



## Future of Water

Natural resources, new technologies  
and Blue Economy

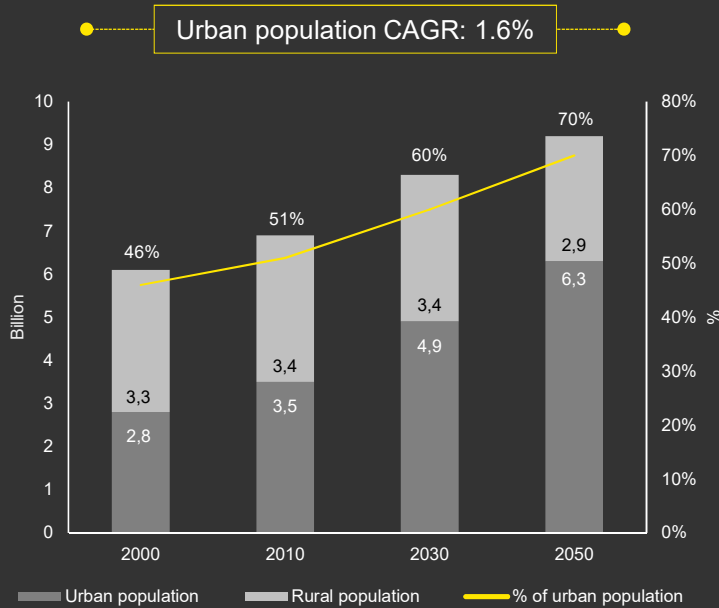
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# Urbanization, globalization and population growth will continue to drive an increase in the demand for clean water

## Urban population to almost double by 2050 ...

By 2030, 60% of the world's population (4.9b people) will live in urban areas, which would increase to 70% (6.3b people) by 2050



Source: UN World Urbanization Prospects

## 52% (~5b people)

Amount of people to be affected by water stress by 2050

Increasing strains on freshwater availability through 2050, with an additional 2.3b people expected to be living in areas with severe water stress, especially in North & South Africa and South & Central Asia.

## 40%

Amount by which global demand for freshwater will increase by 2050

At least a quarter of the world's population is expected to live in countries that have a chronic or recurrent lack of clean water.

## 2 billion

Amount of urban residents facing seasonal water shortages by 2050

Today, over 50% of urban households lack sufficient access to safe drinking water. And urban water demand is anticipated to increase by 50%–70% over the next 30 years.

# Middle East and North Africa (MENA) already the most water stressed region in the world, faces a worsening crisis in terms of its access to water in the decades to come

## Current state

MENA is home to **6%** of the world's population and less than **2%** of the world's renewable water supply.

It is the **world's driest region** with 12 of the world's most water scarce countries (Algeria, Bahrain, Kuwait, Jordan, Libya, Oman, the Palestinian Territories, Qatar, Saudi Arabia, Tunisia, the United Arab Emirates, and Yemen).

On average, water availability is only 1,200 cubic meters, around **six times less** than the worldwide average of 7,000 cubic meters.

Most MENA countries cannot sustainably meet their current water demand. With population growth and increased demand, water availability per capita is **expected to be halved** by 2050.

In a seven year period ending 2009, the rate of **freshwater reserve losses** in the region was almost equal to the volume of the entire Dead Sea, making it the largest rate of loss of liquid freshwater on the planet.

