

Desalination Industry in Saudi Arabia

(An Overview)

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المؤسسة العامة لتحلية المياه المالحة
Saline Water Conversion Corporation

5th
**WATER
ARABIA**
Conference & Exhibition



مؤتمر ومعرض
**المياه
العربي**
الخامس

I would like to take this opportunity to thank the Saudi Arabian Water Environment Association (SAWEA) and the Water Environment Federation (WEF) for co-organizing the 5th Water Arabia Conference & Exhibition that Reviews Sustaining Water Resources Through Innovative And Reliable Water And Wastewater Treatment Technologies

5th
**WATER
ARABIA**
Conference & Exhibition

مؤتمر و معرض
**المياه
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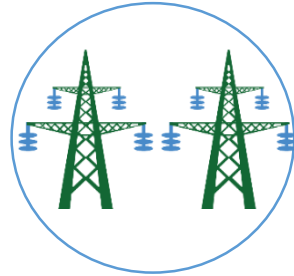
SWCC OVERVIEW



Desalinated Water

4.7
MCM/Day
Total Installed Capacity

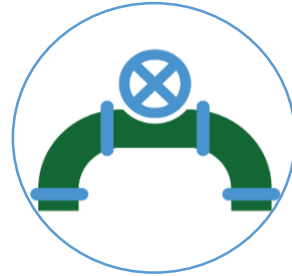
62%
of Desalinated
water in the
