UNITED ARAB EMIRATES
MINISTRY OF ECONOMY

INVESTING IN RENEWABLES IN THE UAE

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- Growth outlook for Renewables in UAE
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THE UAE RENEWABLE ENERGY INDUSTRY CONSISTS OF A WIDE RANGE OF SOURCES

SOLAR ENERGY

Energy that can be harnessed directly from the sun to generate electricity or heat water. Solar Energy is integrated worldwide through two ways – Photovoltaics and Concentrated Solar Power (CSP).

WIND ENERGY

Wind is used to produce electricity using the kinetic energy created by air in motion. This is transformed into electrical energy using wind turbines or wind energy conversion systems.

NUCLEAR ENERGY

Nuclear energy is the energy in the nucleus, or core, of an atom. Nuclear energy can be used to create electricity, and it is released from the atom through the process of nuclear fission.

WASTE-TO- ENERGY

Waste-to-energy is the process of generating energy in the form of electricity or heat from the processing of municipal solid waste. This in turn reduces the amount of non-recyclable waste sent to landfills.

GEOTHERMAL ENERGY

Geothermal energy is the heat contained in the rocks and fluids beneath the earth's crust. Geothermal energy is produced by digging deep wells to access steam and hot water to drive turbines connected to electricity generators.

HYDROPOWER

Hydropower, or hydroelectric power, is one of the largest sources of renewable energy, which uses the natural flow of moving water to generate electricity.

HYDROGEN

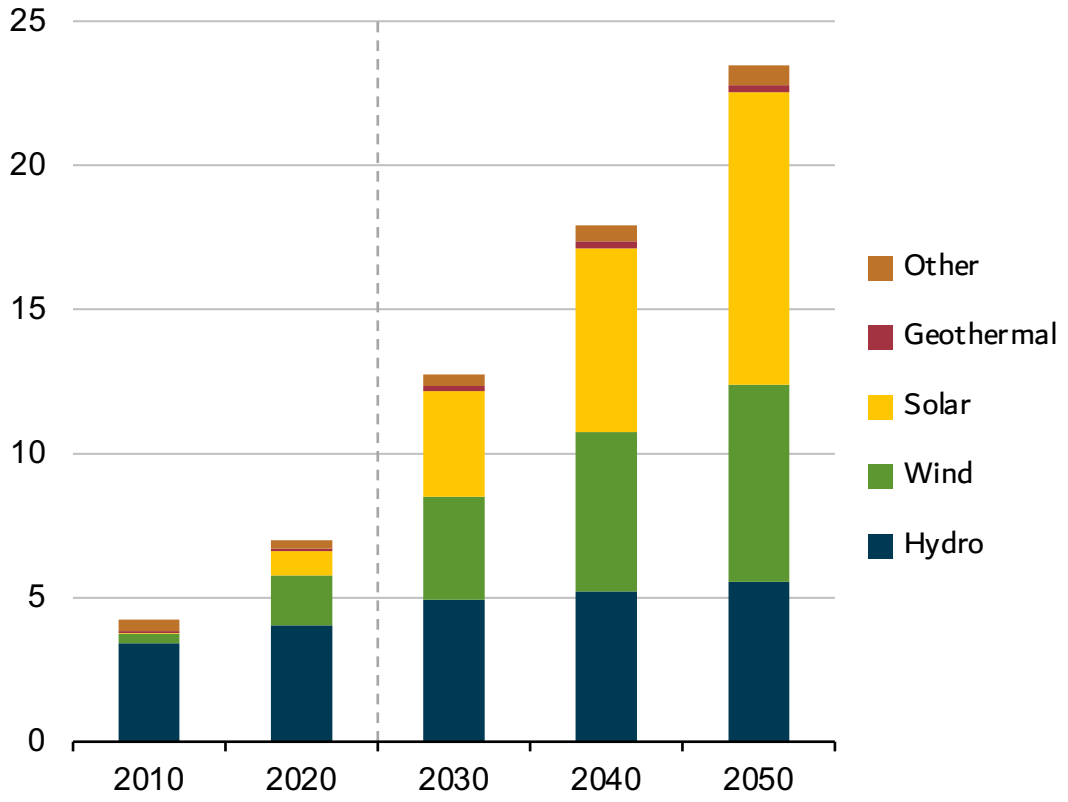
Hydrogen is an energy carrier that can be used to store, move and deliver energy produced from other sources, which are classified based on colours such as Grey Hydrogen, Blue Hydrogen and Green Hydrogen

GLOBAL RENEWABLE INDUSTRY OVERVIEW

Growing Global Renewable Industry

- The global demand for renewables grew by **3% in 2020** and is set to increase across all key sectors – power, heating, industry and transport, making renewable a success story even during the COVID-19 era.
- The global renewable energy market was valued at **$881.7billion in 2020** and is projected to reach **$1,977.6billion by 2030**, growing at a CAGR of **8.4%** from **2021 to 2030.**
- **Long-term contracts, priority access to the grid, and continuous installation of new plants** underpinned **renewables growth** despite lower electricity demand, supply chain challenges, and construction delays in many parts of the world.
- The share of renewables in global electricity generation reached almost **29%** in **2020**, a record annual increase of two percentage points.
- This would be their highest share since the beginning of the Industrial Revolution and up from less than **27% in 2019**.
- Renewables are set to account for almost **95%** of the increase in global power capacity through 2026, with **solar PV and wind** expected to contribute **two-thirds of renewables' growth.**
- Despite **rising costs** and **contract prices**, wind and solar PV generation costs remain **lower** than fossil fuel alternatives, especially given current high natural gas and coal prices.

World net electricity generation from renewables
trillion kilowatt-hours



Source: IEA (international Energy Agency) , eia (US Energy Information Administration)

RENEWABLE INDUSTRY FUTURE TRENDS

Electrification

- Electrification refers to the process of replacing technologies that use fossil fuels (coal, oil, and natural gas) with technologies that use electricity as a source of energy.
- The electrification of end uses will drive shifting trends towards non-fuel powered technologies such as choosing electric transportation over the conventional transportation systems, etc, which in turn would reduce CO_2 emissions.

Green Hydrogen

- Hydrogen can offer a solution for types of energy demand that are hard to directly electrify but almost all of this comes from fossil fuels or from electricity generated by fossil fuels.
- As the IEA points out, integration of green hydrogen would save the 830 million tonnes of CO2 that are emitted annually when using fossil fuels.

Increased Power System Flexibility

- Flexibility in power systems is a key enabler for the integration of high shares of variable renewable electricity – the backbone of the electricity system of the future.
- Power systems will achieve maximum flexibility, based on current and ongoing innovations in enabling technologies, business models, market design and system operation.

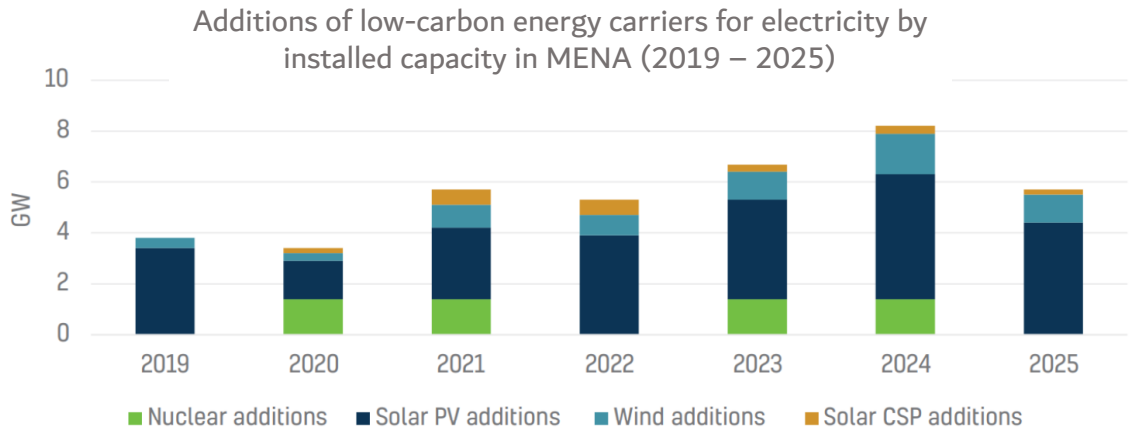
Foster Innovation to Address Challenging Sectors

