Colorado is in the middle of a dynamic evolution in the generation and delivery of electricity because customers are demanding choices and direct participation in how energy is generated and managed. They want to benefit from lower prices, cleaner air and greater autonomy. Colorado’s citizens - and in turn the utilities that serve them - are rapidly changing their perspective on what truly represents an economic “cost.” There is growing consensus that we should take into careful consideration the emerging economic threats presented by climate change and related forces when making decisions about our energy future.

During the 2018 gubernatorial campaign, Governor-elect Polis voiced support for a 100% clean energy goal for Colorado by 2040, built upon markets, not mandates. To reach that goal, Colorado will need to begin planning for the future today and putting policies into place that enable that future. A significant component of that strategy must include a robust role for wind, solar, hydro, and energy storage.

The Colorado Solar Energy Industries Association (COSEIA), which represents the interests of solar and energy storage providers across Colorado, supports Governor-elect Polis’ 100% clean energy by 2040 goal and seeks to partner with Governor-elect Polis and the incoming legislature to craft legislation that will lay the foundation to achieve it. We agree that the best and most path forward is through enabling markets to drive innovation and lower costs for Coloradans.

**COSEIA offers 7 principles to facilitate meeting Governor-elect Polis’ 2040 target.**

1) Use all proven clean energy technologies
2) Support customer choice to access products and services
3) Level playing field for all participants
4) Share benefits of solar and storage across Colorado
5) Identify grid services provided by solar and storage and compensation mechanisms
6) Adjust rate designs to better align cost and value of services
7) Build a network for the future

These principles are not exhaustive. COSEIA looks forward to working with all stakeholders to meet the 2040 clean energy goal as expeditiously as possible, while relying on markets and innovation to drive and enable customers, utilities, suppliers, and stakeholders to realize the savings and benefits from this goal.

**ABOUT COSEIA**

COSEIA represents and leads a wide range of solar and energy storage related businesses including manufacturers, distributors, dealers, installers, integrators, developers, financiers, utilities, entrepreneurs, educators and others across Colorado.
Principle 1: Use all proven clean energy technologies

Clean energy technologies are now the lowest cost energy resource available

To meet the 2040 clean energy goal, Colorado will need to rely on greater amounts of wind and solar. Notably, energy storage can play a vital role in ensuring that wind and solar remain dispatchable by storing excess electricity for use when production from these technologies is low. This means that rather than wasting excess wind or solar when there is a lack of demand, that electricity can be stored for use when there is greater demand or when the wind or solar are otherwise unavailable. Other means of storage can provide additional services to the system, such as aggregation of electric water heaters, which can act as demand response without negatively impacting the end-use customer. Solar thermal and pumped-hydro storage should also be relied upon to meet the energy needs of the state from carbon-free resources. Software that enables a more efficient electric grid, as well as other demand-side management tools, should also be incorporated to meet this attainable goal.

Most recently, Public Service Company of Colorado announced that it would be able to meet the majority of its future needs with a combination of solar, wind, and storage rather than building more fossil fuel resources. It is clear that the market is ready for the future, but we need policies to provide clearer rules of the road, identifying the proper role for the Public Utilities Commission (PUC) to assist in meeting the goal, and allowing all clean technologies the opportunity to participate on a level playing field.

COSEIA recommends the following policies to support the 2040 clean energy goal:

• The 2040 goal should be characterized as a "clean energy goal" rather than a "renewable energy goal." By calling it a clean energy goal, Colorado can better utilize resources across the state to optimize the system more efficiently.

• The 2040 clean energy goal should include opportunities for solar, wind, storage, energy efficiency, and demand response to participate on equal footing.

• Consideration should be given to greater electrification of end uses, most notably supporting and encouraging the electrification of transportation.
**Principle 2: Support customer choice to access products and services**

Remove renewable energy barriers and Colorado consumers will lead the way toward a clean energy revolution.

Customers are driving the demand for cleaner sources of electricity. In order to fully realize the market-based aspect of reaching the 2040 clean energy goal, policies should support this customer demand by allowing customers to source their electricity in more and cleaner ways. By identifying and lowering barriers to entry and customer adoption, a market-based solution can be realized more quickly and at a lower cost to customers. This includes recognizing that customers will go to whoever provides them with the solutions they desire, be it a monopoly or third-party provider. Ensuring that a monopoly does not exercise market overreach and limit external customer options will be important in fostering competitive markets toward all clean energy goals.

