These entities are not burdened by the need to pay off old investments in coal or other fossil fuel plants.

One of the questions is whether MEAN will "go green" because it will increasingly buy power through the RTOs rather than generate the power itself, and the RTOs will introduce cheap renewable energy at a pace faster than MEAN is able to renew and retool its existing plants. The following figures show the generation mix on the two RTOs that MEAN participates in, the Southwest Power Pool ("SPP") and the Midcontinent Independent System Operator ("MISO").

3 See https://www.spp.org/
4 See https://www.misoenergy.org/about/

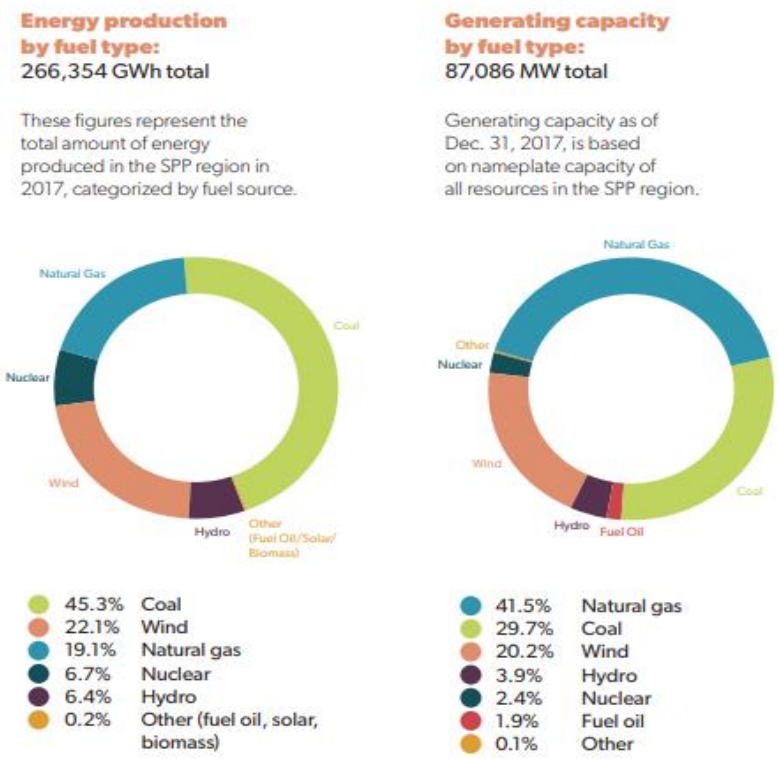


Fig. 2[5] SOUTHWEST POWER POOL ENERGY MIX. Source: SPP

MISO divides their analysis into summer and winter. These data combine the last three years; when those data are disaggregated it appears that the renewable percentage is increasing over time.

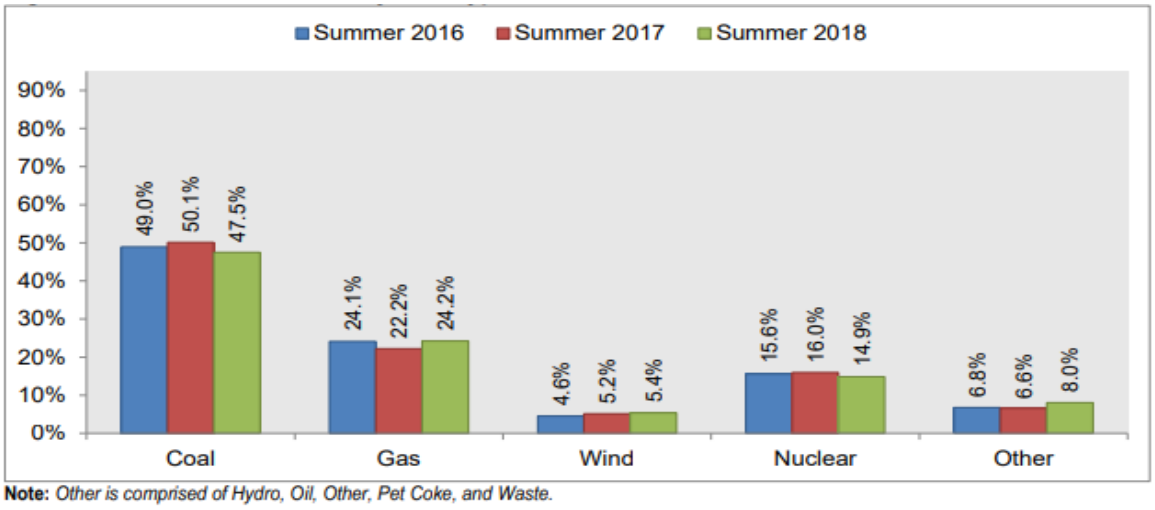
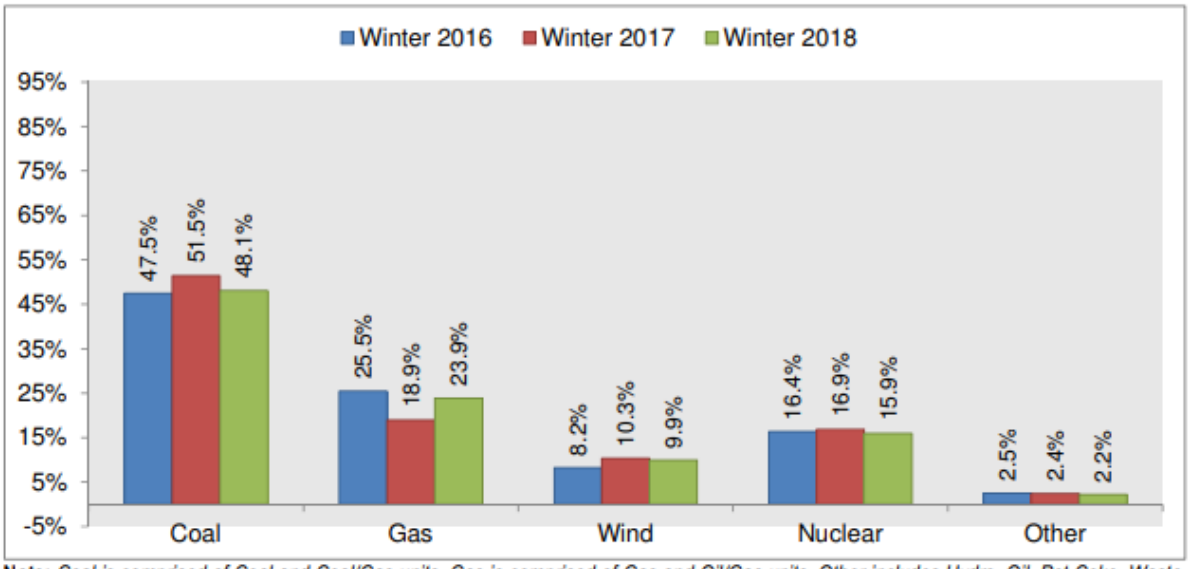


Fig. 3[6] Total Generation by Fuel Type for summers of 2016, 2017, 2018. Source: MISO

5 Southwest Power Pool. Retrieved from https://www.spp.org/

6 Midwest Independent Service Operator. Retrieved from https://www.misoenergy.org/

Figure IV-1.1: Percent of Total Generation by Fuel Type[1] for the 2016, 2017, and 2018 Winter Seasons



Note: *Coal is comprised of Coal and Coal/Gas units. Gas is comprised of Gas and Oil/Gas units. Other includes Hydro, Oil, Pet Coke, Waste, Solar and Other.*

Fig. 4[7] MISO ENERGY MIX. Source: MISO

We compare the mix on the regional grids to what MEAN itself produces. There is evidence that the transition away from coal and to renewables on these regional grids may be more rapid and agile than the transition in MEAN's own system.

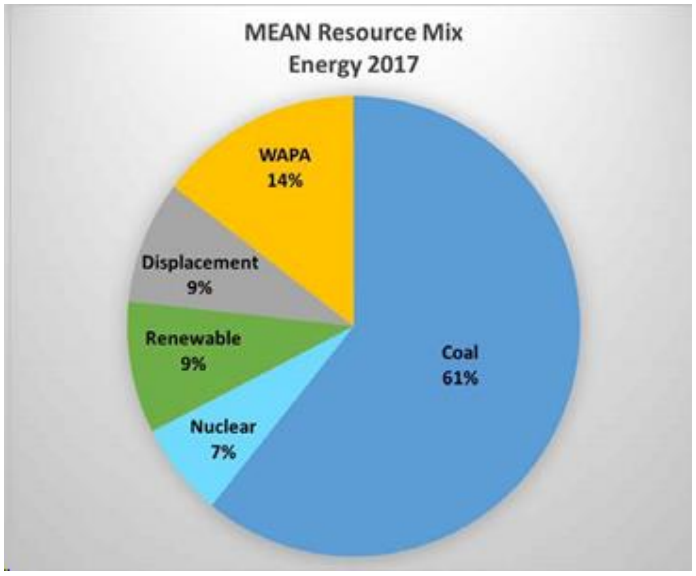


Fig. 5[8] MEAN ENERGY MIX. Source: 2017 IRP

7 Midwest Independent Service Operator. Retrieved from https://www.misoenergy.org/
8 2017 MEAN Integrated Resource Plan. (2017). Page 99.

If MEAN is going to generate less of its members' electrical power, and buy more of it from the RTOs, it appears that this itself will move the overall system to less coal and more renewables. It is not altogether clear why MEAN welcomes the idea of buying more power from the RTO grids, while acting to slow or prevent more power coming in at the level of member municipalities or their residents.

C. Public Power and Local Power

The rural West has a long tradition of public power. Municipal utilities and rural electric co-ops dominate our landscape. Public power has some real advantages. However, if local distribution of electricity is to be managed by the public, good management requires that citizens inform themselves, understand how their system works, where their electricity comes from, and decide what kind of energy future best serves their interests. Supporting this kind of informed decision making continues to be a fundamental purpose of this study.

Years ago, many municipal electrical systems developed their own generating-capacity. The tradition of local self-generation has never completely died out.

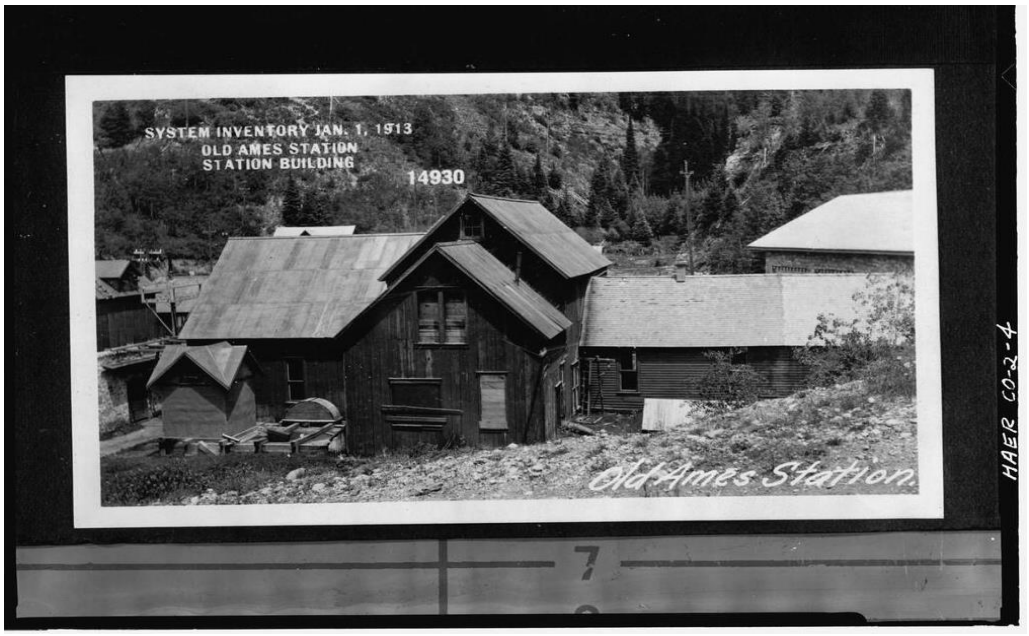


Fig. 6[9] The Ames Hydroelectric Generating Plant near Ophir Colorado, was one of the world's first AC hydroelectric plants, built in 1890. [10] Source: The Library of Congress

9 Library of Congress. (1913). Ames Hydroelectric Plant, San Miguel County, CO. *Library of Congress*. Retrieved from http://www.loc.gov/pictures/item/co0030.photos.021931p/
10 Hughes, A., and Rudolph, R. (Aug 27, 2013). Ames Hydro: Making History Since 1891. *Hydro Review.* Retrieved from https://www.hydroworld.com/articles/hr/print/volume-32/issue-7/articles/ames-hydro-making-history-since-1891.html.

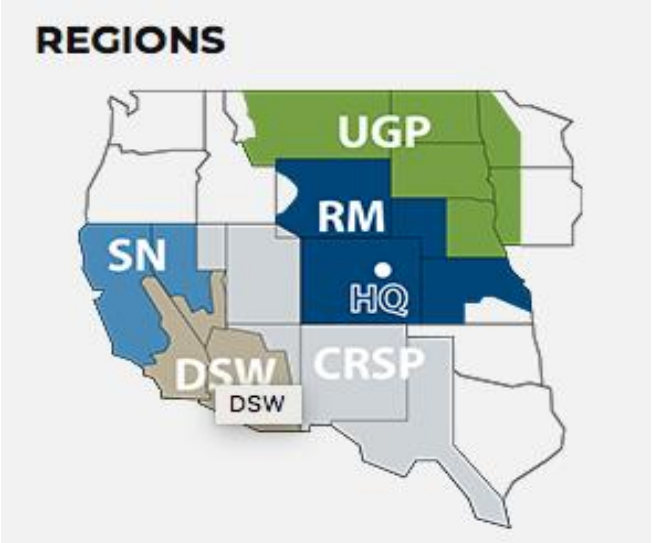
In recent decades, many municipal and rural electrical systems rely on purchased power from large generation and transmission companies (G&Ts) to supply their total energy load. Many of the old municipal power plant buildings or hydro stations are now shopping malls, restaurants, or curiosities, rather than sources of electrical energy.

Fig. 7[11] The Delta Colorado Power Plant Circa built 1937. Source: The Denver Public Library

Fig. 8[12] & 9[13] The historic Longmont Municipal Light and Power Plant is now an imported cheese shop. Source: Longmont Museum & Google Maps

11 Denver Public Library. (1992). Western history collection: call number AUR-3028
12 Photograph Courtesy of Longmont Museum
13 Google Maps. (2018). *103 Main St Longmont, CO.* Retrieved from https://www.google.com/maps/place/103+Main+St,+Longmont,+CO+80501/@40.1605656,-105.1051073,623m/data=!3m1!1e3!4m5!3m4!1s0x876bf99f5a2a14db:0x2126dc5231712717!8m2!3d40.1605615!4d-105.1029186

D. The Western Area Power Administration (WAPA)



The rural West, with a few notable exceptions, was relatively slow to electrify. With a very small number of potential consumers, living far apart on farms and ranches or in small towns, the cost of transmission and distribution lines was high, and the revenues to be earned from power generation were low. Private investors were not attracted by the high costs and low returns, and largely stayed away.

Fig. 10[14] WAPA's service areas. Source: wapa.gov

Ultimately, this gap was filled by public power, consisting of rural electric co-ops and municipally owned utilities. Their formation was greatly aided when the federal government started generating electricity at dams built by the United States Bureau of Reclamation and the Army Corps of Engineers. This relatively inexpensive power was made available to rural co-ops and municipal utilities, which helped in their struggle to organize and establish themselves. This source of power, now sold to the municipalities by a government agency known as the Western Area Power Administration, or WAPA, is still extremely important to rural, publicly owned utilities.

Federal hydropower, government loans, and tremendous effort by individuals and communities eventually got electricity to the public.

