



**North Alamo Water Supply Corporation**

420 S. Doolittle Road Edinburg, Texas 78539  
(956) 383-1618 • (800) 734-0620

# Energy-Efficient Alternatives for Brackish Groundwater Desalination

Robert Rodriguez

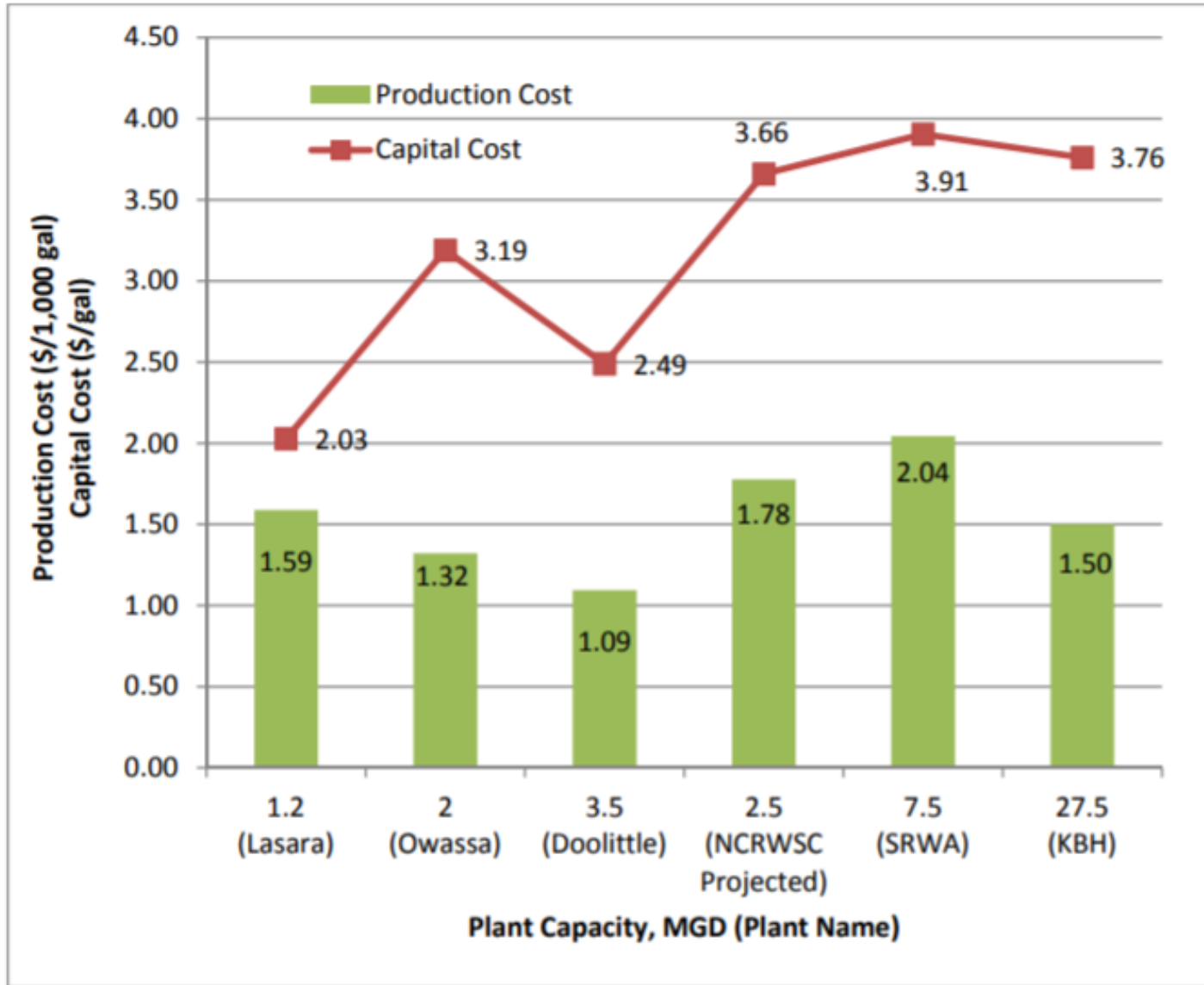
North Alamo Water Supply  
Corporation

Jorge A Arroyo

*Arroyo*



## Cost of Brackish Groundwater Desalination in Texas



Source: Texas Water Development Board, 2012

# Example of Energy Cost for a 5 MGD BGW RO

[7 cents/kW-Hr]

«Based on information from existing facilities, brackish water desalination uses on the order of **1,300 – 3,250 kWh of energy per acre-foot**, dependent largely on the source water quality, plant capacity, and technology used.»

