



# Energy and Water

Industry in Dubai, UAE



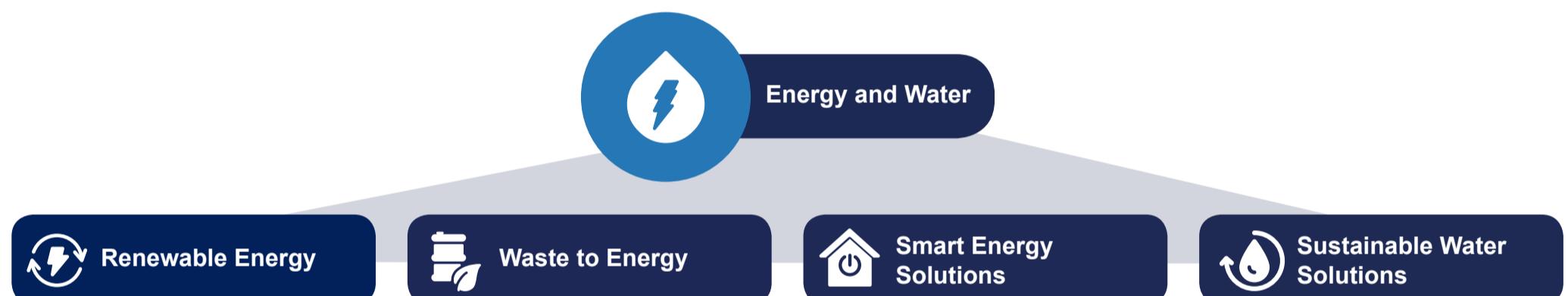
Dubai Economy in collaboration with Frost & Sullivan have undertaken detailed studies of key industry and business segments in Dubai with a focus on trends and opportunities



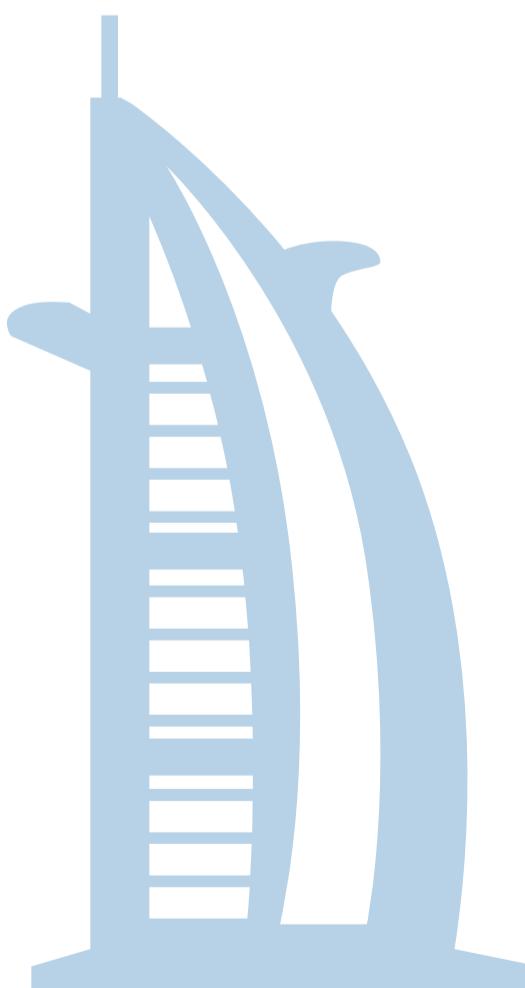
## Energy and Water Industry in Dubai

### Scarce resources, growing demand for energy and water has led to DEWA focus on sustainable solutions

Dubai is one of the most futuristic cities in the world with an ever increasing appetite for scarce resources. DEWA is the sole authority that can supply electricity and water in the Emirate. The increasing level of economic activities and growing population are expected to increase the demand for energy and water industry related services. This has resulted in a number of key initiatives and renewable energy projects by the Government of Dubai to foster sustainable solutions. Some of the key areas of focus in the energy and water industry in Dubai are elaborated as follows:



### Energy – Water Nexus in Dubai



- Water scarcity in Dubai has led to **heavy reliance on desalination** technique (**98.8%**) to meet the growing water demand.
- Desalination plants consume large amount of energy for pumping, treatment and distribution.
- **Energy required to produce 1 m<sup>3</sup> of fresh water - ~4 kWh - 21% of total energy** produced is used for desalination.
- Power generation systems are water intensive and consume water for its cooling process.
- **Water required to produce 1 MWh of energy - ~570 to 1,100 litres - 14% of desalinated water** is used for energy production.

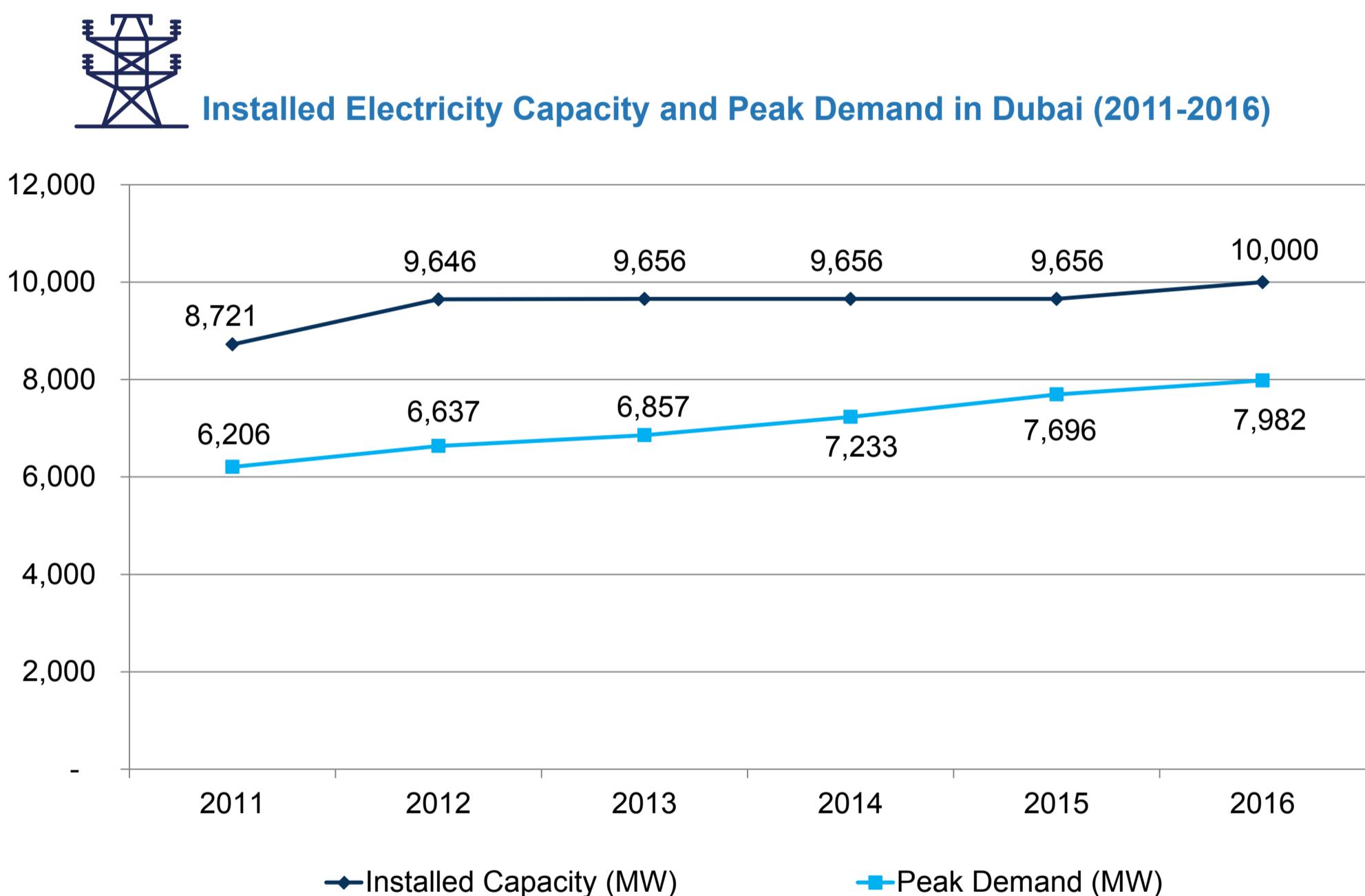
Source: Dubai Statistics Centre; Frost & Sullivan





