

FACTS ARIZONA

A M E R I C A N S E C U R I T Y P R O J E C T

Pay Now, Pay Later: Arizona

Arizona continues to be plagued by a 15-year drought; it is the worst the state has seen in 110 years.¹

The two worst wildfires in Arizona's history occurred in 2002 and 2005.² The Rodeo-Chediski fire in 2002 cost \$139 million for rehabilitation and caused a total of over \$308 million in direct and indirect costs.³

By investing in renewable energy, Arizona could create thousands of construction jobs, and 4,000 permanent jobs, in the next 10 - 15 years.⁴

According to a new study, a failure to mitigate the effects of climate change could begin to cause serious gross domestic product and job losses within the next several decades. Between 2010 and 2050, it could cost Arizonans \$69 billion in GDP and over 481,000 jobs.*

**GDP numbers are based on a 0% discount rate. Job losses are measured in labor years, or entire years of fulltime employment. Backus, George et al., "Assessing the Near-Term Risk of Climate Uncertainty: Interdependencies among the U.S. States," Sandia Report (Sandia National Laboratories, May 2010), 141. https://cfwebprod.sandia.gov/cfdocs/CCIM/docs/Climate_Risk_Assessment.pdf (accessed March 23, 2011).*

Admittedly, the effects of climate change, a complex and intricate phenomenon, are difficult to predict with precision. Informed scientific and economic projections, as we have used in our research, however, allow us to see that Arizona faces significant losses in industries crucial to its economy if no action is taken.

Moreover, data shows Arizona is poised to benefit from the research, development, and distribution of renewable energy technologies. Arizona's access to solar energy ranks among the greatest in the nation.⁵ Investing in this resource will create thousands of jobs and generate millions of dollars in revenue while lessening Arizona's dependence on oil and gas and creating new high-tech industries. At present, Arizona's solar capacity has not been significantly developed. This is particularly problematic given that

Arizona exists in a region projected to be severely impacted by climate change.⁶ Should we fail to take action against climate change, Arizonans have much to lose.

Pay Later: The Cost of Inaction

The expansive Arizonan landscape, home to both low-lying desert and the Grand Canyon, is also home to both extremely hot and cold temperatures. As a result, Arizona faces challenges common to its Southwestern neighbors, including shortages of quality water, the urban heat island effect, and problems with air quality, brought on by rising temperatures. It is also projected to be affected by issues unique to colder regions such as earlier

spring thaws, insect outbreaks, and northern migration of cold climate species as winter temperatures warm.

Population Boom, Water Supply Bust

Arizona's massive population growth and heightened regional demands for water resources, coupled with receding water levels, increase competition for this important resource in the Southwest.

There is a reported 50% chance that Lake Mead—the reservoir of the Hoover Dam on the Colorado River—will be dry by 2050, resulting in a region-wide drought that would leave 12-36 million people in the Southwest without a secure source of water.⁷

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Population growth and the strength of the Arizonan economy depend on the availability of water. Between

1900 and 1990, Arizona's growth rate was 2,880%, far exceeding the national average of 225%. Maricopa County, home to greater Phoenix, grew 10,275% over the course of the last century.⁸ This expansion, largely made possible by the water management systems in place along major regional rivers, is threatened by climate change. While these water schemes currently provide water necessary for agriculture, drinking, and hydroelectric dams, the consequences of climate change will require adaptations. The 25-year water and wastewater cost, including infrastructure augmentation, in Arizona as a result of receding water levels and rising demand is projected to reach \$109 billion.⁹

Climate change exacerbates Arizona's water scarcity problems in other ways as well, including decreased snowfall and earlier snowmelt. Both contribute to declining water supplies in major rivers' headwaters. Rising temperatures will escalate evaporation rates, causing higher concentrations of pollution and salinity as water levels fall. Conservative estimates reveal that the headwaters of the Colorado River system could see a 15% drop in annual snowpack runoff and a 40% decrease in basin storage. In addition to further straining the state's water supplies, this drop will also cause a 45-56% reduction in hydroelectric power generation¹⁰—which accounts for 10% of Arizona's electricity mix.¹¹

