Electric Resource Plan

Annual Progress Report

for

Tri-State Generation and Transmission

Association, Inc.

Submitted to:

Colorado Public Utilities Commission

December 10, 2019

Background

In accordance with the stipulated resource planning process approved by Commission Decision No. C10-0101, in Docket No. 09I-04IE and Rule 3618 (a) of the Colorado Public Utilities Commission's Rules Regulating Electric Utilities, Tri-State Generation and Transmission Association, Inc. (Tri-State) submits the following Annual Progress Report (APR) to the Public Utilities Commission of Colorado (Commission). The APR includes the required information listed in Section 3, Subsection 4 of the stipulated resource planning process. Tri-State filed its latest Electric Resource Plan (ERP) in October 2015.

This 2019 APR to the 2015 ERP contains the following sections:

A. An updated annual electric demand and energy forecast;
B. An updated evaluation of existing resources;
C. An updated evaluation of planning reserve margins and contingency plans;
D. An updated assessment of need for additional resources;
E. An updated report of the utility's action plan;
F. An updated report on resource scenario modeling;
G. An updated report on the utility's efforts to give the fullest possible consideration to the cost-effective implementation of new clean energy and energy-efficient technologies (as defined in Section 1, Subsection 8) in its consideration of generation acquisitions; and
H. Any material changes to its resource plan or action plan.

Forward-Looking Statement

Forward-looking statements include statements concerning our plans, objectives, goals, strategies, future events, future revenue or performance, forecasts, including load, energy and commodities, capital expenditures, capacity needs, plans or intentions relating to acquisitions, business trends and other information that is not historical information. When used in this APR, the words "estimates," "expects," "anticipates," "projects," "plans," "intends," "believes" and "forecasts" or future or conditional verbs, such as "will," "should," "could" or "may," and variations of such words or similar expressions, are intended to identify forward-looking statements. These forward-looking statements are subject to a number of risks, uncertainties and assumptions, including those described from time to time in our filings with the Securities and Exchange Commission. All forward-looking statements, including, without limitation, management's examination of historical operating trends and data, are based upon our current expectations and various assumptions. Our expectations and beliefs are expressed in good faith and we believe there is a reasonable basis for them. However, we cannot assure you that management's expectations and beliefs will be achieved. There are a number of risks, uncertainties and other important factors that could cause our actual results to differ materially from the forward-looking statements contained in this APR.

Summary

The intent of the APR is to discuss material changes in assumptions, fleet characteristics, load forecasts and other factors that have occurred since the previous ERP and any subsequent APRs. To the extent issues addressed in the ERP have not materially changed, they are not addressed in this APR. Significant modeling assumptions made in the 2015 ERP and subsequent 2018 APR process are continued in this APR.

As stated in the 2018 APR, Tri-State has made several changes to its resource portfolio since the 2015 ERP. In late 2016, Tri-State announced the planned retirement of two coal-fired facilities. The Nucla Generating Station ceased operations in September 2019. Tri-State owns 100% of this 100 MW facility. Craig Unit 1 will cease operations by 12/31/2025. Tri-State's ownership share is 102 MW (24%) of this unit, which has a total nameplate capacity of 427 MW.

Also since filing the 2015 ERP, three new utility-scale renewable projects for which Tri-State agreed to purchase the output for 25 years, achieved commercial operation. The 30 MW San Isabel Solar facility located near Trinidad, Colorado was completed in December 2016, the 25 MW Alta Luna Solar facility located near Deming, New Mexico was completed in January 2017 and the 75 MW Twin Buttes II Wind facility located near Lamar, Colorado was completed in December 2017. Additionally, Tri-State has entered into long-term power purchase agreements for two new renewable facilities – the Crossing Trails 104 MW wind facility with an expected commercial operation date of December 2020 and the Spanish Peaks 100 MW solar facility with an expected commercial operation date of December 2023.

Tri-State extended, for another 10 years, its purchase of the output of the 3.5 MW Williams Fork Hydro facility near Parshall, Colorado effective January 1, 2017 and extended, for another 10 years, its purchase of the output of the 5 MW Boulder Canyon Hydro facility near Boulder, Colorado effective June 1, 2018 and included several additional small hydro facilities with an additional total capacity slightly exceeding 1 MW, as a part of this contract extension.

For this APR, Tri-State has updated forecasts of electric demand, energy and fuel prices, and has modified the production cost model inputs to reflect the changes to the Tri-State portfolio as described above. These updates and related analysis were based on finalized available data as of October 31, 2019. The results of the updated modeling are discussed below.

Tri-State's approach to resource planning remains to evaluate various resource options to not only construct a reliable and economic supply portfolio, but also to achieve a balanced set of resources based on forecasted demand, forecasted commodity prices, environmental compliance, risk, and other input assumptions.

Those components of the ERP that entailed evaluation of reserve margins and contingency plans remain largely unchanged and are discussed further below.

Tri-State's evaluation of existing resources and assessment of additional resources are significantly impacted by legislation passed in 2019 in Colorado and New Mexico.