## Energy and Water Industry in Dubai

**DEWA to implement more renewable energy based power generation facilities to meet its energy mix targets**



- Dubai's installed electricity capacity had grown at a CAGR of 2.8% between 2011 and 2016, while the peak demand had grown at a CAGR of 5.2% in the same period.
- It also had a spare electricity capacity of 2 GW in 2016.
- In 2016, electricity generated from gas turbines was 7,448 MW, while steam turbines was 2,542 MW.

Source: DEWA; Frost & Sullivan

Note: The unit is Mega Watts (MW)



## Energy and Water Industry in Dubai

**DEWA aims to increase share of renewables, which is expected to present significant opportunities especially for solar developers**

| Stations  | MIGD | MW     |
|---|------|--------|
| Jebel Ali Power and Desalination Station "D"            | 35   | 1,027  |
| Jebel Ali Power and Desalination Station "E"            | 25   | 616    |
| Jebel Ali Power and Desalination Station "E"            | 60   | 818    |
| Jebel Ali R.O. Desalination                             | 25   | -      |
| Aweer Power Station "H" – Phase I                       | -    | 607    |
| Aweer Power Station "H" – Phase II                      | -    | 421    |
| Aweer Power Station "H" – Phase III                     | -    | 968    |
| Jebel Ali Power and Desalination Station "K"            | 60   | 948    |
| Jebel Ali Power and Desalination Station "L" – Phase I  | 70   | 969    |
| Jebel Ali Power and Desalination Station "L" – Phase II | 55   | 1,432  |
| Jebel Ali Power and Desalination Station "M"            | 140  | 2,185  |
| Solar   | -    | 10     |
| Total   | 470  | 10,000 |

- Almost 80% electricity is generated using natural gas; **DEWA\* aims to reduce the share of natural gas to 61% and increase the share of renewable energy to 25% by 2030** through green initiatives and investments.
- DEWA is the '**Official Sustainable Energy Partner**' for the EXPO 2020 - DEWA is expected to generate half the energy demand from renewable sources.

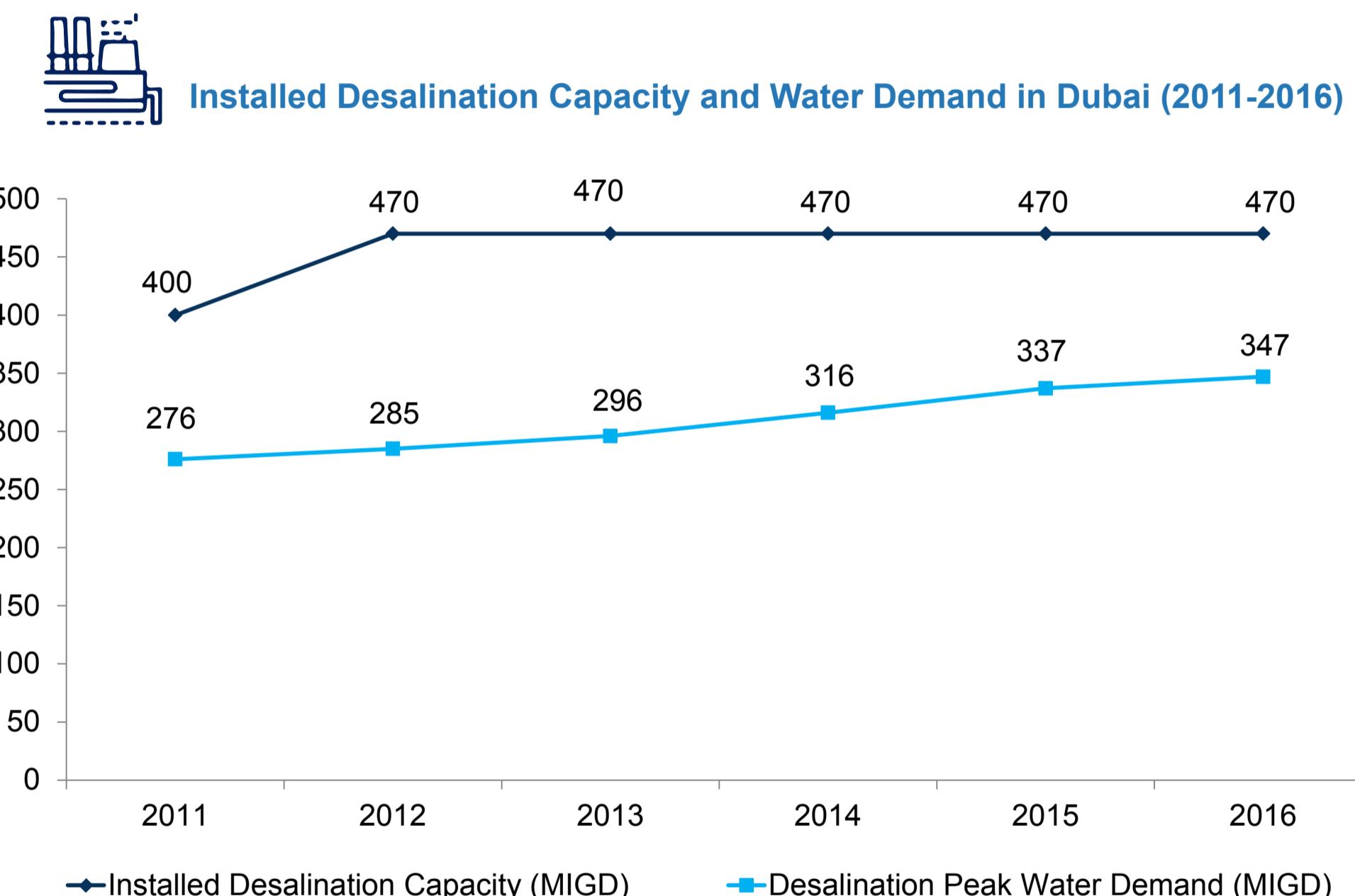
Source: DEWA; Frost & Sullivan

Note: MIGD – Million Imperial Gallons per Day; MW- Mega Watts.



