



# MOHAMMED BIN RASHID AL MAKTOUM SOLAR PARK

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**THE FUTURE STARTS HERE**



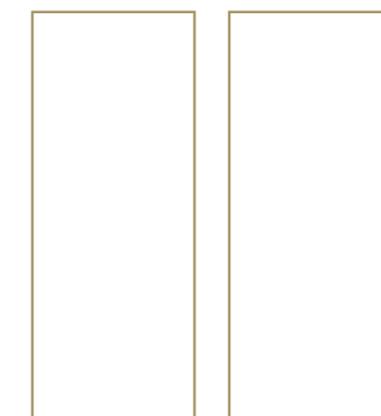
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The UAE is striving to develop and boost its rich resources and expertise in the international energy markets and enhance its leading role as a world centre for renewable energy research and development.

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**His Highness Sheikh Khalifa bin Zayed Al Nahyan**

President of the United Arab Emirates





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Every investment in the development of clean energy sources is at the same time an investment to protect the environment for future generations.

”

**His Highness Sheikh Mohammed bin Rashid Al Maktoum**

Vice President and Prime Minister of the UAE and Ruler of Dubai

## MOHAMMED BIN RASHID AL MAKTOUM SOLAR PARK

The United Arab Emirates and Dubai in particular, has made unprecedented achievements, which have put the UAE on the list of countries that are more competitive globally. This was the result of the efforts of our wise leadership to create a healthy business environment characterised by the availability of high levels of modern standards, quality and efficiency of services.

On the renewable energy side, the UAE has taken a global leading role by being selected to host the headquarters of the International Renewable Energy Agency (IRENA).

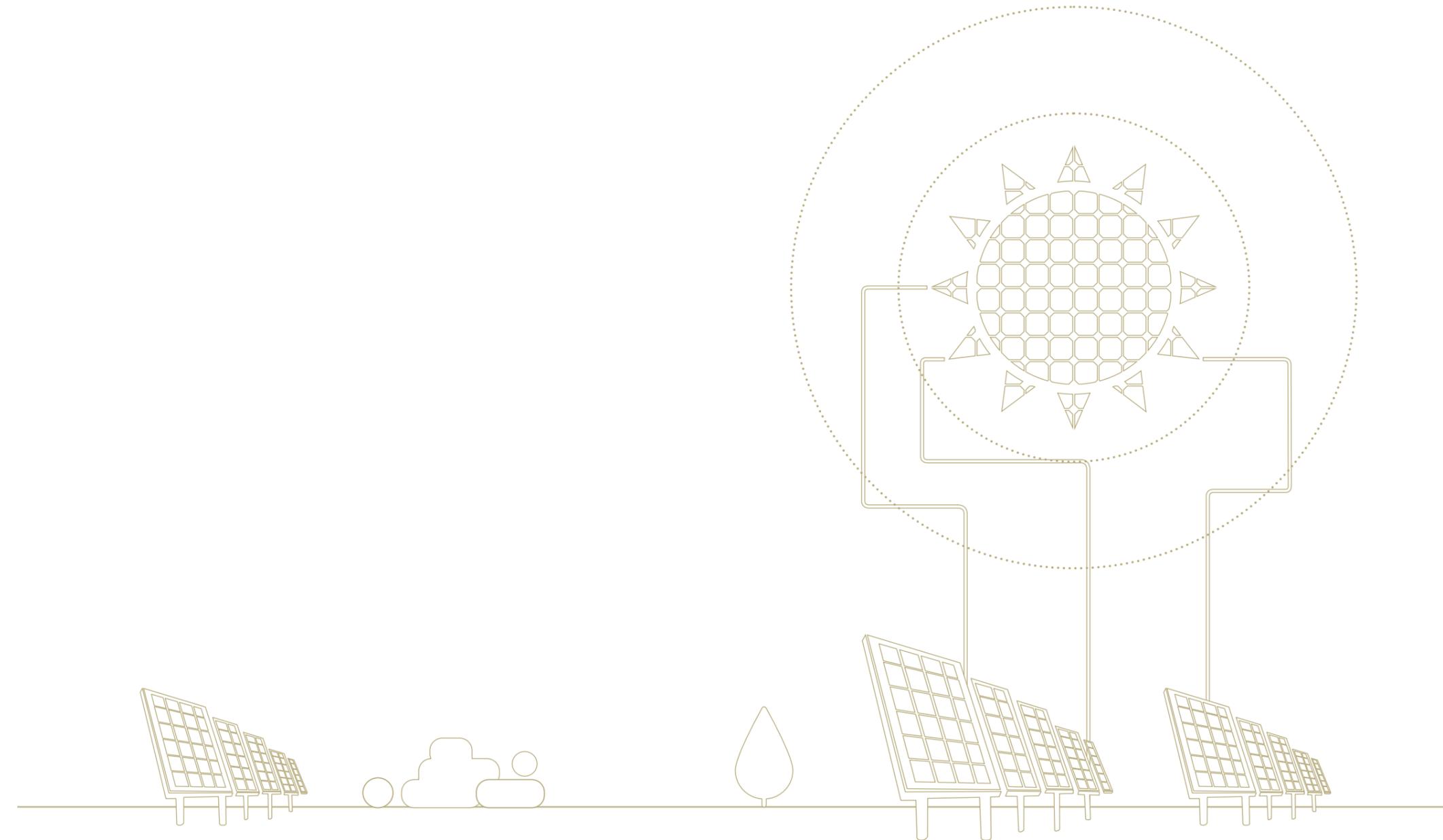
Electricity is an important part of the infrastructure that helps the sustainable development of any country. Therefore we had to develop policies and mechanisms to ensure the availability and reliability of power supply, for the current and future generations through the adoption of best practices and effective programmes to ensure efficient management while preserving the environment and ensuring resources sustainability.

