KAHRAMAA
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المؤسسة العامة القطرية للكهرباء والماء
Qatar General Electricity & Water Corporation

District Cooling Workshop

Wednesday 18/6/2014

Towards Cooperative District Cooling Society

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better living لحيـاة أفضـل

Veolia Water Solutions & Technologies Presentation for District Cooling Workshop

18th June 2014

VEOLIA WATER

Solutions & Technologies

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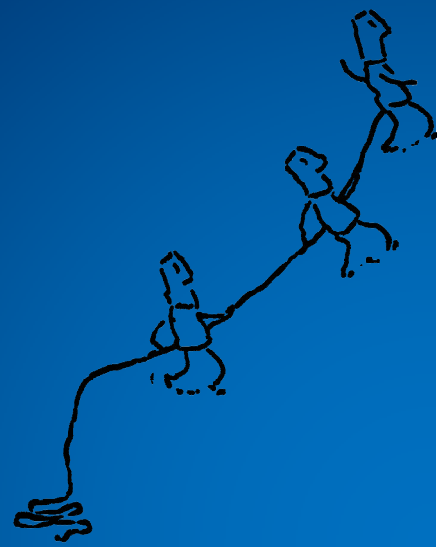
Introduction to Veolia



Meet VWS…

- A story that began 160 years ago …

VEOLIA ENVIRONNEMENT

VEOLIA WATER	VEOLIA ENVIRONMENTAL SERVICES	VEOLIA ENERGY Dalkia	VEOLIA TRANSPORTATION
Water Services & Solutions	**Waste management and Cleaning Services**	**Energy Services and Facilities Management**	**Transportation Services**




Veolia Water Solutions & Technologies

Service

Service is what we provide our clients

Value

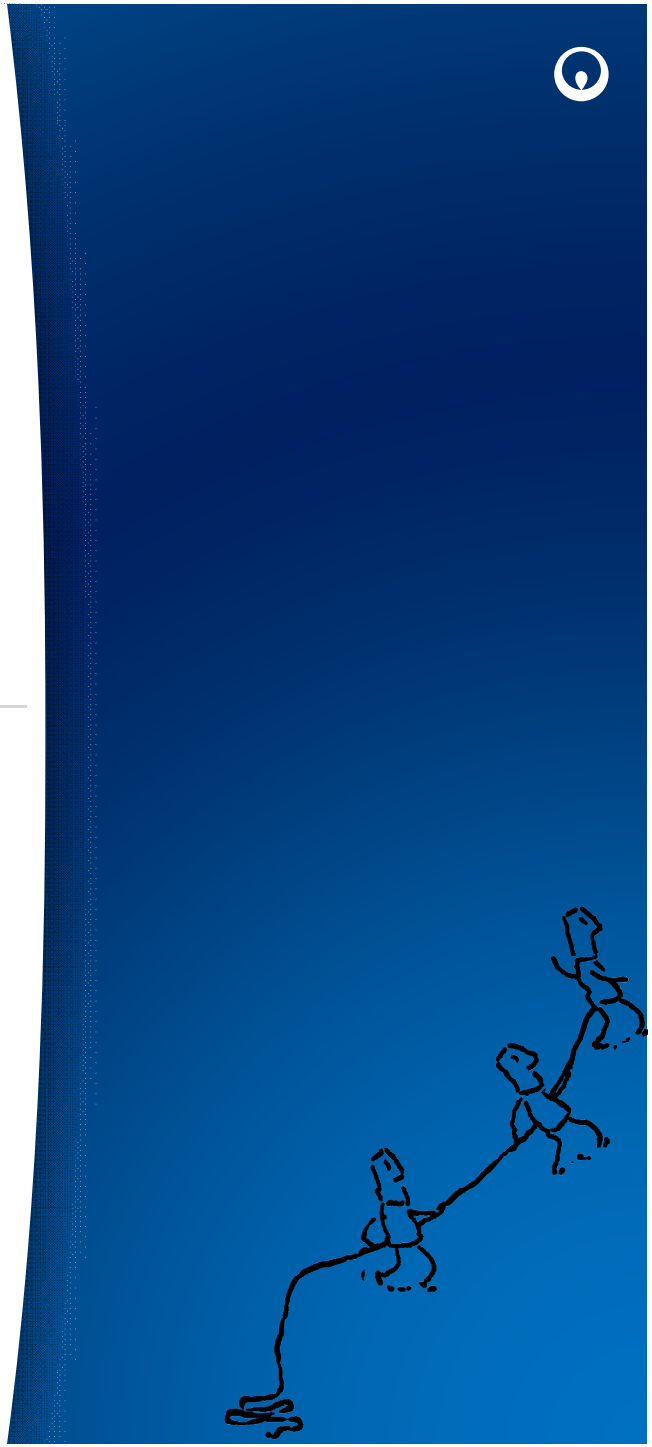
Value is what we create for our clients on top of servicing their infrastructure /systems

