INVESTING IN ARIZONA'S FUTURE: DRIVING EQUITABLE, LOW-CARBON ECONOMIC GROWTH

C2ES CLIMATE INNOVATION 2050

by

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The Center for Climate and Energy Solutions is hosting a series of regional roundtables to bring together local, state, and federal policymakers; businesses of all sizes; community organizations; leading academics and issue experts; trade associations; investors; and philanthropy. These conversations are meant to elevate the perspectives of a diverse set of stakeholders deeply embedded in their communities and uniquely positioned to speak to the needs of their states and regions. They are also meant to create opportunities to integrate local perspectives into state and federal policy contexts and, importantly, identify concrete steps to better align the long-term vitality of these communities with the urgent task of facilitating economy-wide decarbonization. Following the discussion, along with subsequent discussions with key stakeholders, C2ES has compiled a series of policy recommendations for state and federal policymakers to help meet urgent local needs and realize the discrete economic opportunities communities can maximize through the transition to a net-zero economy.

INTRODUCTION

REGIONAL ROUNDTABLES

Achieving net-zero emissions will require large-scale change across all sectors of the economy, and efforts to accelerate this transition are intensifying. Yet these changes—and climate change itself—have already begun to profoundly alter social, economic, and political realities in communities across the country. To chart a pathway to sustainable, long-term prosperity, communities must be able to leverage their unique strengths and capitalize on emerging economic opportunities, while addressing barriers that are often poorly understood outside of the communities in which they occur. As companies make significant commitments and investments in low-carbon technologies and the facilities and workers who will produce them, policymakers have sought to identify approaches that can benefit communities

and businesses alike. Doing this well requires engaging directly with communities to not only understand their unique challenges, but, perhaps more importantly, the future they want to chart for themselves.

Our second roundtable of 2021, held virtually "in" Arizona, brought together more than ninety stakeholders to consider how the state's power sector, economy, and residents can thrive in a decarbonized future. This brief includes key takeaways from the event and a series of recommendations meant to align climate and economic objectives in Arizona. These recommendations are based on the roundtable discussion itself, as well as consultations with stakeholders before and after the event.

FRAMING ARIZONA

Arizona is undergoing a period of rapid development and, thanks to Phoenix being the fastest growing city in the country over the past decade, is the 9th fastest growing state.[1] It is in the midst of an energy transition, as the coal resources that have contributed to the state's growth are retired and communities search for alternative economic drivers. The effects of climate change have also been impacting Arizonans, including aggravated drought, intensifying extreme heat and wildfires, and worsening air quality, all of which tend to threaten marginalized communities most acutely.

Fortunately, the state possesses significant assets that equip it to address these challenges, while meeting the needs of its growing population. Arizona is home to booming technology and manufacturing industries that will be critical to addressing climate change, a strong university system, a skilled energy workforce, some of the highest renewable resource potential in the country, mineral wealth, and more. These assets make the transition to a low-carbon future a crucial opportunity for Arizona that will bolster the state's long-term economic development, resilience to climate change, and public health. Thriving in that low-carbon future, though, will require proactive investments today.

Framing the discussion

The roundtable discussion, which took place virtually over two days in August 2021, welcomed more than 90 participants to explore the following themes: the role clean power can play in spurring economic growth and resilience in Arizona; how to ensure Arizona's energy transition benefits all communities; and the way policy can help the state take advantage of low-carbon energy opportunities. Attendees expressed optimism about the leadership role Arizona can play in a low-carbon economy, as well as the economic benefits it can gain by doing so. Still, the group acknowledged the challenges that must be addressed to enable Arizona to play that leadership role and the supports that must be put in place to ensure all communities benefit equally from low-carbon investments.

This brief will summarize key takeaways from the roundtable and, building on insights from the event and dozens of conversations with stakeholders, provide recommendations developed by C2ES for local, state, and federal policies that would help Arizona succeed in a low-carbon future.

KEY RECOMMENDATIONS

C2ES has identified a set of key policy recommendations with input from stakeholders at the roundtable that would reduce greenhouse gas emissions while advancing equity and economic development in Arizona.

Coordinate governance and plan proactively

- create statewide plans for climate change mitigation, resilience, and clean energy deployment
- explore the re-establishment of a statewide energy office to help plan and direct clean energy investments and guide just transition conversations
- clarify state agencies' jurisdiction over climate-related issues, including mitigation and resilience, and more holistically integrate a focus on climate change across relevant agencies
- direct state and federal resources to tribes to support strategic clean energy planning and investments and build out their local capacity
- undertake robust and accessible tribal consultation and uphold tribal sovereignty and consent in policy and regulatory decision-making and project planning.

Improve infrastructure

- coordinate infrastructure investments across urban, rural, and tribal areas in ways that provide mutual benefits, streamline planning, and enhance equity
- invest in enabling infrastructure in underserved communities, including broadband access, grid connectivity, water infrastructure, road access, and

cell phone service, which can enable communities to fully participate in and benefit from the transition to a low-carbon economy
- work closely with communities to invest in repurposing legacy fossil infrastructure in ways that allow for future growth
- enhance transportation electrification and mobility in rural areas
- evaluate the available options and benefits of participating in a western regional transmission organization (RTO), including whether participation could enable Arizona to be a key clean energy provider throughout the west.

Low-carbon innovation and technology

- support piloting new energy technologies, including via financing and technical assistance, to test their viability and draw emerging growth industries to Arizona
- fund local energy resilience pilot projects, such as microgrids or solar plus storage, that can increase energy independence and reliability in tribal and low-income communities
- expand incentives for clean energy deployment.

A just and equitable transition

- create a flexible, yet replicable framework for coal plant and mine closures governed by the Arizona Corporation Commission that includes support to affected communities and employees, tailored to unique local needs
- direct state resources to planning and providing support for a just energy transition
- invest in workforce development programs that can help coal workers apply and expand their skills in growth industries.

