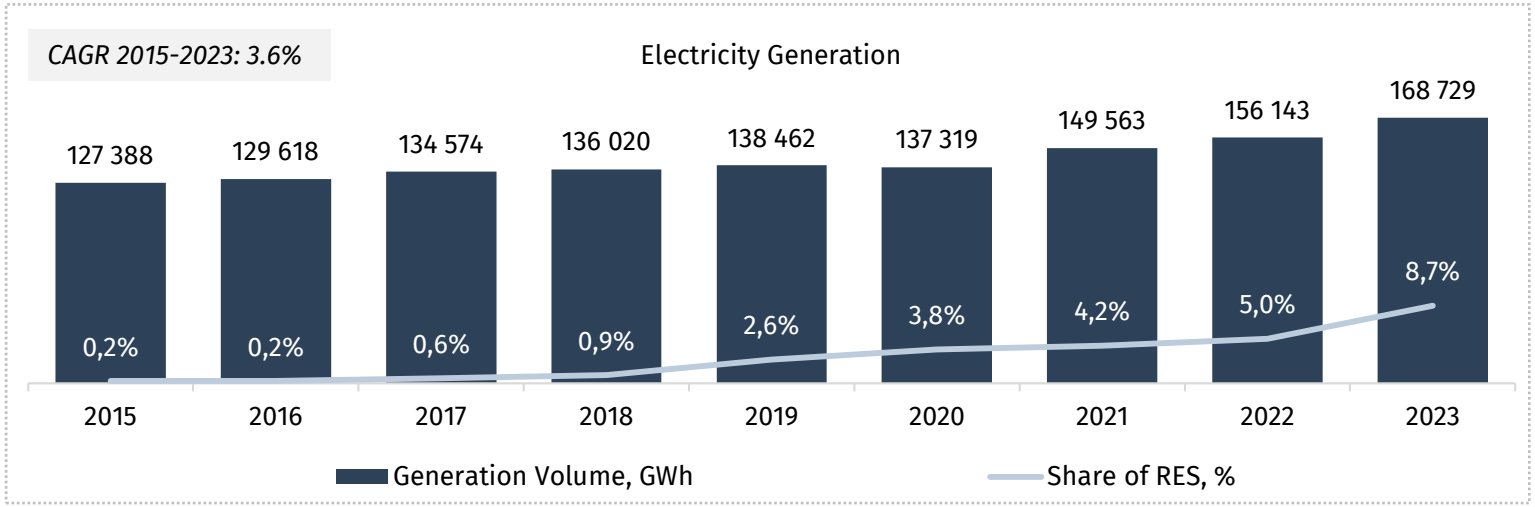
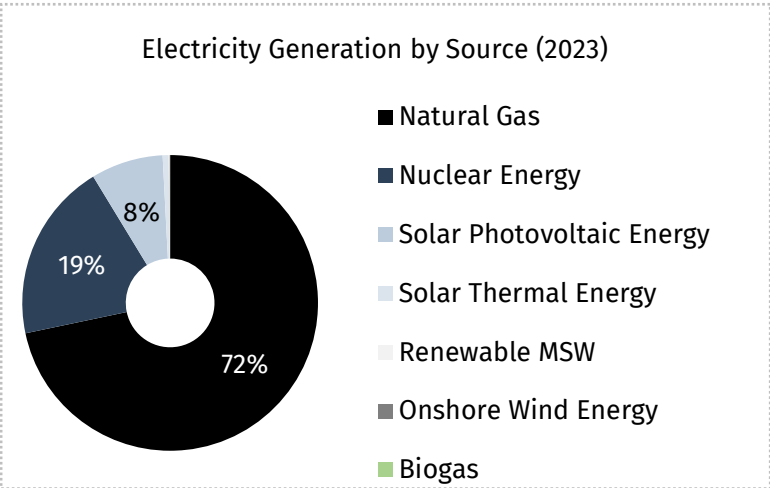
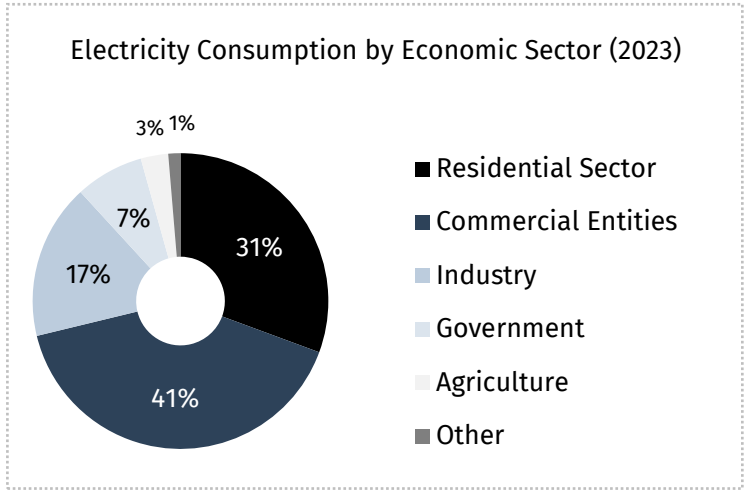
Renewable Energy Market Study
United Arab Emirates

December 2025

ENERGY







Sources: International Renewable Energy Agency, UAE Ministry of Energy and Infrastructure, ASER calculations

RES – Renewable Energy Sources

The UAE's energy sector is a prime example of transformation: shifting from absolute dependence on hydrocarbons to creating one of the most diversified and innovative energy systems in the region.