Responsibility

Responsibility is the keystone for all our business activities

2

Transferring to TSE using Ultra Filtration (UF) & Reverse Osmosis (RO) Technology



CASE STUDY

TSE water to be reused in cooling towers by EMPOWER

The Client

Emirates Central Cooling Systems Corporation (EMPOWER) was established in 2003 as a joint venture between DEWA (Dubai Electricity & Water Authority) and TECOM (Dubai Technology & Media Free Zone) to provide efficient district cooling services to developments in Dubai and the surrounding region.

With electricity demand across the Middle East set to grow between 5% and 12% per annum, EMPOWER will play a very important role as their district cooling services significantly reduce both energy costs and the environmental impact by reducing the amount of power required all the while increasing efficiency.

Dubai Health Care City

- Application: Treated Sewerage Effluent
- Process: Ultrafiltration followed by Reverse Osmosis
- Capacity: 1,000 m3/day
- Delivery year: 2010

The Client's Needs

For Dubai Health Care City District Cooling, EMPOWER required a design able to ensure efficient performance at optimal operational cost through the reuse of treated sewage effluent (TSE).

The process design was a challenge with respect to the high overall design recovery requirement of 80% and 100% of NH_3 removal necessary to protect the copper cooling systems tubes from corrosion.

Apart from the process guarantee, the project involved a delivery schedule of 90 days.

The Solution

Veolia Water Technologies was awarded the contract for the design & build of a 1,000 m^3/day Treated Sewerage Effluent (TSE) Treatment Plant. The project is comprised of Ultrafiltration technology followed by Reverse Osmosis. The treated TSE water will be used as make up water for District Cooling units instead of municipal water. It is the first of its kind for EMPOWER and a very prestigious one for Veolia.

The Benefits

- Membranes make it possible to exceed the performance of traditional processes, notably in terms of treatment safety.
- Cost- effective
- The compactness of the unit considerably reduces the footprint.
- Sustainable.

VEOLIA

CASE STUDY

Process Description

The TSE water is chlorinated enough to generate Monochloramine (MEA) through reaction with the ammonia present in TSE, thereby ensuring disinfecting properties.

After being dosed with Ferric / Alum for the reduction of phosphate downstream in the lamella clarifier, the clarified water is filtered in pressurized multimedia filters before polishing via ultrafiltration and acidification before feeding to the RO system. Residual ammonia ions in the permeate are removed by break point chlorination and the overall recovery is 80%.

Key Figures

- TSS, BOD,TOC, Ammonia = 0
- Capacity : 1 000 m3/day
  Dewa cost : 4.5 Fils /US Gallon
  TSE cost : 0.5 Fils /US Gallon
  Pay back : 1.1 years
- Recovery of water from sewage and domestic waste

Results

The implementation of the TSE plant resulted in water saving and optimization of potable water for Dubai Municipality.
EMPOWER is one of the major district cooling providers throughout Qatar, Oman and KSA to adopt this process.

EMPOWER – DHCC PROJECT - CAPACITY : 1000 M3/DAY

VWS Recommendations

- Adoption of Ultra filtration pretreatment system to polish TSE Water prior feeding to RO System.

- Fouling Resistant RO System using extra fouling resistance membrane.

Industry Adoption of Ultra filtration

- UF can provide water virtually free of pathogens and turbidity.
- Improve water quality and RO performance .
- Better ROI (CAPEX, OPEX, Total Water Cost).
- Wider range of applications and providers.

