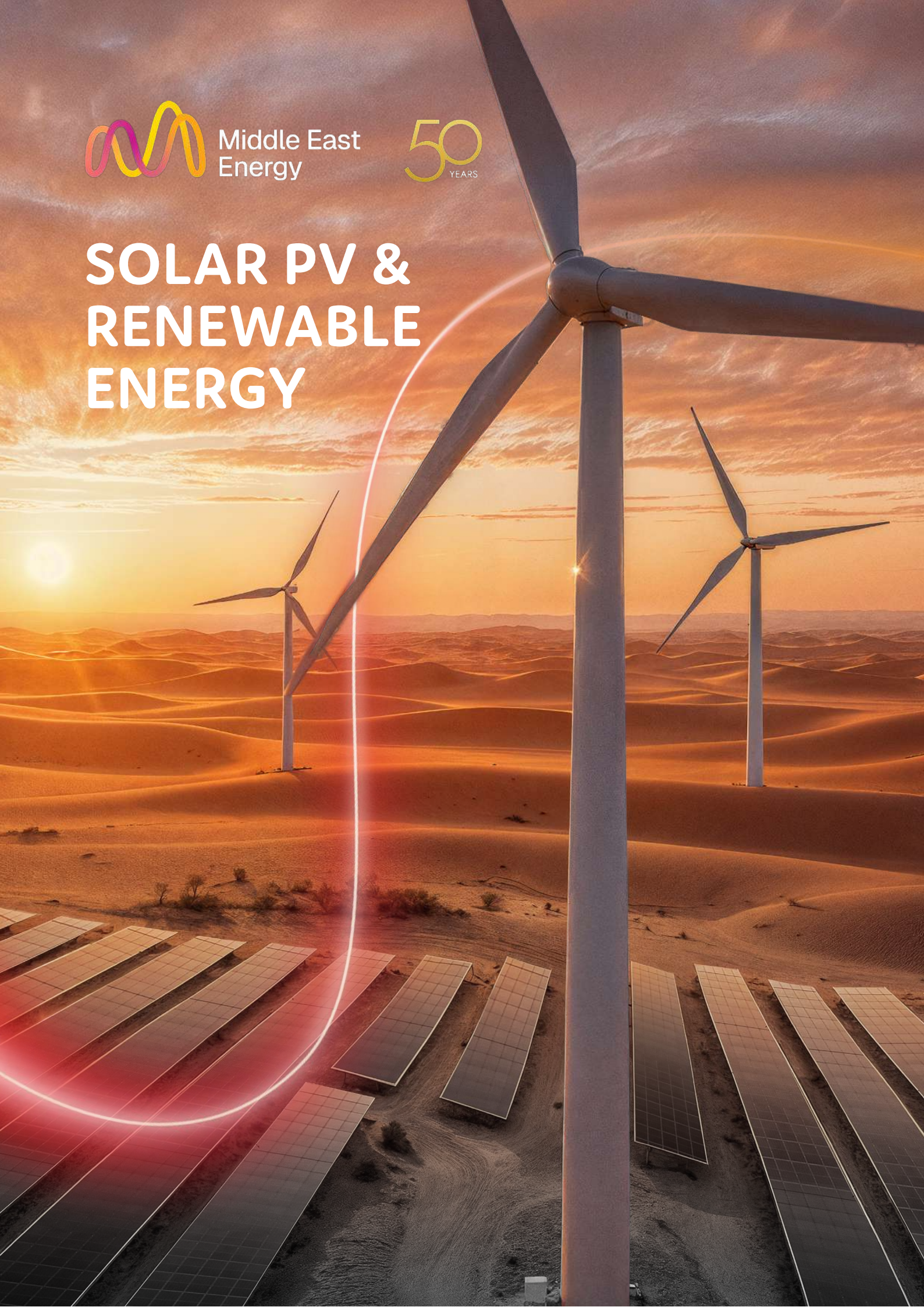
Middle East Energy

50 YEARS

SOLAR PV & RENEWABLE ENERGY



Introduction

The Middle East and North Africa (MENA) is an increasingly energy-hungry part of the world. Between 2000 and 2024, electricity demand across the region grew by more than 1,000 TWh. Only China and India outpaced it in terms of electricity demand growth, according to the International Energy Agency (IEA).

The Paris-based agency predicts that regional demand could rise by a further 50% by 2035, driven by factors such as increasing electrification in transport, growing populations, rising demand for air conditioning and potable water, and general macroeconomic growth.

