



# AQUIFER PUMPED HYDRO

Got a Well? Then You Have A Generator

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Presentation on September 13, 2023; for Antelope Valley IRWMP meeting



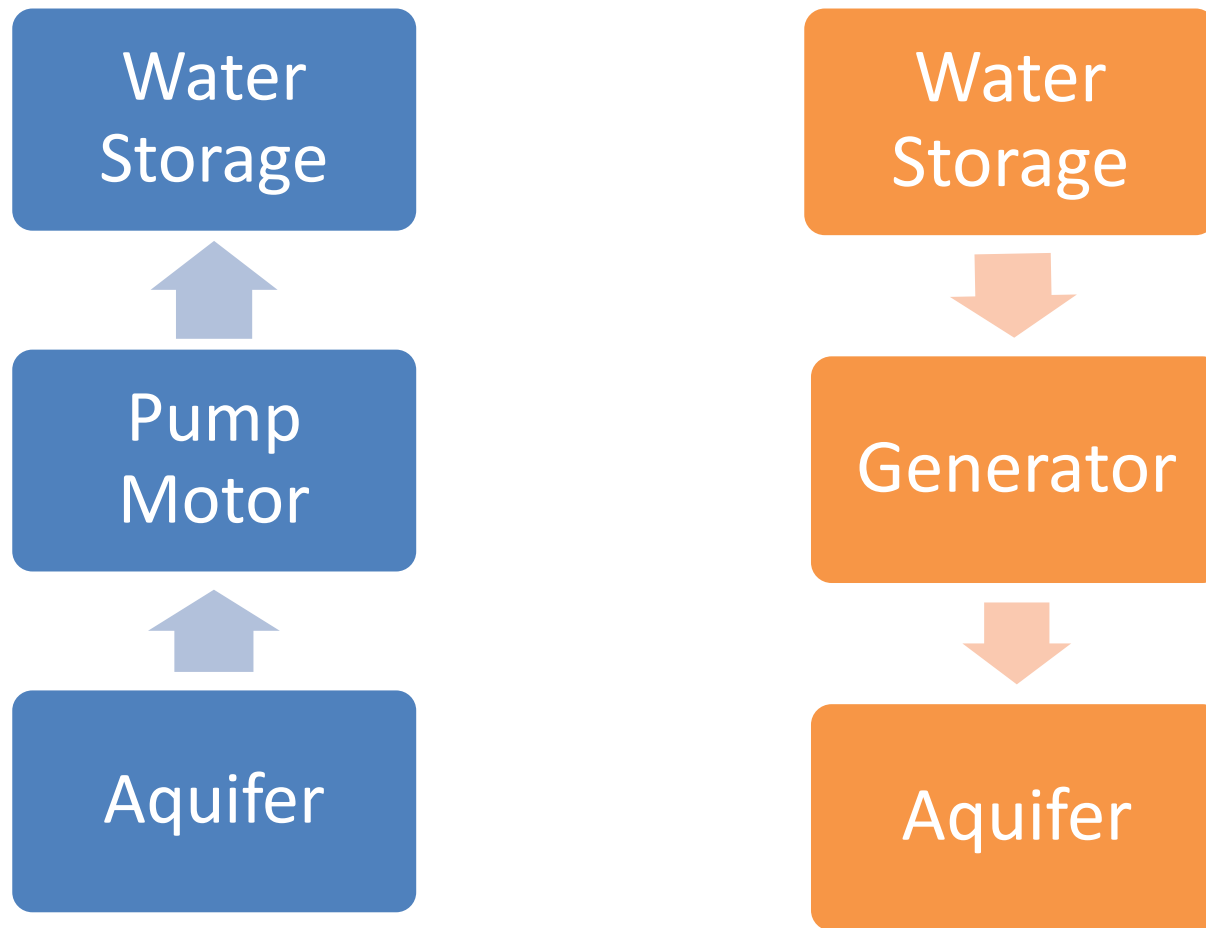
# The Third/Fourth of a Series of California Energy Commission Grants



Study	Funding	Findings
<b>1. Groundwater Bank Energy Storage Systems (EPC-15-049)</b>	\$0.2 M from CEC	APH is feasible but not economic for new wells using current retail rates (completed in 2017)
<b>2. Water/Energy Bank Proof-of-Concept (EPC-16-029)</b>	\$1.0 M from CEC	Demand Response with the State Water Project is feasible (completed in 2019)
<b>3. 50 kW Aquifer Pumped Hydro Demonstration. Retrofit a single existing well (EPC-19-058)</b>	\$2.0 M from CEC	Design, build, and demonstrate a 50 kW APH at one well for one year (finishes in March 2026*)
<b>4. 200 kW Aquifer Pumped Hydro Demo. APH on a cluster of four wells. (EPC-20-008)</b>	\$6.4 M from CEC	Demonstrate a 200 kW APH system at 4 wells for one year (finish in July 2026)

