

Water Study

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Purpose:

The purpose of this study was to determine what issues are on the horizon which may affect real estate value & economics of farming in the foreseeable future. ***More specifically analyze the Colorado River supplied districts including those districts supplied by the Central Arizona Project (CAP).***

Objective:

The overall objective is to utilize the information and intelligence gathered within this study to determine real estate loan collateral risks

Water Study

This study is designed to address several important questions:

- Power costs: Are there sharp rises in energy costs expected which may adversely affect farming feasibility/value.
- Water Supply/costs: What happens in 2030 when long-term excess water contracts expire for Central Arizona Project (CAP) Colorado River water supplied districts?
- Water Supply: When will CAP water no longer be delivered in reliable amounts to the districts?
- District Viability: Will CAP districts cease to be viable when CAP water is used up by non-Ag Users?

Water Study

- Review
 - What is the CAP (Central Arizona Project)
 - CAP delivers **Colorado River water** 1,300' “uphill” 320 miles from Lake Havasu to phoenix down to Tucson via a concrete lined canal.
 - CAP water is the primary water supply to over 260k+ Ac. farm land & is available as supplemental supply to many more acres. Supplies various municipal users to a much lesser extent presently. Irrigation users are the lowest priority. If water runs short agriculture is cut 1st.
 - CAP supplied District Water Costs: water cost for 1 acre of cotton based on 5 AF would be **\$150 to \$300/acre** with Central Arizona ID (Eloy) being the most expensive & Tonopah ID the cheapest
 - Non-CAP **Colorado River Water** districts **In Arizona-from Yuma-east**
 - Arizona Districts include 160k+- Ac. from Yuma east along Gila River. Current costs range from **\$60 to \$120/acre** for vegetables, hay, grain and cotton. Higher cost for citrus on the Mesa (sandy-more water)

Water Study

- Summary of Areas of Concern:
 - Hydro Power Costs are likely to continue to increase. If drought cycle persists hydro-electric power generation/efficiency will decline as will water supplies. Hydro power is the least expensive source for irrigation power. (Mother Nature Rules)
 - If drought persists & Lake Mead drops below 1,075' Colorado River water would will be re-allocated. Downward trend since 2000, a reprieve in 2011, It was at 1,190' in 2010. CAP districts would suffer, lowest priority. All river users would be affected.
 - EPA Increasing Nitrogen Oxide controls on Navajo Generating plant (coal fired) could cause shut down or a 16-20% power cost increase on all Central Arizona Project water (Farmers & municipal users).

Navajo Generating Plant



**CAP uses about 2.8 million megawatt hours of electrical energy each year
From the Navajo Generating Plant**

**To deliver about 1.6 million acre-feet
of water for municipal, agricultural
and industrial uses**



CAP is the single largest end user of power in Arizona

A Question of Power

95% of the energy used by CAP is produced at the Navajo Generating Station near Page, AZ near Lake Powell



CAP, through the Bureau of Reclamation, has access to nearly 25% of the power produced at NGS

A Question of Power

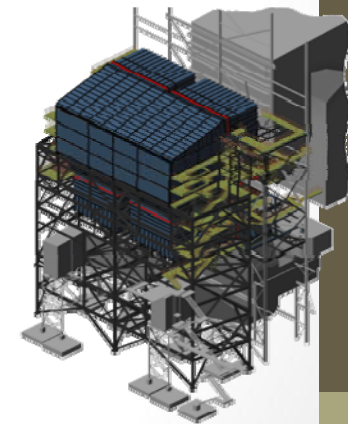
EPA is currently evaluating additional nitrogen oxide (NOx) controls for NGS under its Regional Haze rules to further improve visibility in the area



Low NOx Burners with Separated Overfire Air

COST: \$46 million

Two types of controls are under consideration to reduce NOx emissions at Navajo Generating Station



Selective Catalytic Reduction (SCR)

COST: \$1.2 billion

A Cost to Consider

Some “Back of the Envelope” Estimates



If SCR is mandated and installed, CAP energy costs would increase by at least 20%.

Should the plant instead be closed, replacing the power and revenues from NGS could double or triple CAP water rates

If CAP water rates were to double, the City of Tucson would pay an additional \$15+ million a year for its CAP water deliveries

Water Study

Summary of Areas of Concern (Continued):

- CAP Water Supply (Colorado River Water): after 2030 Excess Water Contracts Expire.
 - At that time control of any on-farm district leased wells will revert to back to the land owner
 - At this point water not being used by municipalities will be available for agriculture based on market prices 1st come 1st serve to the highest bidder. Arizona allocation will likely be put to use on Agricultural land to protect water rights. This may keep water cost down till municipalities need it.
 - By 2030 more non-Ag development is likely on farmland. This may increase water availability for Ag. users on remaining farms.

Water Study

- CAP irrigation district deliveries will likely be scaled down. Some districts may lease Indian owned allocations, invest in new wells, acquire wells via lease or purchase from area farmers to maintain use of Existing water delivery infrastructure.
- Farms without good on-farm wells may be marginally productive if the irrigation district is not able to furnish enough water. Farms will still be responsible for district assessments.
- If ground water pumping increases, water table recession likely
- Those looking to invest in land in the CAP districts need to focus more on the current & future expected on-site well water supplies. This may be the only reliable water source after 2030.

Water Study

- In summary
 - The persistent drought may have some serious implications for all Colorado River Water users. CAP users would be the 1st to get reduced water deliveries.
 - If the EPA decides to beef up Nitrogen Oxide standards on the Navajo Generating plant it could increase power/water costs 16-20% making many operations non-viable. If the plant is shut down it will put 1,000's of Indian and non-Indian workers out of work between those that work at the plant and the coal mine supplying the plant.
 - Colorado River supplied districts in the Yuma, Az., Imperial & Riverside Counties in California are the most secure regarding Ag. water supply & lower water costs as compared to Central Arizona.

Water Study

- It is increasingly critical for anyone appraising, buying, selling, or lending on agricultural land to understand the differences from one irrigation district to the next or from one groundwater basin to the next and even from one farm to the next.
- The American Society of Farm Managers and Rural Appraiser members specialize in this type of property. The presenters here today and others in the organization are a great place to look for agricultural real estate expertise in this area.