Structuring Efficient O&M Regimes in Private RO Plants

Desalination O&M 2011

Jan 24-25 , 2011 – Abu Dhabi

Presented by: **Nizar Kammourie**

GM, SAWACO-Water Desalination

1/9/2011

Contents

Saudi Brothers Commercial Company
- Water Division Structure -

SUIDO KIKO ME:

WATER & WASTE WATER ENGINEERING COMPANY

SAWACO:

THE PRIVATE WATER UTILITY

CHEMSBRO:

CHEMICALS & SOLUTION PROVIDER FOR WATER & WASTEWATER TREAMENT PLANTS

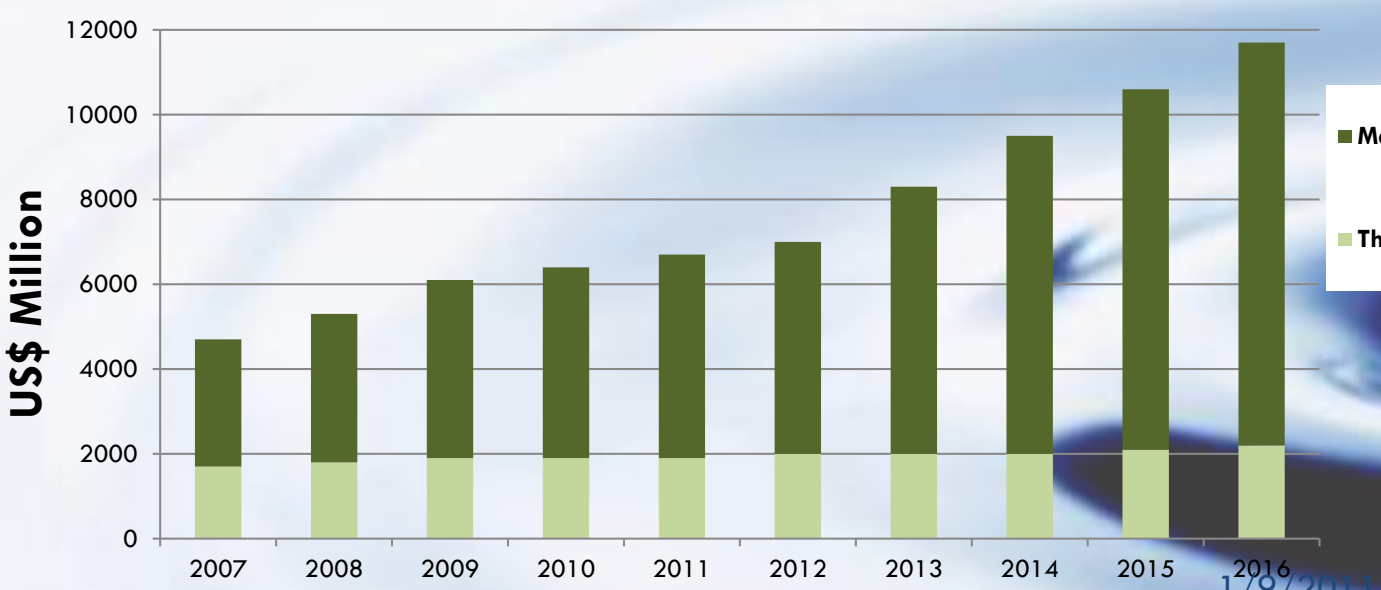
1 - Introduction

Why Focus on O&M capabilities ?

- We live in a region that possess the largest water desalination capacity in the world.
- one of the highest water consumption per capita (domestic use)
  - 280 liter / day/ per capita (Arabian Gulf Average)
  - 130 to 150 liter / day/ capita (UK , Germany & France)
  - More than 450 liter / day/ capita (USA & Canada)
- O&M is a vital factor in the efficient production of desalinated water
- Quality, sustainability, affordability of desalinated water is largely dependent on the O&M regimes of desalination plants
- Relative operating cost of SWRO Plants: $0.76/M3
- Global Desalination Industry Capex to Opex Ratio in 2010 was 0.9

Global desalination operating expenditure forecast (US$ Millions)

