

SPECIAL REPORT REALISING NET ZERO AMBITIONS: A GAME PLAN FOR UAE INDUSTRIES.

FOREWORD

NET ZERO 2050: THE TIME TO ACT IS NOW.

The need to tackle climate change has never been more urgent. The months of June, July and August of 2023 were the hottest ever recorded globally. Across every inhabited continent, wildfires and floods have become more frequent and intense. Several recent studies predict that temperatures in the Middle East may increase by 5°C by the end of the century, creating major health and livelihood challenges.

The UN Intergovernmental Panel on Climate Change report released in March predicts that the world will surpass the target of limiting warming to 1.5°C above preindustrial temperatures by the early 2030s. Nevertheless, the same report warns that while time is running out, there is still time to turn the tide on the climate crisis. To do so, the world needs clear strategies to reduce greenhouse gas emissions.

Our actions in the coming years will shape the world that future generations inherit: we have a moral duty to safeguard their future. As if this motivation were insufficient, there is also a clear economic benefit to embracing net zero. The costs and technological hurdles are formidable. But the drive for net zero will unleash efficiencies and innovation that could transform the global economy, creating wealth and improving lives.

Momentum has been steadily building since the Paris Agreement of 2015. But more must be done: countries and companies must now prioritise and accelerate efforts to reach net zero by 2050.

Public and private sector have a responsibility to their citizens to act and are in the unique position to exercise leadership: binding targets that include all sectors must be backed by clear and comprehensive policies that incentivise immediate action. Likewise, companies – as the drivers of economic growth and innovation – must recognise their responsibilities to stakeholders and meet the challenge of net zero in order to enhance long-term resilience and competitiveness.

We hope this report serves as a call to action for public and private sector to further unite in the pursuit of a sustainable, net zero future by 2050. Together, we can forge a path toward a world where people, prosperity, and the planet thrive in harmony.

Shargiil Bashir
Group Chief Sustainability Officer
at First Abu Dhabi Bank (FAB)



“Companies – as the drivers of economic growth and innovation – must recognise their responsibilities to stakeholders and meet the challenge of net zero in order to enhance long-term resilience and competitiveness.”



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THE UNITED ARAB EMIRATES: COMMITTED TO CLIMATE ACTION.

The United Arab Emirates has committed to net zero. The National Net Zero by 2050 Pathway, unveiled at COP27, pledges the UAE to cut emissions by 18% by 2030 (compared to 2019 levels, based on the UAE’s updated second Nationally Determined Contribution); 60% by 2040; and 100% by 2050. The UAE is now inextricably linked with the goal to limit global warming to 1.5-2°C in line with the Paris Agreement, and the recognition that climate change is the most critical threat to humanity.

The UAE’s hosting of COP28 this year therefore supports the country’s growing reputation for climate action, with a far-reaching plan to transform its oil and gas-focused economy by developing the industries and energy sources of the future.

Regionally, the UAE, showing leadership. In March, sheikh Mohammed bin Rashid Al Maktoum, vice president, prime minister and ruler of Dubai, witnessed the signing of the UAE Governments Net Zero 2050 Charter, which will support the objectives of the Pathway.

By signing the charter, the governments of the seven emirates affirmed their commitment to develop plans, policies and strategies to address climate change. Each of the seven emirates must measure and monitor greenhouse gas emissions as well as identify activities and procedures that generate emissions. Crucially, as part of the

charter, local governments are encouraged to exchange experiences, practices, technologies and innovative solutions as well as spread knowledge and educate society about climate change, in order to deliver the Pathway.