Kingdom



Power Generation

7,305
MW
Total Installed
Capacity

12%
of Production
Capacity in the
Kingdom



Water Transmission

7,175 KM
Total Length

21
Transmission
Systems

56
Pumping Station

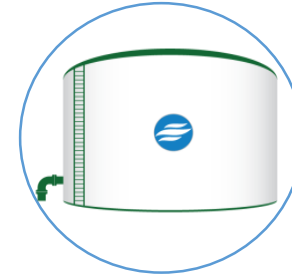
12
Mixing Station



Plants

29
Plants

17
Different Locations



Storage

285
No. of Storage Tanks

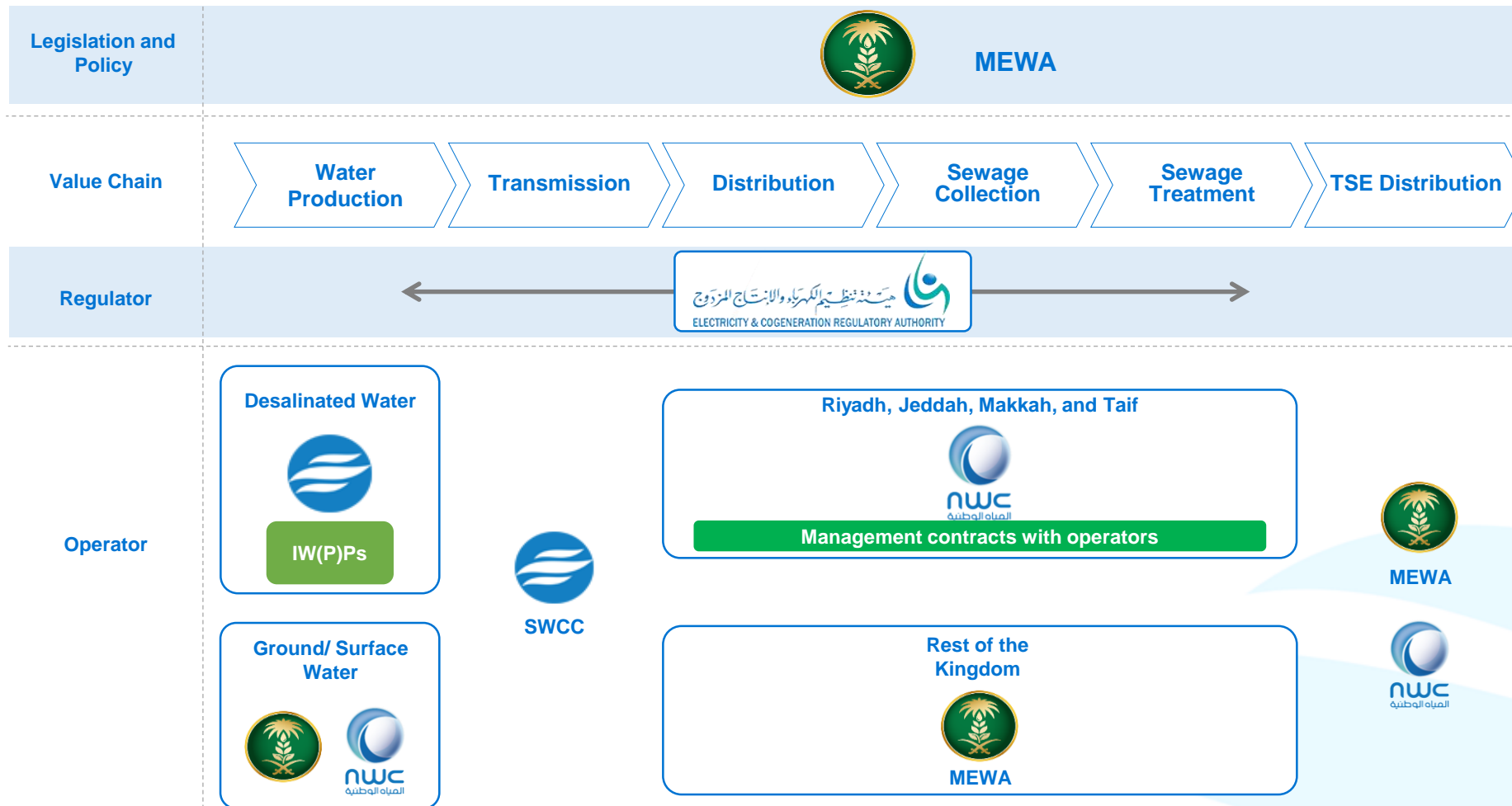
With Capacity
12.7
MCM/Day

MAIN CHALLENGES FACING WATER SECTOR IN SAUDI ARABIA

- Limited natural water resources.
- Elevated per-capita consumption,
- Rapid increase in population and unsustainable growth in water demand.
- High costs of water coupled with low tariffs making the sector unsustainable.
- Limited private sector participation in the kingdom's water sector.
- Substantial investments required in the near future for new capacity to offset planned decommissioning of existing desalination plants.