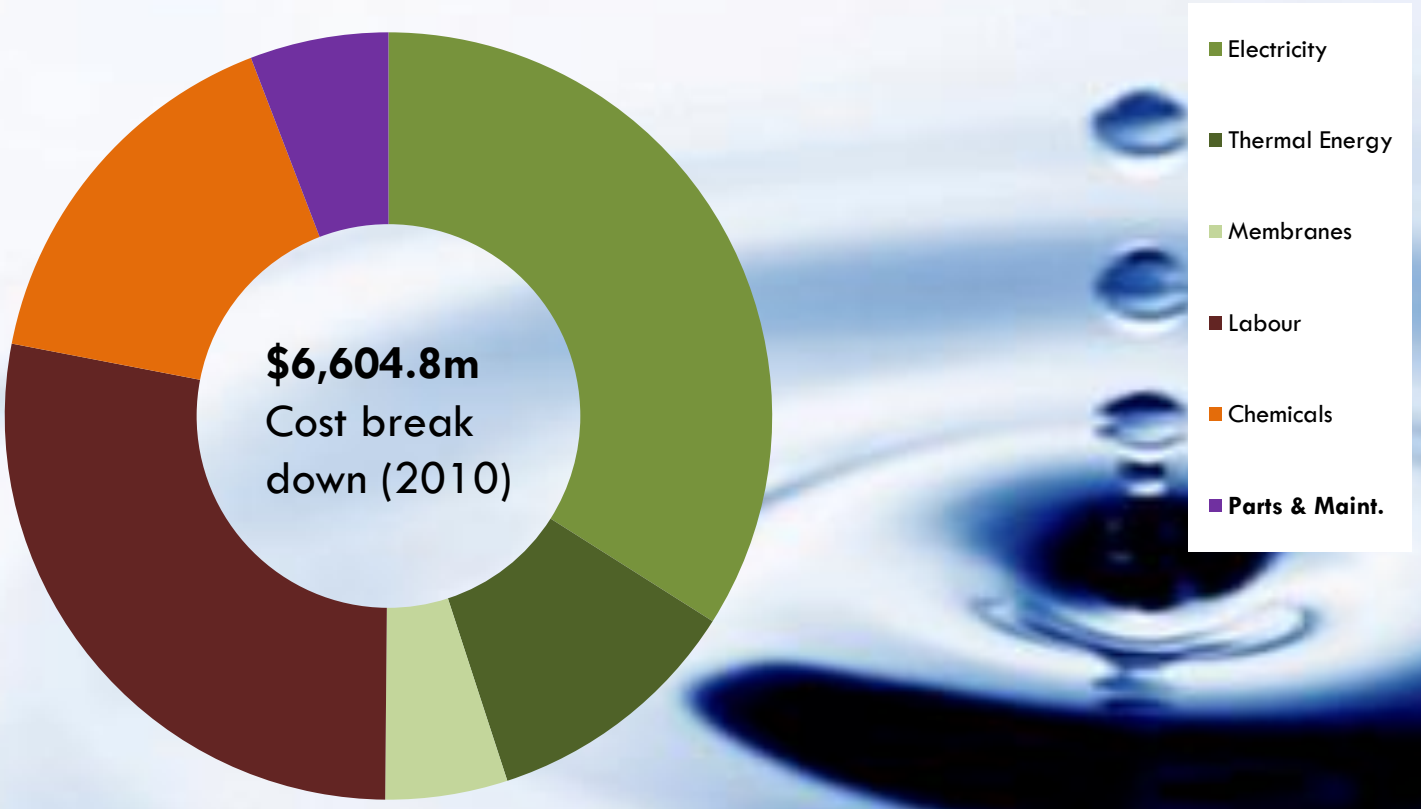
	Thermal	Membrane
2007	1700	3000
2008	1800	3500
2009	1900	4200
2010	1900	4500
2011	1900	4800
2012	2000	5000
2013	2000	6300
2014	2000	7500
2015	2100	8500
2016	2200	9500