Cooling and desalination alone are predicted to account for almost 40% of the region's growth in electricity demand by 2035. Demand could also increase sharply from data centres, as investment in artificial intelligence (AI) heats up.

Meeting that demand will require huge investment in electricity generation and renewable energy is an obvious resource to tap into, given the region's huge solar and wind power potential.

Natural gas and oil currently dominate the MENA region's electricity mix, accounting for over 90% of total generation, with oil-fired plants alone accounting for 20% of the total, according to the IEA. However, the balance is shifting and oil and gas are expected to lose market share to clean energy sources over the coming decade. Solar power is the fastest-growing technology, augmented by wind and other renewable sources as well as nuclear power in a few countries.

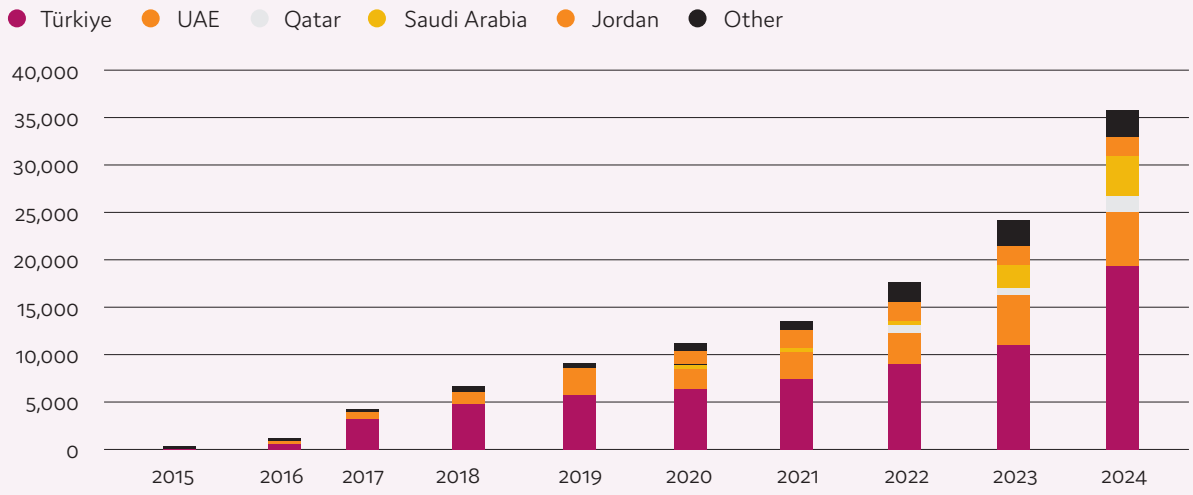
Solar PV Market Outlook & Regional Opportunities

Overall, total electricity generation in the MENA region is projected to increase by around 50% from 2023 to 2035, based on current government policies, reaching nearly 2,700 TWh, according to the IEA.

By the end of that period, fossil fuels are expected to see their market share drop to 75%, compared to more than 90% in 2023. In their place, low-emission power sources will account for most of the growth, with solar PV accounting for around half the additions. Other renewables such as wind, hydro and concentrated solar power (CSP) will in combination add a further 10%.

Solar power has been growing at a rapid and accelerating pace in recent years, with the International Renewable Energy Agency (IRENA) estimating that on-grid capacity had reached more than 36GW by 2024 (see chart).

On-grid solar PV installed capacity



Source: IRENA

Renewable energy generation capacity – led by solar power – is expected to grow by a further 200GW by 2035, to reach a market share of 25% across the MENA region, up from just 6% today, according to projections from the IEA.

Within the region, the Gulf Cooperation Council (GCC) countries and Turkey are among the most enthusiastic adopters of renewable energy – from the Gulf countries' point of view, this is at least partly motivated by the knowledge that rising domestic renewable energy generating capacity means that less oil and gas needs to be used to fuel local power plants and can instead be sold abroad.

The largest developments include the multi-phase Mohammed bin Rashid Al Maktoum Solar Park in Dubai, which will have capacity of 7.3GW by 2030 – up from an initial target of 5GW. In neighbouring Abu Dhabi, work started in October 2025 on a project which comprises a 5.2GW solar PV plant and a 19 GWh battery energy storage systems (BESS).