The municipalities participating in the MEAN system currently have a total 124.5 MW of WAPA capacity allocated to them.[15] Different communities have different contractual commitments and relationships with WAPA. In all MEAN documents and agreements, the WAPA allocation is accounted for and billed separately. In the Total Requirements Power Supply Contracts between MEAN and its members, it states that the TRP customer is required to receive all of its power from MEAN *less its WAPA allocation.*[16]

14 WAPA. Regions. *WAPA.* Retrieved from https://wapa.gov/Pages/Western.aspx
15 See MEAN's Current Generation Portfolio on page 13 of Volume I. Access at SDSG website: https://www.sdsg.org/mean-study
16 MEAN Wholesale Power Bill to Municipalities. December 2017.

While WAPA energy has been and continues to be crucial in the West, the amount of available hydropower is generally not growing much. While regional population is growing, the government is by and large not building new dams.[17] So, the pool of available WAPA power is not growing, but the population of the West is. Thus, the percentage of WAPA power in the local generating mix is continuing to decline.[18]

E. Aridity, Drought and WAPA

It may decline faster if the trend toward aridity continues. Lake Powell, which supplies about 75% of the total generation for the Colorado River Storage Project, is 113.16 feet below full storage capacity. [19] Blue Mesa Reservoir, located just west of Gunnison, is the largest reservoir in Colorado and is at 30% capacity as of November 2018.[20]

Fig. 11 Blue Mesa Reservoir. Luke Danielson Photo.

17 There is talk of retrofit projects at some existing dams.
18 WAPA. (2017). Drought in the West. *WAPA.* Retrieved from https://www.wapa.gov/PowerMarketing/Pages/drought.aspx
19 Water-data.com. (2018). Lake Powell Water Database. *Water-data.com.* Retrieved from http://lakepowell.water-data.com
20 Water-data.com. (2018). Blue Mesa Reservoir Water Database. *Water-data.com.* Retrieved from http://bluemesa.water-data.com

The Colorado Basin is water-short, and is in the process of developing a Drought Contingency Plan.[21] Climate science is warning us of increasing aridity in the Basin.[22] This might have a considerable impact on municipal utilities' ability to access inexpensive WAPA energy, forcing them to look elsewhere for power. Again, this puts local municipal utilities and rural electric co-ops to the test: do they best protect their members'/customers' interests by starting to develop their own renewable generation? Or are they better off continuing to rely on large generation companies that are mostly dependent on burning coal?

What are their options and opportunities? To what extent do their current contractual relationships with generators constrain their choices?

Fig. 12 Blue Mesa Reservoir in summer 2018. Jake Burchmore Photo.

21 United States Bureau of Reclamation. (2018). Colorado River Basin Drought Contingency Plans. *United States Bureau of Reclamation.* Retrieved from https://www.usbr.gov/dcp/ (the plan can be found at: https://www.usbr.gov/dcp/docs/DCP_Agreements_Final_Review_Draft.pdf)

22 United States Bureau of Reclamation. (2012). Colorado River Basin Water Supply and Demand Study. *United States Bureau of Reclamation.* Retrieved from https://www.usbr.gov/lc/region/programs/crbstudy/finalreport/Study%20Report/CRBS_Study_Report_FINAL.pdf

F. The Role of MEAN

MEAN serves as an agent for municipal purchases of power from WAPA. However, MEAN is not in the transmission business. Rather than owning physical transmission facilities, MEAN arranges for transmission through a series of agreements with transmission entities.

Except to the extent that they self-generate power, municipal utilities that receive energy from MEAN sources receive it through a complex set of agreements MEAN has negotiated with various transmission entities. There are said to be some 28 such agreements.[23]

(1) Power Supply Contracts Issued by MEAN

MEAN generates power from energy sources described in Appendix E of Volume I.[24] MEAN supplies the power generated under several types of power contracts:

- The Colorado communities of Aspen, Delta, Fleming, Fort Morgan, Gunnison, Haxtun, Julesburg, Lyons, Oak Creek and Yuma receive power through a *Total Power Requirements Power Purchase Agreement.* This is also referred to as the *Bulk Power Service Schedule M Agreement.* These communities are "Members" of MEAN. The three other communities in our study are not Members, but Participants.

- The City of Glenwood Springs receives its power under what is called a *Bulk Power Supply Service Schedule K-1 contract*.

- The Cities of Wray and Holyoke have something called *Supplemental Agreements for Firm Power under a Service Schedule J Contract.*

(2) Bond Obligations

Some 54 of the 68 MEAN member communities have Service Schedule M agreements. If long-term participation continues, it will offer MEAN greater revenue predictability, financial strength, and debt financing. By signing into a Schedule M contract, municipalities obligate themselves to participate in covering the debt on MEAN bonds, and plant decommissioning costs. This debt amounts to about $180,000,000 total. Schedule M member contribution to debt services poses significant revenue security for MEAN. Payment toward retirement of the bonds and signing a Service Schedule M agreement entitle members to partial ownership of MEAN and its assets.

---

23 Personal communication with General Counsel of MEAN.

24 See page 81 of Volume I for Appendix E: Related Projects. Access at SDSG website: https://www.sdsg.org/mean-study

The length of the Service Schedule M agreement extends with the life of the bonds--currently projected as 2039. There are various ways in which the contract expiration dates might be extended. Without expressing any opinions on the legal validity of any such actions, it seems:

- MEAN might at some time, with the Board's approval, enter into new, longer leases or future contracts that would have the effect of extending the repayment dates. Presumably, it might also choose to refinance the bonds and extend their maturity.

- If MEAN chose to build additional plants or incur additional debt, the existing municipal customers will be responsible for those costs (and their contracts might thereby be extended) if they fail to 'opt out' within 30 days of receiving notice from MEAN. See §3.01(c).

Schedule M customers do not incur the bond liabilities directly, but instead are billed for a share of the bond repayment cost which is determined based on a three-year running average of the community's peak demand, plus the rated capacity of any distributed generation facilities in the municipality's service area.[25] These bond repayments are considerable. For example, each month in 2017 the City of Delta paid $115,850.00 in Fixed Cost Recovery Charges, the term MEAN uses for the cost of bond debt and other administrative activities. This is nearly a third of the city's total electrical bill for a month such as December of 2017, which was $380,389.16.[26]

In the fiscal year ending on March 31st of 2016, 84% of MEAN's electric-energy sales revenue--and 89% of *all* participant generated revenue--was attributed to the Total Requirements Participants (SSM participants). The ten largest consumers among the long-term participants accounted for 56% of MEAN's total participant revenues.[27] It is clearly in MEAN's interest to incentivize long-term agreements. We understand that the city of Fort Morgan is one of these top ten consumers.

(3) The Electric Resource Pooling Agreement ("ERPA")

All of these communities have also signed another significant agreement, the Electric Resources Pooling Agreement28 (also known as the "Pooling Agreement," or "ERPA,") with the Nebraska Municipal Power Pool, a nonprofit corporation of the State of Nebraska (the "Pool").

ERPA was adopted January 6th of 1982. The agreement describes the types of participation in the MEAN system; in this study we generally refer to the two broad types of participants being

25 Fixed Cost Recovery Policy, identified *inter alia* in Section 3.01 of Schedule K-1 Contracts.
26 Access full Wholesale Power Bill at SDSG website: https://www.sdsg.org/mean-study
27 Municipal Energy Agency of Nebraska Power Supply System Revenue Refunding Bonds. 2016 Series A. Pg. 44. Document available on SDSG website: https://www.sdsg.org/mean-study
28 Access document at SDSG Website: https://www.sdsg.org/mean-study

Bulk-Power Participants (Service Schedule M and K) and Firm-Power Participants (Service Schedule J). However, there are other Service Schedule Agreements listed in the ERPA, each specifying varying services from MEAN.[29]

The ERPA contains the obligations of MEAN member-participants and conditions for coordinating member generation capacity with MEAN. The ERPA objectives are as follows:[30]

(a) To provide the means for an adequate power supply for Participants in conformance with proper standards of reliability.

(b) To provide the means for optimal use of generation and transmission facilities resulting in the efficient use of natural resources. *[Relating to resource pooling among participants]*.

(c) To attain maximum practicable economy for the Participants consistent with proper standards of reliability and to provide for equitable sharing of the resulting benefits and costs.

ERPA also stipulates that certain services shall be rendered by MEAN, such as:

(a) Provide coordination to specific service schedules, of purchase and sale of capacity and energy among service power participants and for bulk power participants.

(b) Provide facilities for dispatching and coordinating transmission and generation of participants, and provide materials and supplies as needed to carry out the ERPA agreement.

(c) Act on behalf of the participants as directed by the management committee.

(d) Execute contracts and leases or other instruments authorized by the committee and pursuant to the ERPA.

The ERPA is a significant document for MEAN municipal participants. It clearly outlines the duties of MEAN, and offers flexibility of participation in the MEAN system. Most importantly, ERPA emphasizes the usefulness of "power pooling", which utilizes participant-owned generation to meet load requirements, provide service in emergencies, and utilizes existing participant investments of dependable energy facilities. These services ultimately meet desires to conserve "less abundant resources" and ultimately promote efficiency.

At present we believe the ERPA is limited in its ability to provide these benefits to the MEAN system. This may be partially due to the introduction of the Moratorium on new generation in 2005,[31] which prohibits MEAN municipalities from adding additional local generation.

---

29 The Electric Resource Pooling Agreement "ERPA", Article X. Page 16. January 6, 1982.

30 The Electric Resource Pooling Agreement "ERPA", Article I. Page 2. January 6, 1982.

31 See Page 11 of Volume I. for a description of the 2005 Moratorium. Access full document at SDSG website: https://www.sdsg.org/mean-study

SECTION II
CASE STUDIES OF SELECTED COLORADO MEAN MEMBER COMMUNITIES

To provide some greater insight into the characteristics of the MEAN system in Colorado, this report includes seven case studies from Colorado communities served by MEAN: Lyons, Delta, Fort Morgan, Gunnison, Wray, Aspen, and Glenwood Springs. The case studies take an in-depth look at each community's renewable energy policies, the renewable energy systems already in place, and how each town is planning to reach their goals under similar total power requirements contracts with MEAN.

There are considerable variations in where towns stand in terms of whether they have generation capacity, and if so what it consists of. There are also major differences in the level of individual residential or commercial generation they have achieved.

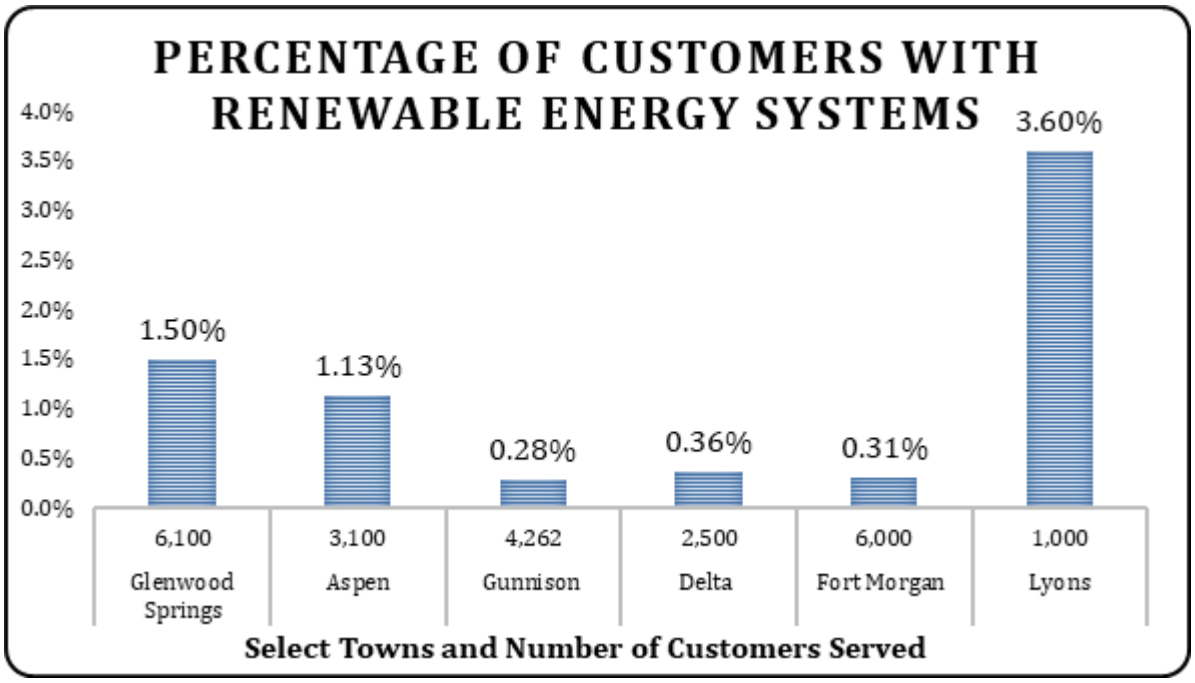


Fig. 13

As we will see below, the towns in the MEAN system in Colorado vary considerably in their size and income levels. In some, the municipality owns or operates considerable generation capacity. In others, there is no municipally owned generation. In one town, over three percent of the customers have solar systems. Other towns have less than a tenth of this level of penetration.

In each of these case studies we present data not only about the municipal utility, but about a neighboring utility, usually a rural electric co-op, in order to get some perspective on terms of service in town and out of town and how they compare.

The Town of Lyons

Located along the Saint Vrain River about 16 miles north of Boulder, the Town of Lyons was home to approximately 2,053 people as of 2017.[32] Lyons has owned and operated its own electric retail distribution utility since 1974, and entered into a Total Requirements contract with MEAN in 1981, which is still in effect today.[33] Lyons is also interconnected to the WAPA transmission grid and receives Firm Electric Service from WAPA's Loveland area projects.[34]

Electricity

Historically, the Town of Lyons has steadily increased its electric load at an annual rate of about 4% through 2011, but had small declines in 2009, 2011, and 2012. In 2013, major floods hit Lyons. As a result, the Town utility lost approximately 200 residential and 60 commercial accounts in 2013 and 34 more residential accounts in 2014. This equals a loss of 21% of the residential accounts and 30% of the commercial accounts through 2014.[35]

Lyons has shown a willingness to reach out for technical expertise to understand the options for its electric utility. Among other efforts, it commissioned an expert review of its system and options: *Town of Lyons Electric System Cost of Services Study.*[36]

According to that December 8, 2016 *Study*, the Town has shown signs of full recovery from three events that affected its electric service operations:

- 2012: Under-collection of revenues and loss of load.
- 2013: Flood damages and loss of load.
- 2014: Energy and capacity price increase due to changes in regulations affecting MEAN in the Southwest Power Pool Regional Transmission Organization (SPP RTO).[37]

In 2015, the peak electric demand in the Town of Lyons registered at the Daugherty Substation meter was 2,715 kW on July 27 at 6 pm.[38] It is difficult for the Town to break down the class specific loads because there are no interval or smart meters installed for residents or businesses.

---

32 U.S. Census Bureau. (2017). Vintage 2017 population estimates. *U.S. Census Bureau.* Retrieved from https://www.census.gov/search-results.html?q=Lyons,+CO&page=1&stateGeo=none&searchtype=web&cssp=Typeahead.

33 EPSIM Corporation for Town of Lyons, Colorado. (2016). Electric System Cost of Services Study. Page 4, part III, Executive Summary. Retrieved from https://www.townoflyons.com/DocumentCenter/View/870.

34 See EPSIM. Note 33 Above.

35See EPSIM. Note 33 above

36 Access at SDSG website: https://www.sdsg.org/mean-study

37 See EPSIM. Note 33 Above. Page 4.

38 See EPSIM. Note 33 Above. Page 11.

Where Lyons Gets its Electricity

Lyons gets its bulk, or wholesale, electricity from MEAN and from the Western Area Power Administration's Rocky Mountain Region (WAPA-RMR). WAPA provides a small portion of base capacity and energy as well as transmission service under Network Integration Transmission Services (NITS). MEAN provides full service capacity and energy on top of WAPA's base resource, and renewable energy from wind generation. MEAN charges base, incremental energy and capacity, wind energy, and fixed customer charges, whereas the Town is charged for base energy, base capacity, and transmission from WAPA.[39] Starting in 2015, MEAN billed the Town a fixed monthly fee for capacity services, which is said to provide a more stable month-to-month invoicing for the increased capacity costs due to increased peak demand. Figure 14 below, shows the Town of Lyons' energy supply portfolio.