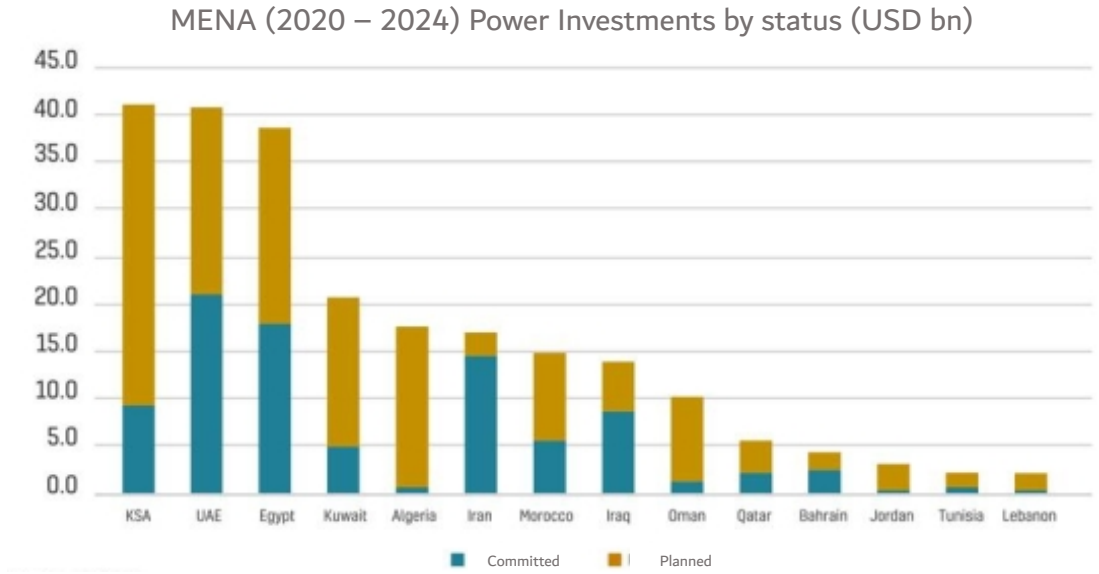
- With drastically increasing energy consumption, solutions to further reduce fossil-fuel use include increased direct use of renewable energy , energy efficiency and structural changes that can reduce energy demand, and deeper electrification.
- However, more will still be needed, in particular for sectors such as shipping, aviation and heavy industry, requiring to foster innovations.

Source: IRENA (International Renewable Energy Agency)

RENEWABLE INDUSTRY IN THE MENA REGION OVERVIEW (1/2)

- Within the **Middle East and the Africa (MENA)** region, the **increased industrial activity** and **increasing population** have **influenced** the drive towards **renewables** to be reflected in each country's strategy.
- The Middle East Institute (MEI) estimates that, if **fully exploited**, **MENA** would have the **capacity** to produce **solar power** to a level that would amount to **60 percent** of global electricity demand.
- The pace of renewable capacity growth in the MENA is estimated to **double over by 2026**, compared to between 2015 - 2020, from **15 GW to over 32 GW**.
- One common driver is the **cost-effectiveness of solar PV** to meet climate goals and fossil fuel diversification needs. Solar PV accounts for more than **two-thirds** of the region's renewable capacity growth.
- The share of MENA's **solar PV growth** taking place in net fossil fuel exporting countries is expected to increase from **40%** to **67% over 2021-2026.**
- From **2015 onwards**, the development of renewable energy across MENA has enjoyed **significant growth**, as shown by the International Renewable Energy Agency (IRENA).
- In **2016**, **$11 billion** was invested in the renewable market across MENA – a staggering leap compared to **$1.2 billion in 2008**.

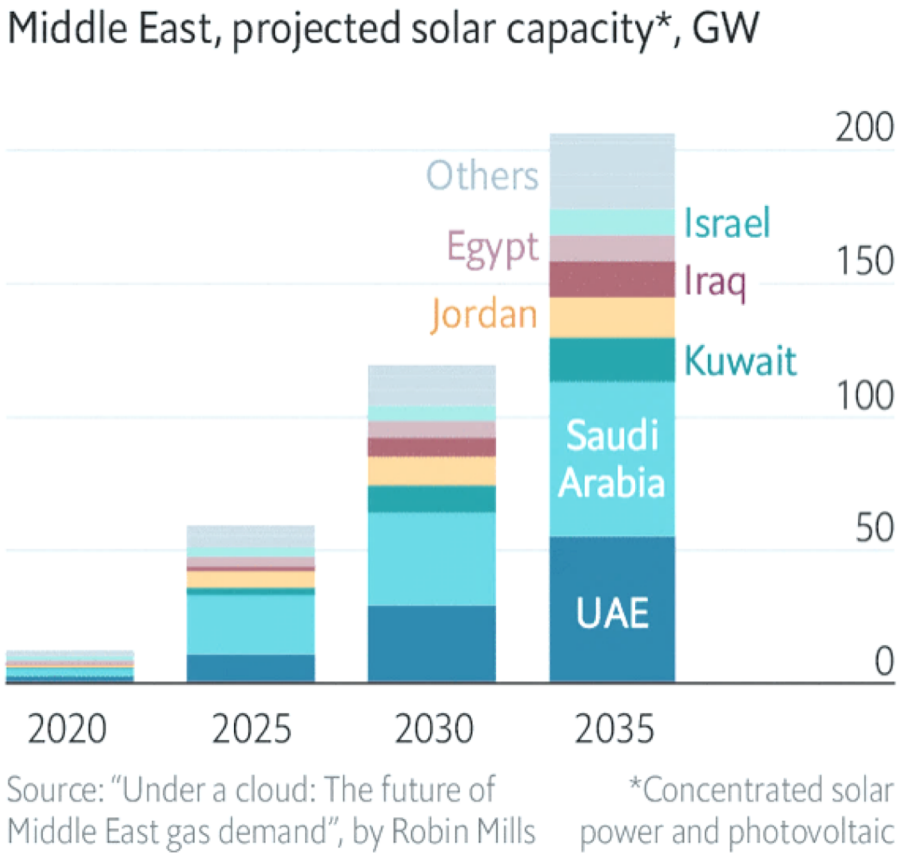




Source: IRENA (International Renewable Energy Agency), MESIA (Middle East Solar Industry Association) and APICORP (The Arab Investment Petroleum Corporation)

RENEWABLE INDUSTRY IN THE MENA REGION OVERVIEW (2/2)

- The growing use of renewables across MENA is intrinsically linked to the area's **socio-economic development**, as its deployment will **not only reduce carbon emissions**, but also **increase economic diversification** and growth, a **healthier balance of trade**, and **opportunities for job creation**.
- This is best exemplified by **Morocco**, where the development of a local industry surrounding solar water heaters has served to **create 13,000 jobs**.
- Across the region, the combined energy goals of various countries translate to an expected **80 GW of renewable capacity by 2030**, based on the successful fruition of these commitments.
- This is evidenced by initiatives such as the **Pan-Arab Clean Energy Initiative (PACE),** a key component of the future roadmap for renewables across MENA.
- As part of the MENA established initiatives, the region is putting in efforts to take the **maximum benefits of the solar power** though modified **energy storage solutions**, improved **cell and modules technologies**, along with new fields of actions such as **floating solar panels**, **building integrated photovoltaics (BIPV)** and **organic thin-film photovoltaics.**



Source: IRENA (International Renewable Energy Agency), MESIA (Middle East Solar Industry Association) and The Economist

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GROWTH OUTLOOK FOR RENEWABLES INVESTMENT IN THE UAE

2.3 GW
Installed renewable-based capacity (2020)

9 GW
Targeted installed renewable-based capacity (2025)

7%
Share of renewables in total installed power generation capacity (2020)

21%
Predicted renewable share in total installed power generation capacity (2030)

$40 billion
Investment by UAE towards renewable market (between 2006-2021)

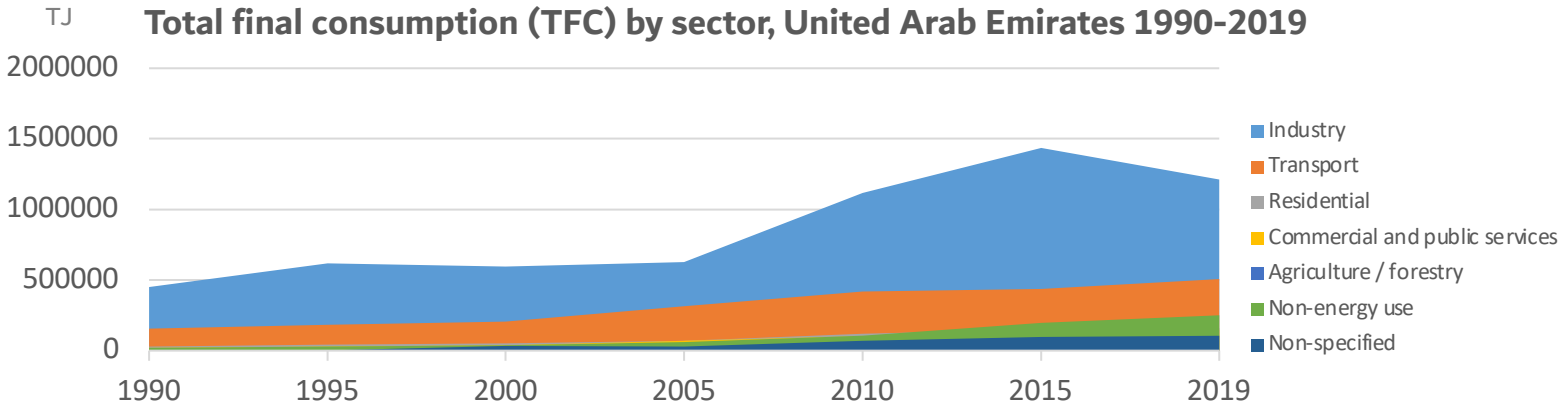
$163 billion
Planned Investment by UAE towards renewable market by 2050

