The Abdullah Bin Hamad Al-Attiyah
International Foundation for
Energy & Sustainable Development

~ Whitepaper ~

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Water Security

Innovative Next Steps

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This Whitepaper was harvested from a CEO Roundtable of 15 leaders in the Gulf's energy industry. The closed door event was held in Doha, Qatar on April 17th.

Innovative Next Steps

One threat on trouble-shooting leaders' agendas casts the longest shadow: water management. The World Economic Forum (WEF) cites water scarcity as one of the greatest threats facing the planet over the next decade. Two-thirds of the population will experience shortages by 2025. Qatar and its Middle Eastern neighbors are at the top of the unenviable list of water-stressed nations. The compasses of their water outlook must shift to avoid joining Cape Town as a Day Zero casualty.

The priority that leaders place on black gold – oil products that have spurred rapid modernization since the 1900s – is now being shared with liquid silver. Water management is no longer overshadowed by more lucrative commodities in policy documents. It is firmly in the global spotlight. A myriad of unnerving statistics highlights why. The world will need up to 40% more water over the next two decades to meet rising demand and the World Bank warns that total water productivity in the Middle East and North Africa (MENA) alone is only about half the world's average. The region has the world's highest proportion of GDP (2%) spent on public water subsidies, yet it could have the greatest economic losses from climate-related water scarcity by 2050, at up to 14% of GDP. The Middle East's population growth will hasten the strain. The UN expects Qatar's population alone to rise by a staggering 42% to 3.7 million by 2050.

Against this backdrop, is the UN's Sustainable Development Goal to 'ensure availability and sustainable management of water and sanitation by 2030' a pipedream or a realistic proposition? It is viable, but only with a holistic approach. Transparency and collaboration between governments, industry, academia and the public

Regional Strain

14

Fourteen of the 33 most likely water stressed countries in 2040 are in the Middle East, according to the WRI. Nine are considered extremely stressed: Qatar, Bahrain, Kuwait, Palestine, the UAE, Israel, Saudi Arabia, Oman and Lebanon.

**Not in order*

50%

The total water productivity in MENA is half the world's average and the region could have the greatest economic losses from climate-related water scarcity by 2050, at up to 14% of GDP.

82%

The percentage of wastewater currently not recycled in MENA.

44%

MENA is home to 44% of capacity of the world's desalination plants.

7

Qatar General Electricity & Water Corporation (Kahramaa) has launched projects to maintain 7 days of strategic water storage within its network.

AGENTS OF CHANGE

The oil and gas industry play a central role in improving the outlook for water-stressed nations. Total estimates that the planet's oil wells will produce 12.7 billion gallons a day of water by 2020. This equates to an average of three to five barrels of water for every barrel of oil produced. The industry's historical stance of utilizing basic water treatments are evolving as the threat of water scarcity gains momentum. Industry is increasingly tackling water management through a problem-solving viewfinder, rather than as a nuisance to be sidelined.

This mentality is also evident in the Middle East; the epicenter of the world's hydrocarbon production. The region will remain the largest oil producer and the second largest gas producer by 2040, accounting for over 34% of global liquids production and 20% of gas production, according to the BP Outlook 2018 report. Blessed with significant natural gas reserves, Qatar's presence on the global energy stage will only strengthen. The country has the third largest natural gas reserves in the world after Iran and Russia and crude oil production of 651,500 barrels a day, according to OPEC's Annual Statistical Bulletin 2017. At current extraction rates, oil reserves could last for another 40 years and proven natural gas reserves for another 135 years, Qatar National Bank (QNB) reported in 2016. Qatar's vast natural gas reserves offer a low hanging fruit in the water outlook. The produced and processed water from gas fields can have a salinity level below 3,000 milligrams a liter versus the 40,000 milligrams a liter in seawater. If properly utilized, this is an opportunity to recycle and treat water at a much cheaper rate than seawater desalination.

Advanced technologies that leverage the digital toolbox under the umbrella of the 4th Industrial Revolution and investments in human capital are critical to leveraging these opportunities. For example, to encourage scientific research and training, Qatar Electricity and Water Company (QEWC) signed a Memorandum of Understanding (MoU) with Qatar University to build a knowledge base for seawater desalination and to develop a water technology network, such as reverse osmosis (RO). The two institutions will collaborate to build and develop local capacity and manpower in the field of water treatment, develop training programs and transform and implement water purification technology. The agreement will also promote and facilitate research and innovation in the water sector and related activities. Plus, the company signed an agreement with Marubeni to introduce training programs for Qatari engineers working with QEWC to provide them with the expertise needed to manage, operate and maintain power generation and water desalination plants and to share experiences on the latest technologies.

Power generation is another form of energy production that is water intensive. Saudi Arabia-based Apicorp estimates that power capacity in MENA must expand by an average of 6.4% each year between 2018 and 2022, which adds to the demand base for water. Leaders must identify golden opportunities in markets where water plays a key role – such as oil, gas and power – and quickly integrate operational solutions. The MENA region will see a number of critical energy projects pushed through over the next five years, according to Apicorp. Up to $345 billion has been committed to energy projects under execution, with an additional $574 billion worth of developments planned. It would be a wasted economic and environmental opportunity if water management is not weaved into most of these blueprints. It risks triggering costly backtracking in the 2020s and beyond.

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are vital to identifying and implementing simple and smart solutions. Therein lies an opportunity for Doha to leverage its transformation into a knowledge-based economy that can 'export' lessons learned to other nations in need, as per its National Vision 2030.

One step to rewriting today's unnerving narrative is enhancing regulatory oversight; the framework must be more cohesive and transparent. "The devil is in the details," one roundtable participant advised. There is also significant potential for cross-border collaboration, as 60% of surface water resources in MENA are transboundary. Creating an integrated water management system – domestically and internationally – would help countries plug black holes in their water demand portfolios and support overall energy and economic security.