KEY TAKEAWAYS FROM THE DISCUSSION

The discussion at the regional roundtable explored the risks Arizona faces as a result of climate and energy challenges; the opportunities Arizona has to leverage its assets to spur both decarbonization and economic development; and the needs that must be met to allow the state and its communities to take advantage of those opportunities.

RISKS

Climate impacts

Roundtable participants emphasized that Arizona is already facing the impacts of a changing climate, including extreme heat, drought, and wildfires. Of all western states, Arizona is projected to experience the greatest increase in high wildfire potential days by 2050, with the second-largest population living in the wildland-urban interface following California.[2] This wildfire risk is fueled in part by a growing "megadrought", which in 2021 reached the worst conditions on record due to poor precipitation and reduced snowpack.[3] As Arizona's climate becomes drier, it has also gotten hotter, with mean annual temperature increasing roughly 1.25 degrees F since 1920.[4] While that increase may appear small, it has had real implications for health. In 2020, for example, Maricopa County saw 323 heat-associated deaths, a more than 1,400 percent increase from 2001, with the majority of those deaths occurring among homeless individuals and those 50 and older.[5] The disparities of extreme heat are also evident along racial and class divisions. In Phoenix and Tucson, average temperatures are up to five degrees F warmer in neighborhoods with large Latino and low-income populations, compared to wealthier, whiter areas, due in part to fewer shading trees in these neighborhoods.[6]

Climate-fueled heat is also likely to exacerbate Arizona's air quality challenges, as warming can increase ground-level ozone and more frequent wildfires increase particulate pollution in surrounding areas.[7] Already the Phoenix metropolitan area ranks among worst in the nation for unhealthy ozone days and year-round particulate matter pollution, and multiple other areas in Arizona are in a state of nonattainment, meaning they consistently exceed National Ambient Air Quality Standards.[8] With higher levels of air pollution come serious implications for public health, as well as challenges for economic development.[9] If areas in Arizona continue to be in nonattainment, they will need to implement more

stringent compliance requirements for local businesses. Businesses that will be a major source of emissions must attain credits to operate, but credits are increasingly sparse in Arizona, notably in Maricopa County.[10] Without serious statewide efforts to reduce air and climate pollution, such as through transitioning to renewable energy or transportation electrification, Arizona's economic growth may be constrained by a lack of clean air.

Several of these climate impacts have implications for Arizona's transition to a cleaner energy system. For instance, growing extreme heat heightens the need for reliable power to supply air conditioning, as well as the imperative to maintain electricity affordability, especially for low-income households that face a higher energy burden. Decreases in Arizona's water availability will directly affect both energy production and use, given that energy generation can consume large amounts of water and that more power will be needed to pump water from greater depths. Utilities, government, and others would benefit from considering these implications when addressing climate challenges to ensure synergistic energy and climate adaptation planning.

Worsening climate change, coupled with a growing population in Arizona, means these impacts are projected to worsen in the coming years. Without proactive planning and government investment in both climate mitigation and adaptation, these effects can have serious implications for the future livability, health, and prosperity of Arizona.

Undermining Arizona's business competitiveness

Arizona takes a "business first" approach to economic development and has made efforts in recent years to attract companies to the state by reducing regulations and tax rates.[11] But as private sector markets increasingly turn to low-carbon business models and the impacts of climate change grow in Arizona, the state's competitiveness as a business destination will directly mirror its success in mitigating and adapting to climate change.

Companies are under increasing pressure to integrate climate into their business decisions. Large investors have begun demanding that companies address climate-related risks to their businesses, including their supply chains; consumers are showing growing preferences for sustainable products; and employee climate activism is on the rise. [12] With these pressures on the private sector, more and more companies are making significant climate commitments and moving aggressively to reduce their emissions. One-fifth of the world's largest public companies now have a net-zero emissions target, while 63 percent of Fortune 100 companies have a public renewable energy procurement commitment.[13] These goals directly influence companies' business and investment decisions, including the communities in which they locate facilities and hire employees.

In this context, states' investments in clean energy and climate action can serve to attract businesses by providing an enabling environment for them to reach their goals. But Arizona currently offers a less competitive destination for the increasing number of climate-minded companies compared to its neighbors. For instance, in a 2020 index by the Retail Industry Leaders Association ranking states by the ease with which companies can procure renewable energy, Arizona placed 32 out of 50, lagging far behind surrounding states.[14] New Mexico, Nevada, California, and Utah all ranked in the top ten due to factors including strong utility purchasing options, market structure, and enabling policies such as robust renewable portfolio standards (RPS). Indeed, while Arizona has a RPS, it lacks ambition relative to its neighbors, requiring electric utilities to generate just 15 percent of their energy from renewable resources by 2025.[15] While the Arizona Corporation Commission had spent over five years considering updates to this policy that would have moved Arizona to 100 percent carbon-free energy, the ACC recently voted down that proposal, leaving the existing RPS in place.[16] Meanwhile, neighboring states' policies reflect both the urgency needed to address climate change and the competitive advantage they can gain as companies look to procure clean energy. New Mexico and California both require 100 percent zero-carbon or clean electricity by 2045, while Nevada and Colorado are required to reach 100 percent by 2050.[17] In the future, Arizona may be at a competitive disadvantage if the state's climate and clean energy ambitions continue to lag behind those of its neighbors and the private sector.