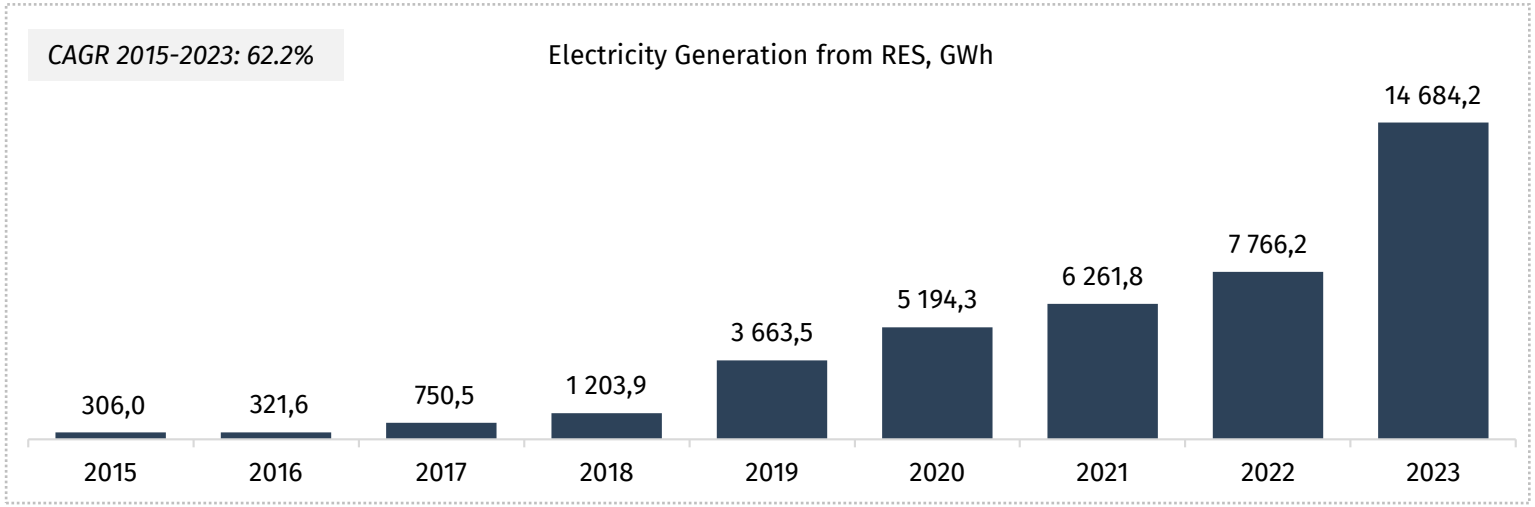
Historically, the UAE is a global hydrocarbon country. Oil and gas have been and remain the foundation of export revenues and the national budget. The domestic energy system also relied almost entirely on gas, which—combined with energy-intensive industries (petrochemicals, desalination, construction) and subsidized tariffs—led to a high energy intensity of GDP. Over the past decade, a steady downward trend in this intensity has been observed.

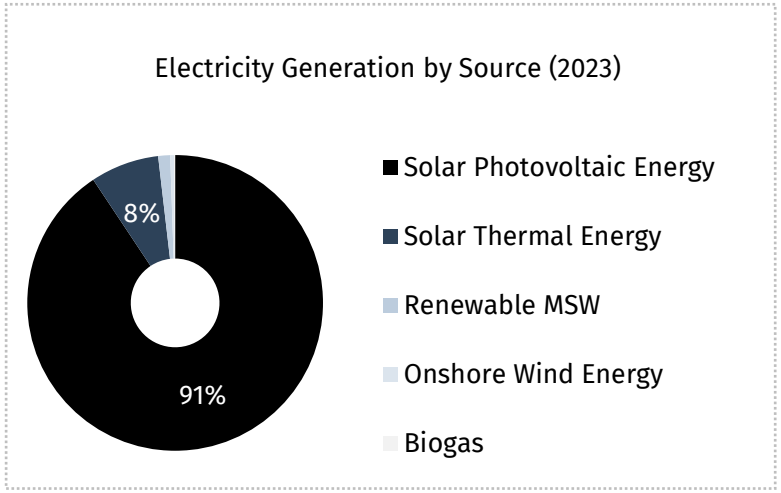
The state's energy mix is no longer a monoculture and has transformed into a balanced portfolio where each source plays a specific role:

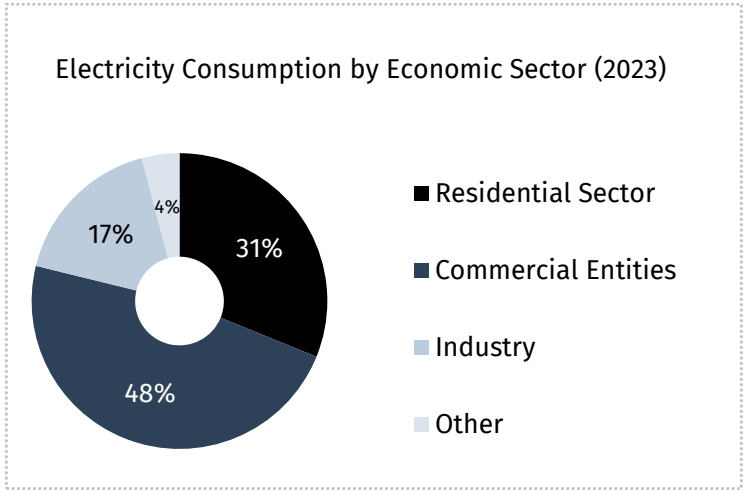
- Gas (baseload & flexibility): Remains the foundation, but its share in generation for the domestic market is declining; it is a key source for covering peak loads and ensuring grid reliability.
- Nuclear energy (new clean baseload): The launch of the Barakah Nuclear Power Plant is a historic event; it provides up to 25% of the country's electricity needs.
- Solar energy (growth leader): Possessing one of the world's best solar potentials, the UAE is implementing megaprojects, achieving record-low tariffs.
- Other RES & technologies (niche but strategic): Wind power, waste-to-energy, and ambitious hydrogen plans complement the portfolio, providing technological advancement and solving local challenges.

The UAE is diversifying its energy system, where the development of clean generation (nuclear and RES) goes hand in hand with improving the efficiency of the entire economy.

RENEWABLE ENERGY







Sources: International Renewable Energy Agency, UAE Ministry of Energy and Infrastructure, ASER calculations

This slide clearly illustrates that **renewable energy has become the most dynamic and high-priority direction of the energy transition in the UAE**. The presented numbers indicate a qualitative change in the industry: a shift from isolated pilot projects to the formation of a powerful, competitive industry.

High growth rates in capacity have been made possible by ideal natural conditions (high solar irradiance), major government investments, the attraction of global industry leaders through competitive auctions, and the creation of a favorable regulatory environment.

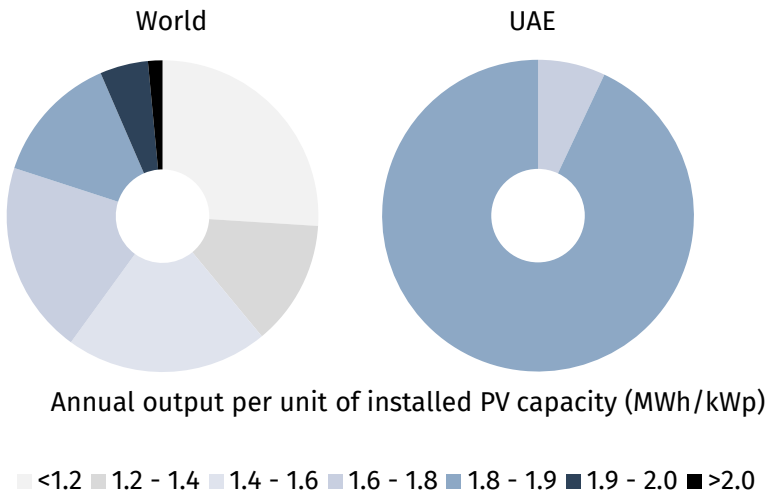
- Solar energy (dominant force) is the absolute leader, which is logical for a country with one of the highest levels of solar radiation in the world.
- Other RES (strategic diversification): Primarily includes waste-to-energy, which for densely populated emirates (Dubai, Sharjah) solves two problems at once: waste disposal and "green" electricity generation. Smaller shares represent wind power (the first commercial wind farm on Sir Bani Yas Island) and biogas plants.

