



Saudi Arabia's Saline Water Conversion Corporation Transforms Operations To Meet National 2030 Strategic Objectives

Significant production increase achieved while unit water cost reduced as a result of joint efforts with DuPont Sustainable Solutions aligned with operation excellences best practices.

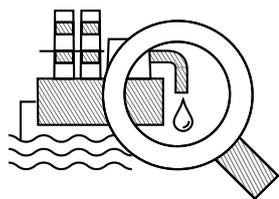
المؤسسة العامة لتحلية المياه المالحة
Saline Water Conversion Corporation



Saudi Arabia's Saline Water Conversion Corporation (SWCC) was established in 1974 to develop seawater desalination plants throughout the kingdom to supply the population with drinking water and electricity. Today, the company is the global leader in seawater desalination and the second largest electricity producer in KSA. It maintains more than 7,000 km of water pipelines for six national water transmission systems and runs 28 plants with a desalination capacity in excess of 5 million m³/day.

In 2016, His Excellency Ali AL-Hazmi was appointed as Governor of SWCC and set about preparing the company to deliver on Saudi Arabia's 2030 Vision. His goal with his SWCC team was to optimize the use of water resources and boost water storage and security. The company aimed to increase production from 3.5 million m³/day to 5.5 million m³/day by 2020. With this in mind, SWCC selected operations management consulting firm, DuPont Sustainable Solutions (DSS), in 2016 as a partner to help SWCC find ways to optimize operations and reduce production costs, while establishing a mindset of safe operations. The DuPont team carried out a range of operations assessments at four of SWCC's most critical desalination plants and water transmission systems.

HIGH-LEVEL OVERVIEW



Assessment of 4 of the largest desalination facilities including electricity & water plant, water transmission systems

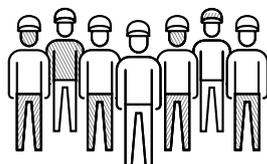


Unit cost reduction potential of

-10-30%

identified across the four sites

400+



employees directly engaged and coached by DuPont

Production increase of

+1.4M M³/DAY



achieved within 13 months of project commencement without CAPEX investment

SWCC Transforms Operations To Meet National 2030 Strategic Objectives

Prioritizing improvement opportunities for rapid results

The transformation project concentrated on achieving tangible and sustainable results. As Abdullah Al Zowaid, SWCC Deputy Governor Operations & Maintenance explains, “SWCC is focused on satisfying future water demands in Saudi Arabia, but we faced a number of challenges from a rapid increase in population to growing industrialization and therefore increased water consumption. These combined factors widened the gap between water demand and supply. It was therefore clear to us back in 2016 that we had to increase our production not only to meet the 2020 national transformation program goals and our commitment to the 2030 Vision, but also to ensure that we have a sustainable, internationally competitive business model that the people of Saudi Arabia can benefit from. DuPont’s experience of implementing similar transformation initiatives at both their own manufacturing facilities and with clients in the Kingdom was invaluable to our improvement process. The DuPont expertise allowed us to maximize productivity and reliability, and to contribute to the overall cost optimization of our existing facilities. Their unique approach also had a positive impact on our risk management practices and enabled us to strengthen our safety culture.”

“ We have improved availability in our desalination system by 12%, from 84% to 96%, and are looking to increase that sustainably to 98%.”

H.E. ALI AL-HAZMI, GOVERNOR OF SWCC

As the driver for the SWCC transformation project was to reduce water cost, DSS began by identifying opportunities to increase water output and decrease production costs from fuel and electricity. To make this target measurable, DSS calculated the net cash cost of unit of water (m³) [Fig. 1].

To measure the gap between actual performance and maximum potential for each SWCC facility included in the scope of the project, DSS developed a framework called Overall Equipment Efficiency (OEE) [Fig.2]. This gave SWCC better insight into the impact of key levers on the water unit cost. The framework accounted for various types of losses that affected three key operating parameters: availability, performance, and quality. In addition to OEE, DSS also assessed the key cost drivers that effect production including fuel, maintenance, electricity, and chemicals.