Exacerbated inequities in the low-carbon transition

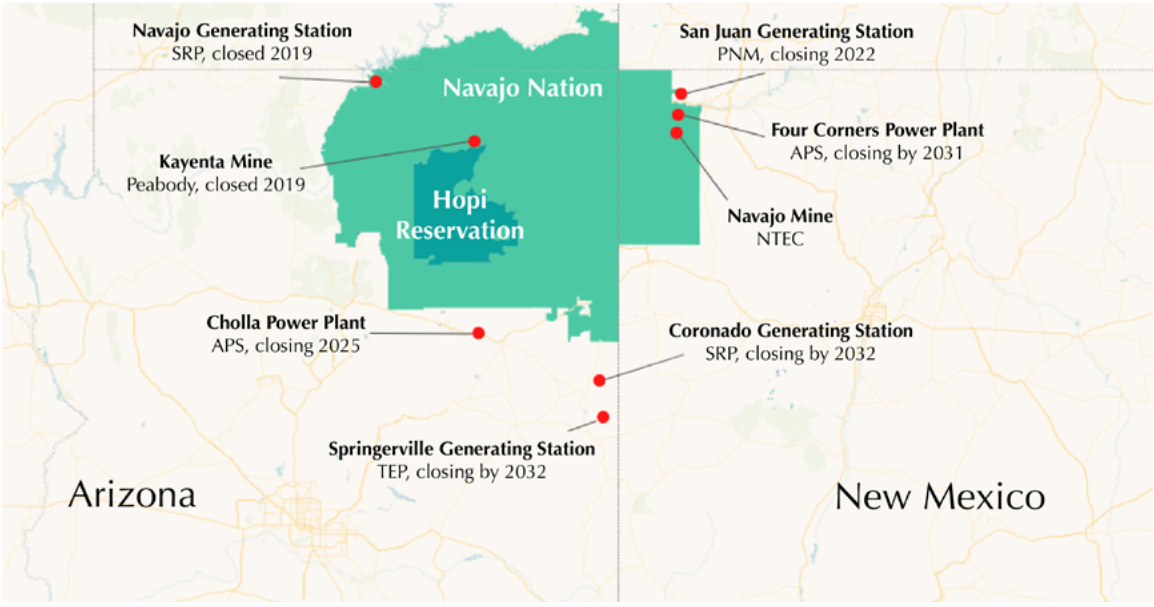
Although the shift to a low-carbon future is a climate imperative, without proper planning and equitable investment, this transition risks leaving behind certain communities and exacerbating existing inequalities.

This risk is perhaps most evident in Arizona's energy transition. While the state has long been powered largely by nuclear and coal energy, coal generation now amounts to only a fraction of what it once was, due

largely to the closures of the Navajo Generating Station (NGS) in 2019, the largest coal-fired facility in the state, and its accompanying Kayenta mine.[18] These closures have had profound impacts on affected communities and workers. The Navajo Nation's annual budget is estimated to have been cut by roughly 23 percent following the closure of NGS, while the Hopi Tribe lost more than 80 percent of its total general fund.[19] In surrounding rural towns, NGS's closure has meant shrinking budgets for schools, hospitals, libraries, flood and fire controls, and other services.[20] Several hundred direct employees have also been impacted by the closures. While Salt River Project (SRP) has provided job relocation opportunities to workers—most of whom are Navajo—roundtable participants reported that the decision to move away from home is difficult for employees, and many may choose not to leave.[21]

These broad-reaching impacts have come with the closure of just one large rural plant and its associated mine, but more planned shutdowns, as illustrated in **Figure 1**, will occur in the next decade in Arizona: the APS-owned Cholla plant in Joseph City will shutter in 2025, the SRP-owned Coronado plant in St. Johns will close by 2032, and the TEP-owned Springerville plant will cease operations by 2032.[22] Just across the border in New Mexico, two additional coal plants are set to retire in the next decade, with implications for Arizonan communities and utilities involved in these projects.[23] While utilities, regulators, and affected individuals have more time to prepare for these closures than they did for NGS, roundtable participants still stressed the need for proactive, inclusive planning and investments that can prepare communities to find new sources of revenue and employment before closures occur. Without this planning and support, coal communities risk being left behind by the transition to a low-carbon economy. An unplanned and uncoordinated transition also risks inequitable distribution of benefits to affected communities and workers, as it allows individual utilities to set the terms of their transition with little oversight from a governing body, making it likely that communities will have dramatically different transition experiences.

Figure 1: Map of coal facility closures



Multiple coal facilities have closed or are slated to close in the coming decade. These closures will have significant implications for the Arizona communities that rely on their economic benefits.

Basemap Source: Google Maps, Carto

The closure of NGS, coupled with anticipated future closures, has laid bare the vulnerability communities have when reliant on a single industry. As communities search for new sources for employment and revenue in the years to come, they run the risk of replicating similarly precarious project models in new industries. Roundtable participants emphasized that one-for-one replacement of coal with another single industry is not a viable economic development solution for transitional communities. For the low-carbon transition to create long-term community benefits, economic diversification needs to be a central goal.

Outside of coal closures, other aspects of the low-carbon transition risk creating inequitable access and distribution of benefits without intentional planning. For instance, electric vehicle (EV) charging stations are often placed in cities because of high population density: in Arizona, more than 70 percent of the state's 860 public EV charging stations are concentrated in greater Phoenix, Flagstaff, and Tucson, with minimal coverage for rural Arizona.[24] Other decarbonization tools, such as rooftop solar panels, are primarily available to homeowners rather than renters, making them inaccessible to many low-income households. In planning to ramp up these and other climate solutions, it is important that diverse stakeholders are at the table to express their unique needs, and that policymakers pursue investment and policy decisions in ways that allow all communities to access the economic, social, and environmental benefits of the transition to a net-zero economy.

