



GAIN

Gateway for Accelerated
Innovation in Nuclear

Trends in State-Level Energy Markets and Policy: Arizona

Prepared by
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Arizona

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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 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 confirm findings from Minnesota, as well as support GAIN's role in fostering awareness and knowledge of advanced reactor technologies amongst potential customers, a second study was conducted in Arizona. Arizona was selected as a target state because of its relatively high amount of retiring baseload facilities, high population growth rates, the existence of a large extraction industry, high potential for state-level changes to energy policy, and the existence of high-profile, current-generation nuclear (Palo Verde). One Arizona IOU, two cooperatives, one municipal joint action agency, one public power district, one regulator, two non-profit environmental advocacy organizations, one state representative, one state senator, and two consumer advocacy organizations participated in this study. As with the pilot study, respondents were asked questions regarding their power procurement and communications habits, 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 legacy nuclear issues in the state, particularly those involving uranium mining near the Grand Canyon. 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 Arizona, while identifying opportunities for GAIN and positioning it as a resource for utility planners and state-level utility stakeholders.

Key Findings

- **Developers of advanced nuclear technologies are conspicuously disengaged from broader utility planning processes, which increasingly involve external energy stakeholders.** Advanced nuclear technology developers lack critical relationships with the Arizona Corporation Commission (ACC), the state’s chief energy authority, and its regulatory stakeholders. Long-term resource planning decisions that require at least tacit acceptance by multiple stakeholders are being made without input from advanced nuclear developers or adequate information about improvements in the technology.
- **The potential for advanced reactors to replace retiring coal assets in the coming decade is extremely limited.** Major power producers in the state have anticipated looming carbon regulation, retiring more than half of the state’s coal fired capacity by late 2020, and are committed to plans that replace coal with other forms of generation. The perceived high cost of advanced nuclear, in lieu of hard cost data and/or assumptions provided by AR developers, has precluded advanced nuclear technologies from serious consideration outside of scenarios mandated by the ACC.
- The ACC is finalizing rulemaking that will establish a 100% Clean Energy Standard (CES) by 2050. **Generating utilities, at the request of the ACC, are developing scenarios that incorporate advanced nuclear reactors but lack adequate data and communication from developers to validate assumptions about the cost of new nuclear.** Direct outreach and bilateral engagement with utilities must be an urgent priority for developers of advanced nuclear reactors, as Arizona’s EUI lacks critical trust and relationships with the advanced nuclear industry.

Results

Most of the electricity generated in Arizona is provided by a few key, large utility organizations that provide retail electricity to metropolitan areas and engage in partnerships with smaller, distribution-focused utilities to serve the state’s rural areas. Arizona Public Service (APS) and Salt River Project (SRP), the two largest utilities in the state, participated in this study; Tucson Electric Power (TEP), the state’s third-largest utility provider, declined participation. In addition to large utilities, smaller municipal and cooperative utilities were examined. Together with a broad set of policy stakeholders including environmental and ratepayer advocates, as well as state regulators and legislators, the participants interviewed in this study provide a full snapshot of Arizona’s unique energy policy and planning ecosystem. Arizona is predicted to have higher than average population growth, with the Phoenix metropolitan area projected to grow at twice the national average and with the Tucson metropolitan area expected to keep pace with the national average through 2024. Despite expected declines in rural load growth due to population and mining industry loss, load growth estimates for the largest generating utilities in the state

are expected to rise 6,000 - 14,000 MW by the middle of the 2030s. With retirements in the state's baseload coal generation fleet expected in the coming decades, natural gas is, and will continue to be, the option of choice for Arizona energy planners and regulators when contemplating cheap, reliable baseload in the future. Arizona's energy planners have resisted participation in a regional market, such as CAISO, but discussion of entry into a regional energy market has followed the decisions of several surrounding states to move forward with aggressive clean energy targets. Arizona is poised to move forward with its own ambitious decarbonization plan following over two years of rulemaking processes undertaken by the Arizona Corporation Commission (ACC), the state's chief regulator and originator of energy policy. The region's patchwork of regulation impacts the ownership of Arizona's lone existing nuclear-generating asset, Palo Verde Nuclear Generating Station (Palo Verde), and could be a complicating factor in the deployment of advanced reactors in Arizona and the region. Moreover, historical water usage and legacy uranium mining issues further shape a complex political landscape that advanced reactor developers will have to navigate en route to commercial deployment in the state.

Interviews with energy planning and policy stakeholders in Arizona revealed a high level of familiarity with advanced nuclear technology generally, but extremely limited specific knowledge of the technology and no plans for its deployment. In 2018, the ACC required the state's two regulated utilities, APS and TEP, to incorporate advanced nuclear technology in their IRP processes. However, due to a lack of publicly available cost and implementation information for next generation reactors, costs and timeline projections from current- and legacy-generation nuclear reactors are being widely used in the processes, inevitably making new nuclear construction in Arizona unfeasible. Cost remains a chief concern for all utilities; the lack of basic information about cost and design improvements of advanced reactors has bred a general skepticism of the technology amongst utility/end users, as well as key energy-policy stakeholders. As the ACC charts the course for the state's energy future, engaging in effective and thoughtful communication with key energy stakeholders in Arizona will be critical for the nascent advanced nuclear industry. Political factors and high competition from renewables, gas, and battery developers threaten the entry of advanced nuclear technology into the market. However, Arizona has lagged behind many other states in their solar capacity despite having the best solar resource potential in the country. The recent closure of Navajo Generating Station headlines the retirement of coal facilities in Arizona as the state's major utilities position themselves to meet their respective, announced mid-century decarbonization goals. Growth in energy-intensive sectors like extraction and technology, coupled with high population and economic growth projections, make Arizona an attractive market for commercial deployment of an advanced reactor. Interested customers with experience in ownership of nuclear-generating assets exist in the state; additionally, the potential for remote and mining applications are noted, but are beyond the scope of this study. Further outreach to Arizona's industrial and mining communities could reveal more insight into potential customers of advanced nuclear technology.