Sustainable and Resilient Economic Development in Tucson, Arizona

Insights for Economic Development Leaders

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Contents

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Introduction

The impacts of climate change coupled with the economic opportunities created by energy transition and resilience investments are changing the landscape of local economic development. Climate hazards pose increasing threats to infrastructure and productivity, forcing local economies to adjust development strategies to account for shifting resilience, risk, and long-term sustainability (World Economic Forum and Accenture 2024). Simultaneously, the nation's gradual transition from a primarily fossil-based infrastructure to renewable energy is strengthening new industries, creating demand for new technology and infrastructure investments, and threatening the stability of legacy industries and jobs. Across the economy, private firms and the public sector are also increasing their investments in resilience measures to mitigate climate risks and adapt to changing conditions. Together, these forces are transforming industry composition, shifting labor market demand for skills, and creating unevenly distributed opportunities for jobs and growth across regions (OECD 2023).

To achieve durable and inclusive economic development, local leaders must contend with the risks and assess the opportunities of a changing climate, and must do so within the context of the economic and political landscape of 2026. As climate impacts accelerate, communities are facing several additional barriers. Consumers and businesses face significant affordability pressures, fueling economic insecurity and hampering growth for small- and medium-sized businesses (Small Business Majority 2026; Stephens et al. 2026). The private sector is increasingly concentrating investment in the artificial intelligence (AI)-driven economy, limiting options for local economic development leaders as community resistance to data centers and other technology infrastructure mounts.[1] Also, local budgets are fiscally constrained, recovering from significant reductions in federal and state funding at a time when their communities need to accelerate the build out of transportation, housing, and energy infrastructure to ease affordability pressures, shore up resilience, and compete for a stake in the economy of the future (Omeyr and Tanksali 2025).

Within this landscape, local leaders need guidance on economic development strategies they can pursue to attract industries and opportunities that will help their residents, workers, and businesses realize economic security and durable growth. They need solutions that can evolve with the uncertain timelines and uneven transitions of technological frontiers—including the applicability and adoption of AI and the transition toward electrification and renewable energy. Desert cities in particular need economic pathways that are suitable for both their current and future climate conditions.

Over the last several decades, the green economy has frequently surfaced as a win-win strategy to create economic opportunity for workers and businesses through investments and activities that facilitate the transition to a low-carbon, resource-efficient future, reduce environmental impacts, and strengthen community resilience to climate change. Once a policy-driven niche, the green economy, which we refer here to as the *sustainable and resilient* economy (box 1), is a growing part of every sector, as industries proactively adopt new and efficient clean technology and make resilience investments to navigate the risks to their operations of a more extreme climate. Consequently, sustainable and resilient services and skills are increasingly embedded in the infrastructure of our economy, and are broadening to include activities related to both mitigation of emissions and adaptation to climate impacts (table 1).

However, adoption across the economy is uneven and fractured among industries and geographies. The politicization of climate change, and of the renewable energy sector in particular, has slowed the promise of sustainable and resilient economic development and exacerbated legacies of distrust among blue collar workers and disinvested communities. In a current moment of rapid transition and polarization, local leaders need to understand which elements of the sustainable and resilient economy hold the most promise and urgency, in what ways, and for whom.

BOX 1

What Is the Sustainable and Resilient Economy?

This report defines the sustainable and resilient economy as the system of economic activities, industries, organizations, and occupations that produce goods and services—or enable processes—that reduce environmental impact, support the transition to a low-carbon, resource-efficient future, and strengthen the ability of economic systems to weather the acute shocks and chronic stressors of a changing climate.

This definition builds on past articulations of the "green economy," including the Brookings 2019 *Advancing Inclusion Through Clean Energy Jobs* report (Muro et al. 2019) and the US Bureau of Labor Statistics (BLS) definition of green goods and services.[2] These past definitions center around opportunities created by the clean energy transition as well as broader sustainability and conservation activities related to energy efficiency; pollution reduction and removal; recycling and reuse; natural resources conservation; and environmental compliance, education, and training.

As the economic losses mount from extreme weather and other climate impacts, the resilience economy continues to grow to meet the acute and increasing need for resilience investments across communities and sectors. Therefore, we have further broadened our definition and articulation of the "green economy" to encompass both mitigation of and adaptation to climate change and have revised

our language to reflect that, using the term the "sustainable and resilient economy" throughout the report.

TABLE 1

How the Sustainable and Resilient Economy Creates Opportunities for Industries and Workers

Sample industry opportunities	Sample workforce opportunities
▪ Increased demand for firms that provide goods and services that directly reduce emissions, conserve resources, or enhance resilience (e.g., renewable energy developers). ▪ Increased demand for firms that supply essential inputs for sustainable and resilient goods and services (e.g., component manufacturing for inputs to solar panels). ▪ Cost savings and resilience benefits for firms that adopt clean technology and mitigate climate risks in their operations (e.g., energy and water efficiency upgrades for small businesses).	▪ Jobs with increased demand for existing roles due to sustainable and resilient activities (e.g., electricians installing solar panels and battery storage). ▪ Jobs that require enhanced skills to integrate green technologies and resilience standards (e.g., HVAC technicians trained on heat pumps and smart controls). ▪ New and emerging roles created by the green transition (e.g., battery recycling engineer).

Source: Authors' analysis.

Assessing the Sustainable and Resilient Economy in Tucson, Arizona

This report explores the sustainable and resilient economy in Tucson, Arizona, where local leaders have a growing urgency to identify and invest in a set of economic development strategies that deliver benefits to residents, workers, and businesses without compromising community values. As local economic development leaders consider pathways forward, local elected officials, city and county government officials, tribal economic development leaders, workforce development and small business support organizations, and local businesses and residents have expressed sustained interest in better understanding the promise of a sustainable and resilient economy that provides inclusive and durable economic development, even amid the current federal policy landscape.

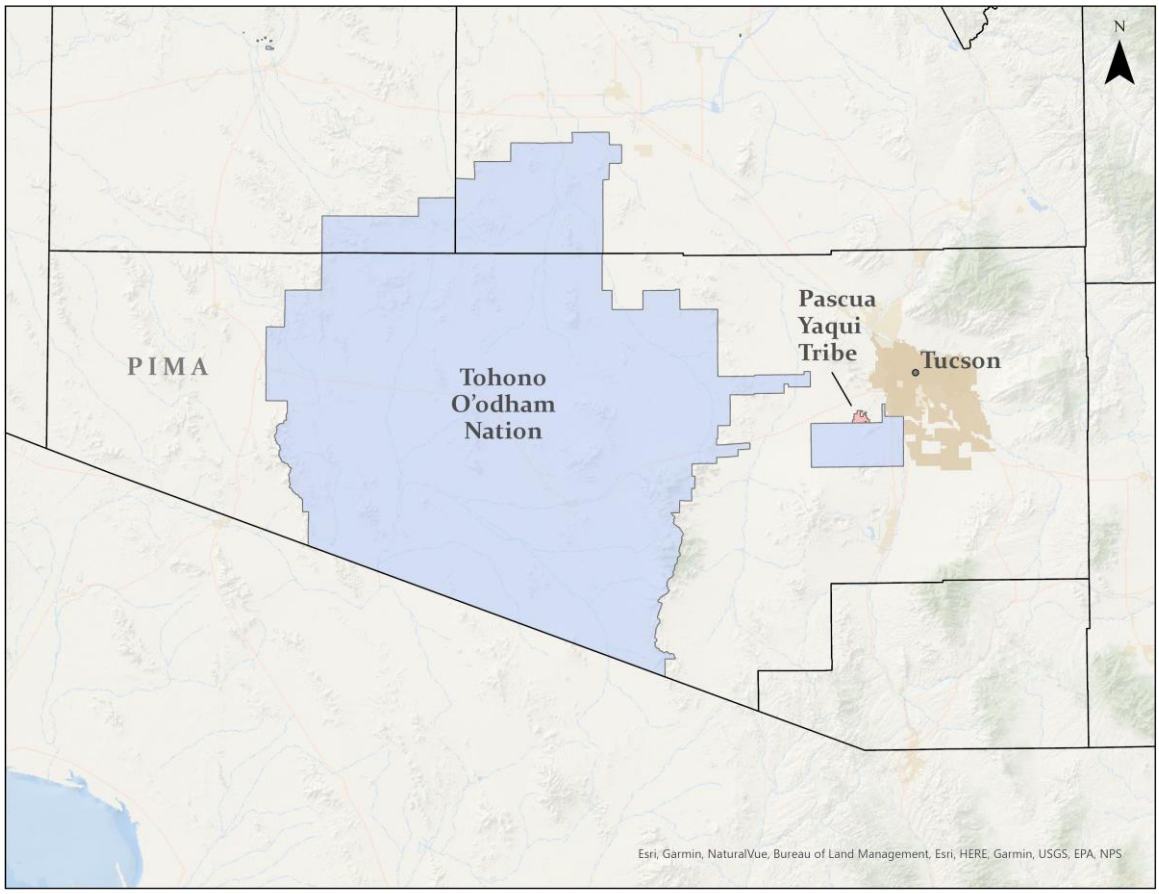
This interest is rooted in the city's rich legacy of conservation and environmental action. Tucson has been a regional leader in water conservation for decades, and the city is home to an abundance of resident-led initiatives and community-based nonprofits focused on sustainability, conservation, and resilience. In addition to this values alignment, the city boasts several strategic assets for sustainable

and resilient economic development. The Sonoran Desert climate offers strategic renewable energy advantages along with heat- and water-related constraints that will require sustained resilience investments. The local economy is rich with innovation, research, and training capacity, anchored by the University of Arizona, Pima Community College, and key tribal institutions including Tohono O'odham Community College and the Pascua Yaqui Development Corporation (figure 1). And the city's existing industrial base, with capacity in aerospace and defense, optics, photonics, advanced manufacturing, natural resources, and renewable energy, provides a strong foundation that is closely aligned with the core pillars of a sustainable and resilient economy.

FIGURE 1

Map of Study Area

Map of the tribal communities, Tohono O'odham Nation and Pascua Yaqui Tribe, and the City of Tucson within Pima County



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Source: Tribal boundaries from the Arizona Department of Health Services GIS Portal.
Notes: The Pascua Yaqui Tribe boundary includes tribal trust lands.

The city also needs and aspires to increase inclusive economic development. As the second largest city in Arizona, Tucson is characterized by relatively slow but steady growth compared with other Sunbelt metro areas like Austin. While slower growth presents opportunities for more inclusive and intentional strategies, residents have a clear need for more broadly shared prosperity and pathways to upward mobility. The Tucson metro area's median household income is below the national average, and over 14 percent of households live below the federal poverty line, a higher percentage than that of the state and national levels. This is particularly acute in historically disinvested neighborhoods and among tribal and Latino communities, who make up 4.4 percent and 37 percent of Tucson's population, respectively.[3] These conditions are exacerbated by national affordability pressures that affect the local economy, including persistent housing and energy cost burdens. Tucson also ranks in the bottom third of the nation's metropolitan statistical areas for labor force participation and occupation wages, and is only middling regarding educational attainment.[4]

So how might local leaders in Tucson leverage the city's aligned assets and strong position in the sustainable and resilient economy to drive economic growth that can deliver benefits to residents, workers, and businesses? We addressed this question by conducting a mixed-methods study as part of a yearlong partnership with the City of Tucson and Local First Arizona (box 2). Our research helps shed light on the existing sustainable and resilient economy in the greater Tucson metro area and its potential to deliver inclusive and durable growth that serves as a model for similar communities in Arizona and the Southwest.

While this analysis focuses on opportunities presented by a sustainable and resilient economy, future research could more deeply examine the economic losses from the energy transition and the constraints that climate change places on regional economic development, including specific limits on water availability, the impact of extreme heat, and other environmental stressors. Understanding both opportunities and constraints is critical for shaping long-term economic development strategies in climate-vulnerable regions.

BOX 2

Project Background

Through the Climate Capacity Initiative,[a] Urban Institute researchers partnered with Local First Arizona and the City of Tucson to better understand the region's sustainable and resilient economic development landscape. This report provides a baseline assessment for local economic development, workforce development, and small business leaders in Tucson and surrounding areas, including tribal communities, to inform strategy and coordinate investments that can help communities across southern Arizona benefit from the region's future clean energy development and resilience investments.

Note: For more information on the project, see "Climate Capacity Initiative," Urban Institute, https://www.urban.org/projects/climate-capacity-initiative.

Research Goals and Methods

The research goals are two-fold:

1. Define and assess the key sectors of the sustainable and resilient economy and outline considerations for local leaders in the Tucson region to develop an aligned economic development strategy.
2. Highlight key opportunities and pathways for Tucson's workforce and small business ecosystems to help residents, workers, and local businesses participate in and benefit from sustainable and resilient economic development.

We used a mixed-methods approach to conduct our research:

- We completed desk research on local sustainable and resilient economic activities, including an analysis of Tucson's and Arizona's policy ecosystem and investment trends, and a review of existing literature on green economic development and frameworks.
- We interviewed 29 local leaders in Tucson and Arizona across government, industry, education and training, nonprofits, and tribal organizations, and conducted a focus group with 11 small business owners.
- We conducted a quantitative analysis of labor market, education, and demographic data using the Arizona Office of Economic Opportunity's resilient classification system for jobs and industries, along with data from the US Bureau of Labor Statistics, the American Community

Survey, the Occupational Information Network, the National Center for Education Statistics' Integrated Postsecondary Education Data System, and the US Department of Education's College Scorecard.

This resulting report introduces a new classification of sectors that describe the sustainable and resilient economy within a place-based context, assess the viability and suitability of those sectors in Tucson based on current and projected economic and climate conditions, and outline considerations for how these sectors might be integrated with Tucson's economic development strategy. We conclude with forward-looking reflections for local leaders to consider as they shape a sustainable and resilient economic development strategy in Tucson.

In two companion products, we explore how the sustainable and resilient economy translates into job and small business opportunities in Tucson (Sick et al. 2026; Theodos et al. 2026). The first identifies promising sustainable and resilient economy job families and opportunities for Tucson's workforce system to build on current strengths to prepare local workers for related career pathways and to improve job quality. The second outlines key pathways for small businesses to participate in and benefit from the sustainable and resilient economy and opportunities for Tucson's small business ecosystem to support their engagement.

Key Findings

- **The sustainable and resilient economy spans six core sectors aligned to Tucson's climate goals, local industries, and economic development strategies.** These sectors capture both the implementation and provision of sustainable and resilient goods, services, and infrastructure investments and the systems that enable them:
  - » **Building decarbonization and weatherization**, which includes electrifying, retrofitting, designing, and constructing energy efficient improvements that allow residential, commercial, and industrial buildings to reduce energy use and emissions, thereby strengthening resilience and long-term thermal performance.
  - » **Clean energy generation and development,** which includes producing, transmitting, distributing, repairing, and maintaining renewable and low-carbon energy sources (e.g., solar, wind, storage, geothermal) and related equipment.

- **Clean technology manufacturing,** which includes manufacturing components and equipment that facilitate the transition to clean and efficient energy (e.g., energy efficient technologies, solar panels, batteries, semiconductors, etc.).
- **Sustainable transportation and land use,** which includes developing transportation and land use strategies that reduce emissions and improve resilience, such as public transit, transit infrastructure, micro mobility development, electric vehicle (EV) manufacturing, assembly, and repair, and other EV and transportation infrastructure investments.
- **Water, waste, and resource management,** which includes water conservation and reuse, wastewater treatment, stormwater and green infrastructure, brownfield remediation, waste reduction and recycling, landfill gas recovery, and other resource-conservation and reuse activities.
- **Resilience professional services,** which includes private, public, and nonprofit research, planning, technical assistance, consulting, program administration, advocacy, and professional services that design, manage, implement, and regulate sustainability and resilience efforts.

- **Tucson's sustainable and resilient economy is broad based but anchored in local-serving industries.** More than 5,000 establishments and 50,000 workers are engaged in sustainable and resilience-related activity, with building decarbonization and weatherization alone accounting for 3,256 establishments and more than 28,000 jobs—over half the region's sustainable and resilient employment. Other sectors are smaller but still meaningful, including water, waste, and resource management (about 6,900 jobs) and clean technology manufacturing (nearly 6,000 jobs). Much of this activity is geographically anchored and tied to local demand. This creates accessible entry points for workforce participation and small business engagement but also constrains growth to the pace of regional investment. Clean technology manufacturing is a notable exception, with much larger long-term growth potential linked to Arizona's broader position as a national and global leader in semiconductor manufacturing, and (increasingly) battery manufacturing.

- **Compared with peer regions, Tucson has widespread firm participation but lower employment intensity.** The region shows relatively high concentrations of establishments across most sustainable and resilient sectors but fewer jobs per resident than Arizona overall and Austin—particularly in building-related industries. This pattern suggests a landscape of many smaller firms rather than a small number of large employers, increasing the importance of

strategies that help firms increase scale, connect to project pipelines, and access procurement and supply chain opportunities.

- **Sustainable and resilient sectors are expected to grow modestly, but account for a disproportionate share of job creation.** These sectors are projected to contribute more than 21 percent of Tucson's net employment growth between 2024 and 2034 (estimated at around 2,350 of the projected 11,000 new jobs) and to grow slightly faster than the overall economy (4.6 percent on average, compared with 4.0 percent overall). Growth is uneven: resilience professional services (8.8 percent) clean energy generation and development (6.8 percent) and clean technology manufacturing (5.1 percent) are projected to grow fastest, while building decarbonization and weatherization is expected to generate the largest number of new jobs (more than 1,200) given its existing scale. This reinforces the need for a balanced strategy that supports both local demand-driven activity and longer-term traded-sector opportunities.
- **The degree of "greening" varies widely across sectors.** Roughly 33,900 jobs—about 49 percent of employment across the six sectors—are currently classified as sustainable and resilient jobs according to a resilient classification system developed by the Arizona Office of Economic Opportunity (Amrein et al. forthcoming). However, concentrations differ substantially: clean technology manufacturing has the highest share (around 70 percent), while resilience professional services has a much lower share (just over 20 percent). These differences suggest the transition toward more sustainable and resilience-intensive activity is uneven across the economy. Notably, sectors closely tied to clean technology outputs and large capital investments tend to have a higher share of the existing sustainability and resilience jobs, while local demand-driven sectors contain a wider mix—highlighting the role of incentives, consumer demand, and project pipelines in accelerating adoption.
- **Sustainability and resilience jobs are broadly accessible but vary in quality and inclusiveness.** Many roles, especially in building, water, and transportation sectors, are accessible to workers without a bachelor's degree and employ on-the-job training, apprenticeships, and nondegree credentials. On average, sustainability and resilience jobs offer higher wages than non-sustainability and resilience jobs, though job quality varies across sectors. However, gender disparities are pronounced: in most sectors, more than 80 percent of sustainability and resilience jobs are held by men. This suggests that expanding opportunity through sustainable and resilient sectors will require both improving job quality in essential sectors and addressing barriers to entering higher-quality career pathways.

- **Climate and resource constraints—especially heat and water—shape economic opportunity.** By mid-century, Pima County is projected to experience one to two additional months of extreme heat annually and 10 to 15 percent more severe drought conditions. Many workers in key sustainable and resilient sectors are already exposed to these risks. For example, more than 70 percent of water and waste management workers and more than 50 percent of those in building-related sectors regularly work outdoors, threatening both the sector's economic productivity and the workers' health (Clemans-Cope et al. 2025). These realities underscore the need to treat climate conditions not just as environmental risks but also as core economic variables that influence which industries and projects are suitable for Tucson's regional context over the long term, and under what conditions.

These findings suggest that a sustainable and resilient economy can play a meaningful role in Tucson's economic development strategy, but realizing inclusive and durable growth through these sectors will require a measured and coordinated approach that can adapt to the changing pace of transition over the long term. Key priorities include building on existing strengths, aligning public investment with project pipelines, strengthening regional positioning for traded sectors, improving coordination around land and resource decisions, centering job quality and inclusion, and reducing barriers for small business participation.