Impactful legislation in Colorado includes:

- Colorado HB 19-1261 Greenhouse Gas (GHG) statewide reduction goals and targets
- Colorado SB 19-096 GHG Reporting

- Colorado SB 19-236 Regulated ERP process for Wholesale G&T Cooperatives

Impactful legislation in New Mexico includes:

- New Mexico SB 19-489 Increased Renewable Portfolio Standard requirements and targets

A. Updated Annual Electric Demand and Energy Forecast

Tri-State's demand and energy forecasts for this APR are based on analysis performed in 2019. The 2019 load forecast is not materially different than the 2018 load forecast as shown in Figure 1. The expected exit of Delta Montrose Electric Association on May 1, 2020 has been included in the load forecast.

At the direction of Tri-State's Board, a contract committee has been formed and is evaluating various options that would allow Members to move to partial requirements contracts. It is anticipated that recommendations will be developed for consideration by the Board in 2020.

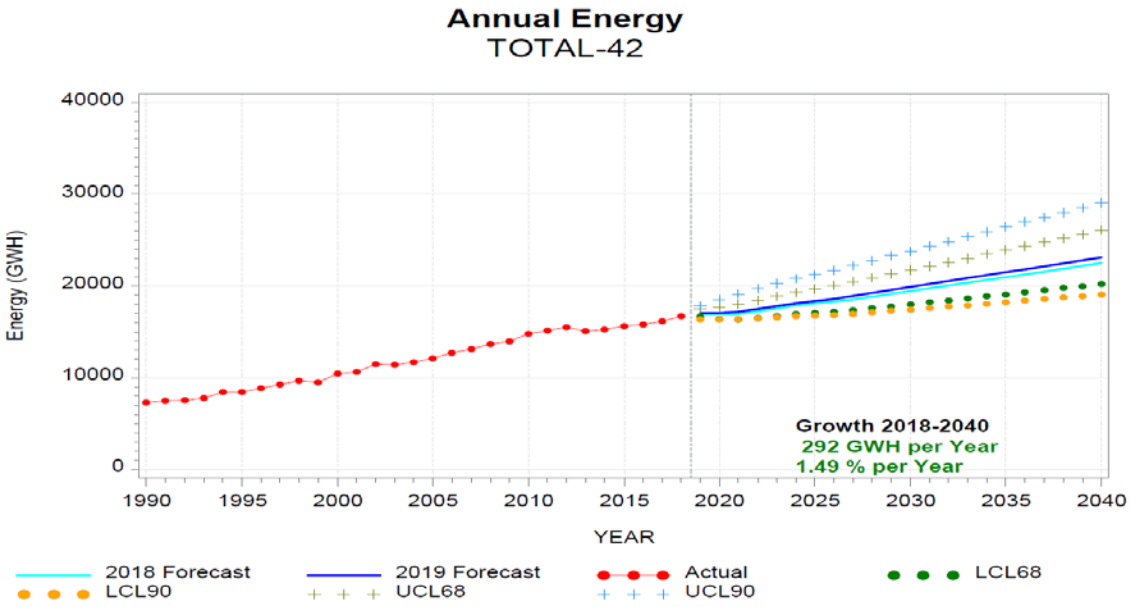


Figure 1 – Updated Load Forecast

B. Updated Evaluation of Existing Resources

Figure 2 below depicts the sources of generation for Tri-State's 2018 energy sales to its members. Figure 3 below depicts Tri-State's 2018 capacity by generation source. Neither chart represents a material change from 2017, however Tri-State's energy supply to its members showed an increase in renewable energy and reduced supply from coal.

