Over the past 10 years, La Plata Electric Association has been observing, studying and adopting, when appropriate and of benefit to members, renewable energy programs and policies. In recent years, the Board of Directors determined the need to look at the “big picture” and be more proactive in exploring and adopting alternative energy options. Thus in 2012, the board asked LPEA staff to begin the process of researching and developing a long-term plan. After many months of research and study, a preliminary draft of a Long-term Alternative Energy Outlook (AEO) has been created. This is currently a living document, subject to change and revision. The information enclosed here is an encapsulated version of the full document.

Beyond the general understanding that embracing more renewable energy production will lessen the dependency on fossil fuels, LPEA also sees a benefit to increasing local generation, or “distributed generation.” Distributed generation is typically understood as electricity generated at or near where it is used, as opposed to “centralized generation,” where large facilities generate power that is then distributed out to remote users.

Distributed generation is believed to be more sustainable, efficient and of greater benefit to a community – especially a service territory such as LPEA’s that is remote and potentially isolated from industrialized, large commercial hubs. The region has long been known for its independent residents, and the founding fathers and mothers have established the heritage of self-sustainability.

Around the time of Durango’s founding, and LPEA’s creation a few decades later, the region was powered completely by locally generated electricity. With the current exploration of adding more distributed generation, the focus has in essence come full circle. The difference will be an emphasis on renewable sources of electricity generation.

The region possesses numerous possibilities – some which are already in place such as hydroelectric generation facilities at Tacoma Hydroelectric Generation Station on the Animas River, and Vallecito and Lemon reservoirs – plus an increase in small solar, wind, bio-fuels and geothermal.

Distributed generation reduces the need to bring in electricity from outside the area and it provides a more efficient usage of the commodity. This also helps to free up capacity of existing power plants and may help defer the construction of new, very expensive power generation facilities.

Locally-produced alternative energy also reduces system line losses (electricity lost in transit), which translates to a reduction in the amount of generation that is needed, the associated costs of producing that electricity, and the amount of fuel that is needed, plus it makes for a more efficient operation.

Renewable energy that is produced locally may also assist Tri-State Generation and Transmission (LPEA’s major, centralized power supplier) in meeting Renewable Energy / Portfolio Standards that are mandated...
by the State of Colorado. In 2008 through 2012 Tri-State was able to utilize the environmental attributes associated with power produced in La Plata and Archuleta Counties in this manner.

LPEA and Tri-State’s service agreement allows LPEA to have its “own” generation of up to 5 percent energy [kWh] and 10 percent capacity [kW] according to the Wholesale Power Contract. As of 2012, LPEA purchased generation equal to approximately 4 percent of its own power from local sources. LPEA is open to negotiating Power Purchase Agreements with additional local renewable energy project developers for the remaining 1 percent. LPEA is also in discussions with Tri-State to foster the ability to increase the 5 percent and 10 percent limits. LPEA's Board and staff have discussed the possibility of exploring options related to the 5% issue.

At the dawn of 2013, approximately 18,164 kW of distributed renewable generation was installed and operating in LPEA's service territory (this includes the aforementioned, plus generation sold to other distributors). The associated annual generation was equivalent to approximately 8 percent of LPEA’s 2012 electric energy purchases. By the end of 2013, the projected capacity of renewable generation will be 18,627 kW.

The central goal of the Long-term Alternative Energy Outlook is to chart a course and monitor the progress to achieving, by 2020, an amount equal to 20 percent of LPEA's electric energy purchases to have been generated locally by alternative means. The LPEA Board of Directors welcomes comment from the members on the information that follows.
La Plata Electric Association, Inc. (LPEA) has developed this Long-term Alternative Energy Outlook [the “Outlook”] for the Board of Directors, staff and membership to achieve the goal to have 20 percent of the electrical energy produced locally by 2020, while ensuring electric reliability and member safety are not compromised.

The purpose of the Outlook is to increase the amount of renewable electrical energy that is locally produced. Accomplishing this would be consistent with LPEA’s Mission, being environmentally responsible, in concert with LPEA Board of Director goals and in agreement with LPEA Policies. Currently, more than 95 percent of LPEA’s electrical energy is provided by Tri-State Generation and Transmission, Inc. (TSGT). Supporting and encouraging additional local renewable generation may provide some relief from future TSGT rate hikes and, eventually, place LPEA in a position where there is less reliance on one source of generation.