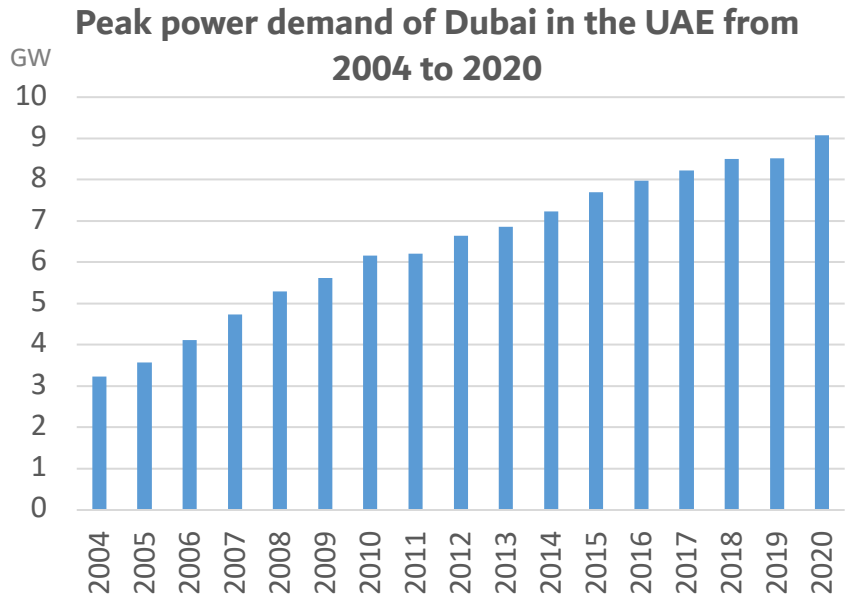
Source: IRENA (International Renewable Energy Agency), eia (US Energy Information Administration) and The Economic Times

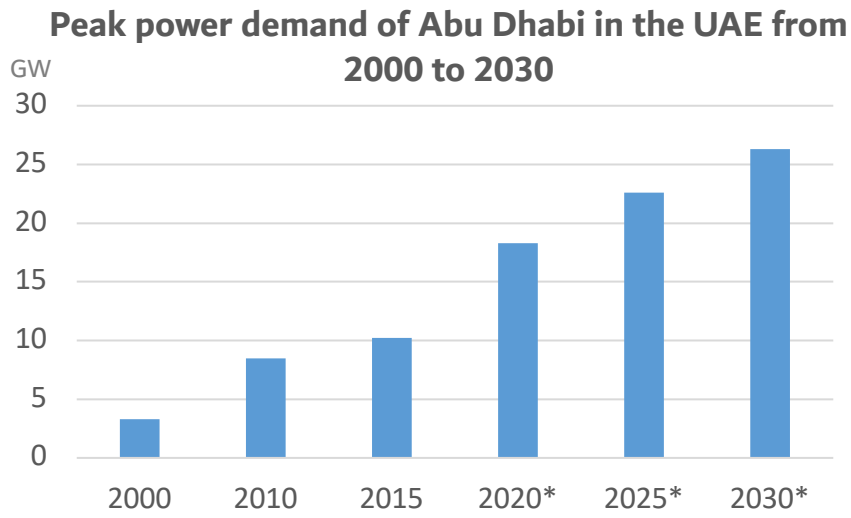
ENERGY DEMAND IN THE UAE

UAE expects the demand for energy to increase by 9 per cent annually

- The UAE's gross domestic electricity consumption **more than doubled** between the period of **2005 - 2015**, and was expected to grow even more rapidly by **2020** with substantial **population and economic growth**.
- In the UAE, demand for electricity is **increasing** year-on-year and this is driven by growth in **population, industrialisation and urbanisation.**
- Total energy consumption of UAE per capita stands high (the **11th** highest worldwide in **2020**) and per capita electricity consumption also stands high at **12.5 MWh** in **2020** (**9th** highest in the world), because of air conditioning in buildings and electro-intensive industries.
- As per IEA's analysis, the **highest sector** that consumes energy in UAE is the **Industry** Sector followed by **transport** and **residential** sector. **Agriculture/forestry sector** consume the **least** energy within the UAE.





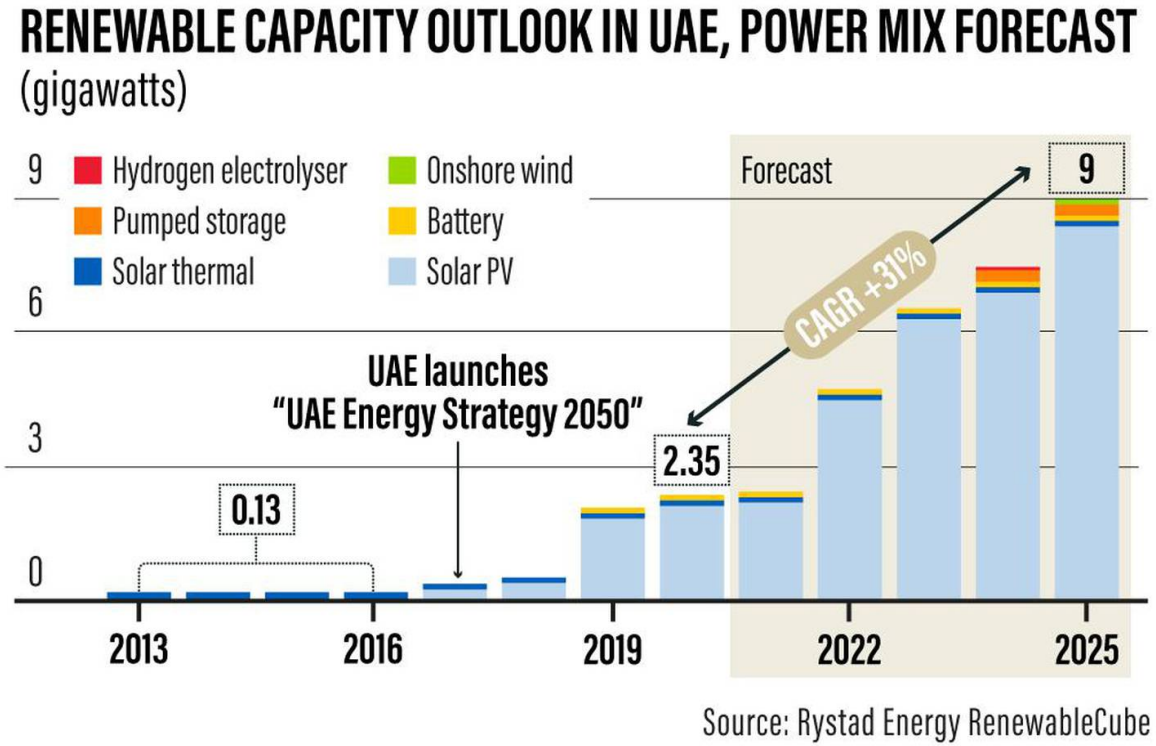


Source: IEA (International Energy Agency), PWC, Statista and Enerdata

RENEWABLE INDUSTRY GROWTH ENVIRONMENT IN THE UAE (1/2)

Overall, UAE's Renewable sector has been growing rapidly to make UAE as a country with net-zero emission by 2050.

- In alignment with **UAE's National Energy Strategy 2050**, UAE has been rapidly **increasing** their renewable energy capacity over the past years.
- The installed renewable capacity of the UAE reached **2.3GW** by the end of **2020**, around **91%** of which comprises of **solar PV** projects.
- Solar PV additions are going to pile up, especially from **2022**, and drive the country's total renewable capacity to **9 GW** by the end of **2025**, with a CAGR of **31%**.
- UAE also provides **lowest tariff prices** with **solar PV** being available at **1.35 cents per kilowatt hour**, the **lowest rate in the world**.
- The share of renewable energy in UAE's power generation mix is set to increase from **7%** in **2020** to **21%** in **2030**, and to **44%** by **2050**.
- With increase in renewable in UAE's energy mix, UAE predicts to save **$192 billion** as it reduces its dependency on subsidized natural gas power.
- Additionally, the efforts of UAE in the renewable market has been instrumental in **attracting foreign investments**.
- In **2019**, the UAE registered the **highest growth** in renewable energy investments, realizing a **1223%** increase compared to **2018.**