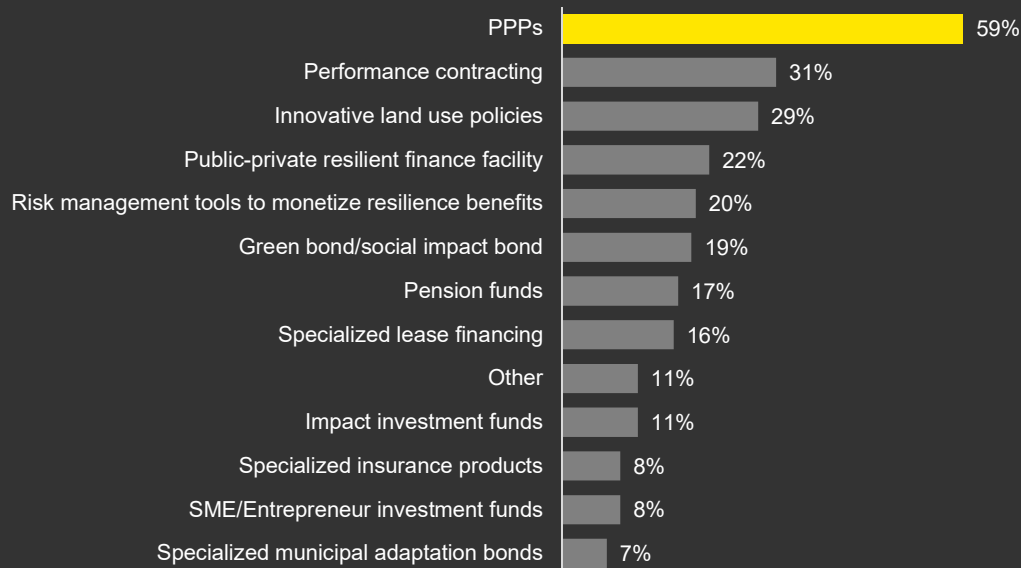
Over the past 30 years, the water table in the UAE has dropped about one meter per year. At current rate, the UAE is projected to **deplete its natural freshwater** resources in about 50 years.

## Future state

# A recent EY analysis shows that PPPs are the key financing mechanism for resilient infrastructure investment

PPPs can make use of other alternative financing options in their own structuring, including direct pay taxable bonds, tax-exempt qualified private activity bonds.

## What are the current financing options?



Water services are more capital intensive than other utilities, requiring twice the capital compared to electricity utilities with the same annual operating expenses. With growing financial needs, along with a decline in public investments in water, and the lack of private investment being directed to this sector (only 5% of private investments tracked by the World Bank went to the water sector), new strategies need to be found to make needed investments.



Source: EY, 100RC, July 2017

# Water management is developing towards integrated, automated and on-demand environment, taking into consideration the following socio-economic trends

## Disruptive Trends

- Global warming
- Pollution
- Urbanization
- Environmental concerns
- Sharing economy
- Consumers' desire to always be connected
- Changing consumer expectations

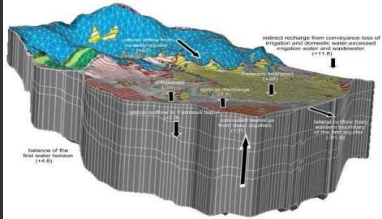


## Disruptive Tech

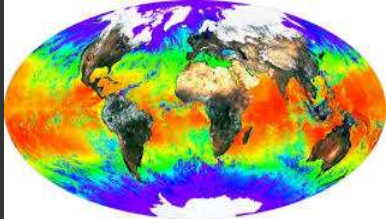
- Artificial intelligence
- Virtual & augmented reality
- Connected devices
- Internet-of-things
- Sensors and digital technologies
- Blockchain



## Previously Unimagined Tools



Water resource modelling



Climate changes analytics



Water demand management



Robotic plant automation

# Startups taking center stage in disrupting the current water utility scenario bringing innovative solutions faster and cheaper into the market

Water Software & Analytics	Water Treatment	Water Irrigation	Water Conservation
Residential Smart Meter	Wastewater management	Real-Time Water Quality Monitoring	Water Generation

Not a complete list!

# Smart assets drive some unique needs for creating and deploying new funding mechanisms

## There are new business models emerging

For example, new data-driven “**utilities**” coming up with the evolution of smart cities.

## Conventional infrastructure assets are getting a refresh

Existing assets/asset classes are being revamped through introduction of **sensors and internet-enabled connectivity**.

