

# TRIPLE BOTTOM LINE ANALYSIS FOR BRACKISH GROUNDWATER DESALINATION SYSTEM IN SOUTHWESTERN UNITED STATES

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## Abstract

Santa Teresa, New Mexico is continuously growing, expanding in areas of industrial growth and development, population, and job opportunities. When evaluating the potential impacts of an implementation or project, triple bottom line (TBL) is a useful decision making tool to help guide decision makers toward the most informed decisions on the potential financial, social, and environmental externalities associated with design specifics.

By considering these three main factors for a groundwater desalination system in Santa Teresa, investors can expect to save up to \$108M in 2019 USD, along with emission reductions of 239,607 lbs of NO<sub>x</sub>, 509,338 lbs of SO<sub>2</sub> and 461,479,322 lbs of CO<sub>2</sub>, based solely on the design specifics they choose. The study compares reverse osmosis (RO) with electro dialysis reversal (EDR) membrane technologies for pump power requirements, and solar photovoltaic renewable energy with conventional energy for power generation. Based on the four scenarios, it can be proven that selecting reverse osmosis membrane technology coupled with solar photovoltaic renewable energy generation can result in the highest level of cost reductions as well as limiting social and environmental impacts. This study takes a deeper look into the impacts energy has toward human health, net agricultural productivity, property damages from increased flood risk, diminished visibility and recreational values, material deterioration, and the value of ecosystem services due to climate change on a monetary as well as emissions basis.

*Keywords: Desalination, Reverse Osmosis, Electro dialysis Reversal, Solar Photovoltaics, Triple Bottom Line*