Source: Rystad Energy RenewableCube

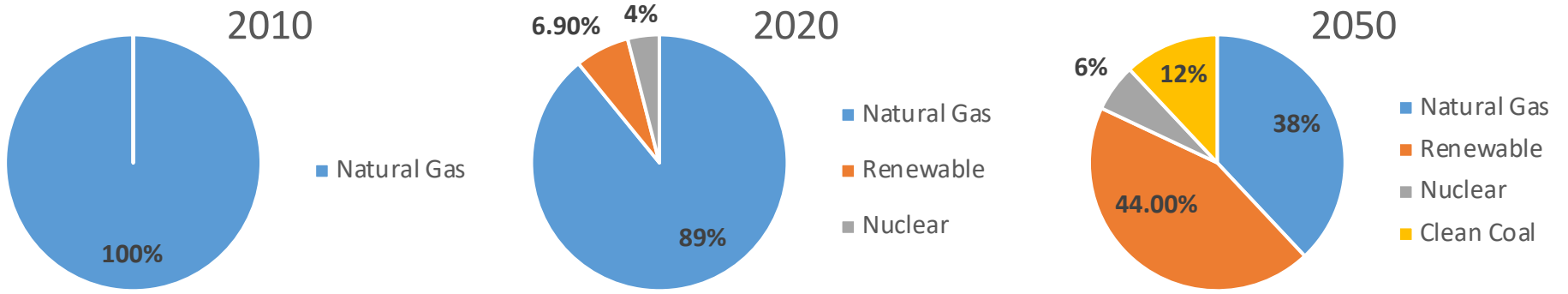
Source: Rystad Energy Renewable Cube, Boston University for Sustainable Energy, and Mordor Intelligence

RENEWABLE INDUSTRY GROWTH ENVIRONMENT IN THE UAE (2/2)

UAE is an active participant in exploring different renewable energy sources to achieve UAE's National Energy Strategy 2050

- Among the Middle-East renewable energy installed capacity, the UAE accounted for about more than **50%** of the region's total renewable energy installed capacity.
- **By 2020**, UAE had more than **6%** share of renewable energy in total electricity capacity. With upcoming and under construction renewable energy projects, the share is expected to reach **40%**, in alignment with UAE's National Energy Strategy 2050.
- Among the seven emirates that make up the UAE, the majority of renewable activity is concentrated in **Abu Dhabi** and **Dubai,** which together accounts for over **90% (8.2 GW)** of forecasted total capacity in **2025**. The remaining **0.9 GW** of capacity will come from projects in **other emirates**, such as Umm Al Quwain, Ras Al Khaimah and Sharjah.
- Major projects expected to drive this growth include four solar farms, the **Al Dhafra (2GW)**, **Abu Dhabi PV3 (1500MW), Mohammed Bin Rashid Al Maktoum Park Phase IVa and IVb (950MW)** and **Mohammed Bin Rashid Al Maktoum Park Phase V (900MW),** all of which are in various stages of development.
- Companies within UAE have joined forces to create a **global renewable energy** and **green hydrogen** venture that will have a generating capacity of **30 GW** by **2030**, along with domestic and international renewable energy and waste-to-energy projects.

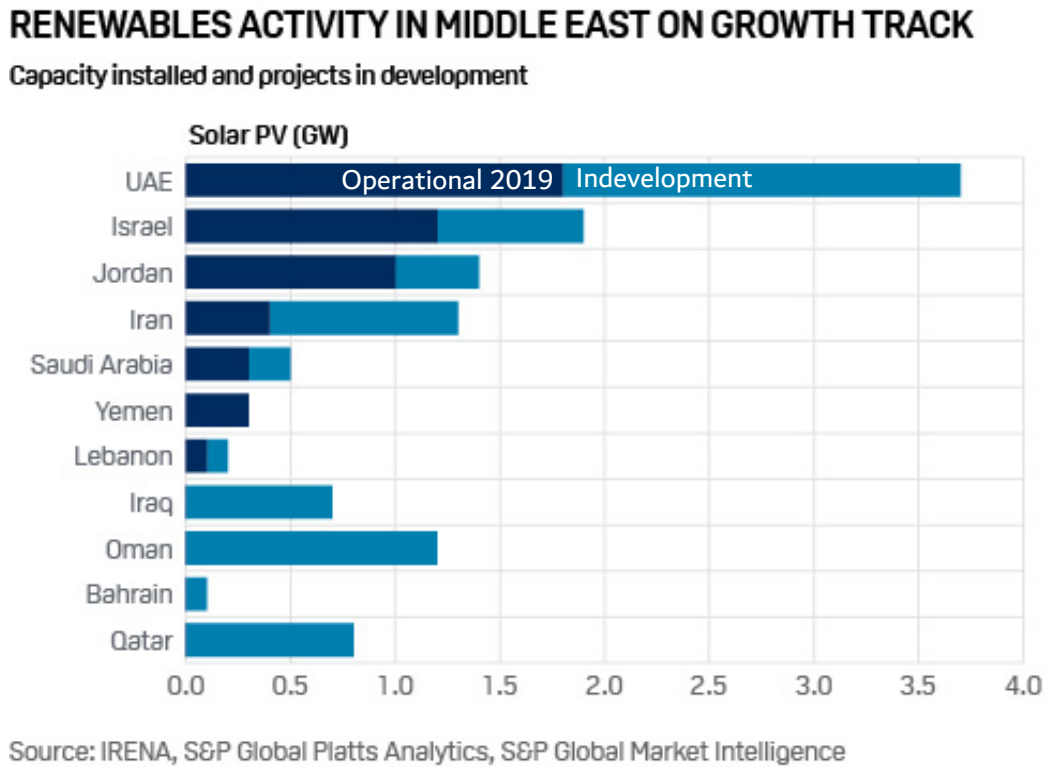
Change in UAE's Electricity Share (2010-2050)



Source: Rystad Energy Renewable Cube, Boston University for Sustainable Energy, and Mordor Intelligence

SOLAR ENERGY MARKET IN THE UAE (1/2)

- UAE has been at the **forefront** of the clean energy transition in the Gulf region in terms of **PV deployment and generation** in the country's ambitious renewable targets.
- The UAE solar energy market has an installed capacity of nearly **1.7 GW** (as of 2019) expected to record a CAGR of more than **15%** in the forecast period, **2020-2025.**
- Factors, such as **encouraging government policies**, pressure to **decrease dependency on fossils** and, **falling system prices for solar panels** are encouraging the growth of the solar market in the UAE.
- The adaption of the UAE Energy Strategy 2050, the country is set to increase the clean energy share to **7%** by **2020** and **44%** by **2050** by investing mainly in solar energy.
- In UAE, PV solar panels held a share of more than **80%** of installed solar capacity in **2018**, with an installed capacity of around **500 MW**, whereas Concentrated Solar Panels (CSPs) contributed **100 MW** of supply to the grid.
- Observing the ongoing project developments in **PV solar panels**, they are going to hold a **significant market** in comparison with Concentrated Solar Panels.
- Photovoltaic solar cells generated **0.9 TWh** of electricity in **2018**, adding **0.4 TWh** to the electricity generated in **2017**. Thus, it witnessed a surge of **80%** in the share of electricity supply and generated **1.6%** of UAE's electricity demand.
- UAE also provides lowest tariff prices in the world with Solar PV being available at **1.35 cents per kilowatt hour**, the lowest rate in the world.



Source: IRENA (International Renewable Energy Agency), Mordor Intelligence, Arabian Business and S&P Global Platts

SOLAR ENERGY MARKET IN THE UAE (2/2)

- **Existing and planned solar projects** in the region are **driving PV solar energy growth** significantly.
- The world's largest stand-alone operational solar plant, **Noor Abu Dhabi**, started generating power in **July 2019**, with a capacity of **1,177 MW** that is expected to meet the power needs of **90,000 people**.
- The world's largest single-site solar park in the world based on the Independent Power Producer (IPP) model, **Mohamad bin Rashid Al Maktoum Solar Park**, with an estimated investment of **USD 13.6 billion**, could power as many as **1.3 million homes**, reducing carbon emissions by **6.5 million tonnes** annually,
- The project is expected to complete its third phase by 2020. It is expected to generate **5 GW** of energy after completion in **2030**.
- In **February 2020**, with the installation of United Arab Emirates' **first floating solar farm** near **Nurai Island, Abu Dhabi**, with a capacity of **80 kW**, the UAE is set to explore new possibilities in the solar market.
- With excellent geographical advantage and an average sunlight duration of 10 hours a day, the **UAE** holds a **strong potential for solar energy** in the coming future.

