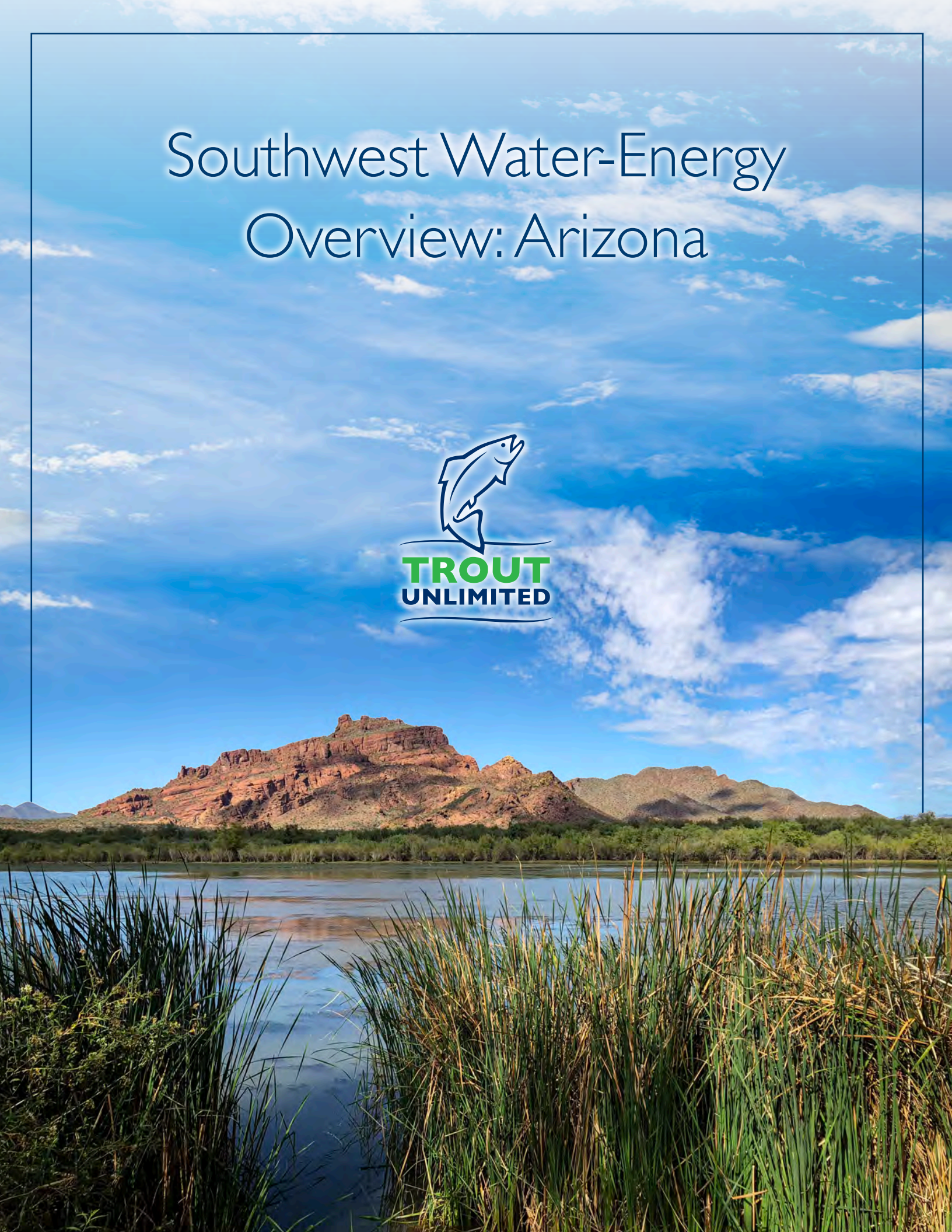
Southwest Water-Energy Overview: Arizona



Our lives and economies run on energy – including energy sources requiring water. The southwestern U.S. is experiencing a significant increase in demand for both energy and water, driven by population growth and economic development.[i] The demands are particularly evident in Arizona, where water availability is a critical issue with ongoing drought, dry years outpacing wet years[ii], and a shift toward long-term aridification.[iii] Although other sectors such as agriculture and municipalities currently use more water in Arizona[iv], it's important to proactively understand water use associated with energy generation to help guide long-term decision-making that may impact water availability in the future. Arizona's water resources are a critical lifeline for future generations to thrive in the Grand Canyon state, and thoughtful approaches will help ensure its long-term sustainability.