*California Desalination Task Force, October 2003*

$$5 \times \frac{\text{kW} - \text{Hr}}{1,000 \text{ gal}} \times 5 \text{ MGD} \times 365 \text{ days} \times 7 \frac{\text{cents}}{\text{kW} - \text{Hr}} = \$638,750/\text{yr}$$

# RECLAMATION

*Managing Water in the West*

## Qualitative Comparison of Reverse Osmosis and Nanofiltration for Treating Brackish Groundwater in Texas

ANNA HOAG, KATIE GUERRA, ANDREW  
TIFFENBACH



U.S. Department of the Interior  
Bureau of Reclamation

## Conclusions

- Software simulations showed that permeate TDS correlated with feed sodium concentration
- NF possible for feed waters with Na < 1,100 mg/L
- NF can be used to treat the majority of waters in the database to < 500 mg/L
- Detailed engineering analysis needed to determine most cost effective membrane design

RECLAMATION

*«....The reduction in pressure observed for nanofiltration membranes compared to reverse osmosis can reduce the energy consumption by approximately 40% for the feed water sources considered in this study.»*

# Example of Energy Cost for a 5 MGD BGW RO

## 40 % energy savings through nano-filtration

40 percent savings → 5.3 kW-Hr/1,000 gal

$$\bullet 3_{NF} \times \frac{KW-Hr}{1,000 \text{ gal}} \times 5 \text{ MGD} \times 365 \text{ days} \times 7 \frac{\text{cents}}{KW-Hr} = \$383,250$$

$$\bullet 5_{RO} \times \frac{KW-Hr}{1,000 \text{ gal}} \times 5 \text{ MGD} \times 365 \text{ days} \times 7 \frac{\text{cents}}{KW-Hr} = \$638,750$$

**\$255,500/yr savings?**

# The Feasibility Question:

Is nano-filtration a cost-effective alternative to reverse-osmosis for brackish groundwater desalination?





## United States Department of the Interior

BUREAU OF RECLAMATION  
P.O. Box 25007  
Denver, CO 80225-0007

IN REPLY REFER TO:  
84-27810  
ACM-1.10

**MAY 15 2017**

VIA ELECTRONIC MAIL

North Alamo Water Supply Corporation  
Attn: Mr. Steven Sanchez  
420 South Doolittle Rd  
Edinburg, TX 78539

Dear Mr. Sanchez:

Thank you for submitting an application for development of a feasibility study under the Title XVI Water Reclamation and Reuse Program. Reclamation conducted a review of applications for funding based on the evaluation criteria included in the FOA announced on October 25, 2016, and posted at [www.grants.gov](http://www.grants.gov). **The Bureau of Reclamation is pleased to inform you that your application was among those receiving the highest ratings and is now being considered for award of a financial assistance agreement.** Reclamation anticipates awarding Federal funds



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REGION M





# North Alamo WSC



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- Eastern Hidalgo, Willacy, and northwestern Cameron Counties
- 44,900 metered connections
- 180,000 people
- 7 surface water treatment plants (26.4 MGD)
- **4 brackish groundwater desalination plants (7.5 MGD)**



# Feasibility Study-Scope

- Select two NAWSC-BGD facilities for detailed evaluation
- Assess current energy use
- Identify opportunities for increased energy-efficiency
- Develop/select energy-efficient alternatives
- Conduct life-cycle cost comparison
- Examine potential applications to future BGD facilities in the Rio Grande Regional Water Planning area

Interested in receiving project updates?

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