Saudi Arabia has also been investing heavily, including in the 1.5GW Sudair solar PV plant developed by the local Acwa Power.

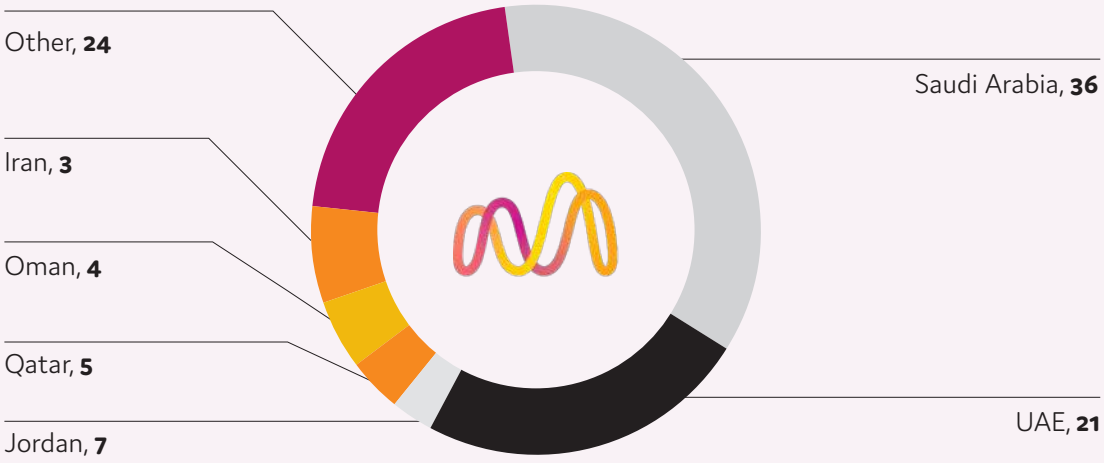
The region's high solar power potential – average solar irradiance is more than 2,000 kWh per square meter a year, according to the Middle East Solar Industry Association (MESIA) – combined with the plentiful availability of land for large schemes has led to the Gulf region repeatedly setting new global records for the lowest cost of tariffs for new utility-scale solar power plants from developers bidding on projects. The Sudair plant, for example, was priced at 1.239 US cents per kWh.

Renewable power is now often cheaper to develop that fossil fuel plants. According to Abu Dhabi-based IRENA, solar PV was, on average, 41% cheaper than the lowest-cost fossil fuel alternatives in 2024, while onshore wind projects were 53% cheaper.

The low cost of developing new solar power plants means many more large projects will be planned and commissioned in the years ahead. That trend is being further encouraged by similar improvements in the cost of battery storage systems, which mean that variable power sources such as solar and wind can now be used to provide reliable power around the clock, not just when the sun is shining or the wind is blowing.

The UAE and Saudi Arabia are currently the largest markets in the Gulf region in terms of installed solar PV capacity and they are expected to maintain their market-leading position over the coming decade. Other key markets include Jordan, Qatar, Oman and Iran.

Solar PV installations in 2025 (% of regional total of 33GW)



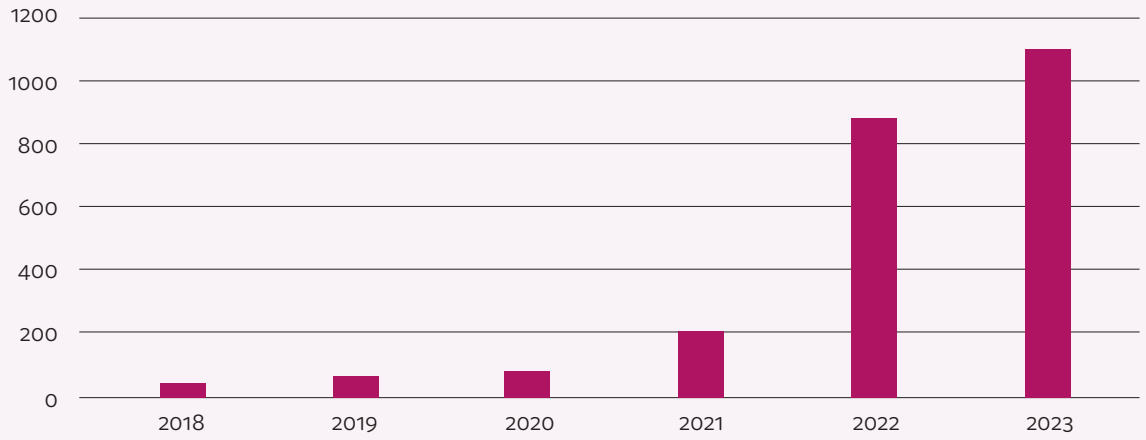
Source: Rystad Energy

In the Levant, projects tend to be on a smaller scale than in the Gulf. In Jordan, for example, the largest solar power plant developed to date is the 200MW Baynouna plant, east of the capital Amman, which began commercial operations in 2020.