Noor Solar Farm
Abu Dhabi

Mohammed bin Rashid Al Maktoum Solar Park
Dubai

Al Nurai Island Solar Farm
Abu Dhabi

Source: IRENA (International Renewable Energy Agency), Mordor Intelligence, and Arabian Business

WIND ENERGY MARKET IN THE UAE

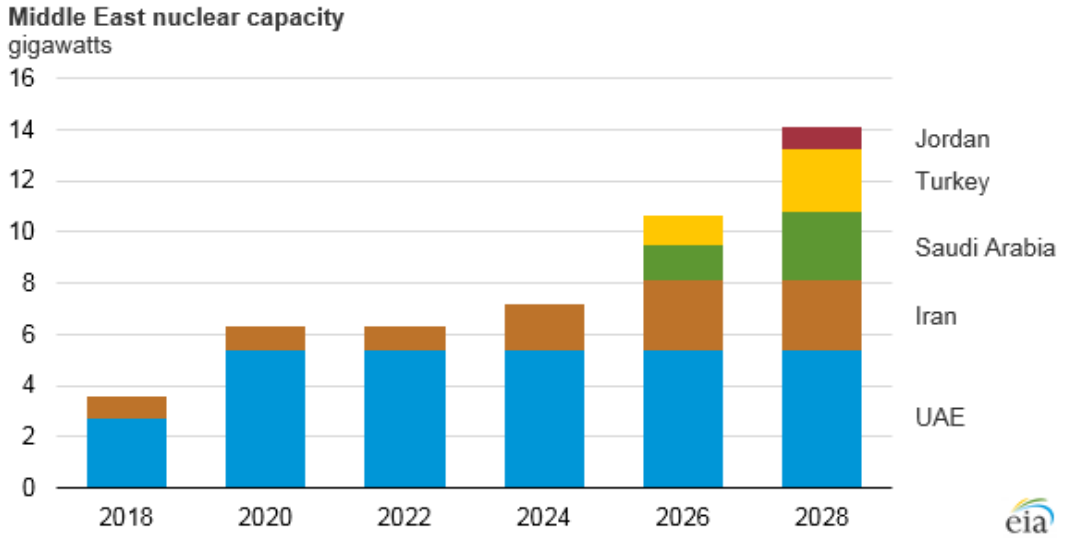
- UAE has started exploring the potential of **Wind Energy** though UAE experiences **low-velocity winds** and **high potential of solar** in the country.
- Currently, UAE is focusing towards **diversifying renewable energy mix** and the potential of wind energy is being studied to a great extent.
- As a result, the **region's first wind turbine** was installed on **Sir Bani Yas Island** in Abu Dhabi.
- The wind turbine, which stands **65 metres** high and has three rotor blades each with a **52-metre** wingspan, has a production capacity of **850 kW/h**.
- After the success of the UAE's first wind turbine, Dubai through their preliminary study has identified **Hatta** as a potential site to develop **UAE's first wind farm** with a capacity of **28MW**.
- Furthermore, more emirates are looking into the potential of wind energy in their respective areas such as **Fujairah** .
- A feasibility study on wind energy potential in Fujairah was presented, with the aim to set up **four wind farms** with the capacity to generate between **130 and 200 megawatts of electricity per year**.

Sir Bani Yas Island Wind Turbine
Abu Dhabi

Source: Asia Wind Energy Association, Gulf News and Middle East Energy and Utilities

NUCLEAR ENERGY MARKET IN THE UAE

- **Nuclear Energy** emerged as a **proven, environmentally promising and commercially competitive option** which could make a significant base-load contribution to the UAE's economy and future energy security.
- In **April 2008**, the UAE independently published a comprehensive policy on nuclear energy. The policy projected escalating electricity capacity requirements from **15.5 GWe in 2008** to over **40 GWe in 2020**.
- This led to creation of a **regulatory framework** and **selection of a site** between Abu Dhabi city and Ruwais, at **Barakah**, 250 km west of Abu Dhabi city.
- **In 2009**, **Emirates Nuclear Energy Corporation (ENEC)** was established and funded with **$100 million** to evaluate and implement nuclear power plants within the UAE.
- The UAE is currently **building four units** at the **Barakah Nuclear Power Plant**, and the project's overall completion rate as of March 2021 is **more than 95%**.
- When all four units of the plant start operating commercially, the plant will produce up to **25%** of the country's electricity requirements with **zero-carbon emissions,** since the plant will be powered by renewables.
- In **2020**, **UAE** became the newest member of an exclusive club of 31 countries running nuclear power operations.
- It is also the **first new country** to launch a nuclear power plant in three decades, the last being China in 1990.



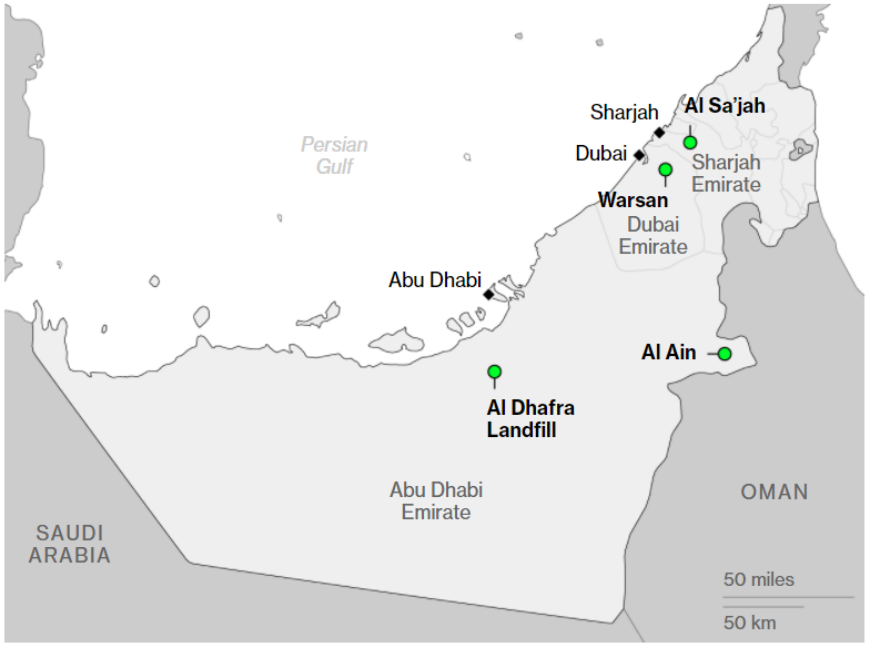
Barakah Nuclear Power Plant
Abu Dhabi

Source: eia, World Nuclear Association Emirates Nuclear Energy Corporation and CNBC

WASTE-TO-ENERGY MARKET IN THE UAE

- In **2017**, **Emirates Waste to Energy Company (EWTE)** commenced building the **UAE's first WtE** (Waste-to-Energy) plant in **Sharjah,** which will divert over **300,000 tonnes** from landfill each year and produce **240,000 – megawatt hours** of clean energy.
- This project will help UAE in achieving its 2021 goal of diverting **75%** of its municipal solid waste from landfill sites.
- In **Dubai,** the municipality appointed a consortium including **Itochu, Hitachi Zosen Inova and Besix,** to develop a **$1.1bn WtE plant in Warsan**, a former landfill site.
- The facility will process **1.9 million tonnes** of municipal solid waste per year and produce approximately **200MW** of renewable electricity, making it one of the largest in the world.
- **Ras Al-Khaimah** is developing an Energy from Waste Programme, which focuses on meeting at least **2%** of the primary energy demand of the emirate from waste by **2040**, as part of RAK Renewable Strategy 2040.
- **Abu Dhabi** Department of Energy launched in its **Policy** for Energy production from Waste in the emirate to support a **sustainable growth and circular economy**.
- Abu Dhabi, is also planning to develop WtE capacity by **inviting firms** to submit prequalification documents for a WtE project under the independent power producer (IPP) model.
- The accepted WtE plant will be located near **Al-Dhafra landfill** site in Abu Dhabi, and will have an expected processing capacity of **between 600,000 and 900,000 tonnes** of waste per year.

WTE plants currently under construction in the UAE



Location	Waste Processing (tons per year)	Power Capacity (megawatts)
Warsan	2M	200
Al Dhafra Landfill	900K	90
Al Ain	600K	60
Al Sa'jah	300K	30

Source: Bloomberg
Note: Al Dhafra waste processing capacity between 600,000-900,000 tons and up to 90MW of power capacity

Source: Bloomberg Green, Middle East Energy & Utilities and Masdar

GEOTHERMAL ENERGY MARKET IN THE UAE

- UAE is already looking at **Geothermal energy** to be a viable option for alternative energy as the country is looking to diversify the renewable energy sources.
- Studies show Geothermal energy from underneath the Earth's surface, the heat that makes hot springs, should be at temperatures of more than **200°C** to be a prime contender for **power generation**.
- The UAE's temperatures are much **lower** than this, making geothermal more appropriate for applications like powering desalination plants.
- **Dubai** is already considering the use of geothermal energy to provide **power needs in desalination plants**, with preliminary studies into the energy source already showing promising results.
- **Dubai Electricity and Water Authority (DEWA)** is requesting proposals for an early-stage feasibility study on producing geothermal energy.
- **National Central Cooling Company (Tabreed)** is set to test the **region's first geothermal technology** in partnership with **Masdar**.
- The two geothermal wells, located at **Masdar City, Abu Dhabi**, will be studied to ascertain the viability of geothermal energy technology and its ability to significantly reduce energy consumption.
- Furthermore, UAE's studies have presented **Al Ain** and **Ras Al Khaimah** as **potential geological sites** with required hot spring reservoirs, temperatures and sizes.
- These areas will have the ability to provide **1,000 MW** of electricity using the geothermal energies which will provide energy to power hundreds of home without generating CO2 emissions.