OPPORTUNITIES

Leverage Arizona's clean energy resources

While the previously described risks pose challenges for Arizona's growth, fortunately, the state possesses assets that can enable it to effectively address these risks, mitigate and adapt to climate change, and lead on clean energy. Arizona has the second-greatest solar potential in the United States, significant geothermal potential on tribal lands, the largest nuclear plant in the nation, and expansive biomass resources in the northern part of the state.[25] These clean electricity resources can act as an economic multiplier for Arizona, attracting new businesses to the state that will create jobs, improve public health, enhance local resilience, and bolster equity.

As discussed in the business competitiveness section, an increasing number of companies are setting goals for renewable energy procurement. We heard from roundtable participants that companies in Arizona already recognize the competitive advantage that clean energy investments can offer the state: major companies including Google, Microsoft, Apple, Siemens, and others wrote to the Arizona Corporation Commission in 2021 in support of updated clean energy standards, noting they would provide "policy certainty" for companies seeking to make long-term sustainable investments in the state.[26] Other large businesses have made procuring clean energy a central component of their Arizona operations, including Intel, who has established both on-site solar generation and clean energy purchase agreements for their Chandler, Arizona, campus.[27]

Clean energy can offer benefits not only to Arizona's businesses, but to its residents as well. A 2020 report found the gross benefits of Arizona's existing renewable energy standard amounted to nearly $2 billion from 2008-2018, including $246 million in health benefits from reduced air pollution; $309 million in societal benefit from avoided carbon dioxide emissions; and a savings in water consumption of more than 7,000 acre-feet per year.[28] These benefits accrued even with a relatively modest renewable energy standard. In examining future clean energy proposals, decision-makers should consider not only costs, but the full range of benefits clean energy creates, including the ways it can help Arizona respond to the growing impacts of climate change, such as drought and air pollution.

For tribes, clean energy presents an opportunity to grow energy independence and promote economic development. Arizona's tribal lands have some of the most significant renewable energy potential in the country, but these resources have been largely untapped due to challenges accessing finance and a lack of tribal government capacity, among other barriers.[29] Three of the top five tribes with the greatest solar potential in the nation are in Arizona (the Navajo, Tohono O'odham, and Hopi reservations, respectively), while the Navajo and Tohono O'odham nations also lead the country in geothermal potential for tribal lands.[30] Clean energy projects located on these reservations can attract business investment, provide jobs, promote local electrification, and help tribal nations recover from the loss of coal projects.

Spur low-carbon innovation

Arizona is a leader in innovation, with Arizona State University (ASU) ranking as the most innovative university in the country for the past seven years and Phoenix scoring among the world's top 100 cities for innovation in business.[31] Building on this record of innovation, roundtable participants noted that Arizona has an opportunity to establish itself as a proving ground specifically for groundbreaking low-carbon technologies, helping attract new businesses and grow jobs in the state.

Arizona is showing signs of a growing low-carbon innovation ecosystem. Phoenix and Tucson rank as the No. 22 and No. 39 top cleantech innovation hubs in the United States, respectively, showing potential, but room to grow.[32] The state has quickly become a hotbed for electric vehicle and hydrogen trucking manufacturers and hosts numerous microchip companies that are critical enablers of low-carbon technologies. Existing energy assets are also being leveraged to test cutting-edge processes. For instance, the U.S. Department of Energy is using the Palo Verde nuclear plant for a hydrogen generation demonstration project, which can serve to attract additional hydrogen businesses to the state.[33] As private sector commitments for clean energy and climate action grow, Arizona can scale up these efforts to become a low-carbon innovation destination.

Roundtable participants expressed interest in pursuing microgrids in Arizona as a potential growth market. With a number of remote communities either lacking grid connectivity or facing unreliable electricity service, and with extreme heat intensifying the need for reliable power to critical infrastructure, Arizona is a prime candidate to test innovative microgrid applications. Two existing pilot programs have already provided benefits to both the areas serviced and the regional electric grid.[34] Future microgrid applications on remote tribal lands could increase energy independence and service reliability, while projects in urban areas could help ensure cooling centers and hospitals never go without electricity in heat waves. Such pilots could help utilities, regulators, and communities better understand microgrids' costs and the full range of their potential economic, health, and environmental benefits.

In addition to testing microgrid applications, Arizona can become a proving ground for innovative mobility and EV charging approaches, which could then be scaled throughout the country. The state government's promotion of EV and self-driving technologies, coupled with a growing network of electric vehicle manufacturers, could put Arizona at the forefront of low-carbon mobility systems. By fostering an ecosystem for testing new concepts such as these, Arizona can establish itself as a national leader in climate tech innovation. This innovation can attract new companies, drive job growth, and promote economic development across the state.

Any investment in innovation requires technical, policy, and financial support to ensure that pilot projects, demonstrations, and startups lead to long-term deployment of new technologies and associated job creation. Programs such as technology incubators or clean energy accelerators can help advance new technologies and expand their local economic benefits by establishing an ecosystem that can draw employers and innovators to the region.

Build a workforce for the future

As the closure of NGS illustrates, the transition to a low-carbon society is already underway and will undoubtedly have implications for Arizona's workforce. Policymakers must actively plan for this low-carbon future to both avoid risks to the state's economy that may arise during the transition and to fully capitalize on opportunities in emerging growth industries.