Source :OECD

Global desalination operating expenditure breakdown 2010

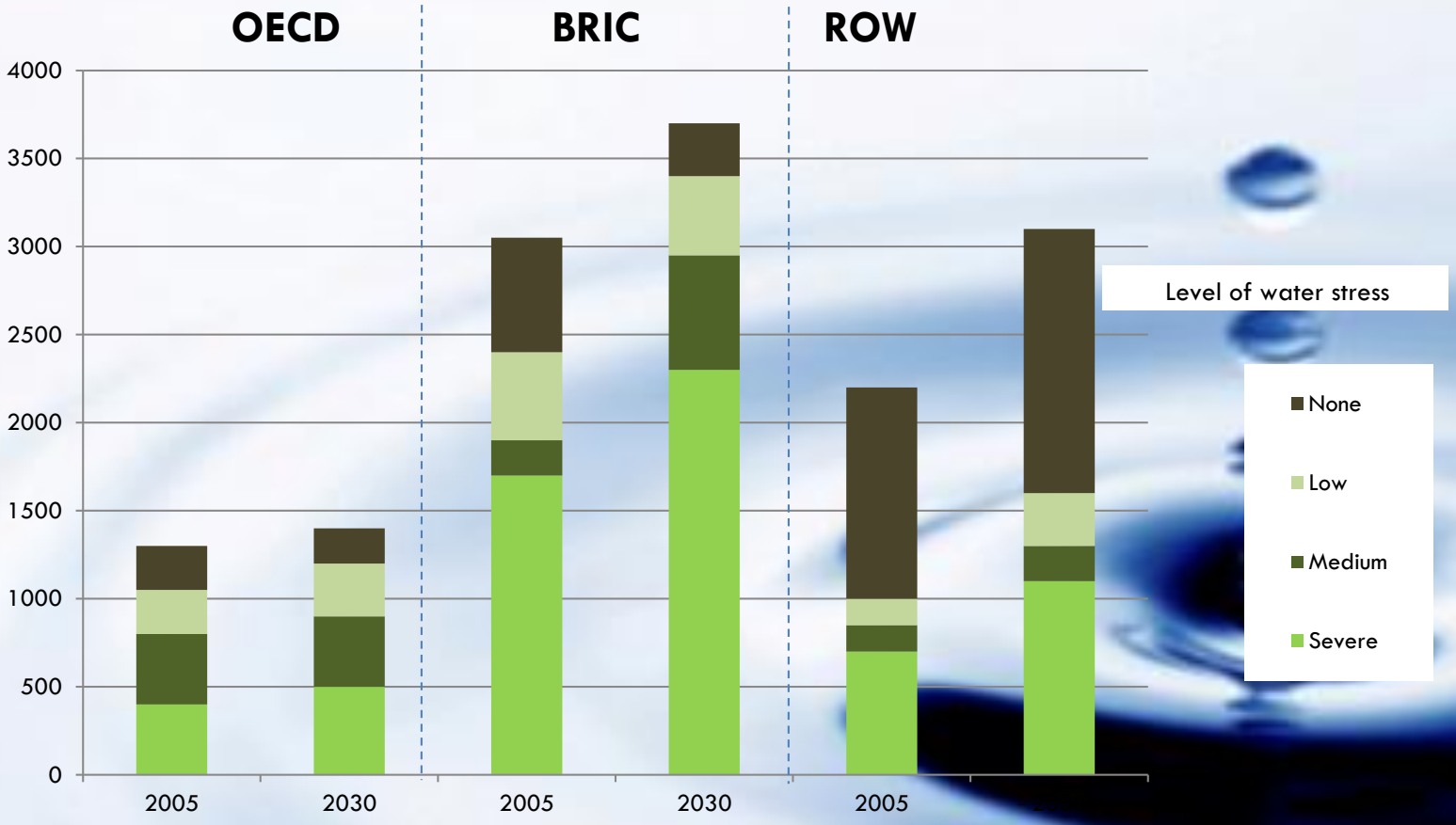
Electricity	Thermal Energy	Membranes	Labour	Chemicals	Parts & Main
$2,244.50m	$726.80m	$340.10m	$1,841.7m	$1,066.1m	$385.50m



Source: GWI-DESALINATION MARKETS

The population living under water stress is increasing (millions)