## Energy and Water Industry in Dubai

**Increased risk of ground water depletion is driving higher emphasis on desalination to meet the Emirate's water demand**



- Desalination is one of the main sources of water in Dubai and has an installed water capacity of 470 MIGD (2016).
- The installed capacity had grown at a CAGR of 3.3%, while the peak water demand had grown at a CAGR of 4.7%.
- DEWA has launched a pilot project - a solar-powered reverse osmosis water desalination plant has a production capacity of 50 m<sup>3</sup> per day of drinking water. This is expected to reduce the dependence on non-renewable sources.

Source: DEWA; Frost & Sullivan

Note: The unit is Million Imperial Gallons per Day (MIGD)





## Renewable Energy in Dubai

**Dubai's Clean Energy Strategy 2050 aims to support its Green economy vision**



- The Dubai Government has launched the Dubai Clean Energy Strategy 2050, which aims to diversify the energy mix and increase share of clean energy sources to 7% by 2020, 25% by 2030 and 75% by 2050, in line with its aim to become a green economy.
- The Government of Dubai has been investing heavily on innovation, R&D, and development of renewable energy resources to create a sustainable environment for the long run.
- As part of the strategy to accelerate development towards 2050, the Dubai Green Fund worth AED 100 Billion is expected to provide funding for investors in the clean energy sector through loans at reduced interest rates.
- The strategy includes initiatives such as the Mohammed bin Rashid Al Maktoum Solar Park, DEWA Innovation Centre, and the Dubai Green Zone.
- The Mohammed bin Rashid Al Maktoum Solar Park is expected to receive an investment of AED 50 Billion for the second phase of the project to increase its capacity by 200 MW.
- The DEWA Innovation Centre is expected to receive an investment of AED 500 Million for R&D activities related to clean energy such as renewable solar generation, smart grid integration, energy efficiency, and 3D printing technology.
- The 'Dubai Green Zone' is a dedicated zone for R&D centres and companies in the field of clean energy.

Source: DEWA; Frost & Sullivan

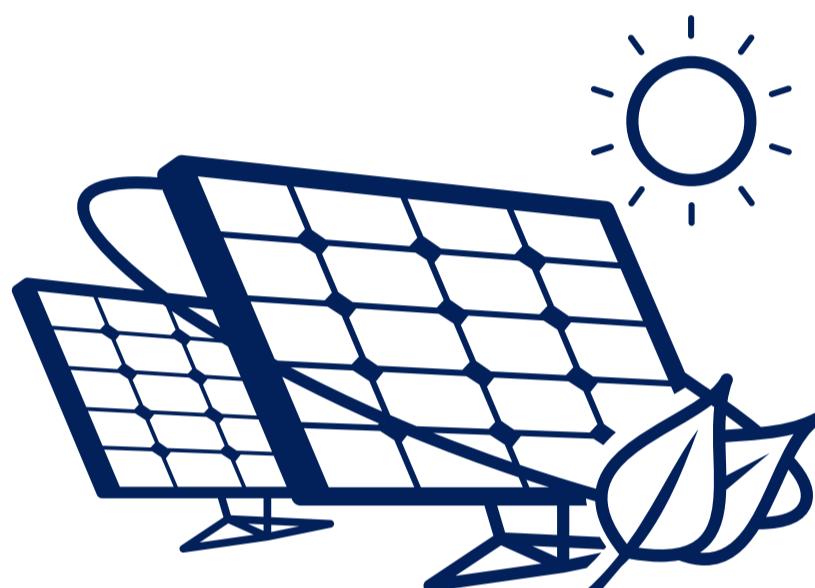
Note: \*Dubai Energy and Water Authority





## Renewable Energy in Dubai

### Harnessing Solar power – Dubai's initiatives to increase power generation capacity



- The Emirate of Dubai lies in the solar belt and is exposed to sunlight all around the year, thereby increasing the potential to harness solar energy.
- The Government of Dubai has launched a few initiatives to harness solar energy such as SHAMS Dubai initiative and the Mohammed bin Rashid Al Maktoum Solar Park.

#### 1. SHAMS Dubai

- This initiative encourages all building owners in Dubai to install Photo Voltaic panels on their rooftops to generate electricity and connect them to DEWA's grid.
- The electricity generated would be used onsite and the excess electricity generated would be transmitted to DEWA's grid.
- As of 2016, there are more than 250 buildings in Dubai, both commercial and residential, that have installed solar panels as a part of SHAMS Dubai initiative.
- DEWA aims to install PV panels on the rooftop of all buildings in Dubai by 2030.

#### 2. Mohammed bin Rashid Al Maktoum Solar Park

- From the current 10 MW power generation capacity (2016), this Solar Park built in multiple phases, is expected to increase its power generation capacity to 1,000 MW by 2020 and 5,000 MW by 2030.
- The project when completed will power about 800,000 homes and is expected to reduce 6.5 Million tonnes of carbon emissions annually.

Source: DEWA; Frost & Sullivan

Note: \*Dubai Energy and Water Authority





## Waste to Energy in Dubai

**Waste to Energy market – Alternate source of energy that keeps a check on waste generation in line with Dubai's sustainability goals**



### **WTE facility in Al Warsan II, Dubai**

- The facility will be developed in a Build-Own-Transfer PPP model.
- It will have capacity to produce 60 MW from 2,000 metric tonnes of solid waste per day.
- The method to be used for conversion of waste to energy is 'Incineration'.
- Estimated cost of the project ~AED 2 Billion.
- The facility is expected to be operational from 2020 and upon completion, it will be the largest facility in the Middle East.

- Per capita waste generation in the UAE was 2.7 kg per day (2015), which is more than double the global average.
- This is due to the steady growth in population and rapid industrialization in the Emirate.
- Global WTE market was worth ~AED 105 Billion in 2016 and had grown at a CAGR of 8% between 2012 and 2016.
- WTE one of the most sustainable solution available to recycle waste as the landfills are filling fast. It is expected to receive a radical boost once tipping fees\* are increased.
- WTE is still a nascent market in Dubai and is expected to grow rapidly as a result of Dubai Municipality's goal to reduce 75% of waste from its landfills by 2021.
- Dubai Municipality plans to build a WTE facility in Al Warsan II through PPP.