The development of RES is the primary tool for achieving national climate goals (Net Zero by 2050) and enhancing energy security by utilizing a local, inexhaustible resource.

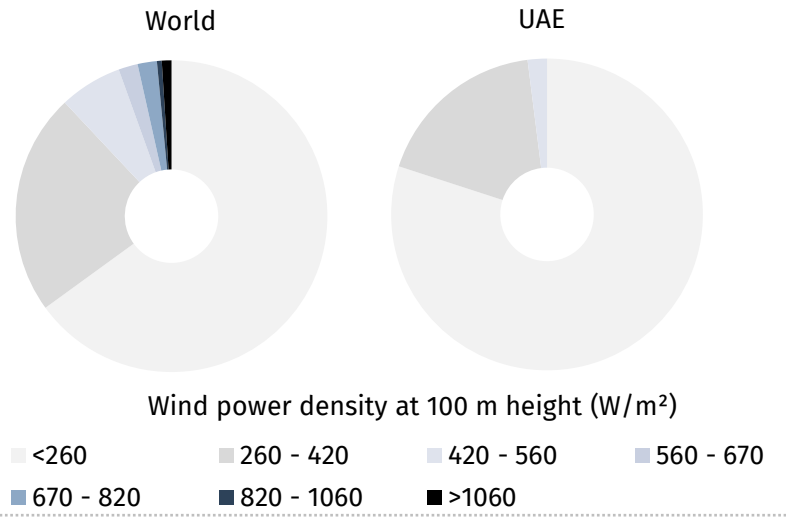
The high CAGR also attests to the creation of new markets, jobs, and expertise, which fully aligns with the UAE's strategy of building a knowledge-based economy.

RENEWABLE ENERGY DEVELOPMENT POTENTIAL

Distribution of Solar Potential (% of Land Area)



Distribution of Wind Potential (% of Land Area)



Biomass Potential: Net Primary Production (NPP)	
Global Average	3-4 tC/ha/year
UAE	0.5 tC/ha/year

Solar energy: an inexhaustible and exceptional advantage
The overwhelming majority of the country's land area falls into the highest classes of solar potential: a large share of the land possesses outstanding characteristics for power generation. This makes the UAE one of the world's most promising countries for solar energy development, explaining its leading role in the renewable energy balance and the record-low tariffs achieved in auctions.

Wind energy: a limited but existing resource
The distribution of wind resources across the country is uneven. The pie charts show that the share of land area with wind potential suitable for cost-effective generation (Class 3 and above) is significantly smaller than for solar energy. The most promising areas are coastal zones, mountainous regions, and some desert areas. This explains why wind power is developing in the UAE as an important, yet niche, direction (e.g., the wind farm on Sir Bani Yas Island).

Biomass: minimal natural potential
The net primary production (NPP) in the country is extremely low (6-8 times below the global average) due to the arid desert climate, poor soils, and water scarcity. This means the potential for traditional bioenergy (energy crops, forestry) in the UAE is practically non-existent. However, this does not preclude the development of modern waste processing technologies (Waste-to-Energy), where the feedstock is municipal solid waste, not specially cultivated biomass. This industry addresses an environmental problem and creates energy, operating on a different economic basis.

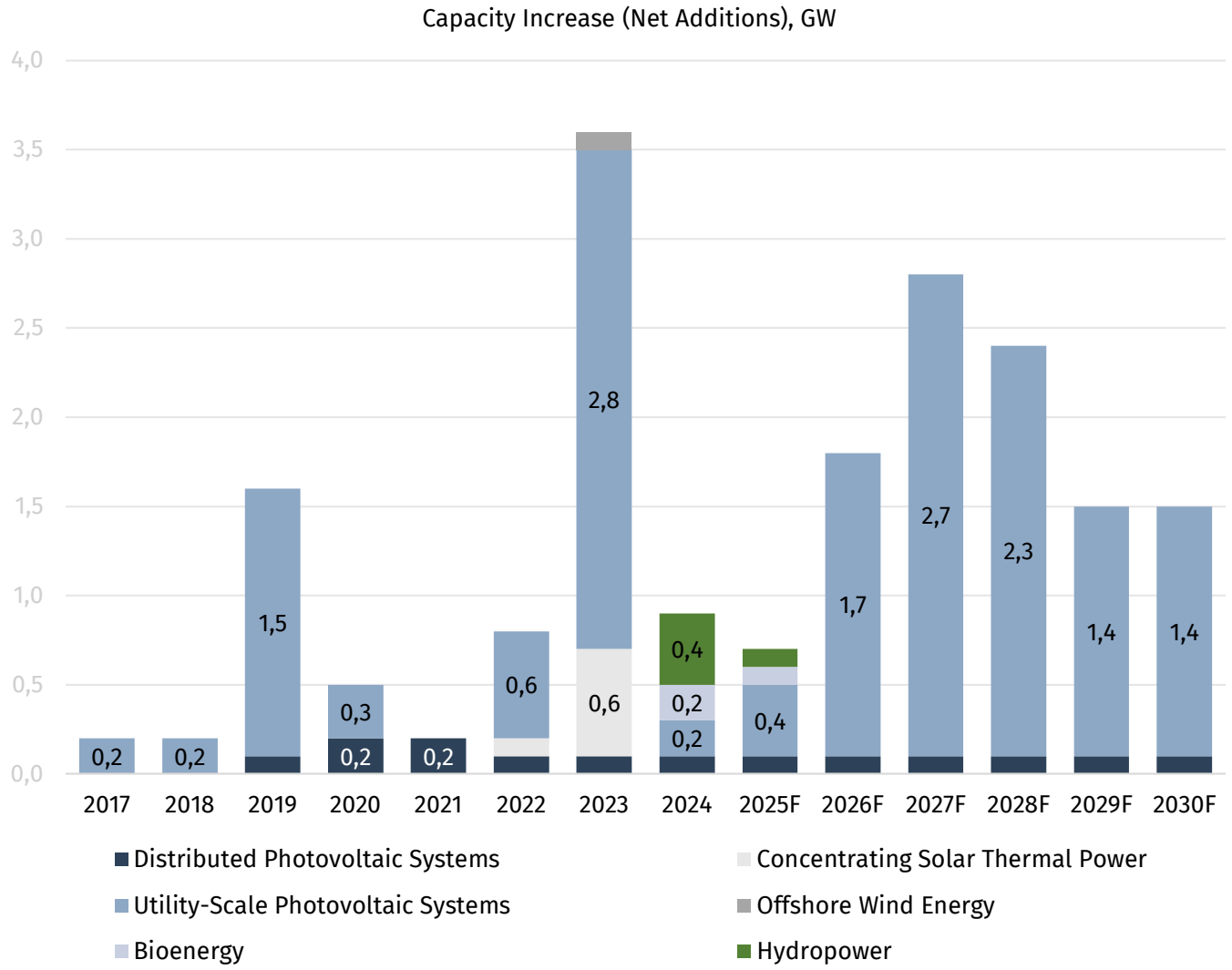
Solar photovoltaic systems: Solar resource potential is divided into seven classes, each corresponding to a range of annual PV system output per unit of power (kWh/kWp/year). The pie chart shows the country's land area share in each of these classes compared to the global distribution of land area by class.