For illustrative purposes only

Source: Gulf News, Adgeco Group, and International District Energy Association

HYDROPOWER MARKET IN THE UAE

- In **2018**, UAE announced developments in the field of **Hydroelectric power** within the country as part of UAE's Energy Strategy 2050, focusing on increasing clean energy in the total energy mix from **25% to 75%.**
- **Dubai Electricity and Water Authority (DEWA)** is building **GCC's first hydroelectric power plant** in **Hatta**.
- The **Pumped Storage Hydroelectric 250 MW** project in Hatta, 134km east of Dubai, will use water resources from an existing **1,716 million-gallon** capacity Hatta Dam.
- With an investment of **Dh1.347 billion**, the project is expected to last up to **80 years** and is scheduled to be commissioned by **February 2024**.
- DEWA also intends to boost the levels of **efficiency** in power production, hence it plans to deploy **turbines** using clean and inexpensive **solar energy** to pump water from the lower dam to the upper reservoir during **off-peak hours**.
- Whereas during **peak hours**, the turbines will be operated using the upper reservoir's waterfall speed to generate electricity.
- UAE's studies show Hydroelectric power to be **low-cost**, **reliable, and efficient energy source** with **huge potential** for the country as well as the region.

Hatta Hydroelectric Power Plant
Dubai

Source: Utilities Middle East, Gulf News and Dubai Media Office

HYDROGEN MARKET IN THE UAE (1/2)

- In UAE, the energy sector accounts for over **85%** of the country's GHG emissions and efforts are being made to integrate **hydrogen** into the economy as a major energy carrier for transportation, industrial use, and electricity generation.
- **ADNOC** (the state oil company of Abu Dhabi), **Mubadala** and **ADQ** (all significant Abu Dhabi state-owned entities) signed an MoU to create the **Abu Dhabi Hydrogen Alliance**, a collaboration to establish Abu Dhabi as a leader in green and blue hydrogen in emerging international markets.
- The alliance will develop a roadmap to **accelerate the use of hydrogen** in major state sectors such as **energy, transport, infrastructure**, etc.
- As a result. the UAE is targeting a **25%** global market share of low-carbon hydrogen by **2030** with the launch of its "**hydrogen leadership roadmap**".
- The roadmap sets out support for **domestic, low-carbon industries** and aims to establish the country as a **leading hydrogen exporter**.
- UAE sees the future of being one of the **lowest cost** and **largest producers** of **blue hydrogen** in the world , reason being that UAE, predominately through ADNOC and Emirates Steel, has **mature carbon capture technologies** in place.
- The **major blue ammonia project** in the country was proposed by **ADNOC**, which is designing a **1-million-mt/year ammonia plant** in **Ruwais** that feeds on blue hydrogen, with a target start-up date of **2025**.

ADNOC's Blue Hydrogen Production Facility
Abu Dhabi

Source: Watson Farley & Williams, Dubai Future Foundation, HIS Markit and CNBC

HYDROGEN MARKET IN THE UAE (2/2)

- UAE has also started studying the country's potential in the production of **green hydrogen**.
- The **Mohammed bin Rashid Al Maktoum Solar Park** in Dubai, is home to the **region's first solar-powered green hydrogen project**, which was commissioned in **May 2021** by Dubai Electricity and Water Authority (DEWA)
- **Masdar** have partnered with **Siemens Energy**, **the Abu Dhabi Department of Energy, Etihad Airways, Lufthansa, Marubeni Corporation** and the Abu Dhabi based **Khalifa University** to develop an **electrolysis facility** to produce **green hydrogen** for the **transport industry.**
- UAE has additionally **formed partnerships** to develop a hydrogen economy and projects with countries like **UK , Canada, Korea, Germany and Russia.**
- UAE has also collaborated with Multinational companies such as **Engie** (French Multinational Utility Company), where Masdar and Engie has formed a **strategic alliance** to develop a **green hydrogen hub** in UAE.
- The hub will consist of projects with at least **2GW** of capacity, which will be developed by **2030** with a total investment of **$5billion**.
- Currently, UAE majorly produces grey hydrogen, but in study released by UAE-Germany confirmed UAE's Plan of **transitioning from grey hydrogen, to blue and then green hydrogen** over the coming years.

DEWA's Green Hydrogen Facility
Dubai

Source: Watson Farley & Williams, Dubai Future Foundation, HIS Markit and CNBC

KEY INITIATIVES FOR THE GROWTH OF RENEWABLES IN THE UAE

UAE Net Zero 2050

- The UAE Net Zero by 2050 strategic initiative is a national drive to achieve net-zero emissions by 2050, making the Emirates the first Middle East and North Africa (MENA) nation to do so.
- The UAE Net Zero 2050 strategic initiative aligns with the Paris Agreement, to reduce greenhouse gas (GHG) emissions and limit the rise in global temperature to 1.5 C compared to pre-industrial levels.
- The deployment and use of clean energy solutions is one of the main pillars of UAE's net zero strategy
- As part of the strategy, relevant plans, strategies, and policies would be updated to shape UAE's journey towards net zero.
- In addition to implementing initiatives and projects to achieve net zero by 2050 in line with their needs and growth requirements.

UAE Energy Strategy 2050

- In 2017, the UAE launched 'Energy Strategy 2050', which is considered the first unified energy strategy in the country that is based on supply and demand.
- The strategy aims to:
  - increase the contribution of clean energy in the total energy mix from 25 per cent to 50 per cent by 2050
  - reduce carbon footprint of power generation by 70 percent, thus saving AED 700 billion by 2050
  - It also seeks to increase consumption efficiency of individuals and corporates by 40 per cent.
- The UAE government aims to invest AED 600 billion by 2050 to meet the growing energy demand and ensure a sustainable growth for the country's economy.

United Arab Emirates

U.AE

وزارة الطاقة والبنية التحتية
MINISTRY OF ENERGY & INFRASTRUCTURE

وزارة التغير المناخي والبيئة
MINISTRY OF CLIMATE CHANGE & ENVIRONMENT

Source: UAE Portal, Khaleej Times

KEY INITIATIVES FOR THE GROWTH OF RENEWABLES IN THE UAE

Dubai Integrated Energy Strategy 2030

- As a part of the policy to use alternative energy sources, Dubai developed the Dubai Integrated Energy Strategy 2030 to drive energy decarbonisation and ensure efficient use of energy.
- The emirate sets plans to generate at least 5 per cent of its power from renewable energy by 2030, as well as 12 per cent from clean coal and 12 per cent from nuclear power.
- In January 2015, Dubai announced a revision of its targets for the share of renewable energy in the total energy mix to 7 per cent by 2020 and 15 per cent by 2030.

المجلس الأعلى للطاقة
Supreme Council of Energy

Ras Al Khaimah Energy Efficiency and Renewables Strategy 2040

- The Ras Al Khaimah Energy Efficiency and Renewables Strategy 2040 (EE&R Strategy) defines the long-term strategy of the emirate in the field of energy efficiency and renewable energy.
- Launched under the patronage of H.H. Sheikh Saud bin Saqr Al Qasimi, Ruler of Ras Al Khaimah, the strategy targets:
  - 30% energy savings
  - 20% water savings
  - 20% generation from renewable energy sources by 2040.
- These targets are aligned with RAK Vision 2030, which aims at 10% electricity savings and 5% of electricity demand to be met by solar power by 2030.

بلدية رأس الخيمة
Ras Al Khaimah Municipality
reem
فريق رأس الخيمة لكفاءة الطاقة والطاقة المتجددة
RAK ENERGY EFFICIENCY AND RENEWABLES TEAM

Source: UAE Portal, Khaleej Times

KEY INITIATIVES FOR THE GROWTH OF RENEWABLES IN THE UAE

Dubai Clean Energy Strategy 2050

- In November 2015, Sheikh Mohammed launched Dubai Clean Energy Strategy. Under this strategy, Dubai aims to produce 75 per cent of its energy requirements from clean sources by 2050.
- The strategy also aims to make Dubai a global centre of clean energy and green economy. It consists of five main pillars: infrastructure, legislation, funding, building capacities and skills, and environment friendly energy mix.