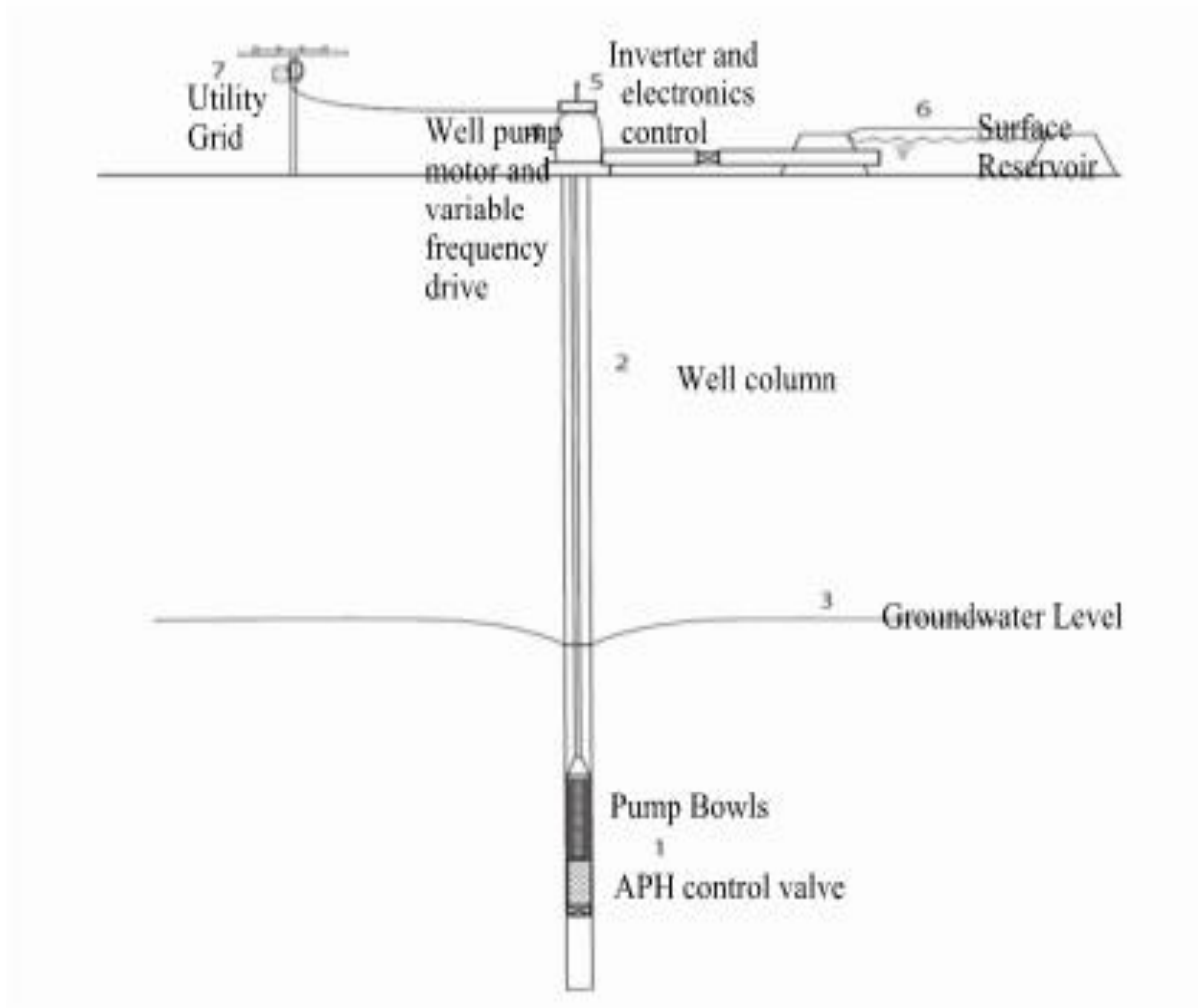
# Project Location 10 miles East of Rosamond, CA





- Well motor becomes a generator when rotated in reverse
- Idle wells provide existing infrastructure to generate electricity
- Water cycles up and down from aquifer to surface water storage reservoir