Source: DEWA; Frost & Sullivan

Note: \*A fee received at a waste processing facility for a given quantity of waste to offset the running costs of the facility.



## SMART Energy Solutions in Dubai

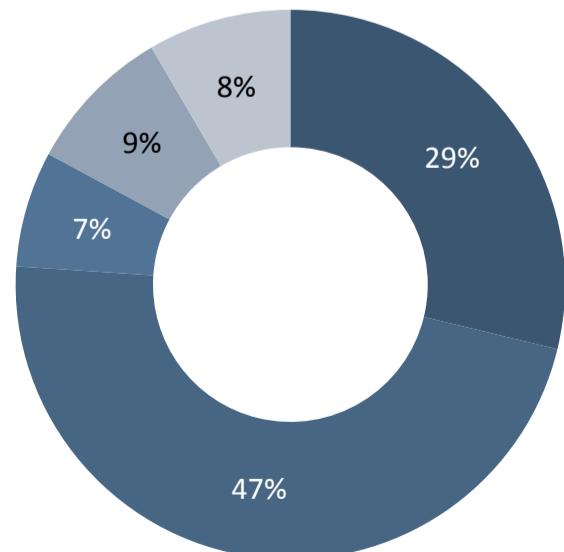
Ample opportunities in demand-side management of electricity, especially in the commercial sector for SMART energy solutions



### Generated Electricity and Consumption by Type of Person in Dubai (2011-2016)

|                                   | 2011    | 2012    | 2013    | 2014    | 2015    | 2016    |
|-----------------------------------|---------|---------|---------|---------|---------|---------|
| System Energy Requirement (GWh)   | 34,606  | 36,297  | 37,478  | 39,599  | 42,006  | 43,093  |
| <b>Residential</b>                |         |         |         |         |         |         |
| Number of Consumers               | 440,516 | 459,642 | 480,680 | 499,347 | 521,009 | 557,121 |
| Energy Consumed Units (GWh)       | 9,307   | 9,815   | 10,077  | 10,835  | 11,724  | 11,922  |
| <b>Commercial</b>                 |         |         |         |         |         |         |
| Number of Consumers               | 151,560 | 155,744 | 162,255 | 168,583 | 177,186 | 185,313 |
| Energy Consumed Units (GWh)       | 15,681  | 16,623  | 17,326  | 18,397  | 19,263  | 19,862  |
| <b>Industrial</b>                 |         |         |         |         |         |         |
| Number of Consumers               | 2,283   | 2,323   | 2,387   | 2,526   | 2,636   | 2,777   |
| Energy Consumed Units (GWh)       | 2,524   | 2,564   | 2,596   | 2,684   | 2,776   | 2,861   |
| <b>Others</b>                     |         |         |         |         |         |         |
| Number of Consumers               | 6,572   | 6,736   | 6,878   | 7,295   | 7,317   | 7,294   |
| Energy Consumed Units (GWh)       | 5,986   | 3,099   | 3,146   | 3,252   | 3,437   | 3,559   |
| Total Number of Consumers         | 600,931 | 624,445 | 652,200 | 677,751 | 708,148 | 752,505 |
| Total Energy Consumed Units (GWh) | 33,498  | 32,101  | 33,145  | 35,168  | 37,200  | 38,204  |

### Composition of Electricity Consumption in Dubai



**Total Electricity Consumption in Dubai, 2016 – 41,799 GWh**

- Residential
- Commercial
- Industrial
- Power Station & Desal Auxillary
- Others

- The commercial sector consumed the maximum electricity in Dubai (2016).
- Increasing demand for electricity across all segments to increase the demand for more power generation capacity and focus on increasing the efficiency of electricity consumption.
- This is expected to present significant opportunities for Smart energy solution providers in Dubai.

Source: DEWA; Frost & Sullivan

Note: GWh - Giga Watt hours





## SMART Energy Solutions in Dubai

**Retrofitting and installation of smart meters is expected to increase the efficiency in consumption and services**



- Dubai is one of the highest electricity consumers in the world mainly due to the need for more air-conditioning in buildings in the hot climatic conditions and old electrical fittings.
- The Government of Dubai plans to increase the energy efficiency in both new and existing buildings.
  - DEWA has established the Super Energy Service Company (Super ESCO) to facilitate retrofitting 100,000 buildings by 2030.
  - The ESCO has already retrofitted 7 DEWA buildings and has also completed lighting retrofit in DEWA's power stations.
  - DEWA has started installing more than 200,000 smart meters in households and other establishments to receive real-time details on consumption of electricity for efficient use and connects them to smart grids.
  - DEWA also plans to replace all mechanical and electromechanical meters and install more than 1,200,000 smart meters in the Emirate by 2020.
  - Dubai aims to have 25% 3D-printed buildings by 2030. 3D Printing technology is a cost-effective solution that provides thermal insulation to buildings and reduces energy consumption.
  - The Dubai Municipality's 'Al Safat' rating system is mandatory for all buildings built after the Green Building Code was implemented in 2014.
  - This rating system ensures buildings are energy efficient by 2020 and aims to reduce electricity consumption by 20%.
- DEWA's retrofitting measures and awareness programmes have saved approximately 1.5TW/h of electricity between 2009 and 2016.

Source: DEWA; Frost & Sullivan

Note: ...





## Sustainable Water Solutions in Dubai

### Dubai's water conservation strategy strives to maintain groundwater levels

- Due to its geographical location, Dubai has sparse sources of water. Despite this, per capita consumption of water at 550 litres is double that of the global average.
- To protect water resources, the Government of the UAE has come up with the **Water Conservation Strategy**, to maintain constant groundwater resources at 2.3 Million cubic metres per year.
- **Desalination** is the **major source of water supply in Dubai** and contributes 98.8%, while the groundwater contributes 1% and treated wastewater contributes the meagre rest.
- **Groundwater is mainly used for irrigation purposes while desalinated water is used for drinking.**
- **Treated wastewater is used for gardens in Dubai's households** at a small cost.
- For efficient water use, DEWA has installed smart meters in houses and other establishments to receive real-time details on consumption and aims to cover all the buildings in Dubai by 2020.