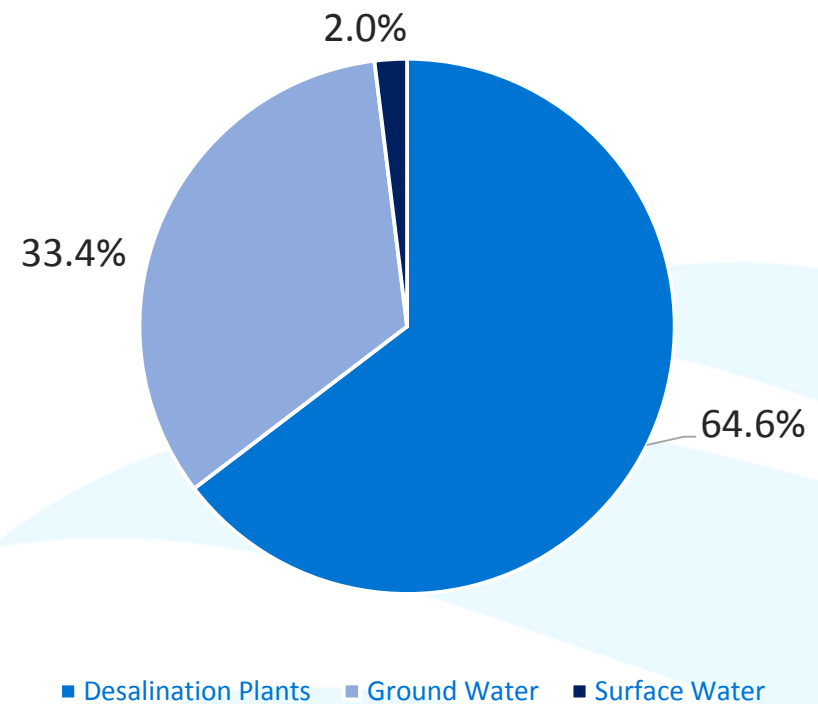
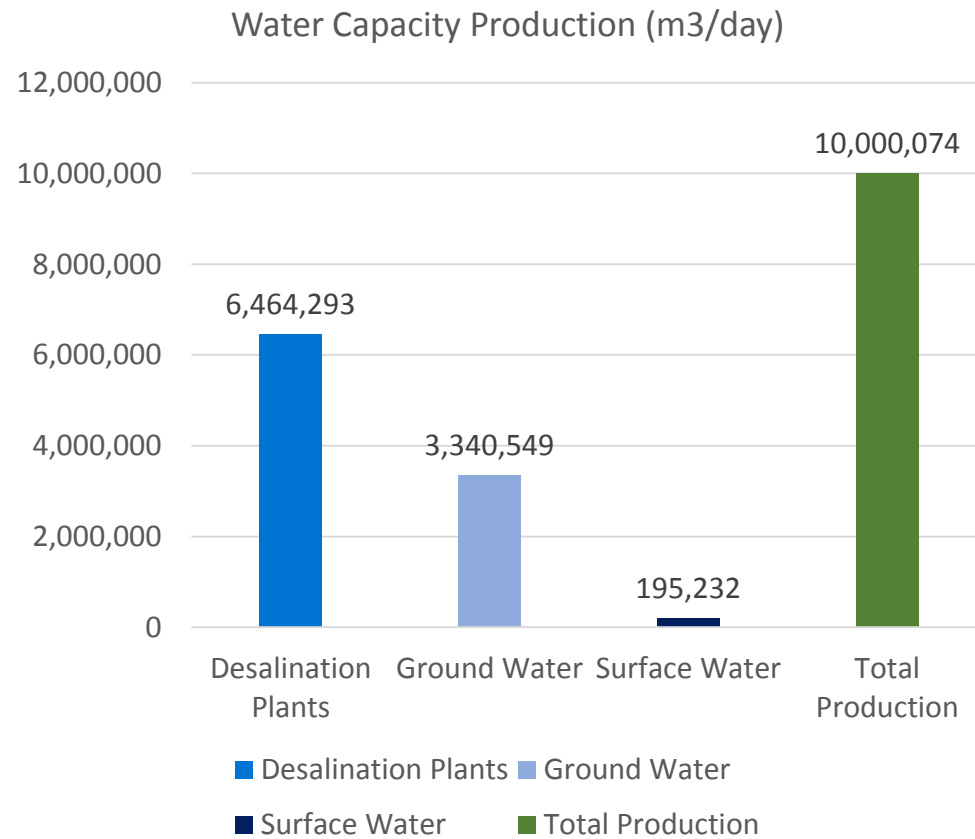


CURRENT MUNICIPAL WATER MANAGEMENT



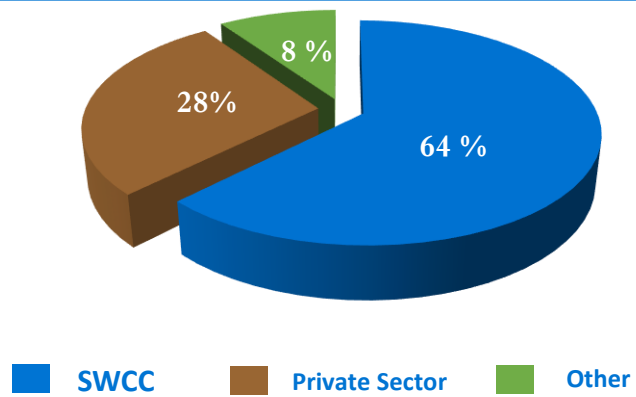
The sector is committed to significantly enhancing the level of private sector engagement to help achieve Vision 2030 and NTP objectives.

