IWRM2018-160
8th International Water Resources Management Conference of ICWRS
© Author(s) 2017. CC Attribution 4.0 License.

Produced Water from a Waste by Product to a Valuable Resource

Basma Al-Shidhani (1)

(1) Petroleum Development Oman, Central Project Delivery , Oman (basma.bn.shidhani@pdo.co.om), (2) Sultan Qaboos University, College of Agriculture & Marine Sciences, Associate Professor, Oman (ahmedm@squ.edu.om)

Produced Water from a Waste by-Product to a Valuable Resource!
Basma Al Shidhani1 and Mushtaque Ahmed2
1Petroleum Development Oman
2Associate Professor, Sultan Qaboos University, Oman

The large volume of produced water resulting from oil and gas extraction is an increasing problem in Oman and similarly in many parts of the world. The preferred approach has been and still is subsurface injection to deal with the problem. However, changing the paradigm from dealing with it as “waste by-product” to “a potential resource” could open up a number of opportunities to recover some of the costs and possibly secure potential high value outcome in the downstream side.

Produced water is mainly generated in remote geographic locations which limits the opportunities of reuse. Moreover existing policies around the reuse and water quality criteria of potential beneficial uses are very stringent especially when it comes to human consumption. Given these challenges produced water could still be utilized to augment conventional water supplies within oil and gas industry applications like reuse for drilling, hydro testing of pipelines, polymer mixing to plant and road construction work.

Another potential alternative reuse of produced water is irrigation keeping in mind that produced water is a mixture of inorganic and organic compounds. This study is to look at a hybrid reverse osmosis and constructed wetland system for produced water treatment. Whilst wetland systems like “Nimr Reed Beds” in PDO concession has been successful in treating produced water from its organic compounds, salinity on the other hand is a general attribute of produced water that could be treated by reverse osmosis up to irrigation water requirements. Such freshwater will have no quality concerns with regards to human or animal health. Whereas this is a technically viable solution it needs to prove commercial feasibility compared to expensive deep water disposal.

Recent experiences in Australia (Sundrop farm) and few other countries including Qatar integrates solar power, electricity generation, freshwater production through reverse osmosis and controlled environment agriculture to produce high value crops in harsh desert environments different than conventional greenhouses that uses groundwater for irrigation, gas for heating, and
electricity for cooling. Technology used in Sundrop farm turns seawater (saline water) and sunlight into energy and water and then use sustainably sourced carbon dioxide and nutrients to maximize the growth of crops. By adopting such creative but less power intense technologies we can turn produced water from a waste by-product to serve as a new water supply with a commercial benefit in Oman and similarly other neighboring countries in the region confronting high demand on freshwater sources.

The paper will look at the technological and economic viability of such a system in Omani conditions. Environmental sustainability will be an added feature of such systems. The paper will also discuss other current uses of produced water on a world-wide scale with particular focus on regional initiatives.