Source: Emirates News Agency (WAM); DEWA; Frost & Sullivan

Image Source: Frost & Sullivan





## Sustainable Water Solutions in Dubai

**High per capita water consumption in comparison to global average has increased focus on efficient use – Sustainable water solutions to play a key role in conserving water for the future**



**Quantity of Water Consumed and Number of Consumers by Type of Person in Dubai (2011-2016)**

|   | 2011    | 2012    | 2013    | 2014    | 2015    | 2016    |
|---|---------|---------|---------|---------|---------|---------|
| Total System Requirement -Desalination Water Demand (MIG) | 93,356  | 96,380  | 100,114 | 106,184 | 113,786 | 116,863 |
| <b>Residential</b>  |         |         |         |         |         |         |
| Number of Consumers                                       | 426,540 | 446,372 | 468,119 | 488,102 | 505,448 | 539,359 |
| Quantity Consumed (MIG)                                   | 46,844  | 49,112  | 51,443  | 55,471  | 61,296  | 64,020  |
| <b>Commercial</b>   |         |         |         |         |         |         |
| Number of Consumers                                       | 102,617 | 104,444 | 108,445 | 112,781 | 116,914 | 122,888 |
| Quantity Consumed (MIG)                                   | 22,064  | 23,931  | 24,663  | 26,462  | 27,638  | 28,020  |
| <b>Industrial</b>   |         |         |         |         |         |         |
| Number of Consumers                                       | 1,222   | 1,227   | 1,297   | 1,364   | 1,389   | 1,447   |
| Quantity Consumed (MIG)                                   | 2,708   | 2,622   | 2,572   | 2,849   | 3,163   | 3,302   |
| <b>Others</b>   |         |         |         |         |         |         |
| Number of Consumers                                       | 2,506   | 2,519   | 2,817   | 2,931   | 2,790   | 2,736   |
| Quantity Consumed (MIG)                                   | 9,520   | 9,281   | 9,394   | 9,940   | 10,204  | 10,100  |
| Total Number of Consumers                                 | 532,885 | 554,562 | 580,678 | 605,178 | 626,541 | 666,430 |
| Total Quantity Consumed (MIG)                             | 81,136  | 84,946  | 88,072  | 94,722  | 102,301 | 105,442 |

- Highest consumption of water was by the residential sector, followed by the commercial sector (2016).
- DEWA aims to create awareness amongst consumers on efficient use of water to reduce the water consumption.
- It also plans to promote sustainable solutions for water use in the Emirate through water efficient fixtures, smart meters etc.

Source: DEWA; Frost & Sullivan

Note: The unit is Million Imperial Gallons (MIG)



## Sustainable Water Solutions in Dubai

**Supply of treated wastewater to reduce the stress on desalinated water and enhance the sustainability of water resources**



**Treated Wastewater Used for Irrigation in Dubai (2011-2016)**

|  | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 |
|--|------|------|------|------|------|------|
| Quantity of Water Treated (Million M3)             | 177  | 180  | 199  | 212  | 231  | 248  |
| Quantity of Water Used for Irrigation (Million M3) | 149  | 167  | 169  | 179  | 211  | 220  |

### Sales of Irrigation Water

|                             |        |        |        |        |         |        |
|-----------------------------|--------|--------|--------|--------|---------|--------|
| Quantity (Million M3)       | 51     | 49     | 69     | 77     | 90      | 89     |
| Value of Sales (in 000 AED) | 62,889 | 59,493 | 80,484 | 99,704 | 114,548 | 99,036 |

- Storm water, industrial wastewater, municipal wastewater are collected in the wastewater treatment plants. **The Dubai Municipality has set regulations and standards for treatment and use of wastewater.**
- Treated wastewater can relieve the pressure on desalinated water and ground water for certain applications and enhance sustainability of water resources.
- It is used in public parks, home gardens, farms, fire stations and sprayed in hot areas to bring down the temperature and adds economic value, which has enhanced the growth of the treated wastewater market.
- Wastewater treatment is expected to help Dubai tackle its water shortage problems to a certain extent, while charging customers a fee for use of treated wastewater is expected to lead to efficient use.





## Outlook and Mega Trends for Energy and Water in Dubai

**Green initiatives and aggressive sustainability targets supported by significant investments expected to drive growth of energy and water industry in Dubai**



- To create a sustainable environment the Government of Dubai has been taking several green initiatives and has set an objective to reduce carbon emissions by 16% by 2021.
- DEWA's main focus in the energy sector is to increase the share of renewables in the energy mix and plans to tap the solar energy.
- It has started installing solar panels in Government buildings and schools and connected them to the smart grid. It also plans to cover residential buildings in the future.
- DEWA is also setting up a solar park, which is one of the largest single-site solar projects in the world with a planned capacity of 5000 MW by 2030.
- With limited water resources available, DEWA plans to increase efficiency in usage through installation of smart meters, waste-water treatment and other smart water solutions.
- Energy and water industry in Dubai is expected to experience a steady demand and the sustainable solution providers are expected to play a bigger role in supporting Dubai achieving a sustainable growth in the future.

Source: DEWA; Frost & Sullivan

Note: ...