While it is well known that agricultural uses drive the most consumption across Arizona and the Colorado River Basin, a new white paper, Southwest Water-Energy Nexus , explores available data on the water use associated with energy generation in Arizona. The paper explores the data on the water required to generate energy for Arizona's 7.36 million residents and the alternatives to fossil fuels and coal

to support smarter policies that conserve water and natural habitats while providing Arizonans with the energy they need. The paper found that over 122 million gallons of water pumped for 16 power plants per year is enough to provide water to nearly 28 percent of homes in the state – though we also found that water usage is unknown for many power plants in Arizona.

Understanding this critical issue is a start to understanding how prolonged drought and aridification may impact water availability for energy generation – especially when you consider recent federal energy investments on public lands and anticipated population growth will increase energy and electricity demand by 60 percent over the next 30 years. In light of this, the paper also identifies areas where additional data is required to implement more forward-thinking water conservation solutions related to energy.

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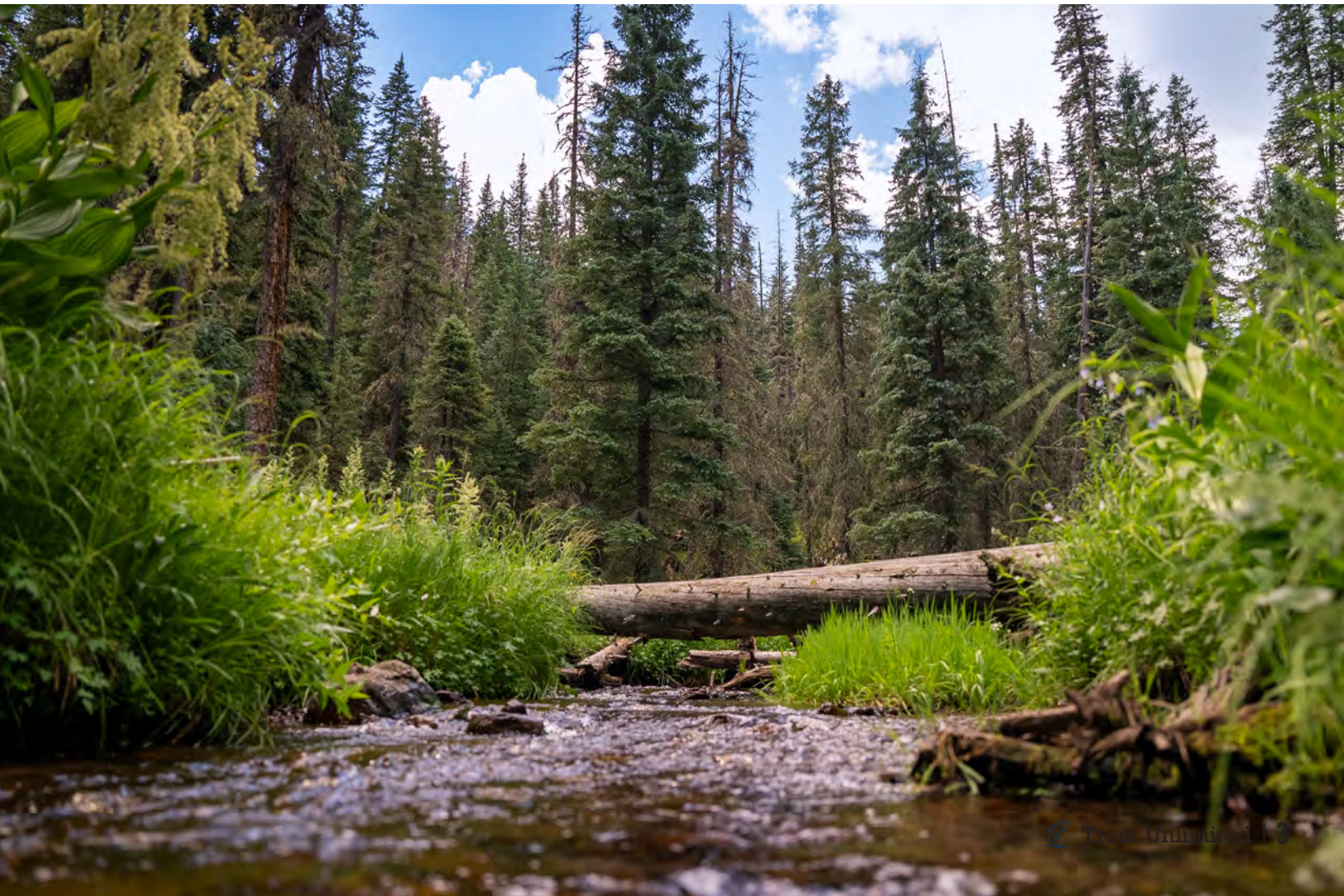


