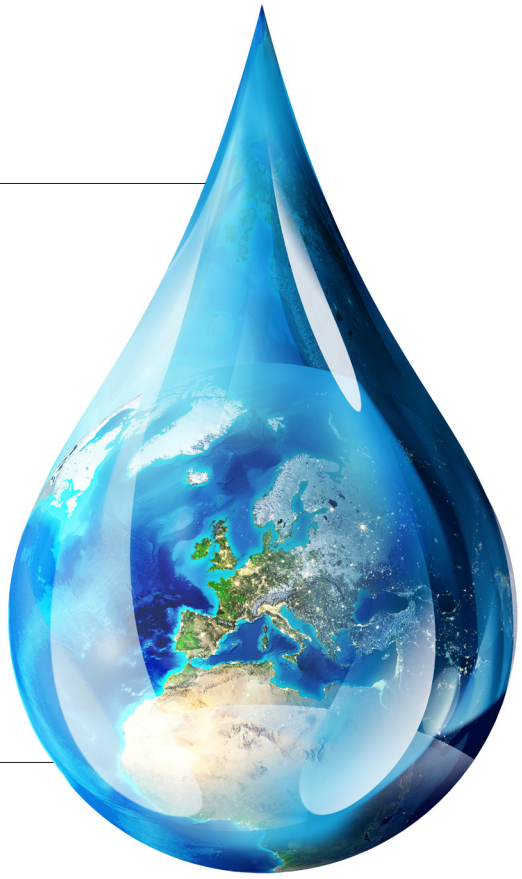
Kingdom of the Netherlands

– *Whitepaper*

2016 WFES KNOWLEDGE SESSION

Water-Food-Energy Nexus:

KEY LESSONS FOR THE U.A.E?



The level of awareness for improving the UAE's increasingly strained water-energy-food nexus has rapidly climbed the country's agenda over the last five years, with significant chunks of capital allocated to boosting energy efficiency renewable projects.

THE UAE, JUST 44 YEARS OLD, HAS made vast inroads into research and development (R&D) of innovative green technologies that could provide a blueprint for the wider Middle East. Gulf leaders' attendance at the Cop 21 global climate change talks in Paris last December marked an unprecedented appetite for change.

Business opportunities for collaboration with foreign entities are also gaining traction as the UAE demonstrates a willingness to learn from those that hold unique expertise, like the Netherlands. The impetus for economic diversification, shedding a long-held reliance on hydrocarbon revenue, is well illustrated by the 12-year low in oil prices in January 2016.

But, the outlook for both the Gulf and world's water-food-energy nexus remains sobering and the UAE has little choice but to adopt a holistic strategy to find cost-efficient solutions – and quickly. Over the next two decades, the world will need up to 40% more water to meet rising demand and agricultural production will increase by 70% by 2050. Such increases drastically reshape the land and water resources that we know today.

Excess consumption is a serious issue in the UAE and beyond. The GCC is rated as the world's most water-stressed region, with the least available water per capita. On a per capita basis, Saudi Arabia and the UAE consume 91% and 83% more water than the global average, and about six times more water than the UK, according to an analysis by Booz & Company.

Equally, it is worth remembering that Gulf countries have literally built their towns and cities from scratch in very recent history – this inevitably takes a heavy toll on natural energy resources and the environment. The UAE's food and water security are particularly concerning, as the country imports more than 90% of its food. Imports are set to double by 2030.

In response to the worrying outlook, the UAE aims to have 24% of its total energy mix be attributable to low-carbon sources by 2021 – up from 0.2% in 2014. The economic benefits for renewable energy are already clear. The UAE could save $1.9bn a year by 2030 if it hits its target to have just a 10% share of renewable energy in the total energy mix. Accounting for the health and environmental benefits, the additional net savings could reach $1bn-$3.7bn within the same period. Again, savings are particularly attractive as low oil prices remind regional governments of their economic Achilles heel.

The UAE can offer a regional beacon of green insight, but it must equally learn from other countries that have fought and won the battles against water and resource management that it now faces. The Netherlands, which lacks enough hinterland to accommodate its needs, have become experts in water management since the 1953 North Sea Flood, in which 1,800 people died. Meanwhile, Singapore has achieved what the UAE are aspiring to by 2019; Singapore has closed the loop between resources and usage, recycling 100% of its water.

SHIFTING PERSPECTIVES

The UAE has imported a lifestyle that does not correspond to its natural resources. Residents own multiple cars per household, which are often petrol-guzzling 4X4s, and live in air-conditioned villas with gardens that require constant irrigation. Historically, homes were de-

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signed without gardens and indigenous trees supplied residents with fruits. Arabs used to live on less than 20 liters a day per capita – today, it is 500 liters. The UAE, like most countries, still suffers from a gap in awareness.

Reams of statistics about how to better the UAE's water-food-energy nexus do little to shift mindsets, especially as people often rely on technology to resolve issues arising from limited natural resources. But technology will be useless when the natural resources inevitably run dry.

The UAE, which anticipates a 30% growth in water demand by 2030, requires ten times more energy for seawater desalination than surface fresh water production. Related costs could soar by 300%, according to Masdar Institute, Abu Dhabi's renewable energy company with a strong focus on research. Accordingly, Masdar is carrying out a two-stage desalination programme, with the first stage from 2013-2016 including four pilot desalination plants in Ghantoot in Abu Dhabi to gauge performance. The second stage runs from 2016 to an undetermined time with a focus on implementation, targeting a commercial scale desalination facility by 2020.

