

# Arizona's Hydrogen Frontier

## Navigating Clean Energy and Water Sustainability

### About Us

AzCaNE serves as a central hub for unbiased information and networking, fostering inclusive dialogue among diverse stakeholders. We work to achieve a carbon-neutral future for Arizona (AZ) by 2050—ensuring benefits for all and leaving no one behind.

### About the Issue

Clean hydrogen (H<sub>2</sub>) offers an effective solution for cutting greenhouse gas emissions in hard-to-abate sectors, boosting economic growth, and improving air quality. Yet concerns persist about its viability in arid regions. This overview explores how clean H<sub>2</sub> can deliver environmental, economic, and reliability benefits while protecting AZ's scarce and vital water resources.

Since the 1980s, AZ's population and economy have grown rapidly, while water demand has dropped. Statewide water use now stands at ~7 million acre-feet annually, down from a peak of ~11 million acre-feet in the 1970s.

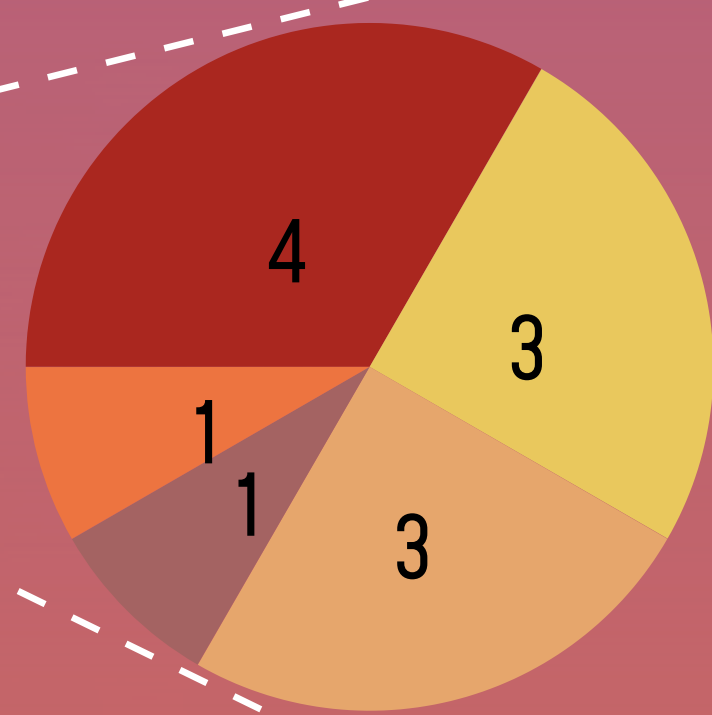
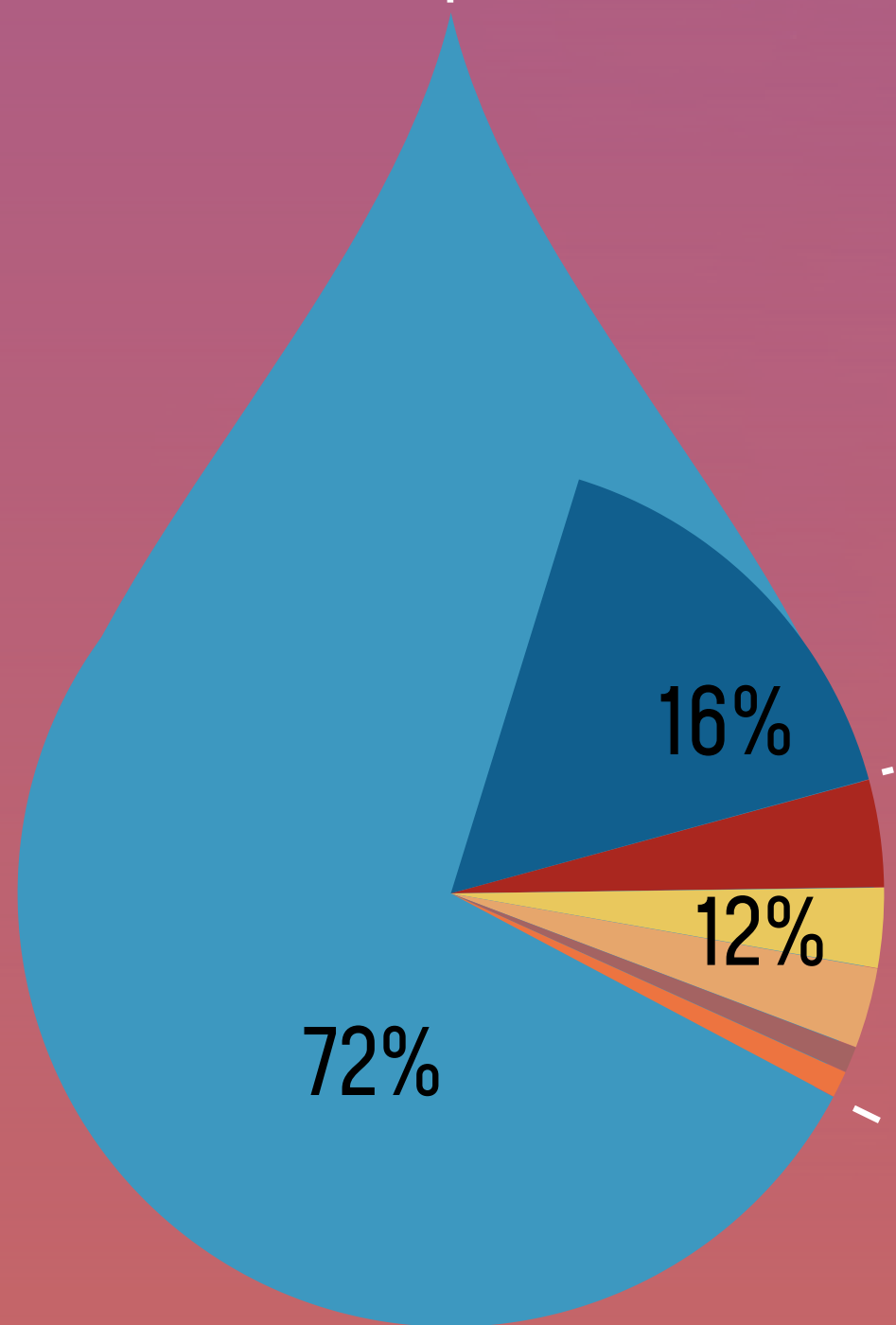
### More with Less