The following sections provide more insights on sustainable and resilience sectors' economic development prospects and offer recommendations for local leaders to harness this growth for community benefits amid a rapidly evolving landscape of economic development.

Defining Sustainable and Resilient Sectors in Tucson

To better understand what a sustainable and resilient economy looks like in Tucson and how it aligns with past articulations of the green economy at the national level, we sought to understand local perceptions of what constitutes a "green economy" in the Tucson region, including nearby tribal communities.

Across interviews, stakeholders most often defined Tucson's sustainable and resilient economy in terms of a core set of sectors already visible in the region. Four primary sectors—building decarbonization and weatherization, sustainable transportation and land use, clean technology manufacturing, and clean energy development and generation—particularly solar and storage—were widely cited by interviewees as central components of Tucson's current and emerging sustainable and resilient economy. These sectors were referenced across stakeholders as places where sustainable and resilient jobs, investment, and policy attention are already concentrated or growing, and where Tucson has existing firms, workforce capacity, and institutional experience upon which to build.

In addition to these sectors, interviewees commonly pointed to related and overlapping areas that involve the local sustainable and resilient economy, including utilities and grid modernization, advanced manufacturing activities tied to clean energy supply chains, environmental services such as urban greening and heat mitigation, and aligned engineering, technical services, construction, and skilled trades. In addition to these industries and economic activities, many interviewees noted water conservation as a unifying thread and constraint to all economic development decisions in the region.

To ground these insights in economic data and better assess the industries that contribute most to a sustainable and resilient economy, we developed a unique classification approach to analyze aligned sectors. Our approach expands on existing definitions of "green industries" to better reflect local perceptions of the green economy and a more holistic view of both sustainability and resilience outcomes. We defined six "sustainable and resilient sectors" that capture the primary domains encompassed by the sustainable and resilient economy over the long term. We measured their level of "greenness" today using a classification system developed by the Arizona Office of Economic Opportunity (see endnote for a more robust discussion on our approach).[5]

By applying a sector approach to our analysis, we aimed to better position local leaders to understand how industries are interconnected; how they might attract and develop job and business

opportunities that take advantage of these connections; which sectors, in aggregate, are best suited for a "sustainability and resilience forward" economic development posture; and which can expect to see more subtle and integrated shifts toward sustainability and resilience over time.

The Six Sectors of the Sustainable and Resilient Economy

This section defines the six key sectors of the sustainable and resilient economy in Tucson (figure 2). For each sector, we highlight the sector's core economic activities, industries, and occupations, outline why the sector matters for sustainability and resilience goals, and provide an overview of relevant state and local programs, policies, and actors that shape the strategic outlook for the sector locally.

FIGURE 2

The Six Sectors of the Sustainable and Resilient Economy in the Tucson Region

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Source: Authors' analysis.

Notes: For the purposes of this analysis, we excluded two key sectors sometimes included in the literature on the green economy—agriculture and critical minerals mining. We excluded agriculture due to limited alignment with economic development pathways in the Tucson context and market-specific data limitations. While mining is an essential input to many sectors of the sustainable and resilient economy and heavily represented in Tucson and southern Arizona, we left it out of our analysis given limited alignment with local perceptions of the sustainable and resilient economy. Future research might better explore the economic development contributions, opportunities, and risks of these two sectors.

Building Decarbonization and Weatherization

The building decarbonization and weatherization sector captures economic activities focused on reducing the energy use and emissions of residential, commercial, and institutional buildings (table 2). This sector includes establishments and employees working on electrification, energy efficiency retrofits, and on-site clean energy generation, such as replacing gas systems with electric heat pumps, improving insulation and sealing, and installing residential solar and storage. It also encompasses building design, construction, and retrofit services that improve thermal performance and reduce long-term energy demand. For the most part, building decarbonization and weatherization involves local industries that produce goods and services for the regional economy.

TABLE 2

Key Industries and Occupations in the Building Decarbonization and Weatherization Sector

Key industries (4-digit NAICS)	Key sustainable and resilient occupations (6-digit SOCs)
▪ Building equipment contractors (NAICS 2382) ▪ Architectural, engineering, and related services (NAICS 5413) ▪ Building finishing contractors (NAICS 2383) ▪ Activities related to real estate (NAICS 5313)* ▪ Building finishing contractors (NAICS 2383) ▪ Building foundation and exterior contractors (NAICS 2381)	▪ Carpenters (472031) ▪ Construction laborers (472061) ▪ First-line supervisors of construction trades and extraction workers (471011) ▪ Heating, air conditioning, and refrigeration mechanics and installers (499021) ▪ Electricians (472111)

Source: Authors' analysis of Arizona Office of Economic Opportunity's resilient classification system.
Notes: NAICS=North American Industry Classification System; SOCs=standard occupational classifications. This table demonstrates the top jobs and industries within the sector by the number of workers in Tucson. See appendix A for a complete list of industries included in the sectors. Activities related to real estate (NAICS 5313) are included at the 3-digit NAICS level through Real Estate (NAICS 531).

This sector is critical to a sustainable and resilient economy, as buildings are responsible for 35 percent of the nation's carbon emissions.[6] In addition to reducing emissions, investments in this sector also reduce energy costs and improve indoor comfort and health (Norton et al. n.d.; Tyler et al. 2023). Globally, the energy efficient buildings market is growing, with a projected compound annual growth rate of 11.1 percent from 2024 to 2030.[7] In the US, building decarbonization has policy momentum at the federal, state, and local levels. In 2024, the Department of Energy released the first comprehensive federal strategy to decarbonize the building sector.[8] Since then, federal support has been retracted, but some local jurisdictions are still increasing energy efficiency standards.[9] Rising energy costs are pushing

more building owners and developers to invest in energy efficiency measures as a means of cost savings.[10]

In Tucson, building decarbonization and weatherization is a critical strategy for developing resilience to the region's extreme heat, lowering energy usage and costs for households and business owners, and improving health outcomes. While the elimination of several federal programs, tax credits, and utility rebates will slow decarbonization and weatherization efforts in Tucson, several efforts are ongoing at the city, county, and state level.

At the city level, Tucson is actively working to decarbonize its municipal operations and to support energy efficiency across the community. The city is implementing energy benchmarking for all city-owned buildings as well as expanding solar infrastructure on city-owned buildings, with 72 solar projects totaling over 18,000 kW as of 2024 (City of Tucson 2025). The city's Housing and Community Development department runs several programs that advance green and healthy home priorities,[11] including home repair, lead abatement, and a manufactured housing repair and replace program funded by the US Department of Housing and Urban Development Preservation and Reinvestment Initiative for Community Enhancement (commonly known as PRICE). Housing and Community Development also collaborates with Tucson Electric Power (TEP) on weatherization efforts and recently completed installing solar panels on the city's public housing stock.[12]

While state preemption restricts the city from implementing some above-code energy efficiency standards,[13] the city has passed key provisions, including a solar-ready ordinance passed in 2008 that requires all new single- and two-family buildings to install solar-ready electric and water heating infrastructure, and requirements for all new municipal buildings and major additions and renovations over 5,000 square feet to achieve silver certification from the Leadership in Energy and Environmental Design rating system (commonly known as LEED).[14] More recently, Tucson adopted the 2024 International Energy Conservation Code building standard that went into effect July 1, 2026, and continues to participate in the Resilient Southwest Building Code Collaborative, a regional effort to design climate-responsive building codes.[15]

To support residential solar, Tucson offers same-day solar permitting through the SolarAPP+ program.[16] The city also invested American Rescue Plan funds to support solar adoption for low-income households through the Solar Empowerment Program, operated in partnership with the Sonoran Environmental Research Institute and Technicians for Sustainability.[17] Groundswell Capital, a green bank headquartered in Tucson, offers an EarthWise loan program for households to finance storm resilience, solar products, air conditioning, weatherization, insulation, sewer, and water upgrades.[18]

At the state level, Efficiency Arizona offers a rebate program of up to $14,000 per household, depending on income level, for efficient appliances and HVAC equipment.[19] Funding is available through 2029 for eligible households.[20] To access the program, households must use a contractor registered within the state's qualified contractors' network. (Notably, only seven contractors in Tucson are registered within the network.[21]) The state also offers a solar tax credit that allows taxpayers to subtract from their personal income tax an amount equal to 25 percent of the cost for purchasing a solar or wind energy device, up to a maximum of $1,000.[22]

TEP also offers residential and commercial solar incentives through net billing and other solar incentive programs. TEP's Resource Comparison Proxy rate, which is used for net billing, is about 65 percent of TEP's average electricity rate.[23] Other incentive programs include the TEP GoSolar Shares program (June 2022–current), which allows residential and business customers to cover some or all of their electrical needs by purchasing locally generated solar power;[24] the TEP Residential Solar Program, a pilot project that provides fixed-price electric service using solar arrays installed on customers' homes; and TEP's energy efficiency for multifamily housing program, which targets multifamily properties with five or more units for energy efficiency upgrades.[25] TEP and Southwest Gas also offer and manage weatherization programs for low-income households.[26]

Tribal communities in and around Tucson have also been active in building decarbonization and weatherization. In 2017, the Pascua Yaqui Tribe developed an Energy Efficiency Action Plan that established a baseline for energy consumption on tribal lands and that recommends improvements to enhance energy efficiency across tribal infrastructure.[27] While not specifically focused on building decarbonization, tribes have also offered workforce development opportunities in the building sector. The Tohono O'odham Community College launched a certificate program in solar panel installation in addition to their solar pilot workforce programs, in partnership with the University of Massachusetts Lowell.[28] The Pascua Yaqui Development Center's Career Pivot Center focuses on construction trades, property management, and related fields,[29] and their training capacity is expanding with the development of a new construction training center, funded by a $4 million federal grant from the US Economic Development Administration. This center will offer traditional certifications as well as training on new technologies for green building practices and infrastructure development.[30] The Pascua Yaqui Workforce Development Department Office also offers credentialing for adjacent workforce skills through partnerships with recognized certification bodies, including certification from the National Center for Construction Education and Research, a nationally recognized credential for construction workers.

Looking ahead, interviewees emphasized opportunities for tribes to integrate Indigenous-led green construction practices and building materials manufacturing into development across southern Arizona. Interviewees mentioned leveraging traditional knowledge of sustainable materials such as adobe alongside emerging innovations like recycled-material bricks to support economic development, housing, workforce creation, and climate resilience in tribal communities.[31]

Clean Energy Generation and Development

Clean energy generation and development includes producing and deploying renewable and low-carbon energy sources such as solar, wind, storage, and geothermal (table 3). This sector encompasses generating, transmitting, and distributing energy as well as repair and maintenance of related equipment. The sector primarily involves local industries that produce goods and services for the regional economy.

TABLE 3

Key Industries and Occupations in the Clean Energy Generation and Development Sector

Key industries (4-digit NAICS)	Key sustainable and resilient occupations (6-digit SOCs)
▪ Electric power generation, transmission, and distribution (NAICS 2211) ▪ Electronic and precision equipment repair and maintenance (NAICS 2211) ▪ Commercial and industrial machinery and equipment (except automotive and electronic) repair and maintenance) (NAICS 8113)	▪ Electrical engineers (172071) ▪ First-line supervisors of mechanics, installers, and repairers (491011) ▪ Heating, air conditioning, and refrigeration mechanics and installers (499021) ▪ Electrical power-line installers and repairers (499051) ▪ Medical equipment repairers (499062)

Source: Authors' analysis of Arizona Office of Economic Opportunity's resilient classification system.
Notes: NAICS=North American Industry Classification System; SOCs=standard occupational classifications. This table demonstrates the top jobs and industries within the sector by the number of workers in Tucson. See appendix A for a complete list of industries included in the sectors.

As a central tenet of reducing greenhouse gas emissions, renewable energy generation has nearly tripled in the past two decades, bringing with it millions of new jobs.[32] From 2021 to 2024, clean energy jobs grew from 3.2 to 3.6 million, a growth rate 4 percent higher than that of the US job market as a whole during this same period.[33] Despite recent federal barriers that discourage wind and solar energy sources, clean energy additions are still on track to exceed 2025 levels, with a total of 86 gigawatts expected to come online this year; 93 percent of that capacity is coming from solar, storage, and wind power.[34]

In Tucson, clean energy is a key strategic asset. At a time when energy capacity is a lynchpin for economic development and regional competitiveness, clean energy generation offers a more sustainable pathway for growth. As a state with a regulated utility market, Arizona's clean energy generation and development runs through the utility sector. The City of Tucson is served by TEP and Southwest Gas. TEP is the main supplier of electricity in the Tucson metropolitan area, serving over 450,000 customers.[35] Southwest Gas provides gas services to the entire Tucson metropolitan area and to two million customers in total across Arizona, Nevada, and California.[36]

TEP's electricity is sourced from a combination of natural gas (46 percent), utility-managed solar and wind (17 percent), coal (17 percent), privately owned residential solar (9 percent), and purchased energy from wholesale energy providers with varied sources (11 percent).[37] While other parts of the state rely on a diverse range of clean power sources including wind, nuclear, and geothermal, the majority of TEP's clean energy sources are from solar projects, with only one active wind project and no current geothermal or nuclear sources. However, the Arizona Governor's Office of Resiliency is currently conducting a $1 million statewide geothermal study to map subsurface resources, streamline permitting, and explore the resources needed to develop geothermal sources to support long-term energy demands.[38]

TEP has plans to increase renewable energy sourcing to over 50 percent by 2038 and to reach net zero emissions by 2050. This includes an anticipated 1,500 MW of new wind, solar, and storage by 2030, and 1,300 MW of new energy storage by 2038. It also includes phasing out two major coal plants by 2030 and fully phasing out coal by 2038. As part of this transition, TEP also plans to add 400 MW of natural gas turbines by 2038 (Tucson Electric Power 2023). However, none of these plans are bound by state or local laws; they are subject to change via the integrated resource planning process.

Another project will bring wind power from Wyoming to population centers in the southwestern states, including Arizona, and will send solar power from the Southwest to the Rocky Mountain states. A third transmission project in development will connect areas of southeastern California to southwestern Arizona, facilitating renewable energy development along the route.[39]

Arizona ranks as the fourth largest among all states for new energy generation proposed in the grid's interconnection queue, with several Arizona counties, including Maricopa, La Paz, and Pinal, ranking among the top ten counties in the country for proposed megawatts.[40] Pima County has a smaller proposed investment but still boasts 20 active projects in the interconnection queue.[41] Across Arizona, and in Pima County, most of these projects are solar and storage projects. While the likelihood of these projects reaching the development phase is low, the relative scale of interest and investment suggests

the Arizona market remains a target for renewable energy development. The loss of federal clean energy tax credits dampens those investment prospects, yet data center demand continues to fuel investment in new energy infrastructure across the state, particularly solar, storage, and natural gas.[42]

At the state level, the Governor's Office of Resilience recently released a report from the Arizona Energy Promise Task Force that outlines several recommendations for clean energy development, including creating a centralized permitting coordination council to reduce the cost and accelerate energy project timelines, developing training programs aligned with project timelines, encouraging transparent and responsible water use in project development, and building community support for energy project development through proactive engagement efforts (Arizona Governor's Office of Resiliency 2026).

While these trends underscore Arizona's growing role as a hub for renewable energy investment, they also highlight important differences in how communities across the state experience and participate in this transition. In particular, tribal nations occupy a unique and increasingly important position within Arizona's clean energy landscape—both geographically, given the significant renewable resource potential on tribal lands, and institutionally, due to their sovereign status and governance structures.

Among the 22 federally recognized tribes in Arizona, the Pascua Yaqui Tribe and the Tohono O'odham Nation are closest to the Tucson area and are actively exploring renewable energy opportunities. The Tohono O'odham Nation has their own utility authority, which provides essential utility services such as electricity, water, wastewater treatment, internet, and telephone services; solar energy reportedly accounts for roughly half of their resource supply.[43] The Tohono O'odham Utility Authority also offers propane services and administers a utility assistance program.[44] The Pascua Yaqui Tribe completed a Solar Feasibility Study in 2015, which reviewed the tribe's potential for engaging in the solar industry, and they recently passed a Solar and Renewable Energy Leasing Ordinance, which facilitates wind and solar lease agreements without the need for further Bureau approval, thereby streamlining development for future energy projects (Pascua Yaqui Tribe 2013).[45]

Tribes have a unique legal status that can facilitate renewable energy innovation, enabling them to diversify their economies beyond common 20th and 21st century resources such as fossil fuel development and casinos.[46] As the federal government rolls back many of its climate and renewable energy commitments, tribes with renewable energy priorities may stand to benefit from the federal government's rescission of renewable energy leasing incentives on federal land in particular, as their unique legal status may position tribal lands as viable alternative sites for renewable energy projects.[47]

This would allow tribes to leverage their resources for economic and workforce development and give them greater control over renewable energy initiatives that align with their community and climate goals. At the same time, recent and looming coal plant closures across the Southwest affect the Navajo and Hopi Nations in particular; the closures have led to significant job losses in tribal communities across Arizona and New Mexico. Many tribes seeking to expand renewable energy on their lands face challenges in navigating the transition, including securing equitable access to the benefits from renewable energy projects, transmission infrastructure siting, and related workforce and economic benefits.

Clean Technology Manufacturing

The clean technology manufacturing sector (table 4) involves producing components and equipment that underpin the transition to cleaner energy sources, products, and other energy efficiency goals. This includes manufacturing energy efficient technologies (e.g., insulation, efficient HVAC systems), clean energy infrastructure (e.g., solar panels and wind turbines), clean energy technology components (e.g., semiconductors), and batteries. This sector involves "traded" industries that produce goods and services for regional, national, and global markets.

TABLE 4

Key Industries and Occupations in the Clean Technology Manufacturing Sector

Key industries (4-digit NAICS)	Key sustainable and resilient occupations (6-digit SOCs)
▪ Navigational, measuring, electromedical, and control instruments manufacturing (NAICS 3345) ▪ Architectural and structural metals manufacturing (NAICS 3323) ▪ Semiconductor and other electronic component manufacturing (NAICS 3344) ▪ Utility system construction (NAICS 2371) ▪ Other heavy and civil engineering construction (NAICS 2379)	▪ Miscellaneous assemblers and fabricators (512090) ▪ Construction laborers (472061) ▪ Electrical engineers (172071) ▪ Electrical, electronic, and electromechanical assemblers, except coil winders, tapers, and finishers (512028) ▪ Mechanical engineers (172141)

Source: Authors' analysis of Arizona Office of Economic Opportunity's resilient classification system.
Notes: NAICS=North American Industry Classification System; SOCs=standard occupational classifications. This table demonstrates the top jobs and industries within the sector by the number of workers in Tucson. See appendix A for a complete list of industries included in the sectors. Architectural and structural metals manufacturing is included in the data through fabricated metal product manufacturing (NAICS 3320A2).

This sector is essential because it underpins the supply chains required for scaling clean energy and efficiency technologies. Expanding clean technology manufacturing domestically can strengthen energy

security, reduce reliance on global supply chain bottlenecks, and expand local manufacturing job opportunities. Investments through the US Chips and Science Act of 2022 have aimed to reshore manufacturing capacity for critical clean energy components.[48] The current administration continues to prioritize investments to strengthen and expand American manufacturing capacity and build self-sufficiency, particularly for industries and infrastructure related to national security, including critical minerals mining and processing and component manufacturing for energy technology.[49]

In Tucson, clean manufacturing is an existing strength and key economic development opportunity. Tucson already has a strong manufacturing base, employing around 8 percent of the city's workforce, and both the city and county have identified manufacturing and advanced and emerging technologies as key priority sectors in their economic development plans (Pima County Economic Development 2023). These strengths align well with Arizona's broader positioning in the national economy.

Arizona is a leader in the emerging "electro-industrial economy," with industries and firms driving semiconductor, EV, solar, wind, and battery manufacturing. According to RMI, Arizona ranks third among states for existing and potential economic activity across the electro-industrial economy, primarily driven by their large presence and investments in semiconductor manufacturing (Carey et al. 2025). Arizona has been identified as a "momentum hub" with existing activity at scale and potential for policy to drive further investments. This momentum is aligned with state priorities to continue building out a semiconductor cluster, including workforce development, as articulated in the Arizona Commerce Authority's latest strategic plan (Arizona Commerce Authority 2024).