Figure 2 – 2018 Energy Mix using Gross Member Sales

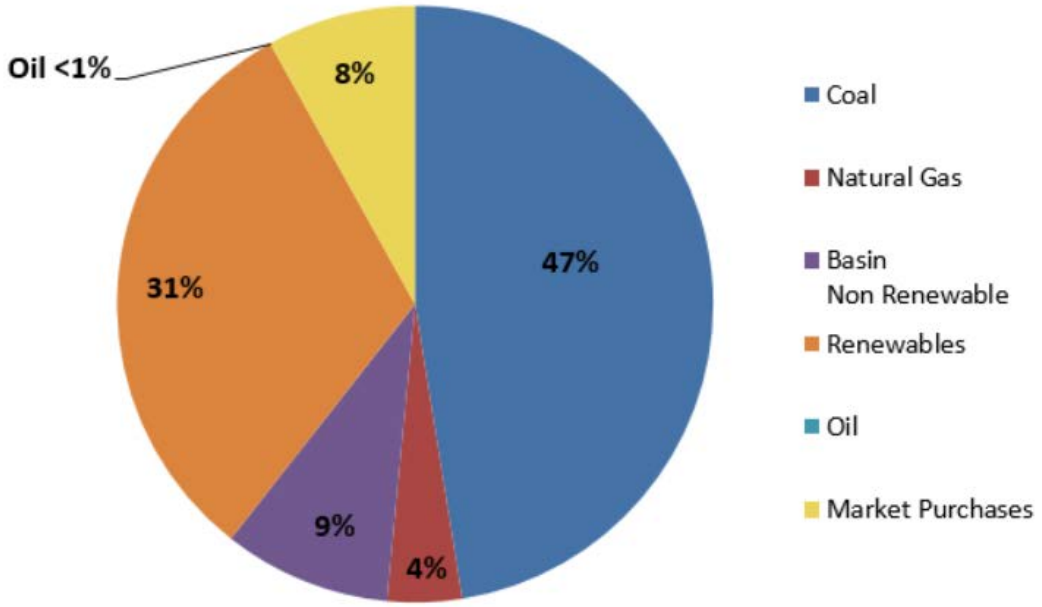
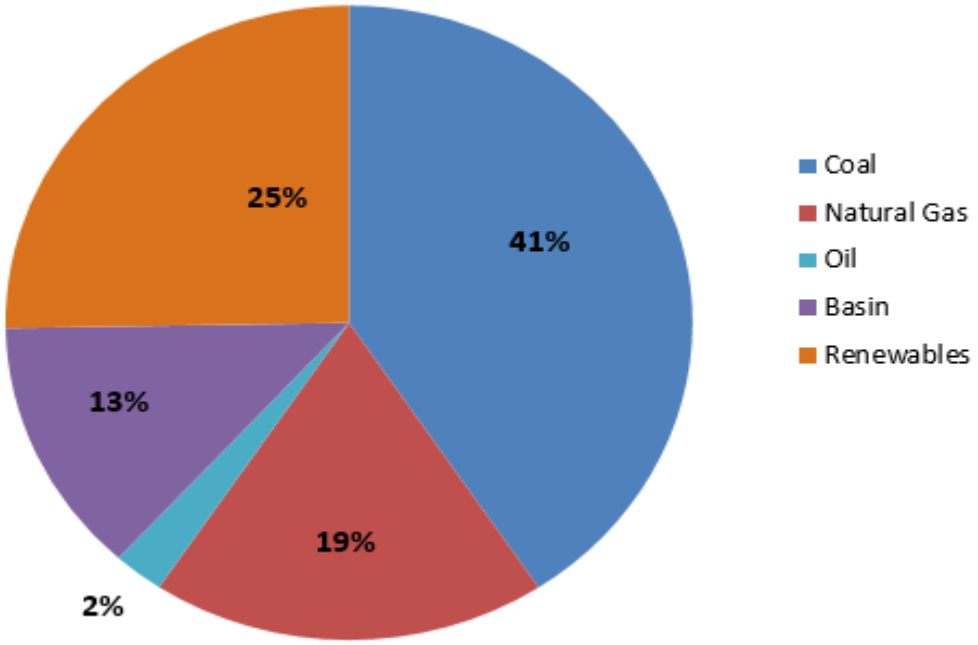


Figure 3 – 2018 Capacity Portfolio



C. Updated Evaluation of Planning Reserve Margins and Contingency Plans

Tri-State continues to develop resource plans based on a 15 percent planning reserve margin. Tri-State's participation in reserve sharing agreements and several bilateral hazard-sharing arrangements provide additional support for reliable operations.

Tri-State stated in the 2015 ERP that it does not expect a capacity shortfall until the early to the mid-2020s unless there is a significant increase in load or existing resources were to become unavailable. The impact of the updated load forecast on planning reserve margins in this APR is discussed in Section D and depicted in Figure 4.

D. Updated Assessment of Need for Additional Resources

Tri-State's need for additional resources was presented in Section I of the 2015 ERP. Figure 4 below provides an update based on the 2019 load forecast, new resources and demand side management effects.

The assumptions used in developing the load/resource chart below are unchanged from the 2015 ERP and are as follows:

- total obligations are defined as firm load, firm contract sales, operating reserves obligations, and planning reserves;
- all existing purchase and sales contracts are assumed to expire on their terms
- no planned capacity changes for existing plants except coal retirements as previously noted;
- no spot purchases or sales are included;

- capacity associated with renewable generation projects are listed in the assumptions on the chart.

The current load/resource balance forecast is shown in Figure 4, and indicates that under the median growth scenario, Tri-State anticipates the need for additional capacity to meet its supply obligations and planning reserve requirements in approximately 2027.