The Dubai Supreme Council of Energy aims to ensure availability and reliability of energy supply while preserving natural resources through effective steps to address the challenges of climate change and the application and development of renewable energy technologies.

The Mohammed bin Rashid Al Maktoum Solar Park is leading the inclusion of renewable resources to Dubai's energy mix and we count on the contribution of the park towards Dubai's sustainability. We ask Allah to bless and guide us to the future we aspire to reach and that Dubai's efforts to increase the use of renewable energies will match the efforts of nations around the world; as we all strive to preserve our resources and protect our environment.



**His Highness Sheikh Ahmed bin Saeed Al Maktoum**  
Chairman of the Dubai Supreme Council of Energy





**His Excellency Saeed Mohammed Al Tayer**

Vice Chairman of the Dubai Supreme Council of Energy,  
MD & CEO of DEWA

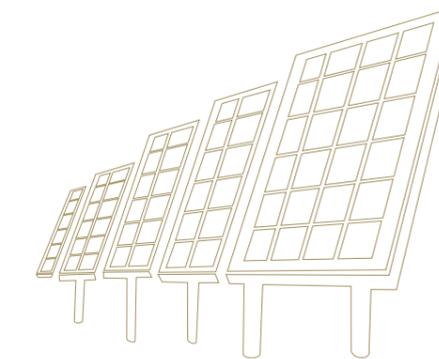
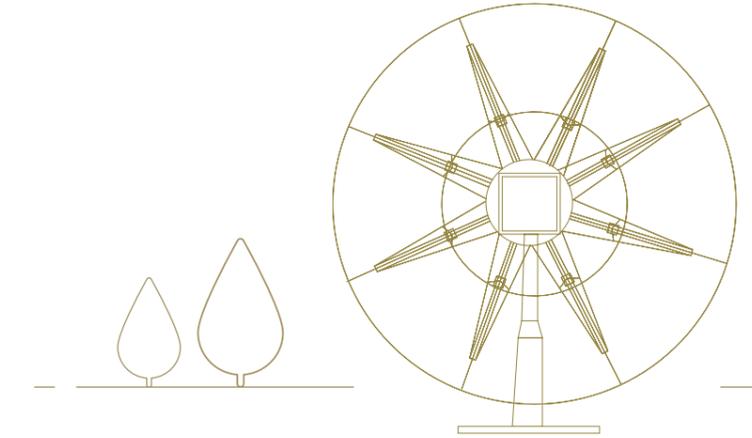
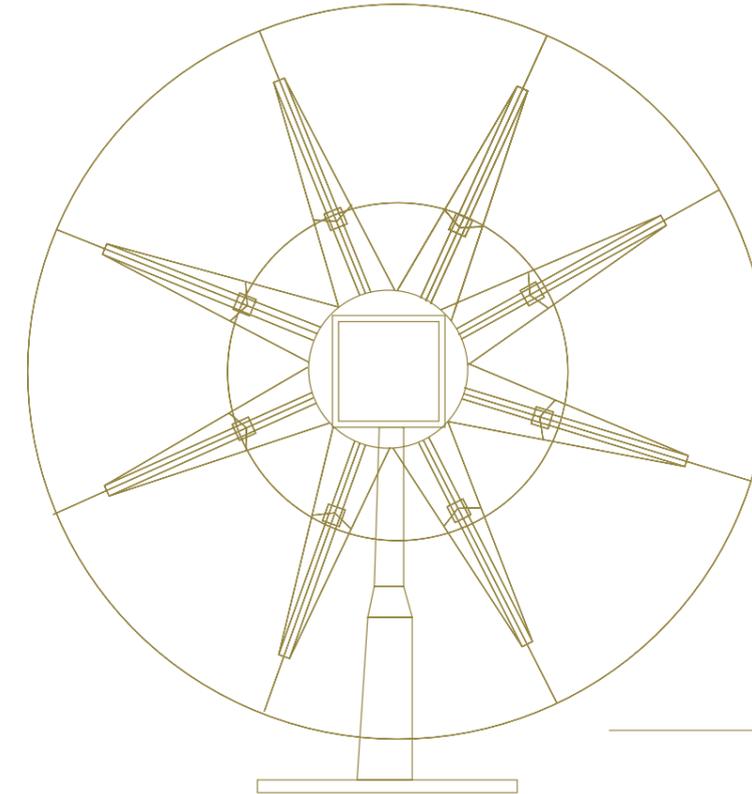
The remarkable vision and steady guidance of HH Sheikh Mohammed bin Rashid Al Maktoum, Vice President and Prime Minister of the UAE and Ruler of Dubai, has provided a roadmap for our ambitious initiatives and development projects to realise the UAE Vision 2021.

