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## The UAE's Clean Energy Drive

*"With God's will, we shall continue to work to protect our environment and our wildlife, as did our forefathers before us. It is a duty, and, if we fail, our children, rightly, will reproach us for squandering an essential part of their inheritance, and of our heritage." Sheikh Zayed bin Sultan Al Nahyan*

Many readers may not be aware that Sheikh Zayed, the late founder of the UAE, devoted a lot of his time towards environmental projects - so much so that the United Nations Environmental Program honoured him posthumously with the 'Champion of the Earth' award for his outstanding wildlife conservation work, as well as his efforts in agriculture, forestation and the preservation of biodiversity. Planning for the future is one of this country's greatest strengths and so it should come as no surprise that despite being one of the world's top ten oil producers, the UAE has been a pioneer in planning and implementing a clean energy program within the hydrocarbons industry, a journey that began over 16 years ago. In this piece we look at the UAE's various achievements in this area so far and its long-term plans to achieve net zero.

### Background

Demand for electricity within the Middle East & North Africa region is expected to triple by 2050, according to the risk management firm DNV. This demand is being driven by a growing population, which is forecast to expand by 20% to 581 mio by 2030 as well as rapid urbanization. The region is also very susceptible to the impact of climate change due to the following factors: water scarcity, concentration of economic activities in coastal areas and the reliance on climate-sensitive agriculture. This in turn has encouraged several governments to focus more closely on the production of renewable energy.

### The Journey Begins

The UAE's shift from relying almost entirely on fossil fuels for its domestic power production to greener sources began back in 2005 when the country became one of the first major oil-producing nations to ratify the Kyoto Protocol to the UN Convention on Climate Change. The following year, Abu Dhabi unveiled its '**Masdar Initiative**' as part of its economic diversification program, which involved the creation of four business units which are:

1. **Masdar Clean Energy** – a developer and operator of utility-scale renewable energy projects.
2. **Masdar Special Projects** – which focuses on small and medium-sized applications in challenging conditions and geographies.
3. **Masdar City** – a sustainable urban community situated within the Emirate of Abu Dhabi.
4. **Masdar Institute** – The GCC region's first research university focused on advanced energy and sustainable technology.

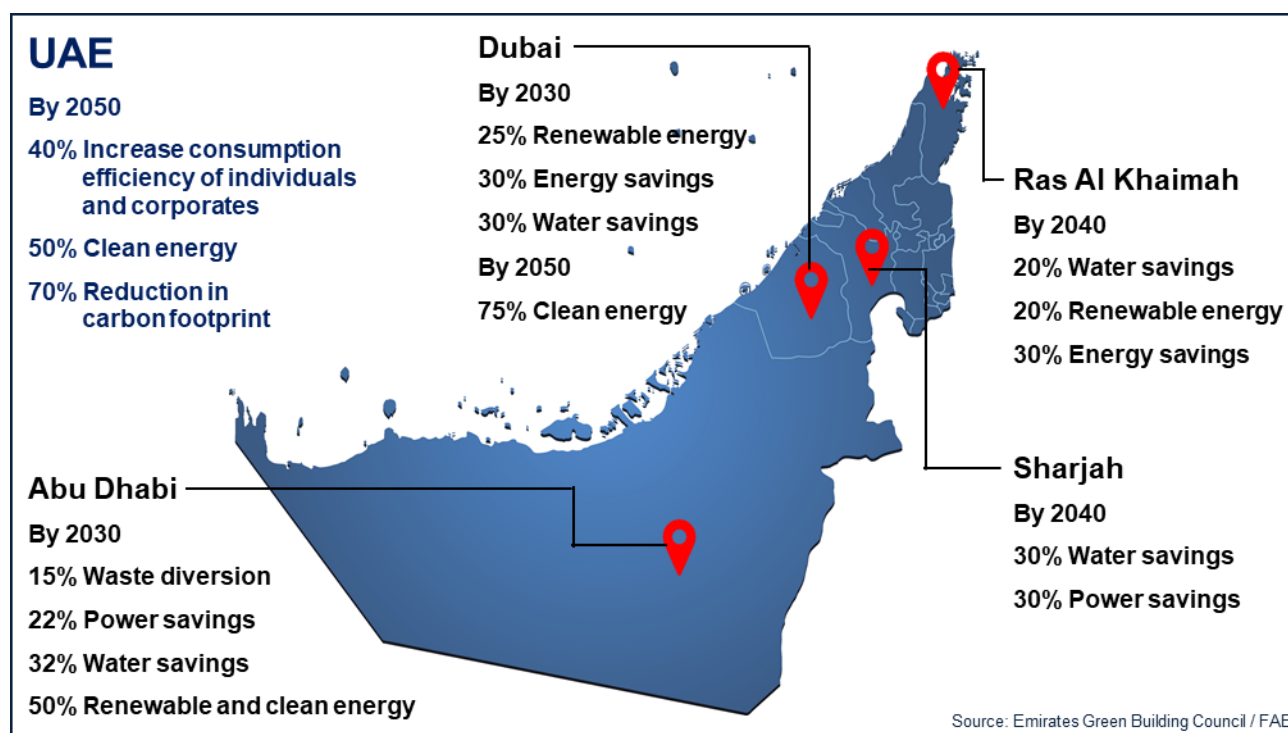
In the space of just 16 years, the capacity of local and international renewable energy projects that Masdar is a partner in now totals 11GW, while Masdar City, continuing to reinforce its position as a global centre for innovation and technology, is home to the headquarters of the International Renewable Energy Agency. Furthermore, hundreds of start-ups, SMEs and multinational companies are now located within the city's free-zone, including Siemens, Saint Gobain, Lockheed Martin, Honeywell and Rheinmetall. Most recently, Masdar opened the Mohammed Bin Zayed University of Artificial Intelligence, which accepted its first students last year.