Clean H<sub>2</sub> is essential for a decarbonized future, addressing hard-to-abate sectors like freight trucking and enabling long-duration energy storage. It reduces emissions, supports clean air, and drives economic growth, advancing a resilient, sustainable, and thriving economy.

### Why H<sub>2</sub>?

### Water Use by Sector

- Crop Irrigation (72%)
- Domestic (16%)
- All Other Uses (12%)



- All Other Uses Include:**
- Commercial (4%)
  - Thermolectric (3%)
  - Golf (3%)
  - Mining (1%)
  - Other (1%)

### How much is an acre-foot?

1 acre foot of water is enough to serve 3.5 homes annually

1 acre foot of water = 325,851 gallons of water



### Water to H<sub>2</sub> for Grid Resilience

With just 7,500–17,000 acre-feet of water, AZ could produce enough clean H<sub>2</sub> to meet 5% of the state's projected electrical demand by 2050, a scalable pathway to clean energy without compromising water sustainability

### Modest water use

### Water to H<sub>2</sub> for Trucking

With just 8,000–17,250 acre-feet of water, Arizona could produce 655,225 metric tons of clean H<sub>2</sub>—enough to fuel 100% of the state's freight trucking. A sustainable solution for clean air and economic growth.

The total projected volume of water to supply H<sub>2</sub> powered freight trucking and 5% of electric power is 0.2–0.5% of Arizona's annual use.