Key advantages of Ultra Filtration over conventional pretreatment

- Conventional pretreatment / Sand filtration operate in the range of 10 – 70 µm.
- Ultra Filtration operate in the range of 0.03 µm.
- remove fine suspended / colloidal impurity, pathogens ,Bacteria, Viruses and other micro-organisms.
- Constant high quality of the UF filtrate will allow higher flux operation and lower fouling tendency in the Reverse Osmosis system.
- RO membrane replacement, cartridge filter replacement and frequency of chemical cleaning will be reduced.
- UF system is skid mounted and occupies very small footprint.

Advantages of UF as Pre-treatment for RO:

- Reduce colloidal fouling in RO membranes.
- Posibility to operate the RO at higher flux / recovery.
- Reduce chemical cleaning frequencies.
- Enhance life of RO by achieving required RO feed parameters.

Reference

- VEOLIA WATER ULTRA FILTRATION AND REVERSE OSMOSIS REFERENCES FOR TSE REUSE APPLICATION

1) CLIENT : EMPOWER – DHCC PROJECT - CAPACITY : 1000 M3/DAY

2) CLIENT : AL AIN FARM DAIRY - CAPACITY : 638 M3/DAY

3) CLIENT : PARK HYATT HOTEL - CAPACITY : 400 M3/DAY

4) CLIENT : AL AIN FARM DAIRY - CAPACITY : 638 M3/DAY

5) CLIENT : JUMEIRAH BEACH HOTEL - CAPACITY : 750 M3/DAY

6) CLIENT : HYATT REGENCY HOTEL - CAPACITY : 432 M3/DAY

7) CLIENT : GRAND HYATT HOTEL - CAPACITY : 1234 M3/DAY

8) CLIENT : ASPIN TOWER - CAPACITY : 357 M3/DAY

9) CLIENT : PAK OASIS - CAPACITY : 65000 M3/DAY FOR DRINKING APPLICATION

1 Dalkia Key Figures

- **43,000** employees in **27** countries
- Revenue: **€8.4 billion**
- **163,000** energy facilities managed worldwide
- **112** TWh of total energy consumed
- **14.2** TWh of energy saving
- Reduction of **7.2 million** metric tons of CO_2