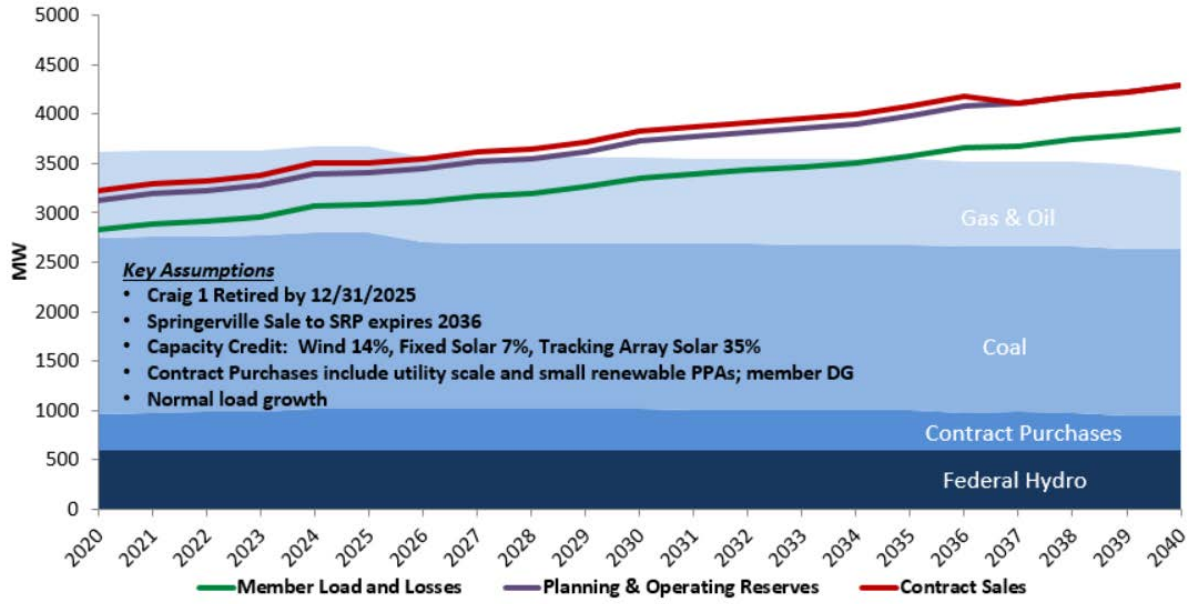


Figure 4 - Updated Load/Resource Position

Scenario modeling has been developed to project the timing and nature of resources that could be selected to satisfy this forecasted capacity shortfall. Resource options include demand side alternatives, natural gas generation including gas turbines and reciprocating engines, renewable generation including solar and wind generation, and

energy storage. No decisions have been made at this time regarding the timing, technology, size or location of new generation projects.

E. Updated Report of the Utility's Action Plan

Tri-State's Action Plan was provided in Section V of the 2015 ERP and was updated in the 2018 APR. The 2018 Action Plan included the following elements, which are discussed below:

- Clean Power Plan and State Plan Review and Evaluation
- Generation Planning and Development
- Transmission Planning and Development
- Possible Expansion of Renewable Energy Portfolio
- Refinement and Development of Energy Efficiency Products (EEP) & Services
- R&D Programs and Projects via EPRI & CRN

Affordable Clean Energy Rule replaces Clean Power Plan

Since the 2015 ERP filing, the implementation of the Clean Power Plan (CPP) was effectively halted by a stay of the United States Supreme Court. Given that stay and the current administration's priorities, Tri-State has moderated efforts to plan for CPP implementation. Since the filing of our 2017 APR, additional activity around this item has occurred. In October 2017, the United States Environmental Protection Agency (EPA) issued a Notice of Proposed Rulemaking to repeal the CPP and provided Advanced Notice of a Proposed Rulemaking in December 2017 to begin work on a replacement rule. On August 31, 2018, the EPA published the proposed Affordable Clean Energy (ACE) rule, which was introduced to replace the CPP. On July 8, 2019, the EPA published final rules that repealed the CPP and finalized the ACE rule. State

plans implementing the ACE rule will be due in July 2022, with initial compliance to be achieved by designated facilities no later than 24 months after State plan submittal, except if a State determines a longer period of compliance time is appropriate and includes legally enforceable increments of progress. Colorado is in the process of developing a timeline and initial steps to implement the ACE rule. The legality of the ACE rule has been challenged before the District of Columbia Court of Appeals.

Generation Planning and Development

Since the filing of the 2015 ERP and subsequent 2018 APR, implementation of new member generation projects has occurred. While efforts to join the Southwest Power Pool as part of the Mountain West Transmission Group have been suspended, Tri-State is moving forward with plans to participate in both the Western Energy Imbalance Market (WEIM - operated by the California ISO) and the Western Energy Imbalance Service market (EIS - operated by the Southwest Power Pool) with expected market entry dates in 2021. It is anticipated that the portion of the Tri-State system in New Mexico will participate in WEIM, and a considerable portion of the remainder of the Tri-State system in the Western Interconnection will participate in the EIS market.

Transmission Planning and Development

Tri-State has ownership or capacity interests in approximately 5,665 miles of high voltage transmission lines and owns or has major equipment ownership in approximately 409 substations and switchyards over which Tri-State transmits electricity to its Members, which in turn provide electric distribution service to their

approximately 1.3 million retail customers in Colorado, Nebraska, New Mexico and Wyoming. Tri-State's transmission facilities are located in these four states and are interconnected with those of other utilities, including Western Area Power Administration, Nebraska Public Power District, Black Hills Colorado Electric, Inc., PacifiCorp, Public Service Company of Colorado, Platte River Power Authority, Colorado Springs Utilities, Basin Electric Power Cooperative, Tucson Electric Power, Public Service Company of New Mexico, and Deseret Generation & Transmission Cooperative.