Surveys have indicated that many LPEA members desire to have a larger percentage of the electric power provided by local renewable energy. There is also considerable support in the communities that LPEA serves for additional local renewable energy projects.

One of the important goals of supporting and promoting local projects is the positive economic impact to a variety of local businesses, companies and contractors. With a commitment to the LPEA mission statement, LPEA should be diligent and assure, to the best of its ability, that all current and future local distributed generation projects do not have detrimental financial or other consequences to the members of the association.

Lastly, LPEA members appreciate having choices. The Outlook will provide options for the membership to decide how and where some of their electricity is produced.
The goal of achieving 20 percent of electrical energy produced locally by 2020 is a target set by the LPEA board and will include all alternative electricity that is generated in LPEA's service territory. This will include generation that is “behind the meter” (i.e. on-site solar panels) as well as independent power producers that are connected to the electrical grid. Currently approximately 8 percent of energy consumed by LPEA members is produced locally.

Various options and alternatives are being reviewed to set up these renewable energy projects. Some generators will sell their power and energy to a utility (perhaps LPEA) and others will be set up to reduce, or offset, the amount of electricity purchased from LPEA at the location where the power is produced.

Xcel Energy is involved with locally produced electricity, currently operating and maintaining the Tacoma Hydro Generating Station built along the Animas River between Durango and Silverton.

Tri-State Generation and Transmission Association, Inc. [Tri-State] is a key player in reaching the goal of having the equivalent of 20 percent of LPEA member’s electric needs coming from local sources. Tri-State has in place policies and programs that assist and encourage local installers with their projects, and the company is currently purchasing the power attributes of the Vallecito hydro facility.

LPEA’s board and staff are currently reviewing and working on an Alternative Energy Plan for 2013 – 2020. The following list of renewable generation projects represent ideas and possibilities that have come up, but in no way are any of these guaranteed:

**In 2014**
- 1,300 kW Community Solar PV Projects – locations TBA

**In 2015**
- 65 kW Methane Capture City of Durango – location Durango
- 1,200 kW Community Solar PV Projects – locations TBA
- 6,000 kW Wood Biomass – location Pagosa Springs

**In 2016**
- 3,000 kW Solar PV on DOE land by developer – location Durango
- 1,000 kW Community Solar PV Projects – locations TBA

**In 2017**
- 2,000 kW Community Solar PV Projects – locations TBA
- 2,800 kW Waste Heat Recovery by private entity – location Ignacio

**In 2018**
- 2,000 kW Community Solar PV Projects – locations TBA
- 2,000 kW Renewable Generation by private developer – location TBA

**In 2019**
- 9,500 kW Community Solar PV Projects – locations TBA
- 3,500 kW Hydroelectric at Tacoma – location Tacoma

**In 2020**
- 2,000 kW Community Solar PV Projects – locations TBA
- 500 kW Hydroelectric by private entity – location Durango
- 500 kW Micro and Small Hydro – location TBA
- 500 kW Wind Power by developer – location TBA
- 3,000 kW Solar PV partner with Tri-State – location TBA
- 5,000 kW Geothermal Heat Capture – location Pagosa Springs
Within LPEA’s service area, many local renewable generation facilities are interconnected through LPEA’s distribution and transmission system and are producing energy that is directly utilized by our members on a daily basis. Each renewable generating facility is uniquely designed for tapping into a specific energy resource. Existing and future renewable generation facilities in LPEA’s service area include hydroelectric, waste heat recovery [recycled energy], wind, solar photovoltaic [PV], methane capture, biomass, geothermal, and community solar gardens. Each renewable generation facility that currently exists or has been proposed to LPEA, is identified below. More projects will be added as LPEA receives additional proposals. A brief overview of each facility/project (as they are known today) follows.

Local Renewable Generation Facilities – Existing and (Potential) Future

Local Distributed Generation Solar – Existing

LPEA has offered interconnection and net metering to members since 2003 through LPEA's Net Metering Tariff nM14. Renewable generation systems installed on site and behind the meter are identified as Local Distributed Generation. Most of these renewable generation systems are solar photovoltaic [PV]. In 2012, the local energy generation from net metered systems was estimated to total 2,963 MWh, which reduced LPEA’s total energy purchase about 0.28 percent.