To better understand the issues at play, consider that the Arizona Department of Water Resources (ADWR) Water Use program tracks and estimates total withdrawal volume for municipalities of public and private water suppliers[v]. Arizona relies heavily on groundwater (41%) and Colorado River water (36%). The extraction of groundwater has contributed to land subsidence, reduced surface water availability, and declining water table levels. Groups such as Trout Unlimited (TU) have long supported state legislation that gives Counties the authority to monitor groundwater outside of an Active Management Area, but laws haven't advanced.

Importantly, water usage in energy production varies significantly depending on the

type of fuel and cooling system used. For example, thermoelectric power plants, which include natural gas, coal, and nuclear facilities, are major consumers of water in Arizona (Figure 1). These plants use water primarily for cooling purposes. Hydropower in Arizona consumes water primarily through evaporation from reservoirs.[vi] In 2022, 16 of 57 electric utility plants in Arizona reported their water usage.[vii] Energy plants in Arizona are required to recycle cooling water to conserve fresh water. However, there is no mandatory requirement for energy plants to report their water usage, leading to limited data on groundwater withdrawals.

Consider also that land use is directly connected to broader issues. Land requirements for energy production often translate directly into loss of fish and wildlife habitat that may lead to population declines, reduced outdoor recreation opportunities, and impacts on local communities (Figure 2).[viii] Given these considerations, there is no perfect energy