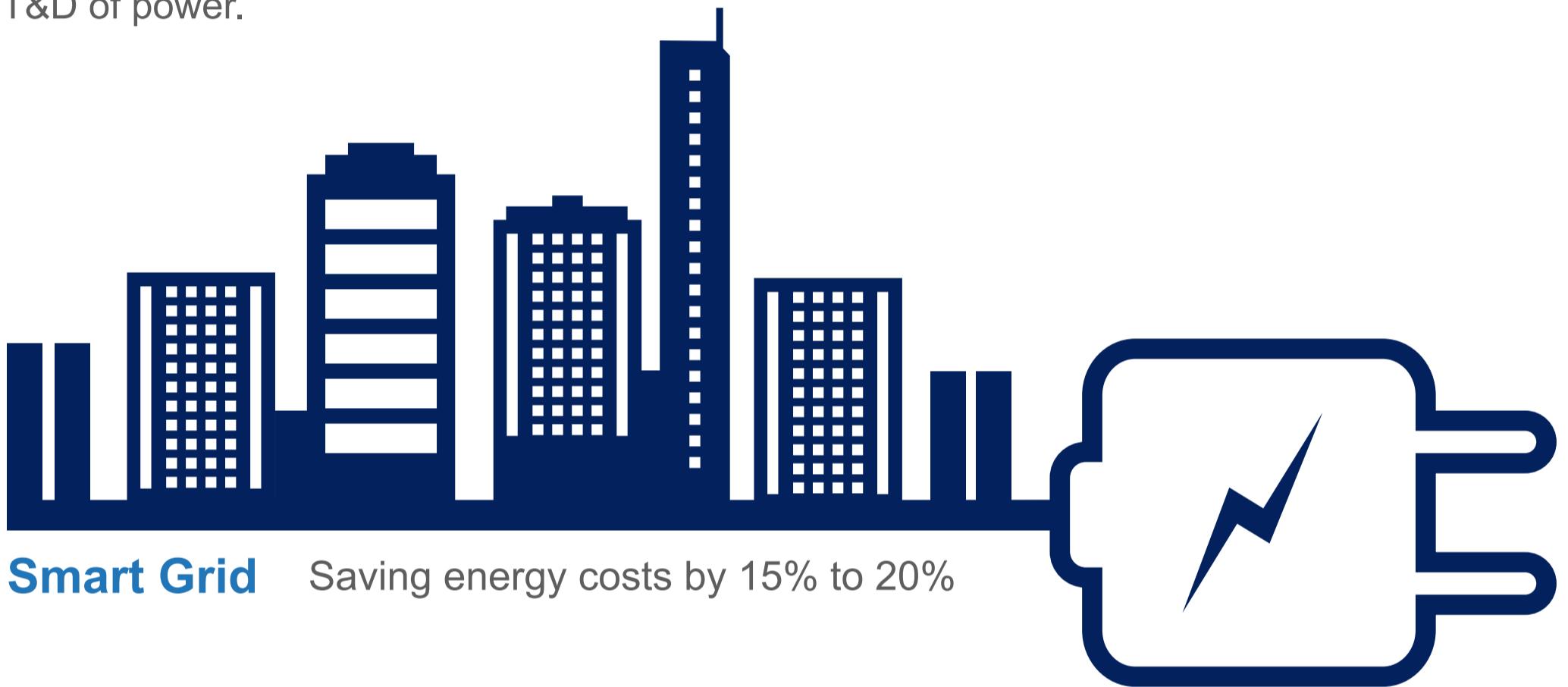




## Outlook and Mega Trends for Energy and Water in Dubai

### Smart Grid — The Future Energy Internet

Smart energy uses digital technology through AMI, distribution grid management, and high voltage transmission systems as well as demand response for the intelligent and integrated T&D of power.



#### Advanced Metering Infrastructure

- Smart meters
- Installation
- Communication systems and networks
- Meter data management agent
- Customer data and program management



#### High-voltage Transmission Technologies

- Flexible alternate current (AC) transmission systems (FACTS)
- High and ultra-high voltage DC
- Grid monitoring systems



#### Demand Response

- Power curtailment revenue
- Home-area network and management
- Smart home appliances



#### Distribution Grid Management

- Distribution automation
- Substation automation and integration
- Field equipment



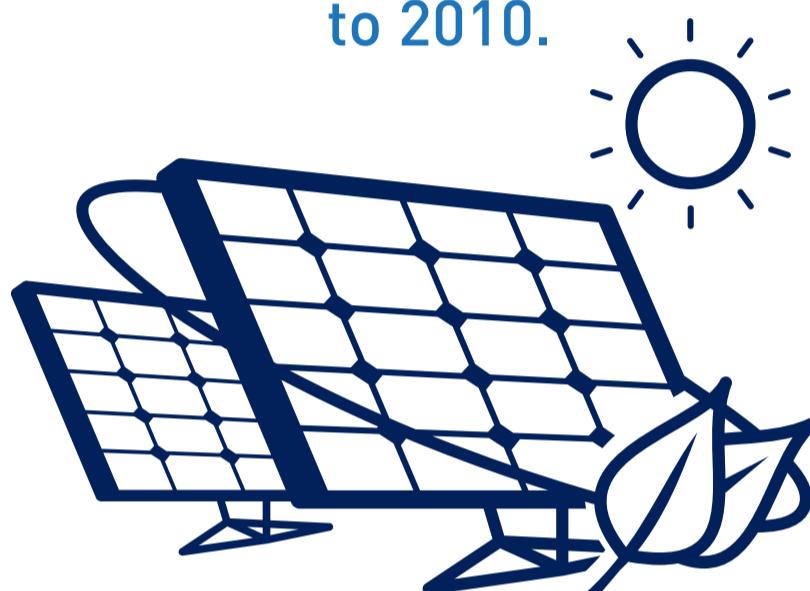
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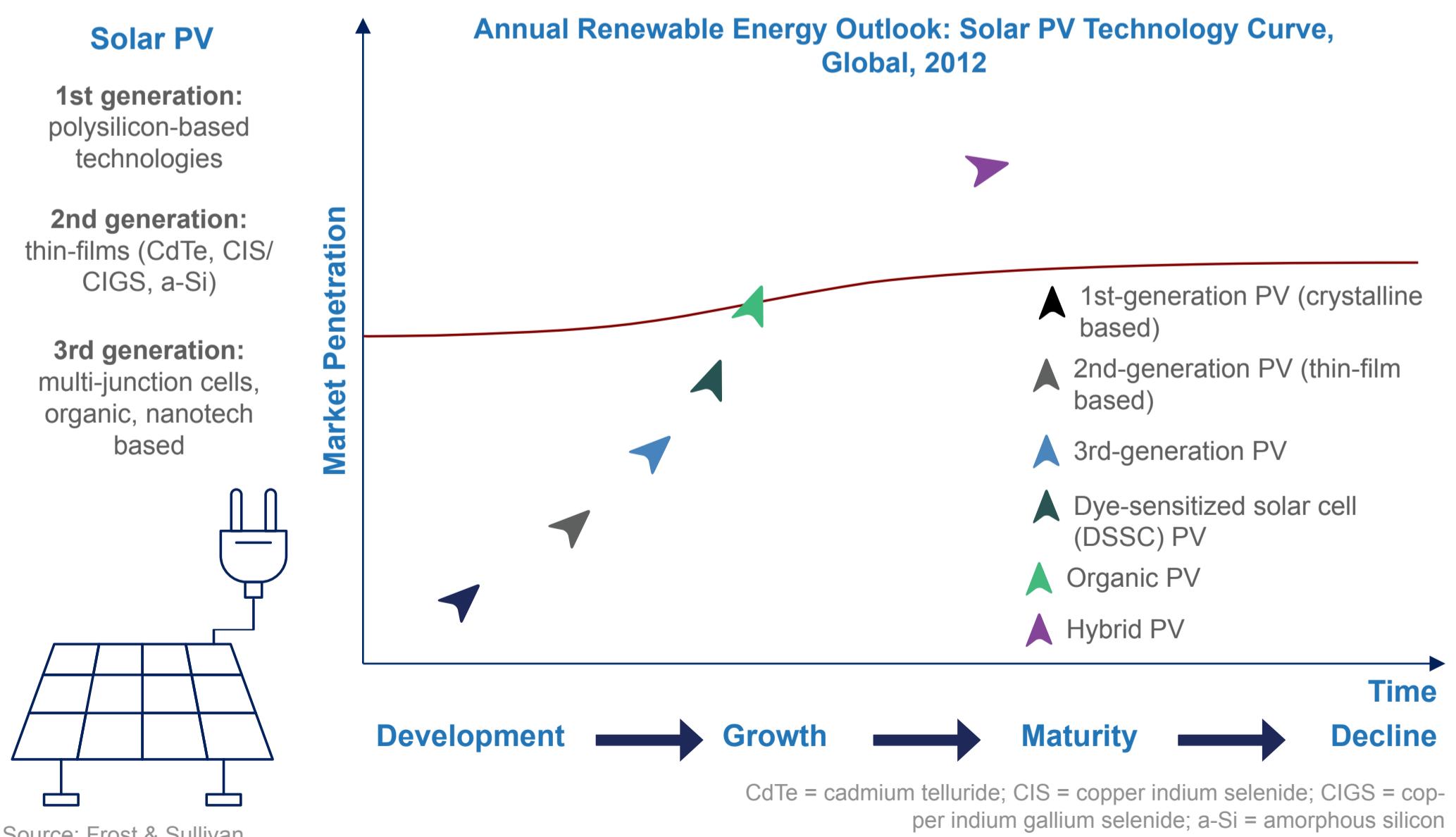


## Outlook and Mega Trends for Energy and Water in Dubai

**Solar PV Energy Outlook – Solar PV's share of total power generation capacity is expected to increase more than 5-fold by 2020 compared to 2010.**



Solar PV is a technology that converts sunlight into electricity, which is used generally for power connected to a grid that can operate commercial equipment and consumer appliances.