It is anticipated that net metered solar photovoltaic installations in the LPEA service territory will continue to increase in the upcoming years. Although it is unclear how Federal and State law and tax changes, industry changes, and LPEA programs and policies will affect the number and size of the installs, collectively they could provide sufficient incentive for additional LPEA members to choose to install on-site solar PV generation.

2020 Projected Annual Energy Production:
- 2012 – 2,963,000 kWh
- 2020 – 17,184,000 kWh

Methane Capture – Existing

The City of Durango Wastewater Treatment Plant, located at 105 South Camino del Rio, installed a 65 kW capacity Digester Gas Burning Micro Turbine in 2009. This methane capture cogeneration system is net metered and interconnected to LPEA's grid through the Bodo Park substation. Annual energy generation for this Methane Capture plant averages about 350,000 kWh. The renewable generation offsets about 19 percent of the annual energy usage at this location. According to the City of Durango, this facility may add another 65 kW capacity methane capture generator in the next few years.

A 30 kW capacity capstone micro turbine [unrelated to the aforementioned] is also installed in the Pine River Valley and interconnected to LPEA's system. This “demonstration” system became operational in April 2009. Although the turbine is rated to 30 kW, normal system operation utilizes approximately 6 kW of electrical power, allowing the remaining energy to be sent into the local electrical grid. Annual “excess” energy generation for this methane capture facility averages about 36,300 kWh.

2020 Projected Annual Energy Production
- 2012 – 377,000 kWh
- 2020 – 735,000 kWh
Lemon Hydroelectric – Existing
Lemon Hydroelectric system, a 120 kW capacity facility, is located at Lemon Reservoir. This system is connected to LPEA’s distribution grid and electricity generated is purchased by LPEA through a PPA. Annual generation averages about 490,000 kWh.

2020 Projected Annual Energy Production
• 2012 – 494,000 kWh
• 2020 – 490,000 kWh

Waste Heat Recovery – Existing
Electrical energy from an industrial plant by the airport between Durango and Ignacio is produced from turbine exhaust waste heat boilers, coupled with steam turbine generators. The facility has a capacity of 6,200 kW of renewable energy. Colorado House Bill 07-1281 expanded the definition of renewable energy eligible for meeting the state’s Renewable Portfolio Standard [RPS] to include “recycled energy,” [energy produced by a generation unit with a nameplate capacity of not more than 15 megawatts that converts the otherwise lost energy from the heat from exhaust stacks or pipes to electricity and that does not combust additional fossil fuel]. Annual energy generation for this Waste Heat Recovery facility averages about 47,000 MWh. LPEA has in place a PPA to purchase the electricity. This facility may add a 2,800 kW capacity waste heat recovery generator in the next few years.

2020 Projected Annual Energy Production
• 2012 – 44,901,000 kWh
• 2020 – 72,000,000 kWh

Solar on Schools – Existing
Since 2008, LPEA has been active in supporting “Solar on the Schools” utilizing voluntary funds collected from LPEA members through Rate Tariff RL19, “Local Renewables” [the voluntary “Green Power” program]. LPEA Board of Directors Policy 361 directs LPEA staff to organize and fund installations of local renewable generation projects including board approved solar PV systems on middle schools within the cooperative’s service territory. The following schools have LPEA sponsored solar PV installations:

• Bayfield Middle School - June 2008
• Escalante Middle School - August 2009
• Pagosa Springs Middle School - November 2012
• Miller Middle School - November 2012
• Ignacio Elementary School - 2014

The combined, total annual energy generation for the four systems averages about 6,000 kWh and offsets some of the electric usage at the schools. The total aggregated generation output for the Solar on Schools program, with the installation of additional PV systems, is expected to increase during the coming years and when possible monetize tax credits.

2020 Projected Annual Energy Production
• 2012 – 6,000 kWh
• 2020 – 80,000 kWh
Vallecito Hydroelectric – Existing

Vallecito Hydroelectric system began producing power in July 1989 and is a 5,800 kW capacity facility connected to LPEA's 69 kV transmission system. Annual energy generation averages about 20,000 MWh, power which is purchased directly by Tri-State. No significant changes are planned that will affect the generation output of the facility.