The vision aims to make the UAE one of the leading countries in the world by 2021 and strengthen Dubai's position as a global hub for trade, finance and tourism, and a model for the world in achieving the highest standards of energy efficiency and renewable-energy use. The Mohammed bin Rashid Al Maktoum Solar Park is a key factor in achieving the Green Economy for Sustainable Development initiative launched by His Highness, to build a green economy in the UAE and achieve sustainable development. The solar park offers plenty of promising investment opportunities that strengthen energy partnerships and investments between the public and private sectors, as the future phases of the Solar Park will produce renewable energy based on the Independent Power Producer (IPP) model.

In November 2015, HH Sheikh Mohammed bin Rashid Al Maktoum, launched the Dubai Clean Energy Strategy 2050, to make Dubai a global centre of clean energy and green economy by providing 7% of Dubai's energy from clean energy sources by 2020, 25% by 2030 and 75% by 2050. The strategy consists of five main pillars: infrastructure, legislation, funding, building capacities and skills, and an environmentally friendly energy mix.

The Mohammed bin Rashid Al Maktoum Solar Park is the largest single-site solar park in the world. Using the Independent Power Producer (IPP) model, it will have a production capacity of 5,000MW by 2030 with investments totalling AED 50 billion. Upon completion, the solar park will reduce over 6.5 million tonnes of carbon dioxide emissions annually and provide thousands of jobs in clean energy and green economy.

The UAE and especially Dubai have impressed the world with their remarkable achievements and will continue to always be at the forefront to achieve prosperity for the country and happiness for its citizens.



## DUBAI CLEAN ENERGY STRATEGY 2050

The Dubai Clean Energy Strategy 2050 aims to diversify the energy mix so clean energy will generate 7% of Dubai's total power output by 2020, 25% by 2030 and 75% by 2050. The strategy consists of five main pillars: Infrastructure, Legislation, Funding, Building capacities and skills, and an Environmentally-friendlyenergymix.

### INFRASTRUCTURE

The infrastructure pillar includes initiatives such as the Mohammed bin Rashid Al Maktoum Solar Park, which is the largest single-site solar park in the world with a planned capacity to produce 5,000MW by 2030. It will help achieve a reduction of approximately 6.5 million tonnes of carbon emissions annually, with a total investment of AED 50 billion.

The infrastructure pillar also includes a comprehensive innovation centre. The R&D centre focuses on renewable energy, producing electricity using solar power, and smart grids and water networks. The infrastructure pillar also includes the establishment of a new free zone called Dubai Green Zone, dedicated to attracting R&D centres and emerging companies in clean energy.



### LEGISLATIVE STRUCTURE

The second pillar focuses on the establishment of a legislative structure supporting clean energy policies through the Shams Dubai initiative, to support the Dubai Clean Energy Strategy.

### FINANCING SOLUTIONS

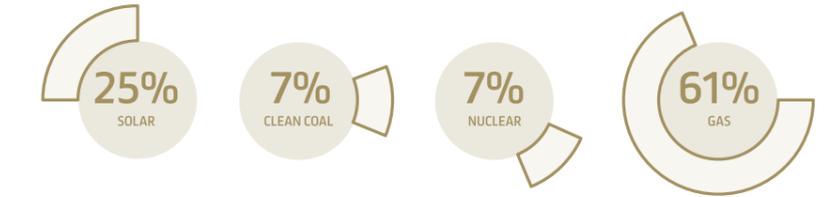
For funding through the Dubai Green Fund, the third pillar covers financing solutions for investment in R&D on clean energy and its applications. This pillar includes the establishment of the Dubai Green Fund, which is worth AED 100 billion.