حكومة دبي
GOVERNMENT OF DUBAI

هيئة كهرباء ومياه دبي
Dubai Electricity & Water Authority

Source The National, UAE Portal

SOLAR PROJECTS FOR THE GROWTH OF RENEWABLES IN THE UAE (1/2)

Mohammed Bin Rashid Al Maktoum Solar Park, Dubai

Technologies Used
Solar Farm

Project Status
Operational

Capacity
5,000 MW by 2030

Carbon Displaced/ year
6.5 Million tonnes = 1.3 million houses

Link to the project

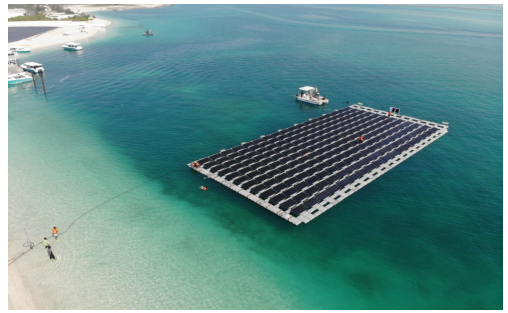
Al Nurai Floating PV, Abu Dhabi

Technologies Used
Solar-Diesel Hybrid

Project Status
Operational

Capacity
9 MVA

Carbon Displaced/ year
5,600 tonnes



Link to the project

Al Dhafra, Abu Dhabi

Technologies Used
Solar Farm (latest crystalline, bifacial solar technology)

Project Status
Under Construction

Capacity
2 GW

Carbon Displaced/ year
2.4 Million tonnes = powering 160,000 homes

Link to the project

Noor Energy 1, Dubai

Technologies Used
Solar Farm (Concentrated Solar Power and Photovoltaics)

Project Status
Under Construction

Capacity
950 MW

Link to the project

SOLAR PROJECTS FOR THE GROWTH OF RENEWABLES IN THE UAE (2/2)

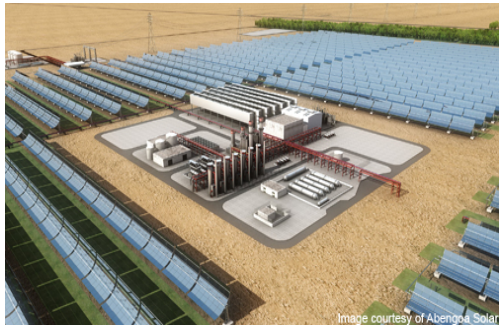
Shams, Abu Dhabi

Technologies Used
CSP and Parabolic Trough Tech

Project Status
Operational

Capacity
100 MW

Carbon Displaced/ year
175,000 tonnes = 1.5 million trees/ 15,000 cars



Link to the project

Masdar City Solar Photovoltaic Plant, Abu Dhabi

Technologies Used
Solar Farm

Project Status
Operational

Capacity
17,500 MW

Carbon Displaced/ year
15,000 tonnes

Link to the project

Murawah Island, Abu Dhabi

Technologies Used
Solar Farm

Project Status
Operational

Capacity
500 KW peak

Diesel Fuel Saving/ year
260,000 litres

Link to the project

Sea Palace, Abu Dhabi

Technologies Used
Solar Farm

Project Status
Operational

Capacity
200 KW

Link to the project

ROOFTOP SOLAR, WIND ENERGY AND NUCLEAR PROJECTS FOR THE GROWTH OF RENEWABLES IN THE UAE

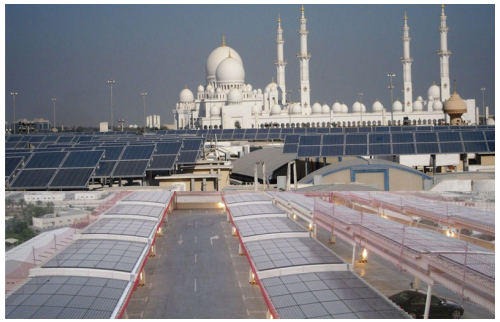
Abu Dhabi Solar Rooftop Programme

Technologies Used
Rooftop PV

Project Status
Operational

Capacity
2.3 MW peak

Carbon Displaced/ year
3,200 tonnes



Link to the project

Omran Hospital, Ras Al Khaimah

Technologies Used
Rooftop PV

Project Status
Operational

Capacity
450 KW

Use of energy
Powers the streetlights in Ras Al Khaimah

Link to the project

Sir Bani Yas Island Wind Turbine, Abu Dhabi

Technologies Used
Horizontal-axis Wind Turbine

Project Status
Operational

Capacity
850 KW/hr

Link to the project

Barakah Nuclear Energy Plant, Abu Dhabi

Technologies Used
Third-generation reactors (APR1400)

Project Status
Operational

Capacity
5,600 MW

Carbon Displaced/ year
21 Million tonnes = removal 3.2 Million cars

Link to the project

WASTE-TO-ENERGY, HYDROPOWER AND HYDROGEN PROJECTS FOR THE GROWTH OF RENEWABLES IN THE UAE

Sharjah Waste-to-Energy Project

Project Status
Under Construction

Capacity
Process 37.5 tones per hour of solid waste, generating 30 MW

Carbon Displaced/ year
450,000 tonnes = powering 28,000 houses

Link to the project

Warsan Waste-to-Energy Project, Dubai

Project Status
Under Construction

Capacity
Treat 1,900,000 tonnes of municipal solid waste , generating 200 MW

Link to the project

Hatta Hydroelectric Power Station, Dubai

Technologies Used
Pumped Storage

Project Status
Under Constructions

Capacity
250 MW

Link to the project

DEWA'S Green Hydrogen Facility, Dubai

Technologies Used
Renewable energy, smart grid and energy efficiency

Project Status
Under Construction

Capacity
Yet to be disclosed

Link to the project

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ECOSYSTEM COMPONENTS – KEY COMPANIES IN UAE'S RENEWABLE SECT

هيئة كهرباء ومياه دبي
Dubai Electricity & Water Authority

- **Dubai Electricity and Water Authority (DEWA)**, is the exclusive provider of electricity and water services in Dubai.
- They support Dubai's efforts to be aligned with UAE's sustainable goals through the delivery of leading services and innovate energy solutions enriching lives and ensuring happiness of their stakeholders in a sustainable manner.
- As part of DEWA's initiatives and efforts, **Innovation Centre** opened in November 2020 at the Mohammed bin Rashid Al Maktoum Solar Park, a pioneering global hub for renewable and clean energy innovations.
- Additionally, **Etihad ESCO** is a DEWA venture that established in 2013 to make Dubai built environment a leading example of energy efficiency for the region and the world.
- DEWA is also the official Sustainable Energy Partner of Expo 2020 Dubai. In addition to development of Mohammed bin Rashid Al Maktoum Solar Park, Shams Dubai, the Hassyan Clean Coal Power Plant.

Masdar
A MUBADALA COMPANY

- Established in 2006, **Masdar**, Abu Dhabi Future Energy Company, is a global leader in renewable energy and sustainable urban development.
- Their mandate is to help maintain the leadership of UAE in the global energy sector, while supporting the diversification of both its economy and energy sources for the benefit of future generations.
- Masdar develops commercially viable renewable energy projects in the Middle East & North Africa (MENA) and international markets along with stimulating further growth in the wider renewable energy and clean-tech industry, creating new revenue streams for the UAE over the long term.
- Al Dhafra Solar PV, Sharjah Waste-to-Energy, Masdar City Solar PV plants are few of their projects in the UAE.

ECOSYSTEM COMPONENTS – KEY COMPANIES IN UAE'S RENEWABLE SECTOR

- In 2017, BEEAH Energy entered into a partnership with Masdar to form the **Emirates Waste to Energy Company (EWTE)**, the UAE's first waste-to-energy development company.
- Building on the complementary skills of the two regional leaders, the joint venture is aimed at setting up waste-to-energy projects across the region.
- The company is currently building its first venture in Sharjah, which will also be the UAE's first waste-to-energy plant.
- Furthermore, EWTE is also investing in other renewable projects such as UAE's first solar landfill project and UAE's first Waste-to-Hydrogen facility.

- The **Emirates Nuclear Energy Corporation (ENEC)** was established by decree in December 2009 .
- ENEC is responsible for the implementation of the UAE Peaceful Nuclear Energy Program, including:
  - The design, construction and ownership of the UAE's nuclear energy plants.
  - Working closely with governments to ensure that the peaceful nuclear energy program is aligned with the plans of the UAE.
  - Developing the human resource capacity for the nuclear energy program along with the educational sector in the UAE.
  - Engaging with the UAE community to ensure a high level of awareness and understanding role of nuclear energy in the nation.

ECOSYSTEM COMPONENTS – RESEARCH & EDUCATION

- **ASPIRE** drives and shapes Abu Dhabi's advanced technology research for an unprecedented future.
- They exclusively commission research that leads to pioneering advances, with a mindset to deliver technology for practical application.
- Under ASPIRE programmes, Virtual Research Institutes Programme (VRIs) is a competitive funding program for outstanding centre-based research proposals in targeted areas within the Emirate of Abu Dhabi.
- ASPIRE has funded three VRIs in the key areas of biotechnology, food security and sustainable energy production.
- These VRIs will stimulate innovation, enable economic diversification and build highly skilled human capital.

- **Khalifa University** is UAE's top-ranked university and leading university in R&D of real-world solutions and preparing science and engineering graduates to build a better world.
- Khalifa University with the support of the UAE government has launched two centres specially dedicated for the renewable energy sector – **The Emirates Nuclear Technology Centre (ENTC)** and **The Advanced Power and Energy Centre (APEC)**.
- ENTC is designed to provide a hub to address the research requirements to support UAE's nuclear power program for the delivery of safe, clean and efficient nuclear energy to meet UAE's strategy.
- APEC's one of the main working areas allowing seamless and economical operation of high capacity renewable and clean energy resources, in addition to other areas such as transportation , electrical grids, etc.