WATER PRODUCTION BY RESOURCE (M3/DAY)



DESALINATED WATER IN SAUDI ARABIA

Desalinated Water Producer in KSA



KSA share of the Desalinated Water production



18%



43%



Key Objectives for the Water Sector

- **Promoting sustainable water supply sources and improving service coverage.**
- **Reducing excessive water consumption.**
- **Achieving customer satisfaction by providing high quality service and reducing waste.**
- **Reduce the sector dependence on state funding by taking steps toward privatization.**
- **Improving financial and operational efficiency.**



Initiative Examples

- Increasing the capacity of strategic water storage.
- Increase the proportion of desalinated water produced by private operators.
- Reduce the waste of the water network.
- Expand the role of the water regulator.
- Attracting private sector participation across the water sector.
- Increase digital content to improve customer services.
- Reduce water service time

National Transformation Program (NTP) - Vision 2020 Initiatives

1) Strengthen Desalination Water Resources .

Ensure sustained water resources to all KSA residents and visitors

2) Increase SWCC Local Content.

Elevate KSA's capabilities & entrepreneurship in local manufacturing

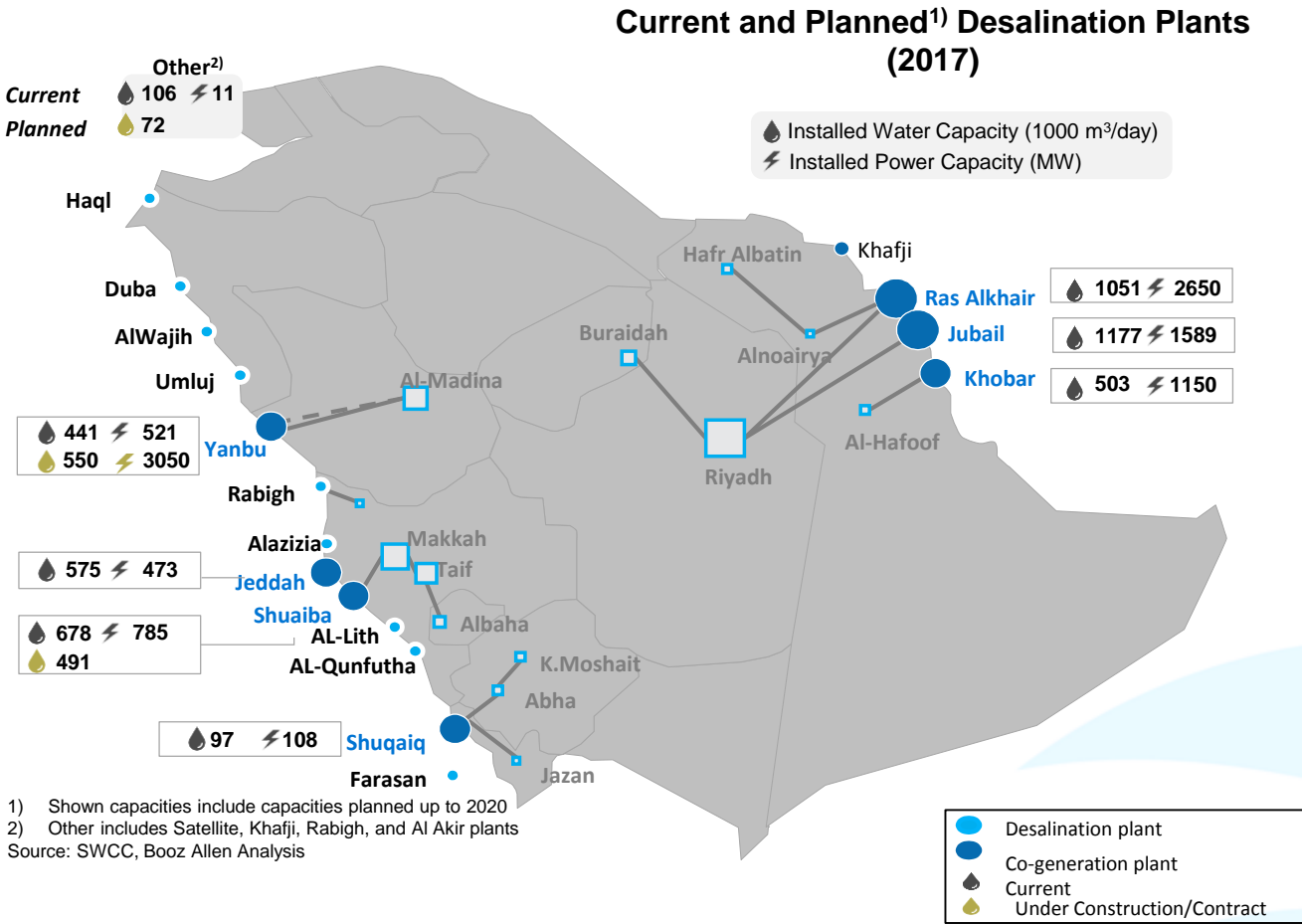
3) SWCC Privatization.