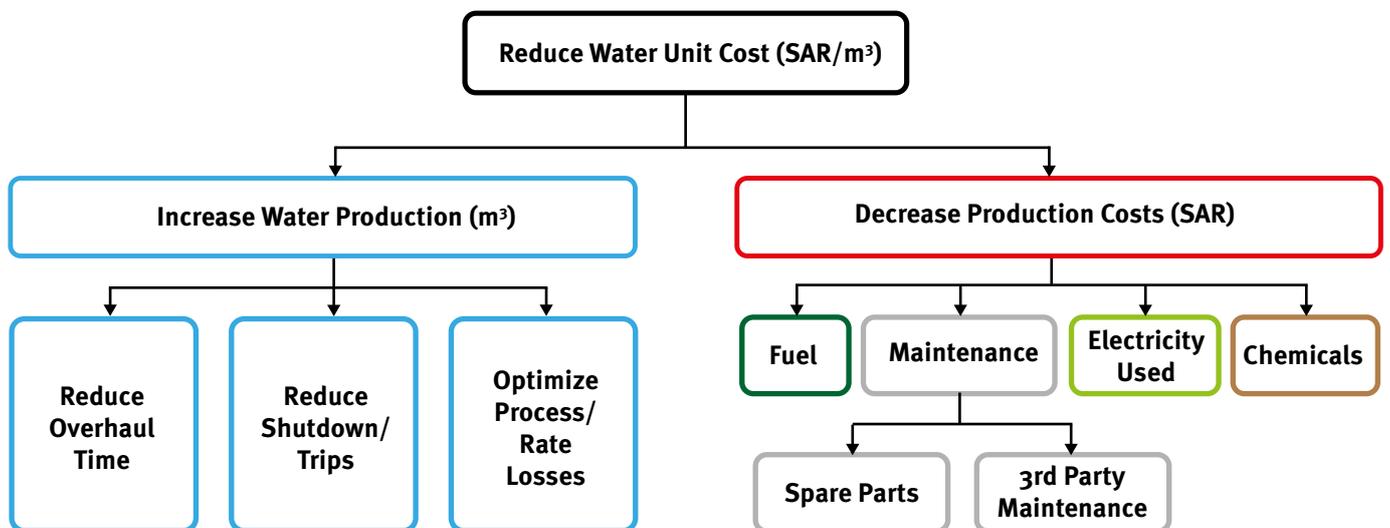


FIGURE 1: DSS WATER UNIT COST CALCULATION MODEL

OVERALL EQUIPMENT EFFICIENCY

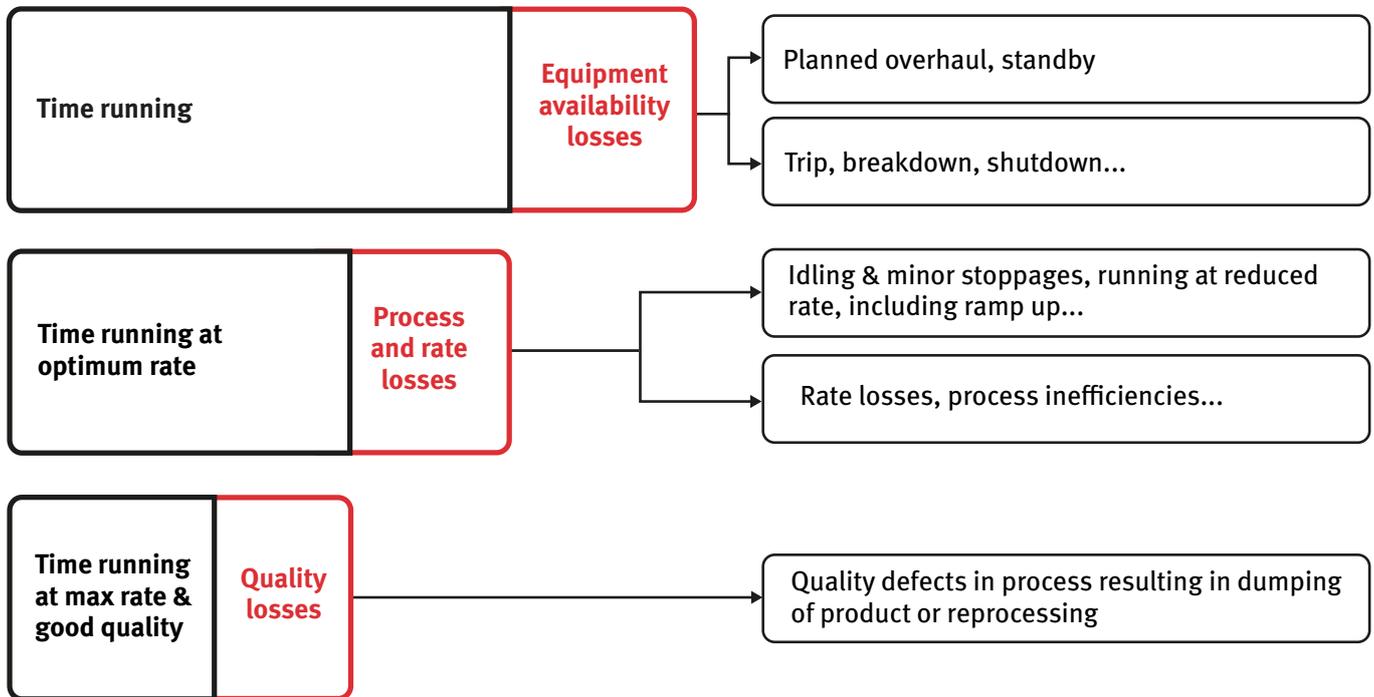


FIGURE 2: OEE FRAMEWORK USED TO ASSESS IMPACT OF KEY LEVERS ON AVAILABILITY PERFORMANCE AND QUALITY

With the water unit cost largely determined by key drivers such as asset efficiency, pump and water transmission systems efficiency, maintenance and reliability, process and employee safety, and culture and performance management, DSS carried out a range of further activities concentrating on these areas within the organization. The consulting team conducted focus interviews and workshops, data analysis, as well as on-site investigations, which were further validated against leading best practices as brought in by DSS’ relevant assessment partners.

This thorough evaluation allowed DSS and SWCC to identify quantifiable improvements that would reduce each facility’s water production losses and optimize costs.

In total, over 100 improvement initiatives were identified, many were implemented and resulted in cutting the cost of water between 10 and 30% across the four facilities.

“ Our dream is for Saudi Arabia to capitalize on its expertise in the desalination industry, to become a world leader and to provide new desalination plants and services to neighboring countries.”

H.E. ALI AL-HAZMI, GOVERNOR OF SWCC



RESULTS

Within 13 months of starting on the transformation project at the Jubail, Khobar, Yanbu and Shoaibah facilities, SWCC was able to increase daily water production by 1.4 million m³ and set a global record with daily desalination capacity reaching 5 million m³ in January 2018. Saudi Arabia's Minister of Environment, Water and Agriculture, Abdulrahman Al-Fadhli said, "This is almost equivalent to the construction of a new desalination plant worth SAR 13 billion, without any additional capital costs."