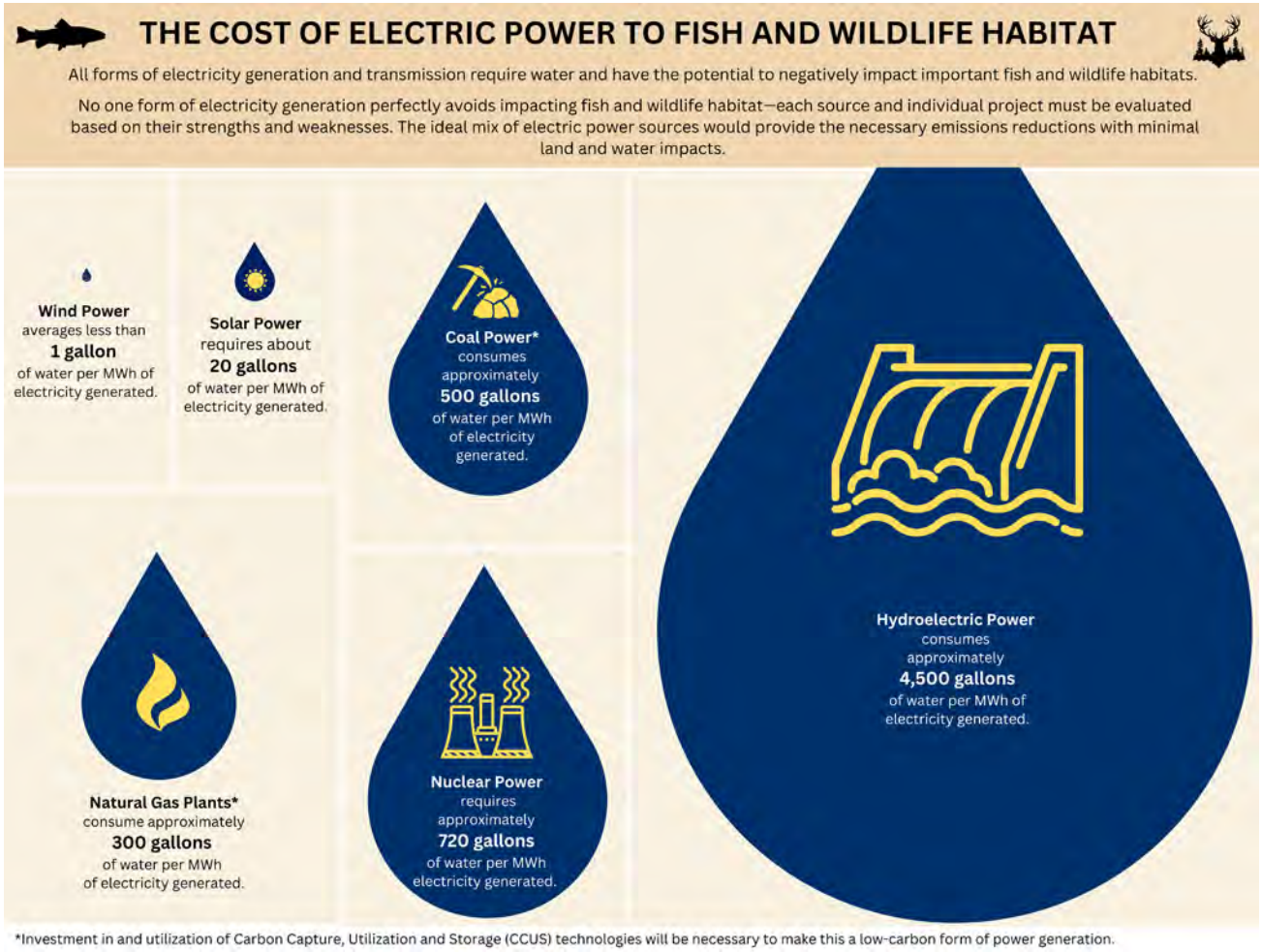


Figure 1. Average water requirements of electrical power generation in Arizona.