Customer solutions come in a variety of technology configurations and financial models. For example, rooftop solar can be stand-alone, or paired with energy storage. The customer seeks these solutions for many reasons, such as avoiding demand charges and higher bills, or using stored electricity when the sun is not shining.

The state should consider the following options to support the role of solar and storage in meeting the 2040 goal:

- Allow storage coupled with “eligible energy resources” to be eligible for RESA funds
- Provide financial incentives for energy storage deployment to drive down soft costs while other regulatory reforms and programs are undertaken to provide additional opportunities for the resource to receive value streams for their services
- Integrate C&I energy storage deployment in demand response programs
- Expand energy management opportunities through storage
- Allow C&I customers to sign contracts with third parties to purchase generation directly
- Clarify ownership and access to customer data, while making it easy for individuals to share with others
- Expand definition of net metering to include virtual net metering, allowing credits from large-scale generation to offset locations under common ownership and utility billing
**Principle 3: Level Playing Field for All Participants**

Not all residents and businesses benefit in Colorado equally from solar and storage, but fixes are at hand.

In order to realize the 100% by 2040 goal, Colorado will need to enhance existing and develop new policies which clearly allow all customers to access clean energy market opportunities. Indeed, without the rules allowing markets to develop, clean energy solution providers and customers will be hard pressed to achieve and realize the benefits that these technologies offer.

Only through a level playing field will Colorado be able to deploy the amount of clean energy resources needed to hit the 2040 goal. As such, it is necessary that the Legislature and Public Utilities Commission ensure that incumbent interests compete fairly with all clean energy providers in all facets.

This commitment to a level playing field ensures that solar and storage can attain ample opportunities to provide robust market-based solutions to meet the state’s goals.

Below are examples of policies that may need to be developed:

- Identify interim goals or targets for different types of resources. For storage, identify opportunities for utility scale, community, and distributed energy resources.
- Ensure that hassle-free interconnection rules incorporate consideration of stand-alone storage and solar+storage resources.
- Adjust property tax methodologies state side to expand the adoption of all scales of renewable energy including residential, commercial, community, and utility.
- Enforce all laws that already prohibit discriminatory rates or charges on distributed generation customers statewide to support open and free markets.
- Ensure competition in the market place by requiring a diversity of ownership in utility scale solar projects.
- Improve the Community Solar Garden program:
  - Allow interconnection for community solar gardens outside the utility’s RES plans.
  - Remove County or Adjacent County Restrictions and allow for all subscriptions within a given service territory.
  - Increase the maximum allowable size to 10 MW.
  - Establish a higher bill credits for Community Solar Gardens.
- Appoint third-party administrators for all programs to ensure a competitive playing field for all.
- Implement a statewide Renewable Energy Credit (REC) market similar to that practiced successfully in many other states.
Principle 4: Share benefits of solar and storage across Colorado

Solar and storage bring health, economic, and community benefits that can be shared by all Coloradans.

Today, Coloradans are investing in solar and storage using their own dollars. Companies across Colorado are seeking to sign up for wind, solar, and storage contracts that meet most or all of their electricity demand. This is private money that is invested in new resources to help meet Colorado’s clean energy future. Investing in these clean resources puts money into local economies, cleans the air, and avoids the construction of new fossil-based power plants. Customers are largely uncompensated for these benefits to society.

Installation of solar produces jobs across the state. With continued job growth, there is a need to support training to ensure an adequate supply of installers and other solar and storage industry professionals to meet the demand for these resources. Along with this training, grants should be made available to communities, especially rural communities, to ensure that local county or city inspectors are educated in the technologies being installed across the state.

In order to meet the 2040 clean energy goal, Colorado will need to expand the opportunity for solar and storage. Limits on net energy metering, community solar garden size restrictions, and barriers to installation of solar and storage on or near customer premises must be addressed. Additionally, low-income customers and other traditionally underserved communities face unique barriers to adoption of solar and storage, especially financial, which must also be addressed to ensure these communities have proportionate access to direct benefits of solar and storage. Dedicated funding and programming for low-income communities should be adopted to ensure that Colorado’s transition to a clean energy economy is equitable and inclusive. By expanding access, Colorado will ensure that the benefits of solar and storage can be achieved and realized not only by those who install it, but across the state. Included in this is the need to streamline the permitting of solar installations to be installed on public lands to reduce costs to end consumers.