# APH Schematic and Principle Components



Aquifer Pumped Hydro (APH) Schematic



# 50 kW project



Existing Well Pump to APH



APH Valve



APH Valve Installed Below Pump Bowls

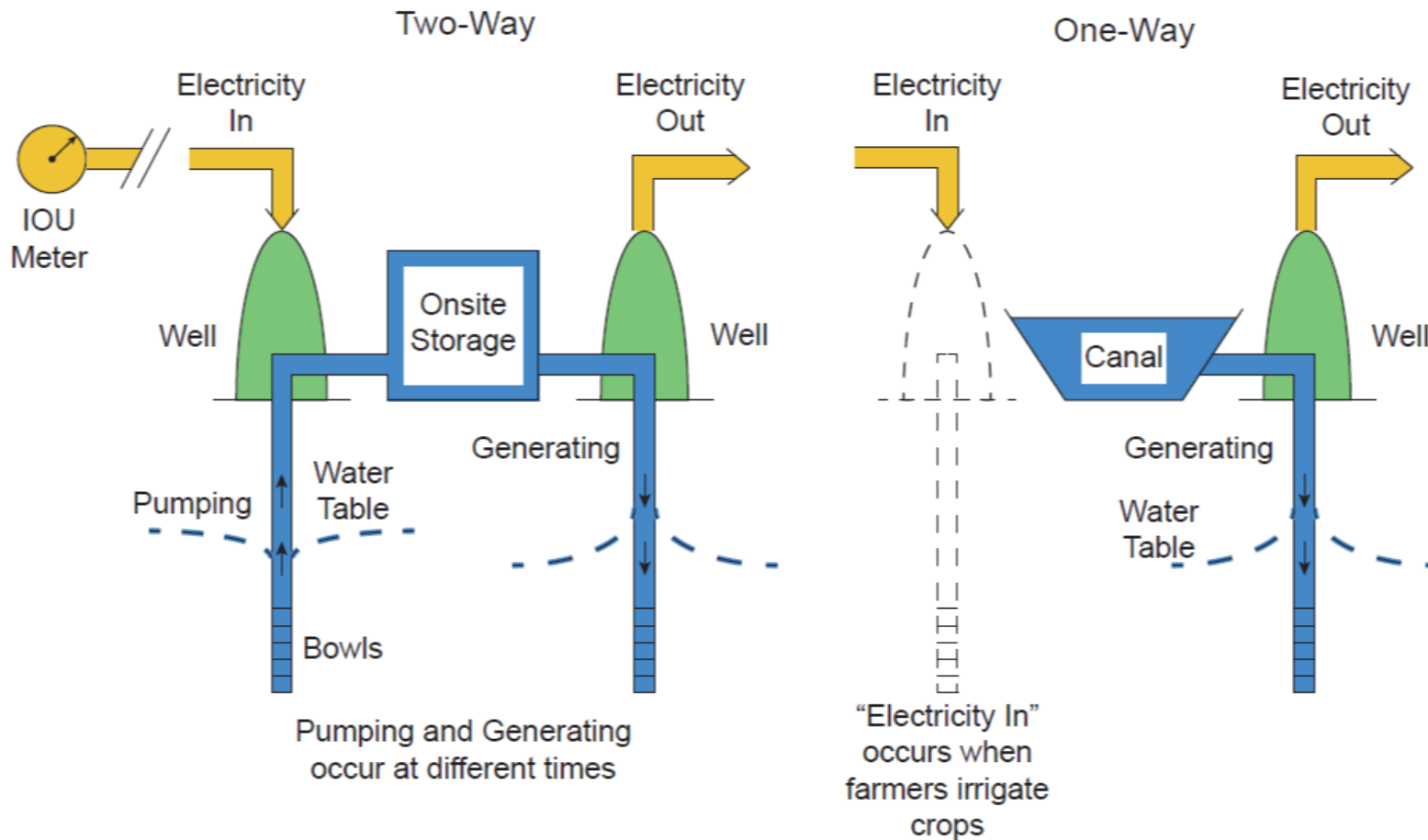


APH site with Container



APH Container with EV charger

# STORAGE: ENERGY IN, ENERGY OUT



1. Existing wells can store energy daily, can also extract energy during injection recharge (one way),
2. Small 17-acre-foot earthen reservoir onsite provides 10 hours of energy discharge.

## Protection of Aquifer Water Quality

- **Store water in a reservoir for 10 hours of energy discharge**
- **Onsite reservoir will be lined and covered**
- **We will drain the reservoir after each use**
- **Will install a chlorine feed system in case it is needed**
- **APH wells to have a spacing of half a mile or more**
- **Lahontan RWQCB requires a pilot program to re-inject groundwater**







# How can others benefit from successful APH demo?

- Store energy for later discharge on-peak
- Use of Net Energy Metering to reduce cost to pump wells



**What we would like: a letter of support for this project**