Onshore wind: Potential wind power density (W/m²) is presented in seven classes as used by NREL, measured at a height of 100 m. The pie chart shows the distribution of the country's area across these classes compared to the global distribution of wind resources. Areas of Class 3 and above (> 420 W/m²) are considered favorable for wind resource utilization.

Biomass: Net primary production (NPP) is the amount of carbon annually fixed by plants and accumulated as biomass. It is a fundamental indicator of biomass productivity. The table shows the country's average NPP (tC/ha/year) compared to the global average NPP of 3–4 tons of carbon.

Source: International Renewable Energy Agency

RENEWABLE ENERGY DYNAMICS



Source: The International Energy Agency

The forecast anticipates a significant increase in new renewable energy capacity additions compared to previous years. **The total new capacity during the 2025-2028 period could reach approximately 10 GW, more than doubling the existing capacity.**

The projected capacity growth will be almost entirely driven by solar energy (photovoltaic plants, PV). This fully aligns with the country's natural potential and current strategy, which includes the implementation of mega-projects such as the Mohammed bin Rashid Al Maktoum Solar Park in Dubai (target: 5 GW by 2030), the Al Dhafra project in Abu Dhabi (2 GW), among others.

In contrast to solar, capacity additions in wind energy and other technologies (biomass/waste) are forecast to be minor or sporadic. This reflects the following factors:

- For wind: Its limited and localized natural potential makes wind farms specific point projects rather than a basis for gigawatt-scale expansion.
- For bioenergy/waste: These technologies are viewed more as waste management solutions than as mass power generation tools; their development will continue, but on a scale incomparable to solar energy.

Such large-scale addition of variable solar generation will require the parallel development of energy storage systems to smooth daily output, smart grids, demand management technologies, and reliable baseload generation to ensure grid stability.

The forecast also underscores the UAE's role as a global investor and technology hub in solar energy, attracting international companies and setting new records for the cost of electricity.

GOVERNMENT SUPPORT

Support / Policy	Emirate / Organizer	Eligible Parties	Key Mechanisms
Shams Dubai	Dubai (DEWA)	Residential & commercial property owners	• Rooftop solar panel installation for self-consumption. • Net-metering: Excess energy is fed into the grid and credited against future consumption, reducing electricity bills. • Simplified connection procedure via DEWA.
D33 Industry Friendly Power Policy	Dubai (DEWA)	Industrial enterprises, agri-companies, data centers, large commercial consumers	• Cover up to 100% of energy needs through self-generation. • 25% discount on connection fees + interest-free installment plan for up to 2 years. • Surplus energy buyback at a fixed tariff of 10.5 fils/kWh (~$0.0286) during working seasons. • Priority access to purchase RECs/i-RECs for ESG reporting. • Full technical and regulatory support from DEWA.
Dubai Clean Energy Strategy 2050 / Mega-Projects (IPP/IPWP)	Dubai (Dubai Government, DEWA)	Large investors, developer consortia, energy companies	• Participation in tenders for giant solar parks (e.g., Mohammed bin Rashid Al Maktoum Solar Park, target 5 GW by 2030). • Long-term Power Purchase Agreements (PPAs). • Creation of a predictable market to attract major foreign investment.
Green Certificate (RECs/i-RECs) Acquisition	Dubai (under D33) / Abu Dhabi (Masdar)	Consumer companies seeking to verify the "green" origin of their energy for ESG goals	• Purchase of certificates proving consumed energy is from renewable sources. • In Dubai, D33 participants have priority to purchase certificates from DEWA projects.

Additional specific tax & financial incentives by emirate:

1. Abu Dhabi:

- The Khalifa Fund for Enterprise Development provides **financing on preferential terms** (low or zero interest) for SMEs, including those involved in sustainable energy and energy efficiency projects.
- The Abu Dhabi Environment Agency (EAD) may offer **grants for pilot and R&D projects in clean technologies**.

2. Dubai:

- The Dubai Green Fund (part of the Dubai Carbon Centre of Excellence), managed by Dubai Islamic Bank, provides **financing on preferential terms** for energy efficiency and renewable energy projects.
- **Connection fee discounts**: As noted in the D33 policy – a 25% discount on new grid connection charges.

GOVERNMENT SUPPORT

Support / Policy	Emirate / Organizer	Eligible Parties	Key Mechanisms
Net Metering Policy	Abu Dhabi (ADDC, AADC)	Residential & commercial property owners	• Program similar to Shams Dubai: solar panel installation, compensation for surplus energy. • Technical requirements and tariffs may differ from those in Dubai.
Programs & Projects by Masdar Corporation	Abu Dhabi (Masdar)	International and local investors, technology companies, government entities	• Investments in utility-scale renewable energy projects worldwide and in the UAE. • Development of green hydrogen and new technologies. • Creation of clean energy clusters (e.g., Masdar City in Abu Dhabi).
Initiatives in Other Northern Emirates	Sharjah, Ras Al Khaimah, Fujairah (local utilities: SEWA, FEWA)	Consumers and businesses in the respective emirates	• Gradual implementation of net-metering policies. • Pilot solar power plant projects. • Processes are less unified and may require individual case approval.
Federal Support (Strategic Framework)	UAE Government	Nationwide, investors, research institutes	• UAE Energy Strategy 2050: Target of 50% clean energy by 2050. • "Emirates of the Future" Clean Initiative: Investments in renewable energy projects. • Tax incentives in Free Economic Zones. • Guarantees for foreign investment, 100% foreign ownership rights.