His excellency Ali Al-Hazmi, Governor of SWCC says, "As we move towards privatization, we are working to improve our operational excellence and efficiency in desalination plants. We are focusing on five key aspects: health, safety and environment, human resources, reliability, profitability and energy saving. Our reliability targets in mechanical availability and utilization are in line with international key performance indicators. We have improved availability in our desalination system by 12%, and are working to reach to 98%. With regard to profitability, we are targeting areas that are set to improve production by 5-10%, in order



CROWN PRINCE MUHAMMAD BIN SALMAN VISITING SWCC IN JANUARY 2018 WITH THE GOVERNOR OF SWCC, H.E. ALI AL-HAZMI

ultimately to increase the capacity of our desalination plants from 5 million m³ per day to 6.5 million m³. We also want to pioneer the most cost-effective desalination production and to be a global leader when it comes to the cost of making 1 million m³ desalinated water. Our dream is for Saudi Arabia to capitalize on its expertise in the desalination industry, to become a world leader and to provide new desalination plants and services to neighboring countries.

The SWCC team were privileged to be visited by HRH Muhammad Bin Salman, Crown Prince of Saudi Arabia on 24 January 2018 to congratulate SWCC on their achievement and during his visit commented, "Increasing the production of desalinated water from 3.5 to 5 million m³ per day, without capital investment, is a great achievement for Saudi Arabia."

“ *Increasing the production of desalinated water from 3.5 to 5 million m³ per day is a great achievement for Saudi Arabia.* ”

CROWN PRINCE MUHAMMAD BIN SALMAN

ABOUT DUPONT SUSTAINABLE SOLUTIONS

DuPont Sustainable Solutions (DSS), a business unit of DowDuPont Specialty Products, is a leading provider of world-class operations consulting services to help organizations transform and optimize their processes, technologies and capabilities. DSS is committed to improving the safety, productivity and environmental sustainability of organizations around the world. Additional information is available at:

www.sustainablesolutions.dupont.com

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[linkedin.com/company/dupont-sustainable-solutions](https://www.linkedin.com/company/dupont-sustainable-solutions)

twitter.com/DuPont_DSS

DuPont International Operations Sàrl
Chemin du Pavillon 2, P.O. Box 50
CH-1218 Le Grand Saconnex
Switzerland
+41 22 717 5920