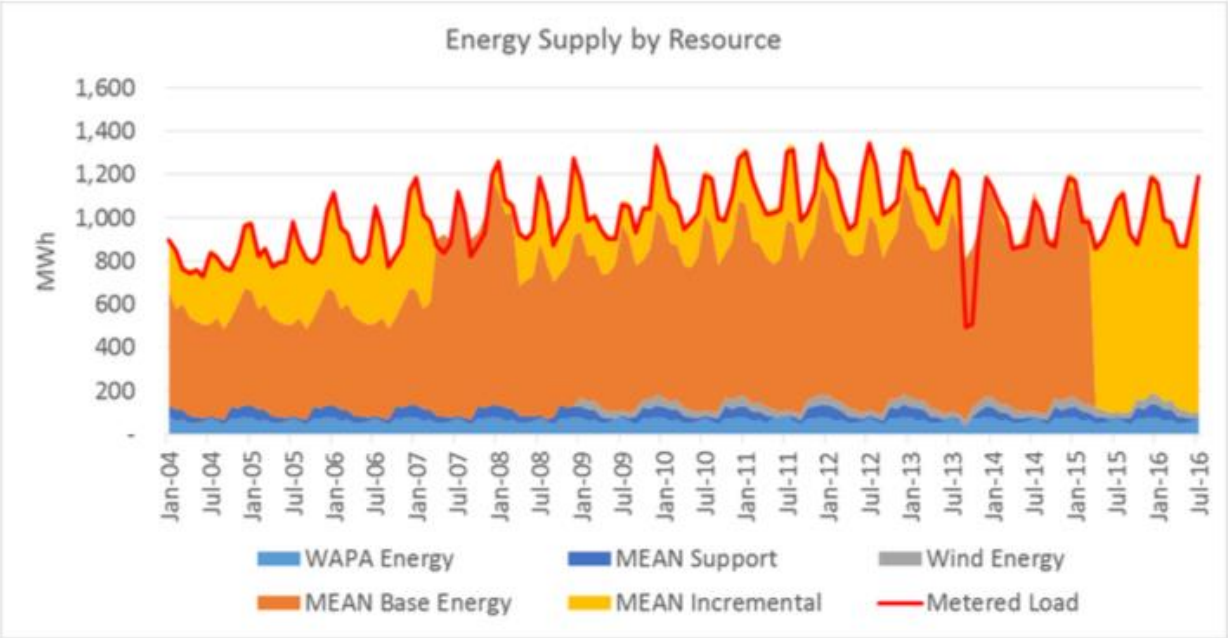


Fig. 14 [40] Lyons' Energy Supply Portfolio.
Source: EPSIM

MEAN & The Town of Lyons

MEAN issues a tariff update each year, effective the first of April, which lays out the price of energy, allocations and definitions of service for the Town of Lyons.[41] In 2015, MEAN's energy price went up 37.3 % to nearly 4.0 cents/kWh. According to the 2016 Lyons Electric System Cost of Services Study, this increase was due "largely as a result of SPP's RTO expansion and recent environmental regulations on power plants."[42] Also according to the Lyons study, despite the

39 See EPSIM. Note 33 Above. Page 18.
40 See EPSIM. Note 33 Above. Page 26.
41 See EPSIM. Note 33 Above. Page 25.
42 See EPSIM. Note 33 Above. Page 27. (Internal citation omitted.) (SPP is the Southwest Power Pool – more info here: https://www.spp.org.)

2015 increase in price, MEAN energy remains stable and cost-competitive despite their heavy reliance on coal sources.[43]

Renewable Energy Requirements and Procurement

Colorado's Renewable Energy Standard of 10% renewable generation by 2020 does not apply to the Town of Lyons because it is a municipal utility that serves less than 1,100 meters, and thus, does not meet the 5,000-customer threshold for municipal utilities to be subject to the mandate--as discussed on page 53 of this report.

Despite the fact that they are not subject to the Colorado Renewable Energy Standard, the Town of Lyons has procured renewable energy. In 2015, 6.2% of the Town's load was supplied from WAPA's Base Energy, which derives from hydropower generation. Starting in 2013, distributed solar generation has brought the Town's total renewable energy percentage above 10%. MEAN also has a wind contract that averaged 3.6% of the Town's load in 2015.[44]

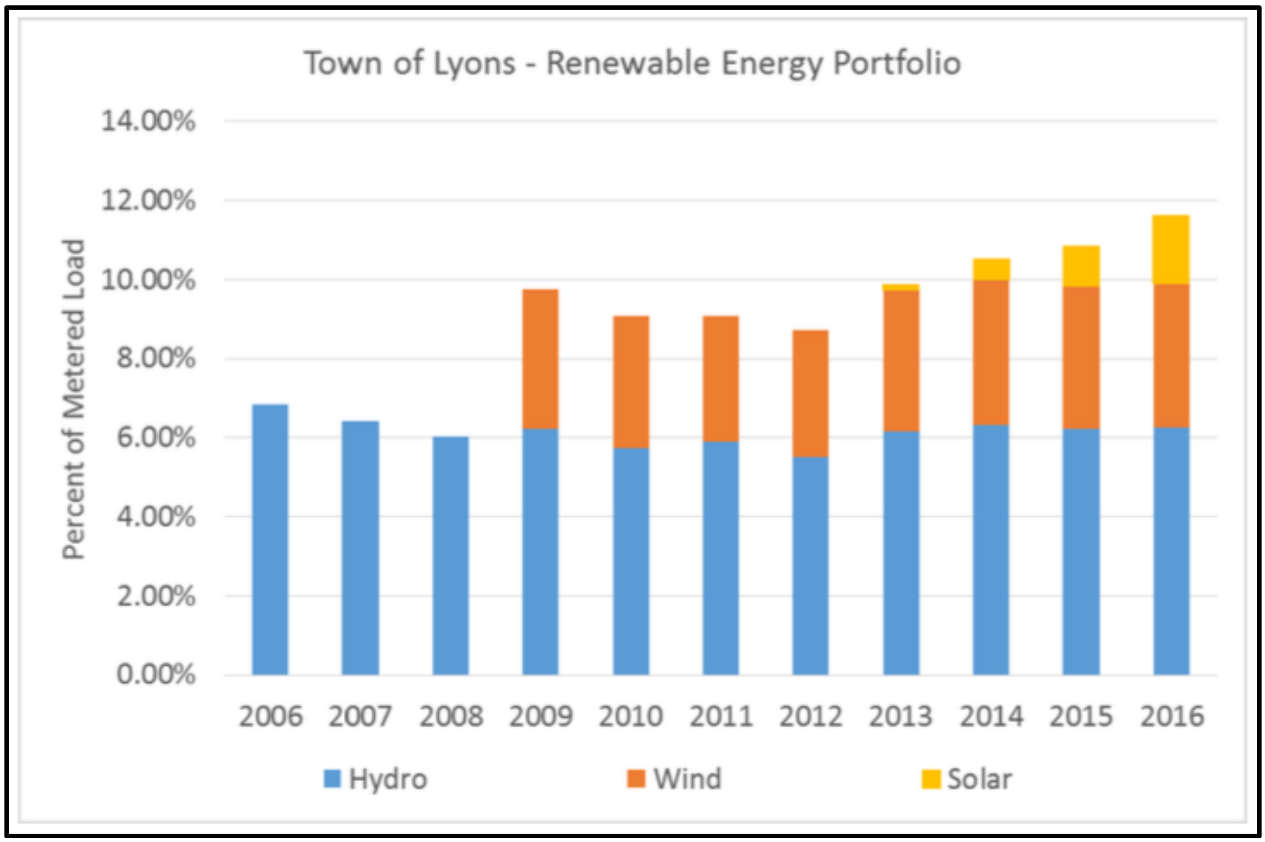


Fig. 15[45] Approximate Percentage of Renewable Energy in Town's Load. Source: EPSIM

Figure 15 above, taken from page 30 of the EPSIM study, shows the approximate percentage of renewable energy in the Town's load. The figure assumes that all WAPA-LAP hydropower

43 See EPSIM. Note 33 Above. Page 27.
44 See EPSIM. Note 33 Above. Page 29.
45 See EPSIM. Note 33 Above.

generation is renewable,[46] and the total solar energy production is estimated from installed capacity. Currently, Lyons does not have a RES program, and does not claim any Renewable Energy Credits (RECs).

Development of Customer-Owned Solar Distributed Generation in Lyons

The first residential solar system in Lyons was a 9.75 kW residential system installed in 2013. The amount of residential solar has increased every year since then. There were four new solar systems installed in 2014, averaging 5.62 kW each, and nine systems in 2015 at an average of 4.42 kW each. According to the 2016 EPSIM study, ten new systems were added in 2016, the last year for data in that study. Those systems averaged 5.90 kW each. There was also one commercial installation in 2014, and it is an 11.40 kW system. Table 1 and Figure 9 from the Lyons 2016 EPSIM study show the installed solar capacity for residential and commercial systems from 2013 to 2016.[47]

	RESIDENTIAL	COMMERCIAL
2013	9.75 kW	
2014	32.23	11.40 kW
2015	72.06	11.40 kW
2016	131.07	11.40 kW

Table 1: Town of Lyons Installed Solar Capacity[48]

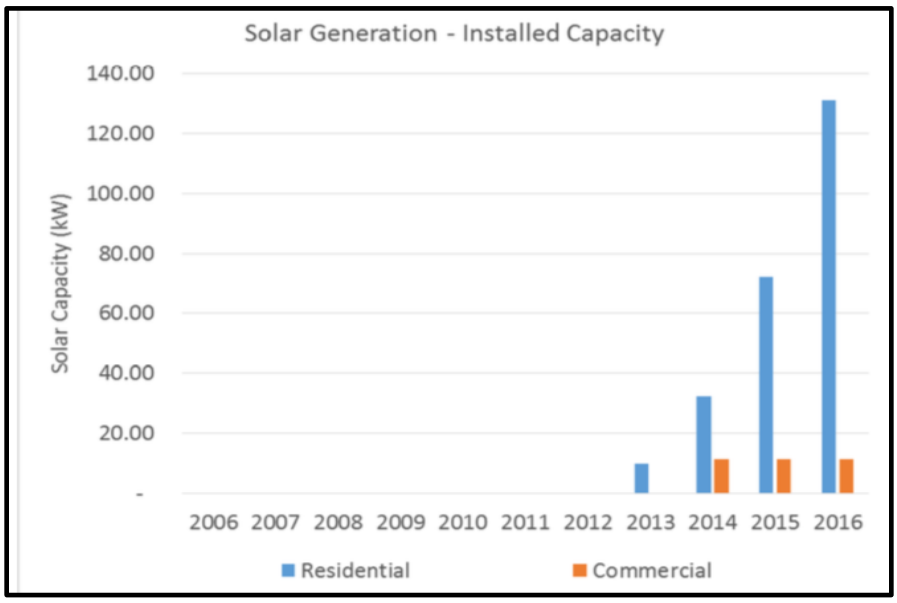


Fig. 16[49] Town of Lyons Installed Solar Capacity. Source: EPSIM

46 The WAPA-LAP hydro may not meet the statutory definition of an "eligible energy resource" as defined in C.R.S. 40-2-124, however the Town of Lyons is not subject to Colorado's renewable energy standard.
47 See EPSIM. Note 33 Above. Page 13.
48 See EPSIM. Note 33 Above. Page 13.
49 See EPSIM. Note 33 Above. Page 14. (Data from Town of Lyons).

The 2016 EPSIM study states:

> "[t]he development of customer-owned solar Distributed Generation is a contributor to decreasing load factor, due to the fact that solar power reduces metered energy but not demand, particularly for residential."[50]

While Lyons was already an evening-peaking community, the installed solar power tends to shift peak demand on the grid to later in the evening. According to the EPSIM study, the next three highest demand events were on August 14 at 3, 4 and 5 pm, and the next seven highest demand events occurred between 5 and 7 pm from July 23 to 27.[51]

Town of Lyons Renewable Energy Outlook

The Town of Lyons has to fit all of its renewable energy generation, including Town-owned and customer-owned distributed generation, into its Schedule M Total Requirements Contract, and the MEAN "DG" Policy. The Contract and corresponding MEAN Distributed Generation Policy caps Lyons' renewable energy generation capacity at 2% of its annual electricity needs.

In 2009, the Town of Lyons entered into a power purchase agreement with MEAN to receive a firm quantity of wind energy, per a fixed monthly allocation,[52] to offset approximately 3.6% of the Town's 2015 load[53] that would otherwise be served by MEAN's incremental or supplemental energy. The 2009 wind PPA with MEAN does not count against the Town's 2% Cap for retail distributed generation because it is not owned and operated by the Town of Lyons, and thus, not a "TRP Resource" under the MEAN DG Policy.

The Town of Lyons has not passed any resolutions setting any renewable energy goals. It does have an Environmental Sustainability Action Plan.[54] In this Plan, the Town does state a goal of "increas[ing] the use of clean energy and transition away from fossil fuels."[55] Furthermore, in the Plan, the Town recommends conducting a feasibility study for an applicable renewable solution, such as a micro-grid or distributed generation that could provide power for the town and offset peak loads, including the idea of community solar gardens that might feed into the grid, but also could be converted to charging stations during a future disaster.[56]

United Power

Much of the area surrounding Lyons is served by the United Power Cooperative, a member owned power distributor, which receives its power from Tri-state Generation and Transmission

---

50 See EPSIM. Note 33 Above. Page 14.
51 See EPSIM. Note 33 Above. Page 11.
52 See EPSIM. Note 33 Above. Page 26.
53 See EPSIM. Note 33 Above. Page 29.
54 Town of Lyons. (2014). Environmental Sustainability Plan. *Town of Lyons.* Retrieved from https://www.townoflyons.com/DocumentCenter/View/265/Environmental-Sustainability-Action-Plan-2014-PDF?bidId
55 See Town of Lyons. Note 54 Above. Page 10.
56 See Town of Lyons. Note 54 Above. Page 10.

Association. We have gathered some information about United Power simply as a point of comparison, to be able to look at how customers in town and customers outside the municipal boundary may be treated differently.

Tri-state's current energy portfolio consists of coal, natural gas, oil fired and combustion turbine generation facilities, hydro power that they purchase from the Western Area Power Administration (WAPA), and other renewable energy sources, including wind, small hydro and biomass.[57] In addition to these power sources, United Power has 5 member owned generation projects being developed in their territory (as of 2016) for a total of 24,420 kW, including methane recovery and solar projects.[58] United Power services approximately 87,000 meters, and approximately 3,000 of those are net metered (3.5% of the total meters serviced).[59] Their current rate fee is 10.76¢/kWh and a $19.00/mo base charge for residential and 11.22¢/kWh and a $20.00 base fee for small commercial.[60]

United Power's net metering policy permits a 1:1 retail rate reimbursement for rollover of excess energy production. Gross excess energy production by customers who generate their own electricity is settled every year in March at the wholesale rate of 4¢/kWh. Tri-State's contract with United Power requires power purchase agreements for all customer generation systems connected to the power grid. United Power also allows larger solar gardens within their service area, and reimburse at an individually contracted rate that is generally lower than Tri-State's wholesale power charge (currently 4¢/kWh). Other fees that are associated with connecting a customer generation system in United Power's service area are the normal state permitting fee, and a $200.00 interconnection fee.[61]

Comparison

To compare, both the Lyons Municipality and United Power reimburse net metered customers at a 1:1 ratio on a monthly rollover basis. The pair have different rates at which they reimburse net metered customers on an annual basis (any balance left at the end of the year).

Every year, Lyons Municipality staff calculates the avoided cost rate at which customer generators will be reimbursed. United Power reimburses their end-use generators at the wholesale rate of 4¢/kWh for any balance remaining. While Lyons reimburses at the end of the calendar year in December, United Power reimburses at the end of the "solar year" in March.[62] United Power does allow larger solar gardens to be constructed, which are reimbursed slightly below the energy wholesale rate. Lyons Municipality does not accept PPA's.