Implement Privatization Strategy of SWCC & Enhance the Operating Model

4) Enhance SWCC Performance Effectiveness

Ensure water safety & availability through enhancement of SWCC water production & cost reduction

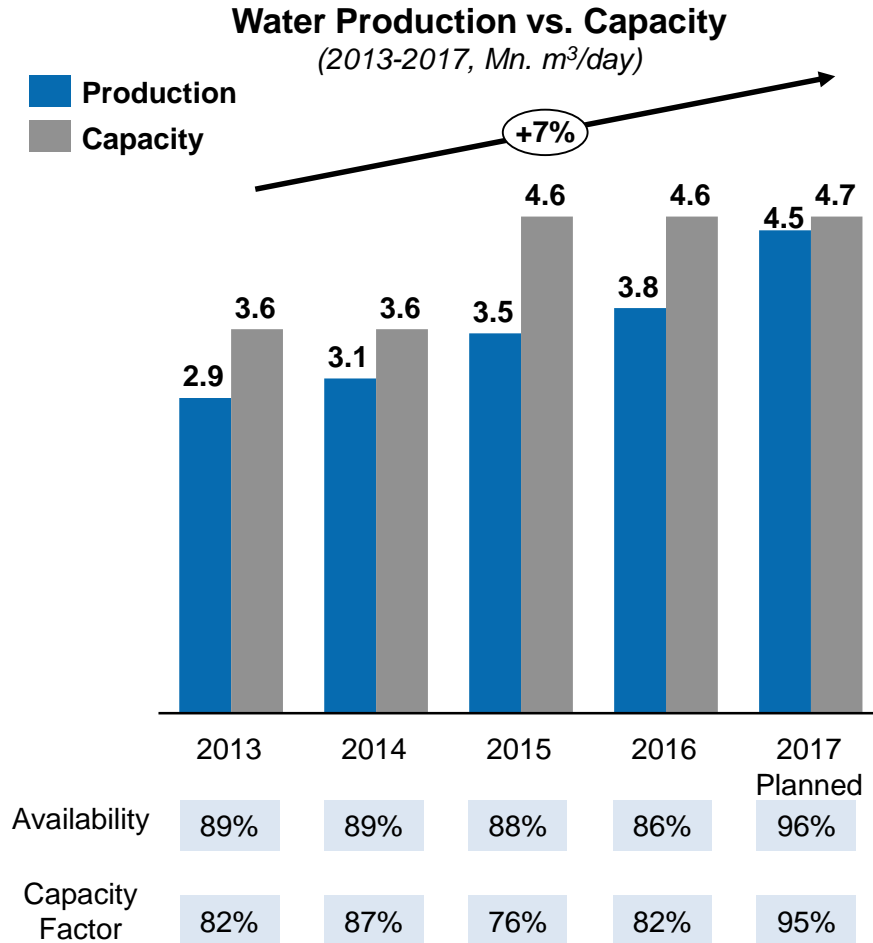
SWCC currently has 17 desalination sites dispersed around the Kingdom with installed capacity of ~4.7 Mn m³/day



Key Insights

- SWCC currently has **4.7 Mn m³** and **7,300 MW** of installed **water** and **electricity** capacity respectively
- Production plant portfolio consists of several technologies:
 - MSF: 3.6 Mn m³ / day – 78%
 - RO: 0.9 Mn m³ / day – 20%
 - MED: 0.1 Mn m³ / day – 2%
- The largest 5 plants make up ~90% of the existing water capacity
- Yanbu 3, Shuaiba 4 and five satellite plants are under construction or under contracting and will add ~1 Mn m³ / day of installed water capacity