## Outlook and Mega Trends for Energy and Water in Dubai

### Energy Management Systems—Energy Efficiency and Smart Buildings

Future of energy management is expected to drive a multiple convergence of technologies, markets, competition, and business models.



Source: Frost & Sullivan

Note: ...



## Outlook and Mega Trends for Energy and Water in Dubai

### Macro-to-micro Implications of Future of Energy on Future Industries, People, and Businesses



#### Macro-to-micro Implications of Future of Energy

##### Small-scale distributed generation (DG) from Renewables

- There is a huge opportunity to meet CO2 reduction targets using DG solutions at the point of consumption.
- DG currently accounts for approximately 20% of the generating capacity worldwide, 55% of which is renewable.
- Smaller-scale DG, domestic solar, and biomass combined heat and power (CHP) are some other opportunities.

##### Energy Storage

- Storing energy is one of the missing links in the energy network.
- With storage, the potential of renewables can be fully exploited, the utilization of CHP plants can be increased, peak capacity can be reduced, and strategic placement of storage solutions can defer grid investment.

##### WTE

- The global shift from coal and nuclear power to renewable energy to lower carbon dioxide emission and ensure energy security is boosting the WTE plant market.
- The global WTE plant market finds that the market earned revenue of \$17.98 billion in 2012 and estimates this to increase to \$28.57 billion in 2016.



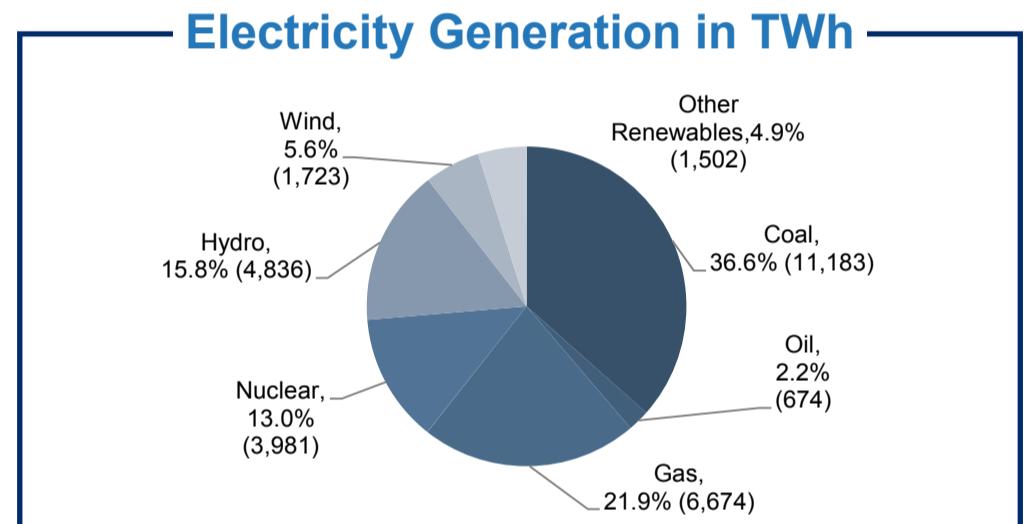
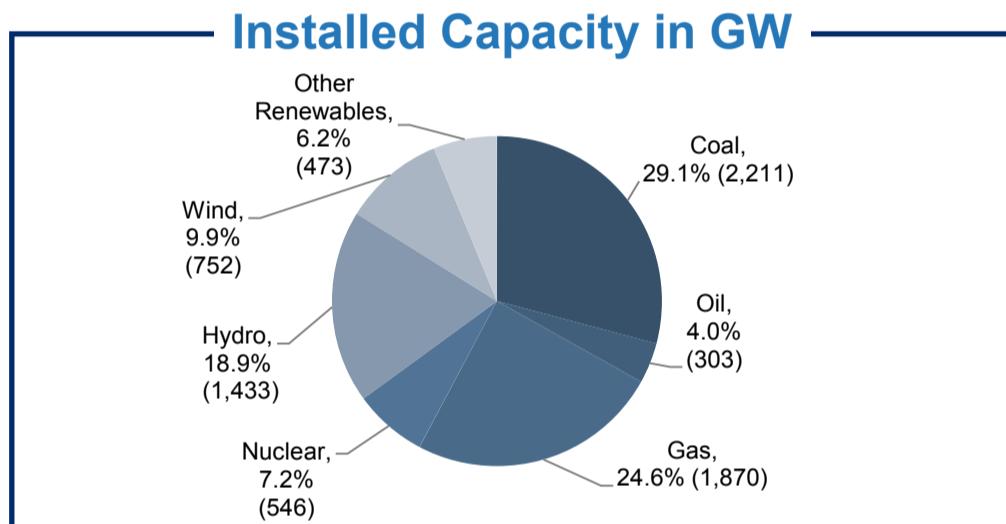
## Outlook and Mega Trends for Energy and Water in Dubai

### Power and Water Infrastructure

Over \$800 billion is expected to be invested annually in power infrastructure worldwide through 2025; The water infrastructure ecosystem, will be the key focus area of governments worldwide for water security and economic development.



#### Power Infrastructure — Installed Capacity and Electricity Generation Forecast by Fuel, Global, 2025



### Water Infrastructure Ecosystem

#### Drinking Water Supply

- The system of pipes, storage reservoirs, pumps, valves, filtration, and treatment equipment are included.
- The system is used for the collection, treatment, and distribution of drinking water.

#### Wastewater Treatment

- Treatment consists of a blend of physical, biological, and chemical operations to eliminate solids, organic matter and, sometimes, nutrients from wastewater.

#### Industrial Water Supply

- Water for industrial use may be delivered from a public supplier or be self supplied.
- Water supply for small-scale industries is provided by public water systems, while large-scale industries will often have their own water supply systems.



## Outlook and Mega Trends for Energy and Water in Dubai

### Water Desalination as a Future Water Source

Water desalination is a viable option to increase water supply and quench global thirst in the future.