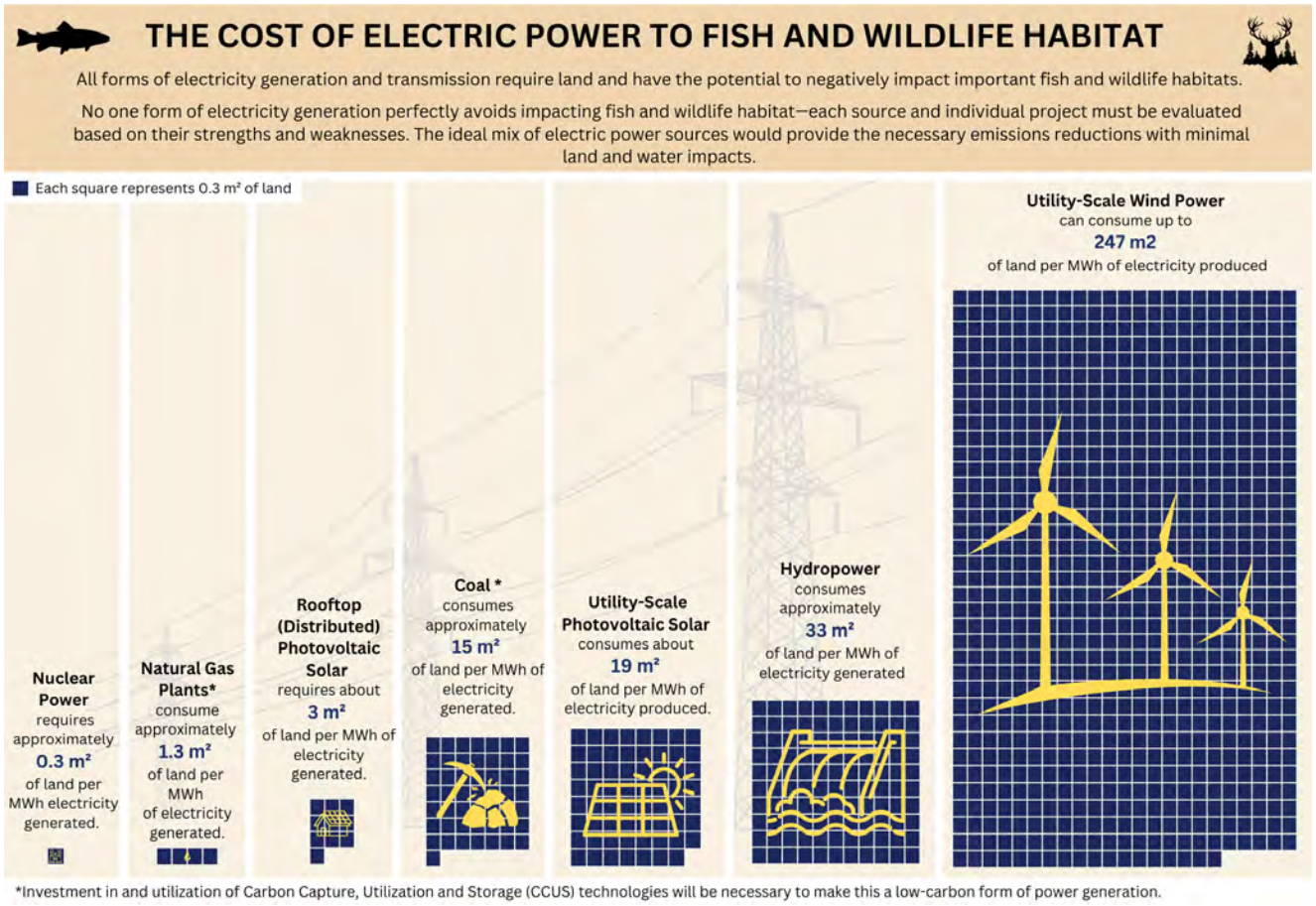


Figure 2. Land requirements of electrical power generation in the U.S.

"solution," and there will always be trade-offs.

TU advocates incorporating a "smart-from-the-start" approach[ix] for any energy project decision-making process. Through our work focused on water availability, habitat protection, and healthy watersheds, we coordinate with stakeholders to further identify low-conflict areas for energy development and create protocols for screening and prioritizing projects in those areas.[x] Focusing new development in appropriate areas can accelerate alternative energy deployment while avoiding unnecessary impacts on water, natural habitats and communities.

> "FOCUSING NEW development in APPROPRIATE AREAS can ACCELERATE ALTERNATIVE ENERGY deployment while AVOIDING UNNECESSARY IMPACTS on WATER, NATURAL HABITATS and COMMUNITIES."