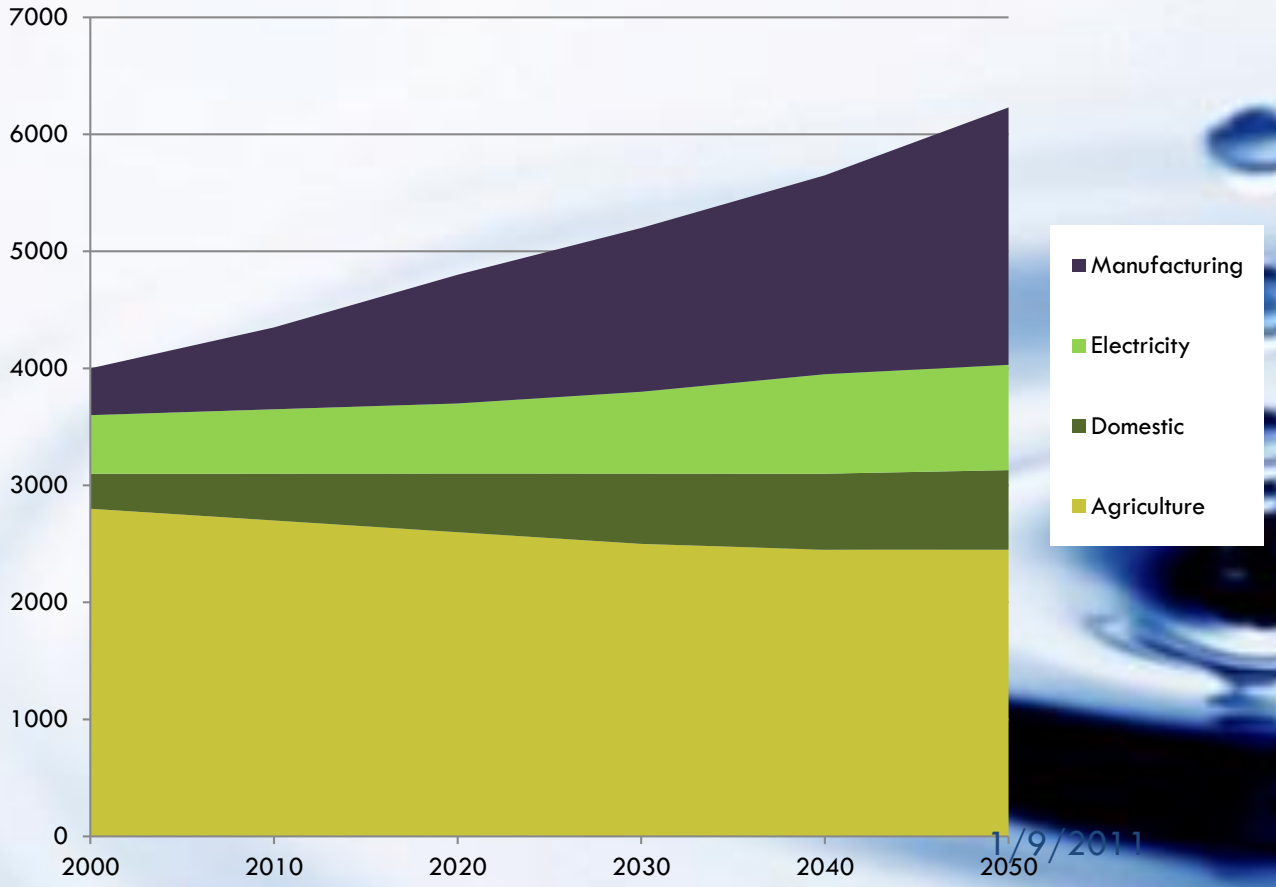
		Severe	Medium	Low	None
2005	OECD	400	400	250	250
2030	OECD	500	400	300	200
2005	BRIC	1700	200	500	650
2030	BRIC	2300	650	450	300
2005	RoW	700	150	150	1200
2030	RoW	1100	200	300	1500