Plus, steps have been taken in the UAE to boost residents' energy awareness, notably the first round of petrol and diesel subsidy cuts in August 2015 – saving up to Dhs9.1b ($2.5bn) a year. The cuts marked a significant social shift in a region where subsidized energy is ingrained in the population's psyche as a national right. Plus, Abu Dhabi's Water and Electricity Company (ADWEC), which forecasts water supplies and demand, introduced a tariff in 2015. The UAE is the first country in the region to build a complete water budget.

CIRCULAR ENERGY ECONOMY

A circular energy economy, which focuses on the reuse of resources and materials, is rising – a shift that is good for the economy and the environment. The amount of water that is within the UAE's food – 90% of which is imported – is not incorporated into the country's wider data set about water supply and wastage, for example.

Greater efforts to develop a circular economy would see the entities and data sets for these two parts of the UAE's essential resource portfolio merging to complement each other. A better understanding today leads to a smarter strategy tomorrow.

Often, the bridge connecting business and government disconnect and there is a communication gap – efforts to tackle the water-energy-food nexus are not immune. Who should take the first step? Businesses tend to wait for governments to take action and provide regulatory guidelines on the emerging renewables sector, while governments expect businesses to take the initiative and suggest green capital strategies. A stalemate ensues and costs soar.

The appetite for a holistic green economy within the UAE is rising, which will support the national growth of renewables, energy efficiency and social change. But the government and businesses must be made accountable to ensure that the management strategy outlined on paper is realized – isolated efforts are costly and time-consuming.

Ideas that the government and private sector could immediately work on include expanding storage for power from renewable energy; solar and wind, predominately. There are unique applications for solar power in the UAE via

clever planning and greater efforts to pin down demand forecasts. Solar power could supply daytime exhibition events – held daily in Abu Dhabi and Dubai – as events are planned far in advance and the power demand can be estimated using data from the previous event, for example.

The next ambitious step – one that may require years to evolve – is to carve out a GCC-wide circular energy economy, which collectively invests into renewable technologies, water and energy management and green policy. Such a goal would heavily rely on developing a region-wide manufacturing capability, which could in turn create innovative technologies for export.

BUILDING BLOCKS: TECHNOLOGY AND DATA

Abu Dhabi's Masdar is a living lab, acting as a hub where technologies and ideas can be tested with the view of being implemented out in the field on a larger scale. The logjam in the UAE, and the wider Middle East, occurs when completed technologies do not receive the proper marketing and distribution support from governments and the private sector. It can take up to two years for a technology to hit the market, which is far too long considering the UAE's 2021 target of having 24% of its total energy from low-carbon sources.

Smart data will also help the UAE both improve its energy efficiency and map out business opportunities that arise from improving its water-food-energy nexus. The UAE's predominant view is that the wrong data is just as worthless as no data. Efficient use of big and simple data can be applied to water management – clarifying the key components of day-to-day use help build a critical database of insight that can be referred back to for decades. How much rain does the UAE get and how much of this evaporates, or percolates? How much desalination do I need and what percentage of desalinated water is going back into the system?

Abu Dhabi's smart meter, which provides residents with real-time feedback on their water and electricity usage, has the potential to gather reams of data. What is being done with this data; is it being examined and analyzed in the right way and being used to inform future decisions?

STEP-BY-STEP

The exhaustive list of steps that the UAE must take to improve its water-food-energy nexus must not dilute how much the country has achieved in less than half a century. The Mohammed bin Rashid Al Maktoum Solar Park will have 1 GW operational capacity by 2019 and 3 GW by 2030, with plans to source 7% of Dubai's total power output from renewable energy sources by 2020 and 15% by 2030.

On a smaller level, the UAE is reusing water, such as polluted water coming out of shrimp farms, to irrigate local algae. This in turn generates biofuel, which means water can be cleaned and energy produced simultaneously, with the residual of that algae used as animal feed for fish farms, for instance. Plus, algae can be fed with carbon dioxide. The process reflects a small and successful local example of an efficient water-food-energy nexus.

The outlook on managing agriculture in the UAE has also evolved, now that the social component of having to stabilize a population within a certain area has diluted. The focus is now on the analytical component of improving the energy and economic efficiency of the sector. Which crop should the UAE produce versus imported food, for example? It is a gradual process, but the integration of the economic, social and technological aspects are being integrated.

The excitement that galvanized world leaders to flock to Paris for Cop 21 has settled and all eyes are on the most crucial stage – carving out actionable steps to boost energy security in 2016 and beyond. The UAE will be front and centre of the Gulf's push for sustainability as public and private leaders' awareness of the stressed water-food-energy nexus evolves. ■

Background

The 2016 World Future Energy Summit (WFES) Knowledge Session for the Embassy of the Netherlands took place at the WFES on January 19 at 11am in Abu Dhabi. The one-hour session focused on pinning down key lessons for the UAE – both local and global – as it works to improve its strained water-food-energy nexus.

Panel Speakers

***Henk Ovink**, Special Envoy on International Water Affairs, Kingdom of the Netherlands*
***Mohammad Al-Hajjiri**, Head of Water Section, Planning and Studies Directorate, ADWEC*
***Dr. Taha Ouarda**, Head of the Institute Center for Water and Environment, Masdar Institute*
***Gus Schellekens**, Partner, EY Clean Energy and Sustainability Services*