---

57 United Power.Bringing You Power. *United Power Cooperative*. Retrieved from http://www.unitedpower.com/bringing-you-power/

58 United Power.Renewable Energy. *United Power Cooperative.* Retrieved from http://www.unitedpower.com/wp-content/uploads/2015/05/TGTRenewables_2016.pdf

59 Marizza J. Personal Correspondence, December 6, 2018.

60 United Power. Demand Rate. *United Power Cooperative*. Retrieved from http://www.unitedpower.com/demand/

61 See Marizza, J. Personal Correspondence. Note 59 above.

62 Kubala, J., Personal Correspondence, February 25, 2019.

Lyons charges a base charge, or monthly connection fee of $13.00/mo for residential users and $18.00/mo for commercial users. United Power charges a monthly base charge of $19.00/mo for residential customers and $20.00/mo for small businesses.[63]

Lyons Municipality has a 2% cap on city-owned generation, while United Power has a cap of 5%. United Power requires a $200.00 interconnection fee for customer generation systems. Lyons Municipality has a variable permit fee, an application fee, and the customer has to pay for the meter and meter installation ($426.00 for the meter and $120.00 for installation).

Summary

The town of Lyons is clearly focused on becoming a more resilient community. Lyons has addressed threats to the viability of their community (such as the floods of 2013) and thus has set a sustainability plan, conducted its own *Study,* and encouraged the adoption of residential solar-systems.

KEY LYONS STATISTICS	
Population	2,053
Median household income	$50,764
Number of meters	~1,000
Municipally-owned generation? Is it renewable?	None
Is the town participating in MEAN's wind program?	Yes, 3.6% of the Town's load is provided by MEAN's wind resources.
Residential electrical rate	12.75¢/kWh
Customer solar penetration as percentage of total meters	3.6%

Table 2

63 See United Power Cooperative Demand Rate. Note 60 above.

The City of Fort Morgan

History

The City of Fort Morgan was established as the seat of Morgan County on February 19, 1889 and was named after Colonel Christopher A. Morgan.[64] Fort Morgan is the biggest municipality in Morgan County. It has steadily grown since 1890, from a population of 488, to a population of 11,281.

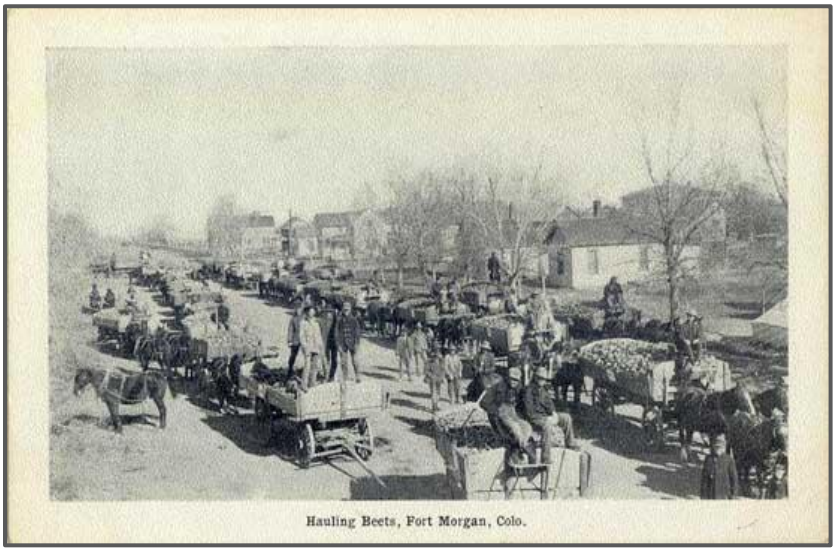


Fig. 17[65] Source: Usgwararchives.net

Electricity

The Light & Power Department of Fort Morgan has been in operation for over 112 years and is responsible for the electric distribution and transmission system for an area of approximately 25 square miles. This area currently serves approximately 6,000 meters. Before electricity was supplied to the city, streets and homes were lit with "dirty and dangerous kerosene lamps."[66] Fort Morgan originally started out by building its own 75 kW power plant back in 1906 at a cost of $11,500.[67] By 1908, Fort Morgan became known as the 'City of Lights' after a vote to furnish one 8 candle-power, or 40-watt porch light free to each electrical customer. The Fort Morgan Times ran a historical piece on July 9, 2015 titled: *Portraits of the Past: How Fort Morgan became the 'City of Lights*.'

---

64 Gannett, H. (1905). The Origin of Certain Place Names in the United States. *Govt. Print Off,* p. 129. Retrieved from https://books.google.com/books?id=9V1IAAAAMAAJ&pg=PA129#v=onepage&q&f=false

65 USGenWeb. (2018). Penny Postcards from Morgan County, Colorado. *Usgwarchives.net*. Retrieved from http://www.usgwarchives.net/co/morgan/postcards/ppcs-morgan.html

66 Community History Writers. (August 9, 2015). Portraits of the Past: How Fort Morgan became 'The City of Lights.' *The Fort Morgan Times*. Retrieved from http://www.fortmorgantimes.com/ci_28461323/how-fort-morgan-became-city-lights.

67 See Community History Writers. Note 66 above.

Fort Morgan upgraded the initial planned capacity a few times, and in 1923 decided to build a second power plant. In the early 1940s, Fort Morgan began supplementing its electricity needs by purchasing hydroelectric power from the U.S. Bureau of Reclamation. In 1952, Fort Morgan shut down the generators at its second plant and subsequently bought all of its electricity from outside sources.[68]

Fort Morgan continues to purchase all of its electricity. Its current principal electric suppliers are MEAN under a Total Requirements power contract, as well as WAPA. The cost of residential electricity is currently 7.64¢/kWh, and the monthly service charge for residential general service is $9.95/month. The Colorado Association of Municipal Utilities ranks Fort Morgan as having one of the lowest electricity rates in Colorado. In the U.S., the national average is approximately 12¢/kWh.

Waste-to-Energy Project

In 2013, a waste to energy project was proposed by Creative Energy Solutions (CES) to be implemented in Morgan County. The 15 MW plant would receive landfill waste streams from several surrounding counties, and be located in or near the City of Fort Morgan. The initial proposal through 2017 was to utilize pyrolysis to reduce waste to pellets--which could be converted into energy and then sold to MEAN through a power purchase agreement.[69]

City manager Jeff Wells described the potential local benefits below:

- "Up to 60 jobs created for Fort Morgan residents
- Reliable backup power option in case of outages
- Increased job diversity to the city's business base
- Reduced fees paid to landfill the waste
- Lower sanitation rates for city customers"[70]

Prior to 2017, the project experienced resistance from MEAN. CES could not arrange for energy for the plant to be transmitted since MEAN denied the interconnection proposal. In 2015, When MEAN hired a more renewable oriented Executive Director, CES again brought the project to the attention of the Morgan County Board of County Commissioners, where it received full support from its three commissioners.[71] Funding for the project has been sourced, but the complexity of the project, and MEAN's unwillingness to purchase energy output, has again slowed recent developments. The project is still in the works, according to Fort Morgan's current Utility Director.

---

68 See Community History Writers. Note 66 above.

69 Colorado.gov. (April 18, 2017). Logan County Commissioners Work Session. *Colorado.gov.* Retrieved from http://www.colorado.gov/pacific/sites/default/files/April%2018%202017_1.pdf

70 Russel, S. (January 25, 2013). Officials: Pyrolysis to provide boost in northeast Colorado town. *American Chemistry Council.* Retrieved from http://blog.americanchemistry.com/2013/01/officials-pyrolysis-to-provide-boost-in-northeast-colorado-town/

71 Alderton, S. (April 5th, 2016). Renewable energy plant a possibility again. *Brush News-Tribune.* Retrieved from http://www.brushnewstribune.com/ci_29735791/renewable-energy-plant-possibility-again

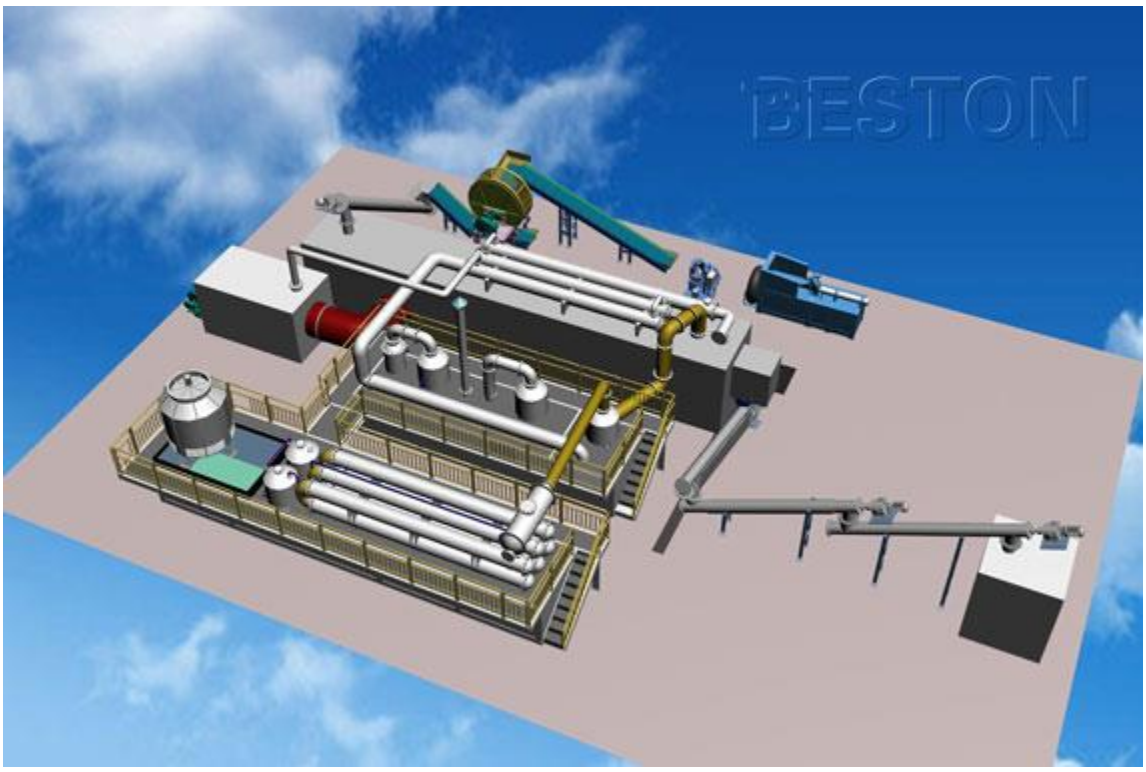


Fig. 18[72] **Waste-to-energy plant model. Source: Brush New-Tribune**

Fort Morgan Net-Metering

In Fort Morgan, a permit and application are necessary for an installation of a solar or other renewable energy generation system to be interconnected to the city's distribution system. Since 2016, the city has been required to notify MEAN of any new renewable energy installations as outlined in MEAN's Renewable Distributed Generation policy.[73] There are permitting fees that range in price depending on the project, but no additional fees or interconnection fees after that. Power purchase agreements are allowed but there has been no interest in PPAs so far. In regard to net metering rates, the net metering policy states that,

> "In the event net metering is negative such that the system production is greater than the customer's consumption in any month, the electric department will apply excess generation credits to the current month's statement or will otherwise be paid to the customer in full [at 3.61¢/kWh].[74]

72 See Renewable energy plant a possibility again. Note 71 above.
73 MEAN. (2016). Renewable Distributed Generation Policy. Section 2.18 Fines and Penalties.
74 The City of Fort Morgan. (2018). Electric Tariff Number 3. *City of Fort Morgan Light and Power.* Retrieved from https://www.cityoffortmorgan.com/152/Light-Power-Electric-Department

Morgan County Rural Electric Association
Morgan County is located approximately 70 miles Northeast of Denver, and is 1,294 square miles with a population of 28,360. The county's electricity demands, with the exception of the City of Fort Morgan which is served by MEAN, are served by Morgan County Rural Electric Association (MCREA). Again, we use this utility, which serves the area around the city, as a point of comparison.

MCREA's mission states: "Morgan County REA, a member-owned cooperative, is dedicated to serving our members by providing safe, reliable energy with a strong tradition and vision for the future."[75]

MCREA was formed on April 27, 1937 after the Rural Electrification Act of 1936 provided federal loans to electrify rural communities in the U.S. MCREA was the third REA to be established in Colorado, and by May 11, 1938 the first 175 miles of line in the county were energized.[76]

The association's service area includes Morgan County and portions of Logan, Weld, Adams, Arapahoe and Washington counties. Towns served by MCREA include Keota, New Buckingham, Raymer, Stoneham, Merino, Messex, Goodrich, Orchard, Weldona, Snyder, Hillrose, Wiggins, Brush, Roggen, Prospect Valley, Hoyt, Woodrow, Grover, Briggsdale, Keenesburg, and Last Chance.[77]

Today, MCREA serves 8,324 meters,[78] including 17 end-use generators.

MCREA Net-Metering
MCREA's net-metering policy requires a permit and has an application on their website. There is a one-time $250 installation fee. PPAs are available upon board approval.

The net-metering policy states: "[if] electricity supplied to the member-generator by the Association exceeds the electricity generated by the member-generator" at the end of the month a rate of 11.06¢/kWh is charged to the customer. If "the electricity generated by the member-generator exceeds the electricity supplied by the Association, the member-generator is required to pay only the customer charges and minimums that the customer would have otherwise paid under the applicable rate schedule" at the end of the month. All excess credits will roll over to the next month at a 1:1 ratio. If there are still credits at the end of the calendar year, MCREA will pay the customer 7.40¢/kWh.[79]

---

75 Morgan County Rural Electric Association. (2016). History and Mission. *MCREA.* Retrieved from https://www.mcrea.org/content/history-mission
76 See Morgan County Rural Electric Association. Note 75 Above.
77 Morgan County Rural Electric Association. (2016). Service Area. *MCREA.* Retrieved from https://www.mcrea.org/content/service-area
78 Morgan County Rural Electric Association. (2016). About us. *MCREA.* Retrieved from https://www.mcrea.org/content/about-us
79 Morgan County Rural Electric Association. (2018). Net Metering. *MCREA.* Retrieved from https://www.mcrea.org/content/net-metering

Comparison
MCREA and Fort Morgan have similar approaches to net metering. MCREA allows end-use generators to roll over credits month-to-month at a 1:1 ratio, allowing users to build up credits in the summer to then use in the winter. If there are credits at the end of the calendar year the balance gets paid using the wholesale rate of 7.4¢/kWh. In comparison, the municipality of Fort Morgan gives its customers the option to have excess generation credits applied to their succeeding bill, or credits can be calculated at the end of every month. For a solar customer, the obvious choice is to have credits rolled over from month to month.

Summary
The city of Fort Morgan has always been progressive in their efforts to locally supply their energy through large projects--their proposed 15 MW waste-to-energy plant is an example of these ambitions. Unfortunately at this time, pursuing large projects will prove difficult until MEAN balances their supply and demand of peaking-capacity which could lift the 2005 moratorium on additional generation.[80]

In the meantime, Fort Morgan can practice other forms of load-control. Since they have one of the biggest base demands within the MEAN system, we point out that their consumer demand could be reduced at the residential and commercial levels. We suggest this can be achieved through encouraging customer-owned renewable systems, but that introduces the problem of a higher FCRC for the city.

KEY FORT MORGAN STATISTICS	
Population	11,281
Median household income	$33,128
Number of meters	~6,000
Municipally-owned generation? Is it renewable?	None yet; waste to energy plant pending
Is the town participating in MEAN's wind program?	No
Residential electrical rate	7.64¢/kWh
Customer solar penetration as percentage of total meters	0.31%

Table 3

80 Access 2005 Moratorium at SDSG Website: https://www.sdsg.org/mean-study

The City of Glenwood Springs

History

Glenwood Springs is a Colorado community which is home to about 10,000 residents as of recent U.S. Census estimates. Glenwood's founding fathers, Isaac Cooper and Walter Devereux, found themselves in the region because of silver prospecting.

