THE FUTURE OUTLOOK OF DESALINATION IN THE GULF: CHALLENGES & OPPORTUNITIES

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Research Question

How sustainable is desalination in the Gulf region?

- What is its role in the water and energy sectors?
- What is the future outlook?
- What are the challenges and opportunities?

APRIL 14TH – MAY 14TH 2012

- Doha (2 weeks)
- Dubai & Sharjah (5 days), Abu Dhabi (9 days)
Primary Research

1. Met with professionals from industry, government and academia
2. Attended two conferences, in Doha and in Abu Dhabi
Desalination

- **Brine water**: 50+ ppt
- **Saline water**: 30 - 50 ppt
- **Brackish water**: 0.5 - 30 ppt
- **Fresh water**: 0 - 0.5 ppt

**Membrane Based**
- Ex. RO

**Thermal Based**
- Ex. MSF & MED

**ENERGY**
1. Long term cumulative effects of desalination on the Gulf
2. Tying of energy and water through desalination has broader implications!
Water & Energy Demand Growth

Electricity Demand Forecast

8 – 10% GROWTH

Water Demand Forecast

8 – 10% GROWTH

Cumulative Installed Desalination Capacity in Qatar & UAE Since 1970

Cumulative Online Capacity (m3/d)
Water & Energy Sectors in Qatar & UAE

NATURAL GAS → POWER + DESAL- → COGENERATION

ENERGY ❯ WATERT
Water & Energy Sectors in Qatar & UAE

W&E Producers

Transmission/Distribution Companies

End User

W&E companies: i.e. Kahramaa, ADWEC

Distribution companies: i.e. Kahramaa, ADDC, AADC

W&E Authorities: Kahramaa, ADWEA, DEWA, SEWA, FEWA
<table>
<thead>
<tr>
<th>Country</th>
<th>WATER</th>
<th>ELECTRICITY</th>
<th>SUBSIDY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Qatar</td>
<td>2.74/m³</td>
<td>$0.07/kWh</td>
<td>38-100%</td>
</tr>
<tr>
<td></td>
<td>0-1.92/m³</td>
<td>$0-0.04/kWh</td>
<td>30-100%</td>
</tr>
<tr>
<td></td>
<td>0.60/m³</td>
<td>$0.01-0.04/kWh</td>
<td>76-100%</td>
</tr>
<tr>
<td>Abu Dhabi</td>
<td>$2.48/m³</td>
<td>$0.07-0.09/kWh</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>$0.01-0.04/kWh</td>
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<tr>
<td></td>
<td></td>
<td>40-88%</td>
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</tr>
</tbody>
</table>
Negative Effects of Subsidization

GDP PER CAPITA VS. ENERGY INTENSITY OF VARIOUS NATIONS

- GDP (PPP)/capita (USD)
- Energy Intensity (toe/thousand 2000 USD)

Countries plotted include:
- Qatar
- Luxembourg
- Hong Kong
- Norway
- Singapore
- United States
- Canada
- United Kingdom
- Italy
- Germany
- France
- South Korea
- Brazil
- Japan
- India
- China
- Kuwait
- UAE
- Saudi Arabia
- Bahrain
- China
- India
Future Outlook of W&E Sectors

- Increased demand for both water and electricity
- Increased privatization, particularly of water & electricity production
- Increasing interest in sustainability

Qatar National Vision of 2030
1. Modernization & preservation of traditions
2. Intergenerational justice
3. Managed growth & expansion
4. Increasing human capital & selecting the optimum development path
5. Economic growth, social development & environmental management

UAE Vision 2021
1. Harnessing Full Potential of National Human Capital
2. Sustainable & Diversified Economy
3. Knowledge Based & Highly Productive Economy
4. Well Preserved Natural Environment

Abu Dhabi 2030 National Vision
1. Economic Development
2. Social & Human Resources Development
3. Infrastructural Development & Environmental Sustainability
4. Government Operations Optimization
Sustainability Consideration

Water/Energy Supply-Demand Gap

Demand management

Supply management
Water Supply Management

**DESAL CAPACITY**

**ENERGY DIVERSITY**

**STORAGE CAPACITY**

< 2 DAY WATER

Storage Capacity
Water Demand Management

TECHNICAL EFFICIENCY

BUILDING CODES

WATER NETWORKS

WATER SAVING DEVICES

BEHAVIOURAL CHANGE

MULTI-SECTOR TARIFF INCREASE

ENVIRONMENTAL AWARENESS

? Tariff
Human Capital

INTERNATIONAL UNIVERSITIES

LOCAL INSTITUTIONS

QATARIZATION & EMIRITIZATION

Qatar National Vision of 2030

UAE Vision 2021

Abu Dhabi 2030 National Vision
Policy Recommendations

1) Decrease water & energy demand
2) Increase supply of energy from greener sources
3) Increase environmental management
4) Increase water supply & system capacity
5) Enhance institutional capacity
Policy Recommendations

Decrease water & energy demand

2) Increase public awareness about water and energy consumption.
3) Increase water and electricity tariffs for all sectors.
4) Increase the technical efficiency of water and electricity systems.
5) Increase the water use efficiency in the agricultural sector.
Policy Recommendations

Increase supply of energy from greener sources

1) Creation of a renewable energy roadmap at the national and emirate based level.

2) Decouple water and energy production.

3) Promote greater public-private-partnerships.

4) Continue and expand research on alternative and renewable energy.

5) Continue and expand alternative and renewable energy projects/installations.
Policy Recommendations

Increase environmental management

1) Adopt an Integrated Coastal Zone Management (ICZM) approach.

2) Reduce environmental impacts of seawater intake by desalination plants on the marine environment.

3) Reduce environmental impacts of brine discharge by desalination plants on the marine environment.

4) Reduce green house gas emissions resultant of water production from desalination.
Policy Recommendations

**Increase water supply & system capacity**

1) Increase rates of reclaimed water utilization.

2) Increase desalination capacity.

3) Increase system capacity.

**Enhance institutional capacity**

1) Enhance human capital, research capacity and public-private-partnerships.
Because things are the way they are,
things will not stay the way they are.

- Bertolt Brecht
THANK YOU!