### DEVELOPING CAPABILITIES

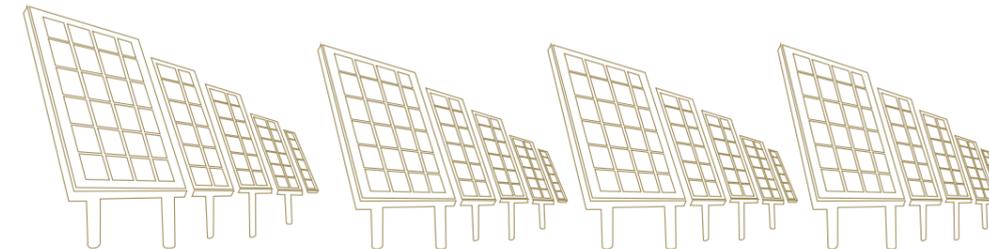
The fourth pillar aims to develop the capabilities of employees through global training programmes in clean energy, in cooperation with international organisations and institutes, as well as international companies and R&D centres.

### ENVIRONMENTALLY-FRIENDLY ENERGY MIX

The fifth pillar is focused on creating an environmentally-friendly energy mix with solar energy generating 25%, nuclear power 7%, clean coal 7%, and gas 61% by 2030. The mix will gradually increase the employment of clean energy sources to 75% by 2050.



Environmentally-Friendly Energy Mix By 2030



## THE UAE IS IDEALLY LOCATED FOR SOLAR ENERGY

The location of the United Arab Emirates and Dubai within the Sunbelt highlights solar energy's major role as a renewable source of energy. In Dubai, available global irradiation usable by photovoltaic technology averages 2,150 kWh/m<sup>2</sup>/y (kilowatt hours per square metres per year). These figures mean the solar energy is an optimal energy source in Dubai.



## KEY SOLAR PROJECTS AND PROGRAMMES IN DUBAI

### Shams Dubai Initiative

This leading initiative supports the vision of HH Sheikh Mohammed bin Rashid Al Maktoum, Vice President and Prime Minister of the UAE and Ruler of Dubai, to make Dubai the smartest city in the world. It also supports diversifying the energy mix by promoting the use of clean and renewable energy sources to build a sustainable future for the Emirate. Launching the initiative implements Council resolution number 46 of 2014, issued by HH Sheikh Hamdan bin Mohammed bin

Rashid Al Maktoum, Crown Prince of Dubai and Chairman of the Dubai Executive Council, to regulate the connection of solar energy to Dubai's power grid. The initiative encourages household and building owners to install photovoltaic panels to generate electricity, and connect them to DEWA's grid. The electricity is used on site and the surplus is exported to DEWA's grid.

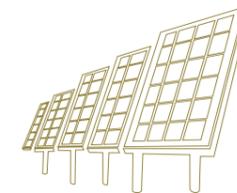




## MOHAMMED BIN RASHID AL MAKTOUM SOLAR PARK

The Mohammed bin Rashid Al Maktoum Solar Park was announced in January 2012 in line with the vision and directives of HH Sheikh Mohammed bin Rashid Al Maktoum, Vice President and Prime Minister of the UAE, and Ruler of Dubai, to enhance the sustainable development of Dubai. It also supports the Dubai Clean Energy Strategy 2050 to make Dubai a global centre of clean energy and green economy. The strategy also aims to provide 7% of Dubai's energy from clean energy sources by 2020, 25% by 2030 and 75% by 2050. DEWA is managing the Solar Park, which is the largest renewable-energy project on a single plot in the world with a planned production capacity of 5,000 MW upon completion in 2030.