STRONG DEMAND GROWTH CONTINUES TO PLACE STRESS ON SWCC'S PORTFOLIO OF ASSETS PRESENTING SIGNIFICANT PPP OPPORTUNITIES



*Recorded in April 2017

Key Opportunities

- Significant investment needed to meet growing demand
- Demographic dividend with rising per capita incomes
- Positive fundamentals as the economy diversifies
- Pro-market reforms as part of the NTP and Vision 2030
- Actively seeking long term strategic partnerships

SWCC's Operational Excellence Program

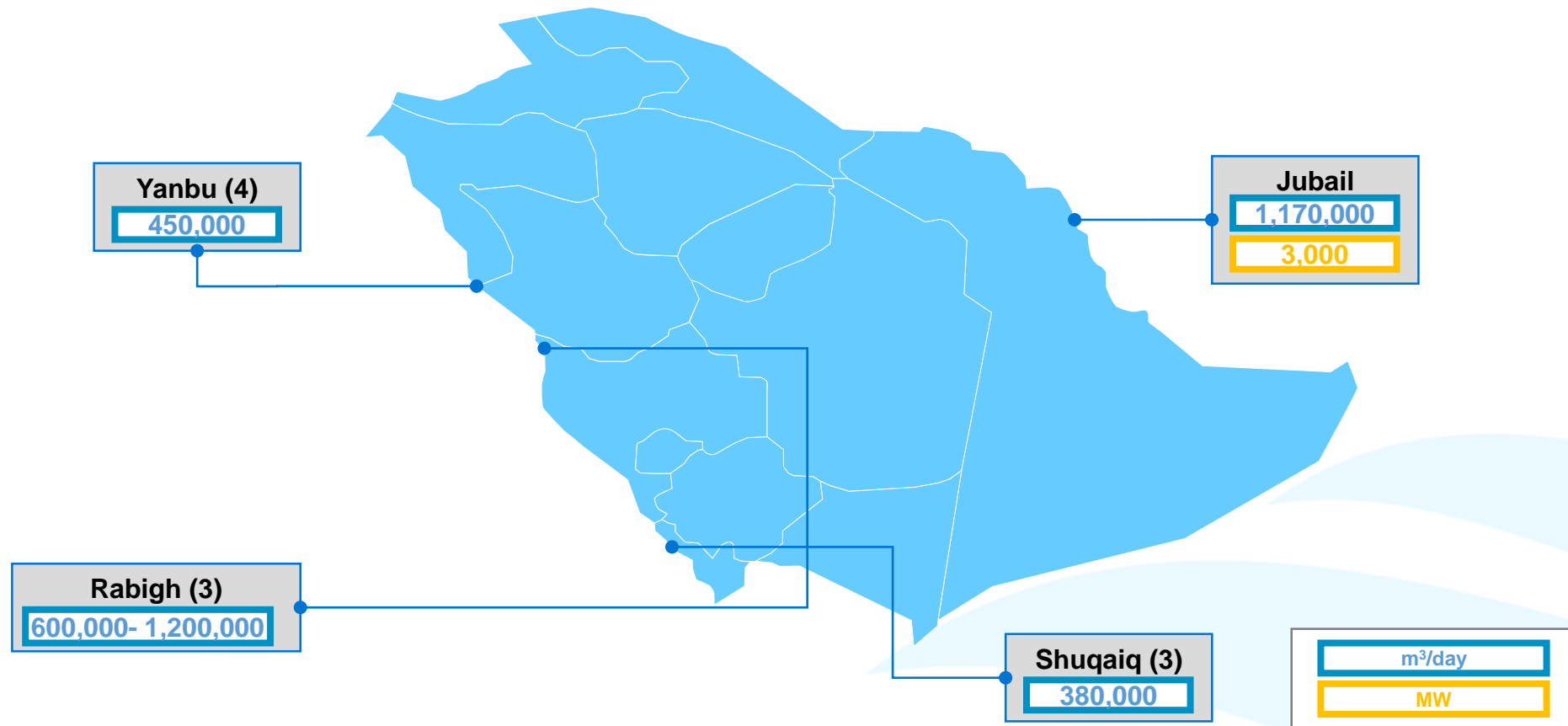
- SWCC has embarked on an aggressive program to **Operational Excellence Initiatives** :
 - Full environmental Compliances.
 - Improve Process Safety & Reliability .
 - Reduce fuel & Energy consumption .
 - Improve Desalination plants efficiency.
 - Maximize the Production.
 - Reduce the Cost SR/M3