2020 Projected Annual Energy Production
- 2012 – 20,000,000 kWh
- 2020 – 20,000,000 kWh

Tacoma Hydroelectric – Existing

Tacoma hydroelectric system, located on the Animas River between Durango and Silverton, is owned by Xcel Energy / Public Service Company and began producing power more than a century ago. It is a 8,000 kW capacity facility connected to the LPEA 46 kV transmission system. Annual energy generation for Tacoma Hydro averages about 16,000 MWh.

2020 Projected Annual Energy Production*
- 2012 – 16,850,000 kWh
- 2020 – 30,000,000 kWh

*The numbers above are projected for each year. Although it has not been confirmed, the aforementioned 2020 projection is contingent on the turbine in the 3.5 MW generator (which became non-functional in 2005) being replaced in the next few years.

Community Solar Projects – Under Consideration/Future Generation

Community Solar Projects program references solar electric generation facilities where the beneficial use of the electricity generated belongs to the facilities’ subscribers. This would commonly mean a group of LPEA members who jointly participate in a grid connected PV system such that their share of the electrical energy generated by that facility is used to offset the electric energy use at their homes or businesses. Annual energy generation would average between 1,500 and 1,800 MWh per installed Megawatt of capacity.

LPEA is currently working to define a potential Community Solar Projects program that would be available to LPEA members. Based on interest from LPEA members as well as developers who are interested in community solar projects, there may be an increase equal to an additional 2,000 kW of solar PV in 2014. By 2019, that number could very well be equal to 2,500 kW.

2020 Projected Annual Energy Production
- 2012 – System not installed.
- 2020 – Combined generation 6,424,000 kWh
Department of Energy (DOE) Solar – Process Underway/Potential Future Generation

The potential DOE Durango Solar Project would be located at the Durango uranium disposal site above Ridges Basin on land owned by the U.S. Department of Energy (DOE) Office of Legacy Management. Potential exists for 3 to 10 MW of solar at this location. A 3 MW solar PV array at this location would be expected to produce an annual energy generation of ~4,800 MWh.

In August of 2012, the U.S. Department of Energy Office of Legacy Management awarded American Capital Energy the opportunity to lease and develop the Durango Solar Project at the Durango Disposal Site. The developer is determining if a PPA with LPEA, Tri-State or an outside entity is the best option to move this project forward.

2020 Projected Annual Energy Production
• 2012 – System not installed.
• 2020 – 4,818,000 kWh

Pagosa Springs Biomass – Development Underway/Future Generation

A 6 megawatt wood biomass generation project has been proposed by a private firm in Pagosa Springs. The completion of this project, planned in the next few years, would generate electricity from an internal combustion engine driven by synfuel derived from a wood gasifier, processing approximately 45,000 green tons of biomass annually. In June 2012, an award of a ten-year $4.5 million stewardship contract with the U.S. Forest Service was received to move this project forward.

No PPA with LPEA or Tri-State is currently in place. The most recent update received by LPEA is that this generation may come on line in 2015.

2020 Projected Annual Energy Production
• 2012 – System not installed.
• 2020 – 47,304,000 kWh

Pagosa Springs Geothermal – Studies Underway/Potential Future Generation

A private entity in Pagosa Springs has presented a strategic plan for a 3-12 megawatt Geothermal Power Plant at the Reservoir River Ranch and put together a proposal to further explore using the Pagosa Springs geothermal resource to generate local, sustainable power. The Geothermal Power Plant would generate electricity through Cascaded or Waste Heat of the Geothermal Aquifer in Pagosa Springs. Energy generation is to be determined.

2020 Projected Annual Energy Production
• 2012 – System not installed.
• 2020 – 39,420,000 kWh
Renewable Generation Projects – Process & Studies Underway/Potential Future Generation

LPEA is currently working with an alternative energy developer to develop an 800 kW Solar Project that would serve buildings owned by the developer’s parent company. The 800 kW solar PV array is expected to provide 1,285,000 kWh of solar power each year.

2020 Projected Annual Energy Production
• 2012 – System not installed.
• 2020 – 16,060,000 kWh

Discussions are also underway for additional renewable projects, with various resources, of approximately 2 MW by 2020.