Arizona's strength in semiconductor manufacturing is translating to investments across other parts of the electro-industrial stack, including in and around the Tucson region. Notably, Tucson is home to a growing battery manufacturing cluster, with Sion Power's headquarters and facilities located in Tucson and the groundbreaking of American Battery Factory's new plant in Pima County, estimated to bring 1,000 jobs to the region.[50] This growth builds on Tucson's existing industrial base in aerospace and defense, and several firms are finding supply chain and market opportunities to align clean technology manufacturing with defense and aerospace industries. Sion Power's recent pivot to expand their batteries' commercial applications beyond EVs to drone technologies represents the increasing integration of clean technology into multiple parts of the economy.

To meet the demand of these employers, the Arizona Commerce Authority launched a Future48 workforce accelerator in partnership with Pima Community College, Maricopa County Community College District, and Central Arizona College alongside local manufacturing leaders to build out the advanced manufacturing workforce.[51] The accelerator includes a Flexible Industry Training Lab that

opened in March 2026 at Pima Community College.[52] Tucson's ability to stay on the leading edge of talent development will be critical to sustaining momentum as a competitive player in Arizona, and the nation's clean technology manufacturing sector.

Sustainable Transportation and Land Use

Sustainable transportation and land use focuses on the systems and infrastructure that reduce emissions, improve accessibility, and enhance resilience to climate impacts (table 5). This includes activities related to public transit; transit infrastructure; micro mobility; EV manufacturing, assembly, and repair; and other EV and transportation infrastructure investments. It also encompasses land use planning practices that promote compact, mixed-use development patterns, reduce sprawl, and integrate climate risk considerations into zoning and infrastructure decisions. This sector includes industries that produce both local goods and services for the regional economy, and traded goods and services for regional, national, and global markets.

TABLE 5

Key Industries and Occupations in the Sustainable Transportation and Land Use Sector

Key industries (4-digit NAICS)	Key sustainable and resilient occupations (6-digit SOCs)
▪ Automotive repair and maintenance (NAICS 8111)	▪ Miscellaneous assemblers and fabricators (512090)
▪ Highway, street, and bridge construction (NAICS 2373)	▪ Automotive service technicians and mechanics (493023)
▪ Land subdivision (NAICS 2372)	▪ Construction laborers (472061)
▪ Motor vehicle parts manufacturing (NAICS 3363)	▪ First-line supervisors of construction trades and extraction workers (471011)
▪ Rail transportation (NAICS 4821)	▪ Operating engineers and other construction equipment operators (472073)

Source: Authors' analysis of Arizona Office of Economic Opportunity's resilient classification system.
Notes: NAICS=North American Industry Classification System; SOCs=standard occupational classifications. This table demonstrates the top jobs and industries within the sector by the number of workers in Tucson. See appendix A for a complete list of industries included in the sectors.

As of 2022, transportation accounted for the largest portion of total US greenhouse gas emissions.[53] Sustainable transportation and land use interventions are critical to reducing emissions, and deliver significant co-benefits including reduced air pollution, improved public health, and increased mobility access (WHO 2011). EVs are a central part of the solution to decarbonizing the transportation sector. Despite recent setbacks in EV growth, driven by the repeal of federal tax credits and the cancellation of billions of dollars in public and private-sector investment in EV manufacturing and

infrastructure, analysts still project EV adoption will eventually dominate the US car market, in line with international trends.[54]

In Tucson, meeting the region's carbon neutrality goals will require significant attention to the transportation sector. The city's history of car-centric development patterns has led to high vehicle dependency and sprawling urban form, with more than 93 percent of residents in the Tucson metro area relying on a car or van to get to work.[55] To meaningfully reduce emissions, residents must transition to EVs, invest in transit, and shift to more sustainable land use patterns.

Tucson has many initiatives underway that focus on enhancing the city's transportation and infrastructure systems with a strong focus on sustainability and accessibility. In 2021, the city published a Move Tucson plan, setting the foundation for a shift toward more sustainable and resilient transportation systems. The plan includes guiding principles for resilience that promote shade, green infrastructure, and other heat resilience interventions.[56]

Given Tucson's heavy reliance on individual vehicles, many interventions have focused on increasing EV adoption. Tucson passed an EV Readiness Roadmap in 2022, establishing EV-ready standards for new residential and commercial developments (City of Tucson 2022). The city has installed over 80 EV chargers and is seeking federal funding to expand this network, though funding prospects are now uncertain due to administrative changes. Beyond the minimum standards set in the EV Readiness Roadmap in 2022, the city offers incentives for developers to install EV charging stations, such as reduced parking requirements.[57] To lead by example, the city adopted a Green Fleet Transition plan in 2023, which emphasizes reducing vehicle miles traveled, minimizing idling, and prioritizing EV replacements for city-owned vehicles, with a goal to eliminate diesel use entirely by 2030.[58] The city currently operates 96 electric units in their fleet, including 11 electric lifts and golf carts and 85 light-duty EVs. In March, the Tucson Unified School District acquired 10 all electric school buses with a plan to replace all diesel buses with electric buses by 2040 if the pilot is successful.[59]

At the state level, Arizona Department of Transportation is set to receive $76.5 million in federal dollars to establish up to 69 publicly available EV charging stations along Arizona's designated alternative fuels corridors.[60] During the last federal administration, the US Joint Office of Energy and Transportation offered technical assistance and created several resources for tribes looking to implement EV chargers. [61] However, one tribal interviewee emphasized that tribal communities have not experienced the same level of investment as the rest of the region, citing insufficient funding to support EV infrastructure deployment on tribal lands.

Beyond increasing EV adoption, city and county leaders have also prioritized expanding public transit and shared mobility options. The city offers fare-free transit and is developing a 15-mile Bus Rapid Transit line, with the first segment connecting downtown to the airport.[62] The Sun On Demand service provides flexible, door-to-door shuttle transit, while transit infrastructure improvements include 80 new bus shelters with integrated green infrastructure and a new compressed natural gas station to phase out diesel buses.[63] Shared mobility options like Tugo Bike Share and e-scooters further enhance transportation flexibility. These initiatives are led by the Department of Transportation and Mobility and the Department of Environmental and General Services, reflecting a coordinated approach to building a cleaner, more efficient urban mobility system. In March, the city voted to approve RTA Next, a $2.67 billion regional transportation plan for the greater Tucson area. However, the environmental impact of the plan is being debated, with critics concerned about the plan's priority for road widening over climate resilience and transit investments.[64]

These activities signal continued demand for sustainable transportation and land use projects that can drive local economic activity. They also signal opportunities for well-established local industries, including automative repair and maintenance businesses, to expand their services and specializations to meet the needs of the growing EV market. Beyond these more locally oriented economic activities, Tucson is well positioned to grow as a hub for EV manufacturing. As demand increases over the long term, Tucson can leverage regional assets, including EV company Lucid Motors's existing manufacturing facility in Case Grande, Arizona, and the concentration and proximity to key EV supply chain inputs, as key selling points for continued growth.

Water, Waste, and Resource Management

Water, waste, and resource management centers on the sustainable use of natural and human-made resources, including effective stormwater management and efficient processing and productive reuse of industrial, commercial, and residential waste (table 6). This sector covers water conservation and reuse, wastewater treatment, brownfield remediation, green infrastructure, and waste collection and recycling. It primarily includes local industries that produce goods and services for the regional economy.

TABLE 6

Key Industries and Occupations in the Water, Waste, and Resource Management Sector

Key industries (4-digit NAICS)	Key sustainable and resilient occupations (6-digit SOCs)
▪ Services to buildings and dwellings (NAICS 5617) ▪ Waste collection (NAICS 5621) ▪ Remediation and other waste management services (NAICS 5629) ▪ Water, sewage and other systems (NAICS 2213) ▪ Waste treatment and disposal (NAICS 5622)	▪ Landscaping and groundskeeping workers (373011) ▪ Laborers and freight, stock, and material movers, hand (537062) ▪ Water and wastewater treatment plant and system operators (518031) ▪ Maintenance and repair workers, general (499071) ▪ Operating engineers and other construction equipment operators (472073)

Source: Authors' analysis of Arizona Office of Economic Opportunity's resilient classification system.
Notes: NAICS=North American Industry Classification System; SOCs=standard occupational classifications. This table demonstrates the top jobs and industries within the sector by the number of workers in Tucson. See appendix A for a complete list of industries included in the sectors.

This sector is increasingly important because climate change intensifies water stress, flooding risks, and resource constraints across the United States. Effective waste and water systems reduce pollution, protect public health, and improve ecosystem resilience while supporting long-term economic growth.

In Tucson, this sector is especially pertinent given the region's dual threat of water scarcity issues and increasingly intense monsoons. On top of water vulnerabilities, 700,000 tons of waste are disposed of at Tucson's local landfill.[65] Consequently, the city has taken steps to conserve water, manage stormwater, and reduce waste.

For decades, Tucson has been a leader in water conservation, guided by their comprehensive water management plan, One Water 2100. Tucson Water operates one of the largest reclaimed water systems in the country, servicing many of the golf courses and parks in the city (City of Tucson and Tucson Water 2023).[66] They also offer rebates for commercial, multifamily, and residential water efficiency upgrades such as installing high-efficiency toilets and clothes washers.[67] In addition to rebates, through its Low-Income Conservation programs, Tucson Water provides grants and loans to help residents reduce water use and utility costs.[68] Tribes in the region have also received funding for water conservation work through the federal 595 Program, the Environmental Infrastructure, Resource Protection, and Development Program. Most recently, the Pascua Yaqui Tribe received funding to build a mile-long nonpotable distribution line, delivering water to recreational fields and other landscaping, that will free up nearly 50 acre-feet of potable water annually for use within the community.[69]

Tucson has also made significant investments in green stormwater infrastructure to enhance urban sustainability and resilience. The city established a $3 to $5 million annual green stormwater infrastructure fund, financed through a city services fee, to centralize planning and maintenance of public green infrastructure. Programs like Storm to Shade, launched in 2021, use stormwater runoff to support native vegetation, providing shade and cooling benefits across nearly 800 green stormwater infrastructure features (City of Tucson and Tucson Water 2024). Additionally, the Green Streets Policy mandates that all publicly funded road projects incorporate green infrastructure capable of retaining at least 0.5 inches of rainfall, promoting sustainable urban design.[70] To further encourage green practices, Tucson offers a range of incentives and policy requirements such as requiring new commercial developments to meet at least half of their irrigation needs with rainwater, and rebates for residential and commercial rainwater harvesting, turf replacement with desert-adapted plants, and graywater system installations.[71] The city also supports community-led projects through its green stormwater infrastructure Mini-Grant Program.[72]

Tucson's Zero Waste Roadmap, adopted in 2023, outlines a comprehensive strategy to reduce landfill waste and promote circular resource use.[73] A key initiative is the city's composting program, which diverts all green and food waste to the Los Reales Sustainability Campus for compost production. The city is also updating its sustainable procurement policy and exploring new technologies and partnerships to enhance waste diversion.[74] One major effort includes developing a ByFusion facility at Los Reales, which will recycle 200 tons of hard-to-recycle plastics monthly into construction-grade blocks.[75] Complementing this, the Hefty Renew program offers residents a voluntary way to recycle difficult plastics. Additional innovations include recycling old pavement, resource recovery through heat exchange, and the Los Reales Landfill Gas Recovery Project, which converts landfill gas into usable natural gas.

Resilience Professional Services

Resilience professional services focus on the industries that research, regulate, and manage the environment, and includes consulting, research, advocacy, urban planning, and program administration for environmental, housing, and community development (table 7). The sector includes industries that produce both local goods and services for the regional economy, and traded goods and services for regional, national, and global markets.

TABLE 7

Key Sector Industries and Occupations in the Resilience Professional Services Sector

Key industries (4-digit NAICS)	Key sustainable and resilient occupations (6-digit SOCs)
▪ Management, scientific, and technical consulting services (NAICS 5416) ▪ Scientific research and development services (NAICS 5417) ▪ Social Advocacy Organizations (NAICS 8133) ▪ Administration of environmental quality programs (NAICS 9241)* ▪ Administration of housing programs, urban planning, and community development (NAICS 9251)*	▪ Firefighters (332011) ▪ Business operations specialists, all other (131199) ▪ Compliance officers (131041) ▪ First-line supervisors of firefighting and prevention workers (331021) ▪ Social scientists and related workers, all other (193099)

Source: Authors' analysis of Arizona Office of Economic Opportunity's resilient classification system.
Notes: NAICS=North American Industry Classification System; SOCs=standard occupational classifications. This table demonstrates the top jobs and industries within the sector by the number of workers in Tucson. See appendix A for a complete list of industries included in the sectors. Administration of Environmental Quality Programs (NAICS 9241) and Administration of Housing Programs, Urban Planning, and Community Development (NAICS 9251) are included in the data as federal executive branch (NAICS 9991), state government excluding schools and hospitals (NAICS 9992), and local government excluding schools and hospitals (NAICS 9993).

This sector plays a critical role in enabling the other sustainable and resilient sectors by providing the expertise needed to design, implement, and evaluate solutions. The Inflation Reduction Act significantly expanded federal investment in planning, technical assistance, and implementation capacity for climate and resilience programs, channeling funding through the US Environmental Protection Agency, US Department of Energy, and US Department of Housing and Urban Development to support state and local governments, community-based organizations, and technical intermediaries in designing and delivering decarbonization, adaptation, and environmental justice initiatives. While federal resources and capacity have been retracted across the resilience professional services sector, emerging public sector demand at the state and local levels and within the private sector will help to expand regional energy supply, lower energy costs for ratepayers, and build resilience to extreme heat and drought across industries and actors.

In Tucson, the city's and county's ambitious resilience, community development, and economic development goals will require the planning and technical expertise, program administration, community engagement, and evaluation capacity of the resilience professional services sector. As outlined in the previous sector descriptions, several active programs and plans related to a sustainable and resilient economy will draw on Tucson's strong ecosystem of public agencies, universities, and

mission-driven organizations to design, manage, and deliver climate and resilience projects across the region.

This ecosystem relies on strong leadership from public sector agencies, including the City's Chief Resilience Officer and Climate Action Team, and engagement from several departments including the Departments of Transportation and Mobility, Parks and Recreation, Housing and Community Development, Environmental and General Services, Economic Development, and Tucson Water. It also includes leadership from analogous departments across Pima County, and within tribal governments.

For the sector's research side, the University of Arizona, in partnership with TEP, hosts one of the largest solar research parks in the country, the Tech Park Solar Zone, where the university pilots and evaluates solar technologies.[76] The university's Institute for Energy Solutions, within the Arizona Institute for Resilience, also conducts research on clean energy manufacturing technologies and renewable energy solutions.[77]

In addition to public sector agencies and universities, many nonprofit organizations are advancing equitable climate resilience in Tucson. For example, Sustainable Tucson advocates for energy transformation, habitat restoration, water conservation, and waste reduction.[78] Tucson Clean and Beautiful administers Tucson Water's Green Storm Water Infrastructure Mini-Grants and provides resources and programming related to recycling, land stewardship, and workforce development initiatives.[79] Sonora Environmental Research Institute promotes environmental sustainability, justice, and health in southern Arizona through water conservation, solar energy adoption, and healthy home assessments, primarily focusing on underserved, low-income households.[80] Certain national nonprofits also have a presence in the Tucson region, such as the American Red Cross, which organizes Heat Walks that go door-to-door before extreme heat events to perform wellness checks, ensuring that residents know how to stay safe during extreme heat and equipping them with the necessary resources.[81]

Overall, the resilience professional services sector plays a key driving and enabling role for the sustainable and resilient economy. Plans, investments, and insights from this sector have the potential to fuel growth in other sectors of the sustainable and resilient economy. And as those other sectors grow, the demand for the professional services that underpin their expansion will also grow.

Assessing the Economic Development Potential of Sustainable and Resilient Sectors in Tucson

Across the six sectors, several consistent themes emerge regarding the structure and trajectory of Tucson's sustainable and resilient economy. First, much of the near-term economic activity identified through desk research and interviews is rooted in local-serving industries—construction trades, utilities, repair and maintenance, water and waste services, and public agencies—that directly translate climate and resilience goals into on-the-ground investments. These industries are geographically anchored and closely linked to core sustainability and resilience drivers that include lowering household costs, strengthening heat mitigation and water security, and improving infrastructure. While they may present powerful workforce and small business opportunities, and are critical for achieving Tucson's resilience goals, they are unlikely to increase the size and competitiveness of the overall Tucson economy. Conversely, Tucson also has meaningful exposure to traded activities, particularly through clean technology manufacturing, battery production, and segments of EV and energy supply chains. These industries present long-term growth potential and can serve as engines to expand Tucson's overall economic output. However, investment in these sectors carries greater risk, especially amid federal policy reversals and shifting private-sector sentiments.

Taken together, the sector profiles suggest that the sustainable and resilient economy in Tucson is likely to evolve through gradual, fragmented, and strategic changes rather than through rapid economic transformation. Local and state initiatives, utility investments, and private-sector leadership can continue to shape opportunities and sustain activity in sustainable and resilient sectors, but the pace and scale of expansion will be determined by broader market demand, which is currently characterized by constrained public resources and softening private-sector investment.

To vet these assumptions and better assess the viability of the sustainable and resilient economy as an engine for local development, we needed a better understanding of the current scale and projected growth of each sustainable and resilient sector. Which sectors are delivering durable employment, where has growth slowed or stalled, and where might targeted economic development and workforce strategies still unlock meaningful opportunity, even within an increasingly uncertain policy and

economic landscape? The following section explores whether these perceptions are reflected in industry and employment data.

The State of Tucson's Sustainable and Resilient Economy

Using labor market data, we analyzed the current size and projected employment growth for each sector over the next ten years to identify insights on the share of sustainable and resilient jobs within each sector, the quality of those jobs, and who has access to them. We compared trends in Tucson with trends in the state of Arizona and several city-level benchmarks, including the 100 largest metropolitan statistical areas in the country, and two of Tucson's southwestern peers, Austin and Albuquerque.

Sizing Up the Sectors

In Tucson, over 5,000 establishments and 50,000 employees are in sectors related to the sustainable and resilient economy (table 8). Similar to trends across Arizona and among peer cities, the largest share of establishments and employees are concentrated in the building decarbonization and weatherization sector, which accounts for nearly 15 percent of all establishments and around 3 of every 100 jobs in Tucson. The remaining sectors are much smaller; combined, they account for fewer establishments and fewer employees than are in the building decarbonization and weatherization sector alone.

