



GAIN

Gateway for Accelerated
Innovation in Nuclear

Trends in State-Level Energy Markets and Policy: Colorado



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**ENVOY
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**National Strategy for Establishing
Relationships with Utilities/End-Users
Colorado**

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Executive Summary

Introduction

Since July 2018, the Gateway for Accelerated Innovation in Nuclear (GAIN) has supported the *National Strategy for Establishing Relationships with Utilities/End Users*. Direct engagement, in targeted states, with the electric utility industry (EUI) and a broad set of stakeholders has yielded a detailed picture of the ecosystem in which generation planning takes place. From this picture, GAIN has begun to build an understanding of what information utilities need to assess advanced nuclear technologies, and how to provide that information. Broad deployment of advanced reactors into the US market will require well-informed customers who can see value in the technology as part of a clean, resilient resource portfolio. Doubt about whether the US customer base was well-enough informed about advanced reactor technologies was first raised at the March 8-9, 2018 symposium, *Enabling Advanced Reactors for the Market*, sponsored by GAIN in partnership with the Nuclear Energy Institute (NEI) and the Electric Power Research Institute (EPRI). A subsequent pilot study in Minnesota and follow up study in Arizona both found that most utilities and key energy stakeholders, including environmental and ratepayer advocates, state regulators, and legislators, did not have sufficient information to properly evaluate advanced reactor technologies. GAIN is well-positioned to serve as a conduit for resources from the US national laboratories to potential customers of advanced reactor technologies; a more informed US customer base will better enable the US market for commercial deployment of advanced reactors.

To support GAIN's role in fostering awareness and knowledge of advanced reactor technologies amongst potential customers, four additional states were selected for direct engagement: Colorado, North Dakota, Washington, and Wyoming. Colorado was selected as a target state due to its rapid transition away from fossil fueled generation to a deeply decarbonized economy. The state passed the Clean Action Plan in 2019, an aggressive, economy-wide decarbonization measure, which aims to eliminate 90% of carbon emissions from the state's economy, focusing on the electric sector in the 2020's. Colorado boasts strong renewable resources, a robust workforce, and the presence of technical universities that have supported a progressive shift in Colorado's politics, and makes it an ideal state for a high-tech sector like advanced nuclear. The coming decades will require a significant deployment of flexible, carbon-free electricity to meet the state's electrification, carbon policy, and load growth needs. The study included twelve respondents from across Colorado, including various utilities, NGOs, and state officials. As with previous studies, respondents were asked questions regarding their power procurement and communications methods, as well as their policy interests. Questions were also asked to gauge respondents' knowledge and sentiments regarding advanced nuclear energy; questions were included to specifically understand the impacts of two separate legacy nuclear issues involving weapons waste and a default on public financing, respectively. The ultimate goal of the preliminary engagement completed by this study was to better understand the circumstances and challenges facing the EUI and its stakeholders in Colorado, while identifying opportunities for GAIN and positioning it as a resource for utility planners and state-level utility stakeholders.

Key Findings

- **Changing market structures, rapidly decarbonizing energy systems, and strong state-level policy are creating an environment that will challenge the traditional nuclear business model.** Particularly in Colorado, smaller utilities are gaining access to wholesale markets and distributed generating technologies, allowing them to operate independently of larger, more capitalized utilities. This trend is expected to accelerate throughout the rest of the West. Advanced reactor developers will need to be prepared to navigate changing market structures.
- **Sweeping greenhouse gas legislation is currently overhauling the regulatory environment in the state.** Building on the success of an ambitious renewable portfolio standard and other clean energy policies, Colorado is embarking on a plan that would decarbonize its electric sector by 2050. To meet the state's carbon goals, utilities are planning near term compliance with renewables, while acknowledging longer term uncertainty about how to completely decarbonize.
- **Despite market and policy conditions that could create an opportunity for commercial deployment of advanced reactors, a lack of engagement in the state has left advanced nuclear technologies out of policy and stakeholder plans.** The combination of carbon constraints, a growing population, and electrification will support load growth and the adoption of carbon-free generation. With a state-wide interest in pursuing advanced technologies and new industries, these conditions could support the mid-term deployment of ARs.

Results

The Colorado electricity market is being shaped by a number of favorable factors that make it a potentially attractive market for new power plant construction. With one of the most educated workforces in the country, the state enjoys a vibrant, diversified economy. This includes a strong energy sector, with substantial in-state production of coal, oil, natural gas, bioresources, wind, solar, and limited amounts of hydro. Colorado, particularly the Front Range around Denver, is experiencing relatively rapid population growth, which can support long-term load growth. With a state-level desire to develop competitive industries of the future, the state has passed strong supporting policies for renewable energy development. Voters initially passed a renewable portfolio standard by ballot referendum, which has been strengthened by the legislature several times to lead to almost 20% of 2020 generation coming from wind, solar, and other renewables. As costs have declined and the state's politics trended progressive, this focus on clean energy technologies has now moved towards a focus on decarbonization. A major suite of bills passed in 2019, led by the Climate Action Plan, promises to accelerate the state's energy transition and make it a national leader in economy-wide decarbonization. Electrification of transportation and other sectors could further boost load growth. These supportive climate policies are being implemented at the same time that the state's electric structure is in midst of systematic change. The rise of scalable and distributed renewable options has given small towns and cities the

opportunity to own their own generation for the first time. Though the state has yet to embrace full ISO/RTO membership, most utilities will soon be participating in energy imbalance markets run by CAISO or SPP. The spread of wholesale power markets and local options for electricity supply has led to a push for city municipalization in investor owned utility service territories and to distribution cooperatives defecting from the larger Tri-State cooperative.

Nuclear interests generally, and advanced nuclear stakeholders in particular, have been absent from the policymaking shaping the state's energy future. Nevertheless, the state is a prime candidate for future AR deployment due to its educated workforce, focus on new industries, growing population, potential for load growth, opening of electricity markets, and strong climate policy. In the near-term, most utilities are focused on building wind, solar, and battery storage to meet their 2030 decarbonization goals. However, longer-term decarbonization of the electric sector will require dispatchable, firm resources like ARs, especially if large transportation electrification materializes. The state has two major legacy issues, the unsuccessful high-temperature gas reactor at Fort St. Vrain and military waste at Rocky Flats, with the cost overruns of the former looming largest in stakeholders minds. The primary criterion for utilities to adopt ARs will be economic competitiveness and may require nth-of-a-kind designs and government financial support in order to temper construction risk. Unique resilience needs at military bases in the state could present first-of-a-kind market opportunities. AR developers should also be aware of the paramount importance of having flexible dispatch and the ability to integrate with high amounts of variable renewable energy. Water concerns were also identified as a major concern by state stakeholders as the state, already semi-arid, faces worsening water stress due to climate change and population growth.