

## Small Community's Proactive Thinking to Move from Zero to 100 Percent Water Reuse

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**Abstract :** The City of Jal serves a population of approximately 3,500 people, including 2,100 permanent inhabitants and 1,400 oil and gas sector workers and RV park occupants. Over the past three years, Jal's population has increased by about 70 percent, mostly due to the oil and gas industry. The City anticipates that the population will exceed 4,200 by 2020, necessitating the construction of a new wastewater treatment plant (WWTP) because the old plant (aerated lagoon system) cannot accommodate such rapid population expansion without major renovations or replacement. Adhering to discharge permit restrictions has been challenging due to aging infrastructure and equipment replacement needs, as well as increasing nutrient loading to the wastewater collecting system from the additional oil and gas residents' recreational vehicles. The WWTP has not been able to maintain permit discharge standards for total nitrogen of less than 20 mg N/L and other characteristics in recent years. Based on discussions with the state's environmental department, it is likely that the future permit renewal would impose stricter conditions. Given its location in the dry, western part of the country, the City must rely on its meager groundwater supplies and scant annual precipitation. The city's groundwater supplies will be depleted sooner than predicted due to rising demand from the growing population for drinking, leisure, and other industrial uses (fracking). The sole type of reuse the city was engaging in (recreational reuse for a golf course) had to be put on hold because of an effluent water compliance issue. As of right now, all treated effluent is evaporated. The city's long-term goal is to become a zero-waste community that sends all of its treated wastewater effluent either to the golf course, Jal Lake, or the oil and gas industry for reuse. Hydraulic fracturing uses a lot of water, but if the oil and gas industry can use recycled water, it can reduce its impact on freshwater supplies. The City's goal of 100% reuse has been delayed by the difficulties of meeting the constraints of the regular discharge permit due to the large rise in influent loads and the aging infrastructure. The City of Jal plans to build a new WWTP that can keep up with the city's rapid population increase due to the oil and gas industry. Several treatment methods were considered in light of the City's needs and its long-term goals, but MBR was ultimately chosen recommended since it meets all of the permit's requirements while also providing 100 percent beneficial reuse. This talk will lay out the plan for the city to reach its goal of 100 percent reuse, as well as the various avenues for funding the small community that have been considered.

**Keywords :** membrane bioreactor, nitrogen, reuse, small community

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