Additional specific tax & financial incentives by emirate:

3. Nationwide measures:

- **Zero VAT on solar panels & key equipment:** Although a 5% VAT applies in the UAE, supplies of certain solar power generation equipment may be taxed at 0% if they meet specific criteria.
- **Free economic zone (FEZ) incentives:** The vast majority of companies developing renewable energy projects (especially EPC contractors, consulting, and technology firms) register in FEZs, granting them:
  - ✓ 0% corporate tax for 50 years (guaranteed).
  - ✓ 100% foreign ownership.
  - ✓ 0% customs duties.
  - ✓ Full repatriation of capital and profits

ENERGY STRATEGY 2050

The UAE Energy Strategy 2050 was adopted in 2017 as the country's first unified energy strategy, based on balancing supply and demand with environmental commitments and creating a favorable economic environment for growth.

Considering recent dynamic changes in the energy sector, the maturity of new low-emission energy technologies, and the country's commitment to the Paris Agreement goals, **the UAE Energy Strategy 2050 was updated in 2023**. This update sets targets for 2030 and **ambitious goals for 2050 to achieve net zero emissions**.

The updated strategy aims to facilitate the development of renewable and nuclear energy sources, improve energy efficiency, stimulate R&D and innovation in energy technologies, increase the local clean energy capacity, and encourage investment in the country's renewable and clean energy sector.

National Targets for 2025

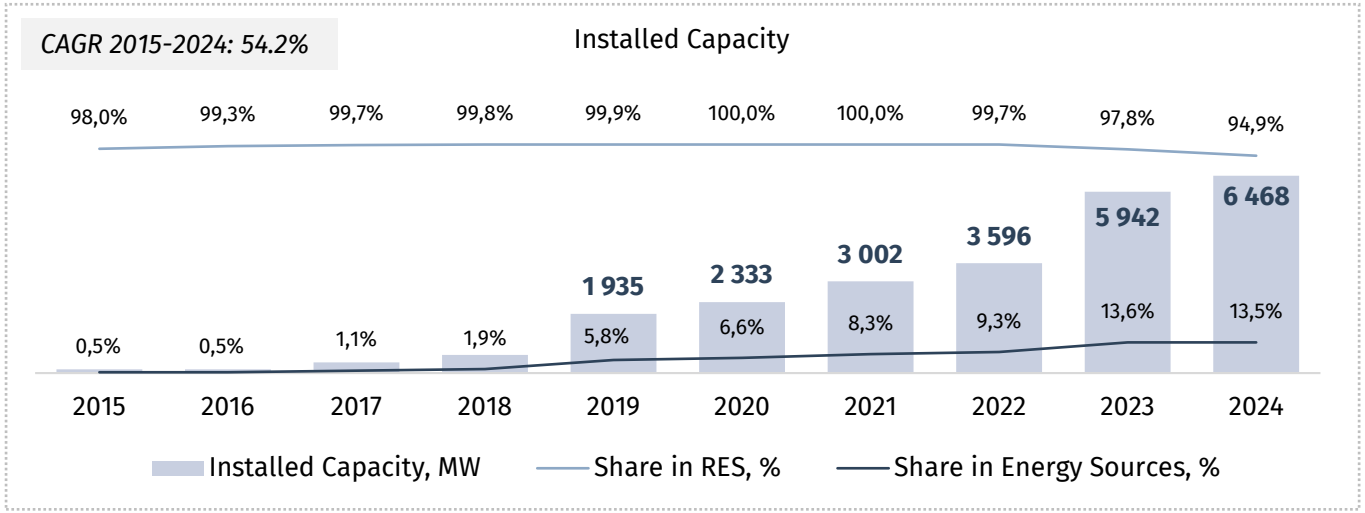
- ✓ Achieve Net Zero emissions
- ✓ Increase the share of clean energy in the total energy mix to 50%

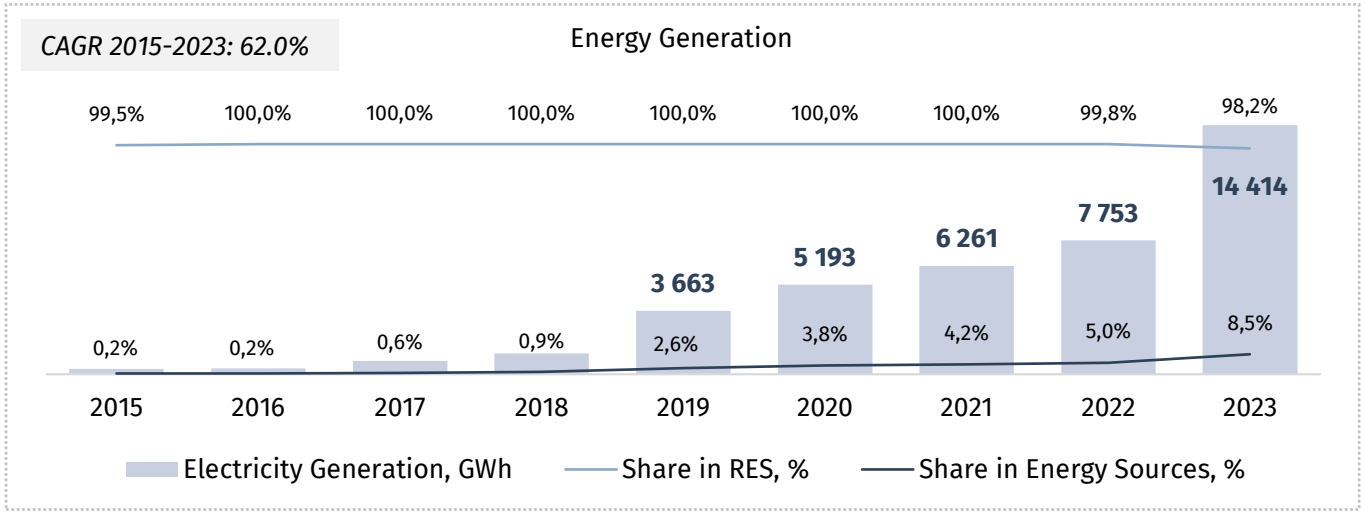
Source: UAE Ministry of Energy and Infrastructure

Energy Targets for the First Phase – by 2030

- Reduce emissions in the water and energy sector to pave the way for achieving net zero by 2050.
- Eliminate the use of unabated coal from the energy mix, ensuring the country's leadership and achievement of climate neutrality by 2050.
- Improve the efficiency of individual and institutional energy consumption by 42%-45% compared to 2019.
- Increase installed clean energy capacity from 14.2 GW to **19.8 GW**.
- Increase the share of installed clean energy capacity in the total energy mix to **30%**.
- Increase the share of clean energy generated by 2030 to **32%** to ensure the country is on track to meet its climate change mitigation goals.
- Create **50,000 new green jobs**.
- Achieve financial savings of **AED 100 billion**.
- Mobilize investments between **AED 150 and 200 billion** to meet energy demand and sustain economic growth in the UAE.
- Achieve a grid CO_2 emission factor of **0.27 kg/kWh**.