# 5,000MW BY 2030



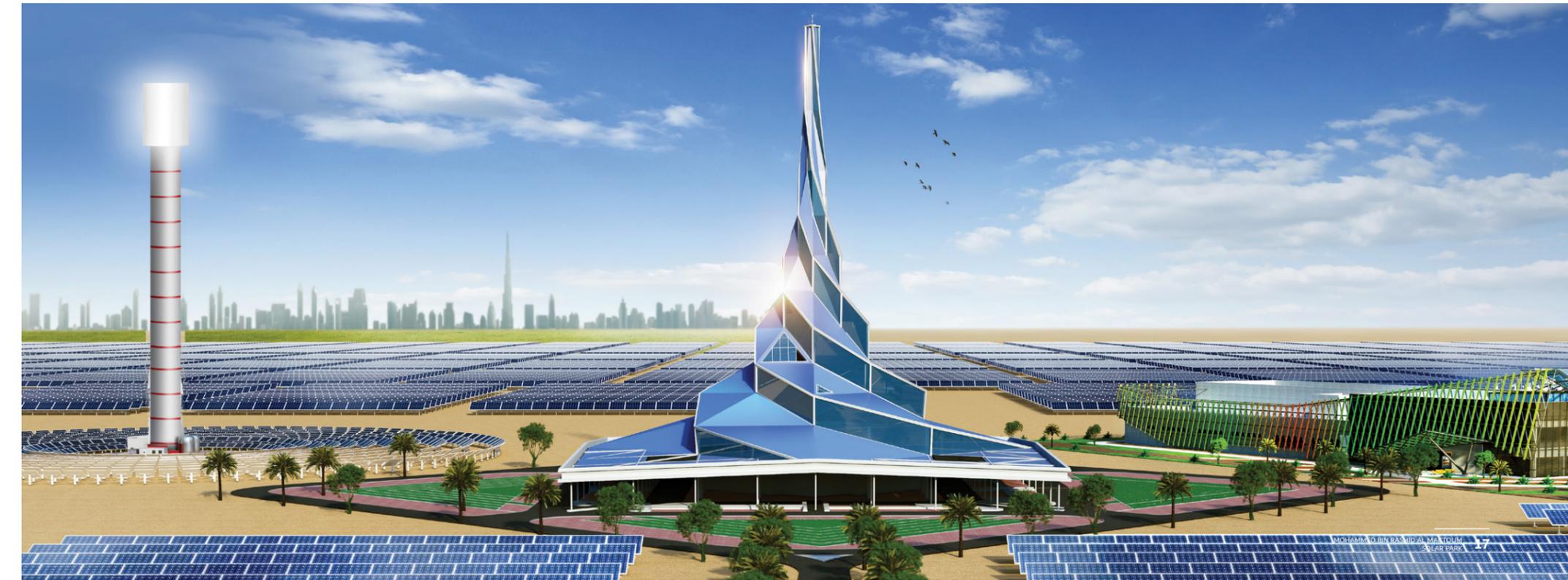
## MOHAMMED BIN RASHID AL MAKTOUM SOLAR PARK PROJECTS

### • Energy Production Projects

- First Phase: 13MW photovoltaic commissioned on 22 October 2013
- Second Phase: 200MW photovoltaic commissioned on 20 March 2017
- Third Phase: 800MW photovoltaic will be implemented in stages, commissioned by 2020
- Fourth Phase: 950MW (700MW CSP and 250MW PV) will be commissioned in stages starting from Q4 of 2020.
- Fifth Phase: 900MW photovoltaic, will be commissioned in stages starting from Q2 of 2021.
- Future Phases: up to 5,000MW by 2030

### • Innovation Centre

- **Research & Development (R&D) Centre with a solar testing facility and Photovoltaic Reverse Osmosis Project (PVRO)**