2020 Projected Annual Energy Production
• 2012 – System not installed.
• 2020 – 16,644,000 kWh

Micro and Small Hydroelectric - Existing & Future

LPEA has discussed with several members their interest for installing micro hydro and small hydro systems in the irrigation ditches that flow through their property. Each system is engineered and designed for a specific location and dependent on the water source, i.e. high flow vs. high drop. In 2010, the Colorado Governor’s Energy Office worked with FERC to streamline the permitting process for micro and small hydroelectric projects.

LPEA anticipates that micro hydro and small hydro systems could be installed throughout LPEA’s service area in the future. LPEA has conducted several workshops on micro hydro systems. Based on feedback from the membership, it would be helpful to have a local installer or expert for micro hydro systems who could assist with the design and installation.

2020 Projected Annual Energy Production
• 2012 – 47,000 kWh
• 2020 – 2,190,000 kWh

Lake Nighthorse Hydroelectric – Future

A hydroelectric system could be located at Lake Nighthorse at the Ridges Basin dam site just west of the City of Durango. The potential size of the turbines that would produce electricity at this location is currently unknown, though a conservative number of 500 kW is used in this plan. The lake is filled with water pumped from the Animas River. According to the Bureau of Reclamation, the capacity of the lake is more than 120,000 acre-feet. Over the course of construction [2003-2009] representatives from the Bureau of Reclamation informed LPEA staff and board members that the site is “hydro ready.”

A 500 kW hydroelectric power plant at this location would be expected to produce an annual energy generation of ~2,190 MWh. The Bureau of Reclamation would determine if a PPA with LPEA, Tri-State or an outside entity is the best option to move this project forward.

2020 Projected Annual Energy Production
• 2012 – System not installed
• 2020 – 2,190,000 kWh
Financing

Each year the LPEA Board and staff will work to assure that funds and resources are available to meet the goals of the Alternative Energy Outlook. This will be accomplished through annual budget and forecasts, by partnerships and collaborations, and by applications for available grants and additional financial resource assistance.

- Budget Parameters
- Capital Items Expenditures
- Capital Projects
- Departmental Work Scopes
- Financial Forecasts
- Strategic Plan
- Rate Tariffs
- Funding Resources

Renewable Energy Credits (RECs) Environmental Attributes

Beginning in 2008 with Tri-State’s Policy 117 Member System Local Renewable Project Policy, LPEA has been able to purchase and utilize the environmental attributes associated with renewable power produced in La Plata and Archuleta Counties. Policy 117 defines the available REC payment funds from Tri-State to LPEA each year and is limited to ½ of 1% of LPEA retail revenues. In 2011 and 2012, with LPEA’s board approved resolution (2011-12), the ownership and inclusion of the environmental attributes from a local waste heat recovery generator allowed LPEA to receive the maximum funds available through Policy 117.

Wind Power - Existing & Future

To be determined.

Tri-State Local Project - Future

Tri-State has an established history of developing large-scale renewable energy projects throughout its service territory, such as the 51 MW Kit Carson Wind power project and the 30 MW Cimarron Solar facility. Given the availability of land and renewable resources within LPEA's service territory a potential large-scale generation facility could be built and owned by Tri-State and be put into production by 2020. Tri-State's resource mix for 2012 includes 15 percent from renewable energy sources.

Wind Power - Existing & Future

To be determined.

Tri-State Local Project - Future

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FREQUENTLY ASKED QUESTIONS

Why is LPEA not free to install as much renewable generation as it desires?
For many years LPEA and Tri-State have been parties to a long-term wholesale power purchase agreement, the most recent of which is dated July 1, 2007. In this agreement, LPEA, in essence, agrees to purchase no less than 95 percent of its electric service needs from Tri-State until December 31, 2050. This leaves only 5 percent that can be generated locally. Presently, local generation that applies to this “5 percent” totals about 4 percent, leaving minimal opportunities before this 5 percent ceiling is hit. LPEA’s board of directors has supported requesting that Tri-State amend the agreement to allow for a 10 percent cap.

Will the goal of 20 percent of electrical energy produced locally by 2020 violate any provisions of the Electric Wholesale Service Contract between LPEA and Tri-State?
Possibly, yes. However, the AEO sets forth the provision that electricity generated from ALL sources (including, for example, net metered solar panels on individual homes as well as large suppliers like Tacoma that sells the power to another entity). LPEA must carefully craft its AEO to ensure that it does not violate any provisions of the Wholesale Electric Service Contract.