Dalkia, creating energy progress

1 Dalkia Portfolio

1 **Heating and cooling networks**

2 **Industrial utililities**

3 **Energy services**

770 networks including **44** cooling networks

5,700 healthcare institutions

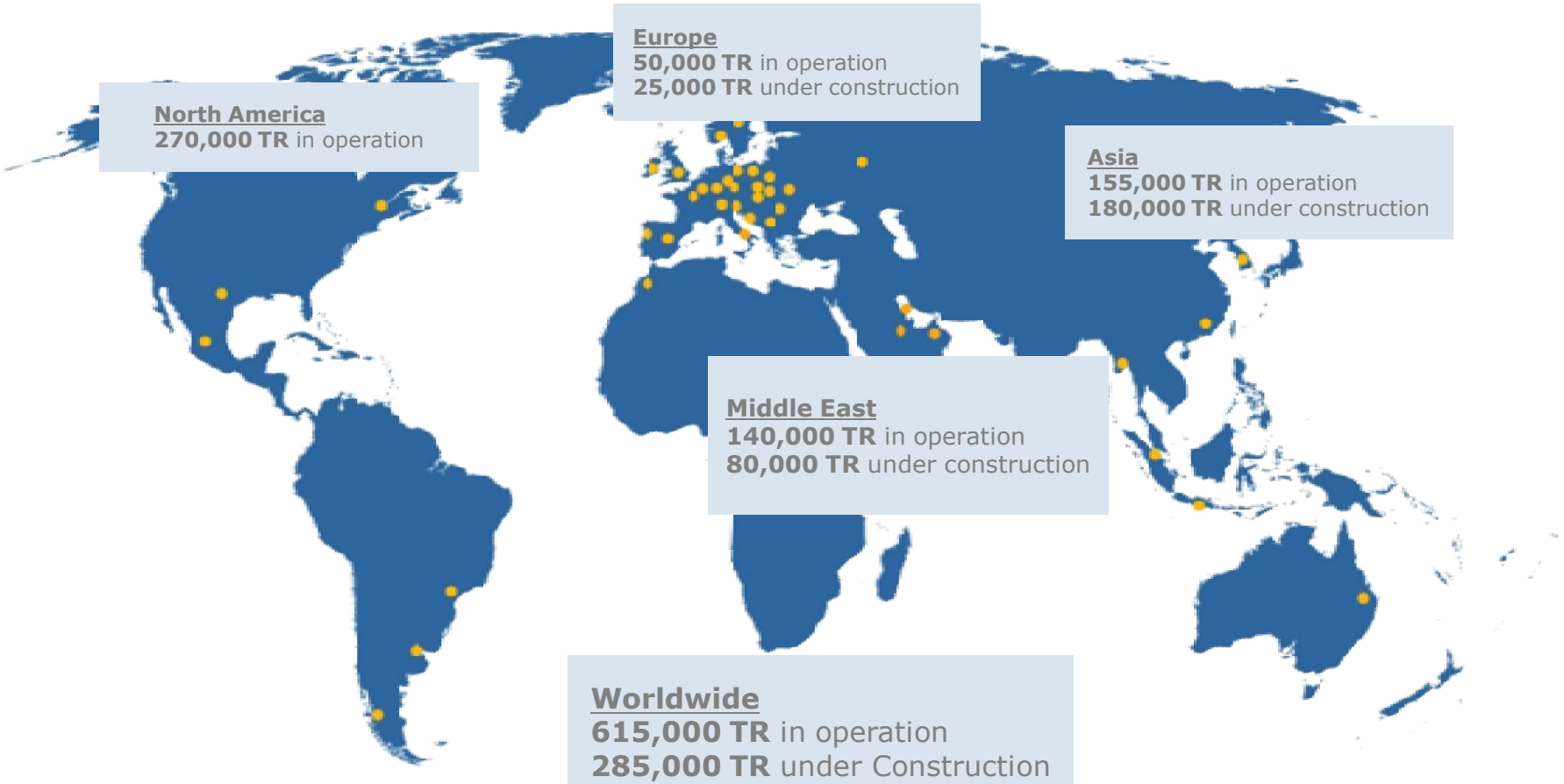
4.5 millions housing units

530 biomass facilities

4,300 industrial facilities

24,300 educational, cultural, leisure and sports facilities

1 Global Leader in District Cooling



Europe
50,000 TR in operation
25,000 TR under construction

North America
270,000 TR in operation

Asia
155,000 TR in operation
180,000 TR under construction

Middle East
140,000 TR in operation
80,000 TR under construction

Worldwide
615,000 TR in operation
285,000 TR under Construction

TOTAL: 900,000 TR in more than 60 installations.*

*Installations >1500TR only

2 References: Saadiyat Island (UAE)

Development Profile

- 29 years BOT between TDIC (Abu Dhabi Government) and Saadiyat Cooling, a JV between Dalkia and TDIC.
- Saadiyat Island is a US$ 27 billion mixed-use development being developed as a cultural and touristic destination for the Abu Dhabi emirate, with a total built-up area of over 1.6 million m2 and which is comprised of:
  - Saadiyat Cultural District (Louvre, Gugenheim, Zayed National Museum)
  - Saadiyat Beach (St Regis, Rotana, Park Hyatt)
  - A variety of residential and hospitality centric developments

Technical Data

- Total Capacity: 70,000 RT (246 MWc) with 3 plants
- Capex: 130 M US$
- Chilled Water storage
- TSE Water technology
- Networks length: 10 km
- 25 Energy Stations

Saadiyat Island Development

2 References: Bahrain Bay (Bahrain)

Development Profile

- 50 years BOT between Bahrain Bay Development and Bahrain Bay Utilities, a JV between Dalkia and Arcapita
- Bahrain Bay is a US$ 1.5 billion mixed-use waterfront development with a total built-up area of over 1.1 million m2 and which is comprised of:
  - The Four Season Hotel
  - The Arcapita's Headquarters building
  - A $600 million residential and retail zone to be operated by CapitaLand
  - A variety of residential and hospitality centric developments

Technical Data

- Total Capacity: 45,000 RT (155 MWc)
- Capex: 165M US$
- Beach well technology (sea water intake for cooling towers)
- Network length: 5 km
- 18 Centrifugal chillers, 9 cooling towers (sea water & TSE)
- 30 Energy Stations
- Sewage Treatment Plant (7,000 m3/day)

Bahrain Bay Development

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Thank you

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