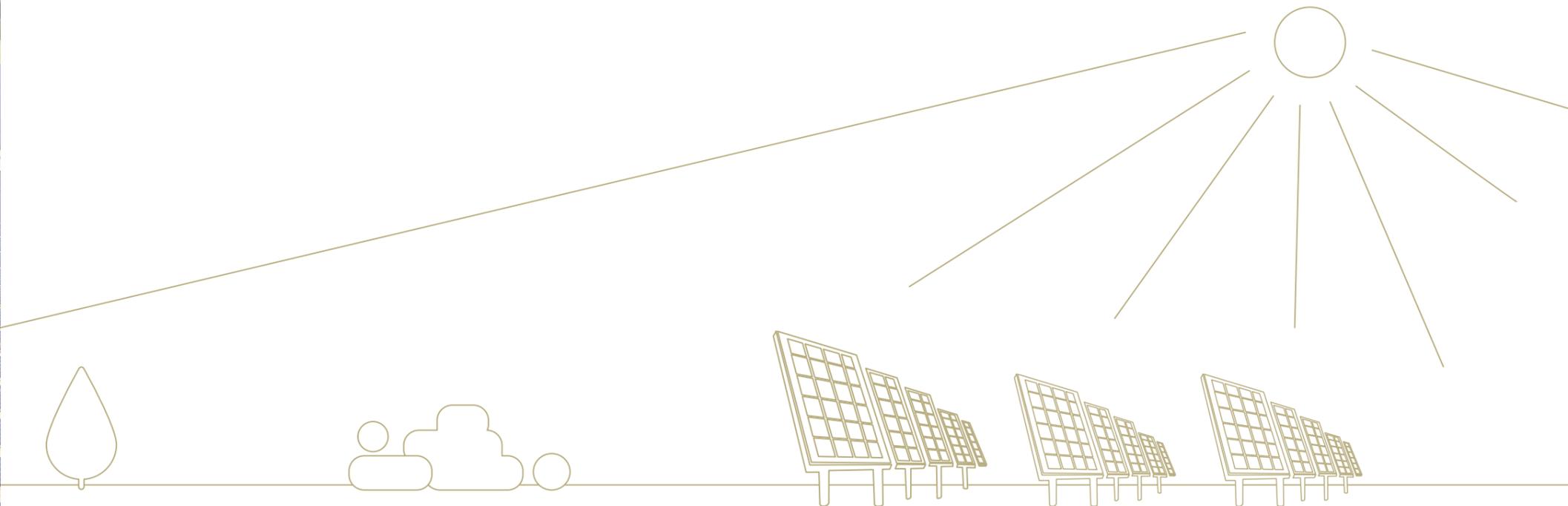


## MOHAMMED BIN RASHID AL MAKTOUM SOLAR PARK

# 1

### First Phase

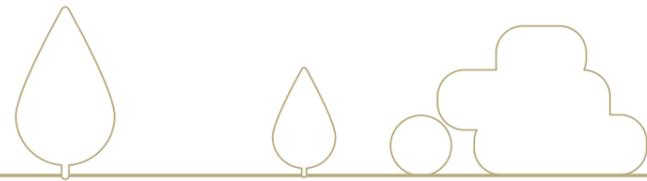
On 22 October 2013, His Highness Sheikh Mohammed bin Rashid Al Maktoum, Vice President and Prime Minister of the UAE and Ruler of Dubai, inaugurated the first phase of the project, with a capacity of 13MW generated by photovoltaic technology. It was one of the largest photovoltaic power generation projects in the MENA region at the time. The project reduces about 15,000 tonnes of carbon emissions a year, and uses over 152,000 photocells to generate over 28 million kilowatt-hours of electricity annually, while being connected to the network in Dubai.



# 2

## Second Phase

On 20 March 2017, His Highness Sheikh Mohammed bin Rashid Al Maktoum, Vice President and Prime Minister of the UAE and Ruler of Dubai, inaugurated the second phase, with a capacity of 200MW generated by photovoltaic technology. The project is currently the largest single-site solar park in the world, based on the IPP model. The project was implemented through a partnership with the consortium led by ACWA Power from Saudi Arabia, and Spain's TSK, with an investment of AED 1.2 billion. The project will provide clean energy to 50,000 residences in the Emirate, reducing 214,000 tonnes of carbon emissions a year. This phase installed 2.3 million photovoltaic solar panels over an area of 4.5 square kilometres with 1.5 million Safe Man Hours without Lost Time Injury during project execution.



# 3

## Third Phase

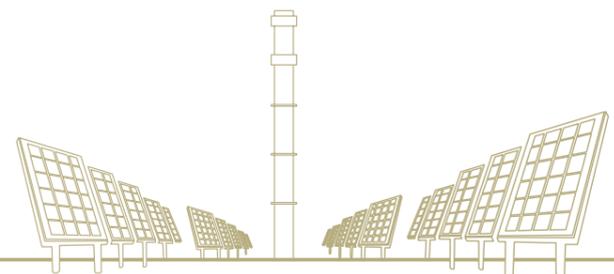
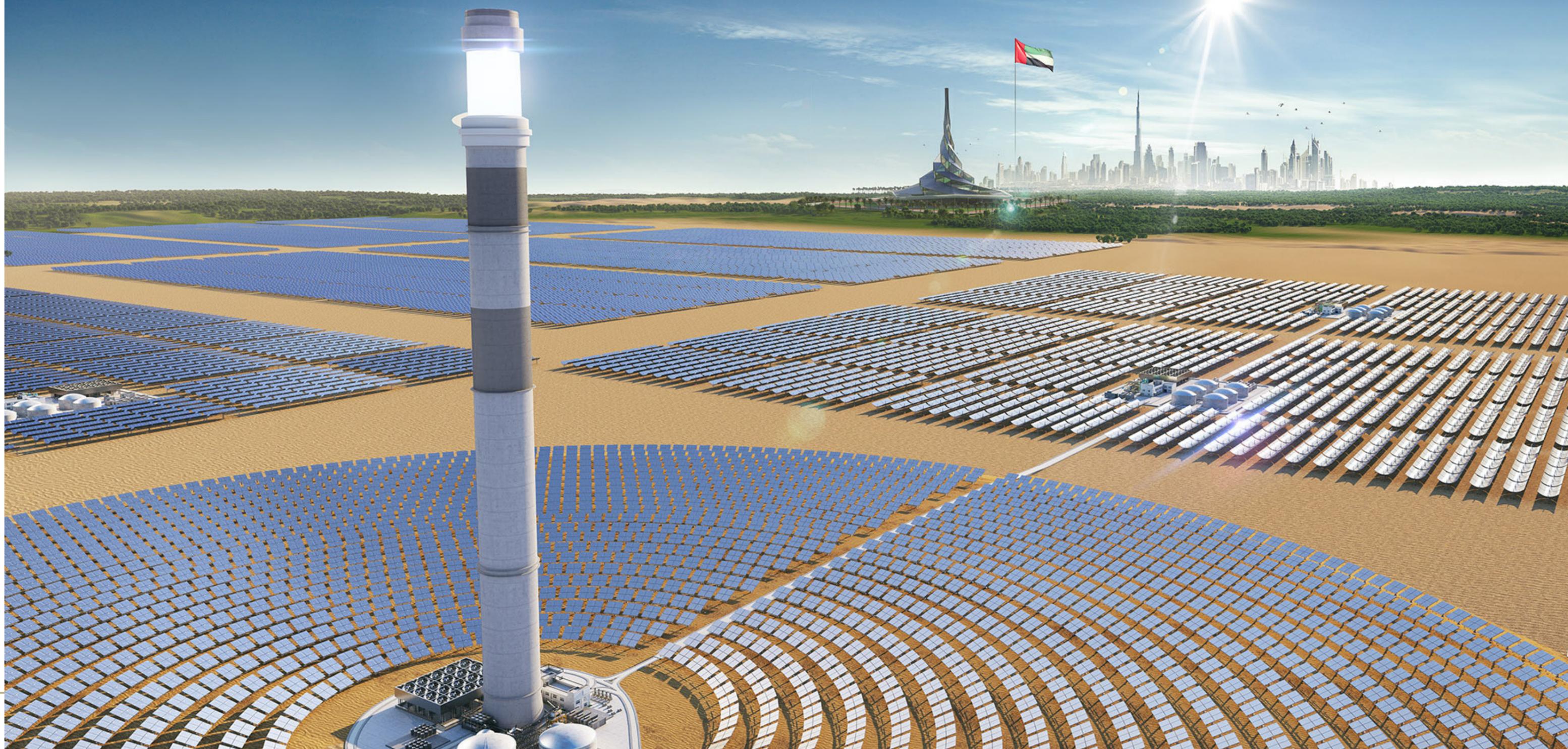
In June 2016, DEWA announced the Abu Dhabi Future Energy Company (Masdar) led consortium as selected bidder for the 800MW third phase of the solar park. The consortium bid the lowest cost of electricity, which will be constructed based on the IPP model. The consortium bid USD 2.99 cents per kilowatt-hour (kWh). The third phase will be implemented in stages until 2020.