Better policy decisions could help neutralize the negative impacts of climate change on water, with some regions able to improve growth rates by up to 6%. Success on any of these fronts would create a wave of confidence and help water stakeholders cut through the stiff competition of energy players vying for investors' attention.

> "The Middle East has a problem. We have no rivers, minimal springs and we rely heavily on desalination. Of course, the simple formula is reducing demand and increasing supply. But this is easier said than done. So, what's next?"

Global Challenge

1st
The WEF cites water scarcity as one of the greatest risks facing the planet over the next decade.

7
It could be 2025 – an unnerving seven years' away – when two-thirds of the globe's population face water shortages.

4.5bn
The World Bank estimates that 4.5 billion people lack safely managed sanitation services and 2.1 billion people lack access to safely managed drinking water services. This accounts for a shocking 60% and 27% of the global population, respectively.

2030
The world will face a 40% shortfall between forecast demand and the available supply of water by 2030.

15%
Ensuring an adequate food supply for the global population requires a 15% increase in water withdrawals by 2050.

Increasing consumers' awareness – both municipal and industrial – is also key to holistic problem solving. Consumers must understand the monetary value of their daily water usage, for example. One roundtable participant described an awareness campaign in the UAE, which started in 2011; the initial stage included giving residents two tiers to monitor their consumption. One tier was the appropriate amount of water used in a flat or a villa and the second tier highlighted consumption over that level. UAE nationals were then charged for water from 2015, which was the first time since the country's independence in 1971. It worked; consumption plummeted in some areas by 30-40%.

Stepping Stones

Several tools are vital in the mission to improve water strategies and others deserve to be explored further. At the top of the list is desalination: a lifesaver in MENA. At the end of 2015, there were approximately 18,000 desalination plants worldwide, with 44% of this capacity in MENA, according to the International Water Association. Qatar's current projects to bolster its water security include the expansion of the Ras Abu Fontas desalination plant with RO technology. The project was inaugurated in April 2017 with a production capacity of 36 million imperial gallons per day of desalinated water at a total cost of QR1,750 million

27%
Concerns over water scarcity will only intensify as the global population swells by nearly a third to 9.7 billion by 2050.

2019
Cape Town's Day Zero has been prevented for a year, from April 2018 to early 2019.

KEEP THE TAPS RUNNING

No country is immune from water management challenges. Cape Town is currently on the frontline of a 21st century battle; water scarcity is threatening to bring the cosmopolitan African city to a standstill. Responsible leaders are asking: "How can we avoid the same scenario in a financially and environmentally affordable way?" Cape Town's strife, known as Day Zero, was anticipated in April this year. Urgent efforts have postponed Day Zero to 2019, but the situation remains dire. "No-one should be showering more than twice a week. You need to save water as if your life depends on it, because it does," stressed Helen Zille, head of the provincial government, earlier this year. The alarm bells are not confined to South Africa. The World Resources Institute (WRI) warned in 2015 that Chile, Estonia, Namibia and Botswana could face a significant increase in water stress by 2040. The Institute added that global heavyweights, such as China, India and the US will encounter water risks of their own. History points to the breadth of the challenge. In 2006, drought conditions in China threatened 182 million hectares of farmland, 8.7 million livestock and 95 million people. Those affected by this hardship alone is around 40x the population of Qatar.

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> Hong Kong has been using unfiltered seawater for domestic use since the 1960s. How can Qatar and the wider Middle East leverage this six decades of experience to ease strains on local water supply?"

($480 million). A promising trajectory has emerged in the cost-reward ratio of desalination: costs are falling as water demand climbs. In 1985, one RO membrane cost $10,500 – it is now less than $400. But every method has an Achilles' heel and critics argue that more research is required to reduce the negative impact of the brine that is injected back into the sea in order to reduce concerns over ecological damage.

The same research-focused ethos applies to exploring how water – including seawater, desalinated and waste water – can be applied more innovatively to relieve the stress on water tables and reservoirs. One roundtable participant described how 98% of households and industry in Hong Kong have used seawater to flush toilets since the 1960s. This method has slashed water consumption by 20% in an area, which is home to 7.4 million people. How can Qatar and the wider Middle East leverage Hong Kong's experience over nearly six decades to ease strains on local water supply?

Proactively addressing leakages in the desalination process and general distribution networks is also key. One roundtable participant spoke of a relatively dry part of the UK that suffered 30% leakages in the water distribution system. Residents' efforts to plug the leaks as part of their resistance to the construction of a dam reduced the leakages to 5%. Plus, considering how to 'knit' together the flow of clean and waste water between businesses within one location (i.e. an industrial cluster) would accelerate the region's creation of a circular economy.

And the Middle East's diversifying energy mix – such as nuclear power plants in the UAE and Saudi Arabia – raises new questions. How the national and regional water tables would be affected by a worst-case scenario – a leakage or contamination – must be proactively addressed to ensure safety and security of supply.

There are multiple avenues to explore and all are united by a key message: sustainable improvements triumph over knee-jerk reactions. Equally, speedy change is paramount to keeping the taps running. Cape Town's woes cannot be a snapshot of what is to come. A new narrative must be written to spur global change; one where water innovators rather than casualties are in the limelight.

6%
The negative impacts of climate change on water could be neutralized with better policy decisions. Some regions could improve their growth rates by up to 6% with better water resource management.

12.7bn
The planet's oil wells will produce 12.7 billion gallons a day of water by 2020.

8/10
Eight of the top ten countries listed as the most water stressed by 2040 are in the Middle East, according to the World Resources Institute.

**Uncited statistics and facts are attributable to the roundtable participants or sources that have already been referenced.*

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