SOLAR ENERGY





Sources: International Renewable Energy Agency, ASER calculations

The UAE's solar energy sector is the key driver of its energy transition, delivered through gigawatt-scale projects that set world records in both scale and cost-efficiency. Through a competitive auction model, the UAE has achieved some of the world's lowest solar power tariffs (below 1.5 US cents per kWh), making it commercially more advantageous than gas-fired generation and delivering direct savings for the energy system.

The foundational and dominant segment is solar photovoltaics (PV), which accounts for the overwhelming majority of new capacity due to its technological maturity, scalability, and record-breaking cost-effectiveness. Concentrated Solar Power (CSP) plays an important but niche role, developed within specific projects (such as phase 4 of the MBR Park) to provide generation after sunset through integrated thermal storage systems.

Key operational capacities:

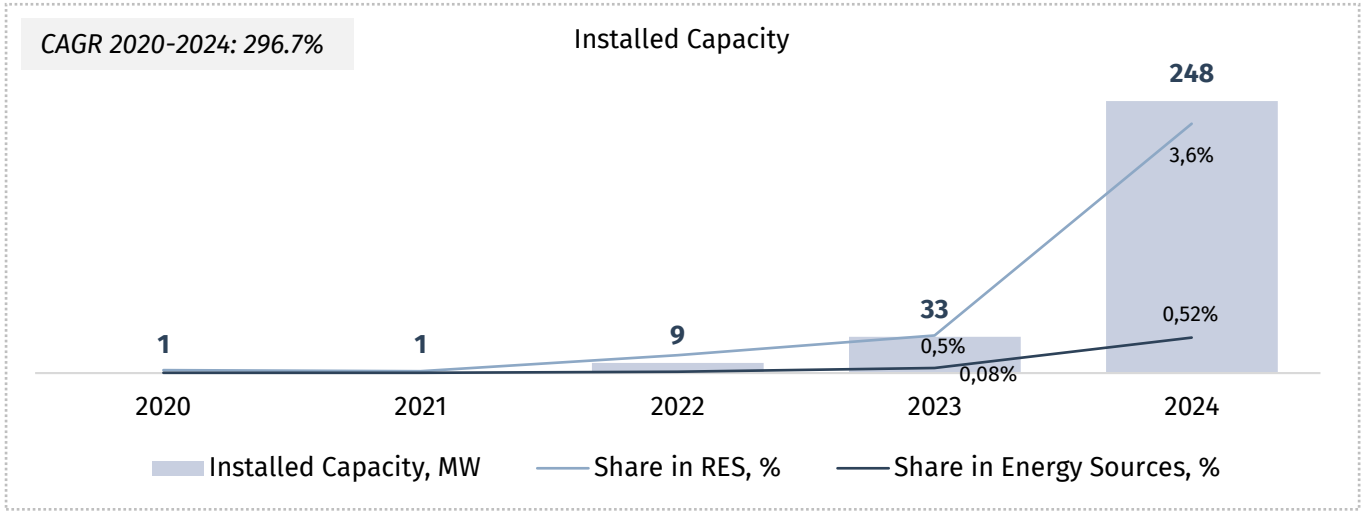
- Mohammed bin Rashid Al Maktoum Solar Park (Dubai): Current capacity – approx. 2 GW
- Noor Abu Dhabi (2019): World's first single-site gigawatt-scale PV plant (1.177 GW)
- Al Dhafra PV (2023): New world's largest single-site PV plant (~2 GW), setting the latest global cost record

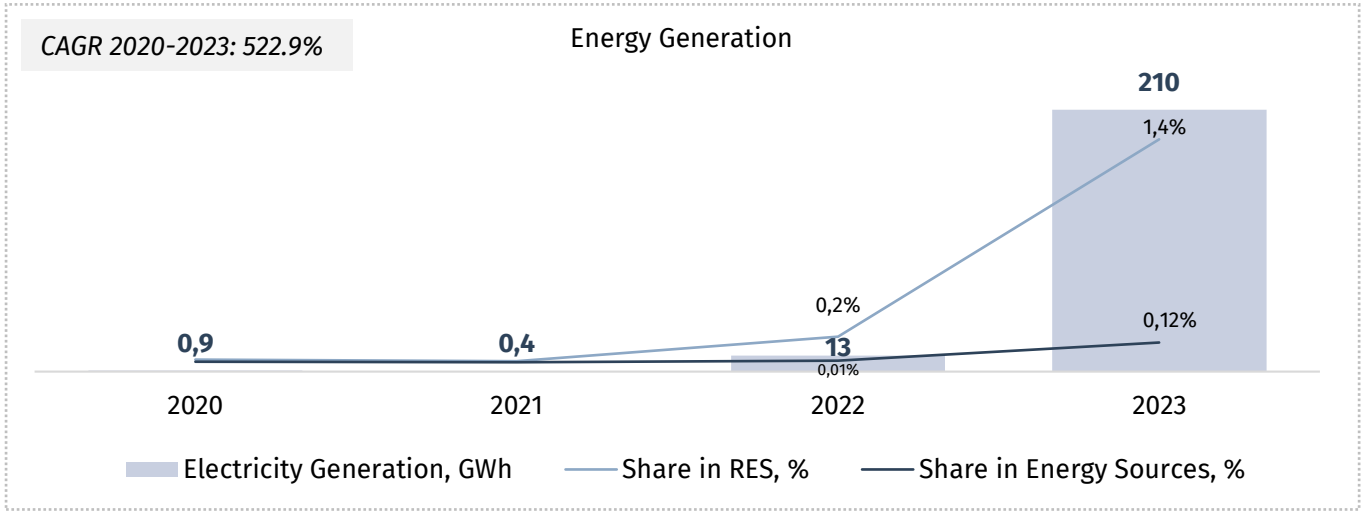
Key planned capacities:

- MBR Solar Park: Target of 5 GW by 2030
- New Gigawatt-Scale Parks in Abu Dhabi: Projects of 1.5–3 GW
- Development of solar generation in Sharjah and Ras Al Khaimah

Solar energy, having become the cheapest source of new power, creates synergy with nuclear generation and is the primary tool for achieving the UAE's carbon neutrality by 2050.

BIOENERGY





Sources: International Renewable Energy Agency, ASER calculations

The UAE's bioenergy sector is a strategic direction focused not on energy crops but on waste disposal with concurrent green energy generation. It addresses the critically important task of waste management for densely populated emirates, transforming an environmental problem into an energy resource.