Closer cooperation around the energy transition between all of the UAE's seven Emirates has grown in recent years, encouraged by the federal government's decision to include 'sustainable environmental and infrastructure development' as one of the six key priorities listed within the '**National Agenda**' that was unveiled in 2014. The following year, the Emirate of Dubai launched its '**Clean Energy Strategy**' which has five key pillars:

1. **The development of sustainable infrastructure projects such as the MBR Solar Park.**
2. **The establishment of a 'Green Fund', which provides soft loans to investors within Dubai's clean energy sector.**
3. **Legislation supporting sustainable energy policies.**
4. **Human resource capabilities via international training programs.**
5. **The creation of an environment-friendly energy mix.**

Then in early 2016, the UAE created a Ministry of Climate Change and Environment, before ratifying the Paris Climate Change Agreement later that same year. In 2017, the country's federal energy strategy was launched, setting a target date of 2050 to reduce its power generation carbon footprint by 70% and transform its energy mix so that 44% of domestic demand will be met by clean renewable sources, 38% from natural gas, 12% clean coal and 6% nuclear.

These diversification efforts are being supported by the introduction of consumption efficiencies, as well as robust recycling and waste management tactics, including the establishment of waste-to-energy plants such as Bee'ah's one in Sharjah, which was the first such commercial-scale facility to be built in the Middle East. The plant, was inaugurated last year and is currently able to convert 300,000 tonnes of municipal waste into low-carbon electricity per annum, which is enough to supply power to 28,000 homes. Meanwhile, Dubai's Electricity and Water Authority (DEWA) has said that it now restricts new water desalination projects to reverse osmosis technology using clean energy only, while its coal-fired 'Hassyan' power complex has recently being converted to use natural gas instead.






Another key platform in the UAE's transition strategy has been to partner with other countries, in an attempt to advance shared climate goals and strengthen global energy security. The most recent example of this was the November 2022 signing of an agreement entitled the **UAE-US Partnership for Accelerating Clean Energy**, which aims to catalyse US\$100 billion in financing and other support in addition to deploying 100GW of clean energy in the US, UAE and emerging economies around the world by 2035.

## Grey, Blue & Green Hydrogen

This gas is now recognized as a versatile energy carrier that can play a key role in the transition away from fossil fuels. This is because it is generally considered clean, non-toxic, abundant and emits zero carbon dioxide when burned, although admittedly the process to generate standard (grey) hydrogen is relatively carbon-intensive. Therefore there is a growing focus on producing low-carbon hydrogen, otherwise known as 'blue hydrogen', created when the CO<sub>2</sub> generated by the manufacturing process is captured and stored. This now forms a key part of the UAE's clean energy strategy.

In January 2021, the **Abu Dhabi Hydrogen Alliance** was formed, comprising the Mubadala Investment Company, ADQ, ADNOC and the Ministry of Energy and Infrastructure. Then, during the COP-26 conference in November 2021, the UAE unveiled its **Hydrogen Leadership Roadmap**, a comprehensive national blueprint to support domestic, low-carbon industries, contribute to the country's net-zero ambition and establish itself as a competitive exporter of hydrogen. The country's Minister for Climate Change and Environment, Mariam Almheiri, was quoted as saying at the time that the UAE *"has the natural resources, technological expertise and the political will needed to become a key player in the global hydrogen supply chain. We aim to involve all sectors and all actors in accelerating hydrogen deployment and cost-reduction to ensure the UAE is making headway towards a cleaner future"*. She added that *"the roadmap builds on our knowledge of the industry, and will assist us in aligning our efforts, developing new policies and increasing the private sector's participation in the hydrogen space"*. As a result, there are now six major hydrogen projects under development and, according to a [country report](#) published by the UK-based Energy Industries Council in November last year, the UAE could potentially supply 25% of the global low-carbon hydrogen market by 2030, adding that Abu Dhabi alone *"has an abundance of untapped gas resources which could be utilised to power the UAE for many decades"*.

Meanwhile, Masdar is also looking to become one of the lead players in the area of 'Green Hydrogen' production, in which the energy used to power the hydrogen-manufacturing process comes from renewable sources such as solar or wind. This was highlighted by the announcement of several new joint ventures, including a partnership with Fertiglobe and Engie to build a 200MW green-hydrogen plant in the UAE and a project to produce both hydrogen and SAF (sustainable airline fuel) in collaboration with Siemens, Total Energies, Etihad and Lufthansa Airways, Marubeni and Khalifa University. Masdar is also reportedly planning to develop similar projects in the UK, Egypt and Azerbaijan.