TABLE 8

The Size of Tucson's Sustainable and Resilient Sectors

Number of establishments and employees per sector compared with all other industries in Tucson

	Establishments	Employment
Building decarbonization and weatherization	3,256	28,363
Resilience professional services	1,029	4,706
Water, waste, and resource management	791	6,911
Sustainable transportation and land use	483	4,946
Clean technology manufacturing	206	5,967
Clean energy generation and development	100	524
All other industries	16,776	235,030
Total	**22,641**	**286,447**

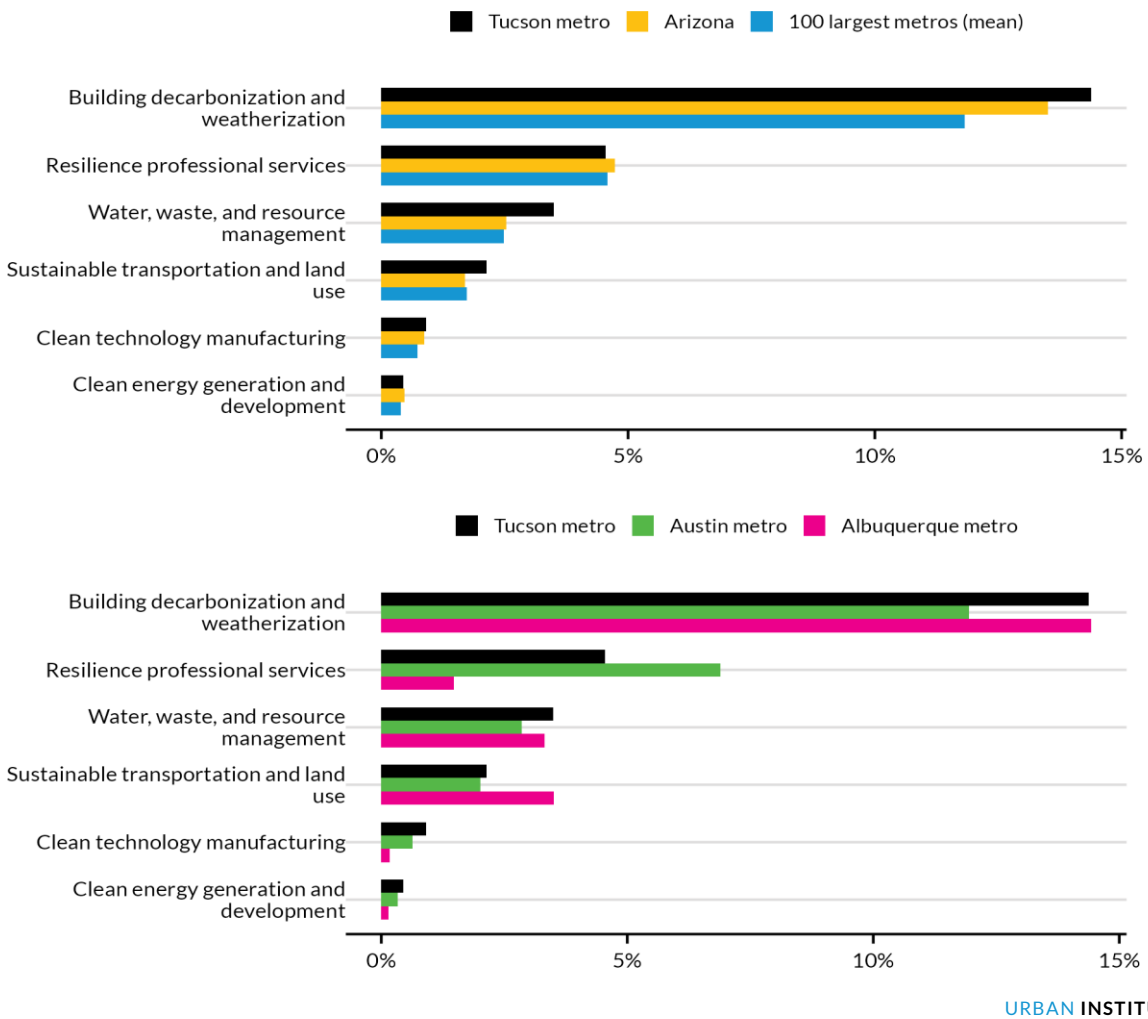
Source: US Bureau of Labor Statistics 2025 Quarterly Census of Employment and Wages data.

Relative to Arizona and the 100 largest metro areas, Tucson has a higher concentration of establishments across most of the sustainable and resilient sectors, including building decarbonization and weatherization; water, waste, and resource management; sustainable transportation and land use; clean tech manufacturing; and clean energy generation and development (figure 3). Only the resilience professional services sector is slightly less concentrated in Tucson. This trend holds in Austin, but diverges in Albuquerque, which has some slightly higher and significantly lower sector concentrations than its peers.

FIGURE 3

Establishments by Sector

Share of sector establishments relative to total establishments within a geography, comparing Tucson with Arizona, the l00 largest metro areas (averaged), and peer cities Austin and Albuquerque



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Source: US Bureau of Labor Statistics 2025 Quarterly Census of Employment and Wages data.

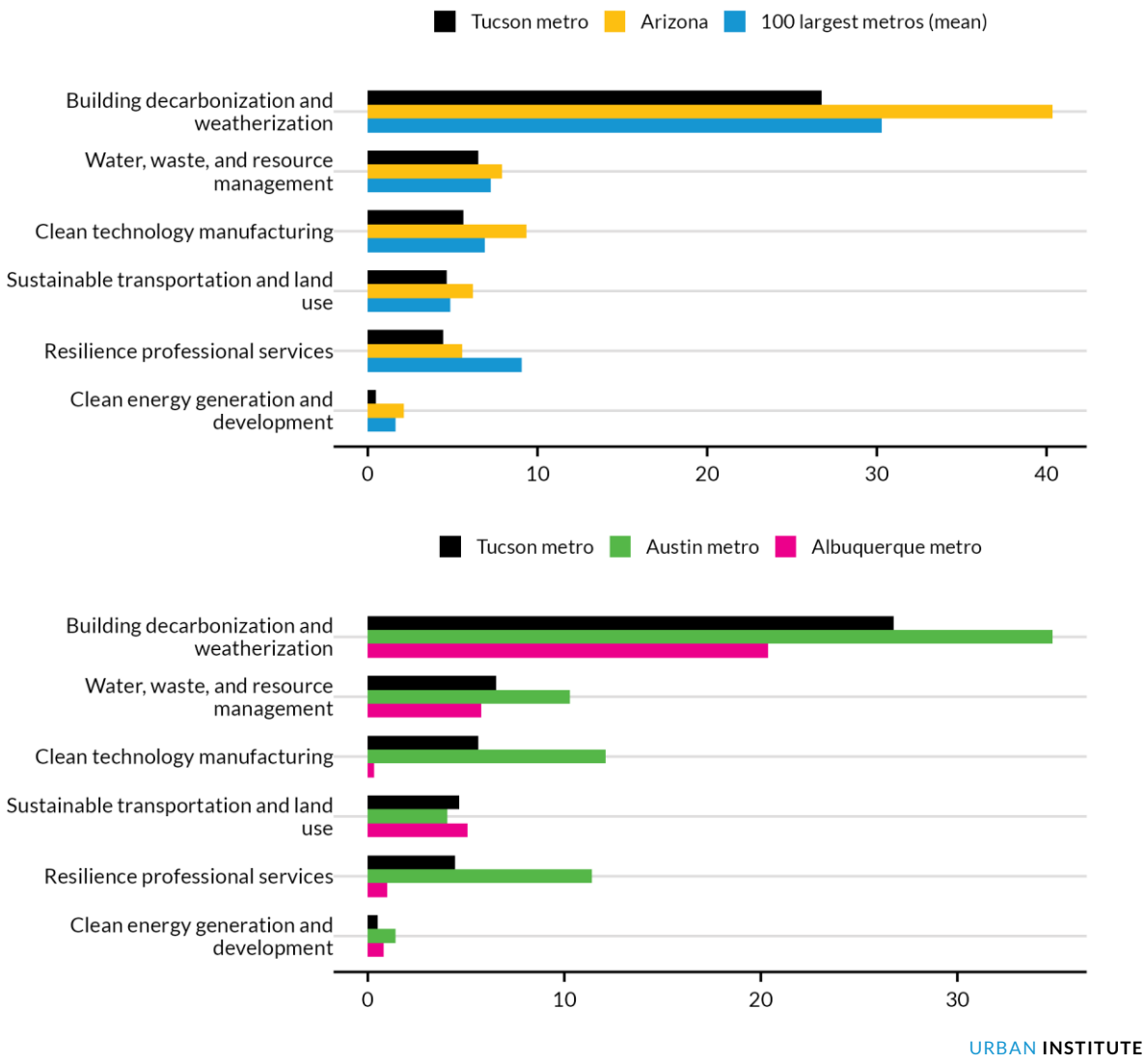
Notes: Share of establishments was calculated by dividing the number of establishments in each sector by total establishments in each metropolitan area.

Despite higher establishment concentrations in these sectors, Tucson has significantly less concentrated employment in these sectors relative to Arizona and the 100 largest metro areas, especially within the building decarbonization and weatherization sector (figure 4). Notably, Tucson employment lags the state of Arizona in clean tech manufacturing and lags the top 100 metro areas in resilience professional services. Relative to its peer cities, Tucson has a higher concentration of building decarbonization and weatherization and clean tech manufacturing jobs than Albuquerque, but lags Austin across all sectors except sustainable transportation and land use.

FIGURE 4

Employees by Sector

Sector jobs per 1000 residents, comparing Tucson with Arizona, the average of the l00 largest metro areas, and peer cities Austin and Albuquerque



Sources: US Bureau of Labor Statistics Quarterly Census of Employment and Wages data (2025); American Community Survey 2020–24 five-year estimates of population.

How Is Each Sustainable and Resilient Sector Expected to Grow?

To understand the projected growth of each sector, we calculated 10-year employment estimates (2024–34) from the Bureau of Labor Statistics for each industry, aggregated by sector. These

projections account for the number of anticipated openings based on industry changes and natural attrition and turnover.

In Tucson, sustainable and resilient sector growth accounts for over 21 percent of the city's expected employment growth (table 9). The average 4.6 percent growth rate across sustainable and resilient sectors outpaces growth rates in other sectors (3.70 percent) and across the broader economy (4.01 percent), primarily driven by high growth in the resilience professional services, clean energy generation and development, and clean technology manufacturing sectors (figure 5). Within the sustainable and resilient sectors, the largest number of net new occupations is concentrated within the building decarbonization and weatherization sector.

TABLE 9

Projected Employment Growth

Projected Tucson metropolitan area employment growth in sustainable and resilient sectors compared with the economy as a whole (2024–34)

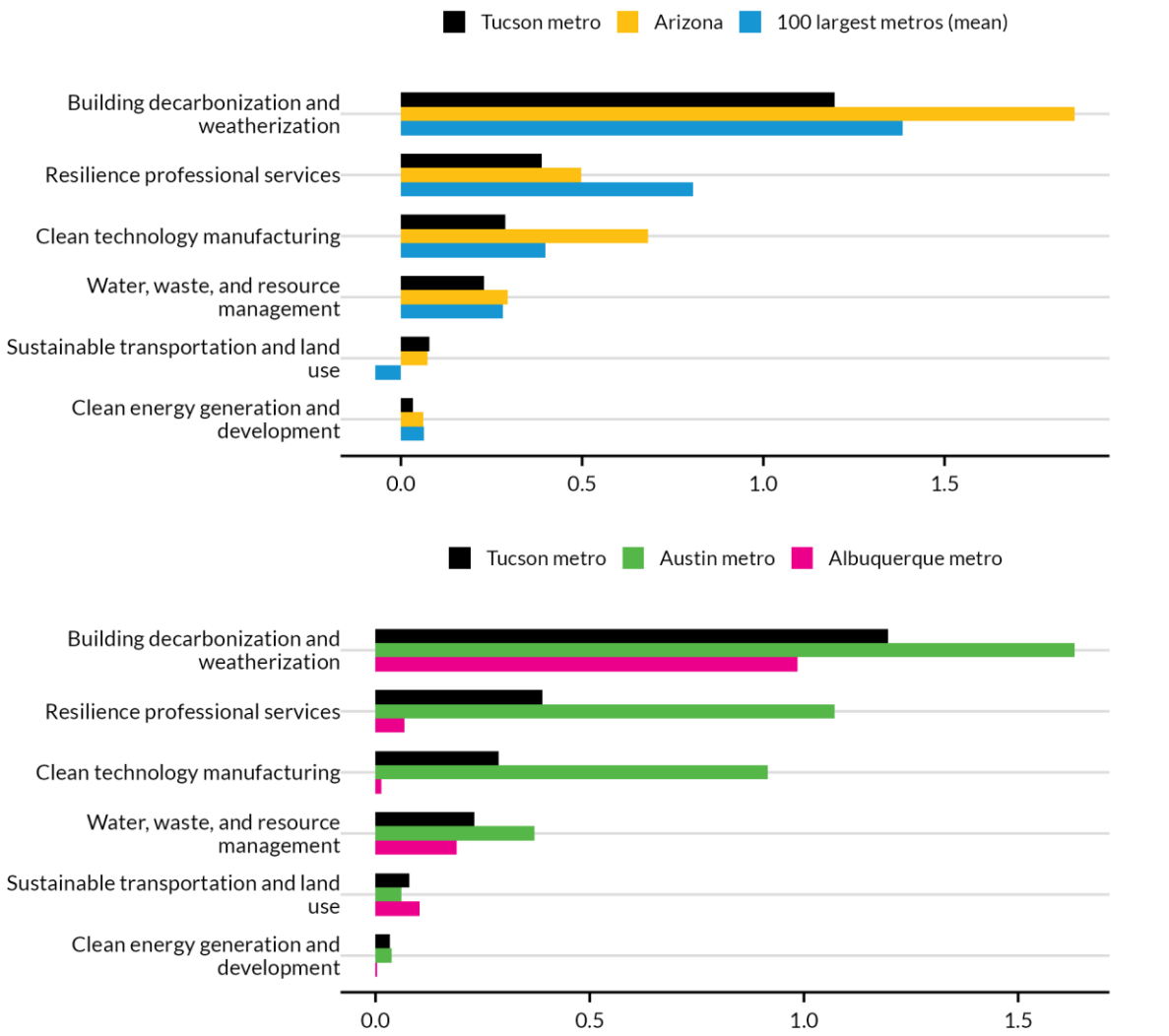
	Projected Employment Growth 2024–34	
Tucson sectors	**Net employment growth**	**Growth rate**
Tucson sustainable and resilient economy	2,349	4.6%
All other industries	8,695	3.7%
Tucson economy	11,044	4.01%
Resilience professional services	413	8.8%
Clean energy generation and development	35	6.8%
Clean technology manufacturing	305	5.1%
Building decarbonization and weatherization	1,269	4.5%
Water, waste, and resource management	244	3.5%
Sustainable transportation and land use	83	1.7%

Sources: US Bureau of Labor Statistics 10-year employment projections; Arizona Office of Economic Opportunity's resilient classification system.

FIGURE 5

Projected Growth of Sustainable and Resilient Sectors in Tucson (2024–34)

Net new jobs per 1,000 residents in Tucson compared with Arizona, the average of the l00 largest metro areas, and peer cities Austin and Albuquerque



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Sources: US Bureau of Labor Statistics Employment Projections data; American Community Survey 2020–24 five-year estimates of population.

Compared with Arizona and the top 100 metro areas, Tucson is expected to lag across all sectors except sustainable transportation and land use, which is expected to contract, on average, across the 100 largest metro areas. Tucson is expected to see far less growth than Austin and far more growth than Albuquerque across all sectors except sustainable transportation and land use, for which the trend is reversed.

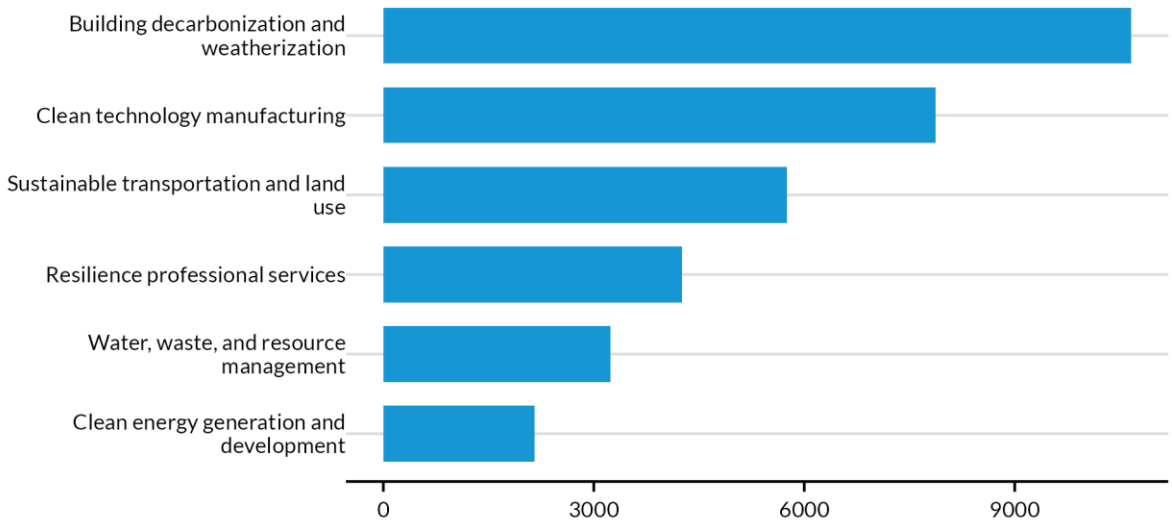
How Many Jobs Within Each Sector Are Currently Classified as Sustainable and Resilient?

Thus far, we have described industry-level analyses, encompassing the full range of establishments and employees within a sustainable and resilient sector regardless of whether they are currently "green." While key sustainable and resilient economy activities are concentrated in these sectors, and many establishments and employees within these sectors will focus on sustainability and resilience activities in the future, it is important to gauge the current relative "greenness" within each sector to illustrate which are already primarily green, and which present opportunities for "greening."

Using the Arizona Office of Economic Opportunity's resilient classification system (Amrein et al. forthcoming), we find that 33,940 jobs are categorized as sustainability and resilience jobs, which represents 49 percent of all jobs within these sectors. With over 10,000 jobs, building decarbonization and weatherization has the largest number of sustainability and resilience jobs. Clean tech manufacturing is second, with nearly 8,000 jobs (figure 6).

FIGURE 6

Number of Sustainability and Resilience Employees by Sector



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Sources: Arizona Office of Economic Opportunity's resilient classification system; US Bureau of Labor Statistics Occupational Employment and Wage Statistics data.

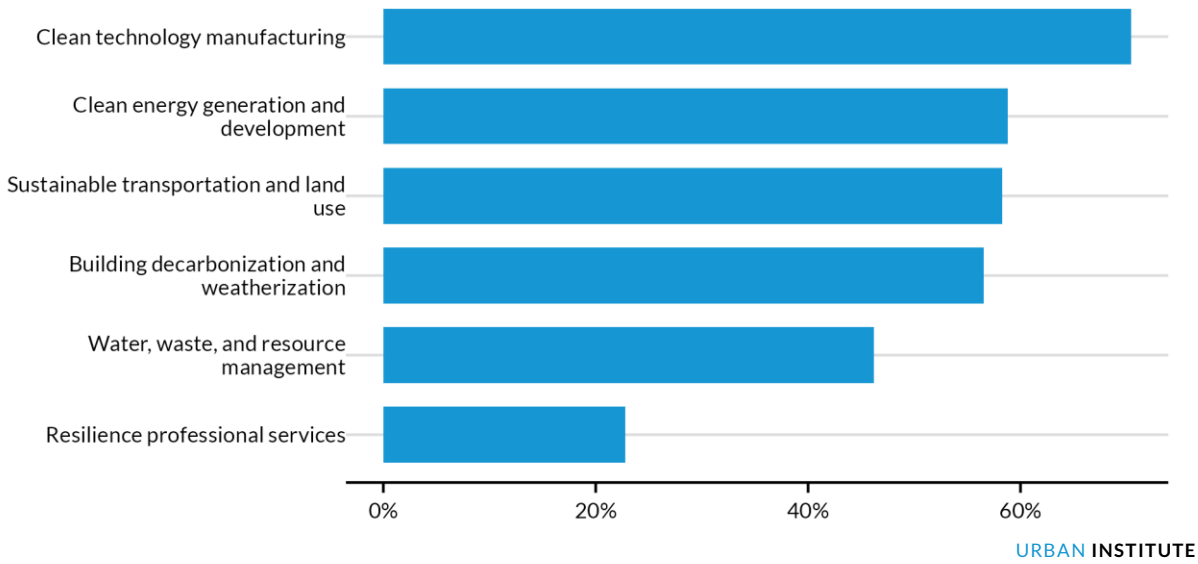
The much smaller gap between the number of sustainability and resilience jobs across the building decarbonization and weatherization and clean tech manufacturing sectors relative to their sector-level comparisons is explained by the concentration of sustainability and resilience jobs within each sector.