The transition to a net-zero economy will create jobs not only in clean energy, but a range of related and complementary areas. A 2020 report found that a $15 billion investment in advanced energy in Arizona would create over 1.3 million job-years, including in energy efficiency, electric vehicles, building electrification, energy storage, transmission, and grid modernization.[35] Further, the reclamation and remediation of legacy fossil energy sites and affected areas can require hundreds of jobs per site, offering transitional opportunities for affected workers.[36]

Equipping workers for these new job types will take preparation. Fortunately, multiple organizations are already helping train workers for such jobs, including Native Renewables, which trains Navajo and Hopi participants in off-grid solar installation and management, and the Arizona Sustainability Alliance, which trains students from disadvantaged communities on building sciences, distributed energy resources, and other topics.[37] For workers affected by the closure of NGS, SRP has offered a retraining program in the technology industry.[38]

Involving Arizona's school system in preparing workers for a low-carbon economy can help scale up these existing efforts. The Arizona Sustainability Alliance, for instance, reported via email that it is partnering with high schools

to educate students on clean energy topics and is working with the Maricopa County Community College District to develop an energy management certificate that they hope to expand into a full degree program. With government, nonprofits, the private sector, and schools jointly investing in workforce development and education programs, Arizona can create new economic opportunities throughout the state and ensure its workers have the skills to thrive in a low-carbon future.

NEEDS

Coordinated governance and proactive planning

A common theme throughout the dialogue was the need for state government leadership on climate and energy issues. Participants discussed which government agency could be tasked with leading statewide conversations on renewable energy, just transitions, climate resilience, and other issues moving forward, noting that current efforts on these topics are mostly led by cities, individual organizations, and universities. Indeed, Arizona does not have a statewide energy office or agency with climate mitigation and resilience clearly integrated into its mission. The Arizona Office of Energy Policy, founded in 1975, was disbanded in 2015, and the responsibilities of operating the state's energy program were dispersed throughout other agencies.[39] While Arizona's state agencies do work on air quality, forest fire management, drought, and other related climate impacts, mentions of climate change are sparse on agency websites, and the state lacks a climate action plan or similar strategy to focus agencies' work on mitigating both the causes and impacts of climate change. Without proactive statewide leadership on these issues, Arizona risks taking a piecemeal and ineffective approach on climate and energy challenges, falling behind other states in the region whose governments are planning proactively for the low-carbon transition. This fragmented strategy is also likely to leave some communities behind, as a lack of coordination makes delivering equitable outcomes far more challenging.

In addition to a need for state-led climate and energy action, participants also highlighted the importance of tribes undertaking their own strategic energy and climate planning. This planning can help communities adapt to the energy transition, build out capacity for new energy projects, and make communities more resilient to climate change. But while several tribes may want to formalize a clean energy strategy or climate action plan, many lack the financial and human capital to do so. The state and federal governments can help meet this need by providing resources to fund strategic planning activities, as well as to develop tribes' in-house capacity and energy expertise.

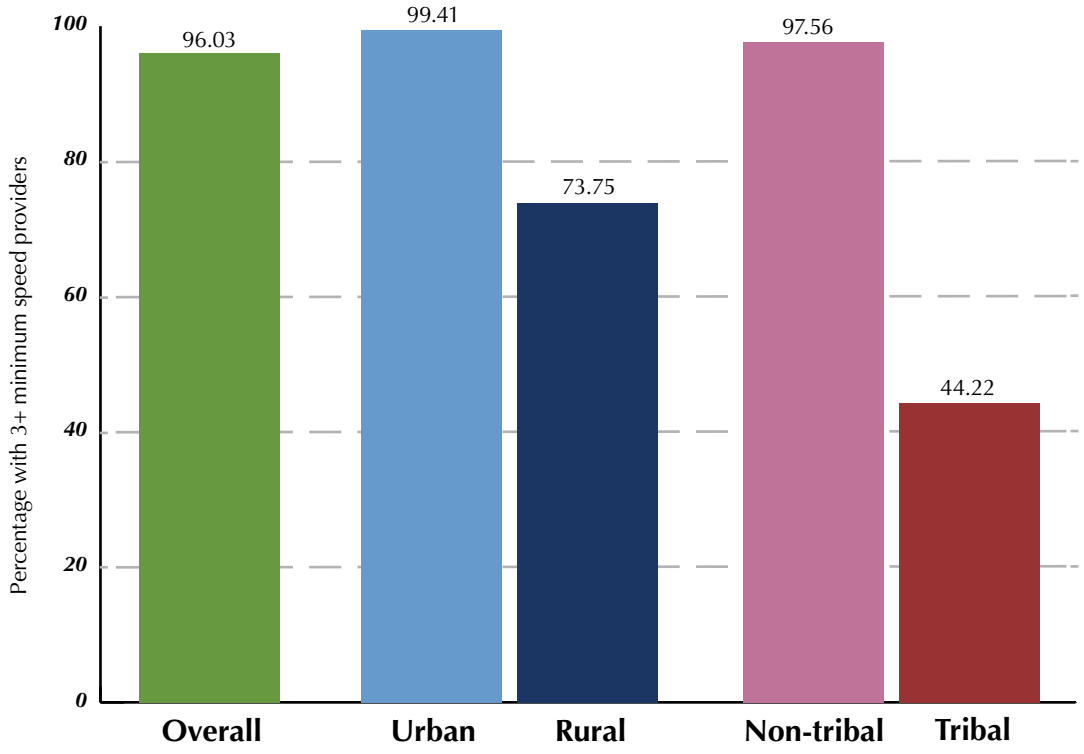
Another common theme throughout the dialogue was the need to create more equitable and accessible decision-making processes in Arizona. This includes consulting affected individuals in project planning and regulatory proceedings, as well as upholding tribal sovereignty and consent in governance processes. Participants also described barriers that inhibit their full participation in governance, including tribal and rural stakeholders struggling to attend in-person meetings in urban areas, as well as via online forums due to poor broadband access. Many attendees also stressed that underrepresented voices, such as low-income communities and communities of color, need greater representation in decision-making bodies and processes and that, without this representation, their potential to thrive and contribute meaningfully to a net-zero future will not be realized. To avoid the risk that the low-carbon transition may leave these communities behind, decision-making processes need to be designed in ways that are accessible (such as by hosting local meetings in affected communities) and stakeholders need to be provided the financial and technical resources that can enable them to be full participants in the decisions that influence their—and the entire state's—future.