COSEIA has identified the following policies to better share the benefits of solar and storage across all of Colorado:

- Ensure that all electric customers across the state have access to fair net energy metering tariffs, including customers of distribution cooperatives and public power utilities
- Encourage utility procurement targets that grow over time
- Apply policies consistently across the state, including on municipal and cooperative utilities
- Eliminate unreasonable barriers by utilities that limit a customer’s ability to install solar and storage
- Establish job training programs across the state as needed
- Ensure low-income customers, as well as affordable housing providers and nonprofits have access to direct benefits of onsite and community solar and storage.
- Invest RESA or other state dollars to support proportionate access to solar and storage by low-income customers
- Support statewide residential PACE
Principle 5: Identify grid services provided by solar and storage and compensation mechanisms

Solar and energy storage provide services and benefits beyond generation, bill avoidance, or energy management. The type of benefit provided is dependent on the type of technology but is, nevertheless, a service that can be provided and compensated. The NARUC Distributed Energy Resources and Compensation Manual provides jurisdictions with information on the types of services and compensation mechanisms that may be appropriate.

There are a variety of technologies that can provide even more services which shows that solar and storage can be used for many different purposes. For example, electric water heaters can act as a form of thermal storage and support demand response products or other ancillary services as needed. Different types of battery storage products can respond at different time intervals depending on the specific grid need—response rates can occur as fast as every cycle, and durations can last from seconds to hours, depending on the type of battery or storage product.

The use and needs of customers will vary, and policies should reflect this. However, some rational customer activities may not be currently allowed or allowable under existing rules or laws. Energy aggregators who work directly with customers to provide energy solutions should be allowed to aggregate customer products, such as demand response, local generation, voltage support or other local or grid-wide services, and offer them to the utilities as a product or service. This would also allow for customers to better engage in arbitrage to more effectively manage their usage and their bills.

The state should consider the following options to identify appropriate services and compensation methodologies:

• Direct the PUC to open a proceeding to identify services that can be procured, valued, and compensated from distributed energy resources
• Encourage municipal and cooperative utilities to identify services that can be procured, valued, and compensated
• Allow third-party aggregators to operate in Colorado to provide aggregation services of behind-the-meter installations
• Direct the PUC and municipal and cooperative utilities to report on barriers, including lack of enabling technology, and a plan for mitigating those barriers for distributed energy resources
Principle 6: Adjust rate designs to better align cost and value of services

Rates serve several purposes in the utility industry. Notably, rates are the means by which the utility recovers its authorized revenue requirement, but rates can also be used to signal to customers that they should avoid using electricity during some hours or that it is ok to use more electricity in other hours. More dynamic rates can be more aligned with real-world conditions across the electricity grid. However, most customers across Colorado do not see a price signal as their rates are flat – that is, the customer pays one price for electricity no matter what time of day or year that electricity is used. The flat rate masks the costs of service and limits the ability of the customer to realize greater savings from installing storage (by avoiding a higher rate), and potentially participating in a program or service where the customer can use storage as a solution to high cost periods (see Principle 5).

The movement to other rate designs will not only provide customers a better sense of the cost to serve, but can also encourage adoption of technologies, such as storage, at a faster pace than if there were no price signals. In the long run, these prices may also change based-on a location for areas where there are constraints, and can be used as a source for determining potential non-wires alternatives.

Municipal and cooperative utilities should be required to follow state laws regarding non-discriminatory rates for net energy metered customers, as several currently do not. To remove utility disincentives to charge time-of-use rates that can reduce long-term capital investments, polices that promote competition or welcome self-generation should be instituted. The PUC should open a proceeding to investigate alternative ratemaking schemes, such as the use of performance-based ratemaking where the utility continues to recover a portion of its revenue requirement via traditional means (capital investments) but has a portion of its revenue tied to how well it performs relative to certain goals or metrics. Many states, including Colorado, have similar mechanisms in place related to energy efficiency performance-based ratemaking, but this model would be expanded to include issues such as how well the utility integrates storage, how fast it reduces carbon emissions, how satisfied its customers are with service, or how quickly an interconnection request is processed. Moving to a performance-based ratemaking model can provide sufficient revenue to keep the utility whole without suffering severe profit shortfalls due to lower sales volumes resulting from increased self-generation and competition.