What are the consequences to LPEA if it breaches the Wholesale Contract between LPEA and Tri-State?
Simply put, Tri-State can opt to sue LPEA. Should LPEA be found to have breached the Wholesale Contract, it likely would be liable to Tri-State for any damages sustained as a result of the breach, including lost profits, and/or be subject to injunctive relief to force LPEA to take service from Tri-State.

How does LPEA’s Green Power Program fit with this plan?
For the most part, not at all. The Green Power Program is an optional, voluntary program through which members can opt to pay extra each month and support Tri-State’s purchase of Green Power (renewable energy) to its mix. LPEA also offers members to contribute to the “Local” Green Power fund for building local renewable projects. This local fund could impact the AEO, as projects built might contribute to the “5 percent” and ultimately push LPEA over the threshold established in LPEA’s contract with Tri-State.

How does this Alternative Energy Outlook affect rates?
That is yet to be determined. At the outset the LPEA board intends for it to have no impact on rates, but ultimately it might be found that all members be assessed a small amount to ensure construction of more local electricity generation. In the long term, an increased amount of distributed (local) generation could result in a reduction of rates, but this cannot be guaranteed.

How does all this impact the financial solvency of LPEA?
The LPEA board and staff are committed to fiscal responsibility. No project, renewable or otherwise will be entered into without extensive study and, when appropriate, input from the membership.
**Alternative energy**: Electricity that is generated from sustainable sources and not from fossil fuels, including solar, wind, hydro, biomass and geothermal.

**Ampere**: The unit of measurement of electrical current produced in a circuit by 1 volt acting through a resistance of 1 Ohm.

**Behind the meter**: Electricity generated on the consumer’s side of the meter, i.e. on-site solar power generation.

**Connected load**: Connected load is the combined rated capacity of all of the consumer’s electrical energy consuming equipment.

**Consumer’s installation**: Consumer’s installation is the wiring and apparatus owned by the consumer on their side of the Point of Delivery (except the Association’s meter).

**Cooperative electric utility**: An electric utility legally established to be owned by and operated for the benefit of those using its service. The utility company will generate, transmit, and/or distribute supplies of electric energy to a specified area not being serviced by another utility. Most electric cooperatives have been initially financed by the Rural Utilities Service (prior Rural Electrification Administration), U.S. Department of Agriculture.

**Demand charge**: The charge associated with the maximum rate of flow of electricity demanded at one point in time during a typical billing period.

**Distribution system**: Distribution system is all of the Association’s facilities from the transmission system to the consumer’s installation, including the Association’s meter.

**DOE**: Department of Energy

**Electric current**: The flow of electric charge. The preferred unit of measure is the ampere.

**Electric energy**: The ability of an electric current to produce work, heat, light, or other forms of energy. It is measured in kilowatt hours.

**Electric generator**: A facility that produces only electricity, commonly expressed in kilowatt-hours [kWh] or megawatt-hours [MWh]. Electric generators include electric utilities and independent power producers.

**Energy**: The capacity for doing work as measured by the capability of doing work [potential energy] or the conversion of this capability to motion [kinetic energy]. Energy has several forms, some of which are easily convertible and can be changed to another form useful for work. Most of the world’s convertible energy comes from fossil fuels that are burned to produce heat that is then used as a transfer medium to mechanical or other means in order to accomplish tasks. Electrical energy is usually measured in kilowatt-hours, while heat energy is usually measured in British thermal units (Btu).

**Generation**: Electricity generation can be distributed or centralized. Distributed generation would be power that is generated in various locations close to its consumers, whereas central generation is energy generated at one large centralized power plant, often located hundreds of miles from the end-users.