In other nearby countries, where national grid supply has been unreliable due to war and political instability, the development of utility-scale solar plants has proven difficult if not impossible. As a result, where solar power has gained traction, it has often been concentrated around rooftop installations by individual household or businesses.

In Lebanon, for example the Ministry of Energy and Water (MEW) issued a request for proposals to build a dozen 15MW solar PV plants in 2017. Licences for 11 of the planned projects were issued in May 2023 but financing problems have meant that none have yet been completed. In the meantime, distributed solar power has leapt ahead, with 114MW installed in 2021 and 663MW in 2022, according to the Lebanese Centre for Energy Conservation (LCEC). A further 212MW was added in 2023 and the agency estimates that total solar PV capacity exceeded 1GW by end of that year.

Lebanon solar PV installed capacity (MW)



Source: Lebanese Centre for Energy Conservation (LCEC)

However, more recently there have been signs that the country's utility-scale projects could be revived. In September 2025, Lebanon's energy ministry signed power purchase agreements with Merit Invest, a subsidiary of French shipping giant CMA CGM, for three solar power projects which had been part of the original slate of 11 plants.

In Syria, there are also positive signs for the renewables sector, following the end of the country's long civil war in late 2024. In May 2025 an international consortium signed a memorandum of understanding to develop 5GW of electricity, including a 1GW solar power plant at Wedian Alrabee in the south of the country. The consortium is led by Qatar's UCC Holding and includes two Turkish firms, Kalyon GES Enerji Yatirimlari and Cengiz Enerji.

The interest shown by the Saudi, Qatari and Turkish governments in helping to rebuild the shattered country means further similar deals could follow with such partners.

Turkey itself has seen a rapid rollout of solar PV generating capacity in recent years. It almost doubled its capacity from 2022 to the end of 2024, with the figure rising from 9.4GW to more than 19GW over that period, according to IRENA. That figure could more than triple over the course of the next decade – under the country's Long-Term Climate Change Strategy, Ankara is aiming to have 77GW of solar capacity installed by 2035.

Even so, such developments still only tap into a fraction of the region's potential. Energy think tank Ember estimates that Turkey has the potential to generate more than 120GW just from rooftop solar installations.

There is huge untapped potential in other countries too. A study published in Energy Strategy Reviews in May 2025 found that, across the MENA region, solar PV could generate up to 65,000 TWh a year, far above projected electricity demand. Saudi Arabia alone has the potential to generate 12,132 TWh a year, according to the study.

1 https://www.sciencedirect.com/science/article/pii/S2211467X25001257

The Impact of ESG Market Dynamics on Solar Investments

Efforts to limit the impact of climate change are a key driver of the push for more renewable energy and highlight the influence of environmental, social and governance (ESG) issues on the power sector.

At least six countries in the region have set net zero pledges, with Lebanon, Oman and the UAE aiming to reach that target by 2050 and Bahrain, Kuwait and Saudi Arabia setting a goal of 2060.

Those six countries, along with Iraq, Jordan, Qatar and Yemen, have also joined the Global Methane Pledge to cut emissions of that gas. In addition, four regional countries – Bahrain, Iraq, Oman and Saudi Arabia – have also endorsed the Zero Routine Flaring by 2030 initiative.

There have been many other, country-specific pledges that have been announced by governments across the region, including:

Bahrain plans to cut emissions by 30% by 2035, under its National Energy Strategy.

Kuwait aims to be carbon neutral in the oil and gas sector by 2050 and in other parts of the economy by 2060. It also aims to increase in the share of renewable energy to 30% of its energy mix by 2030 and 50% by 2050.

Iraq plans to add 12GW of solar PV capacity, along with 1.25GW of wind power, by 2030.

Jordan's Energy Strategy 2020-30 sets a target of a 31% renewables share in its electricity generation mix, equivalent to 3.2GW of installed capacity.