In May 2018, HH Sheikh Mohammed bin Rashid Al Maktoum, Vice President and Prime Minister of UAE and Ruler of Dubai, has inaugurated the 200 megawatt (MW) first stage of the 800MW third phase of the Mohammed bin Rashid Al Maktoum Solar Park. The solar park is one of the major projects that DEWA is implementing based on the Independent Power Producer (IPP) system in partnership with a consortium led by Abu Dhabi Future Energy Company (Masdar) and EDF Group, through its subsidiary EDF Énergies Nouvelles. The second and third stages of the third phase, which have a capacity of 300MW each, will be completed in 2019 and 2020 respectively.

# 4

## Fourth Phase

The fourth phase of Mohammad bin Rashid Al Maktoum solar park is the largest single-site solar IPP project in the world that combines CSP and photovoltaic technology. The phase will use three technologies to produce 950 megawatts (MW) of clean energy at an investment of AED 15.78 billion. It will use 700MW of CSP; 600MW from a parabolic basin complex and 100MW from a solar tower; and 250MW from photovoltaic solar panels. The project will use 70,000 heliostats, and the largest global thermal storage capacity of 15 hours; allowing for energy availability round the clock.





## INNOVATION CENTRE

DEWA is working to develop an Innovation Centre, equipped with the latest renewable and clean energy technologies. Through this, DEWA aims to raise awareness on sustainability, while enhancing national capabilities and increasing competitiveness. DEWA's Innovation Centre will comprise of four stories, in addition to a ground floor, standing 90 metres tall. The project will be completed by 2018.

## RESEARCH & DEVELOPMENT CENTRE (R&D)

The Centre focuses on four key research areas. These include producing electricity from solar power and other clean energy technologies; the integration of smart grids; energy efficiency, and water. The R&D Centre has two storeys covering over 4,400 square metres, with one floor for employees and the other for labs. Building-Integrated Photovoltaic Panels (BIPV) are installed on the rooftop and outer walls of the Centre to produce electricity from clean solar power.



### Producing electricity using solar energy

Research, conducted in cooperation with international organisations, will focus on studying photovoltaic panels, and limiting the impact of dust, to maintain their performance. It will also test their long-term capability and develop criteria and specifications that suit the local environment.



### Energy Efficiency

DEWA cooperates with partners and educational institutions all over the world, to invest in innovation and creativity, and work to develop the next generation's capabilities of using solar energy through many pioneering initiatives.