ECOSYSTEM COMPONENTS – INCUBATORS & ACCELERATORS (1/2)

- The **Catalyst** is the region's first clean technology start-up accelerator based in Masdar City.
- Supported by Masdar and energy giant BP, the Catalyst will help start-ups accelerate their business through funding, training and mentorship.
- Based in Masdar City Free Zone, the Catalyst targets eco-friendly business ideas that are 1-3 years away from commercialization, and accelerates them through a holistic program, which provides entrepreneurs a range of services and support needed to run a business.

- Located in the award-winning Sustainable City in Dubai, **Bedayat** is an incubator certified by Dubai SME.
- Bedayat supports ideas, innovations and technologies that contribute to social, environmental, and economic sustainability.
- The start-up incubator fosters a vibrant ecosystem for entrepreneurs who are on the quest to find new solutions for sustainable living.
- The expertise, facilities and professional networks that have contributed to the realization of The Sustainable City are available to entrepreneurs working out of Bedayat.
- Bedayat has partnered with leading universities, companies, government entities and professional organizations to drive innovation through creativity, collaboration and commitment.

ECOSYSTEM COMPONENTS – INCUBATORS & ACCELERATORS (2/2)

- **Energy Transition Accelerator Financing (ETAF)** is an inclusive, multi-stakeholder climate finance platform managed by the International Renewable Energy Agency to advance the energy transition, and based in UAE.
- With anchor funding of USD400 million from the United Arab Emirates via the Abu Dhabi Fund for Development (ADFD), the Platform serves as the first global climate finance partnership from the Middle East to the world.
- ETAF supports the implementation of ambitious National Determined Contributions (NDCs) to meet the Paris Agreement targets and the United Nations Sustainable Development Goals (SDGs), while serving important national objectives.

ECOSYSTEM COMPONENTS – INTERNATIONAL ORGANISATIONS

IRENA
International Renewable Energy Agency

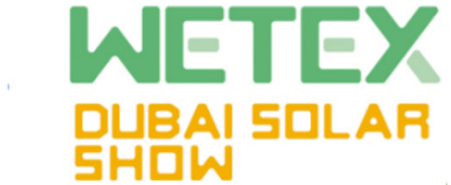
- The **International Renewable Energy Agency (IRENA)** is an intergovernmental organisation that supports countries in their transition to a sustainable energy future.
- It also serves as the principal platform for international cooperation, a centre of excellence, and a repository of policy, technology, resource and financial knowledge on renewable energy.
- With a mandate from countries around the world, IRENA encourages governments to adopt enabling policies for renewable energy investments, provides practical tools and policy advice to accelerate renewable energy deployment,

IRENA's New Permanent Headquarters in Masdar City

EVENTS & EXHIBITIONS IN RENEWABLES

Illustrative, non exhaustive

Expo 2020 is a World Expo, currently hosted by Dubai in the United Arab Emirates from 1 October 2021 to 31 March 2022. This global event is dedicated to finding solutions to fundamental challenges facing humanity by offering a journey inside a chosen theme through engaging and immersive activities.



WETEX and Dubai Solar Show organised by DEWA, are the perfect platforms to display the latest technological advancements and discuss the latest trends related to energy and other environmental areas. They provide an ideal opportunity for local and international companies to share and showcase their products and services with exhibitors from around the world.

Abu Dhabi Sustainability Week (ADSW) is a global platform for accelerating the world's sustainable development by bringing together a unique fusion of policy makers, industry specialists, technology pioneers and the next generation of sustainability leaders. ADSW and its host Masdar welcomes stakeholders across a series of events that includes the IRENA Assembly, Atlantic Council Global Energy Forum, World Future Energy Summit, Abu Dhabi Sustainable Finance Forum, Zayed Sustainability Prize Awards Ceremony, WiSER Forum, etc.

EVENTS & EXHIBITIONS IN RENEWABLES

Illustrative, non exhaustive

inter solar connecting solar business | MIDDLE EAST

Intersolar Middle East is the largest gathering of solar and renewable energy industry professionals in the Middle East & Africa, offering the most effective trade focused platform to international manufacturers and distributors looking to meet regional buyers. It will deliver a wider range of exhibiting companies for visitors, more international participation and a content platform that best serves industry trends and investment opportunities.

MENA RetrofitTech SUMMIT

The regional Retrofit Tech events culminate in the Annual Retrofit Tech MENA Summit and Awards, bringing together the top stakeholders across the UAE, as well as the key stakeholders from across the MENA region, to share ideas, learn from industry best-practices, and see the most innovative technologies in the sector.

WORLD FUTURE ENERGY SUMMIT

القمة العالمية لطاقة المستقبل هي الحدث الدولي الرائد الذي يعمل على تسريع الاستدامة والتحول العالمي إلى الطاقة النظيفة. تم دمج المعرض وعرض التكنولوجيا وحاضنة الاستثمار ومنتدى الأعمال في حدث واحد ، وتجمع القمة القادة والمبتكرين والمفكرين العالميين لمشاركة الأفكار التي تخلق مخططات لمستقبل مستدام.

EVENTS & EXHIBITIONS IN RENEWABLES

Illustrative, non exhaustive

THE BIG 5 International Building & Construction Show

For over 40 years, the Big 5 has provided an unmatched platform for the global construction industry to secure new business across the Middle East, Africa, and South Asia with live product showcases, knowledge exchange and networking opportunities. Solar products, technologies & services is one of the main product sector covered in during the event.

القمة العالمية للاقتصاد الأخضر
WORLD GREEN ECONOMY SUMMIT

The World Green Economy Summit (WGES) is one of the leading global forums on the green economy. It brings together world-class experts in critical sectors from around the world to directly focus on advancing the global green economy and sustainability agenda, achieving the UN Sustainable Development Goals and implementing the recommendations of COPs.

Upcoming Event*

The UN Framework Convention on Climate Change (UNFCCC) has officially announced that the UAE will host the 28th Conference of the Parties (COP28) in 2023. UAE plans to commit as a nation to support the entire international community in accelerating our combined efforts to overcome the very real threat of climate change.

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RENEWABLES SECTOR GOVERNANCE

وزارة الطاقة والبنية التحتية

MINISTRY OF ENERGY & INFRASTRUCTURE

https://www.moei.gov.ae/en/home.aspx

- The Ministry of Energy and Infrastructure was established in 2020 by merging the Ministry of Energy and Ministry of infrastructure.
- The Ministry of Energy and Infrastructure implements a strategic plan aiming, in its entirety, to organize, develop and enhance the competitiveness of the UAE in the sectors of energy, mining, water resources and land and sea transportation, roads, utilities, housing, building and construction and in investment, sustainably.
- In addition to optimizing partnerships, technology and advanced sciences, in addition to adopting global innovative solutions to improve the quality of the society's life.

وزارة التغير المناخي والبيئة

MINISTRY OF CLIMATE CHANGE & ENVIRONMENT

https://www.moccae.gov.ae/en/home.aspx

- In 2016, the role of the Ministry of Environment and Water was expanded to manage all aspects related to international and domestic climate change affairs, which led to the establishment of Ministry of Climate Change and Environment.
- It enhances the UAE's efforts to addressing the issue of climate change, through the implementation of comprehensive policies and initiatives to mitigate and adapt to climate change and protect our unique environmental systems.
- The Ministry of Climate Change and Environment will continue to enhance domestic efforts across all fields relating to its functions, so as to achieve sustainable development and to maintain the UAE's position as a regional and international leader of action.

RENEWABLES SECTOR GOVERNANCE

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وزارة التغير المناخي والبيئة

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RENEWABLES SECTOR GOVERNANCE

FANR
الهيئة الاتحادية للرقابة النووية
Federal Authority for Nuclear Regulation

https://www.fanr.gov.ae/en

- In September 2009 FANR was established to be the regulatory body for the nuclear sector in the UAE in accordance with Federal Law by Decree No 6 of 2009, Concerning the Peaceful Uses of Nuclear Energy, which was issued by the UAE President H.H. Sheikh Khalifa bin Zayed Al Nahyan.
- FANR protects the UAE's public, its workers and the environment by conducting nuclear regulatory programmes in safety, security, radiation protection and safeguards, which fulfill key objectives in licensing and inspection in accordance with best international practices.
- FANR also oversees the implementation of the UAE's obligations under the international treaties, conventions and agreements in the nuclear sector, and determines administrative standards, which support excellence in regulation.

LICENSING AUTHORITIES IN UAE

وزارة الطاقة والبنية التحتية
MINISTRY OF ENERGY & INFRASTRUCTURE
https://www.moei.gov.ae/en/home.aspx

وزارة التغير المناخي والبيئة
MINISTRY OF CLIMATE CHANGE & ENVIRONMENT
https://www.moccae.gov.ae/en/home.aspx

FANR
الهيئة الاتحادية للرقابة النووية
Federal Authority for Nuclear Regulation
https://www.fanr.gov.ae/en

Dubai

المجلس الأعلى للطاقة
Supreme Council of Energy
https://dubaisce.gov.ae/en/

Abu Dhabi

دائرة الطاقة
DEPARTMENT OF ENERGY
https://www.doe.gov.ae/

Sharjah

هيئة كهرباء ومياه الشارقة
Sharjah Electricity & Water Authority
https://www.sewa.gov.ae/en/