**The high demand for water reveals the urgent need for effective management and development of water resources using methods such as desalination. Currently, 16,000 desalination plants worldwide are producing billions of liters of clean water every day.**

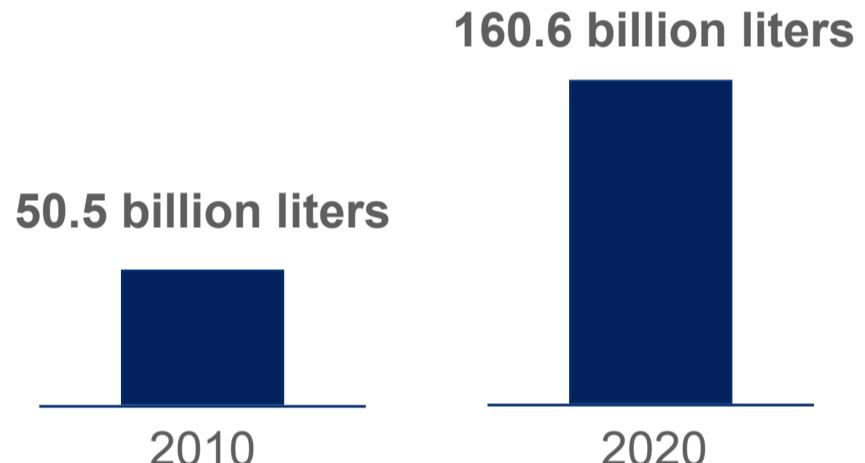


#### Total Amount of Water from Desalination, Global, 2010 and 2020

##### Future Initiatives to Increase the Demand for Desalination

##### Technology

- Government implementation of water trading between businesses; tax redemption and allowances
- Technical advancements with faster payback period and a system that could be retrofitted with minimal downtimes



#### Key Developments in Desalination, Global, 2010–2020

| Improvement Area | Expected Further Improvements | Description  |
|------------------|-------------------------------|--|
| Energy Recovery  | ++                            | Energy recovery devices have become a standard in reverse osmosis (RO) desalination plants and have exponentially reduced the costs of desalination.   |
| Process Design   | +                             | The arrival of engineering companies with a global focus and expertise in desalination allowed exponential achievements that were to a large extent a major reason for the reduction in the costs of desalination. |
| Membranes        | +++                           | Improvements in membrane performance guaranteed a lower cost of water per square meter and further reduced the overall cost of desalination.   |
| Privatization    | +++                           | Currently, specialized companies run most of the large global desalination plants, thus guaranteeing state-of-the-art methodologies and improved efficiency.   |

Source: Frost & Sullivan

Key: +++ = Expected ++ = likely + = not likely



## Outlook and Mega Trends for Energy and Water in Dubai

### Developing Water Business Model

Increasing demand for efficient water management is driving new business models in the water industry that can help overcome the water scarcity problem in the future.

#### Rejuvenation of the PPP Model

- Includes different models created by the partnership of public and private organizations to develop water infrastructure
- The following models are included:
  - BOO
  - BOT
  - Design, build, finance, and operate (DBFO)

#### Waste for Value

- Refers to monetizing waste streams into reusable water/energy
- Reduces the costs of wastewater disposal, electricity, and clean water as well as improves overall efficiency
- Helps reduce the plant's carbon footprint

#### Water Trading

- Refers to buying and selling of rights to water access
- Helps promote more efficient water allocation as it differentiates the low-value and high-value water activities
- Driven by the need to manage increasing global population, urbanization, and climate variations

#### Water as a Service

- A modern, innovative business concept that has become a significant part of the managed liberalization model
- Helps local entrepreneurs do business with financially weak water utilities
- Example: Aqua America project for shale gas

Source: Frost & Sullivan

PPP = public-private partnership





## APPENDIX

### Appendix

#### Glossary & Definitions

| Abbreviation             | Expansion  |
|--------------------------|--|
| ADNOC                    | Abu Dhabi National Oil Company   |
| AED                      | United Arab Emirates Dirham  |
| DEWA                     | Dubai Electricity and Water Authority  |
| DM                       | Dubai Municipality   |
| DSCE                     | Dubai Supreme Council of Energy  |
| DSOA                     | Dubai Silicon Oasis Authority  |
| ENOC                     | Emirates National Oil Company  |
| EPC                      | Engineering, Procurement, and Construction   |
| ESCO                     | Energy Service Company   |
| FEWA                     | Federal Electricity and Water Authority  |
| GCC                      | Gulf Cooperation Council   |
| KEPCO                    | Korea's Electric Power Company   |
| RTA                      | Roads and Transport Authority  |
| UAE                      | United Arab Emirates   |
| Definition               |  |
| Middle East              | Bahrain, Iran, Iraq, Jordan, Kuwait, Lebanon, Oman, Qatar, Saudi Arabia, Syrian Arab Republic, the United Arab Emirates and Yemen                          |
| Gulf Cooperation Council | Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, and the United Arab Emirates   |
| United Arab Emirates     | Emirate of Abu Dhabi, Emirate of Ajman, Emirate of Dubai, Emirate of Fujairah, Emirate of Ras al-Khaimah, Emirate of Sharjah, and Emirate of Umm al-Quwain |





## APPENDIX

### Appendix

#### DEWA's green initiatives strive to create a sustainable environment – key objective to increase share of renewables in the energy mix

##### **SHAMS Dubai**

- This smart initiative launched by DEWA, encourages households and building owners to install Photo Voltaic panels to their buildings to generate electricity from solar energy and connect them to DEWA's grid.
- The electricity generated will be used onsite and the excess electricity generated would be transmitted to DEWA's grid.

##### **Dubai Integrated Energy Strategy (DIES) 2030**

- The main aim of the strategy is to make the Emirate a role model in power security and reduce energy demand by 30% by 2030.
- The energy diversification strategy, which is a part of DIES 2030 aims to increase the share of renewable energy in Dubai's energy mix to 7% by 2020 and 15% by 2030.

##### **Dubai Clean Energy Strategy 2050**

- The strategy aims to diversify the energy mix and increase the share of clean energy sources to 7% by 2020, 25% by 2030 and 75% by 2050.
- The strategy consists of five main pillars: infrastructure, legislation, funding, building capacities and skills, and a environment-friendly energy mix.
- Dubai Green Fund is a part of the infrastructure pillar worth AED 100 Billion, which will provide funding for investors in the clean energy sector

##### **Green Charger – Electric Vehicles**

- The DSOA has started an initiative by which electric vehicle owners in Dubai can charge their vehicles free of cost in the charging stations present in the Dubai Silicon Oasis free zone.
- The initiative is in line with Dubai's Clean Energy strategy and is expected to reduce carbon emissions.

##### **UAE Vision 2021**

- Set of key themes that showcases UAE's vision for socio-economic development in the next decade.
- One of the themes is 'Sustainable Environment and Infrastructure' for which the Government plans to improve the quality of air, preserve natural resources, use innovative methods for waste treatment, and increase contribution of clean energy in line with its vision to become a Green economy.

##### **Dubai Plan 2021**

- The plan is built on six different themes and the theme that focuses on sustainability is 'The Place: A Smart & Sustainable City'.
- Objective of the theme is to reduce dependence on non-renewable resources by protecting natural resources and ensuring availability of clean energy for consumption.

Source: DEWA; Frost & Sullivan