Tri-State continues to support regional transmission study efforts, primarily through its participation at WestConnect and the Colorado Coordinated Planning Group. Tri-State is continuing to make transmission investments to serve growing loads, increase reliability, ensure system stability, and support additional generation interconnections.

Some of Tri-State's more significant transmission projects include the continued rebuild of the Montrose – Nucla (Maverick) – Cahone line as well as the presently necessary portions of the Southwest Weld Expansion Project. Tri-State is continuing to develop the San Luis Valley and Burlington – Lamar 230 kV transmission projects, and is presently re-evaluating the sufficiency of those projects, as well as all of its planned major transmission projects, in light of Colorado's Climate Action Plan To Reduce Pollution (HB19-1261).

Expansion of Renewable Energy Portfolio

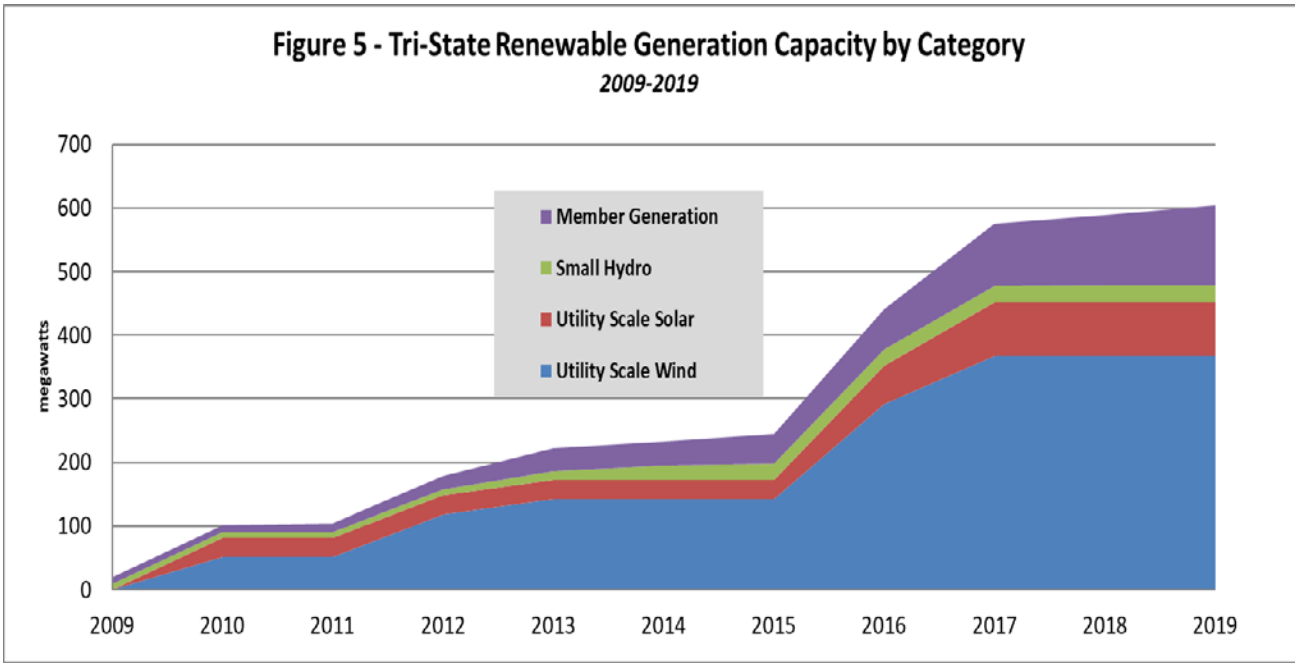
Tri-State currently has 367 MW of utility scale wind and 85 MW of utility scale solar in operation under long-term power purchase agreements. In early 2019, Tri-State

announced that it had entered into two new purchase power agreements for the Crossing Trails 104 MW wind project with an expected in-service date of December 2020 and the Spanish Peaks 100 MW solar project with an expected in-service date of December 2023. In addition, Tri-State purchases the output from approximately 27 MW of small hydroelectric projects located in Colorado and Wyoming.

In June 2019, Tri-State issued a Request for Proposals (RFP) for new renewable resources. Tri-State continues to advance through the evaluation and negotiation process and plans to announce the results of the RFP in early 2020. In evaluating future renewable portfolio additions beyond this most recent RFP, Tri-State will continue to monitor market conditions, tax credit expiration schedules, impacts of current renewable resources on reliable system operations and the operation of existing generating assets, transmission system capacity, Tri-State's participation in an organized market, the regulatory requirements for meeting state renewable portfolio or energy standards and state GHG reduction goals.

In addition to the utility-scale renewable energy projects described above, Tri-State's members have developed over 125 MW of local renewable projects. The development of these projects has been facilitated by Tri-State policies for members wishing to serve a portion of their load requirements through projects they own or control through power purchase agreements. The total installed capacity associated with these member projects is expected to grow to over 135 MW expected in 2020.

