

A to Z of Water Management and Overall Scenario in Saudi Arabia

Abdullrahman AlHweedi¹, Tauseef Zia Siddiqui², Dr.Fauzia Siddiqui³

¹ Sustainability Engineer, SAFCO, hweedi@safo.sabic.com

² Sustainability Engineer, SAFCO, ziats@safo.sabic.com

³ HOD, Mechanical Engg Dept, SCOE, Kharghar, India, fauzia.hoda@gmail.com

Abstract: Water is an essential resource and plays a significant factor for the industrial field. It is the platform of economic and society survival. During the last years, the kingdom has gone through comprehensive development in all fields along with tremendous growth rates in population. For that, integrated water resource management is important to ensure the continuous supply of quality water for all sectors.

In spite of the tremendous efforts made by the government to develop the water supplies in the country, the consumption of water in Saudi Arabia has reached alarming levels. The objective of this paper is to seek sustainable management for water resources in the Kingdom of Saudi Arabia through the following the integrated water management approach.

Key words: Water, Integrated Water Management, Waste Water

INTRODUCTION

The Kingdom of Saudi Arabia has seen tremendous changes in its social and economic spheres in the last 30 years. Wealth from oil revenues made it possible for the government to develop all sectors of the economy. One major sector which has seen tremendous growth is the agricultural sector. It has grown so fast during this period causing huge withdrawals from the country's limited deep groundwater reserves. The growth of cities, increase in the population and the rise in the standards of living caused domestic and industrial water consumption to increase many folds.

The constant pressures on the country's water resources made it necessary to develop both the conventional water resources (surface and groundwater) and the unconventional ones (desalination of sea water and treated wastewater).

OVERVIEW OF WATER MANAGEMENT IN KSA

Saudi Arabia is currently the world's largest producer of desalinized sea water. Desalination plants produce water for coastal urban centers and for many cities in the interior of the country including the capital city of Riyadh. Wastewater treatment plants were also constructed in many urban areas. Utilization of treated wastewater, however, is still limited.

Waste water treatment is one of the most reliable way with respect to cost and energy compared to desalination and long distance water transportation. Waste water treatment can contribute to the saving of clean water resources. Also, water reuse contributes in saving electric power, for example production of services water from desalination of or seawater.

PREDICTION OF FUTURE WATER RESOURCES

It is expected that utilized surface water resources will increase to about 2000 MCM by the 2025. This will be mainly due to the construction of more dams throughout the country.

Renewable groundwater resources that are utilized are also expected to increase due to developments taking place in the areas where they are available. It is expected that by the end of the study period, about 1500 MCM of renewable groundwater will be available. Available nonrenewable groundwater resources will continue to decline as more water is pumped from major aquifers. The amounts withdrawn up to the year 2025 will highly depend on different scenarios future development especially in the agricultural sector.

Desalinized seawater is expected to increase at about 3% annually. This estimate was based on the last few year's increases and on the number of desalinization projects planned during the future development plans. This resource will be about 1750 MCM by the year 2025 and will exclusively be used for domestic purposes.

Treated wastewater will continue to be available at increasing amounts as more treatment plants are constructed and as more parts of different cities are connected to sewage networks. It is anticipated that the amounts of this important resource will increase from about 30% of domestic water supply to almost 70% by the end of the study period.

CHALLENGES IN MANAGING WASTE WATER FROM INDUSTRIES

One of the largest consumers of raw water in KSA is Petroleum & Petrochemical complexes, since Saud Arabia is considered one of the largest oil producers. Operations of these plants are dependent on consumption of huge amount of fresh water and thereby generating excess of waste water from the processes.

The treatment of wastewater generated by Petrochemical& refinery activity is a main concern for plant owners. . The petroleum refining complex produces a large amount of wastewater due to the quantity of water used in refining the processes especially for cooling systems, Industrial recycling and reuse of (cooling water, boiler feed, process water) is a mandatory target in KSA.

Most industrial production plant process required cooling water for Refineries, and petrochemical plants, manufacturing facilities. Cooling water systems contribute in controlling of the temperatures and pressures by transferring heat from hot fluids into the cooling water which absorb the heat and cool down the water as per the specifications of the plants needs. As a result, the cooling water temperature heats up and must

be cooled before it can be recycled or replaced with fresh water.

OPTIMIZATION OF WASTE WATER THROUGH WASTE WATER RECYCLING

Optimization of wastewater management to achieve the desired production is a new change for different industrial companies. There, recycling of the process water is the main area of recycling the used water instead of waste it. The purification unit in utility receive the returned water from the process and send it back to the plant for further usage during the normal operation

Another approach for treatment of water during the off line operation R,O unite is another type of way to treat the waste water specially during the cleaning purpose for the major equipments such as Heat Exchanger during the turnaround activities. Reverse osmosis (RO) is a water purification method that uses a membrane to remove unwanted, particles from waste water. Another potential opportunity in utilizing the water in industry is the recycled of the condensate of the compressed air. Vapor and moisture is always present when compressing air. Even the smallest system can generate large quantities of water These removed water can effectively be used and have a significant impact on water consumption which considered as a free water entering to the boundary of the process plant Remove of the vapor exacting in air. Keeping in mind that the majority of the petrochemical and refinery complexes are located in both east and west coast of KSA and summer temperatures are extremely hot, often ranged between the 43 - 50 °C. Furthermore, summers are also very humid and quite oppressive so the air is witch as been taking from the air is always contains a huge quantity of drops water.

SUGGESTED SOLUTIONS AND CONCLUSION

Shortages of water in arid areas are normal and expected. However, severe shortage of water will have serious social and economic effects. They will also cause severe health problems and may result in economic collapse. To avoid the problems that will be faced by the water sector in Saudi Arabia, or at least reduce their effects, it is necessary to concentrate actions in the following areas like Conservation of water use in arid regions is of a paramount importance. Although some conservation efforts (public awareness programs, television and other public media messages etc.) were made in the past, there is urgent need to do more. Actions needed include the use of drip irrigation, increase prices for water and require drainage water recycling. Give priority in government spending to wastewater treatment plants construction and to distribution and pumping facilities for transporting treated wastewater. This will result in more treated wastewater being available for different uses. Hence, some of the demands for agriculture and industry can be met from this resource.

REFERENCES

[1] Al-Ibrahim, A.A. (1990), Water Use in Saudi Arabia: Problems and Policy Implications. Journal of Water Res. Plan. and Mange., ASCE, Vol. 116, No. 3, pp. 375-388.

[2] Al-Saadi, Salem Odah (2006), Analytical Study of Water Requirements in KSA for Next Twenty Years, Senior Project, C.E. Dept., King Saud University.

[3] Turbak, A.S. and K.H. Al-Dhowalia (1996), Contribution of Treated Wastewater in Solving Water Shortage Problems in Saudi Arabia (in Arabic), King Saud University, Symposium on Wastewater Treatment Technology and Reuse, Riyadh, pp. 14-33.

[4] Ministry of Planning (1985), Fourth Development Plan, Riyadh, Saudi Arabia.

[5] Wojcik, C.K. and A.G. Maadah (1981), Water and Desalination Programs of Saudi Arabia, Journal of Water Supply and Improvement Assoc., Vol. 8, No. 2, pp. 3-21.