**Interconnection standards**: Interconnection standards specify the technical and procedural process by which a customer connects an electricity-generating facility to the grid. Such standards include the technical and contractual terms that system owners and utilities must abide by. State public utilities commissions typically establish standards for interconnection to the distribution grid, while the Federal Energy Regulatory Commission (FERC) has adopted standards for interconnection to the transmission level. While many states have adopted interconnection standards, some
states’ standards apply only to investor-owned utilities [and not to municipal utilities or electric cooperatives]. [Source DSIRE]

**Net metering:** For electric customers who generate their own electricity, net metering allows for the flow of electricity both to and from the customer — typically through a single, bi-directional meter. When a customer’s generation exceeds the customer’s use, electricity from the customer flows back to the grid, offsetting electricity consumed by the customer at a different time during the same billing cycle. In effect, the customer uses excess generation to offset electricity that the customer otherwise would have to purchase at the utility’s full retail rate. Net metering is required by law in most U.S. states, but state policies vary widely. [Source DSIRE]

**Power Purchase Agreement (PPA):** An agreement between a large energy producer and LPEA (or other transmission/distribution company such as Tri-State), for purchase of electricity generated at the site for a set price and a given period of time.

**Reliability (electric system):** A measure of the ability of the system to continue operation while some lines or generators are out of service. Reliability deals with the performance of the system under stress.

**RUS:** United States Department of Agriculture Rural Utilities Service.

**Transformer:** An electrical device for changing the voltage of alternating current.

**Transmission and distribution loss:** Electric energy lost due to the transmission and distribution of electricity. Much of the loss is thermal in nature.

**Transmission service:** The portion of the electrical system that is energized at higher voltage levels.

**Transmission system:** Transmission system is all of the Association’s facilities typically energized at 46,000 volts or higher. The transmission system interconnects the Association’s electrical substations.

**Voltage:** The difference in electrical potential between any two conductors or between a conductor and ground. It is a measure of the electric energy per electron that electrons can acquire and/or give up as they move between the two conductors.

### UNITS OF MEASUREMENT

- **Kilovolt (kV):** One-thousand volts. Distribution lines in residential areas usually are 12 kV (12,000 volts).
- **Kilowatt (kW):** A unit of electric power equal to 1,000 watts. One kilowatt can light up ten 100-watt light bulbs.
- **Kilowatt-hour (kWh):** The electrical energy unit of measure equal to one kilowatt of power supplied to, or taken from, an electric circuit steadily for one hour. The basic unit for pricing electricity. A kilowatt-hour is equivalent to one kilowatt of power used for one hour.
- **Megawatt (MW):** A megawatt equals 1,000 kilowatts. One megawatt-hour is enough power to service 1,000 homes for about one day.
- **Watt:** The unit of electrical power equal to one ampere under a pressure of one volt. A watt is equal to 1/746 horse power.
How an electric system works

Electric systems are designed to supply customers with safe, reliable and affordable energy, which requires a number of processes and complex infrastructure. Not all systems are designed exactly alike as each community has its own special needs, as well as geography. The basic components, however, are the same:

**Power plant** – Electricity starts here, produced by spinning generators that are driven by water, diesel engine, or natural gas or steam turbine. Steam is made by burning coal, oil or natural gas or by nuclear reactor. When needed, extra power is brought into an electric system from plants outside the area.

**Power grid** – Electricity is carried over a network, or “grid,” that connects power plants to substations and from there to distribution lines that take the power to homes or businesses.

**Transmission substation** – These facilities look like giant erector sets connected to wires from the power plant. Here large transformers increase voltage from thousands to hundreds of thousands of volts so the power can be sent over long distances.

**Distribution substation** – These are the local facilities – compact, fenced-in areas scattered throughout LPEA’s service territory that have electric lines coming in and going out. Within a substation are transformers that reduce voltage sent from the transmission substation to a lower level so the electricity can be sent out on distribution lines to the surrounding community.

**Distribution system** – This includes main or primary lines and lower voltage or secondary lines that deliver electricity through overhead or underground wires to homes and businesses. These are the lines seen on poles alongside roads and streets.

**Service connection** – LPEA members are connected to LPEA’s system through the line from a home or office building to the meter. The meter is used to determine how many kilowatt-hours are used by each member.
APPENDIX

Additional Resources
To help foster local renewable projects, LPEA board direction will be received along with member input, related to actions, now and in the future, on specific items regarding the Alternative Energy Outlook. Annually, the LPEA Board will review and approve all Policies, Resolutions, Tariffs, Programs and Plans related to the Alternative Energy Outlook. Some of the following can be found on the LPEA website, www.lpea.coop or the Tri-State website, www.tristateenergy.org.