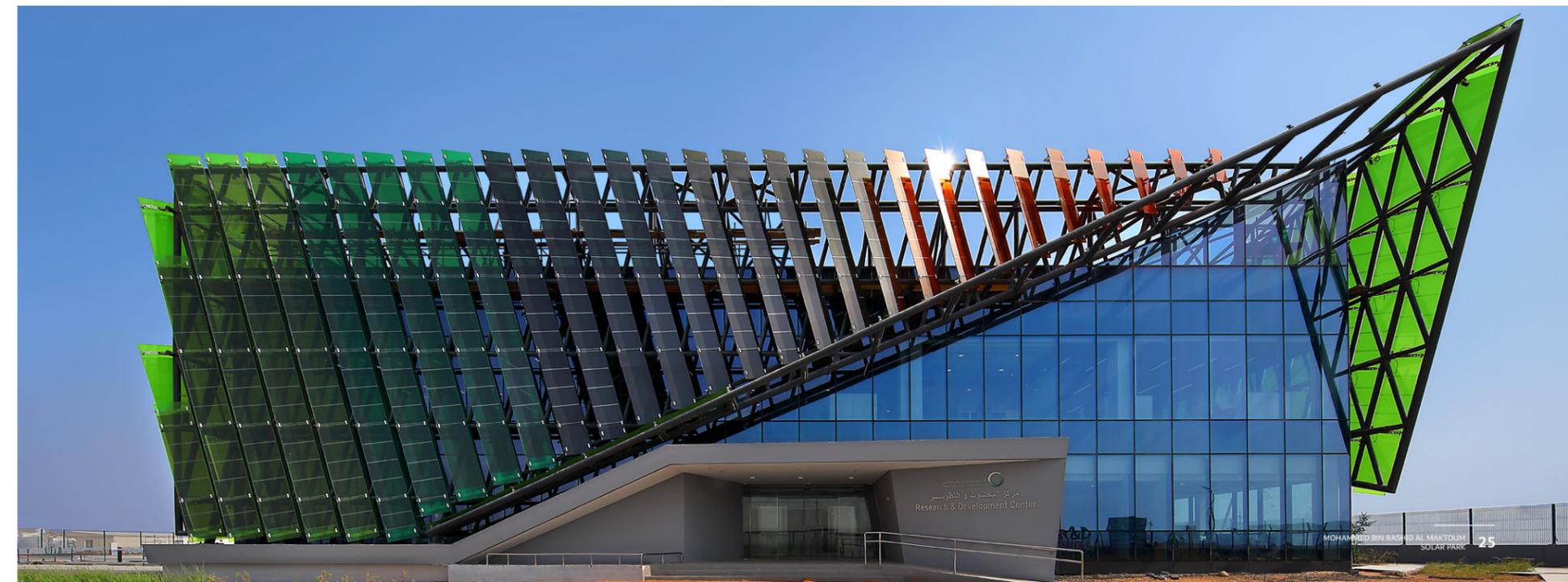
### Integration of Smart Grids

DEWA will conduct research to develop models, and smart grid technologies and systems. These include studying loads, monitoring energy consumption, the effect of new technologies on the grids, renewable energy and storage technologies, electric vehicle infrastructure, 3D printing, and using drone in operations and maintenance.



### Water

DEWA is working to develop sustainable solutions to desalinate and purify water using solar energy. DEWA also aims to develop technology to produce drinking water, by collecting humidity from the air.



## THE CENTRE'S INFRASTRUCTURE INCLUDES:

### • Internal labs

- Electrical characterization Lab
- Mechanical characterization Lab
- Materials characterization Lab
- Solar Simulator Lab
- Accelerated Aging Lab

### • 3D-printing lab

The lab is the first building in the UAE to be fully-printed onsite, and the first such 3D-printed laboratory building in the world.

### • The Photovoltaic solar testing facility (PV testing facility)

The main purpose of the outdoor test facility is to study and evaluate the performance and reliability of solar panels under desert climatic conditions. The center includes more than 30 solar panels of various technologies manufactured by leading international companies. Research at the PV test center involves studying the performance and reliability of solar panels under desert climatic conditions by monitoring performance (energy production, yield, degradation rate, dust effect, etc.) for each solar panel over a long term period. The existing studies contribute to determining the most suitable PV panels and to form a baseline for the development of specifications and standards for photovoltaic equipment in the desert climate.

The outdoor test facility also includes Other testing facility for

- Concentrated solar power ( CSP )
- BIPV Building Integrated Photovoltaic ( BIPV )
- Multi-tilt PV panel
- Single and two axis tracking systems

### • Photovoltaic Powered Reverse Osmosis Water Desalination Plant (PVRO)

For research and development purposes in the field of water desalination using solar energy, DEWA built a pilot solar-powered reverse osmosis water desalination plant, the production capacity is 50 m3 per day of drinking water (With bottled water quality) by desalinating brackish water using solar energy with Energy Storage Batteries.