Improved infrastructure

Roundtable participants from rural and tribal communities stressed significant needs for basic infrastructure that can enable economic development. For communities who had previously relied on coal projects, poor existing infrastructure can make their transition to a diversified economy more challenging as they look to attract new opportunities to their communities.

A lack of broadband and cellular access in rural and tribal areas was raised as an especially crucial inhibitor to communities' ability to work, learn, access healthcare, and participate in governance processes in an increasingly digital society. The Federal Communications Commission (FCC) measures broadband availability by the number of minimum speed broadband providers available to communities (**Figure 2**). It reports that 96.03 percent of Arizonans have access to three or more minimum-speed broadband providers, but significant disparities emerge when examining availability in rural and tribal areas.[40]

Figure 2: Broadband availability in Arizona



Source: Federal Communications Commission (December 2020)

99.41 percent of urban Arizona has access to three or more providers, compared to 73.75 percent in rural areas. In non-tribal areas, 97.56 percent have access to at least three providers, while only 44.22 percent in tribal areas do. This low rate of minimum speed broadband availability on tribal areas is second lowest in the country, behind only Alabama. Despite the wide gaps already evident in FCC data, other organizations, including the Government Accountability Office (GAO), assert that the FCC's figures overestimate broadband availability on tribal lands by measuring where service providers may have, or be able to extend, broadband infrastructure, rather than true connectivity.[41] It is therefore likely that broadband access on tribal lands in Arizona is much lower.

In addition to poor digital connectivity, some tribal communities lack full access to electricity, despite their coal resources being used to fuel growth throughout the southwest for decades. Estimates suggest 15,000 homes on the Navajo Nation lack such access, amounting to just under 30 percent of total households, while roughly 35 percent of Hopi homes are similarly unelectrified.[42] Many Navajo and Hopi homes also lack running water, meaning families frequently drive miles to fill containers with water in nearby towns.[43] The remoteness of many rural Arizonan communities and lack of reliable transportation routes make extending this basic infrastructure to them a challenge. Numerous roads on the Hopi and Navajo reservations are unpaved and only accessible in fair weather, while multiple rural roads in western and northern Arizona are in need of significant repairs that have proven challenging to undertake due to funding shortfalls.[44]

Lastly, while electric power transmission infrastructure across Arizona is generally robust, certain communities lack connections to the grid that can enable them to benefit from electrification, generate renewable energy, and send clean power back to the grid. Particularly in off-grid tribal areas, transmission and distribution infrastructure needs to be expanded to accommodate future energy projects such as utility-scale solar. In cases where buildout of costly transmission and distribution

infrastructure is infeasible, microgrids and energy storage can act as alternatives for grid expansion. Leveraging existing fossil fuel assets can also reduce the need for new infrastructure buildout: fossil plants' transmission infrastructure can be repurposed as plants retire, reducing decommissioning costs and supporting new clean energy projects in legacy fossil communities.

As significant federal funds have recently been allocated to address these challenges in the Infrastructure Investment and Jobs Act (IIJA), which was passed by Congress in November 2021, a statewide plan for smart infrastructure buildout is critical to ensure use of that capital is maximized.[45] Roundtable attendees underscored the need for greater coordination in infrastructure planning among cities, rural towns, tribal nations, and state and federal officials. Arizona does have multiple mechanisms for collaborative infrastructure planning, including four councils of government (COGs) representing rural towns and two federally-designated transportation management areas in the greater Phoenix and Tucson areas, respectively (the Maricopa Association of Governments and Pima Association of Governments). Bringing these organizations together, along with tribal, state, and federal government representatives, to define statewide infrastructure priorities could help focus investments in areas of greatest need and ensure efforts are neither inefficient nor duplicated due to lack of communication. Integrated planning between urban and rural Arizona could also help close the urban-rural infrastructure gap and develop projects that can serve an entire region of the state, rather than a single municipality.

A just and equitable transition

Roundtable participants emphasized that conversations on a just energy transition in Arizona have been piecemeal to date, mostly led by nonprofits or universities, and in some cases, happening only after a facility has closed. The lack of a unified approach on energy transitions has meant coal closures in Arizona are taken on a case-by-case basis: some project closures are announced relatively suddenly, while others are projected ten years out; some utilities have offered financial assistance to transitioning communities, while others have not yet done so. While the Arizona Corporation Commission (ACC) has considered just transition issues in APS's recent rate case and has an open docket for fossil fuel closure-related topics, some participants noted that maintaining an open docket is not sufficient. Further, the ACC's purview only extends to regulated utilities, making any actions they take intrinsically patchwork. Participants pointed to the need for a systematized, statewide dialogue bringing together all utilities, workers, communities, nonprofits, and others to plan for past and future fossil plant closures. This dialogue should be facilitated through a state agency other than the ACC to allow inclusion of non-regulated utilities; a reestablished state energy office would be a logical host for such coordination. With no unifying framework or strategic plan for closures, Arizonan communities and workers risk being unprepared for the energy transition, threatening their and the state's long-term prosperity.

As part of a proactive planning process for fossil plant closures, participants emphasized the need for assistance to affected communities, including interim financial support to allow communities to recover economically from the loss of revenue due to coal closures; workforce development and job placement programs in growth industries; reclamation of plant and mine sites to allow for new business investment; and new project commitments that can provide jobs and revenue in these communities.