Glenwood Springs is not far from major coal deposits. The Redstone coal baron, John Osgood,[81] a founder of the Colorado Fuel and Iron Corporation, opened coal mines in the area in order to make 'coke' for silver smelting.

The City's prosperity, rising from natural geothermal attractions and mining opportunities, leveraged Glenwood Springs to become one the first cities to be electrically lit in the United States.[82] In 1886 Glenwood constructed its own hydro plant for electric generation. This project was eventually overshadowed by the Shoshone Hydro Project in Glenwood Canyon that is still operational as of 2018, and now owned by Xcel energy.[83]

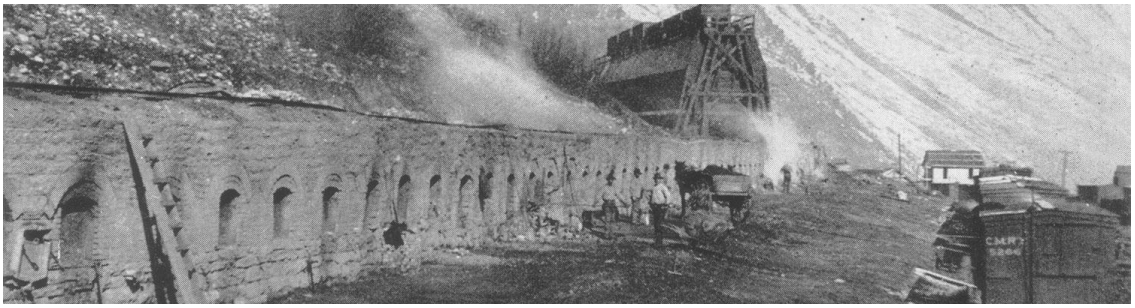


Fig. 19[84] 'Silver Coke Ovens' 1800-1900s. Source: visitglenwood.com

81 National Mining Hall of Fame and Museum. Inductee Database. *National Mining Hall of Fame and Museum*. Retrieved from https://mininghalloffame.org/inductee/osgood

82 Colorado Encyclopedia. Glenwood Springs Hydroelectric Plant. *Colorado Encyclopedia.* Retrieved from https://coloradoencyclopedia.org/article/glenwood-springs-hydroelectric-plant-glenwood-center-arts

83 Sackett, H. (June 3, 2018). Shoshone plant water rights in Glenwood Canyon eyed by Colorado River District. *Aspen Times.* Retrieved from https://www.aspentimes.com/news/shoshone-plant-water-rights-in-glenwood-canyon-eyed-by-colorado-river-district/

84 City of Glenwood Springs. Springs History. *City of Glenwood Springs.* Retrieved from https://www.visitglenwood.com/history/

Fig. 20[85] Glenwood Spring's first hydroelectric plant, now serving as Glenwood's center for the arts. Source: Colorado Encyclopedia.

Electricity

Today, the City of Glenwood springs receives its electrical power from MEAN, less its WAPA allocation. On January 1, 2013, Glenwood signed a Service Schedule Class K-1 Bulk Power Supply Agreement with MEAN. This agreement lasts for 10 years, expiring January 1, 2023.[86]

This puts Glenwood Springs in a highly visible position among Colorado communities served by MEAN. Most of the other communities are locked into agreements that will last more than twenty years, while the utility environment changes dramatically, and the demand to accelerate the introduction of renewable sources strengthens. How Glenwood Springs approaches the termination, renegotiation, or renewal of its contract will be looked to by others as guidance in regard to where the MEAN system is going, and also how it is responding to changing circumstances and different public expectations.

MEAN has suggested that sometimes communities opt into class K and K-1 contracts as a sort of 'trial period' to see how the relationship with MEAN may work for them. As Bulk-Power recipients, K-1 contract holders agree to contribute to MEAN any existing energy output that

85 See Colorado Encyclopedia. Note 82 above.

86 Service Schedule "K-1" to the Electrical Resources Pooling Agreement (the "Pooling Agreement") between the Municipal Energy Agency of Nebraska and Glenwood Springs, 2013.

the City may be generating. In the case of Glenwood, there has been no municipal generation during the time of the MEAN contract. Under the K-1 contract, Glenwood also agreed that MEAN would supply all existing and future electrical needs (aside from Glenwood's WAPA allocations).[87] Glenwood is the only K-1 contract holder in Colorado.

Wind Power Purchase

In January of 2011 Glenwood amended their power Service Schedule K-1 Bulk-Power Supply Contract to increase their share of wind energy. This wind power would be supplied by MEAN as part of a Supplemental Wind Power Purchase. Under this agreement, MEAN will generate or cause to generated electricity from their wind resource pool.[88] In 2011 Glenwood agreed to receive an annual total of 34,097,000 kWh at 4.9¢/kWh[89]as well as other associated costs such as applicable transmission charges, energy imbalance charges, ancillary fees and scheduling fees.

Fig. 21[90] MEAN Wind turbine from Kimball facility. Outside Kimball, NE. Source: NMPP

87 The Electric Resource Pooling Agreement between the Municipal Energy Agency of Nebraska ("MEAN") and Glenwood Springs, CO.

88 Amended and Restated Supplemental Agreement for Wind-Generated Energy Purchase between Municipal Energy Agency of Nebraska And City of Glenwood Springs, Colorado. November 7, 2011.

89 Email correspondence between Research Associate, Victoria Jarosh, and Glenwood Springs Meter Tech.

90 NMPP Energy. (August 2, 2018). Kimball Wind Facility Goes Online. *NMPP Energy.* Retrieved from http://www.nmppenergy.org

Glenwood Springs Net-Metering

In November of 1997 Glenwood Springs enacted an ordinance amending their then current electrical tariff sheets, which included photovoltaic criteria. This ordinance outlines home-owner responsibilities, photovoltaic system requirements, and the responsibilities of the City in regard to the customer owned PV systems. A clear explanation of the photovoltaic criteria can be found in the town's Net Metering Interconnection Agreement. This document includes information such as billing, conditions for system approval, and maximum generation limits. This form can be found on the SDSG website.[91]

Glenwood Springs has encouraged the development of individual solar systems. The MEAN requirements applicable to these individual solar systems depend on whether they existed prior to the adoption of MEAN's "Distributed Generation" policy in 2018, and if they were in place before May 19th of 2016, which would qualify that generation as a 'grandfathered system.'[92] If prior to these dates, the system is subject to more favorable treatment than systems installed after the policy was adopted.

Glenwood Springs has 69 "grandfathered facilities" with a sum of 515.01kW; these are apparently all customer owned solar arrays.[93]

Glenwood Springs' maximum limits on (non-grandfathered) individual solar:

- No system can generate more than **120%** of the site's annual electricity usage
- Residential customers systems may generate power that will be subject to the net-metering policy up to **10kW**
- Commercial customers may generate up to **25kW**[94]

Any excess energy produced will be recorded by a meter installed at the customer's site (meter charge: $11.95 per month). The meter records the energy consumed by the customer, or excess energy produced and routed back onto the utility's grid. The excess energy will be rolled over on a monthly basis and credited back to the customer at a one to one ratio, meaning the Glenwood resident with a solar system will effectively be reimbursed at the same rate they pay for electricity.

91 Glenwood Springs Net-Metering Application for Interconnection. Access at SDSG website: https://www.sdsg.org/mean-study

92 See Grandfathered Facilities List at report Volume I. Appendix D. Page. 80.

93 MEAN Renewable Distributed Generation Policy. Grandfathered Facilities List, Volume I. Appendix B.

94 See Glenwood Springs Net-Metering. Note 91 above.

At the end of the annual billing cycle (April 1st – March 31st), Glenwood offers the customer two options if there is still a balance remaining:

1. The customer may request in writing that they would like their excess energy credits to be continuously rolled over month to month and credited at a 1:1 ratio until they terminate their service with the city; or
2. The customer may choose to be compensated at MEAN's "avoided cost" rate (2.553¢/kWh) if there is any remaining balance at the end of billing cycle.[95]

The customer generator in Glenwood, when consuming energy from the grid, typically pays 10.6¢/kWh for retail electricity.

There are currently 92 net-metered systems operating in Glenwood Springs (75 residential PV systems and 17 commercial PV systems) with a total installed capacity of 545.994 kW. As stated in the MEAN Renewable Distributed Generation Policy, all monthly output from net-metered users will be added to Glenwood's peak demand for calculation of the Fixed Cost Recovery Charge (FCRC), which is paying MEAN's old coal-related debt.[96] So the more solar or other renewables that are installed in Glenwood Springs, the greater will be Glenwood's share of the coal debt repayment.

For Glenwood, MEAN's Fixed Cost rate is $15.97/kW of monthly peak demand (plus the rated capacity of all solar systems), calculated on a three year rolling average.[97] In 2017, Glenwood Springs paid $286,574 per month towards the FCRC based on prior-year peak demands.[98]

Solar Rebates

Since 2010, Glenwood Springs has been offering solar rebates to those who decide to adopt solar systems. The City has funding to supply rebates to 12 residential systems and 3 commercial systems per year. The rebates are given out on a first-come-first-served basis and usually sell out quickly. Solar customers can receive rebates at the following rates:[99]

- Commercial customers: 50¢ per watt up to 10 kilowatts ($5,000)
- Residential customers: 75¢ per watt up to 3 kilowatts ($2,250)

The City also advertises other solar rebates accessible for customers such as CORE (Community Office for Resource Efficiency) rebates. Other programs they promote are rebate and energy coaching opportunities offered by CLEER (Clean Energy Economy for the Region).

---

95 See Glenwood Springs Interconnection Agreement & Net-Metering Application. Access as SDSG website: https://www.sdsg.org/mean-study

96 MEAN's Renewable Distributed Generation Policy. Page 4.

97 See email correspondence. Note 89 above.

98 Copy of Glenwood Springs Wholesale Electric Bill. December 2017.

99 Garfield Clean Energy. Glenwood Springs Solar PV Rebates. *Garfield Clean Energy.* Retrieved from http://www.garfieldcleanenergy.org/solar-rebates-GWS.html

These rebates were temporarily suspended in 2017. This was because MEAN implemented a charge on all additional solar systems added to the grid which forced the City to halt any rebates for solar. Despite this, energy efficiency rebates were allowed to continue. In 2018, the issue was resolved, and the City once again offered the solar rebates described above.[100]

Comparison to Holy Cross Energy

Holy Cross is the electrical energy supplier located outside Glenwood Springs. We therefore use it as a reference point.

On the first 25 kW of solar installation, Holy Cross offers customers some of the most generous rebates in the country. For non-profits, they finance up to 40% of the organization's first 25 kW array. Holy Cross Energy funds their incentive programs by requiring each member to pay 2% of their total energy charges towards the Holy Cross 'WeCare' energy conservation program. Their associated rebate structure is shown below.

• 6 kW	x	$750/kW	=	$4,500
• 12-6 kW	x	$500/kW	=	$3,000
• 12-15 kW	x	$200/kW	=	$600
Total available:				$8,100

Table 4[101]

Holy Cross residential electric rates are off-peak 7.29¢/kWh and on-peak 18.759¢/kWh, compared to a flat-rate of 10.66¢/kWh in Glenwood Springs. Holy Cross and Glenwood both reimburse customer energy production at a one to one ratio.

The Future of Electricity in Glenwood Springs

Since the 1800's, Glenwood Springs has been an energy leader. Through rebates, user friendly policy, and clean power purchases from MEAN, Glenwood seems to be moving towards a cleaner and more renewable energy future. The City, however, has yet to develop any municipal scale renewable generation of its own.

Though Glenwood has made significant strides to achieve a higher percentage of renewable energy in their electricity, the City has experienced various impediments to this process. MEAN's imposed fixed costs, as well as MEAN's 2% limit on local energy production make it more difficult for Glenwood to offer rebates or other financial clean-energy incentives, like those offered by Holy Cross Energy. Also, these restrictions may stall local energy projects the City may want to develop and operate.

100 See Glenwood Springs Solar Rebate Media Release 2018. Access at SDSG website: https://www.sdsg.org/mean-study

101 Holy Cross Energy. Renewable Energy Incentives. *Holy Cross Energy*. Retrieved from https://www.holycross.com/renewable-energy-incentives/

While communicating with city staff and elected officials, we began a dialogue with the City Council. **The following are drafted questions submitted by Council Member Shelley Kaup:**

- *What are the renewable energy resources available for purchase by MEAN wholesale customers?*
- *What additional resources are planned, and could be offered to MEAN's Municipal customers to help meet their goals?*
- *Does MEAN have a goal for 100% Renewable Energy?*
- *Are Municipal Utilities allowed to consider the use of Battery storage on their system to either store renewable energy or reduce peak load?*
- *Does MEAN have any future plans for battery storage or integration of EVs into their power supply?*
- *What new technologies are being considered by MEAN to modernize its power services?*
- *Does it have plans to help its customers modernize?*
- *Will services such as demand response, storage, EVs, renewable energy and customer choice be part of the plan?*

Engaged City Council members who ask important questions about these policies is something we found in several of the communities in this study, and we thank them for it.

Fig. 22[102] Celebration of the first solar electric system installed on a Glenwood Springs city government building. Source: CLEER

[102] Garfield Clean Energy Collaborative. Managed by CLEER: Clean Energy Economy for the Region. (November 19, 2010). *Grand Opening for the Glenwood Springs Community Center solar array.* Retrieved from http://www.garfieldcleanenergy.org/gov-solar-grand-opening-GlenwoodCC.html

Summary

In our experience with Glenwood Springs, we observed an enthusiasm to pursue cleaner sources of electricity. Electric cars and charging stations were relatively common and easily seen. The City has created an enabling environment for its customers to generate their own electricity by reimbursing customer produced energy at a 1:1 ratio and offering generous solar rebates.

Since Glenwood's contract is set to expire in 2023, the city is in a unique position among Colorado MEAN customers. It is clear that Glenwood intends to increase their reliance on renewables moving into the future. We hope that Glenwood Springs will make renewables a priority and at the same time find some common ground with MEAN. Without some flexibility on MEAN's part, it is hard to see this happening.

KEY GLENWOOD SPRINGS STATISTICS	
Population	~10,000
Median household income	$43,934
Number of meters	~6,100
Municipally-owned generation? Is it renewable?	None
Is the town participating in MEAN's wind program?	Yes
Residential electrical rate	10.6¢/kWh
Customer solar penetration as percentage of total meters	1.5%

Table 5

The City of Delta

History

The City of Delta serves as the county seat and most populous city in Delta County, with 8,720 residents according to the 2014 census. The county and city gained their name from the rich farmland formed by the delta created at the confluence of the Uncompahgre and Gunnison Rivers. The earliest western settlement in this area is Fort Uncompahgre, constructed to establish a fur trading post by Antoine Robidoux in 1828. The City of Delta was later established as a trading post for the Ute Tribes and early settlers and was incorporated on October 24, 1882. Delta is also home to the headquarters for the Grand Mesa, Gunnison, and Uncompahgre National Forests (GMUG).[103]

Fig. 13[104] Fort Uncompahgre. Source: Fort Uncompahgre Interpretive Center.

Demographics

The city has an area of 14 square miles with 3,530 households with a median household income of $39,040 in 2016. This is sharply below the Colorado median income of $65,685. The income level is closely comparable to the median income in Gunnison of $39,181.[105]

---

103 Wikipedia. (2018). Delta, Colorado. *Wikipedia*. Retrieved from https://en.wikipedia.org/w/index.php?title=Delta,_Colorado&oldid=854121957

104 Fort Uncompahgre Interpretive Center. *Colorado.com.* Retrieved from https://www.colorado.com/history-museums/fort-uncompahgre-interpretive-center. Permission given by Kris Miller for photo use, 970-640-7076.

105 City of Delta. Delta, Colorado profile. *City of Delta.* Retrieved from http://www.city-data.com/city/Delta-Colorado.html

Electricity
Delta is currently under a Service Schedule-M contract with MEAN. Delta does not accept power purchase agreements (PPAs) with their customer generators, and is one of few municipalities that still has such a policy after MEAN abandoned it in 2018.[106] The current residential rate for the City of Delta is 10¢/kWh with a monthly base charge of $20.00/month.