OPERATIONAL EXCELLENCE

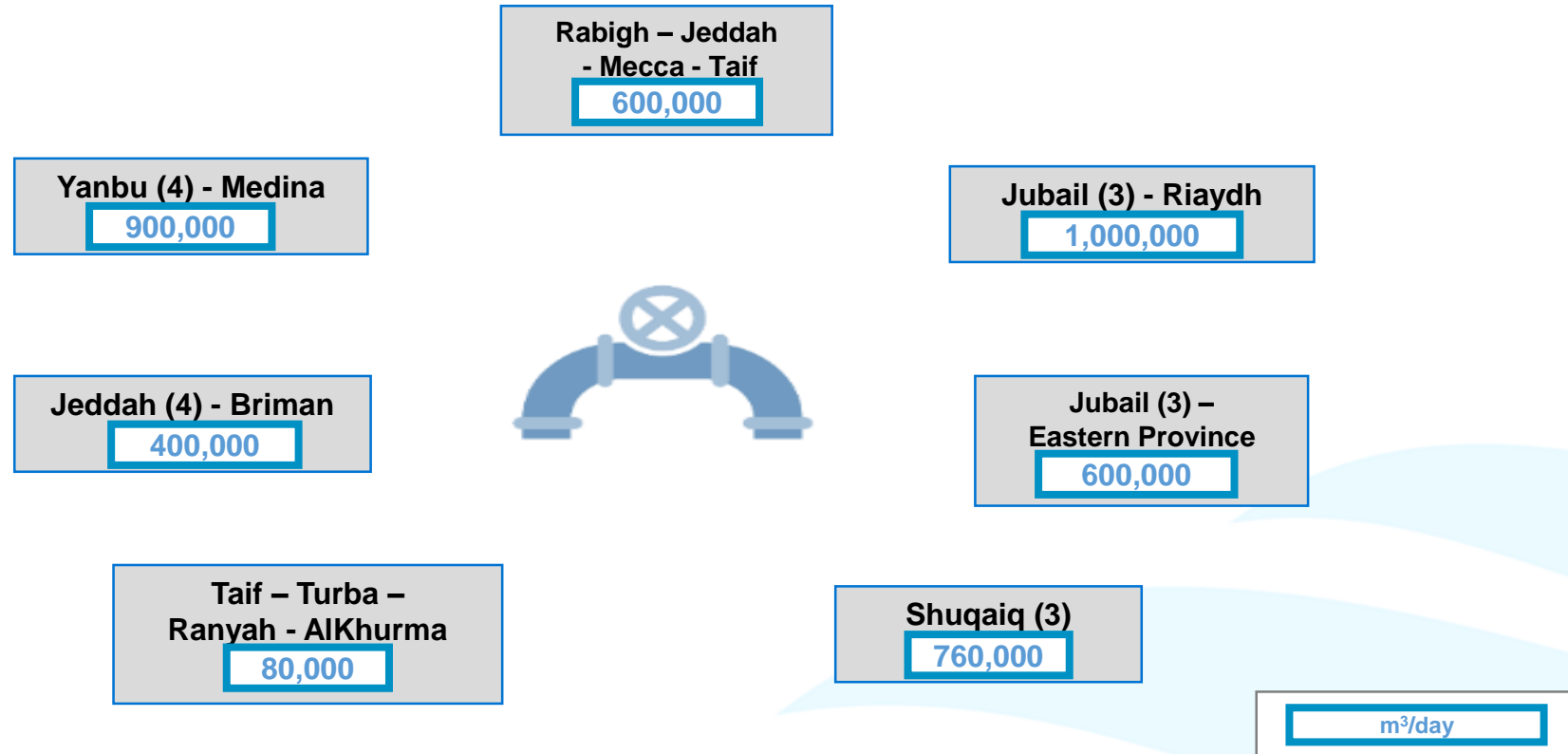
Workstream Objectives

<p>PROCESS & EMPLOYEE SAFETY</p>	<ul style="list-style-type: none"> • Diagnose existing process and employee Safety core practices maturity both at corporate level and within each of the four site within scope, by focusing on • Adopt a risk-based approach focusing on key risks areas; in particular, selecting sample areas as well as selected critical elements of the SMS based on experience in similar facilities. • Through a targeted review of core safety risks at both corporate and site level, help leadership team appreciate key risks areas and priorities to define a roadmap to develop mitigation plans and reduce overall operational risk
<p>ASSET EFFICIENCY</p>	<ul style="list-style-type: none"> • Diagnose and define realistic asset efficiency target by focusing on Water pumps and transmission systems, Steam boilers, steam Turbine and MSF, RO and MED desalinization process optimization with the objective to • Reduce the operational expenditure induced by those assets by 20%, covering such as energy and power consumption, operational and maintenance costs, chemical costs, fuel cost. • Identify opportunities to Improve capacity factor of Desalination plant up to 93% and capacity factor of power Generation up to 90%, and plant availability up to 97% and reduce the energy consumption by 10%
<p>MAINTENANCE & RELIABILITY</p>	<ul style="list-style-type: none"> • Identify opportunities to Optimize the overall expenditures related to fix and variable Maintenance activities to improve asset availability up to 97% from reducing core assets downtime, by focusing on the following • Maintenance & Reliability Organization structure, staffing and supervisory skillsets , Work Management Process (Planning, Scheduling, Work order management) , Material and spares management ,Reliability strategies, criticality ranking, preventive maintenance, task management, lubrication, problem elimination , Material Management, warehouse and inventory, kitting, Information management (CMMS, equipment data, parts data, technical documentation,