Source :OECD

Global water use will increase more than 50% by 2050

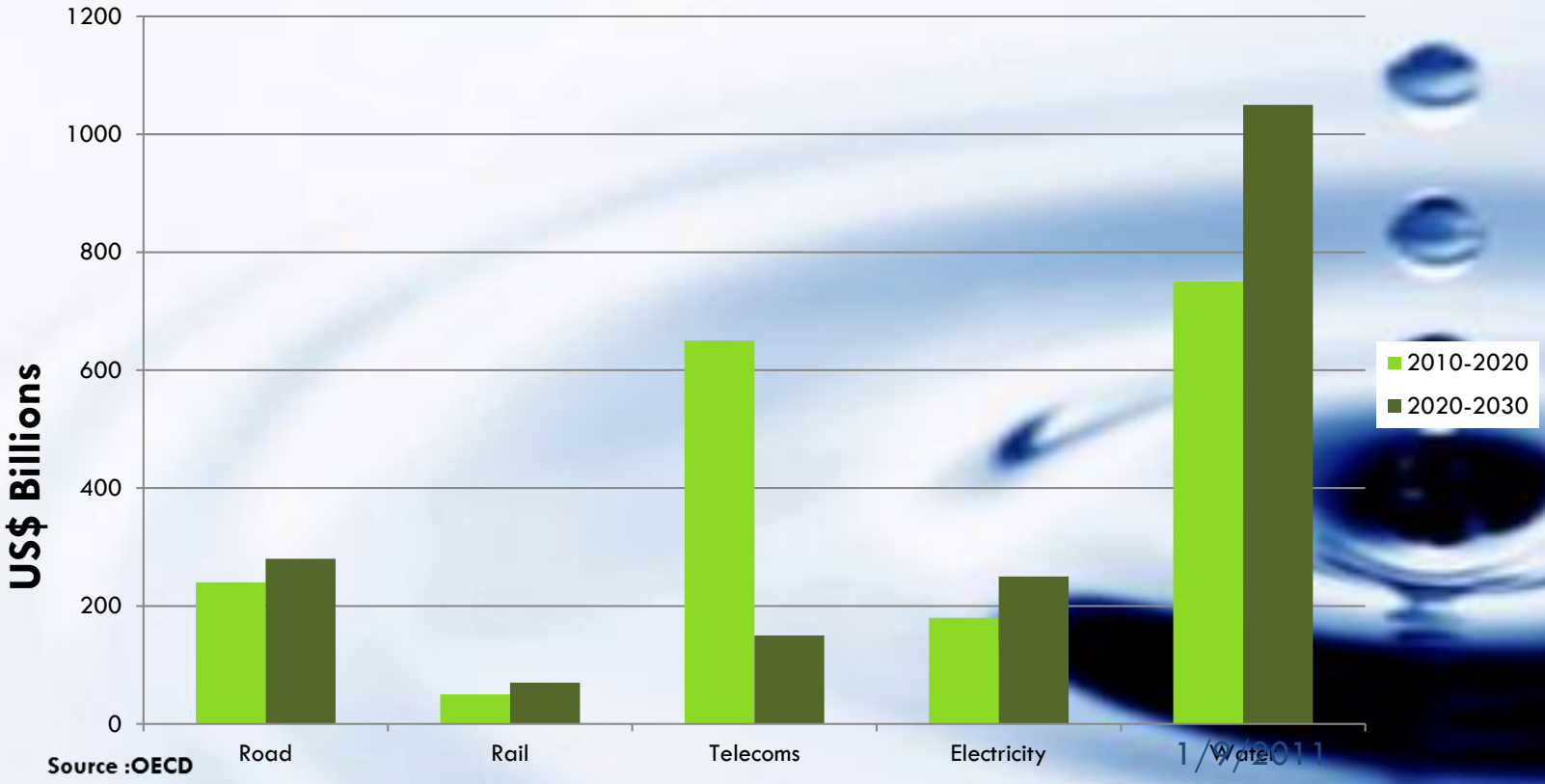
	Agriculture	Domestic	Electricity	Manufacturing
2000	2800	300	500	400
2010	2700	400	550	700
2020	2600	500	600	1100
2030	2500	600	700	1400
2040	2450	650	850	1700
2050	2450	680	900	2200



Source :OECD

Average annual world infrastructure expenditure (additions and renewals)

	2010-2020	2020-2030
Road	240	280
Rail	50	70
Telecoms	650	150
Electricity	180	250
Water	750	1050



Source :OECD

3-O&M Capabilities & Privately Financed Desalination Schemes

- O&M Capabilities is key for pre-qualification criteria for Desalination BOO/BOT/BOOT schemes
- Effective and efficient O&M practices can make the difference between securing /losing a privately financed project
- O&M expertize can influence the design and choice of equipment for RO plants
- Tariff , pay-back and IRR are greatly influent by O&M regimes that determine the cost /m3 of desalinated water
- Power consumption, chemicals, manpower and spare parts can be optimized by experienced O&M operators following efficient standards
- Environmental impact of desalination plants can be substantially reduced by innovative and efficient O&M processes.

4-SAWACO Case Study : how the first private water utility in KSA relied on O&M for healthy growth and survival (1/2)

- SAWACO started operation in Dec 23, 2001with an initial capacity of SWRO 5, 000 m3/day
- In 2010 its desalination capacity grew to 30,000 m3/day
- Opex was decreased over the years /m3 despite that manpower cost and material cost increased
- Flexibility and knowledge of O&M teams allowed SAWACO to produce 10 different types of water with minimum equipment, instruments and controls

SAWACO Case Study : how the first private water utility in KSA relied on O&M for healthy growth and survival (2/2)