## Monetization for transforming infrastructure assets

Data monetization — **direct** (assets are transformed through data, and the data itself can be used to generate additional revenues) and **indirect** (data can be used to improve the effectiveness of infrastructure asset)

Appropriate revenue sharing



Effective risk sharing

# Innovative Financing Mechanisms deliver appropriate revenue sharing and effective risk sharing

Global PPP examples show risk and reward can be structured, and are attracting private sector capital

## DC Clean Rivers Project



In July 2014, DC Water & Sewer Authority issued its **inaugural green bond (\$350 million)**, with another \$100 million issued in January 2017

Bond proceeds to finance a portion of the **DC Clean Rivers Project**

A **debt instrument with a risk-adjusted market rate of return**

The Social Impact Bond allows DC Water to attract investment whereby the costs of installing the green infrastructure are paid for by DC Water, but the performance risk of the green infrastructure in managing storm water runoff is shared amongst DC Water and the investors.

## NYC's "paid-for-performance" contract

NYC signed a **"paid-for-performance" contract** with Veolia in 2012 to evaluate opportunities for cost-savings and operational improvements to city's water and wastewater systems

By tying **Veolia's earnings directly to NYC's savings** — the approach delivered private sector expertise without any long-term costs

This is saving the city **\$84 million each year** in cost-oriented improvements and enhanced revenue collection initiatives

## SFPUC 'Climate Certified' Water Bond

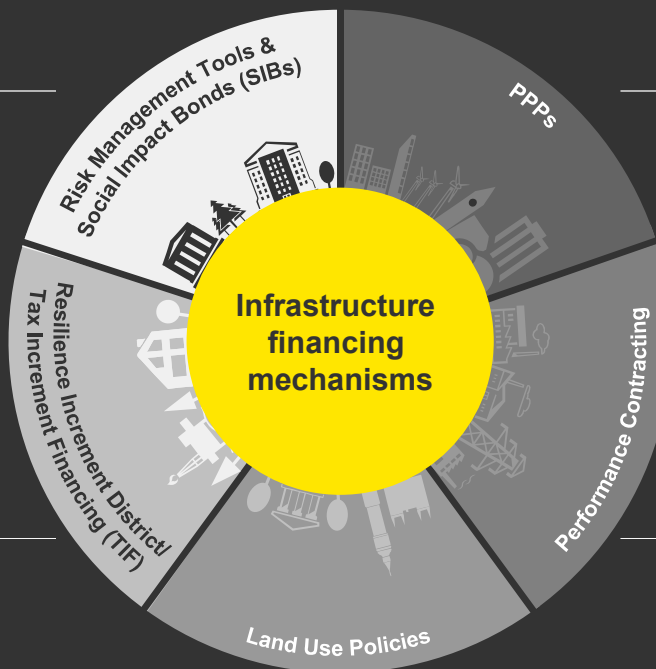
The San Francisco Public Utilities Commission (SFPUC) has become the first organisation to issue a **green bond (\$240 million) certified under the Climate Bonds Water Criteria.**

Proceeds will fund eligible sustainable storm water management and wastewater **projects under the utility's Sewer System Improvement Program.**



## Outside of PPPs, there are other alternative financing options

SIBs are debt instruments with repayment linked to achieved improvement in social outcomes



P3s are contractual agreements that allow risk and profit sharing between the public and the private sector. Most popular financing instrument for resilient infrastructure investment

TIF uses future additional revenue gains from taxes to fund public infrastructure improvements, that will in turn create those gains

Performance contracting rewards service providers for achieving a mutually agreed outcome

Innovative land use policies use comprehensive planning or zoning, incentives and building codes to drive investment with resilience benefits

## There is an important potential role and a rise in use of SIB's in developing countries to drive private capital into smart infrastructure investment

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### Examples from developing countries



The world's first development **impact bond for education** reported the results of its first year, showing a 23% improvement in learning for girls' in Rajasthan, **India**, despite some program setbacks

The Ministry of Innovation, Science and Technology in the state of Jalisco, **Mexico**, committed to fund an **impact bond for female-headed households**.

The Western Cape Province of **South Africa** became the first middle-income country government entity to commit outcome funding for impact bonds, with the Department of Social Welfare and Department of Health committing **\$1.8 million** for three new social impact bonds for **early childhood development**.



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## Advisory — Performance Improvement

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