Over 70 percent of jobs in the clean technology manufacturing sector are considered sustainability and resilience jobs compared with only 56 percent of jobs in the building decarbonization and weatherization sector. The resilience professional services sector has the lowest concentration of occupations currently classified as sustainability and resilience jobs, with just over 22 percent (figure 7).

FIGURE 7

Share of Employees in Sustainability and Resilience Jobs by Sector

Percentage of jobs classified as sustainability and resilience jobs within each sector



Sources: Arizona Office of Economic Opportunity's resilient classification system; US Bureau of Labor Statistics Occupational Employment and Wage Statistics data.

These findings suggest that the rate of change and adoption of sustainable and resilient products and services (and thus the number of sustainable and resilient jobs) vary significantly by sector. Jobs that focus on producing goods and services central to the green economy and that require large-scale capital investment—such as clean tech manufacturing and clean energy generation and development—are more consistently classified as sustainability and resilience jobs, while jobs that are more responsive to local consumer demand—such as building decarbonization and weatherization and resilience professional services—are less so. This variance may reflect the roles played by fluctuating market conditions, consumer demand, and policy incentives in facilitating the transition to and driving growth within sustainable and resilient sectors.

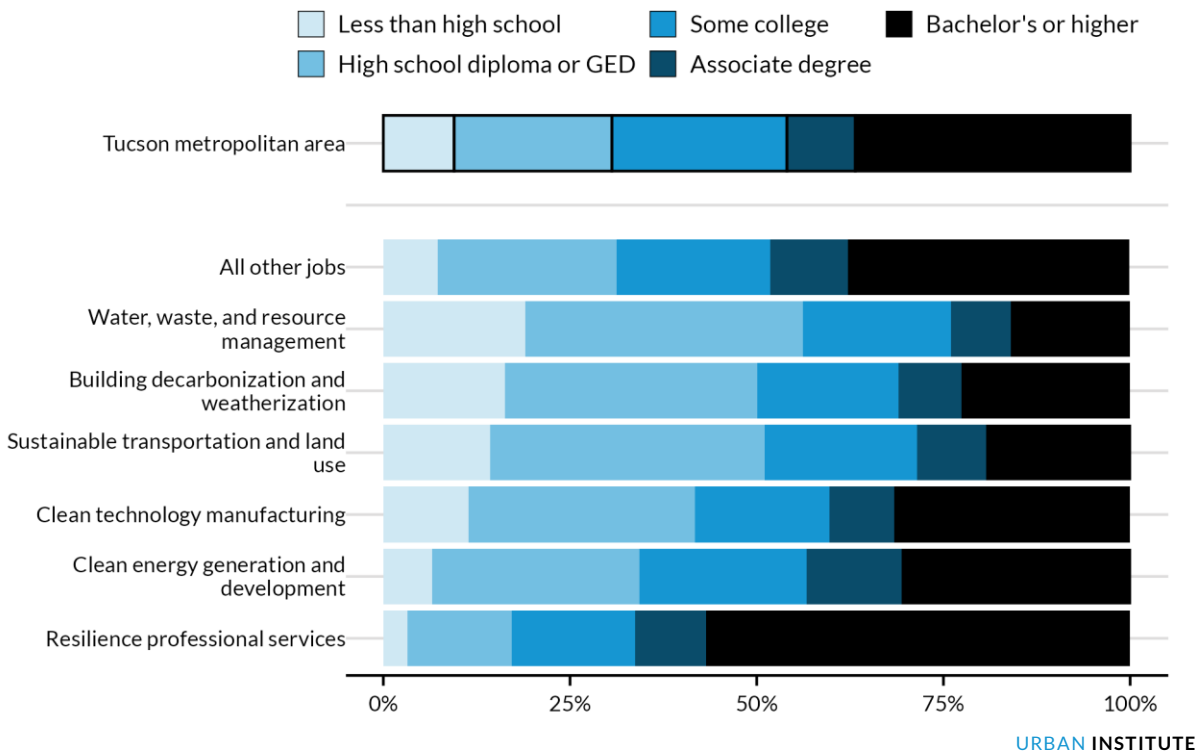
Comparing the Accessibility and Quality of Sustainability and Resilience Jobs in Each Sector

To better understand and compare sustainability and resilience jobs across sectors, we explored the relative accessibility, wages, and overall quality of jobs within sectors. Overall, jobs within the sustainable and resilient economy are highly accessible across educational attainment, with the vast majority of jobs available to workers with less than a bachelor's degree, and many jobs available to those with a high school degree or less (figure 8). The distribution of educational attainment among sustainability and resilience jobs is much more accessible compared with the distribution of education attainment across jobs in all other sectors, particularly in the water, waste, and resource management, building decarbonization and weatherization, and sustainable transportation and land use sectors. This is expected among sectors with high concentrations of jobs in trades that typically require on-the-job training, apprenticeships, and nondegree credentials.

FIGURE 8

Typical Educational Attainment per Sector

Distribution of educational attainment requirements within each sector, compared with educational attainment levels in Tucson and typical requirements for all other jobs



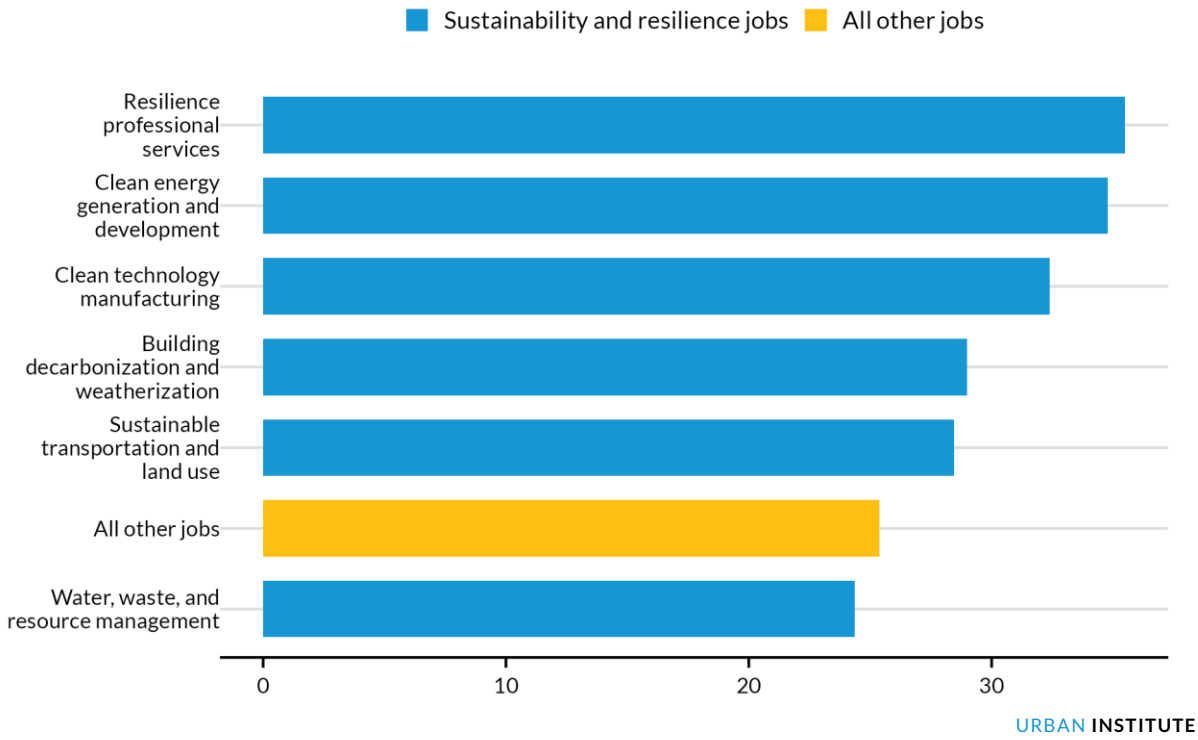
Sources: Arizona Office of Economic Opportunity's resilient classification system; US Bureau of Labor Statistics data.

Higher average wages were reported for sustainability and resilience jobs that require higher levels of educational attainment, such as resilience professional services, while lower average wages were reported for jobs requiring lower educational attainment, such as building decarbonization and weatherization. However, compared with jobs in all other industries, sustainability and resilience jobs in all sectors except water, waste, and resource management pay higher wages on average (figure 9).

FIGURE 9

Average Hourly Wages for Sustainable and Resilient Jobs per Sector

Weighted mean of hourly wages within each sector compared with the mean hourly wage of all other jobs in the Tucson metropolitan area



Sources: Arizona Office of Economic Opportunity's resilient classification system; US Bureau of Labor Statistics Occupational Employment and Wage Statistics data; US Census Bureau Current Population Survey.
Notes: The mean job wage of each sustainable and resilient job was weighted by the job's employment rate in Tucson.

To compare job quality across sectors, we calculated a job quality score ranging from 0 (lowest quality) to 100 (highest quality). The scale aggregates data on key metrics including hourly wages, whether the job typically offers full-time hours, number of weeks worked in a year, work schedule irregularity, health insurance coverage, on-the-job training days provided, flexibility and autonomy, stress, hazards (e.g., outdoor work exposure), job stability, and AI exposure. These factors were not individually weighted, so each component (e.g., hourly wages, irregular schedules, etc.) has the same

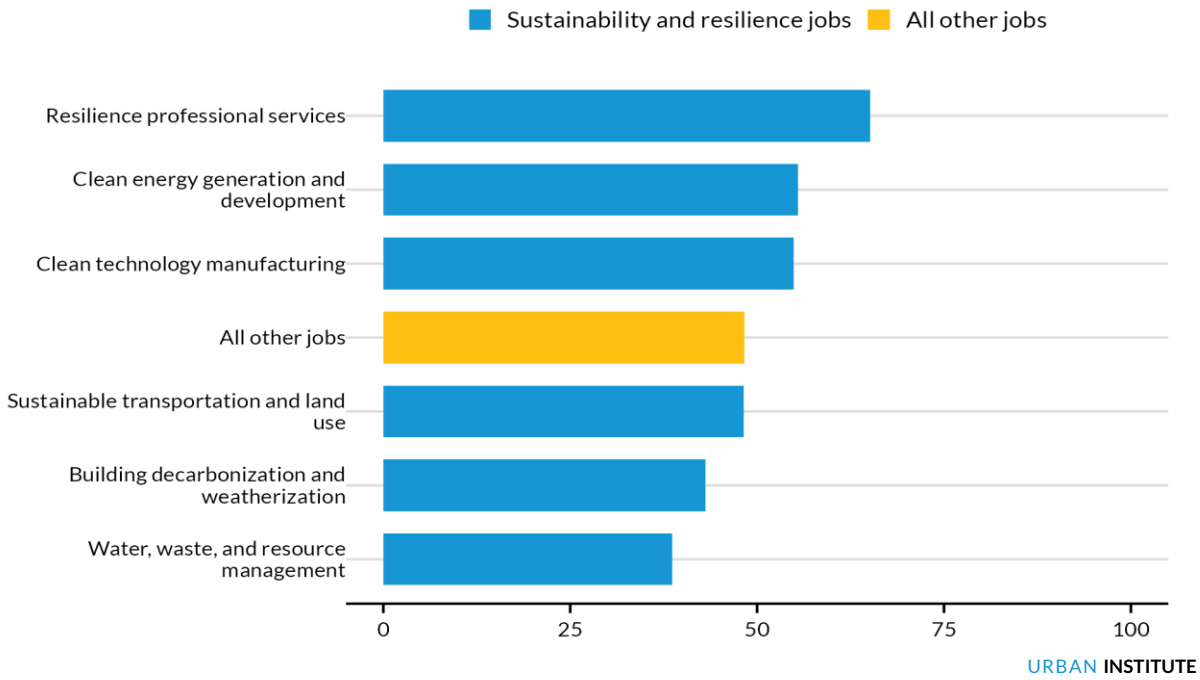
relative importance in the score. Also, the score is relative in that it provides a comparative measure rather than an intrinsic value.

Using this scale, we assessed the weighted average of job quality for sustainability and resilience jobs within each sector (figure 10). Similar to the observed relationships between educational attainment and income, we found an inverse relationship between job quality and accessibility. Sectors with lower barriers to entry, such as waste, water, and resource management, have a lower average job quality, while the highest-quality jobs are concentrated in the research and professional services sector, which also requires the highest degree of educational attainment. Several sustainable and resilient sectors, including resilience professional services, clean technology manufacturing, and clean energy development, showed higher job quality scores than all other sectors. These higher scores were driven by higher wages, more frequent access to full-time work, and more consistent work over the course of a year. On the other end of the spectrum, job quality in the water, waste, and resource management and building decarbonization and weatherization sectors lagged jobs in all other sectors, with the lower scores driven by irregular schedules, lower health care access, and increased hazard exposure.

FIGURE 10

Assessing Job Quality Across Sectors

Average job quality of sustainable and resilient jobs by sector



Sources: Authors' analysis of Arizona Office of Economic Opportunity resilient jobs taxonomy; US Bureau of Labor Statistics Employment Projections, Occupational Employment and Wage Statistics, Occupational Requirements Survey, and Job Openings

and Labor Turnover Survey; US Census Bureau Current Population Survey, Monthly and Current Population Survey Annual Social and Economic Supplement; O*NET Work Context, Work Styles, Generalized Work Activities, and Education and Training.
Notes: The chart represents the mean job quality score of all jobs in each sector, weighted by the job's employment rate in Tucson. See appendix A for a description of the methodology used to calculate the job quality score.

These insights across educational attainment, wages, and job quality factors highlight that jobs in some sustainability and resilience sectors are more durable, inclusive, and of high-quality compared with other economic segments, while jobs within a few sustainable and resilient sectors are less so. These findings signal the importance of supporting access to jobs that have higher barriers to entry but provide better wages and overall job quality. The findings also identify which sectors need increased focus on job quality improvements such as wage increases, strengthened worker protections, and expanded health care access, especially given the sectors' relative importance to meeting local sustainability and resilience goals.

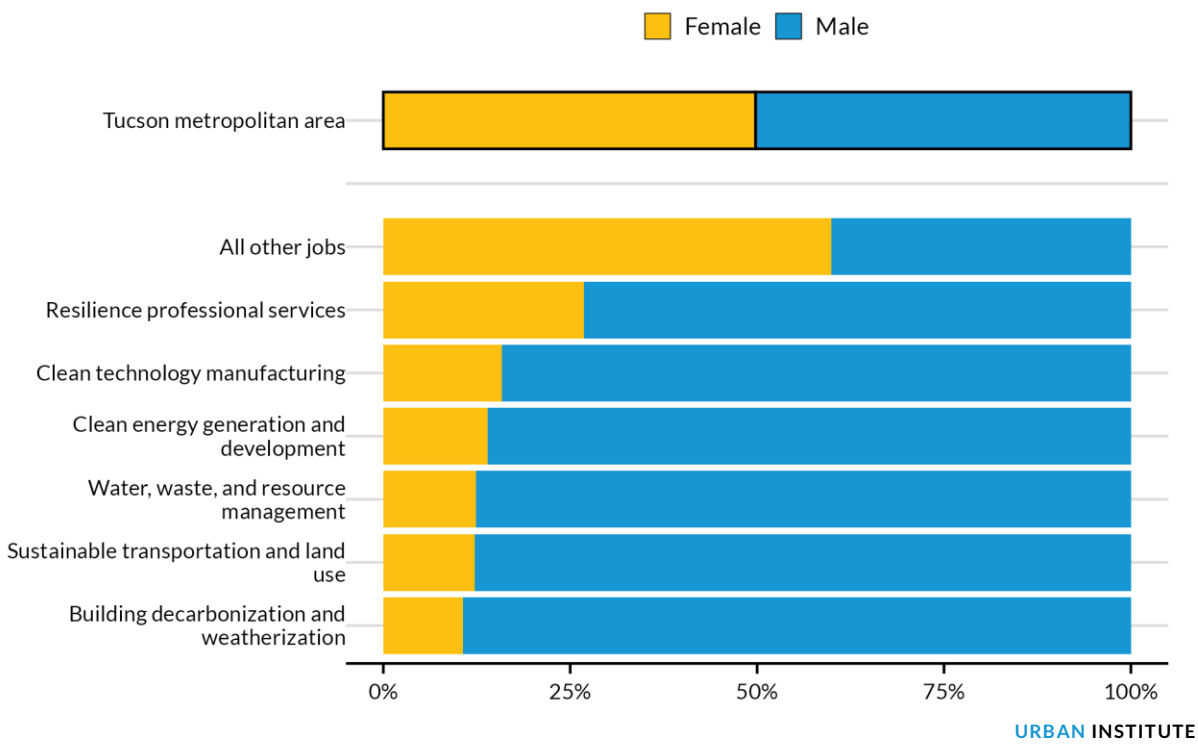
Who Holds Sustainability and Resilience Jobs Across Gender and Race/Ethnicity?

Sustainability and resilience jobs are highly concentrated among men, who comprise more than 80 percent of jobholders in all sectors except resilience professional services (figure 11). This aligns with broader gender disparities for the trades, manufacturing, and infrastructure jobs. The high concentration across these sectors skews the breakdown of gender roles across Tucson's economy, with women significantly more concentrated in all other jobs by a margin of 3 to 2. This presents a significant barrier to inclusive economic development through sustainable and resilient sectors. While promising models exist to create pathways for women in the trades, historic preferences coupled with and shaped by legacies of exclusion suggest that a sustainable and resilient economy may not offer accessible career pathways for most women.

FIGURE 11

Gender Representation of Job Holders by Sector

Distribution of gender representation compared with Tucson's demographics and gender distribution across all other jobs



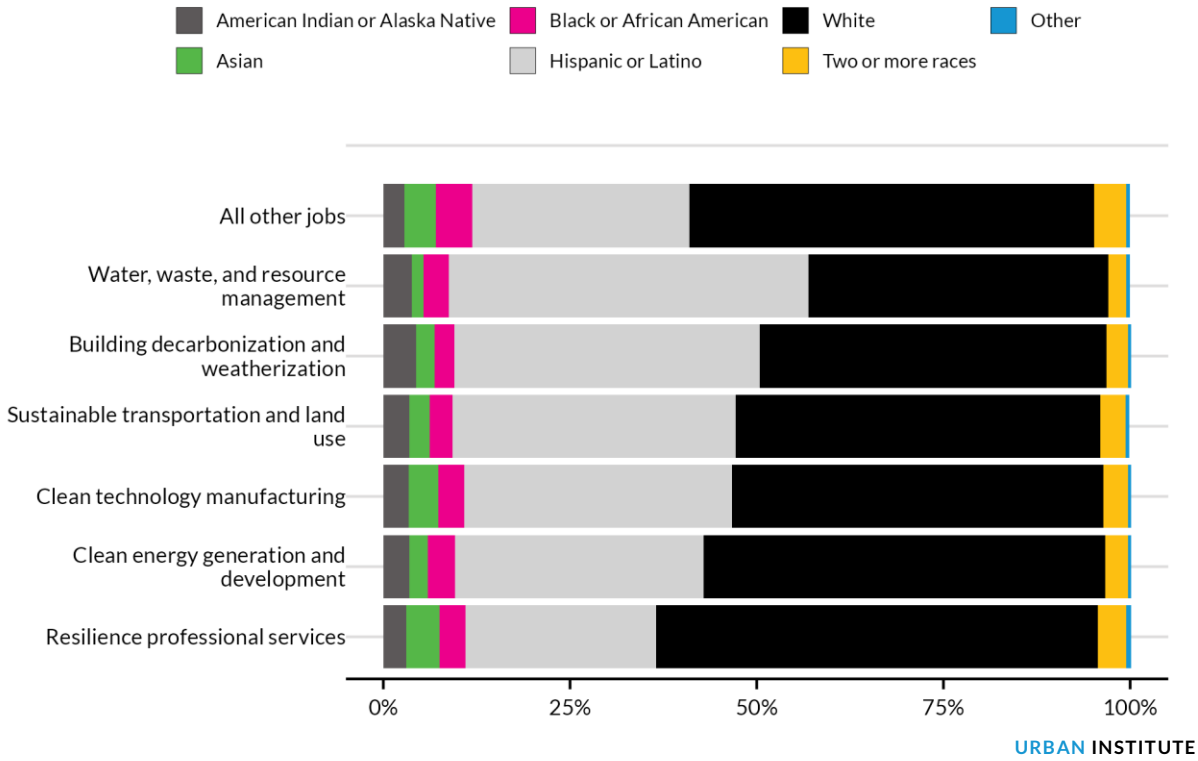
Sources: Arizona Office of Economic Opportunity resilient jobs taxonomy; American Community Survey 2020–24 five-year estimates.