Lebanon has set a target of at least 30% of generation capacity to come from renewable sources by 2030.

Oman aims for renewables to account for 60% of total power supply by 2034, under its National Strategy for an Orderly Transition to Net Zero.

Qatar aims to increase the share of renewable energy to 18% in its power mix by 2030, under its National Renewable Energy Strategy. It also aims to convert 35% of its car fleet and all of its public buses to electric power by 2030.

Saudi Arabia: Saudi Vision 2030 sets a target of increasing the share of renewables to 50% of its electricity mix by 2030.

The UAE's Energy Strategy 2050 aims to triple the share of renewable energy by 2030. The country also plans to increase the share of electric vehicles (EVs) to 50% of its total fleet by 2050 and plans to cut the energy consumption of buildings by 40% by 2050, from 2019 levels.

While governments are investing heavily in renewables (as well as gas-fired power plants) to help meet the expected strong growth in electricity demand, there are also efforts to limit demand by encouraging greater energy efficiency by consumers.

Among the areas being targeted are the use of cooling and other appliances in buildings. In 2023, buildings accounted for two-thirds of final electricity demand across the region, followed by industry at 24%, according to the IEA. The UAE is among the countries trying to limit this in the future, with its National Green Building Regulation of 2021 setting minimum standards for new buildings.

Other authorities have been setting stricter performance standards for appliances. According to the IEA, the average efficiency rating of an air conditioner in the MENA region is less than half the level in Japan and improving that could cut peak demand growth by 35GW by 2035, equivalent to the total power generation capacity of Iraq today. In 2021, Saudi Arabia revised the minimum energy performance standards for air conditioners in its market to tackle this issue.

Utility-Scale & Hybrid Solar PV Project Development

Utility-scale solar plants continue to spread around the region, with the largest ones concentrated in the Gulf region and Turkey – although there are also plans for at least one giga-scale plant in Syria.

Dubai's seven-phase Mohammed bin Rashid Al Maktoum Solar Park is the largest single-site development of its kind in the world.

Other significant projects include Saudi Arabia's Sudair solar PV plant, the first phase of which came online in September 2023, with the second and final phase following in 2024.

Oman's largest solar facility, the 500MW Ibri II plant came on line in 2022, while Qatar has the 800MW Al-Kharsaah solar PV plant.

Some other countries that are trailing behind have announced ambitious targets. In Kuwait, for example, the Ministry of Electricity, Water and Renewable Energy plans to add 17.35GW of generating capacity over the next five years, 30% of which will come from renewable energy.

Key Middle East solar PV power projects

Project	Location	Capacity (MW)	Status
Mohammed bin Rashid Al Maktoum Solar Park	Dubai	7,260	Partially complete
Round The Clock (RTC) Project	Abu Dhabi	5,200	Under construction
Sudair plant	Saudi Arabia	1,500	Complete
11 solar power plants	Lebanon	165	Planned
Wedian Alrabee plant	Syria	1,000	Planned
Baynouna	Jordan	200	Complete
Ibri II	Oman	500	Complete
Al-Kharsaah	Qatar	800	Complete
Gas Growth Integrated Project - solar power plant	Iraq	1,000	Planned
Karbala solar power plant	Iraq	700	Partially complete
Aftab-e-Sharq	Iran	600	Partially complete
Kalyon Karapınar	Turkey	1,350	Complete
Al Dur	Bahrain	100	Planned

In the Levant, projects tend to be more limited in scale. Beyond the 200MW Baynouna plant near Amman, many solar power plants in Jordan have a capacity of just 50MW, such as the Risha and Mafraq independent power plants (IPPs) developed by Acwa Power and the Al-Husainiyah plant developed by Amea Power.

In Turkey, by contrast, the largest plant developed to date is the 1.35GW Kalyon Karapınar solar PV facility in Konya province.

According to Rystad Energy, total solar PV generation capacity across the region should reach more than 33GW by the end of 2025, up from just 7GW in 2020. It predicts that it could go on to reach 140GW by 2030 and almost 300GW by 2035.

A key element going forward will be hybrid developments, which mix solar generation capacity with battery storage facilities, to ensure that power is available throughout the day. The steady decline in the cost of batteries is encouraging more deployments and Rystad Energy predicts that regional BESS capacity will exceed 29GW by 2030 and more than 60GW by 2035.