POLICY RECOMMENDATIONS

COORDINATE GOVERNANCE AND PLAN PROACTIVELY

- **Create statewide plans for climate change mitigation, resilience, and clean energy deployment.** Legislative and executive action in nearby states, including New Mexico, Utah, Nevada, California, and others, has resulted in the creation and implementation of state plans for climate change mitigation and resilience.[46] Arizona's state government has in the past engaged in this type of planning on climate and energy, but these plans are now sorely out of date.[47] Without a defined strategy, Arizona risks being unprepared for the certain changes that climate change and the low-carbon transition will bring to its society and economy. The state legislature and administration should allocate resources to undertake collaborative planning for climate change and the state's energy transition. Done well, this groundwork can serve to strengthen Arizona's health, competitiveness, communities, and environment into the future.
- **Explore the re-establishment of a statewide energy office to help plan and direct clean energy investments and guide just transition conversations.** With an energy transition underway and the need for proactive energy planning becoming more urgent, Arizona should consider re-establishing and expanding its statewide energy office. The office should be charged not only with ensuring responsible management of federal funding and promoting energy efficiency, as it previously had been, but should also enable and support efforts to expand clean and renewable electricity deployment, update the state's strategic energy plan, and facilitate conversations on a just transition that can involve both regulated utilities and unregulated utilities not under ACC's purview.
- **Clarify state agencies' jurisdiction over climate-related issues, including mitigation and resilience, and more holistically integrate a focus on climate change across relevant agencies.** Arizona's state agencies will be increasingly called upon to address the impacts of climate change, including drought, wildfire, air quality, and heat, and their associated health risks. By clearly and explicitly integrating climate change mitigation and adaptation into the missions and work of state agencies, Arizona can be better prepared for the impacts of a changing climate and help avoid the worst climate impacts by reducing its emissions.
- **Direct state and federal resources to tribes to support strategic clean energy planning and investments and build out their local capacity.** This planning can help tribes enhance their energy independence, diversify their economies, attract new energy investments to their communities, and transition away from fossil fuels. Neighboring states such as Colorado are beginning to offer financial resources for communities' transition planning, including tribes, through their Office of Just Transition and other avenues such as the Rural Economic Development Initiative.[48] Arizona could replicate this model by creating grant programs through its state agencies. The state, nonprofits, and others can also better advertise existing federal support for strategic planning and capacity building, including through the Department of Energy's Office of Indian Energy Policy and Planning or the National Renewable Energy Laboratory.[49] Any resources provided should include support that ensures as many community members as possible participate in the development of these strategic plans.
- **Undertake robust and accessible tribal consultation and uphold tribal sovereignty and consent in policy and regulatory decision-making and project planning.** Effective consultation requires equipping tribal stakeholders with the resources needed to engage fully in decision-making processes, including funding and expanded broadband connectivity, as well as creating local consultation forums accessible to remote communities. Consultation and consent should not be limited only to tribal government, but should include direct engagement with affected tribal members and allow for broad community involvement in decision-making, including diverse representation by age, gender, and other demographic factors.

IMPROVE INFRASTRUCTURE

- **Coordinate infrastructure investments across urban, rural, and tribal areas in ways that provide mutual benefits, streamline planning, and enhance equity.** Arizona's state government should leverage existing coordination models, such as the rural COGs and urban transportation management areas, by bringing these organizations together, along with tribal governments, for joint planning forums across regions of Arizona (south, central, and north). Arizonan cities, towns, and tribal nations involved in these forums could meet regularly to discuss attracting critical infrastructure investments to their regions and sharing resources among local governments. Individual task forces could also be spun out of these coordinating bodies, for instance to focus on broadband availability, EV chargers, and other shared infrastructure needs.
- **Invest in enabling infrastructure in underserved communities, including broadband access, grid connectivity, water infrastructure, road access, and cell phone service, which can enable communities to fully participate in and benefit from the transition to a low-carbon economy.** With federal funds for infrastructure anticipated to flow to states due to the passage of the bipartisan infrastructure bill, Arizona has an opportunity to level the playing field for rural and tribal Arizonans by building out the critical infrastructure currently lacking in many communities. Governor Ducey's recent announcement of $100 million for high-speed broadband in unserved or underserved areas is a good start to address infrastructure disparities in rural and tribal communities, and these efforts can be expanded into other infrastructure types with new federal funding.[50] Provisions in the Build Back Better framework (hereafter BBB framework), passed in the U.S. House of Representatives in November 2021, include funds for a tribal energy loan guarantee program and tribal electrification, which can also serve to meet basic needs and should be passed into law.[51]
- **Work closely with communities to invest in repurposing legacy fossil infrastructure in ways that allow for future growth.** Existing and even retired fossil plants offer a range of infrastructure that make them attractive for repurposing projects, including connections to the electrical power grid, nearby railways, and more. Such projects should consult with affected communities and offer employment opportunities to those previously employed at those facilities. Several examples of innovative post-closure projects include converting a coal plant near Ithaca, New York, into a data center and converting coal plants in New Mexico and Utah into clean hydrogen facilities.[52] The state could also actively promote specific uses for retired coal plants, as Illinois does by incentivizing solar and storage developments at former coal facilities.[53]
- **Enhance transportation electrification and mobility in rural areas.** With the majority of Arizona's public EV chargers concentrated in urban centers, rural areas have been underserved in transportation electrification efforts. Expanding zero-emission transportation in rural corridors can promote tourism, enhance mobility, improve air quality, and increase equity between rural and urban Arizona. Both state and federal governments can support the creation of charging corridors in rural Arizona. Roughly $1 billion in the House-passed BBB framework would support the buildout of zero-emission vehicle infrastructure with a focus on rural, underserved, and disadvantaged areas. Passing these provisions would make a significant impact on rural and tribal areas in Arizona. The state government should mirror these investments by offering a grant program to support rural charging infrastructure in key tourism corridors. Further, local governments should update building codes to require charging station availability for certain types of buildings, including multi-family units, commercial buildings, and more.
- **Evaluate the available options and benefits of participating in a western regional transmission organization (RTO), including whether participation could enable Arizona to be a key clean energy provider throughout the west.** An RTO or other regional market could provide significant benefits for Arizona ratepayers by facilitating cost-efficient resource sharing across the western United States. One recent study estimated the creation of a western RTO could save regional electricity customers more than $2 billion per year, increase grid reliability, and support regional renewable energy development.[54] Arizona's major utilities have all joined the recently formed Western Markets Exploratory Group, which may provide a pathway to a western RTO, and utilities should explore market

coordination through other mechanisms, too.[55] Federal technical assistance would also assist efforts to explore and evaluate market options and the benefits they could offer the state. Provisions in the House-passed BBB framework would provide $40 million to support the formation and expansion of wholesale electricity markets, which would have clear benefits for Arizona.