Figure 5 provides a graphical representation of the growth in Tri-State's renewable resource portfolio over the last 11 years. Although not represented in this chart, another 600 MW of federal hydropower brings Tri-State's renewable resource portfolio to approximately 1,200 MW.



Refinement and Development of Energy Efficiency Products (EEP) & Services

An ongoing part of Tri-State's Action Plan is the implementation of Energy Efficiency (EE) programs. Options that have been evaluated include programs related to residential/small commercial, irrigation, large commercial and industrial programs. These offerings are continually refined based on effectiveness and member feedback. Additionally, Tri-State has an initiated a Demand Side Management (DSM) and Energy Efficiency (EE) Potential study with an outside consultant with the goal of receiving updated information in regards to achievable potential and cost savings in this area for use in the resource planning process. To the extent available, this information will be utilized in Tri-State's 2020 ERP process.

R&D Programs and Projects via EPRI & CRN

Tri-State supports research, development and advanced technology and has been a full-member of the Electric Power Research Institute (EPRI) and the National Rural Electric Cooperative Association (NRECA) research program since 1993. Tri-State is also a founding member of several other research groups. Tri-State is committed to continuing this support for vital R&D going forward.

An important part of our R&D efforts involves direct participation in research projects. This helps solve unique problems, brings us early information on advanced technology, facilitates the commercialization of new products and provides information exchange with industry subject matter experts.

Some examples of Tri-State's ongoing involvement in R&D projects include:

1. Use of unmanned aerial vehicles to improve transmission, distribution, and generation maintenance.
2. Dynamic load shaping to integrate renewable energy more cost-effectively.
3. Beneficial Electrification to reduce emissions, increase energy efficiency, and improve customer's lives and businesses.
4. Decarbonized hydrogen/ammonia production for season scale energy storage, grid balancing, and decarbonization of energy uses that are hard to electrify.
5. Energy storage to reduce the cost of integrating renewable energy and as an alternative to transmission and distribution upgrades.

F. Updated Report on Resource Scenario Modeling

Tri-State addressed scenario modeling in the 2015 ERP. This APR updates the base scenario with the following additional changes:

- Updated with retirement of Nucla in 2019 and Craig 1 at end of 2025
- Updated 2019 long-term load forecast
- Updated 2019 electricity market, natural gas, and coal price forecasts
- Updated Tri-State small renewable projects and member renewable and distributed generation projects

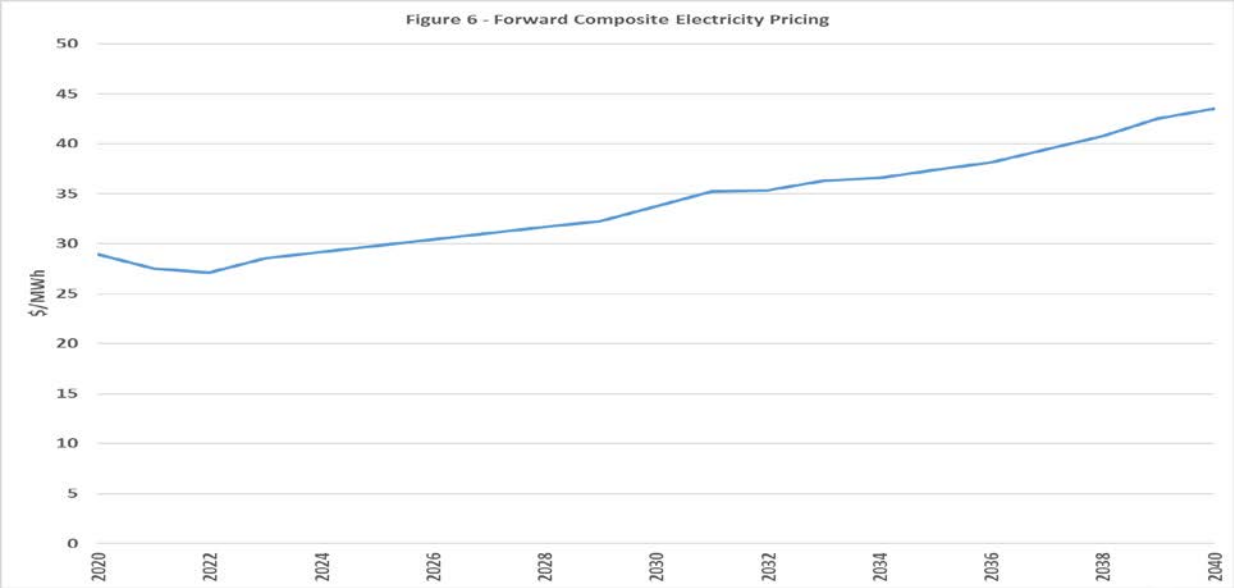
As a result of the updated RPS requirements in New Mexico under 2019 legislation and 2019 legislation in Colorado resulting in GHG reduction goals along with the regulation of wholesale generation and transmission cooperatives in regards to resource planning, Tri-State has been updating models and evaluating scenarios while working with appropriate entities in regards to related rule making processes. Tri-State anticipates a rigorous 2020 ERP process that will result in an expansion plan that will address all necessary legislative requirements for Tri-State's footprint while providing responsible, reliable, and affordable power to Tri-State's Member Systems.

