

UAE Clean Energy Ambitions

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The United Arab Emirates is undergoing a profound transformation of its energy landscape, strategically maintaining its role as a significant hydrocarbon producer while aggressively pursuing ambitious clean energy targets. The country's current power mix, where natural gas accounts for a dominant 72%, is set for a dramatic overhaul by 2050. The UAE Energy Strategy 2050 aims to achieve net-zero emissions, a 50% clean power mix, and a 70% reduction in total carbon emissions.

USD 28.2bn investment pipeline

The UAE energy sector is seeing massive infrastructure investments. According to the latest data from MEED Projects (July 2025), the UAE currently has 25 energy projects in the pipeline that are worth an estimated net project value of USD 28.2bn and would have a total of 21,714 MW of generation capacity, a 38% expansion from the current estimated power generation capacity of 56,600 MW.

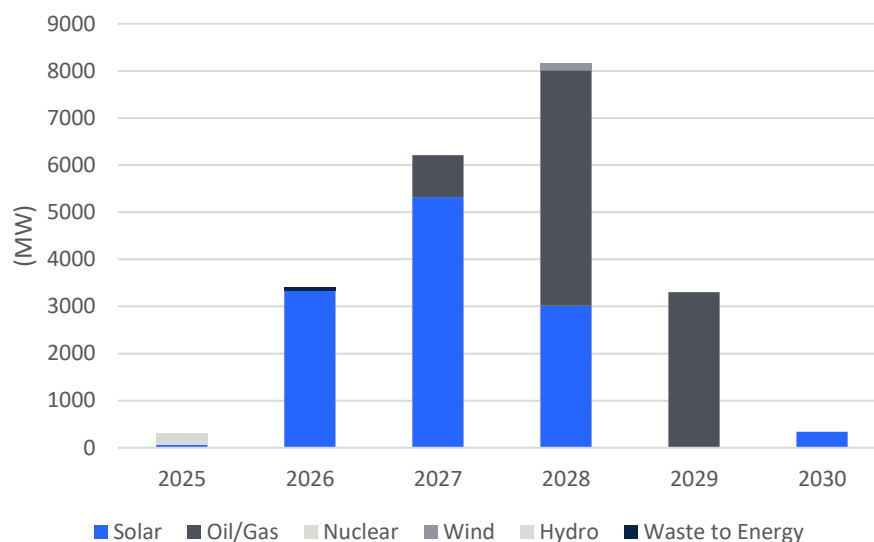
Projects by energy source:

- Solar power: Leads with 14 projects valued at an estimated USD 16.7bn.
- Thermal power: Accounts for seven projects, totaling an estimated USD 10.4bn.
- Waste-to-energy power: Includes two projects with an estimated net project value of USD 520m.
- Hydro power: One project with an estimated net project value of USD 387m.
- Wind power farm: Comprises one project with a net project value of USD 140m.

The UAE power mix will be 36% clean energy by 2030

The UAE will accomplish a significant milestone towards its 2050 Energy target by increasing the share of clean energy in the overall power mix to 36% and the share of renewable energy to 29% by 2030 upon completion of the projects that are currently in the pipeline. The UAE identifies clean energy as a broad category encompassing solar, wind, nuclear power, waste to energy, and hydrogen while renewable energy specifically refers to naturally replenishing sources including solar and wind and excluding nuclear.

Annual additions of power by energy type



Source: MEED Projects, Emirates NBD Research

Solar power is the main contributor behind the UAE's clean and renewable energy growth. Solar power energy capacity will more than double, growing 126% from 9,606 MW in 2025 to 21,670 MW in 2030. Solar power is likely to build even further with projects that are currently in the study phases. Solar projects also benefit from shorter timelines at a range between one to three years compared to other energy sources. The share of oil and gas in the power mix is expected to decline to 64% by 2030.

Solar power: cornerstone of the renewable energy ambition

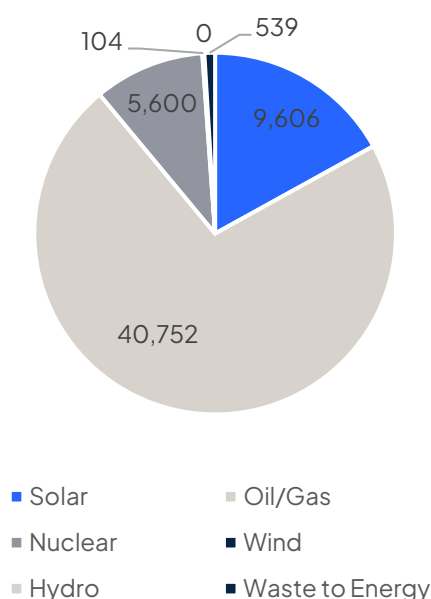
Solar energy is at the forefront of the UAE's renewable energy strategy, leveraging the nation's abundant sunshine to achieve world-leading cost efficiencies. The UAE boasts some of the lowest solar electricity generation costs globally, ranging from 1.32 to 1.35 US cents per kilowatt-hour. This remarkable cost-effectiveness is a key driver for its widespread adoption.