Abu Dhabi's Round-the-Clock solar plus battery project is the largest such scheme launched to date. It is being developed by Abu Dhabi Future Energy Company (Masdar) and Emirates Water and Electricity Company (EWEC) and will be able to deliver 1GW of baseload renewable energy around the clock

Corporate PPAs & Renewable Procurement Trends

Power purchase agreements by major commercial and industrial (C&I) users are a key feature of the growth of the solar power sector. Such projects typically have relatively small generating capacity, ranging from a few hundred kilowatts to a few megawatts. Some developers, such as Dubai-based SirajPower and Yellow Door Energy, specialise in this area of the market.

SirajPower, for example, has signed numerous agreements to develop both on- and off-grid solar power facilities. Its customers have ranged from supermarket chain Lulu Group to port operator DP World and numerous other commercial users at sites around Dubai. It estimates that the size of the C&I market in the emirate is around 1 GW and it says it has a pipeline of several hundred MW due to be installed over the next three to four years

Yellow Door Energy has developed similar-sized projects for clients across a broader range of markets, including Bahrain, Jordan, Oman, Saudi Arabia and the UAE.

In early November, Yellow Door announced an agreement with Bahraini industrial conglomerate Foulath Holding to develop a 123MW solar project spread across 14 sites around the country, using both rooftop and ground-mounted solar PV installations. The plans include the world's largest rooftop solar power plant, a 50MW facility using 77,000 solar panels that will be built on top of a new 262,000-square-meter stockyard shed for Bahrain Steel.

Abu Dhabi's Masdar is another notable actor. It develops both large, utility-scale projects and smaller C&I facilities in countries around the world. Examples of the latter include a 1.2MW solar PV plant at Bab Al-Shams in Dubai, which provides power to a local farm, a 7MW plant for the Khazna data centre in Masdar City, Abu Dhabi and solar rooftop installations at the Warner Bros. World and SeaWorld theme parks in Abu Dhabi.

Such plants are in contrast to larger utility-scale projects developed by the likes of the Dubai-based Amea Power, Saudi Arabia's Acwa Power and Qatar's Siraj Energy.

Talent & Workforce Development in Renewable Energy

The Middle East region has the benefit of a large, young population. That, along with its long history of developing and managing world-class infrastructure – both in the conventional energy sector and in other areas including transport and urban development – means it is well placed to foster the skills needed for the growth of the renewable energy industry in the future.

Developing such abilities will be a critical element for the region if it is to make the most of its renewable energy potential as a driver of economic growth and to help it diversify away from oil and gas – both as a source of energy and a source of income.

Many of the skills useful for the oil and gas industries could be adapted to the renewable energy industry, from the engineering skills needed to build large power plants and deliver that energy to end-users, to expertise in everything from chemicals to pricing mechanisms and the extraction and transport of raw materials.

Saudi Arabia's Vision 2030 strategy includes several elements designed to increase the skills of the country's citizens, including the Human Capability Development Program, which aims to match local education with the skills needed by the evolving labour market.

A recent study by H2-diplo, a German-funded programme – called Powering the Transition: Forecasting and Closing the Skills Gap for Saudi Arabia's Renewable Energy Sector – predicted that between 91,000 and 127,000 skilled workers will be required to meet demand in the Saudi energy market by 2030. Most of those jobs will be in engineering-related fields, including electrical, civil, and mechanical disciplines, including 46,000 junior roles and 20,000 experienced ones. Local manufacturing of renewable energy components could add another 11,000 jobs. The report said that Saudi nationals could make up 45% of the industry workforce by 2032.

The UAE's Green Growth Strategy and Energy Strategy 2050 also includes a focus on developing local skills, with the aim of creating 50,000 jobs by 2030.

Across the region, third level institutions have been developing courses which aim to train locals in the skills needed to fill such roles. In the Gulf region, for example, Abu Dhabi University offers a BSc in Renewable and Sustainable Energy Engineering, while Heriot-Watt University, Dubai has an MSc in Renewable Energy Engineering and Saudi Arabia's Taif University has a master's program in renewable and sustainable energy engineering.

https://h2diplo.de/news/new-h2-diplo-study-maps-workforce-needs-for-saudi-arabias-renewable-energy-transition/

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Meet the people powering change, from government leaders to trailblazing innovators, and explore real-world solutions that address the region's most pressing power challenges. Whether you're scaling your business, scouting partnerships, or staying ahead of energy trends, this is where the region's energy transformation takes place.

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