Delta Net-Metering
The city implemented a standard monthly rollover for excess energy production by end-user generators that ends each year in March. The excess power generated by a solar customer is credited against electrical purchases at a 1:1 rate. At the end of the metering period in March, any remaining balance is paid to the customer at an Avoided Cost Rate that is voted on every year by the city council (4.6 cents in 2017). There is only one associated fee for installing an end-user power generating system, but it is very significant. The Network Distribution Charge is a monthly peak demand charge of installed capacity ($2.79 per kW). This fee is unique among the Colorado municipalities served by MEAN, and appears to be Delta's mechanism for recovering the addition of the system to the city's FCRC. This fee poses a significant barrier for customer generators to economically justify the use of solar.

There is no associated application fee for a solar system, and the city pays for and provides the meter. As of December 2018, out of a total of 3,384 meters on its system, there are 4 businesses and 9 residents that utilize net-metered solar systems.[107]

City of Delta Rate Schedule

Service Size/Type	Monthly Base Charge	Consumption Charge	Monthly Demand Charge
Residential	$20.00	$0.1000/kWh	N/A
Single Phase Commercial	$25.00	$0.0989/kWh	N/A
Three Phase Commercial	$40.00	$0.0989/kWh	
Industrial	$140.00	$0.0700/kWh	$9.00 x cust. monthly kW demand
Net Metering Avoided Rate Credit	N/A	$0.0460/kWh	N/A
Net Metering Dist. Network Charge	N/A	$2.79 x month/y peak A/C production rate of renewable generation	N/A

Table 6[108] Delta Rate Schedule Sourcw: A. Suppes, personal correspondence, December 5, 2018

106 A. Suppes, personal correspondence, December 5, 2018
107 See A. Suppes, personal correspondence. Note 106 above.
108 See A. Suppes, personal correspondence. Note 106 above.

Delta-Montrose Electric Association (DMEA)
Delta-Montrose Electric Association is a member owned and locally controlled rural electric cooperative based in Montrose, CO. Their energy provider is Tri-State Generation and Transmission Association. Since DMEA serves the area around the City of Delta, we use it for comparative purposes.

DMEA's current residential rate is 10.45¢/kWh.[109] According to Jim Heneghan, DMEA's Renewable Energy Engineer, they service approximately 33,000 customers, 470 of which are customer generators.[110]

The net metering policy for DMEA dictates that they reimburse their customer generators at a 1:1 ratio. At the end of the year the annual excess is reimbursed based on the Public Utilities Regulatory Policies Act (PURPA) avoided cost of 4¢/kWh (determined yearly).[111] The only associated fee for establishing a customer generation system is the cost of the state electrical permit. There is no application fee and there is no fee for the meter.

Comparison
In comparison, both the Delta Municipality and DMEA reimburse at a 1:1 ratio for energy produced and consumed. The pair have a similar annual reimbursement for excess energy production. The avoided cost rate for Delta Municipal Utility is determined at the end of each year in March, and was 4.6¢/kWh in 2017, while DMEA bases their annual excess reimbursement on a PURPA avoided cost rate that was 4¢/kWh in 2017.

Neither of the entities accepts power purchase agreements from their customers.[112] DMEA has a monthly base fee of $27.50, and Delta Municipality has a monthly base fee of $20.00 for residential customers.[113]

Tri-State limits DMEA to a 5% cap for any local generation, and MEAN limits local generation to a 2% cap in Delta. Delta does charge a distribution network charge for monthly peak demand of installed capacity at $2.79/kW, which seems to pose a significant barrier to would-be end-user generators.[114] This unique fee is the largest difference between the two utilities. Neither has an application fee for a private solar system. Both DMEA and Delta Municipality pay for the required meter. Overall, Delta Municipal Utility and DMEA are, with the exception of the City's unique "distribution network charge," mostly comparable.

---

109 Delta-Montrose Electric Association. Net Metering. *DMEA.* Retrieved from http://www.dmea.com/content/net-metering
110J. Heneghan, personal correspondence, December 6, 2018
111 See Net Metering. Note 109 above.
112 See A. Suppes, personal correspondence. Note 106 above.
113 See Net Metering. Note 109 above.
114 See A.Suppes, personal correspondence. Note 106 above.

Summary
Though Delta is experiencing a solar penetration rate of only 0.36% of customers, 4 of their 13 customer-owned solar accounts were added in 2018.

As communities move forward in their adoption of renewables, it is important that customers at all income levels are treated fairly in the process. Delta city officials are concerned that non-solar customers, especially low income customers, will be subsidizing solar customers.
Net metering at a one to one ratio has, in one recent study, an extremely small impact on retail rates paid by non-solar customers.[115] Reassuring Delta, and some of the other towns on this issue, is quite important to encouraging them to back local solar more aggressively.

We believe Delta should reevaluate its unique current peak-demand charge for solar customers. This charge will greatly impact the introduction of local solar. And it is not at all clear to us that it is justified.

KEY DELTA STATISTICS	
Population	8,720
Median household income	$39,040
Number of meters	~2,500
Municipally-owned generation? Is it renewable?	No
Is the town participating in MEAN's wind program?	Yes, 10.1% of Town's load is provided by MEAN's wind resources.
Residential electrical rate	10¢/kWh
Customer solar penetration as percentage of total meters	0.36%

Table 7

115 Barbose, G. Putting the Potential Rate Impacts of Distributed Solar into Context. *Berkeley Lab*. Retrieved from https://emp.lbl.gov/sites/all/files/lbnl-1007060-es.pdf

The City of Gunnison

History

The Gunnison Country had occasional visitors from the Spanish settlements further south along the Rio Grande, but no permanent settlements until the late 1800s. Fur trappers and mountain men entered the area in the early part of the 19th century, but did not stay long, because of a drop in fur prices. The Native American population of the Gunnison Valley was displaced and forced onto reservations in the 1870s as the result of discovery of rich mineral resources in the region and the desire of miners to exploit them.

In the late 1870's, Gunnison saw its population start to rise, mostly due to various mining booms and the discovery that this was a good region for ranching and raising cattle. The railroad arrived in 1880, allowing Gunnison to connect more effectively with the outside world. Mining and ranching were the principal activities in Gunnison for much of its early history, and ranching continues to be important to the local economy, along with tourism, recreation and education. The Colorado State Normal School (now Western Colorado University) was opened in 1911, and continues to be a vital part of the community. The construction of Blue Mesa Dam started in 1961 and concluded in 1971, and drastically altered the landscape west of Gunnison. This Bureau of Reclamation dam also served to supply a significant amount of electricity to the region.

Figure 24[116] The city of Gunnison. Source: GoTravelaz

116 Retrieved from: http://gotravelaz.com/gunnison/

Gunnison is known as one of the coldest places in the U.S during the winter.[117] The city sits at an altitude of 7,703 feet, has an area of 3.2 square miles, and holds a population of 5,854 people. There are a total of 2,645 housing units, and the median income for a household was $39,181, well below the national average of $59,039.[118] Cold temperatures, long winters, and a moderate average income make energy costs a prominent local issue.

Electricity

The City of Gunnison started its own electrical utility before most of the rural parts of Gunnison County electrified. As rural Gunnison County tried to electrify in the 1930s, 40s, and 50s, it developed an ambivalent relationship with the city. The city did ultimately allow some rural customers to hook up to its diesel fired generation system, but at rates that were widely viewed as unfair by rural customers. And when the surrounding areas tried to form a rural co-op and bring Bureau of Reclamation electricity over Monarch Pass, Gunnison was less than cooperative until some special benefits for the city were built into the deal.[119]

The City of Gunnison now serves 4,262 electric meters within city limits, which means the city does not fall under the state mandate to offer net metering at "non-discriminatory rates" to renewable energy owners, which applies only to municipalities serving more than 5,000 meters. Gunnison nevertheless does allow net-metering.

Gunnison Net-metering

There are twelve customer generators in the city, all rooftop solar systems. Nine of those twelve systems were grandfathered by MEAN in 2016, meaning they are not subject to MEAN's 2% cap on renewable generation and do not add to the municipality's Fixed Cost Recovery Charge (FCRC).

The capacity of the three systems that were installed after May of 2016, and any new systems yet to be installed, would be added to the city's monthly consumption for purposes of calculating the portion of the FCRC chargeable to the City of Gunnison. Thus, the more renewable systems that are built in Gunnison, the higher Gunnison's share of the FCRC will be.

The City of Gunnison is currently absorbing the extra charge added to the FCRC by individual systems, instead of passing it on to the customer. If solar became much more popular in the city, this policy might need to be re-evaluated. In total, the City of Gunnison paid $847,147.00 to MEAN for Fixed Cost Recovery Charges in 2017,[120] basically payments toward retiring MEAN's coal plant bond debt.

---

117 Colorado Encyclopedia. (2018). Gunnison County. *Colorado Encyclopedia.* Retrieved from https://coloradoencyclopedia.org/article/gunnison-county

118 Wikipedia. (2018). Gunnison, Colorado. *Wikipedia.* Retrieved from https://en.wikipedia.org/wiki/Gunnison,_Colorado

119 G. Sibley, SEVENTY YEARS OF POWER TO THE PEOPLE (2017).

120 MEAN Fixed Cost Recovery Charge. See FCRC Chart at https://www.sdsg.org/mean-study

The city of Gunnison's residential electric rate is about 8.4 cents (8.395¢/kWh)[121], along with a monthly flat rate charge of $8.75. The 8.4 cent rate is well below the national average of 12¢/kWh.[122] There are some associated administrative fees for commercial and net metered systems that are not charged to non-solar customers:

- $2.50/month fee for residential
- $5.00/month fee for commercial[123]

PPAs are allowed within the city to ensure that entities with no federal income tax liability (nonprofits or government entities) can partner with for-profit entities in an agreement where the tax credits can be utilized by the for-profit entity, while the electricity is consumed by the entity with no tax liability. While PPAs are permitted, our study did not indicate that there currently are any.

While not mandated by the state, the city allows both residential and commercial systems up to 25 kW to be interconnected with the city's grid. However, the net metering structure adds many years to the payback period for a solar installation, as the city pays end-user generators less than half the retail rate for any excess electricity they produce. Instead of crediting end-user generators at a one-to-one ratio, they credit any excess generation on a monthly basis at the wholesale rate from MEAN, which is 4.028¢/kWh. Even then, the city is having to absorb the difference between the 4.028¢, and the 2.55¢ that MEAN will pay for locally generated electricity.

Annual reconciliation of the customer's electrical purchases from the grid and the customer's sales to the grid is very helpful to solar customers where there is seasonality in production and consumption. Most of the municipal utilities in this study practice annual reconciliation.

If there is *monthly* reconciliation, the customer winds up buying a considerable amount of electricity from the utility in the winter, and selling a lot of low priced electricity to the utility in the summer.

As an example, a Gunnison solar customer who produced 1000 kWh (using large, round numbers for the sake of simplicity) of excess electricity in July would receive a credit of about $40.28. If the same customer buys 1000 kWh in the winter, it would cost the customer $83.95. With monthly reconciliation, the customer is out $43.67 compared to annual reconciliation, where that winter electricity cost would be cancelled out by the credits from July.

---

121 Gunnison Municipal Code. (2018). Utility Service Rates and Fees, Rules and Regulations. Retrieved from https://www.codepublishing.com/CO/Gunnison/#!/Gunnison12/Gunnison1240.html#12.40

122 Gunnison city officials indicate that this low rate may in part be a function of past deferred maintenance on the system, and that renovation of the system may require some increases in rates to finance improvements.

123 See Gunnison Municipal Code. Note 121 above.

Gunnison's monthly reconciliation policy presents an economic barrier to any potential solar customers. If Gunnison simply offset solar generated electricity on a 1:1 basis (as most other utilities do), with annual reconciliation, the economics of self-generated electricity would be far more attractive.

Gunnison County Electric Association

When compared to Gunnison County Electric Association (GCEA), which serves the area outside of the City of Gunnison, the distributed generation policies of MEAN and the City are less favorable to solar, as reflected in this graph.

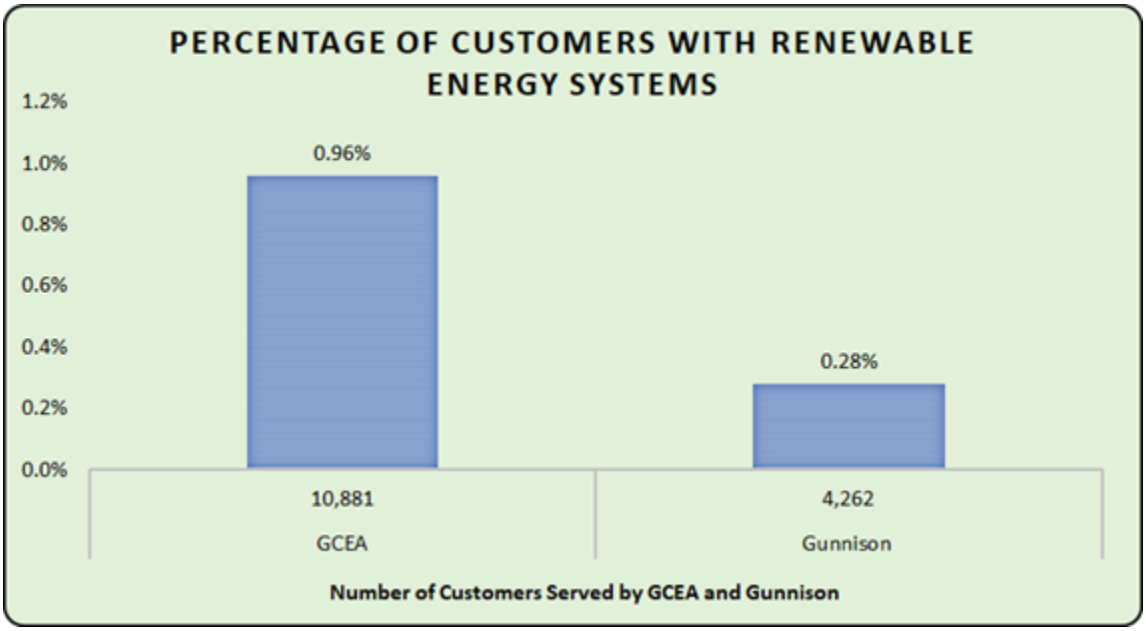


Fig. 25

GCEA reimburses end-user generators at a one-to-one ratio, with annual reconciliation, meaning they are credited one kWh of consumption for every kWh of excess generation. The balance simply rolls over from one month to the next, and is reconciled once a year. If we use the previous example with 1000 kWh of excess generation, and use GCEA's residential rate of 12.732¢/kWh, the value of that excess electricity would be $127.32.

GCEA does charge a one time, $250 net metering fee for administrative purposes. When compared to the city of Gunnison's $2.50/month residential fee for net metering, GCEA's fee is still less costly considering an average lifespan of a solar array of 25 years. 25 years at $2.50/month comes out to $750, three times the GCEA one-time fee.

Summary

Gunnison is seeing substantial interest from its residents in finding policies that will increase the penetration of customer-owned renewable energy systems. In response to this pressure, Gunnison has incorporated energy concerns in its new strategic planning process, it is in the process of establishing a formal interconnection policy, and is reevaluating the current net-metering policy.

In May of 2018, the City also conducted a cost of services study with MEAN, updated meters and efficiency rebates, and expressed support of a 1MW solar project proposed by Western Colorado University to offset the schools consumption.[124] Much like Fort Morgan's proposed waste-to-energy plant, the solar project was faced with impediments and has showed little progress since 2018.

Gunnison has other untapped potential that could be utilized, including geothermal sources, and community solar potential seeing that Gunnison sees sunshine on more than 300 days in a year.