Lastly, rate design also plays a role in the adoption of electric vehicles. EVs can act as a mobile storage device when there is a sufficient amount of information exchanged among the vehicle, the charging infrastructure, and the utility. EVs are considered paramount to the realization of a statewide move to a cleaner transportation sector, and with growing adoption rates, better management will be needed to ensure the EVs are charging during hours with plenty of available supply, but also at locations without identified constraints.

The state should consider the following steps to better align costs with service:

- Direct the PUC to open a proceeding to consider rate design options for customers, including the development of principles for rate design to support distributed energy resources
- Direct the PUC to open a proceeding to consider performance-based ratemaking
- Direct the PUC to open a proceeding to develop an EV tariff, including necessary technological and communication requirements with the meter and charging equipment
- Consider a moratorium or elimination of demand charges for Level 3 Fast Chargers for a specific time period or usage, so that clean energy solution providers are incentivized to deploy chargers sooner rather than later
- Direct utilities to finding creative ways to encourage consumers to purchase electric vehicles
Principle 7: Build a network for the future

In order to make an electric system that is reliant on wind, solar, and storage operational without impacting reliability, the distribution monopoly will need to invest in new technologies, undertake new operational characteristics, invest in robust communications and sensoring networks, and plan the system in a new way, without stranding investments already paid for by customers. Electricity distribution planning can no longer stay solely within the realm of utility engineers, but must start integrating with other utility functions, such as transmission planning and integrated resource planning. These processes must utilize similar forecasts and scenarios and be informed by each other. Developing a more integrated distribution plan is necessary to ensure that utility investments are coordinated and are being made consistent to customer adoption trends, and the 2040 goal.

Additionally, this evolution to relying on solar, wind, and storage means that the distribution system must be operated in a two-way manner and be optimized in real time. Investing in the necessary sensors and measuring technologies will allow the utility to have the information necessary to efficiently operate its system. This information is also useful to storage developers in identifying locations across the system where storage can benefit the system to ease constraints, enhance hosting capacity, and provide additional services as warranted.

Even more importantly to the system and the customer, nearly all solar installations come equipped with advanced inverter capabilities that, when enabled under the interconnection agreement, can address several of the operational challenges that solar can impart upon the distribution system. For example, the advanced inverter, if properly incentivized, can modulate voltage variability, to allow the solar to continue to produce during poor voltage events, and re-direct electricity into the customer’s premises during a local outage.

The result is that the distribution system will be conceived as a network. This distribution network connects products and services with customers and delivers the services across its wires to the benefit of individual customers, but also to society. By thinking of the grid as a network, users can recognize it as something new and different. The grid is no longer simply delivering electrons to a passive customer; it is now enabling the procurement of products and services. Customers will not only still receive the benefit of electricity, they will also be able to engage with the utility (and other customers) by sending electrons back into the system for others to consume. This changes the relationship to one where the utility and customer can engage in several additional arrangements and enables better use of resources, to maintain and enhance reliability and keep it affordable for all.

The state should consider the following polices related to the upkeep of the distribution system:

- Require the PUC to open a proceeding to develop requirements for utility distribution system planning
- Require all utilities to develop detailed, feeder-level, hosting capacity maps, with regular updates
- Update the requirements for any new utility investment that goes through the prudency process to include a robust showing of alternatives that were considered, including solar and storage, and an explanation for why they were ultimately not selected
**Conclusion**

Recent announcements by Public Service Company of Colorado and the Platte River Power Authority underscore the reality that a clean energy future is possible. The question facing Coloradans is how will we get there? Open and competitive markets are a proven way to ensure a rapid deployment of capital and efficient allocation of resources.

Colorado policy makers have an opportunity to lead the country in the transition of the electric power sector, but changes are needed to the current statutory and regulatory environment. Following these seven core principles, Coloradans across the state will benefit from cleaner air, lower electricity prices, and more control over their energy choices.