Threats to Arizona's Forests

Increased pest proliferation and more frequent wildfires could destroy 15-30% of Arizona's forests.¹² Drought reduces the trees' ability to resist pests, and warmer temperatures allow fewer insects to die each winter; as the insects multiply

and spread north, they leave behind dry, dead trees that are more susceptible to fire.¹³ **From 2002-2004, 3.4 million acres of Piñon and Ponderosa pine trees in Arizona and New Mexico were destroyed by bark beetles.**¹⁴

As a 15-year drought continues to plague Arizona today, intensified forest fires are already increasingly prevalent. In the past eight years, Arizona experienced the two worst wildfires in its history: the 2002 Rodeo-Chediski fire and the 2005 Cave Creek Complex fire. The cost of the Rodeo-Chediski fire totaled \$308 million in direct and indirect costs. The fire significantly damaged two local timber mills, causing job losses in the tribal community and \$8.1 million in lost revenue.¹⁵

An Outdoorsman's Nightmare

Degraded air quality and a fall in tourism are other consequences of climate change. In July 2002, the Sunset Crater National Monument saw a drop of 12,000 visits due, in part, to extreme drought and forest fires¹⁶—which cost the local economy over \$225,000.¹⁷ Weather is a key component of tourism and outdoor recreation in Arizona; mild winters are a large draw and one of the major reasons people flock to the state. **In 2009, 35.3 million people visited Arizona, generating \$16.6 billion and 157,200 jobs.**¹⁸ But these numbers will suffer as a result of warmer temperatures, receding lake and reservoir levels, declining snowfall in the mountains, the loss of native species and habitats, and an increase in flooding and wildfire. **Falling water levels in lakes and reservoirs are estimated to cause a 5% decrease in visitors for every 1% of water volume lost. Lake Powell and Lake**

Mead declined 5.4% and 2.1%, respectively, reducing visitors to the Glen Canyon National Recreation Area by 500,000 in 2003—and causing a loss of 758 jobs, \$32.1 million in tourist spending, and \$13.4 million in income. Similar losses were experienced by the Lake Mead National Recreation Area.¹⁹ Such losses will likely persist, should climate change continue unmitigated.

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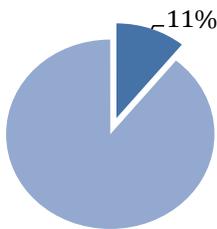
Arizona's skiing industry is extremely sensitive to seasonal precipitation. Changes in snowfall determine the number of days ski resorts can open, and, accordingly, their seasonal revenue. A shorter snow season can have significant effects. The Arizona Snowbowl ski facility is open an average of 96 days per season²⁰ and generates \$15.8 million in direct revenue.²¹ But during the 2001-2002 season the facility only opened four days; it was able to open 16 days in 2005-2006.²² The loss of revenue in these seasons ranges from \$13-15 million.²³

Agriculture Under Threat

Arizona's \$2.4 billion agriculture

industry²⁴ employs approximately 20,000 people.²⁵ The Colorado River is a key source of water for human consumption as well as agriculture in Arizona and the rest of the region. The state's agriculture industry consumes 70% of its total water supply, and Arizona's Colorado River allocation is used almost entirely (80%) for irrigation. **The Colorado River's future is uncertain, and the livelihoods of the thousands of people employed by the agriculture industry share in that uncertainty.** Farmers in the Southwest rely on underground wells for nearly half the water used for their crops, causing these wells to deplete faster than they can be replenished and further stressing the water supply. As temperatures rise, evaporation and evapotranspiration (the process by which plants lose moisture to the air) increase, leaving farmers increasingly short of water.²⁶ Drought and desertification will exacerbate these problems and necessitate difficult decisions concerning water rights.