KEY GUNNISON STATISTICS	
Population	5,854
Median household income	$39,181
Number of meters	4,262
Municipally-owned generation? Is it renewable?	None
Is the town participating in MEAN's wind program?	Yes
Residential electrical rate	8.395¢/kWh
Customer solar penetration as percentage of total meters	0.28%

Table 8

124 Gunnison City Council Agenda. May 8, 2018. Page 112.

The City of Aspen

History

The city of Aspen, Colorado has deep roots in mining, and a current resort economy. At one point in the late 1800's, Aspen was the largest silver producing district in the nation, in terms of annual silver production.[125] Aspen has been a consistent leader in renewable energy.

In 1885, Aspen was the first municipality west of the Mississippi to use hydroelectric power. In 1893, prior to the "Silver Panic" and rapid decline in silver production and the town's economy, Aspen reached a peak population between 10,000 and 16,000 residents,[126]compared to a 2017 population of 7,359 people.

Today, Aspen has recovered its economic prosperity and has become a leader in adopting renewable energy. In 2004 and 2005, Aspen created something called the Canary Initiative to take part in combating climate change. The City of Aspen, whose economy is heavily dependent on snow and winter recreation, will be directly impacted by changing climate conditions.

Aspen compares itself, and other mountain communities, to "canaries in the coal mine" as a metaphor for their sensitivity to rising temperatures, aridification, and ultimately shorter snow seasons. Rising global and regional temperatures will impact the ski industry, tourism, and Aspen's overall economy. Aspen has adopted a climate action plan. A novel element of this plan was for Aspen Municipal Electric Utility to rely 100% on renewable electricity by 2015.[127] Aspen had achieved about 75% renewable energy when they partnered with MEAN and arranged to receive power from MEAN's wind resources. Aspen met their renewable electricity goal in August of 2015.

Aspen has owned and operated the small Maroon Creek hydro project and the Ruedi hydroelectric project since the 1980's.[128] It is understood that the bonds associated with these projects are paid off, giving Aspen stable and affordable power.

Electricity

The Aspen municipal utility serves only a portion of the area within the Aspen city limits. It is a wholesale energy customer of MEAN, under a Total Requirements Power Purchase Agreement under which 100% of the utility's energy needs (beyond its WAPA allocation, and local generation that pre-existed the contract) is to come from MEAN.

---

125 Aspen Historical Society. The Mining Boom: 1879 – 1893. *Aspen Historical Society.* Retrieved from http://aspenhistory.org/aspen-history/the-mining-boom-1879-1893/

126See Aspen Historical Society. Note 125 above.

127City of Aspen. *Go100%RenewableEnergy.* Retrieved from go100percent.org

128 Robbie, E. (September 1, 2015). Aspen is third U.S. city to reach 100% renewable energy. *AspenTimes.com.* Retrieved from http://www.aspentimes.com/news/aspen-is-third-u-s-city-to-reach-100-renewable-energy/

In 2002 Aspen became a "Charter Subscriber" to the MEAN's Kimball Wind farm. In 2015 the City of Aspen contracted with MEAN for additional wind and landfill gas to complement the existing energy portfolio and achieve the 100% renewable energy portfolio.[129] An article by Alan Best posted on June 19, 2018 in the Mountain Town News states that Aspen's deal with MEAN "has been crucial to achieving the city's goal of 100 percent renewables."[130]

Another important step toward keeping Aspen at 100% renewable electricity is the repowering of MEAN's Nebraska wind farm. The old wind farm that was constructed in 2002 (the first one in Nebraska) is being replaced with new towers that are taller and have longer blades. The old towers were 230 feet tall, and the new ones are 295 feet, which allows the newer, longer, more efficient blades to capture more wind more consistently throughout the year. The improvements have increased the energy capacity for individual turbines from around 30 percent to between 40 and 50 percent, which reduce backup costs from other sources.[131]

Maroon Creek Hydroelectric

- Modest 0.45 MW capacity.

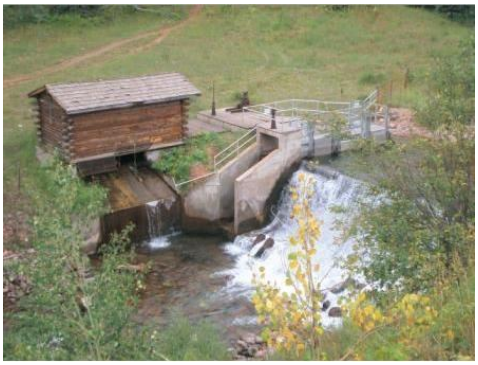
Ruedi Hydroelectric

- 5 MW of capacity.
- Aspen's energy purchases from MEAN are reduced by the load provided by Ruedi.

Ridgway Hydroelectric

- Aspen has a power purchase agreement for the non-summer output (October to May) from this 8 MW facility.
- Tri-County Water District owns and operates this facility.
- For resource planning purposes, MEAN includes Ridgway in its resource mix allocations in the capacity of 4.5 MW, and not the full 8 MW capacity.
- Aspen's contract with Tri-County water conservation district for Ridgway ends in 2034.[132]

129 Hornbacher, D. Personal correspondence.
130 Best, A. (June 19, 2018). Aspen's renewable bet pays off. Aspen Electric's 100% renewables just keeps looking better and better. *Mountain Town News.* Retrieved from: http://mountaintownnews.net/2018/06/19/aspens-renewable-bet-l6095/.
131 See Aspen's renewable bet pays off. Note 130 above.
132 2017 MEAN Integrated Resource Plan. (2017). Page 89.



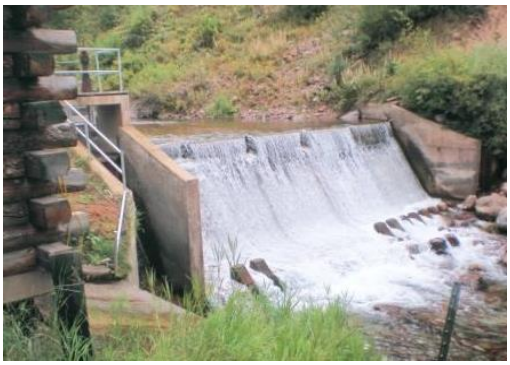


Fig. 26 and 27[133] Perspective of the 0.5 MW Maroon Creek Hydroelectric.
Source: City of Aspen

It should be noted that although Aspen owns significant renewable generation sources and purchases enough renewable energy to be 100% offset, that doesn't necessarily mean it is always consuming strictly renewable energy.[134] On a calm day when MEAN's wind resources aren't producing enough energy for Aspen to meet its demand, Aspen would consume non-renewable energy to fill the gap. Unless Aspen developed very extensive storage capabilities, this is a reality that they can do little about.

Aspen Net-Metering

Within the city of Aspen, there are 35 end-user generation systems (grandfathered systems as well as systems installed after 2016). They are all solar arrays amounting to about 269 kW of capacity.[135]

The customer must comply with Aspen's Interconnection Agreement,[136] which outlines that the customer is responsible for all costs that may be incurred by the City from the implementation of the system on a monthly basis.[137] The System Interconnection Agreement also states that PPA's between the customer and a third-party are not allowed.[138] It is not clear why Aspen takes this position.

Rebates

Rebates are available at $0.75 per installed watt up to $2,250 per customer account or $5,000 in total for PV rebates combined with efficiency rebates.[139]Aspen is one of only two

133 City of Aspen. Home. *Aspen, CO Official Website.* Retrieved from http://www.cityofaspen.com/Search?searchPhrase=maroon%20creek%20hydroelectric
134 NREL. Reaching 100% Renewable Energy. *National Renewable Energy Laboratory.* Retrieved from https://www.nrel.gov/docs/fy15osti/62490.pdf
135 Aspen Distributed Generation. Access at SDSG website: https://www.sdsg.org/mean-study
136 Aspen Interconnection Agreement. Access at SDSG website: https://www.sdsg.org/mean-study
137 The City of Aspen Utilities, Small Generation System Interconnection Agreement, terms and conditions
138 See Aspen Interconnection Agreement. Note 136 above.
139 City of Aspen. Residential Rebate Information. *Aspen, CO Official Website*. Retrieved from cityofaspen.com

municipalities among MEAN's Colorado members that offer their customers solar rebates, again showing their commitment to renewable energy.

Summary

While most other communities are just now accelerating in renewable energy adoption, the city of Aspen has been working at it for years--which ultimately allowed them to function within MEAN in the unique framework that they do.

It is not clear whether other MEAN members can follow this same path. Part of Aspen's success is because the city acted very early and consistently towards a renewable energy goal. Aspen owned some its own renewable projects before it joined MEAN, such as the hydroelectric projects mentioned above.

It is true that not every electron that Aspen consumes at any time of day or night is a "green electron." On the other hand, if this is a criticism, it is more of a criticism of the grid than a criticism of Aspen.

We hope Aspen will not be content with its own success, but will be a leader in encouraging MEAN to reduce the carbon portion of its energy portfolio. Encouraging growth of renewables at all levels of the MEAN system is consistent with Aspen's expressed intentions to protect vulnerable towns and economies. Protecting the western Colorado winter recreation economy from climate change is going to require more than greening Aspen's electrical supply.

KEY ASPEN STATISTICS	
Population	7,359
Median household income	$53,750
Number of meters	3,100
Municipally-owned generation? Is it renewable?	Yes, they own and operate both the Maroon Creek hydroelectric and Ruedi hydroelectric dams, as well as setting up a PPA for output of the Ridgway hydroelectric dam.
Is the town participating in MEAN's wind program?	Yes, provides 53% of the town's demand
Residential electrical rate	Aspen has a complex rate structure, but the average residential rate is 9.56¢/kWh
Customer solar penetration as percentage of total meters	1.13%

Table 9

The City of Wray

Wray is a Colorado plains community located about 17 miles from the Colorado-Nebraska state line. It was founded in 1882 and currently has around 2,400 residents.

Eastern Colorado is an excellent location to harness wind energy. The City of Wray has strategically used its open-range advantage to encourage a local wind project described below.

Wray's Wind Project

The Wray school district successfully installed a 900 kW wind turbine in 2008. The turbine generates additional revenue for the school and is said to enhance the district's educational mission.[140]

Before the project, the Wray High School had an energy bill of up to $80,000 per year. This, coupled with a decrease in student enrollment, required the district to dismiss 21 staff members.[141] For any rural community, this has a negative impact on local quality of life.

In response to the situation, Jay Clapper--an agriculture education instructor-- proposed the school invest in a wind turbine to offset the district's electricity bill. This idea was not met with universal support--there were various misunderstandings and considerable debate over the project. In part, this created complications securing the necessary funding to install the district's turbine. Regardless, the project was completed in 2008.

In a 2010 radio interview, Mr. Clapper stated that the completed wind turbine generates $180,000 per year for the school with an annual energy production of over 2,000,000 kWh.[142] The turbine's generation exceeds the school's needs, and supplies energy to about 200 homes in Wray.[143]

The Wray wind project is an educational, financial, and local resiliency asset. Although the project initially was met with skepticism, the community now generally stands behind the project.

---

140 NativeEnergy. Wray School District Wind Turbine. *Native Energy.* Retrieved from http://nativeenergy.com/project/wray-school-district-wind-turbinehb/

141 See NativeEnergy. Note 140 above

142 Colorado Public Radio. (April, 2010). Wray Wind Farm. *CPR.* Retrieved from http://www.cpr.org/news/story/wray-wind-farm

143 See NativeEnergy. Note 140 above.

Fig. 28[144] Wray wind turbine. Source: Native Energy, a Public Benefit Corporation

A portion of project funding was sourced from local donations to an Energy Impact Grant. This accounted for $350,000 of funding, yet left the project with a 14% funding deficit, which was filled by a commitment with NativeEnergy.[145] NativeEnergy, a public benefit corporation, agreed to buy Renewable Energy Credits (RECS) from the Wray project on an upfront basis. This offered enough financial capital to complete the project.

Wray & MEAN

In July of 2018, Wray signed a Service Schedule Class J power participant contract with MEAN which is effective until June 30th of 2023.[146] Aside from the energy produced by the wind turbine, and the energy sourced from their federal WAPA allocation, Wray is obligated to receive their supplemental firm-power from MEAN.

As a service power participant, Wray's local generation may be interconnected in the MEAN system in order to provide pooling or energy assistance to MEAN or MEAN participants. However, Wray maintains full control and responsibility over its community generation assets. Therefore, if MEAN requests Wray to provide energy assistance, the city of Wray has the sole judgement on whether this request can or will be fulfilled based on the status of their facility and other energy obligations.[147]

144 See NativeEnergy. Note 140 above.

145 See NativeEnergy. Note 140 above

146 Supplemental Agreement for Firm Power Interchange between the Municipal Energy Agency of Nebraska and the City of Wray, Colorado. Access at SDSG website: https://www.sdsg.org/mean-study.

147 MEAN's Electrical Resource Pooling Agreement (ERPA). Access at SDSG website: https://www.sdsg.org/mean-study.

Summary
Like Aspen, Wray acted early and before entering into any agreement with MEAN. Their short-term agreement allows for more flexibility and freedom in local decision making in terms of energy.

Under Wray's contract, the City is currently paying MEAN about 5.5 cents per kWh. What it is not paying is a Fixed Cost Recovery Charge. It has no responsibility for MEAN's past debts, or the coal related bonds.

In general terms, Wray is not paying more than the Schedule M total requirements communities. It has the benefit of being able to leave the MEAN system if a better deal is available when its relatively short term contract expires.

Regardless, Wray stands as a formidable example of the potential that lies within every town within this study, no matter how small or rural.

KEY WRAY STATISTICS	
Population	2,400
Median household income	$29,052
Municipally-owned generation? Is it renewable?	Yes, part of the output from 900 kW wind turbine
Is the town participating in MEAN's wind program?	No
Residential electrical rate	10.97 cents/kWh

Table 10

Case-Study Conclusions

Each Colorado community served by MEAN is unique. Many communities are working to identify sources of local renewable generation which are best for them, given their circumstances and location. Meeting Colorado's renewable energy expectations can be supported by more projects such as the Wray wind project. Wray developed its project before it joined MEAN, as did Aspen with a significant portion of its renewable energy assets. It might have been harder to implement such projects after they joined the MEAN system.

Significant barriers to renewable energy amongst these communities include:

- MEAN's Moratorium policy;
- The 2% Cap on local generation in MEAN's Distributed Generation Policy;
- MEAN's policy of adding any local generation to demand calculation on which its Fixed Cost Recovery Charge is based

Also posing a significant economic barrier to local project development is the Avoided Cost Rate from MEAN. The cities and towns in this study should insist that MEAN justify its extremely low avoided cost rate of 2.5¢ for locally generated electricity, and disclose and justify its methodology for deriving that figure. This rate does not appear to be fair and equitable.

Raising the Avoided Cost Rate would open the door for more renewable energy to be generated in the communities in this study, either by the municipalities themselves, or by individual customers within them. This would move the MEAN served communities toward the state goal of 100% renewable energy. Without some help and flexibility from MEAN, it is hard to see much progress.

Community level energy policies also need to be reviewed. There are some things towns can do that may be very helpful, and on which they can act without the need for permission from MEAN.

- Towns can negotiate rates with power providers within their service territories. They are not bound by MEAN rate structures. The FERC has made this clear in the Delta Montrose Electric decision;[148]

- Cities such as Fort Morgan and Gunnison could reconcile accounts with net metering customers on an annual instead of monthly basis, or follow the policy that Glenwood Springs has adopted;

- Delta could review and revise its requirement for monthly capacity charges to solar system owners;

- It is not clear what Aspen or Lyons actually gain by prohibiting power purchase agreements, perhaps they can open the door to more renewable energy by abandoning this prohibition;

- Each of the municipal utilities in this group could and should set renewable energy goals for its system;

- Each municipal utility should try to develop some version of the solar garden concept to make renewable energy more available to low income residents;

- Every one of the municipal utilities can and should develop a project -- even if it is simply solar collectors on City Hall -- up to the 2% limit currently adopted by MEAN. Where the most economical scale for local generation is bigger, they should seek exemptions from MEAN for larger systems;

148 151 FERC ¶ 61,238, June 8, 2015.

- Town councils and City Managers need to know how their representatives on the MEAN board are voting, what issues are being considered, and what MEAN is planning. They should request frequent reports from their designated MEAN representative; and

- There are a variety of innovative rebate programs and other forms of incentives for local solar development. Towns should learn about what other towns are doing and emulate successful programs elsewhere.