<p>CAPEX & CONTRACTOR MGT</p>	<ul style="list-style-type: none"> • Diagnose existing Capital Efficiency to corporate level and Yanbu Sample and contractor management core practices and define realistic improvement efficiency target, by focusing on the following core dimensions: • Capital project / investment program effectiveness during business planning, front-end loading, design and construction, Contractor Management, namely contract performance, interface management, consumption patterns analysis and contractor performance evaluation • Identify opportunities to Optimize overall contractor Spend , Optimize capital expenditure for minor Capex investments, and Optimize long term balance between capital expenditure and operational expenditure
<p>CULTURE & PERF. MGT</p>	<ul style="list-style-type: none"> • Evaluate the overall corporate culture on each of the different sites and within core corporate functions by focusing on selected leadership team members thorough profiling and coaching, leveraging established practices around felt leadership models.

Planned Desalination Projects – IW(P)Ps (Up to 2025)



Planned Water Transmission Projects – IW(P)Ps (Up to 2025)



SWCC R&D

(Partners of Success)



SWCC adopting R&D in these Innovative Desalination Technologies :

- Forward Osmosis.
- Mega-ton.
- Adsorption.
- Try-hybride (NF – RO – MED).
- Dia-hybride (NF – RO).



Completed Projects 1990-2017

- 14 Applied Collaborative Projects
- 93 Applied Internal Projects
- 45 Evaluation Projects
- 263 case studies

Publication and Conferences

- 91 published papers in Journals
- 203 papers in conferences & Symposia



Summary

- Desalination is a strategic industry for the kingdom of Saudi Arabia.
- Saudi Arabia represents a substantial percentage of the global desalination capacity.
- Having the largest global desalination capacity for a long time, SWCC has served over the years to pioneer and push the envelop of desalination technology, engineering, reliability and operation excellence.
- Accelerate the development and implementation of new desalination technologies.
- We aspire to achieve our strategic objectives by forming alliances with global desalination leaders.
- Opportunity for technology partnership in the Desalination industry.

Thank You



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