	GREY HYDROGEN	BLUE HYDROGEN	GREEN HYDROGEN
Process	Reforming or gasification	Reforming or gasification with carbon capture	Electrolysis
Energy Source	Fossil fuels 	Fossil fuels 	Renewable electricity 
Estimated emission from the production process	Reforming: 9 - 11 <sup>b</sup> Gasification: 18 - 20	0.4 - 4.5 <sup>c</sup>	0

Source: International Renewable Energy Agency / FAB

## Wind

Some countries within the MENA region began utilizing wind power on a commercial scale more than 10 years before solar. The largest of these plants are currently situated in Egypt, Israel, Jordan and Morocco. The UAE, which has been a key funder of wind projects overseas, is now looking to invest more into this resource at home, and a feasibility study has been launched regarding the potential construction of a 28MW wind power plant in the Hajar Mountains and a similar facility on Sir Bani Yas Island.

## Hydropower

No stranger to undertaking 'first-of-its-kind projects', the Emirate of Dubai is currently building a 250MW pumped-storage hydroelectric power station close to the Hatta Dam. According to the UAE's state media outlet [WAM](#), the plant will convert water stored in a new upper dam into kinetic energy by allowing it to flow through a 1.2 kilometre subterranean tunnel. This, in turn, will rotate the turbines and convert the kinetic energy into electricity, which will be transferred directly to the grid. Thereafter, clean energy generated by Mohammed bin Rashid Al Maktoum Solar Park will be used to pump the water through this same tunnel back to the upper dam. The hydro-plant will reportedly have a storage capacity of 1,500MW hours, a turnaround efficiency of 78.90% and be able to respond to a sudden demand for energy within 90 seconds.

## Nuclear Energy

The UAE was a pioneer of nuclear energy within the Gulf region, establishing the Arab world's first commercial nuclear power station, which was built by a coalition of firms led by South Korea's Electric Power Corporation. This plant called 'Barakah' has four APR-1400 reactors with a total capacity of 5,600 MW and is situated just over 50km from Abu Dhabi city. Three of these reactors are already operational, with the fourth and final unit expected to be commissioned and connected to the national grid later this year. Once this happens, the Emirates Nuclear Energy Corporation expects the plant to meet the energy demand of 570,000 households and prevent 22.40 million tonnes of carbon emissions annually. Meanwhile, the Presidents of the UAE and South Korea signed an MOU earlier this month which aims to broaden the two countries' collaboration in the commercial nuclear energy sector by "*jointly pursuing additional nuclear projects, whether in the UAE or third countries*".

## Sustainable Finance

Both Abu Dhabi Global Market (ADGM) and the Dubai International Finance centre (DIFC), continue to pursue a wide range of initiatives around sustainable finance which supports capital raising and deployment, as well as the creation of products that meet ESG objectives. Some examples of these initiatives include, [the Abu Dhabi Sustainable Finance Declaration](#) in 2019 which was led by ADGM and is an extension of the ongoing cooperation among government, regulators, as well as key UAE and international institutions in order to establish a sustainable finance industry that supports the country's drive to meet the UN's Sustainable Development Goals. Another more recent example, was the introduction of a Climate Finance course by the DIFC's Training Academy earlier this month. This course was created to help UAE based financial services practitioners better understand global trends in climate finance and the best practice approaches to take, when developing and implementing net zero strategies.

## Conclusion

The subjects outlined above, briefly touch on the progress the UAE has made thus far on its road to net zero as well as its wide-ranging strategies to get there. What is clear is that the country is investing heavily in a varied mix of clean energy solutions domestically, as well as actively assisting other countries in planning and implementing their own energy transition journeys with expertise and funding. To underscore this latter point, Masdar's clean energy projects alone are now spread across 40 countries around the world with investments of more than US\$20 billion. Equally of course, the UAE continues to also invest in its conventional oil and gas sector, which will still be needed to ensure a stable transition. When you take all this into account, it should not be surprising that the CEO of ADNOC, Dr Sultan Al-Jaber, was recently made President-designate of the COP-28 climate conference, which will be held in the UAE later this year. As the US Presidential Envoy for Climate, John Kerry remarked earlier this month, "*I think that Dr Sultan Al-Jaber is a terrific choice because he is the head of the company. That company knows it needs to transition. He knows, and the leadership of the UAE is committed to transitioning.*"



Kerry also referred to a speech given by the ADNOC chief during a recent conference in Abu Dhabi, in which Al-Jaber (who is also chairman of Masdar) *“made it absolutely clear we’re not moving fast enough. We have to reduce emissions. We have to begin to accelerate this transition significantly. So I have great confidence that the right issues are going to be on the table. That they’re going to respond to them and lead countries to recognise their responsibility.”*

For a major oil and gas producer, the UAE’s progress towards a greener future has thus far been nothing short of remarkable, and the country has become a vocal and active proponent of responsible and eco-conscious growth. This success will hopefully encourage more countries to follow their example.

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**Sources found to be useful in researching this article:**

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