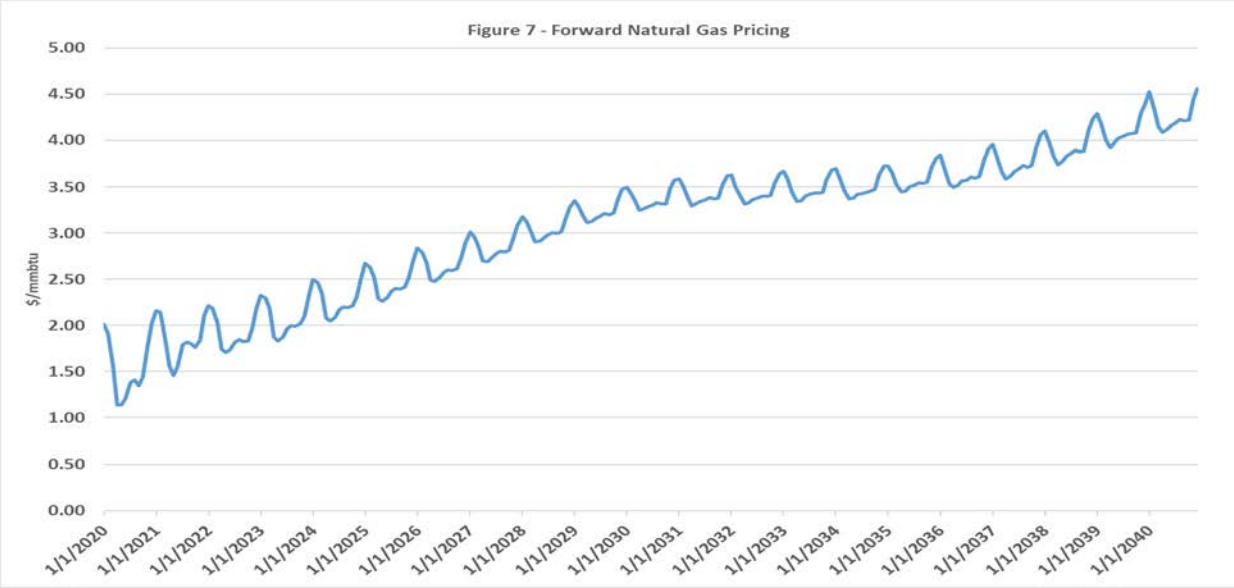
Inputs and Variables used in Scenario Modeling

Forward Price Curves

For this APR, Tri-State used updated forward price curves for electricity and natural gas based on the near term market activity and independent long-term price

forecasts. The latest price forecasts for electricity and natural gas used by Tri-State are shown in Figures 6 and 7, respectively.





Potential Generation Sources and Associated Costs

The Electric Power Research Institute (EPRI) Technical Assessment Guide (TAG) provides cost and performance data for power plants of various technologies. The TAG has become an industry standard for power plant cost and performance information. As in previous filings, Tri-State used the TAG to estimate variable O&M costs, generation forced outage rates, and overnight capital costs. Use of the TAG data provides two major benefits in Tri-State's resource planning process. First, the TAG provides consistent financial and economic assumptions between the various technologies eliminating any financial or economic bias between the technologies. Second, the annual TAG updates provide updated cost analysis that capture technology and market trends allowing Tri-State to have the latest technological information.

Load Forecast

The median (or base) load forecast for Tri-State's members is based on the best available data created in 2019 from the forecasts for each member.

G. Update on Implementation of Cost-effective New Clean Energy and Energy-efficient Technologies.

The growth in Tri-State's renewable resource portfolio, including utility scale projects and smaller generation projects, is graphically depicted in Figure 8.

As noted previously in this report and other filings, Tri-State's wholesale power contract with each of its members and board policies allow for and facilitates the

development of local distributed generation projects in its members' service territories. These renewable and distributed projects are helping to fulfill both Colorado and New Mexico RES/RPS requirements, as well as satisfy members'/consumers' interests in purchasing renewable power from locally-sited projects.

Figure 8 below shows the projected growth in capacity of these distributed projects through the end of 2020. Figure 9 shows the breakdown of these projects by technology category. As of December 2019, 65 renewable or distribution generation projects totaling 136 MW are operating or under development. It is expected that the number of these projects will continue to grow as pricing for solar and wind resources continue to be attractive and more members are showing interest in supporting local renewable projects.