The sector demonstrates an exceptionally high CAGR, reflecting the recent start of large-scale projects. Installed capacity has reached 248 MW, with **95% coming from waste-to-energy incineration plants**. The remainder comprises biogas from organic waste and solid biofuels.

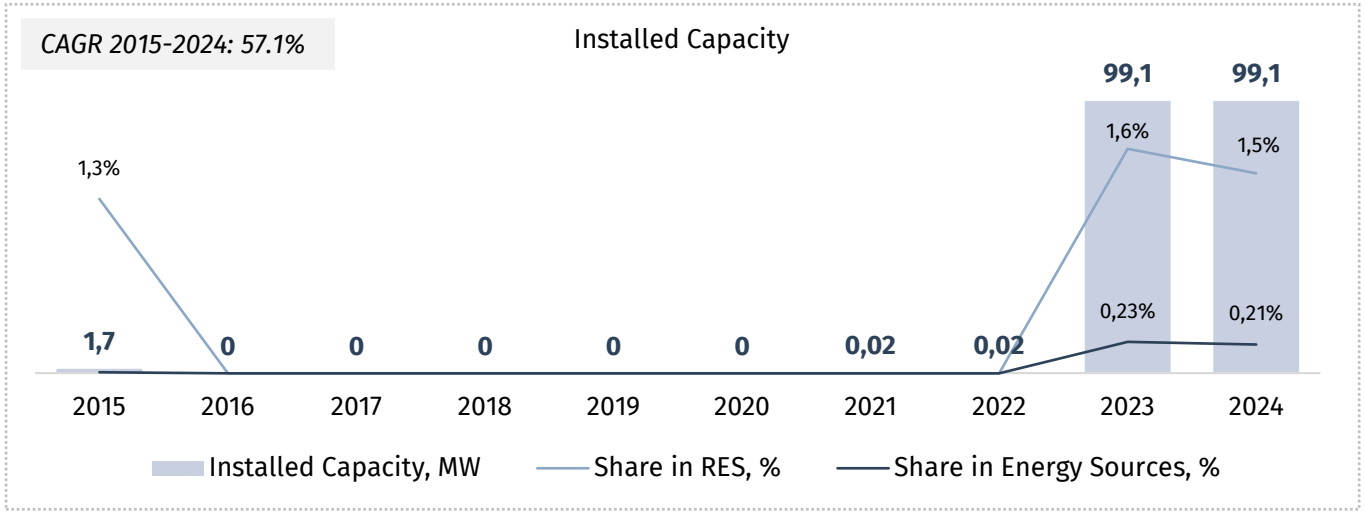
Key operational capacities:

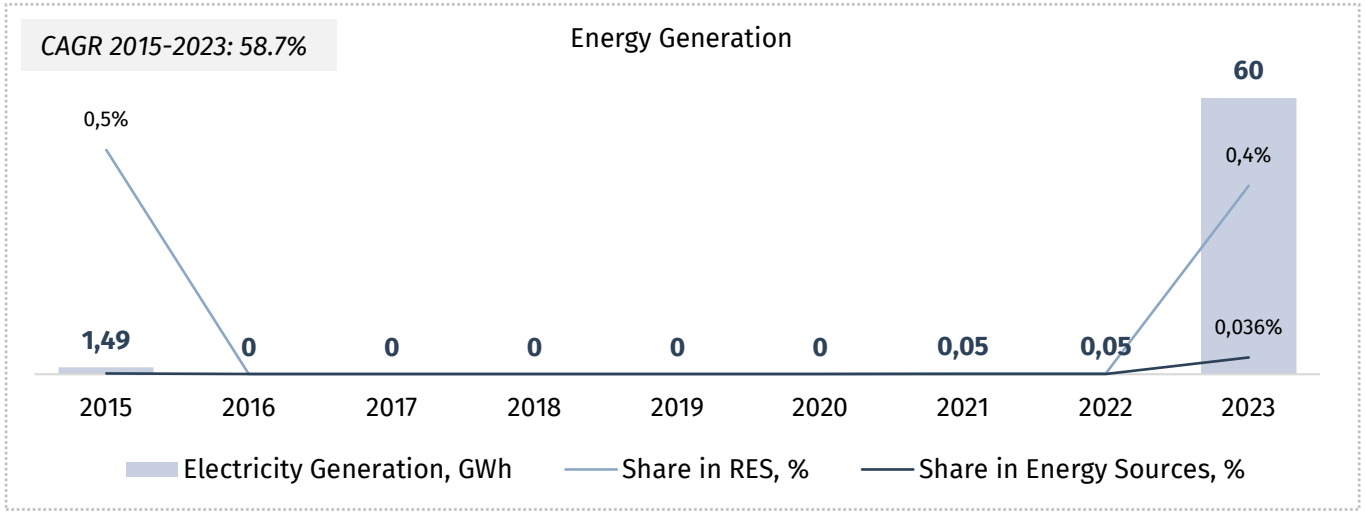
- Dubai Waste Management Centre (Warsan, 2024): The world's largest waste-to-energy facility with a capacity of 200 MW; it processes 2 million tons of municipal solid waste annually, meeting the needs of approximately 135,000 households.
- Sharjah Plant (Emirates Waste to Energy Company): 30 MW capacity, processing over 300,000 tons of waste per year.
- Biogas Plants: Small-scale projects at agricultural and food processing facilities.

The development of similar waste-to-energy (WtE) infrastructure is planned for Abu Dhabi and Ras Al Khaimah to create an integrated national waste processing system.

Waste-based bioenergy is an ideal solution for the UAE, where the natural potential for traditional bioenergy is absent. It directly contributes to the circular economy and provides stable, dispatchable generation, complementing variable solar and wind power.

WIND ENERGY





Sources: International Renewable Energy Agency, ASER calculations

Wind energy in the UAE is a developing segment that complements solar generation for renewable energy diversification, but it has limited potential due to moderate wind resources. **Its development is targeted and innovative, focusing on the most promising locations.**

The best wind conditions are concentrated in coastal zones and islands of the Arabian Gulf, as well as some mountainous areas.