The racial and ethnic demographics of all job holders closely aligns with Tucson's overall demographics with some minor exceptions (figure 12). The resilience professional services sector has a higher concentration of white employees, and the water, waste, and resource management, and building decarbonization and weatherization sectors have a slightly higher representation of Hispanic/Latino workers. These findings align with reported disparities in educational access.

FIGURE 12

Racial and Ethnic Representation of Job Holders by Sector

Distribution of racial and ethnic representation compared with Tucson's demographics and racial and ethnic distribution across all other jobs



Sources: Arizona Office of Economic Opportunity resilient jobs taxonomy; American Community Survey 2020–24 five-year estimates.

How Vulnerable Are the Sectors to Natural Resource Constraints and Future Climate Conditions?

In the coming decades, Tucson is projected to see increased heat, drought, and extreme precipitation events. By midcentury, Pima County is projected to experience roughly one to two additional months of heat danger days per year, where the heat index results in a "feels like" temperature of 103°F or higher. Over the same period, most of the county is expected to experience a 10 to 15 percent increase in extreme drought conditions relative to the 2000–2020 period. Despite predicting decreased overall rainfall, climate models anticipate more frequent extreme precipitation events, increasing the risk of flooding and infrastructure damage (Woodwell Climate Research Center 2024).

These climate conditions pose increasing risks to the region's economic base. Heat affects workers' productivity, translating into economic losses at the industry level. Nationally, from 2001 to 2023, heat-related economic losses increased from $130 billion to $220 billion (Clark et al. 2025). Manufacturing and construction experienced the highest average annual losses, which has implications for Tucson's clean technology manufacturing and building decarbonization and weatherization sectors.

The heat also poses serious public health risks, especially for outdoor workers (Clemans-Cope 2024). From 2019 to 2020, 2,546 heat-related deaths occurred among outdoor workers in Arizona (Dean and McCallum 2025). As temperatures warm, Tucson's heat-related deaths are expected to increase by 64 additional deaths per 100,000 between 2019 and 2029.[82] As illustrated in table 10, many workers across sustainable and resilient sectors, such as solar installers, landscapers, and contractors, regularly work outdoors and are at high risk of experiencing heat-related health impacts. This risk is particularly concentrated in the water, waste, and resource management and building decarbonization and weatherization sectors, where more than 50 percent of workers in sustainable and resilient jobs work outside more than once a week.[83]

TABLE 10

Exposure to Outdoor Work by Sector

Sustainability and resilience sectors	Percentage of workers outside more than once a week
Water, waste, and resource management	73.4%
Building decarbonization and weatherization	50.7%
Clean energy generation and development	37.8%
Sustainable transportation and land use	35.6%
Clean technology manufacturing	31%
Resilience professional services	29.1%

Sources: Urban Institute Analysis of O*NET Work Context data; US Bureau of Labor Statistics and Occupational Employment and Wage Statistics data.

Any economic development strategy that leverages the sustainable and resilient economy to create high-quality jobs must mitigate these risks by providing adequate heat protection for workers. While city and county employees are covered by heat protection ordinances (which also apply to licensed contractor's employees), no overarching mandate requires private-sector employers to provide similar protection to all workers.[84] A task force convened by Governor Katie Hobbs recently released recommendations for outdoor-worker heat protections, which require employers to create heat-illness prevention plans, provide free water to workers, and provide shade and rest breaks. However, the plan

has been criticized for not including enforcement mechanisms, and Arizona still lacks a statewide enforceable heat standard.[85]

In addition to extreme heat, Tucson faces long-term drought and water scarcity challenges driven by its arid climate, rising temperatures, and dependence on the increasingly stressed Colorado River system. The Central Arizona Project has largely replaced groundwater as Tucson's primary water source, reducing pressure on local aquifers that were historically overdrawn. However, prolonged drought conditions across the Colorado River Basin continue to threaten regional water supplies; in 2025, the basin remained under a US Bureau of Reclamation Tier 1 shortage declaration, resulting in reductions to Arizona's water allocation.[86] While Tucson has made strides in water conservation efforts—maintaining the same water-usage levels as those of the mid-1980s despite population growth and increased service connections—water remains a serious constraint on the city (City of Tucson and Tucson Water 2025).

> **"We have enough water to drink, not enough to waste."**
>
> *—Tucson public sector leader*

These constraints greatly influence economic development opportunities and raise important questions about the viability of existing industries and the suitability of new ones. Water scarcity poses the largest threat to Arizona agriculture, which accounted for 72 percent of statewide water use in 2019 (compared with 6 percent for industrial use).[87] The cotton industry, which contributes between $400 and $500 million per year to Arizona's economy, is particularly at risk. In Pima County alone, intensifying drought conditions are projected to create an annual 3 percent decrease in cotton yields, leading to revenue and job losses.[88]

As drought conditions intensify, reducing reliance on highly water-intensive sectors such as irrigated agriculture may create opportunities to expand less water-intensive industries, including some clean technology manufacturing and service sectors. However, water demands vary considerably across clean technology industries, and more data is needed to understand how manufacturing water use compares across technologies and how these demands may evolve as production scales. Some manufacturing processes, particularly semiconductor fabrication, require substantial water inputs.[89] At the same time, manufacturers are investing in water conservation and recycling technologies to reduce freshwater demand.[90] Thus, sustainable and resilient sectors, when paired with strong conservation and reuse practices, may offer opportunities for economic diversification while placing less pressure on regional water supplies than traditional agricultural production.

However, not all emerging industries align equally well with Tucson's long-term water realities. Interviewees noted that developers for highly water-intensive industries, especially data centers, are increasingly evaluating Tucson as a potential location. While these facilities can generate tax revenue and short-term construction jobs, they also raise concerns about cumulative water and energy demand in an already water-stressed region. In preparation, the city has already passed an ordinance with regulations for large quantity water users, and discussions continue regarding the appropriate safeguards for these new user types.[91]

Given Tucson's unique environmental landscape, economic development will require intentional attraction of industries that are compatible with local climate constraints and aligned with both broader decarbonization and sustainability targets as well as local economic development goals.

> **"We need to focus on environment as a critical lynchpin of economic policies and strategies. If we don't have a habitable environment, we have no economy to develop."**
>
> *—Tucson nonprofit leader*

Considerations for Future Growth and Investment

Our analysis provides a more grounded view of Tucson's sustainable and resilient economy. The sector profiles highlight where sustainability and resilience objectives intersect with Tucson's core industries, and the labor market data clarify how those intersections translate into jobs today, including differences in scale, growth trajectories, accessibility for workers with varying skill levels, job quality, and exposure to climate and resource constraints. These findings suggest that economic development opportunities are real, but contingent, shaped by local institutions, regional dynamics, market demand, and the availability of water, energy, land, and talent. We offer a series of considerations based on our findings to help local economic development leaders identify a balanced path forward to drive economic development through sustainable and resilient sectors.

- **Build from existing strengths.** As several interviewees shared, Tucson's strongest path forward lies in building on existing assets: a diversified industrial base, deep expertise in conservation and water management, and legacy industries such as advanced manufacturing, defense contracting, and renewable energy, which have natural intersections with sustainability and resilience activities.

> **"From a strategic perspective, we want to leverage existing industries here to attract new industries. It strengthens industries here, diversifies the economy once successful, and creates complex, diverse ecosystems of companies and people."**
>
> *—Local economic development leader*

Rather than anchoring an economic development strategy around narrow definitions of the "green economy" or a single "clean industry," leaders can focus on strengthening the broader ecosystem in which sustainable and resilient sectors operate, and allow the market to respond to demand as it rises. To help legacy industries tap into sustainable and resilient growth, economic development leaders can create better visibility into emerging opportunities across supply chains and project pipelines by proactively engaging employers and industry groups to identify where market demand is real, what opportunities exist for sustainable and resilient economic development, and what enabling conditions matter most in the absence of strong federal mandates.

- **Leverage public sector investment and policy to build a market for locally driven sustainable and resilient sectors.** Growth in locally anchored sectors, such as building decarbonization and weatherization; water, waste, and resource management; and sustainable transportation and land use, will be driven by regional demand and the pace of resilience investments. While these sectors are unlikely to increase the size and competitiveness of the overall Tucson economy, local leaders can take a market-building stance, using state and local policy and public investment to crowd in capital for these sustainable and resilience sectors. Given the outsized role of the public sector, local leaders can take proactive steps to help local businesses and workers participate in and benefit from these direct investments without overpromising or overbuilding capacity.
- **Think regionally about traded sectors of the sustainable and resilient economy.** Tucson functions within a wider southern Arizona and Southwest economy that connects to the Phoenix corridor and cross-border markets with Mexico. This regional positioning is a key strategic advantage for traded sectors, such as clean technology manufacturing, clean energy generation and development, and the resilience professional services that undergird them. As many interviewees noted, Tucson is well positioned to capture outsized benefits from Arizona's emergence as a hub in the wider electro-industrial economy, particularly semiconductors and battery manufacturing. In addition to attracting more of those anchor manufacturers to Tucson, economic development strategies can position Tucson as a complementary node for broader

state and regional growth—supplying talent, components, land, and services to surrounding manufacturers and energy developers.

- **Strengthen coordination around emerging industries to help stakeholders across sectors get to "yes" (and to "no").** Several emerging industries, both within sustainable and resilient sectors and beyond, present trade-offs among economic growth, community benefits, and alignment with natural resource constraints and resident values. As interviewees shared, current economic development processes for accessing land, water, and energy are fragmented and opaque, which often leads to private or one-off deals with limited transparency or communication across actors. This uncertainty can dissuade existing or prospective firms from expanding or setting roots in Tucson. For local Tucson residents, the lack of transparency sows distrust and increases resistance to all forms of investment. To better assess which opportunities are well-suited for Tucson, economic development leaders can improve certainty and transparency by engaging city, county, and state agencies, local utilities, tribal governments, employers, industry groups, and community perspectives to develop more transparent processes and agreements around zoning, permitting, water use, and energy use. This approach will attract emerging industries that work within Tucson's natural resource constraints, align with community values, and deliver long-term economic benefits.

- **Treat water as both the binding constraint and a strategic asset.** Across interviews and sectors, water emerged as the central constraint shaping growth that is both feasible and desirable. Tucson's long-standing leadership in conservation, reuse, and integrated water management is a competitive advantage, but it demands deliberate choices about which water-intensive activities deliver the greatest economic and community return. Economic development leaders should articulate clear priorities for water and energy use—while recognizing that energy capacity can be expanded more readily than water supply—then engage in early communication with firms about expectations regarding efficiency, life cycle impacts, and community benefits.

- **Build an aligned and coherent narrative around economic development.** Despite many strategic assets, interviewees shared that Tucson is often perceived by outside firms as slower-moving, resistant to growth, and constrained by natural resources. Some of these perceptions come from fragmented information and divergent perspectives across sectors. Strengthening local alignment around a common narrative for economic development, built on shared values and regional strengths, can help overcome these perceptions. The sustainable and resilient economy may offer a single coherent path forward. Based on interviews, message framing

around common strengths would focus on Tucson's legacy of conservation, its culture of research and innovation in renewable energy and clean technology, and its strong industrial base, which is well positioned to respond to emerging growth in sustainable and resilient sectors.

- **Invest in career pathways that develop transferable skills, improve access to high-quality jobs, and retain workers.** Tucson's long-term competitiveness depends on its ability to build, retain, and protect a workforce that meets in-demand employer needs and adapts across sectors as markets evolve. The region's university and community college systems are major assets, but stronger coordination with employers is needed to align training with real demand and to improve talent retention.

> **"When building a new sector of the economy, such as one focused on creating clean tech or green jobs, you need to start by determining whether you have a talent base with the right skills to fill those positions. If you don't have folks with proper training or transferable skills, and a clear pipeline within the education system to support ongoing sector growth, it will fail."**
>
> *—Local economic development leader*

In a volatile policy environment, emphasizing transferable skills, especially those shared across manufacturing, energy, construction, and defense-adjacent industries, reduces risk for workers and employers alike. Additionally, improving job quality—through wage growth, benefits, and protections against workplace hazards such as extreme heat—is essential to building a stable and locally rooted workforce.

Looking Ahead

Over the long term, the demand for a sustainable and resilient economy will almost certainly emerge—the global economy's technological infrastructure is moving toward electrification, and the demand for regional resilience investments will remain strong as Tucson adapts to accelerating extreme heat and water constraints. Our findings suggest that, despite stronger growth than other parts of the economy, no single sustainable and resilient sector is projected to experience accelerated growth. In the current economic and policy landscape, which lacks federal backing to boost the energy transition or finance resilience investments, the likely scenario is that the sustainable and resilient economy will reshape industries over time as technologies and skills adapt to meet market demand. Tucson's ability to use this pathway to drive growth will require coordinated efforts to increase the region's attractiveness as a haven for the sustainable and resilient economy. Additionally, it will require the region to harness the opportunities that emerge in ways that benefit residents, workers, and local businesses.

To deliver durable and inclusive economic development through sustainable and resilient sectors, Tucson leaders will need to take a measured approach that can adapt to the changing pace of transition over the long term. For example, workforce leaders can initially focus training and credentialing on transferable and durable infrastructure and manufacturing skills that help workers find employment in existing green and non-green jobs. Then, as major new green investments materialize, training providers can collaborate with relevant employers and public sector stakeholders to create specialized training or credentials that meet emerging demands. Similarly, economic development and small business leaders can collaborate on industry efforts to map existing supply chain assets and opportunities in clean technology manufacturing, explore how legacy firms can help meet emerging needs, and identify gaps where new local businesses are needed. Local leaders can also collaborate with business and industry leaders to close stark gender disparities and create inclusive pathways for diverse community members to participate in and benefit from opportunities across all sectors.

In addition to engaging the sustainable and resilient economy as a driving force for local economic development, Tucson leaders must also devise a development strategy for economic sectors that are less aligned with local sustainability and resilience goals. This includes several growing industries that are downstream from, adjacent to, or in competition with the sustainable and resilient sectors, such as critical mineral mining, data centers and other technology infrastructure, and nonrenewable energy resource development, particularly the natural gas infrastructure.

Mining is a high-wage industry in southern Arizona, with large-scale operations, particularly within and near tribal communities. The mining industry provides critical material inputs into renewable energy technology and is experiencing expanded investments across the region, driven by national security and economic priorities to ensure that more of the nation's critical minerals are mined in the United States. In addition to mining, Arizona is making rapid and large-scale investments in energy infrastructure, particularly natural gas, to meet surging energy demands driven by AI data centers. Although data centers are primarily concentrated in Phoenix and other parts of Arizona, the energy infrastructure will have downstream effects on Tucson's grid and will create infrastructure-related workforce opportunities across the state.

These growing industries raise questions about what fits within a sustainable and resilient economic development strategy and how to contend with the unevenness of transition and misalignment with local climate goals. Several of these industries present ripe opportunities for integrating more sustainable and resilient operations and business models, such as more sustainable and less extractive forms of mining and data center development that helps build the grid of the future and deliver distributed energy benefits to communities. But they also present significant tradeoffs around water and energy use that may threaten regional resilience and hamper future growth of other industries. And importantly, they risk breaking community trust and alignment.

Given these concurrent realities, local leaders must be clear-eyed about where sustainability and resilience can drive growth and where it better serves as a lens to safeguard community well-being and longevity in the face of natural resource constraints and changing climate conditions. This report provides a baseline assessment for the first point, shedding light on the promise, limitations, and suitable contexts for sustainable and resilient sectors to drive economic development. Future research might further explore the second point, to help Tucson leaders shape an economy-wide approach that prepares the region for both the potential opportunities and the expected losses related to climate change and energy transition.

Appendix A. Methodology

Sustainable and Resilient Clustering Methodology

The following outlines the steps taken to group industries into sustainable and resilient clusters for a sustainable and resilient economic development and workforce analysis.

There were three key steps to our process:

1) Defining the universe of the North American Industry Classification System (NAICS) industry codes to include as sustainable and resilient.

2) Grouping these industries into clusters so that they can be more easily understood and targeted by the economic development ecosystem in Tucson.

3) Cross-walking these NAICS (industries) to their related standard occupational classifications (SOCs).

Defining the NAICS Universe

To define our sustainable and resilient NAICS universe, we first analyzed which NAICS had been identified as "green" in three other studies (the BLS "Green Goods and Services Survey Universe," the Brookings "Advancing Inclusion Through Clean Energy Jobs," and the Center of Excellence "Understanding the Green Economy in California"). These studies all identified NAICS at the 6-digit level, but in Tucson we were constrained to working at the broader 4-digit level due to local data limitations. Therefore, we created a list of green 4-digit NAICS from each of these studies, with the understanding that these 4-digit industry groups include both industries considered "green" at the 6-digit level and industries that were not.

First, we labeled all NAICS that were identified as sustainable and resilient in at least two of the three studies. To justify inclusion based on the 4-digit scale, we removed the NAICS where the 6-digit industry code had too few data points or was not relevant to sustainable and resilient industry priorities in Tucson. Then we reviewed the remaining NAICS for inclusion (those that none or only one of the prior studies identified as "green"), adding justifications for any NAICS we added manually to this list.

Creating Sustainable and Resilient Industry Clusters

We then clustered these NAICS based on findings from our qualitative analysis, grouping around Tucson's key sustainable and resilient strategies and impact pathways, which identified the following clusters (table A.1):

- building decarbonization and weatherization
- clean energy generation and development
- clean technology manufacturing
- resilience professional services
- sustainable transportation and land use
- water, waste, and resource management

TABLE A.1

Sustainable and Resilient Sector Industries

Sustainable and resilient sectors	Industries (NAICS codes)
Building decarbonization and weatherization	4230A1 Merchant wholesalers, durable goods (4232, 4233, 4235, 4236, 4237, and 4239 only)
	5310 Real estate
	NAICS 8114 Personal and household goods repair and maintenance
	NAICS 2361 Residential building construction
	NAICS 2362 Nonresidential building construction
	NAICS 2381 Building foundation and exterior contractors
	NAICS 2382 Building equipment contractors
	NAICS 2383 Building finishing contractors
	NAICS 2389 Other specialty trade contractors
	NAICS 5413 Architectural, engineering, and related services
	NAICS 3333 Commercial and service industry machinery manufacturing
	NAICS 5313 Activities related to real estate*
	NAICS 4236 Household appliances and electrical and electronic goods merchant wholesalers*
Clean energy generation and development	NAICS 2211 Electric power generation, transmission and distribution

Sustainable and resilient sectors	Industries (NAICS codes)
	NAICS 8112 Electronic and precision equipment repair and maintenance
	NAICS 8113 Commercial and industrial machinery and equipment (except automotive and electronic) repair and maintenance
Clean technology manufacturing	3330A1 Machinery manufacturing (3331, 3332, 3334, and 3339 only)
	3320A2 Fabricated metal product manufacturing (3323 and 3324 only)
	NAICS 2371 Utility system construction
	NAICS 2379 Other heavy and civil engineering construction
	NAICS 3336 Engine, turbine, and power transmission equipment manufacturing
	NAICS 3345 Navigational, measuring, electromedical, and control instruments manufacturing
	NAICS 3351 Electric lighting equipment manufacturing
	NAICS 3352 Household appliance manufacturing
	NAICS 3353 Electrical equipment manufacturing
	NAICS 3359 Other electrical equipment and component manufacturing
	NAICS 3344 Semiconductor and other electronic component manufacturing
	NAICS 3323 Architectural and structural metals manufacturing[a]
	NAICS 3334 Ventilation, heating, air conditioning, and commercial refrigeration equipment manufacturing[a]
Resilience professional services	9991 Federal executive branch
	9992 State government, excluding schools and hospitals
	9993 Local government, excluding schools and hospitals
	NAICS 5416 Management, scientific, and technical consulting services
	NAICS 8133 Social advocacy organizations
	NAICS 5417 Scientific research and development services
	NAICS 9241 Administration of environmental quality programs[a]
	NAICS 9261 Administration of economic programs[a]
	NAICS 9251 Administration of housing programs, urban planning, and community development [a]
Sustainable transportation and land use	NAICS 2373 Highway, street, and bridge construction
	NAICS 4821 Rail transportation

Sustainable and resilient sectors	Industries (NAICS codes)
	NAICS 3362 Motor vehicle body and trailer manufacturing
	NAICS 2372 Land subdivision
	NAICS 3361 Motor vehicle manufacturing
	NAICS 3363 Motor vehicle parts manufacturing
	NAICS 3365 Railroad rolling stock manufacturing
	NAICS 4851 Urban transit systems
	NAICS 4852 Interurban and rural bus transportation
	NAICS 8111 Automotive repair and maintenance
Water, waste, and resource management	NAICS 5617 Services to buildings and dwellings
	NAICS 2213 Water, sewage, and other systems
	NAICS 5621 Waste collection
	NAICS 5622 Waste treatment and disposal
	NAICS 5629 Remediation and other waste management services

Source: Authors' analysis of US Bureau of Labor Statistics NAICS codes.
Notes: NAICS=North American Industry Classification System. See the "Cross-Walking Industries to Occupations" section below for more details.
[a] Industries that were included in employment data through their Occupational Employment and Wage Statistics classification.