LOW-CARBON INNOVATION AND TECHNOLOGY

- **Support piloting new energy technologies, including via financing and technical assistance, to test their viability and draw emerging growth industries to Arizona.** Continuing its history of innovation, Arizona can become a proving ground for novel energy technologies, such as clean hydrogen, small modular nuclear reactors, and more. Federal support will be essential to these efforts, and funding available through the IIJA, as well as the BBB framework, presents opportunities for Arizonan businesses to launch demonstration and pilot projects in the state. These efforts should also aim to leverage technical support provided by various program offices at the U.S. Department of Energy. Establishing these pilots can employ Arizonans, while enhancing Arizona's reputation as a leader in energy innovation to help attract new industries to the state.
- **Fund local energy resilience pilot projects, such as microgrids or solar plus storage, that can increase local energy security and reliability, especially in tribal and low-income communities.** Arizonan utilities and regulators have already expressed interest in distributed energy resources including microgrids and battery storage, but more efforts are needed to realize these technologies' potential, particularly for communities facing frequent brownouts, extreme heat, lack of electrification, and other challenges. Utilities, tribes, cities, and others should partner to launch pilots in suitable communities across the state to test these technologies' widespread viability as well as enhance communities' energy resilience. Such projects could leverage and grow local energy workforces, especially in communities affected by the coal transition.
- **Expand incentives for clean energy deployment.** Incentives for clean energy can come from the federal and state levels and serve to promote employment, save consumers money, and improve air quality. The Build Back Better framework includes more than $300 billion in investment tax credits (ITC) and production tax credits (PTC) for clean energy technologies, including wind, solar, nuclear, geothermal, energy storage, microgrids, clean hydrogen, and other projects. This legislation also includes specific credits to promote energy equity, e.g., incentivizing solar projects located in low-income communities. The enactment of these incentives presents an important long-term economic development opportunity for Arizona. At the state level, Arizona should expand tax incentives for renewable energy deployment, while also establishing incentives for energy efficiency, energy storage, and related energy infrastructure, such as electric vehicle charging stations. While several utilities have offered their own incentives for these technologies, such as APS's energy storage bill credit or SRP's EV charging station rebates, these programs have limited availability, and some are no longer accepting applications.[56] Expanded statewide incentives would level the playing field between utilities and encourage both Arizona residents and businesses to invest in and benefit from clean energy technologies.

A JUST AND EQUITABLE TRANSITION

- **Create a flexible, yet replicable framework for coal plant and mine closures that includes support to affected communities and employees, tailored to unique local needs**. The state should identify an appropriate agency to create and oversee the implementation of this framework, which could include the Arizona Corporation Commission, a reconstituted state energy office, or other governing body. The framework should outline the minimum criteria that utilities must meet when retiring fossil fuel facilities, including forms of support for affected communities. This support could involve initial monetary aid to make up for lost revenue, assistance with basic needs including electrification, employment and training opportunities for affected workers, plans for future clean energy projects, and more. The framework should also include a timeline for facility closures, notifying affected communities several years before closure and developing requirements for community consultation in planning processes to identify stakeholders' distinct needs. This consultation should involve not only local governments, but also provide support to ensure all community members can access opportunities for participation.
- **Direct state resources to planning and providing**

support for a just energy transition. While other states in the region have led on proactively planning for and investing in the energy transition, Arizona's state government has not taken an active role on just transitions thus far. This lack of leadership risks exacerbating the urban-rural divide and undermining communities' economic development by losing out on post-coal investments to competitor states. Arizona's state legislature should pursue a just transition support package, following the lead of New Mexico's Energy Transition Act, which would direct funding, workforce training, replacement projects, and other resources to impacted communities. The state government should also charge a state agency with transition work, akin to Colorado's Office of Just Transition within the Department of Labor and Employment, to direct strategic planning and administer support programs to communities. A reestablished state energy office is a logical place for such responsibilities.

- **Invest in workforce development programs that can help coal workers apply and expand their skills in growth industries.** Utilities, state government, nonprofits, colleges, and others should coordinate to support coal workers through existing workforce development and job placement programs, such as those available through the Department of Economic Security and other organizations, and explore the creation of new training programs specifically for coal workers in growth industries. Such industries could include energy efficiency, renewables development, energy storage, low-carbon manufacturing (including electric vehicles), information technology, and others. These programs should ensure that workers have opportunities to be trained and work as locally as possible so they do not need to choose between employment and proximity to home.

ADDITIONAL RESOURCES

C2ES RESOURCES

Getting to Zero: A U.S. Climate Agenda

Climate Policy Priorities for the New Administration and Congress

OTHER RESOURCES

Economic Development Administration's community funding opportunities through American Rescue Plan, including at least $300 million for coal communities

Interagency Working Group on Coal & Power Plant Communities & Economic Revitalization

ASU's Center for Negative Carbon Emissions (CNCE)

ASU Laboratory for Energy and Power Solutions (LEAPS)

ASU Just Energy Transition Center

Arizona Sustainability Alliance's Arizona Clean Energy Workforce Development Program

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