- LPEA Policies
  - # 214 Rate Policy
  - # 359 Renewable Generation and Environmental Attributes
  - # 361 Renewable Generation Funds
  - # 366 Draft Community Solar Garden
  - Potential New Policies for AEP

- Tri-State Policies
  - # 100 Conservation, Load Management, and Renewable Resource Policy
  - # 101 Policy for Purchase of Capacity and Energy from Small Generation sources Using Renewable Energy Resources
  - # 102 Long-Term Power Supply Policy
  - # 115 Member System Distributed Generation Policy
  - # 117 Member System Local Renewable Project Policy
  - # 118 Member System Participative Generation Policy
  - Potential New Policies related to AEP

- LPEA Tariffs
  - Annual Review of All Rates
  - NM 14 net Metering
  - R 18 Renewable
  - RL 19 Local Renewables
  - Potential New Tariffs for AEP

- Tri-State Tariffs
  - Annual Review of Rates and rate Structure
  - Schedule R Green Power
  - Potential New Tariffs related to AEP

- Power Purchase Agreements (PPA)
  - Tri-State Policy 115 Local Generation Purchase Contract
  - Tri-State Policy 115 Local Generation Purchase Contract (5 percent agreement)
  - Tri-State Policy 115 Local Generation Purchase Contract – LPEA PPAs
  - Non-LPEA PPA for Renewable Generation Systems in LPEA Service Area

- Green Power
  - Tri-State Green Power Program
  - LPEA Rate R18 Renewables and RL19 Local Renewables
  - 100% Green Power LPEA Accounts
  - EPA Green Power Partner Annual Updates
  - Annual LPEA Energy Efficiency Cost Benefit Analysis
  - LPEA RL19 Funds and Solar PV Systems for Schools

- Miscellaneous
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  - Annual Report to LPEA Board – Corporate Services Department
  - City of Durango Franchise Agreement - Reports
  - Colorado PUC RPS Compliance Report
  - Database of State Incentives for Renewables and Efficiency (DSIRE)

- Interconnection and Net Metering Program
- Optional Renewable Energy Credits (RECs)
- Board Resolution for adopting initial Alternative Energy Plan
- Legal Counsel Reviews and Opinions

Many of the following reports and updates related to AEO are also available upon request:

- Annual Alternative Energy Update
- Tri-State Policy 100 Conservation, Load Management, and Renewable Resource
- Tri-State Policy 101 Purchase of Capacity and Energy from Small Generation Sources Using Renewable Energy Resources
- Tri-State Policy 102 Long-Term Power Supply
- Net Metering
- NM14 Tariff – 1% of LPEA's Aggregate Peak Demand
- Annual LPEA Energy Efficiency Cost Benefit Analysis
- NM14 Tariff – Rate Review
- Interconnection and Net Metering Application
- Renewable Energy Credits (RECs)
- Tri-State Policy 117 Member System Local Renewable Project Policy
- Policy for REC Performance Payments - Revisions
- Tri-State Policy 117 "REC" Attestation Reports
- LPEA Annual Budget for REC Payments to Members
- Tri-State Policy 117 Annual Available Funds ½ of 1%
- LPEA Policy 359 Local Renewable Generation and Environmental Attributes
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To help foster local renewable projects, LPEA board direction will be received along with member input, related to actions, now and in the future, on specific items regarding the Alternative Energy Outlook. Annually, the LPEA Board will review and approve all Policies, Resolutions, Tariffs, Programs and Plans related to the Alternative Energy Outlook. Some of the following can be found on the LPEA website, www.lpea.coop or the Tri-State website, www.tristateenergy.org.

- LPEA Policies
  - # 214 Rate Policy
  - # 359 Renewable Generation and Environmental Attributes
  - # 361 Renewable Generation Funds
  - # 366 Draft Community Solar Garden
  - Potential New Policies for AEP

- Tri-State Policies
  - # 100 Conservation, Load Management, and Renewable Resource Policy
  - # 101 Policy for Purchase of Capacity and Energy from Small Generation sources Using Renewable Energy Resources
  - # 102 Long-Term Power Supply Policy
  - # 115 Member System Distributed Generation Policy
  - # 117 Member System Local Renewable Project Policy
  - # 118 Member System Participative Generation Policy
  - Potential New Policies related to AEP

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