Cross-Walking Industries to Occupations

We used a BLS crosswalk to map these NAICS (industries) to their related SOCs (occupations). However, some NAICS were not included in this crosswalk (or were reported in aggregate with other 4-digit NAICS). In these cases, we pulled in the code from the BLS crosswalk (e.g., the government NAICS, such as "9241 administration of environmental programs" was not included in the crosswalk so we pulled in the Occupational Employment and Wage Statistics 99 codes for federal executive branch, state government, and local government; table A.2).

TABLE A.2

Crosswalk Between NAICS Codes and OEWS Classifications

NAICS codes	OEWS classifications
▪ NAICS 9241 Administration of environmental quality programs ▪ NAICS 9261 Administration of economic programs ▪ NAICS 9251 Administration of housing programs, urban planning, and community development	▪ 9991 Federal executive branch ▪ 9992 State government, excluding schools and hospitals ▪ 9993 Local government, excluding schools and hospital
NAICS 5313 Activities related to real estate	5310 Real estate
NAICS 4236 Household appliances and electrical and electronic goods merchant wholesalers	4230A1 Merchant wholesalers, durable goods (4232, 4233, 4235, 4236, 4237, and 4239 only)
NAICS 3323 Architectural and structural metals manufacturing	3320A2 Fabricated metal product manufacturing (3323 and 3324 only)

Source: Authors' analysis of US Bureau of Labor Statistics NAICS data and US Occupational Employment and Wage Statistics data.
Notes: NAICS=North American Industry Classification System; OEWS = Occupational Employment and Wage Statistics. The NAICS codes in the left column were included in our employment analysis through their OEWS classification. The three NAICS codes starting with 92 that relate to public administration were included in our analysis through the 999 Federal, State, and Local government OEWS codes.

Classifying Sustainable and Resilient Occupations and Functions

To identify and measure the role of sustainable and resilient activity within Tucson's economy, we drew on the Arizona Office of Economic Opportunity's resilient classification framework, which uses job posting data to assess the extent to which work activities contribute to environmental sustainability or climate resilience.

At the core of the methodology is a machine learning model built using more than a decade of job posting data. Individual job postings are evaluated based on their content, including keywords, job tasks, and industry classifications, to determine whether they involve resilient activities. The labeling strategy is central to the methodology and integrates multiple signals designed to approximate expert judgment, such as keyword-based matching informed by literature, similarity to O*NET green task descriptions, historical SOC/NAICS classifications (O*NET and BLS), and proprietary Lightcast green job labels. The weak supervision approach explicitly models agreement and overlap among these labeling functions to produce more robust probabilistic labels. The trained model outputs are validated

using externally constructed SOC and NAICS benchmark sets derived from prior research, with performance evaluated using standard classification metrics (e.g., accuracy, precision, recall).

These signals are combined using a weak supervision approach that programmatically labels postings as resilient or not. The model then aggregates results across occupations and industries to calculate a resiliency ratio, which reflects the share of job postings within each occupation or industry that include resilient work. Occupations are classified as resilient if this share exceeds 15 percent and industries are classified as resilient if the share exceeds 20 percent. These resilient occupations are the jobs we identified as sustainable and resilient in our analysis.

Linking Industry and Occupational Codes with Labor Market Data and Growth Projections

To analyze the size and growth of the sustainable and resilient sectors, we used the US Bureau of Labor Statistics Quarterly Census of Employment and Wages and Employment Projections. Employment projections data were only available at the national level so projections for counties were weighted by employment within the industry.

To benchmark Tucson's size and growth in these sectors, we calculated the same metrics for peer cities identified in our qualitative interviews and conversations with local partners, the state, and nationally. We also included a comparison with the mean of the top 100 (by population) metropolitan statistical areas to provide a broader national benchmark for evaluating Tucson's relative performance. To make meaningful comparisons, we weighted employment in each sector by the population of each geography (jobs per 1,000 residents) and calculated the share of total establishments in each geography.

We also leveraged the US Bureau of Labor Statistics Occupational Employment and Wage Statistics data to analyze growth at the job level as well as educational attainment, hourly wage, and other job characteristics. The American Community Survey five-year 2020–24 data were also used to identify the gender and race breakdown of sustainable and resilient jobs in our sectors.

Measuring Job Quality

We applied a modified version of Urban's job quality analysis framework to generate a standardized occupational scoring rubric. Different evolutions of this framework have been published (Biu et al. 2023; Congdon et al. 2020; Katz et al.).[92] The analysis takes place in several steps.

Step 1: SOC-6 Processing

Data from each input file (see table A.3, primary and secondary source columns) are processed to the 6-digit SOC code level. In most cases processing is minimal, with a few exceptions:

- BLS Occupational Requirements Survey data are at the 6-digit level for 499 occupations, but for each individual variable the values are missing for some occupations. Where possible, missing data are first filled in with 4-digit level averages and if still missing then filled in at the 2-digit level.
- The BLS Job Openings and Labor Turnover survey only reports industry-level quit and layoff rates. Standard procedure is followed to map Job Openings and Labor Turnover industry super-sectors to BLS 2-digit NAICS codes. Then those values are distributed to 6-digit SOC codes based on the BLS Occupational Employment and Wage Statistics industry matrix, which tracks what percentage of each industry comprises each 6-digit SOC.

After processing, all data are joined to BLS Occupational Employment and Wage Statistics data on 831 SOC codes at the 6-digit SOC level.

Step 2: Imputations

The merge at the 6-digit SOC level results in some missing data for most metrics. When two reliable sources exist, missing data are filled in with a secondary, comparable and reliable source (see table A.3, secondary source column). For example, if the BLS Occupational Employment and Wage Statistics wage is missing, it is filled in with the average hourly wage from the US Census Bureau's Current Population Survey monthly file, and missing O*NET hazards metrics are filled in with a comparable (but less comprehensive) metric based on the BLS Occupational Requirements Survey. Remaining missing data are imputed using a mixed-effects regression model. The variable to be computed is first logit transformed. The model is weighted by the number of workers in each job and contains a random intercept at the 4-digit SOC level to allow for partial pooling across groups. Each model started by including all 17 BLS skill measures, which describe the skills needed for each job and are available for all

SOC codes. Each model also started with all available and fully complete occupational characteristics. Models were reduced to the variables that most heavily predicted the outcome (typically all $p<0.001$) and that minimized the Akaike Information Criteria score. In some cases, a variable was included for theoretical reasons if it also reduced the Akaike Information Criteria score (even if the p value was > 0.001, but no variable with $p > 0.10$ was included). Missing values are predicted using coefficients derived from each regression equation.

Step 3: Smoothing

Each variable is winsorized by cutting off at the 1st and 99th percentile. Then each variable is tested for skewness and, depending on the variance and data type (e.g., percentage, right skewed number), one of the following processing methods is selected: raw values, log transform, logit transform, arcsine transform, or hyperbolic arcsine transform (table A.1). These transformations avoid heavily skewed results where outlier occupations dominate the scale (e.g., CEOs earning well above $100 per hour will unduly compress the lower wage scale). Although smoothing removes real values, it focuses the scales on the most relevant trends for the average worker.

Step 4: Min-Max Normalization

To combine metrics with different units, values are min-max normalized, whereby the lowest value becomes 0, the largest value becomes 1.0, and the median value becomes 0.5 (with any value between being possible). If a variable had a minimum of 0 and a maximum of 1,000, then after min-max transform a change of 0.1 would equal a real change of 100. This preserves the fundamental distribution but creates a unitless scale for summing metrics and comparing jobs.

Step 5: Inversion, Summing, and Renormalization

Some variables are inverted so that "higher is better" (e.g., hazards). All variables are summed and renormalized using a min-max procedure, making the worst job score 0 and the best job score 100. Three final metrics are created with no missing data for 831 occupations from the following sums:

- Job quality: hourly wages, full-time hours, weeks worked, health insurance offered, on-the-job training days provided, flexibility and autonomy, stress, hazards, irregular schedule, stability, AI exposure
- Access: licensure percentage, years of education required, days of work required
- Growth: 10-year growth projection

Step 6: Sustainable and Resilient Taxonomy and Demographics

Sustainability and resilience jobs and industry taxonomies are merged onto job quality data by 6-digit SOC code. Demographic estimates are obtained by converting job quality scores to the American Community Survey occupational taxonomy (which generally corresponds to a mix of 4- and 6-digit SOC codes) and merging onto person-level American Community Survey data for Arizona. Demographic statistics are subsequently calculated using standard American Community Survey methods.

TABLE A.3

Job Quality Methodology

Sources and data processing notes

Category	Metric	Description	Primary source	Primary processing notes	Secondary Source	Init. comp. (%)[a]	Final processsing[b]
Meta	Job quality	Sum of 11 metrics in compensation, daily experience, and outlook	-	-	-	-	-
	Barriers	Sum of 3 access metrics	-	-	-	-	-
	Growth	10-year projected growth percent	BLS projections	None	-	100	-
Compens-ation	Hourly wages	Median hourly wages	BLS OEWS	None	CPS monthly	91	Capped $50 / hour; log
	Full-time hours rate	Percent working 35+ hours per week	CPS monthly	Limited to people with known job; person-weighted	-	100	Logit
	Weeks worked	Average number of weeks worked per year	CPS ASEC	Limited to people with known job; ASEC-weighted	4-digit SOC avg.	99	-
	Health insurance offered	Percent with employer-offered health insurance	CPS ASEC	Limited to people with known job; ASEC-weighted	Imputed	89	Logit
	OJT days provided	Median days of OJT provided by employer	BLS ORS	Missing filled in with 4- and 2-digit SOC averages (pre-imputation)	Imputed	55	Log
Daily experience	Flexibility	Composite of metrics related to flexibility	O*NET work context	Metrics standardized for addition	Imputed	55	Log
	Autonomy	Freedom to make decisions	BLS ORS	Missing filled in with 4- and 2-digit SOC averages (pre-imputation)	Imputed	89	-
	Stress	Composite of metrics related to stress	O*NET work context / styles	Metrics standardized for addition	Imputed	89	Inverted
	Hazards	Composite of hazards commonly exposed to	O*NET work context	Metrics standardized for addition	BLS ORS; imputed	89	Arcsine; inverted
	Irregular schedule	Percent with an irregular schedule	O*NET work context	None	Imputed	89	Logit; inverted

Category	Metric	Description	Primary source	Primary processing notes	Secondary Source	Init. comp. (%)[a]	Final processsing[b]
Outlook	Quits	Quarterly quits	BLS JOLTS	Mapped to 2-digit NAICS codes and assigned to 6-digit SOCs with BLS OEWS matrix	Imputed	95	Inverted
	Layoffs	Quarterly layoffs	BLS JOLTS	Mapped to 2-digit NAICS codes and assigned to 6-digit SOCs with BLS OEWS matrix	Imputed	95	Inverted
	AI Exposure	Composite of metrics predicting AI exposure	O*NET work context / activities	Metrics standardized for addition	-	100	Inverted
Access	License	Percent of workers for whom a professional license is required	BLS ORS	Missing filled in with 4- and 2-digit SOC averages (pre-imputation)	Imputed	55	Logit; inverted
	Years of education required	Average years of education required for job	O*NET ed. and train.	Categories converted to time in years	BLS ORS; BLS projections	100	Hyperbolic arcsine; inverted
	Days of work required	Average prior days of work required for job	O*NET ed. and train.	Categories converted to time in days	BLS ORS; Imputed	89	Inverted

Source: Framework developed by the authors.

Notes: ASEC=Annual Social and Economic Supplement; CPS=Current Population Survey; JOLTS=Job Openings and Labor Turnover Survey; OEWS= Occupational Employment and Wage Statistics; OJT=on-the-job training; ORS=Occupational Requirements Survey BLS = Bureau of Labor Statistics; O*NET ed. and train. = Occupational Information Network; CPS = Current Population Survey; SOC = Standard Occupational Classification.

[a] All variables 100% complete after imputation; [b] all variables except hourly wages winsorized with 1st/99th percentile cut-offs, all variables normalized.

Notes

[1] Joyce Guevarra, Kelly Morgan, Shambhavi Gupta, "Private Equity Investment Surge Sends US Data Center Deals to 5-Year High," S&P Global, May 12, 2026. Jeffrey Jones, "Americans Oppose AI Data Centers in Their Area," Gallup, May 13, 2026.

[2] "Green Definition," US Bureau of Labor Statistics, accessed June 12, 2026, https://www.bls.gov/green/green_definition.pdf.

[3] US Census Bureau, "QuickFacts: Tucson City, Arizona," Washington, DC: US Department of Commerce, 2024, https://www.census.gov/quickfacts/fact/table/tucsoncityarizona/PST045224.

[4] University of Arizona Economic and Business Research Center, Workforce & Demographics Overview, MAP AZ Dashboard, Tucson, AZ: University of Arizona, accessed June 12, 2026, https://mapazdashboard.arizona.edu/workforce-demographics-overview.

[5] Prior research, including work from the US Bureau of Labor Statistics, the State of California, and the Brookings Institution, have created definitions and categorizations of "green" industries, grounded in the Bureau of Labor Statistics North American Industry Classification System (COE 2009; Muro et al. 2019). We expanded on these foundations to create a classification of "green" industries that better reflects local perceptions of the green economy and a more holistic view of both sustainability and resilience outcomes. Once we aligned on the universe of industries relevant to the sustainable and resilient economy, we grouped industries into clusters based on their alignment with key pillars of place-based climate action and economic development. To capture that nuance of how "green" industries are today, we applied a resilient classification system developed by the Arizona Office of Economic Opportunity to occupation data within each sector to better understand the current scale of sustainable and resilient jobs at the sector level (Amrein et al. forthcoming). This classification system, built around job description data, provides rich insights into both the presence and the function of each sustainable and resilient job.

[6] Susannah Shoemaker, "NREL Researchers Reveal How Buildings Across the United States Do—and Could—Use Energy," National Renewable Energy Laboratory, September 14, 2023, https://www.nlr.gov/news/detail/features/2023/nrel-researchers-reveal-how-buildings-across-the-united-states-do-and-could-use-energy.

[7] GVR Green Building Materials Research Team, "Energy Efficient Buildings Market (2024–2030)," Grand View Research, July 2024, https://www.grandviewresearch.com/industry-analysis/energy-efficient-buildings-market-report.

[8] US Department of Energy, "DOE Releases First Ever Federal Blueprint to Decarbonize America's Buildings Sector," April 2, 2024, https://www.energy.gov/articles/doe-releases-first-ever-federal-blueprint-decarbonize-americas-buildings-sector.

[9] US Department of Energy, "Building Energy Codes Program," accessed June 12, 2026, https://www.energycodes.gov/infographics#Municipal.

[10] Paul Ciampoli, "EIA Sees Retail Electricity Prices Continuing to Increase Through 2026," American Public Power Association, May 18, 2025, https://www.publicpower.org/periodical/article/eia-sees-retail-electricity-prices-continuing-increase-through-2026.

[11] City of Tucson, "Homeowner Repair Programs," accessed June 12, 2026, https://www.tucsonaz.gov/Departments/Housing-and-Community-Development/Homeowner-Repair-Programs.

[12] City of Tucson, "Mayor and HCD Announce Completion of Solar Panels in Public Housing," June 10, 2025, https://www.tucsonaz.gov/Government/Mayor-Council-and-City-Manager/Mayor-Regina-Romero/Mayor-Regina-Romeros-News-Releases/HCD-Solar-Panel-Completion.

[13] Arizona Revised Statutes § 9-500.36, "Prohibition on Requirement of Energy Measuring and Reporting; State Preemption," 2025, https://codes.findlaw.com/az/title-9-cities-and-towns/az-rev-st-sect-9-500-36/.

[14] American Council for an Energy-Efficient Economy "State and Local Policy Database," accessed June 12, 2026, https://database.aceee.org/city/tucson-az.

[15] "Resilient Southwest," accessed June 12, 2026, https://resilientsouthwest.org/.

[16] Solar APP+, "Solar Permitting Solved," accessed June 12, 2026, https://www.gosolarapp.org/.

[17] Sonoran Environmental Research Institute, "Grants and Loans for Solar," accessed June 12, 2026, https://seriaz.org/sustainable-energy/solar-empowerment-program/.

[18] Groundswell Capital, "EarthWise Fair Green Financing," accessed June 12, 2026, https://www.groundswellcapital.org/earthwise.

[19] Efficiency Arizona, "Rebates to Upgrade Your Home," accessed June 12, 2026, https://efficiencyarizona.com/.

[20] Arizona Governor's Office of Resiliency, "Efficiency Arizona Program Invests Over $2 Million in Arizona Homes, Launches Eligibility Screening Tool," January 20, 2026, https://resilient.az.gov/news/efficiency-arizona-program-invests-over-2-million-arizona-homes-launches-eligibility-screening.

[21] Efficiency Arizona, "Qualified Contractor Network," accessed June 12, 2026, https://efficiencyarizona.com/qualified-contractors/.

[22] Arizona Governor's Office of Resiliency, "Residential Solar and Wind Energy Systems Tax Credit—State of Arizona," accessed June 12, 2026, https://resilient.az.gov/clean-energy-hub/households/residential-solar-and-wind-energy-systems-tax-credit.

[23] Catherine Lane, "Homeowner's Guide to Going Solar with Tucson Electric Power," *Solar Reviews*, https://www.solarreviews.com/blog/going-solar-with-tucson-electric-power.

[24] Tucson Electric Power, "TEP GoSolar Shares," accessed June 12, 2026, https://www.tep.com/gosolarshares/.

[25] American Council for Energy-Efficient Economy, "State and Local Policy Database," accessed June 12, 2026, https://database.aceee.org/city/tucson-az.

[26] Southwest Gas, "Weatherization Programs," accessed June 12, 2026, https://www.swgas.com/en/arizona-weatherization. Tucson Electric Power, "Weatherization Assistance," accessed June 12, 2026, https://www.tep.com/weatherization-assistance/.

[27] US Department of Energy, "Pascua Yaqui Tribe–2017 Project," accessed June 12, 2026, https://www.energy.gov/indianenergy/pascua-yaqui-tribe-2017-project.

[28] Tohono O'odham Community College, "Degrees & Certifications," accessed June 12, 2026, https://www.tocc.edu/degrees-certifications.