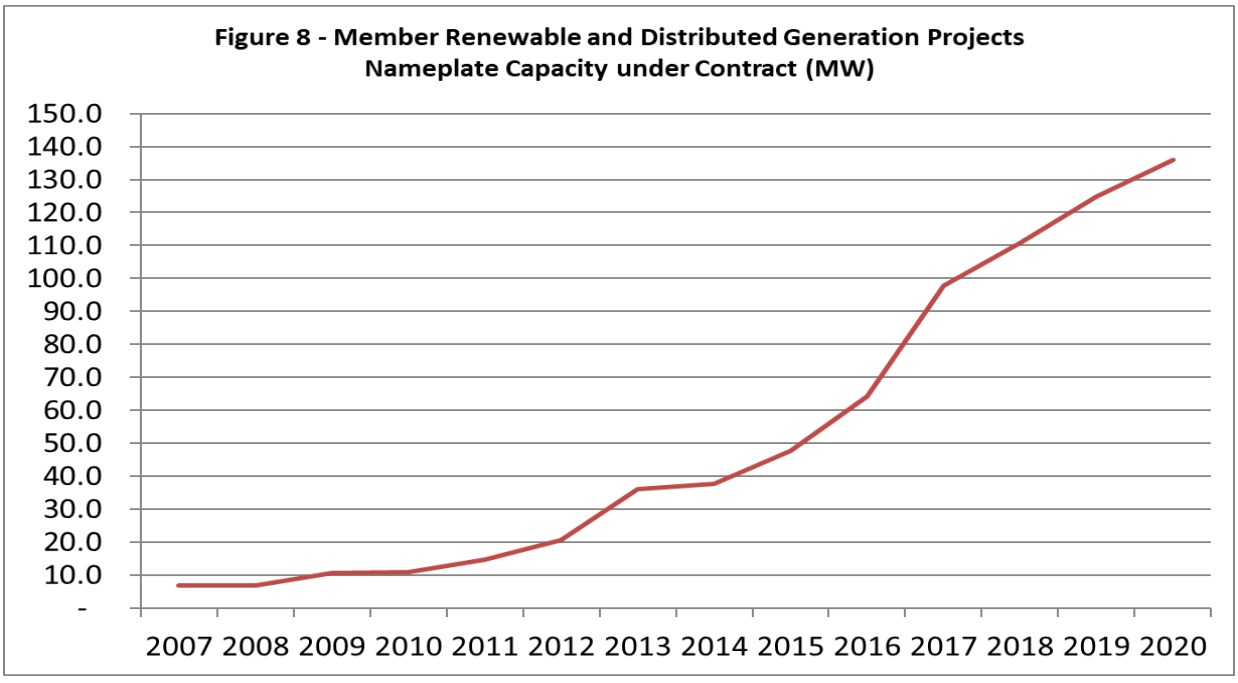
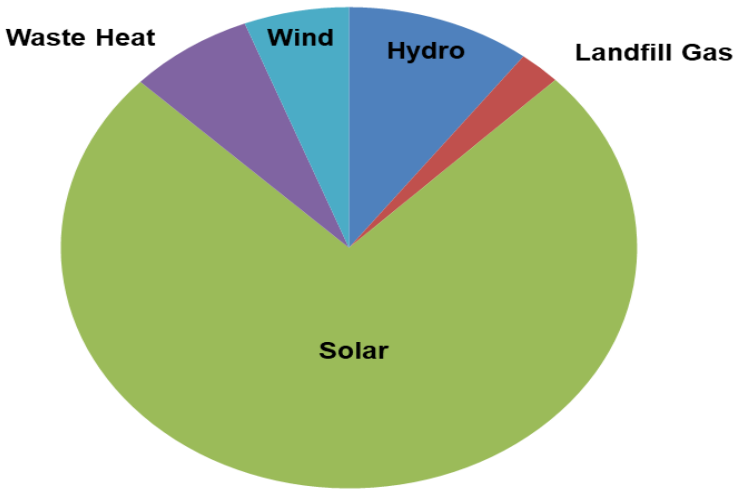


Figure 9 - Member Renewable and Distributed Generation Projects by Technology (nameplate capacity)



Community Solar Program

In December 2019, in an effort to provide more renewable options to its members, the Tri-State Board of Directors approved a new community solar program for its membership. Tri-State's total commitment to the program, if acted upon by all members, would be 63 megawatts of additional community solar projects and projects deployed under this program would not be included in the 5% self-supply provisions in the members' wholesale power contracts with Tri-State.

Demand Response and Energy Shaping

Tri-State, in association with its members, developed a portfolio of demand response and energy shaping offerings for all customer segments from residential and small commercial to irrigation to large commercial and industrial to system enhancements. In the past approximately a quarter of Tri-State's members participated in these

programs. However, changing market conditions, updates to Tri-State's rate structure, and changing member priorities have resulted in a phase out of these offerings.

H. Material Changes to its Resource Plan or Action Plan

There are no material changes to report regarding the action plan contained in the 2015 ERP, and Tri-State remains confident in its ability to achieve the elements of this action plan. However, given recent legislation in Colorado and New Mexico in regards to renewable portfolio standards, GHG reduction and the regulation of resource planning for wholesale generation and transmission cooperatives in Colorado, Tri-State expects significant changes to its 2020 ERP and resulting action plan.

No material changes to Tri-State's generation portfolio have occurred since the 2018 APR update. After updating the Tri-State resource planning model inputs to prepare this APR, the need for new generating capacity has shifted from 2026 per the 2018 APR to 2027.