Major solar projects:

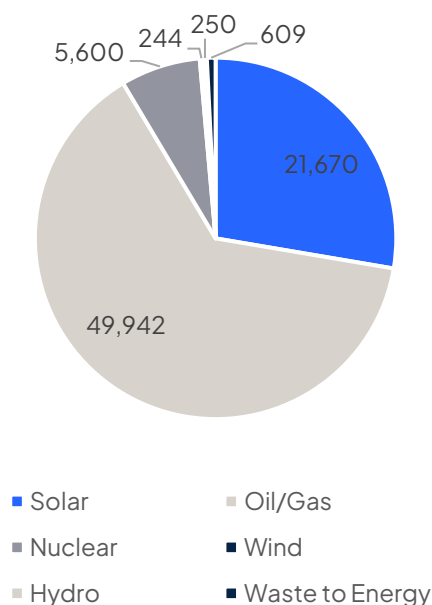
- Mohammed bin Rashid Al Maktoum Solar Park: Projected to reach 7.2 GW capacity by 2030 with investments totaling USD 13.6bn. This single project alone is expected to reduce annual carbon emissions by over 6.5m tonnes.
- Al Dhafra Solar project, one of the largest solar power plants in the world, with an installed capacity of 2 GW, enough to power 200,000 homes.

- Masdar is spearheading the development of the world's first 24/7 renewable energy facility. This USD 6bn plant will combine a 5.2 GW solar photovoltaic (PV) facility with a 19 GWh Battery Energy Storage System (BESS) to have a capacity of 1 GW of uninterrupted clean power by 2027, directly addressing the intermittent nature of solar generation

Current power mix (MW)



2030 power mix (MW)



Source: MEED Projects, Emirates NBD Research.

Nuclear Power Supplies 25% of UAE's Electricity Needs

The Barakah Nuclear Power Plant, the first nuclear energy plant in an Arab country, has a total capacity of 5.6 GW and can supply around 25% of the UAE's electricity needs. The plant's four operational APR1400 design nuclear reactors produce 40TWh annually which is equivalent to powering more than 500,000 homes. Barakah is playing a critical role in the nation's decarbonization efforts, preventing the release of 22.4m tonnes of carbon emissions annually, equivalent to removing 4.8m cars from the roads.

Waste-to-energy: transforming waste into value

Waste-to-energy (WtE) technology represents a crucial component of the UAE's circular economy and clean energy strategy, transforming municipal solid waste into valuable electricity and significantly reducing landfill volumes. These projects not only address environmental challenges but also attract substantial foreign direct investment.

Major WtE Projects:

- Dubai Centre for Waste Processing (Warsan): The world's largest waste-to-energy project valued at USD 1.09bn. This facility is designed to treat approximately 1.9m tonnes of waste per year, converting it into 200 MW of clean electricity. This output is sufficient to power 135,000 households and will process up to 45% of Dubai's current municipal waste generation. The project's financing includes USD 900m in project finance loan agreements led by international financial institutions like Japan Bank for International Cooperation showcasing strong international confidence and attracting significant FDI.
- Al Dhafra waste-to-energy plant: one of the largest WtE facilities globally, currently under construction and will be completed by 2026. The USD 480m facility has the capacity to process up to 1.5m tonnes of waste annually, generating around 117 MW of electricity for the national grid. This project is expected to reduce carbon emissions by 1.1m tonnes per year and generate enough electricity to power up to 52,500 households.

Wind Power

Although the UAE's wind resources are not as extensive as its solar potential, strategic investments are being made to harness this clean energy source. Previously, wind energy was not viable at utility scale due to low wind speeds in the UAE, but innovations within climate technology and UAE-led expertise have made power generation using wind possible. Larger turbines, lower hardware costs, and the discovery of a unique weather phenomenon that generates high winds at night, have made the UAE wind program project scalable and economically viable. Masdar, a leader in renewable energy, has also been involved in developing the Middle East's largest operational wind farm, the 400 MW Dumat Al Jandal project in Saudi Arabia, showcasing its regional expertise in wind energy.

Key Wind Projects:

- UAE Wind Program: The UAE wind program led by Masdar was completed in 2023 and developed a cost-effective large scale utility wind power that leverages advanced technology in material science and aerodynamic to capture low wind speeds at utility scale. The project has a total capacity of 103.5 MW of wind power spanning across 4 locations: Sir Bani Yas Island, Delma Island, Al Sila, and Al Halah in Fujairah. The project powers over 23,000 homes and

displaces 120,000 tonnes of CO₂ per year, contributing significantly to the nation's decarbonization efforts.

- Al Sila 140 MW Wind Power Plant: Currently in main contract bid phase and is expected to be completed by 2028, this facility will double the UAE's current wind generation capacity. The facility will have sufficient power capacity to power 36,000 homes annually and offset 190,000 tonnes of carbon dioxide emissions.

Hydropower

The Hatta Pumped Storage Plant represents Dubai's entry into hydroelectric power generation in the region. The USD 387m project, currently at 98% completion, will generate 250 MW of power and store 1,500 megawatt-hours of energy. The plant operates like a giant battery, using solar power from the Mohammed bin Rashid Al Maktoum Solar Park to pump water uphill to an upper reservoir during low demand, then releasing it through turbines to generate electricity when needed. With 78.9% efficiency and a 90-second response time to electricity demand, the facility can operate for up to 80 years. A consortium led by Austrian construction giant STRABAG is building the plant, working alongside Austria's Andritz Hydro for the electromechanical equipment and Turkey's Özkar Group for specialized concrete dam construction.

Ras Al Khaimah is positioning itself for an even more ambitious pumped storage project that could transform regional energy infrastructure. France's EDF is in talks with Ras Al Khaimah Municipality to develop a massive 5GW pumped storage hydropower plant that would be the "biggest in the world". The proposed facility is designed to store energy for up to 12 hours and represents a "country-level" initiative aimed at balancing electricity supply across the UAE. According to EDF, the project takes advantage of the fact that "most of the solar farm development is happening in Abu Dhabi and Dubai but for the storage and especially pumped storage, you need mountains". At 5 GW capacity, this proposed facility would be 20 times larger than Dubai's Hatta plant and would serve as massive energy storage infrastructure to support the UAE's clean energy transition, though the project remains in early exploratory discussions with no timeline or contractors yet announced.

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