[29] Pascua Yaqui Development Corporation, "PYCD Workforce Development: Envision, Invest, Employ," accessed June 12, 2026, https://pydcorporation.com/training/.

[30] "Pascua Yaqui Corporation Builds Construction Training Center with Federal Grant," Local First Arizona, October 24, 2025, https://localfirstaz.com/news-blog/pascua-yaqui-tribe-construction-training-federal-grant.

[31] "Eco-friendly Blocks Build Tribal Houses & Business," Native Business, November 23, 2018, https://nativebusinessmag.com/eco-friendly-blocks-build-tribal-houses-business/.

[32] US Environmental Protection Agency, "Power Sector Evolution," accessed June 12, 2026, https://www.epa.gov/power-sector/power-sector-evolution.

[33] Daksh Goyall, Willy Carlsen, Devashree Saha, "5 Key Insights on the State of US Clean Energy Jobs," World Resources Institute, November 19, 2025, https://www.wri.org/insights/clean-energy-jobs-us-report-findings.

[34] Alexander Yankovsky, "Clean Energy Additions to Break Records in 2026," Environment Arizona, March 2, 2026, https://environmentamerica.org/arizona/updates/clean-energy-additions-to-break-records-in-2026/?pg=6.

[35] Tucson Electric Power, "Our Service Territory," accessed June 12, 2026, https://www.tep.com/service-territory/.

[36] Southwest Gas, "Who We Are," accessed June 12, 2026, https://www.swgas.com/en/about-us.

[37] Tucson Electric Power, "Our Energy Mix," accessed June 12, 2026, https://www.tep.com/our-energy-mix/.

[38] Arizona Governor's Office of Resiliency, "Governor Katie Hobbs Invests $1 Million and Expands Initiatives to Spur Geothermal Development in Arizona," February 4, 2026, https://resilient.az.gov/news/governor-katie-hobbs-invests-1-million-and-expands-initiatives-spur-geothermal-development.

[39] US Energy Information Administration, "Arizona," last updated July 17, 2025, https://www.eia.gov/states/AZ/analysis.

[40] Energy Markets & Planning–Berkeley Lab, "Maps of Active Interconnection Requests by Region, State, and County," accessed June 12, 2026, https://emp.lbl.gov/maps-projects-region-state-and-county.

[41] Interconnection, "US County Map of Active Arizona Generation Interconnection Requests, 1995–2026," accessed June 12, 2026, https://www.interconnection.fyi/?state=AZ.

[42] Nicole Garcia, "Vice Chair Myers Opens Natural Gas Infrastructure and Storage Docket," Arizona Corporation Commission, February 10, 2026, https://www.azcc.gov/nick-myers/news/2025/02/10/vice-chair-myers-opens-natural-gas-infrastructure-and-storage-docket. Nicole Garcia, "Solar Power Surging in Arizona, Across the U.S." Arizona Corporation Commission, February 4, 2025, https://www.azcc.gov/news/home/2025/02/04/solar-power-surging-in-arizona-across-the-us.

[43] Tohono O'odham Utility Authority, "Solar Project," accessed June 12, 2026, https://toua.net/solar-project/.

[44] Tohono O'odham Utility Authority, "Tohono O'odham Utility Authority," accessed June 12, 2026, https://toua.net/.

[45] Bureau of Indian Affairs, "HEARTH Act Approval of Pascua Yaqui Tribe of Arizona Solar and Renewable Energy Leasing Ordinance," January 31, 2022: 4902–03, https://www.federalregister.gov/documents/2022/01/31/2022-01876/hearth-act-approval-of-pascua-yaqui-tribe-of-arizona-solar-and-renewable-energy-leasing-ordinance.

[46] Resources Radio, "Exploring the Energy Transition on Tribal Lands, with Pilar Thomas," podcast, May 4, 2021, https://www.resources.org/resources-radio/exploring-the-energy-transition-on-tribal-lands-with-pilar-thomas/.

[47] Scott Streater, "Interior Moves to Rescind BLM Rule Promoting Renewable Energy," E&E News by Politico, May 14, 2025, https://www.eenews.net/articles/interior-moves-to-rescind-blm-rule-promoting-renewable-energy/.

[48] CHIPS and Science Act, H.R. 4346, 117th Congress. (2021), https://www.congress.gov/bill/117th-congress/house-bill/4346.

[49] The White House, "Fact Sheet: President Donald J. Trump Ensures National Security and Economic Resilience Through Section 232 Actions on Processed Critical Minerals and Derivative Products," April 15, 2025, https://www.whitehouse.gov/fact-sheets/2025/04/fact-sheet-president-donald-j-trump-ensures-national-security-and-economic-resilience-through-section-232-actions-on-processed-critical-minerals-and-derivative-products/; The White House, "Fact Sheet: President Donald J. Trump Takes Action on Certain Advanced Computing Chips to Protect America's Economic and National Security," January 14, 2026, https://www.whitehouse.gov/fact-sheets/2026/01/fact-sheet-president-donald-j-trump-takes-action-on-certain-advanced-computing-chips-to-protect-americas-economic-and-national-security/.

[50] Pima County, "American Battery Factory Breaks Ground on New Pima County Facility," October 26, 2023, https://www.pima.gov/3161/Newsroom?contentId=eb1378d0-5feb-4b72-bb0f-2c306cc4b969.

[51] Arizona Commerce Authority, "Future48 Workforce Accelerators," accessed June 12, 2026, https://www.azcommerce.com/future48-workforce-accelerators/.

[52] Pima County, "PCC's FIT Lab Prepares Students for Manufacturing Careers," March 20, 2026, https://www.pima.gov/2720/Newsroom?contentId=f3025004-0b2d-491d-a10a-db053a505122.

[53] Environmental Protection Agency, "Fast Facts on Transportation Greenhouse Gas Emissions," May 18, 2026, https://www.epa.gov/greenvehicles/fast-facts-transportation-greenhouse-gas-emissions.

[54] Rajat Shrestha, Devashree Saha, Danielle Riedl, and Alyssa Kashin, "For the US EV Market, a More Turbulent Road Lies Ahead," World Resources Institute, April 14, 2026, https://www.wri.org/insights/us-state-of-electric-vehicles.

[55] US Census Bureau, "S0801: Commuting Characteristics by Sex," 2020–2024 Five-Year American Community Survey Estimates, accessed June 12, 2026, https://data.census.gov/table/ACSST5Y2024.S0801?g=860XX00US87315.

[56] Move Tucson, Delivering Mobility Choices, 2021, https://assets.tucsonaz.gov/share/transportation/movetucson/Plan_Fall2021.pdf.

[57] City of Tucson Planning & Development Services, "Adopted EV Readiness Requirements," June 2024, https://www.tucsonaz.gov/files/sharedassets/public/v/1/pdsd/documents/boards-committees-commissions/planning-commission/12.18.24/attachment-e_overview-of-ev-charging-requirements.pdf.

[58] Numbers provided by City of Tucson staff.

[59] Tucson Unified School District, "Tucson Unified Unveils EV Bus Fleet," March 5, 2026, https://www.tusd1.org/story-20260305-ev-bus-celebration.

[60] Arizona Department of Transportation, "ADOT Electric Vehicle Infrastructure Deployment Plan," accessed June 12, 2026, https://azdot.gov/planning/transportation-studies/arizona-electric-vehicle-program.

[61] "Technical Assistance and Resources for Tribal Nations" Joint Office of Energy Transportation, accessed June 22, 2026, https://driveelectric.gov/tribal-nations.

[62] Tucson Rapid Transit, "Tucson's First Bus Rapid Transit System," accessed June 12, 2026, https://www.tucsonrapidtransit.com/.

[63] Sun Tran, "Sun on Demand," accessed June 12, 2026, https://www.suntran.com/on-demand/.

[64] RTA*next*, "What's in the RTA Next Plan?" accessed June 12, 2026, https://rtanext.com/resources/whats-in-the-rta-next-plan/. Arilynn Hyatt, "RTA Next Plan Sparks Environmental Debate," Tucson Spotlight, February 19, 2026, https://www.tucsonspotlight.org/rta-next-plan-sparks-environmental-debate/.

[65] Julia Leon, "New Waste Disposal Area Opens at Los Reales Landfill," January 30, 2020, https://www.kvoa.com/news/local/new-waste-disposal-area-opens-at-los-reales-landfill/article_5d5e66bb-f4b4-5cd3-b977-75c80bc552c9.html.

[66] Caylee Scott, "Tucson Is Leading the Nation in Reclaimed Water Use," Southern Arizona Environmental Management Society Inc., July 23, 2021, https://saems.org/uncategorized/tucson-is-leading-the-nation-in-reclaimed-water-use/.

[67] City of Tucson, "Conservation," accessed June 12, 2026, https://www.tucsonaz.gov/Departments/Water/Conservation.

[68] City of Tucson, "Low-Income Conservation Programs," accessed June 12, 2026, https://www.tucsonaz.gov/Departments/Water/Conservation/Low-Income-Conservation-Programs.

[69] Debra Utacia Krol, "Yaqui Leaders Break Ground on a Project to Supply Water for 200 New Homes," AZ Central, September 18, 2025, https://www.azcentral.com/story/news/local/arizona-environment/2025/09/18/pascua-yaqui-project-will-bring-water-200-new-homes/86188039007/.

[70] Brad Lancaster, "Tucson, Arizona, Green Streets Policy," Rainwater Harvesting for Drylands & Beyond, accessed June 12, 2026, https://www.harvestingrainwater.com/resource/tucson-arizona-green-streets-policy/.

[71] City of Tucson. *City of Tucson Land Use Code: Appendix C, Reference*. Tucson, AZ: City of Tucson, accessed June 12, 2026, https://www.tucsonaz.gov/files/sharedassets/public/v/1/city-services/planning-development-services/documents/appendix_c_reference.pdf; City of Tucson, "Conservation," accessed June 12, 2026, https://www.tucsonaz.gov/Departments/Water/Conservation.

[72] Tucson Clean & Beautiful, "GSI Mini-Grants," accessed June 12, 2026, https://tucsoncleanandbeautiful.org/programs/mini-grants/.

[73] City of Tucson, "Celebrating Four Years of Acting Boldly to Combat Climate Change," September 19, 2024, https://www.tucsonaz.gov/Government/Mayor-Council-and-City-Manager/Mayor-Regina-Romero/Mayor-Regina-Romeros-News-Releases/Celebrating-Four-Years-of-Acting-Boldly-to-Combat-Climate-Change.

[74] City of Tucson, "Los Reales Sustainability Campus," accessed June 12, 2026, https://www.tucsonaz.gov/Departments/Environmental-Services/Los-Reales-Sustainability-Campus.

[75] Tucson.com, "New Tucson Facility to Transform Plastic Waste into Building Blocks," January 15, 2025, https://tucson.com/news/local/environment/article_f4241acc-d1f6-11ef-9848-e7e40d1327b7.html.

[76] The University of Arizona Office of Sustainability, "Innovative Partnership Reduces UArizona GHG Emissions by One-Third," accessed June 12, 2026, https://sustainability.arizona.edu/projects/large-scale-renewable-energy.

[77] The University of Arizona, "Institute for Energy Solutions," accessed June 12, 2026, https://energy.arizona.edu/about/overview.

[78] Sustainable Tucson, "Sustainable Tucson," accessed June 12, 2026, https://sustainabletucson.org/.

[79] Tucson Clean & Beautiful, "About Tucson Clean & Beautiful," accessed June 12, 2026, https://tucsoncleanandbeautiful.org/.

[80] Sonoran Environmental Research Institute, "Programs & Projects," accessed June 12, 2026, https://seriaz.org/.

[81] L. M. Boyd, "'Heatwalk' Campaign Targets High-risk Pima County Neighborhoods to Prevent Heat-Related Illnesses," AZPM, March 18, 2026, https://originals.azpm.org/s/102946-heatwalk-campaign-targets-high-risk-pima-county-neighborhoods-to-prevent-heat-related-illnesses/.

[82] Jeremy Proville, "Climate Costs Will Strain Arizonans' Health and Economy," Environmental Defense Fund, December 1, 2020, https://www.edf.org/climate/costofinaction/arizona.

[83] O*NET Online, "Outdoors, Exposed to All Weather Conditions, " accessed June 12, 2026, https://www.onetonline.org/find/descriptor/result/4.C.2.a.1.c.

[84] City of Tucson, "Heat Protection Ordinance," accessed June 12, 2026, https://www.tucsonaz.gov/Departments/Business-Services-Department/Procurement/Heat-Protection-Ordinance; Pima County, "Heat Ordinance," September 2024, https://www.pima.gov/3336/Heat-Ordinance.

[85] Sophia Braccio, "Arizona Guidelines to Protect Workers from Heat Hard to Enforce," Tucson.com, April 23, 2026, https://tucson.com/news/state-regional/government-politics/article_8855d26b-a9dc-4e4d-a4b6-4a8ade470df2.html.

[86] Central Arizona Project, "Shortage Impacts," accessed June 12, 2026, https://www.cap-az.com/cap-system/planning-and-processes/shortage-impacts/.

[87] Jennifer Pullen, "Arizona's Water Use by Sector," Making Action Possible (MAP) for Southern Arizona, August 2, 2023, https://mapazdashboard.arizona.edu/article/arizonas-water-use-sector.

[88] Jeremy Proville, "Climate Costs Will Strain Arizonans' Health and Economy," Environmental Defense Fund, December 1, 2020, https://www.edf.org/climate/costofinaction/arizona.

[89] Kirsten James, "The Water Challenge for Semiconductor Manufacturing: What Needs to be Done," World Economic Forum, July 19, 2024, https://www.weforum.org/stories/2024/07/the-water-challenge-for-semiconductor-manufacturing-and-big-tech-what-needs-to-be-done/.

[90] Jake Bittle, "Arizona's Water is Drying Up. That's not Stopping the Data Center Rush," Grist, March 4, 2026, https://grist.org/technology/arizona-water-data-centers-semiconducters/.

[91] Ian Stash, "Tucson Considers New Rules for Large Water Users," Tucson Spotlight, March 5, 2026, https://www.tucsonspotlight.org/tucson-considers-new-rules-for-large-water-users/.

[92] Scott, M. Molly, Judah Axelrod, and Hailey D'Elia, "Who Has Access to Good Clean-Energy Jobs?," Urban Institute, updated May 1, 2024, https://www.urban.org/projects/clean-energy-job-access-race-gender.

References

Amrein, Arielle, Edward Bakko, Molly Hoover, Tobi Butler, Mingyu Yang, and Ferris Ramadan. Forthcoming. *Identifying Resilient Occupations and Industries in Arizona*. Phoenix, AZ: Arizona Office of Economic Opportunity.

Arizona Commerce Authority. 2024. *2025–2029 Strategic Plan*. Phoenix, AZ: Arizona Commerce Authority.

Arizona Governor's Office of Resiliency. 2026. *Arizona Energy Promise Taskforce: Report to Governor Katie Hobbs*. Phoenix, AZ: Office of Resiliency.

Biu, Ofronama, Batia Katz, Afia Adu-Gyamfi, and Molly Scott. 2023. *Job Quality and Race and Gender Equity*. Washington, DC: Urban Institute.

Carey, Lachlan, Jon Ekberg, Ben Feshbach, and Allie Jobe. 2025. *GREASE Lightning: A Playbook for Investment-Led, State-Driven, Electro-Industrial Economies*. Boulder, CO: RMI.

City of Tucson. 2022. *Electric Vehicle Readiness Roadmap*. Tucson, AZ: Office of the Mayor.

City of Tucson. 2025. *Plan Tucson 2025*. Tucson, AZ: City of Tucson.

City of Tucson and Tucson Water. 2023. *One Water 2100 Plan*. Tucson, AZ: City of Tucson.

City of Tucson and Tucson Water. 2024. *Storm to Shade FY 23 | 24 Annual Report*. Tucson, AZ: City of Tucson.

City of Tucson and Tucson Water. 2025. *Water Conservation Program Annual Report FY 2023–2024*. Tucson, AZ: City of Tucson.

Clark, Jordan, Ben Weintraut, Emily Nagamoto, Melanie Wilson, Julee Snyder, and Ashley Ward. 2025. *Counting the Cost: Quantifying the Rising Impacts of Heat-Related Productivity Losses in the United States (2001–2023)*. Durham, NC: Nicholas Institute for Energy, Environment & Sustainability.

Clemans-Cope, Lisa, Lisa Dubay, Avani Pugazhendhi, Vincent Pacini. 2025. *Outdoor Workers at Risk*. Washington, DC: Urban Institute.

Clemans-Cope, Lisa, Dulce Gonzalez, Sara McTarnaghan, and Michael Karpman. 2024. "Extreme Heat at Work." Washington, DC: Urban Institute.

COE (Centers of Excellence). 2009. *Understanding the Green Economy in California: A Community College Perspective*. Sacramento, CA: California Community Colleges Centers of Excellence, Economic and Workforce Development Program.

Congdon, J. William, Molly M. Scott, Batia Katz, Pamela J. Loprest, Demetra Smith Nightingale, Jessica Shakesprere. 2020. "Understanding Good Jobs: A Review of Definitions and Evidence." Washington, DC: Urban Institute.

Dean, Adam, and Jamie McCallum. 2025. "California's Heat Standard and Heat-Related Deaths Among Outdoor Workers." *Health Affairs* 44 (12): 1490–96. https://doi.org/10.1377/hlthaff.2025.00096.

Katz, Batia, William J. Congdon, and Jessica Shakesprere. 2022. *Measuring Job Quality*. Washington, DC: Urban Institute.

Muro, Mark, Adie Tomer, Ranjitha Shivaram, and Joseph W. Kane. 2019. *Advancing Inclusion Through Clean Energy Jobs. Washington, DC: Brookings Institution.*

Norton, Ruth Ann, Brendan Wade Brown, and Kiki Malomo-Paris. n.d. *Weatherization and Its Impact on Occupant Health Outcomes*. Accessed June 12, 2026. Baltimore, MD: Green and Healthy Homes Initiative.

OECD (Organisation for Economic Co-Operation and Development). 2023. *Job Creation and Local Economic Development 2023: Bridging the Great Green Divide*. Paris: OECD.

Omeyr, Farhad, and Harshita Umesh Tanksali. 2025. *City Fiscal Conditions 2025*. Washington, DC: National League of Cities.

Pascua Yaqui Tribe. 2013. *Pascua Yaqui Solar Feasibility Study Final Report*. Santa Fe, NM: Red Mountain Energy Partners.

Pima County Economic Development. 2023. *Economic Development Strategy*. Tucson, AZ: Economic Development.

Sick, Nathan, Shayne Spaulding, and Oriya Cohen. 2026. "Strengthening Career Pathways in the Sustainable and Resilient Economy in Tucson, Arizona." Urban Institute.

Small Business Majority. *Voice of Main Street: First Quarter*. 2026. Washington, DC: Small Business Majority.

Stephens, Hannah, Mayu Takeuchi, Glencora Haskins, Andre M. Perry, and Joseph Parilla. 2026. "States of Affordability: A Series on Where and Why US Households Struggle to Make Ends Meet." Washington, DC: Brookings Institution.

Theodos, Brett, Noah McDaniel, and Oriya Cohen. 2026. "Helping Small Businesses Harness Investments in Clean Energy and Climate Resilience." Urban Institute.

Tucson Electric Power. 2023. *Tucson Electric Power 2023 Integrated Resource Plan*. Tucson, AZ: TEP.

Tyler, M., E. Poehlman, D. Winiarski, M. Niemeyer, and M. Rosenberg. 2023. *Impacts of Model Building Energy Codes*. Washington, DC: US Department of Energy.

WHO (World Health Organization). 2011. *Health in the Green Economy: Health Co-Benefits of Climate Change Mitigation: Transport Sector*. Geneva: WHO.

Woodwell Climate Research Center. 2024. *Climate Risk Assessment: Pima County, Arizona*. Falmouth, MA: Woodwell Climate Research Center.

World Economic Forum, and Accenture. 2024. *Business on the Edge: Building Industry Resilience to Climate Hazards*. Geneva: World Economic Forum.

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