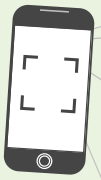
The reduction of emissions must be complimentary to decades of effort conserving and protecting our natural environments. According to Caro et al., we need to be mindful that climate change is secondary to habitat loss, fragmentation, degradation and overexploitation as the primary cause for biodiversity loss and the changes we are witnessing across landscapes.[xi] Developing sound policies, embracing innovative technologies, and coordinating integrated energy-water planning to meet current and future demands of domestic electric power generation and transmission on both private and public lands will also help minimize the impacts to natural habitats, agricultural lands, and thriving wildlife populations.

The Department of the Interior (DOI) has identified over 52 million acres of public lands potentially suitable for wind and solar energy development.[xii] In Arizona, there are currently several expansions and new fossil fuel plants being proposed, several of which are controversial (Mohave Energy Park[xiii], Coolidge Generating Station Expansion[xiv],

Fort Mohave Gas Plant[xv]). Given Arizona's arid climate and the increasing energy demands, deliberate steps must be taken to balance a resilient supply of energy with one that considers water resources, fish and wildlife conservation, healthy public lands, and thriving communities.

THE BOTTOM LINE:

- At a time of drought in Arizona, policymakers and planners need to consider both water usage and landscape impacts of energy production, and consider where and when alternatives to natural gas, coal and nuclear make sense.
- Arizona needs transparency in data reporting requirements, especially the reporting of water usage by energy producers.
- Water recycling standards for power plants in Arizona should be updated to help conserve more water. These could include requirements for energy producers to use advanced treatment technologies, replace outdated equipment, and optimize their operations.



Click here or scan the QR Code to learn more.

Endnotes

[i] Theobald, D. M., W. R. Travis, M. A. Drummond, and E. S. Gordon. (2013). "The Changing Southwest." In Assessment of Climate Change in the Southwest United States: A Report Prepared for the National Climate Assessment, edited by G. Garfin, A. Jardine, R. Merideth, M. Black, and S. LeRoy, 37–55. A report by the Southwest Climate Alliance. Washington, DC: Island Press.

[ii] Villarreal, Y. (2022, April 1). *Arizona's 27-year drought. A guide*. AZ Luminaria. http://azluminaria.org/2022/04/01/arizonas-27-year-drought-a-guide/

[iii] USDA Southwest Climate Hub (2024). *Megadrought and aridication in the southwest United States*. https://www.climatehubs.usda.gov/hubs/southwest/topic/megadrought-and-aridification-southwest-united-states.

[iv] Arizona Department of Water Resources. (2019).

[v] https://www.azwater.gov/

[vi] https://www.eia.gov/state/print.php?sid=AZ

[vii] https://www.eia.gov/state/print.php?sid=AZ

[viii] https://www.tu.org/wp-content/uploads/2024/09/Energy-Statement-Sept-24.pdf

[ix] See the Association of Fish & Wildlife Agencies Energy & Wildlife Policy Committee's web page for links to individual state wildlife agency development guidelines and best management practices for different types of energy development. https://www.fishwildlife.org/afwa-acts/afwa-commitees/energy-and-wildlife-policy-commitee

[x] https://www.tu.org/conservation/conservation-areas/land-management-and-development/responsible-energy-development/

[xi] Caro, T., Z. Rowe, J. Berger, P. Wholey, and A. Dobson. 2022. An inconvenient misconception: Climate change is not the principal driver of biodiversity loss. Conservation Letters:e12868.

[xii] https://www.doi.gov/pressreleases/interior-department-proposes-rule-bolster-solar-and-wind-development-public-lands

[xiii] https://www.azcentral.com/story/news/local/arizona-environment/2024/06/28/profit-motives-and-political-influence-plague-mohave-gas-plant-project/74122007007/

[xiv] https://www.nbcnews.com/news/nbcblk/arizona-power-plant-expansion-rcna23520

[xv] https://www.azcentral.com/story/news/local/arizona-environment/2024/04/10/in-rural-arizona-officials-ban-solar-but-approve-a-gas-power-plant/73206250007/