As renewable energy, especially small-scale solar, becomes more widely used, these communities need to ensure they have proper policies in place. The use of nationwide best practices concerning net-metering and general small-scale solar policy could help residents and businesses utilize solar more effectively.

Power Purchase Agreements

As mentioned, something that may further support the use of renewables by communities are power purchase agreements (PPAs). A PPA is an agreement between an electricity generator and an electricity purchaser. This agreement allows the host customer to receive stable renewable electricity without the upfront cost of purchasing the photovoltaic system or having to deal with maintenance. In turn, the solar service provider gets financial benefits such as tax credits, accelerated depreciation, and the income generated by the sale of electricity to the host customer. [149]

There may be a variety of advantages to third party generation from renewable energy:

- On the small scale, there are nonprofits, government entities, or others that do not benefit from the federal renewable energy tax credits because they do not pay income tax. Therefore, acting as a 'host customer' within a PPA can be ideal. In many regions of the country, private companies that do have tax liability and therefore can take advantage of the tax credits,[150] may install a solar system on a church, a synagogue, a municipal library, or a town hall and take advantage of the tax credit and accelerated depreciation and provide the electrical energy to the building owner.
- There are also options for larger private power producers, who may be considered Qualifying Facilities (QFs) under the Public Utilities Regulatory Policy Act of 1978, ("PURPA").

To reiterate, MEAN did not allow PPA agreements among its members until last year. Communities now have full discretion to permit PPAs amongst their customers.

---

149 EPA. (2017). Solar Power Purchase Agreements. *Environmental Protection Agency.* Retrieved from https://www.epa.gov/greenpower/solar-power-purchase-agreements
150 Energy.gov. (2018). Renewable Electricity Production Tax Credit (PCT). *Energy.gov.* Retrieved from https://www.energy.gov/savings/renewable-electricity-production-tax-credit-ptc

SECTION III

CHECKS AND BALANCES: REGULATION OF THE MEAN ELECTRICAL SYSTEM

If a community were to pursue renewable sources, and issues arise that cannot be resolved with simple negotiation, they may see to the following entities to resolve disputes that may potentially arise with MEAN or others.

The State

Since the late 1990's and early 2000's, renewable energy standards have eased the nation into the current of renewable energy transition. Colorado was the first to adopt a voter-led renewable energy standard in 2004, and the state has increased the renewable energy requirement on three occasions since then.[151] These standards require utilities to move toward a higher percentage of renewables in their mix. Currently, each qualifying retail utility is required to generate (or cause to be generated) electricity from eligible energy resources in the following proportions for its retail sales for 2020 and thereafter:

- 30% for investor-owned utility
- 20% for electric cooperatives serving at least 100,000 meters
- 10% for electric cooperatives serving less than 100,000 meters and municipal utilities serving more than 40,000 meters.[152]

Fig. 29[153] Electricity sources that are eligible for Colorado's Renewable Energy Standard. Source: Energy.gov

151 Colorado Energy Office. (2019). Renewable Energy Standard. *Colorado Energy Office.* Retrieved from http://www.colorado.gov/pacific/energyoffice/renewable-energy-standard
152 Energy.gov. (2018). Renewable Energy Standard. *Energy.gov.* Retrieved from https://www.energy.gov/savings/renewable-energy-standard
153 See Colorado Renewable Energy Standard. Note 151 above.

A considerable impediment to renewable adoption in the communities in this study is that fact that The Colorado Renewable Portfolio Standard does not apply to them because they are municipalities that serve fewer than 40,000 meters.

We understand the limits of finances and technical capacity in the small towns in this study. On the other hand, we have all had more than a decade to get used to the idea of renewable portfolio standards in Colorado. Further, even if small towns may not be able to meet the standards for big co-ops or investor owned utilities, this does not mean that they are permanently incapable of doing anything. They need to start on this journey, and the law and regulations need to be changed to help them along the way.

MEAN itself might well not be considered a "qualifying wholesale utility" subject to the renewable portfolio standard since the Colorado Renewable Energy Standard Statute states:

> "Each generation and transmission cooperative electric association *that provides wholesale electric service directly to Colorado electric associations that are its members is a qualifying wholesale utility*." [154] (Emphasis added).

The statute continues,

> "Notwithstanding any other provision of law, each qualifying wholesale utility shall generate, or cause to be generated, at least twenty percent of the energy it provides to its Colorado members at wholesale from eligible energy resources in the year 2020 and thereafter."[155]

MEAN is however an agency of the state of Nebraska, and is not a "generation and transmission cooperative electrical association." MEAN is currently not filing reports under the Colorado Renewable Energy Standard.[156]

Something notable that has happened quite recently is the Colorado Public Utility Commission's decision that they have jurisdiction in the Tri-State vs. DMEA case discussed in Volume I.[157] While there will be deliberations on the merits of this case for some time, the simple fact that the PUC determined it had jurisdiction in this matter could have serious implications in the future for other Tri-State disputes with their member cooperatives, possibly, for MEAN and any disputes it might have with member communities.

---

154 Colorado Renewable Energy Standard Statute (CRS 40-2-124 (8)). Definition a. Retrieved from https://codes.findlaw.com/co/title-40-utilities/co-rev-st-sect-40-2-124.html
155 See Colorado Renewable Energy Standard Statute. Note 151 above. Definition b.
156 C. Dibbern. (December 12, 2018). Personal Communication.
157 Heidelberg, K. (February, 2019). PUC will hear DMEA's petition to leave Tri-State. *Montrose Press.* Retrieved from https://www.montrosepress.com/news/puc-will-hear-dmea-s-petition-to-leave-tri-state/article_cc0a9a38-30b3-11e9-90c0-dff02203a3e9.html

Although the law is not requiring small rural communities to comply with the Colorado Renewable Portfolio Standards, it doesn't mean it isn't in these communities' best interests to start looking toward that future. Certainly, communities like Wray, Fort Morgan, and Aspen have concluded it is in their interest to do so in their pursuit of local renewable energy projects. Existing laws and allowances may change sooner than later as Colorado's governor-elect has pledged to move toward 100% renewable energy by 2040.[158]

It is inconsistent with basic principles of good government to create and endow unaccountable entities, public or private. There need to be checks and balances that apply to all.

MEAN, being a Nebraska state entity, might not be considered a utility under Colorado law. It is clear that it is currently not being regulated by the Colorado PUC. The question of whether there is any basis on which it could be subject to Colorado PUC jurisdiction, or what kind of legal or regulatory changes would be necessary to subject it to PUC jurisdiction, are beyond the scope of this study.

One option might be for MEAN to be regulated in Nebraska. But Nebraska has no investor owned electric utilities, and the jurisdiction of the state Public Service Commission does not extend to regulating the terms and conditions of service or rate structures of electricity providers.[159] The apparent theory is that since the electric generators are publicly owned, they do not need regulation.

The Nebraska Power Review Board (NPRB) is another state agency with a relevant role. It was formed during the 1960's as the electric industry experienced rapid growth following WWII. This rapid growth resulted in numerous power disputes, and the Power Review Board was created to oversee such disputes among

> "public power districts, public power and irrigation districts, individual municipalities, registered groups of municipalities, electric membership associations, and cooperatives in furnishing electric energy to retail and wholesale customers."[160]

Their main regulatory responsibilities include:

> "approval of retail and wholesale service areas and any amendments thereto, construction or acquisition of transmission lines that are located outside a power supplier's service area, construction or acquisition of electric generation

158 Kohler, J. (Sep 18, 2018). Can Colorado get to 100 percent renewable energy? It's complicated, utilities say. *The Denver Post.* Retrieved from https://www.denverpost.com/2018/10/29/colorado-utilities-renewable-energy/
159 See https://psc.nebraska.gov/
160 Nebraska Power Review Board Orientation Manual. Page 1. Retrieved from https://powerreview.nebraska.gov/sites/powerreview.nebraska.gov/files/doc/PRB%20Orientation%20Manual%20%28website%29.pdf .

facilities, construction of microwave communication facilities, and approval of public power district charters and any amendments thereto."[161]

But it appears that the PRB's authority does not extend to setting of electrical rates, terms of service, renewable standards or the other central issues dealt with in this report.

Our work on this study leads us to conclude that MEAN does need to be regulated, and subject to some form of external checks and balances. Big government entities can and do make mistakes, and act in self-interested ways, and need some form of external oversight. The idea, for example, that publicly owned utilities, such as the Tennessee Valley Authority, can manage their own environmental impacts without oversight, because they are publicly owned, is laughable.

If MEAN is going to sell electrical energy in Colorado, we suggest that it is appropriate to seek the necessary statutory or regulatory changes to subject it to state regulation.

The Federal Energy Regulatory Commission (FERC)

FERC was created in 1977. It developed from an organization called the Federal Power Commission (FPC), which was formed in 1922 to manage American hydropower. In 1935 the Roosevelt Administration proposed the "Federal Power Act" to disassemble energy monopolies. The FPC was tasked to oversee wholesale electricity prices to ensure they are "just and reasonable."[162] FERC absorbed this responsibility when it replaced the FPC. FERC consists of five commissioners, including a chairman, as well as an extensive staff of over 1,400 people and an annual budget of $347 million in 2017.[163]

FERC's main responsibility is regulating rates and services for electric transmission and electric wholesale power sales, but it is also responsible for certification of Qualifying Facilities (see below), hydroelectric dam licensing and safety, rates and services for natural gas pipeline transportation, and rates and services for oil pipeline transportation.[164] FERC most often gets involved with regulation when dealing with public utility transmission in interstate commerce and sales for resale in interstate commerce.[165] Other more detailed regulatory issues are left to the states.

161Nebraska Power Review Board Orientation Manual. Retrieved from https://powerreview.nebraska.gov/sites/powerreview.nebraska.gov/files/doc/PRB%20Orientation%20Manual%20%28website%29.pdf

162 PBS. (2018). Regulation - What Is FERC? *Public Broadcasting Service.* Retrieved from http://www.pbs.org/wgbh/pages/frontline/shows/blackout/regulation/ferc.html

163 Greenfield, L. (May, 2017). An Overview of the Federal Energy Regulatory Commission and Federal Regulation of Public Utilities. *FERC.* Retrieved from https://www.ferc.gov/about/ferc-does/ferc101.pdf

164 See An Overview of the Federal Energy Regulatory Commission. Note 163 above.

165 See An Overview of the Federal Energy Regulatory Commission. Note 163 above.

In 2016 FERC decided a dispute between the rural cooperative Delta-Montrose Electric Association (DMEA), and the G&T Tri-State Electric Association. Under PURPA, described below, rural cooperatives are required to a buy a minimum amount of renewable energy from a qualified facility (QF). In 2016, when DMEA tried to fulfill this requirement, Tri-state attempted to penalize DMEA for making these QF purchases through an added fee. Tri-state justified the fee as a "lost revenue recovery fee". FERC ruled that this fee was unwarranted and did not allow the attempted penalty from Tri-State.[166]

We therefore suggest that, absent changes in state law in Nebraska or Colorado, FERC is the place to start looking for more effective oversight of MEAN and its decision making.

Public Utility Regulatory Policies Act of 1978 (PURPA)

PURPA is a statute designed by Congress to encourage co-generators and small renewable generators to produce energy.[167] The incentive to these generators is that the power they produce must be bought by utilities at Avoided Cost Rates.

The creation of PURPA boosted small renewable facilities and helped secure their success within the energy sector. These Qualified Facilities include small power production plants and "co-generation facilities."

- The small generation power-plants are categorized as facilities with a generation capability of under 80 MW (with some exceptions prior to 1995), with the dominant source of their power-production retrieved from hydro, wind, solar, biomass, waste, or geothermal sources. Fort Morgan's proposed waste-to-energy plant would likely be considered a small power-production facility.

- Qualifying co-generation facilities are not subject to size limitations. These plants are defined as a generation facility that produces electricity *and also* formulates thermal energy, which offers high production efficiency at one site. E.g. simultaneously produced heat, steam, or hot water can be repurposed for functions on the industrial or residential level.[168]

166 Kaften, C. (June 29, 2016). FERC Rules Against Tri-State Fee on Local Renewable Power. *Energy Manager Today.* Retrieved from http://www.energymanagertoday.com/ferc-rules-that-tri-state-fee-on-local-renewable-power-violates-purpa-0125235/

167 See An Overview of the Federal Energy Regulatory Commission. Note 163 above.

168 See An Overview of the Federal Energy Regulatory Commission. Note 163 above.

Closing Discussion

While we have presented this information as important background, we reiterate that this small reconnaissance level study is not a study of the whole MEAN system. Its focus is only on how MEAN's plans and policies might impact the ability of municipalities, and their residents, to develop more renewable energy. It does seem that a study of renewable energy options in the MEAN system would be valuable, and we much hope it will be undertaken.

We hope that Volume II is helpful for those who would like extra context on this issue, and that it contributes to everyone's understanding of the MEAN system in Colorado. While our recommendations for the municipalities, for MEAN, and for the state of Colorado are the same from Volume I, we want to emphasize that this transition is coming, and is already largely underway. Having policies in place to try to stop that momentum will only make the process longer, more expensive, and more frustrating for everyone involved.

Kate Gienapp

Community members gathered Tuesday to speak with city leaders on the topic of renewable energy in Gunnison.

City residents push for more renewables

Fig. 30[169] Article by Kate Gienapp, February 14, 2019. Source: Gunnison Country Times

[169] See copy of Gunnison Country Times Article, *City residents push for more renewables.* Access at SDSG Website: https://www.sdsg.org/mean-study

List of Figures

Figure 1. Page 1: NMPP Headquarters

Figure 2: Page 3: Southwest Power Pool Energy Mix

Figure 3. Page 3: Total Generation by Fuel Type by MISO

Figure 4. Page 4: MISO Energy Mix

Figure 5. Page 4: MEAN Energy Mix

Figure 6. Page 5: Ames Hydroelectric Plant

Figure 7. Page 6: Delta Power Plant

Figure 8. Page 6: Historic Longmont Municipal Light and Power Plant

Figure 9. Page 6: Historic Longmont Imported Cheese Shop

Figure 10. Page 7: WAPA Service Areas

Figure 11. Page 8: Blue Mesa Reservoir

Figure 12. Page 9: Blue Mesa Reservoir

Figure 13. Page 13: Percentage of Customers with Renewable Energy Systems

Figure 14. Page 15: Lyons' Energy Supply Portfolio

Figure 15. Page 16: Renewables in Lyons' Load

Figure 16. Page 17: Town of Lyons Installed Solar Capacity

Figure 17. Page 21: Fort Morgan Photo

Figure 18. Page 23: Waste-to-Energy Plant model

Figure 19. Page 26: Glenwood Silver Coke Ovens

Figure 20. Page 27: Glenwood's First Hydroelectric Plant

Figure 21. Page 28: Kimball Wind Turbine

Figure 22. Page 32: First Solar Electric on a Glenwood Government Building

Figure 23. Page 34: Fort Uncompahgre

Figure 24. Page 38. The city of Gunnison

Figure 25. Page 41. GCEA and Gunnison Customers with Renewable Energy Systems

Figure 26 & 27. Page 45: Perspectives of the Maroon Creek Hydroelectric

Figure 28. Page 48: Wray Wind Turbine

Figure 29. Page 52: Energy Sources Eligible for Colorado RES

Figure 30. Page 57: Gunnison City Council Meeting. February 14, 2019

List of Tables

Table 1. Page 17: Town of Lyons Installed Solar Capacity

Table 2. Page 20: Key Lyons Statistics

Table 3. Page 25: Key Fort Morgan Statistics

Table 4. Page 31: Holy Cross Energy Rebates

Table 5. Page 33: Key Glenwood Springs Statistics

Table 6. Page 35: Delta Rate Schedule

Table 7. Page 37: Key Delta Statistics

Table 8. Page 42: Key Gunnison Statistics

Table 9. Page 46: Key Aspen Statistics

Table 10. Page 49: Key Wray Statistics

116 N. Taylor Street

Gunnison, CO. 81230