Arizonan Labor Force Projected to be Directly Affected



Source: Bureau of Economic Analysis²⁷

Pay Now: The Benefits of Taking Action

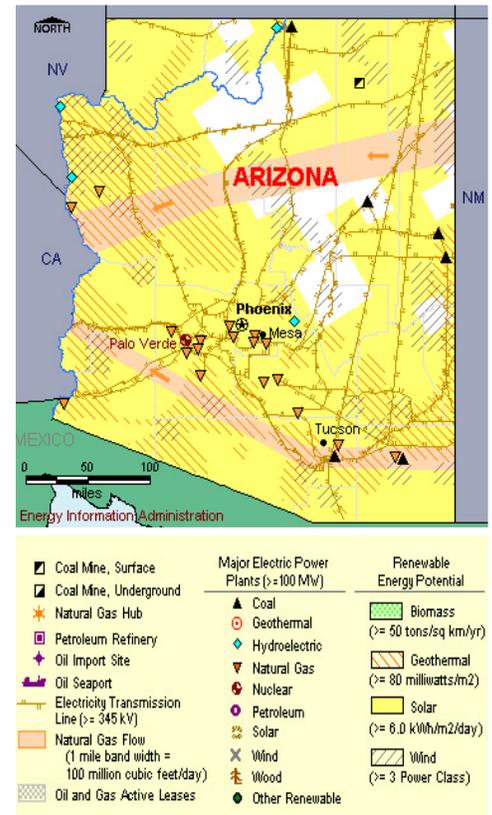
Arizona's potential for solar power is 2nd only to Nevada.²⁸ However, it has

installed less than 5 MWh of its 101 million MWh potential.²⁹ Arizona is already a net exporter of energy, selling its surplus—33% of its total generation—to neighboring states. Whereas today this excess energy is produced by coal-fired power plants, Arizona has the potential to become an exporter of clean energy and in the process create jobs and mitigate the effects of climate change.³⁰ It could meet its domestic needs of around 70 million MWh per year³¹ and export the remaining 30 million MWh. According to the Landsward Institute, Arizona is in a position to shift its generation from coal to solar energy—creating jobs and generating revenue in the process.³²

Potential economic growth in Arizona is immense; the development of low-carbon and renewable energy sources will create tens of thousands of construction-phase jobs and generate more than \$10 billion in earnings and economic activity. Investment in Arizona's renewable energy resources could generate 4,000 permanent jobs and more than \$750 million annually.³³

Solar energy is also an important way of extending electricity access to Arizona's remote areas. The Hopi Foundation is installing photovoltaic panels on homes and businesses at a fraction of the cost of extending the electrical grid. In 1985, NativeSUN began supplying solar photovoltaic systems at a cost of \$5,000-15,000 (the cost of extending Arizona's electrical grid is \$40,000 per mile).³⁴ The Solana project, a 280 MW sun farm with the ability to power 70,000 homes, will upon its completion in 2013, be among the world's largest solar plants.³⁵

While Arizona's current solar power production is comparatively minute to its potential, research at major Arizonan universities,³⁶ increasingly ambitious renewable portfolio standards (RPS), and tax incentives are



encouraging signs of the state's intentions to develop this crucial resource. Arizona's RPS requires many state utility companies to generate 15% of their power from a renewable energy mix by 2025.³⁷ Compared with other states, Arizona ranks near the middle for existing requirements,³⁸ though state leadership in early 2011 chose to back out of the West's cap-and-trade program, the Western Climate Initiative.³⁹

While other renewable energy resources in Arizona (such as wind, geothermal, and biomass) are dwarfed by its massive solar resources, they offer a diversification of energy supplies. Arizona's wind and geothermal resources have the potential to produce 5 million MWh per year each, and biomass can produce 1 million MWh each year, for a total of 11 million MWh per year of non-solar renewable energy, or roughly 15% of yearly

electricity consumption. Yet, unfortunately, Arizona continues to rely on coal and natural gas to generate over half of its electricity.⁴⁰

Conclusion

Arizona must consider action on climate change not just in terms of cost, but also in terms of opportunities. If we give Arizona's population, businesses, and investors clear and consistent signals by properly offering initiatives and cultivating demand, investment and innovation in renewable technologies will follow.

Arizonans will have to pay for the effects of climate change. The only remaining question is whether they will pay now, or pay later and run the risk of paying significantly more.

(Endnotes)

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