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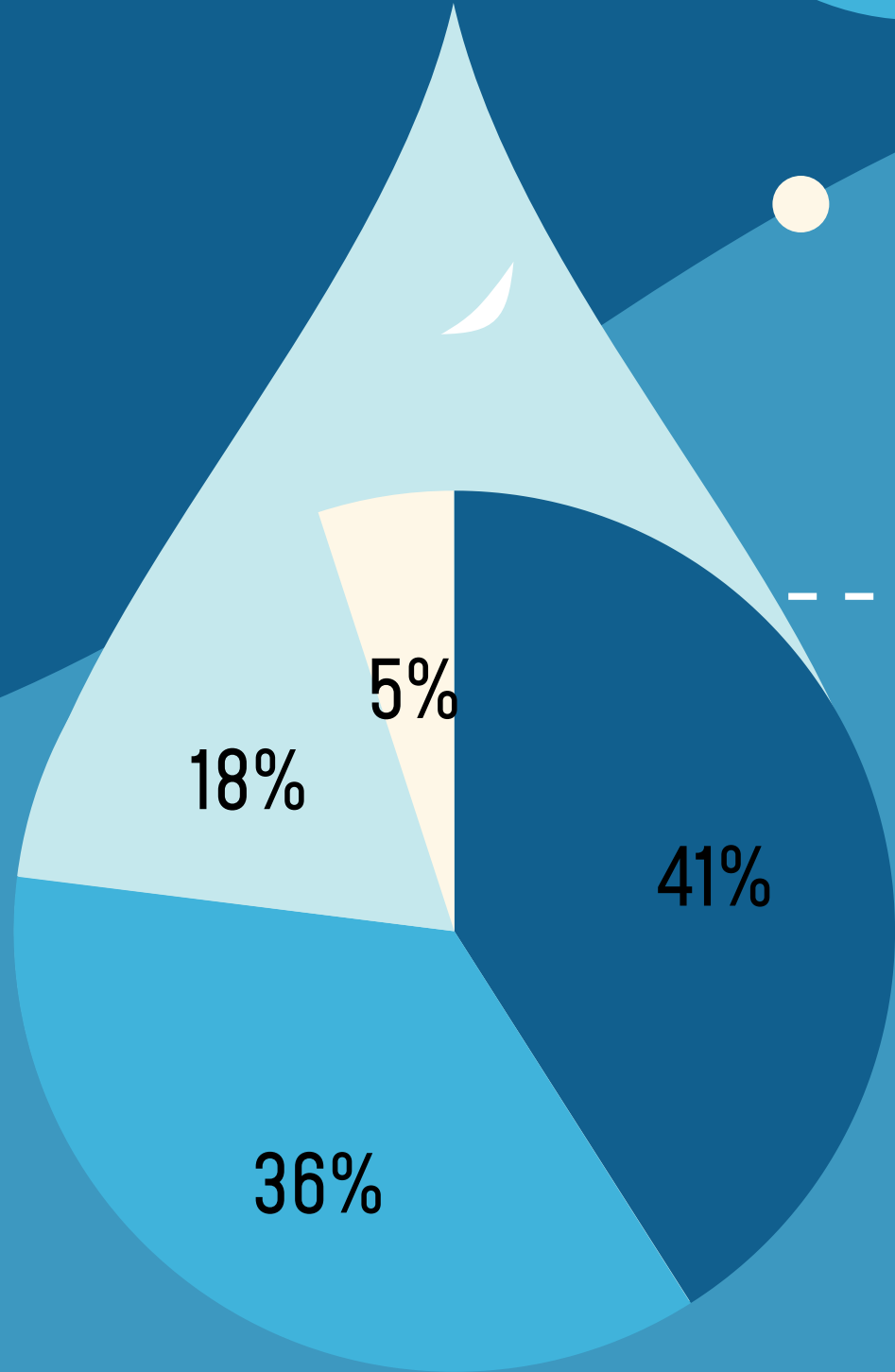


## How much water?

Producing 1 kilogram (kg) of clean H<sub>2</sub> via electrolysis (one of several approaches to H<sub>2</sub> production) requires water, with amounts varying based on water use efficiency.

4-9 gallons

1 KG H<sub>2</sub>



## Sources

AZ has four main sources that make up its supply

- Groundwater [41%]
- Colorado River [36%]
- In-state Surface Water [18%]
- Reclaimed Water [5%]

## Diminishing Resource

The Colorado River is over-allocated and its flows are declining.

## Over Reliance

In parts of Central AZ, officials are restricting groundwater use for urban development due to the full allocation of supplies.

## Unresolved Claims

Uncertainty over the rights to use in-state surface water and groundwater near rivers and streams will persist until AZ completes its two general stream adjudications.

## Challenges

## Priority Actions

## 5 Considerations

- 1 Groundwater withdrawals deplete aquifers unless offset by recharge. In contrast, water from rivers, streams (surface water), and reclaimed wastewater are considered renewable supplies.
- 2 The sustainability of reallocating agricultural water to clean H<sub>2</sub> production depends largely on the source of the supply.
- 3 Reclaimed and surface water is in high demand and first movers will have an advantage.
- 4 Clean H<sub>2</sub> production can remain economically feasible even when relying on relatively costly sustainable water supplies.
- 5 AZ's natural and built infrastructure offers opportunities to support clean H<sub>2</sub> production.

1

**Identify Sustainable Water Sources:** Prioritize opportunities to use reclaimed water or other sustainable water supplies.

2

**Engage Stakeholders:** Involve communities and ensure transparency in water management.

3

**Support Research and Development:** Invest in research to reduce water use and to identify alternative sources.

4

**Reduce Consumption:** Invest in low water-use technologies and maximize water reuse in production processes.

5

**Monitor and Adapt:** Continuously track water use and adjust strategies as needed.