Key operational capacities:

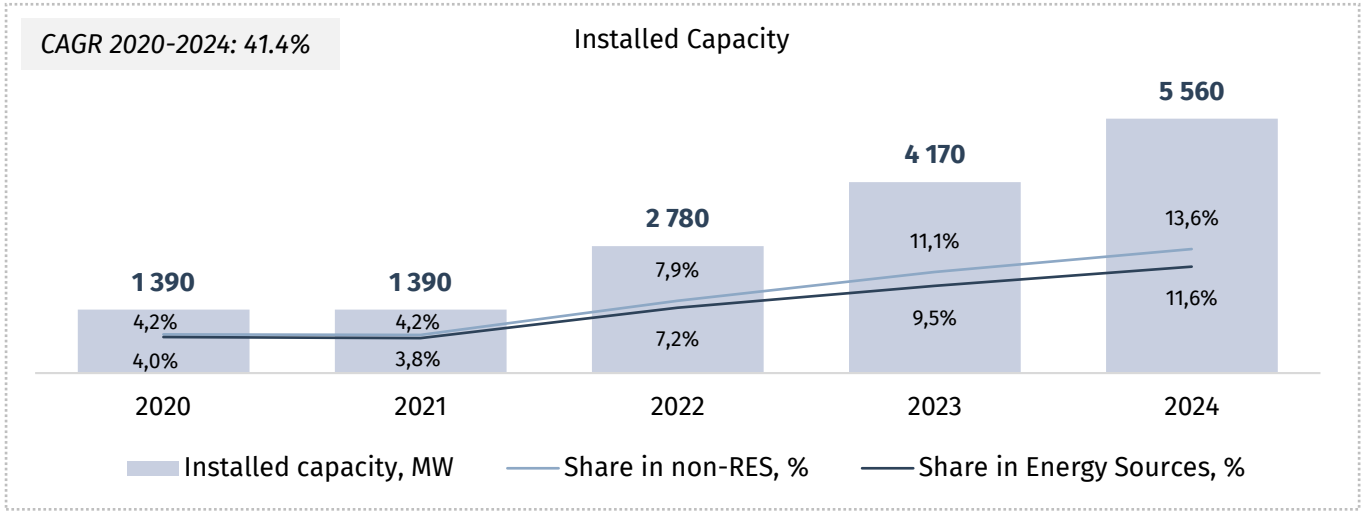
- Siroya Wind Farm (Sir Bani Yas Island and Delma Island, 2023): A pilot project that officially launched wind power generation in the country.
- Umm Al Quwain Project: A smaller demonstration installation.

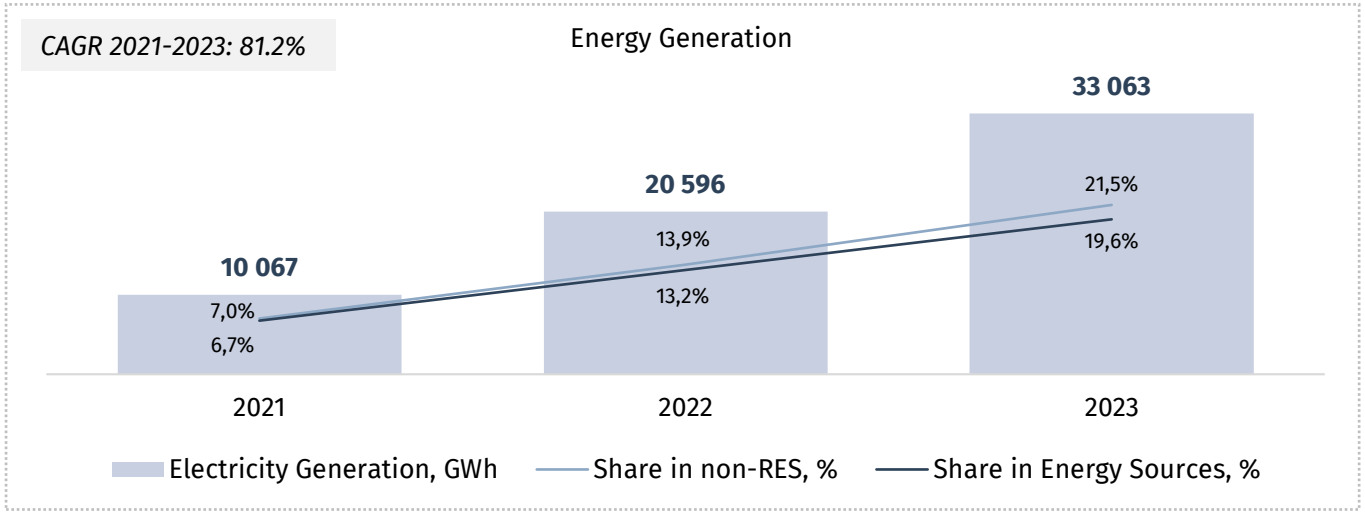
Key planned capacities:

- Offshore wind development: The government is studying the potential for offshore wind farms in the Arabian Gulf, where wind conditions may be more stable.
- Hybrid projects: The main vector is the integration of wind generation into hybrid solar-wind parks, especially on islands and in coastal areas, to improve overall generation stability.

Thus, wind energy in the UAE is developing as a strategic complement to solar power.

NUCLEAR ENERGY





Sources: International Renewable Energy Agency, ASER calculations

Although nuclear energy is not classically classified as a renewable source due to its use of a finite resource (uranium) and waste management complexities, some researchers and international organizations highlight it as a critically important low-carbon source in the fight against climate change. It provides stable, baseload generation without CO_2 emissions during operation, placing it alongside renewables in achieving the common goal of energy decarbonization.

The UAE became **the first Arab country to build and operate a nuclear power plant for peaceful purposes**, making it a cornerstone of its energy strategy.

Barakah Nuclear Power Plant:
- Location: Emirate of Abu Dhabi
- Capacity: 4 APR-1400 reactors, ~5,600 MW total capacity
- Status: All 4 units are in commercial operation (the last in 2024). The plant provides up to 25% of the country's electricity needs.

The project was implemented under the strict oversight of the UAE's Federal Authority for Nuclear Regulation (FANR). The country has adopted the highest international IAEA standards for safety, transparency, and non-proliferation.

CONCLUSIONS & TRENDS

Achieving the national target of a 50% share of clean energy in the energy mix by 2050 is driven by the accelerated growth of solar and nuclear power generation.

Large-scale government support through strategic planning, infrastructure investment, and preferential financing has laid the foundation for explosive growth in renewable energy sources (RES).

Solar photovoltaics have become the primary driver of the transition due to ideal natural conditions and record-breaking cost efficiency achieved through competitive auctions.

Waste-based bioenergy has transformed an environmental challenge into a source of stable power, contributing to the circular economy.

Wind energy is developing as a strategic complement to diversify the RES mix, primarily in the form of hybrid and pilot offshore projects.

Stringent climate goals (Net Zero by 2050) and targets to reduce the energy intensity of GDP are driving the continuous expansion of RES capacity and the adoption of innovations.

State energy companies (DEWA, EWEC) serve as key off-takers and operators, providing long-term contracts and guaranteeing returns for investors.

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