- The key factors were :
  - Adopting flat reporting structure
  - Turning Maintenance technicians into Operators and vice-versa
  - Pooling expertize from all three shifts to solve tedious and urgent problems in any one shift
  - Maintaining enough spares
  - Adopting Predictive Maintenance as a regime not as an option
  - Immediate Troubleshooting
  - Training O&M staff to install brand new RO Plants
  - Developing own design capabilities from within the O&M team
  - Turning our own RO Plants into a big lab/testing premises for serious innovations
  - Simplicity in O&M processes without compromising quality
  - Adopting (without fear) new innovations in desal technology
  - And finally the obvious fact of continuous training

5-Role of O&M in extending lifetime of desalination plants

- Major cost in running any RO Plant are in decreasing order :
  - Electricity: recovery devices/selection of HHP+ Motor/VFDs/design of intake/quality of water desired
  - Labour: multi-tasking/training/motivation/flexibility of reaction & intervention
  - Chemicals: the less the merrier, understanding the process need
  - Parts & Maintenance: predictive approach/ample spares/proper selection of equipment/Double Checking of SCADA generated data
  - Membrane : secure pre-treatment/negotiate replacement ratio & pro-rata warranty terms/understanding fouling principles: organic & inorganic
  - Developing in-house capabilities to handle most maintenance tasks
- O&M cannot fix, at reasonable cost, serious errors in:
  - design
  - Choice of equipment
- Therefore, designers have to take vital input from experienced O&M specialists

6-O&M as prime tool in building the business around customers' needs

- RO Plants should serve :
  - Communities with severe shortages in potable and domestic water
  - Industries that require a wide spectrum of water qualities
  - The need of communities and industries at reasonable affordable rates
- WHO regulates the standards required for bulk/unbottled water.
  - Public domestic use is a well defined issue and within reach of most serious RO operators
- Industrial needs is an interesting field where RO operators can bring value added:
  - Even in communities where water is abundant , there is a clear opportunities for RO plants
  - RO operators can become partners of each industry that needs specific water for its production lines
  - Value-added is brought by reducing pre-treatment in industrial processes
  - Supplying “designer water” to the process, hence reducing cost and improving productivity for many industries
  - This can be done by understanding the water specifications of targeted industries
  - SAWACO for example produce 10 different types of water for varied applications
  - Dairy products, juices, fizzy drinks, pharmaceuticals, ready mix concrete etc.

7-Integration of QA/QC procedures into the routines of O&M

- By integrating QA/QC procedures into the routines of O&M:
  - a close link is created between the business & marketing plan and the customers' needs.
  - decisions about the quality system are made based on recorded data and the system is regularly analyzed and evaluated for conformance and effectiveness.
  - checking and pinpointing defects will become a routine like recording operating data
  - continuous improvement becomes all the O&M operators business
- However, this is possible when :
  - suitable infrastructure, resources, information, equipment, measuring and monitoring devices are provided
  - all key processes are mapped and integrated into the daily routines of the operators

8-Developing existing O&M procedures to adapt to new technological advances in desalination

- This is quite a complex task that is not fully implemented in the GCC
- The basis of New-technology-adaptable O&M procedures can be summarized :
  - Establish the extent of in-house vs out-sourced O&M activities
  - Keeping the O&M team in touch/interacting with major manufacturers and innovators in this field
  - Establish periodical plans for introducing viable and tested new innovations in the Desal Equipment
  - Prepare Manpower for the functions of the new components to be introduced
  - Integrate operating data of the new equipment into existing logs/records . Develop new sets of records only if necessary
  - Replacement /introduction of new concepts to take place in a staged manner
  - Ensure seamless integration of new components into existing operation
  - In the introductory stage, maintain comparative operating data logs between existing and new technologies
  - Full conversion of all production lines to new technologies remain a Management Decision
  - Examples

Conclusion

- Building efficient O&M capabilities remain the single-most important element, post EPC, in the success of any privately-financed RO scheme
- Using O&M as an important tool in building the water production around customers' needs, Integration of QA/QC procedures into the routines of O&M, Developing and adapting O&M procedures in line with new advances in desalination technologies, are critical to the success of operating RO plants.
- Desalination cannot be considered as a stand-alone measure to meet increased water demand for public water supplies. Desalination should be considered as a viable component of an overall water supply management system that includes all available sources of water (fresh and impure) and all uses of water (public water supplies, agricultural, industrial, etc.).
- Operators have no choice but to prepare their manpower and procedures to adapt to the many new Desal innovations that are surely to become the norms in this industry.

Thank you

NIZAR KAMMOURIE
nizarkam@sawaco.com
T:+966-2-6644101
M:+966-555-604035