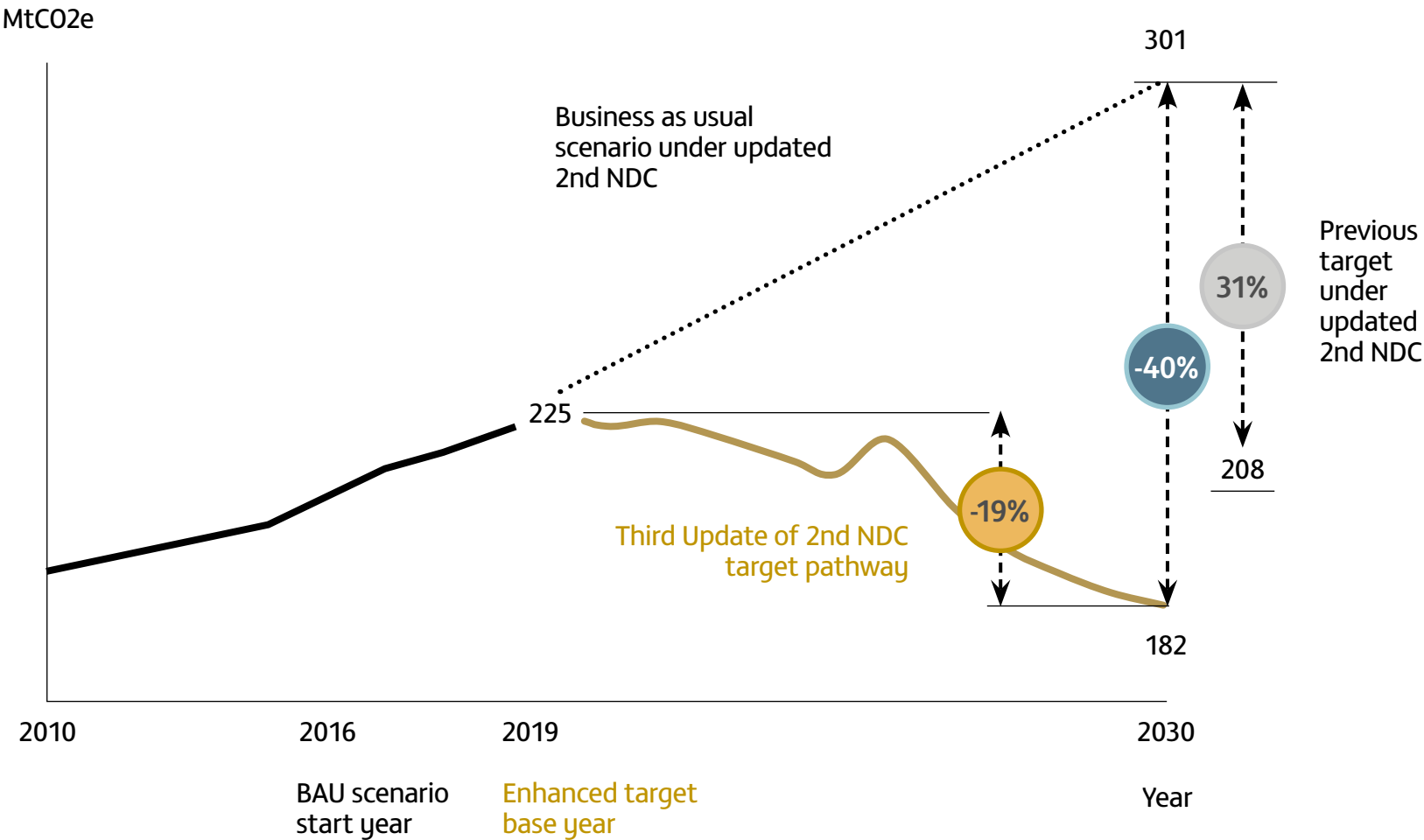
The good news is that the UAE is already developing several technologies that could define the net zero era. Al Reyadah was one of the first commercial scale carbon capture (CSS) facilities globally when it opened in 2016 and remains the only CSS plant for the iron and steel industry. Similarly, while other countries tout the potential of technologies such as green hydrogen, the UAE already has advanced plans in place to produce and export what could be a key solution for hard to abate sectors.

Moreover, many major companies are already fully engaged when it comes to net zero 2050 plans. As we show in this report, corporates active in the key sectors of the UAE’s economy impacted by the National Net Zero by 2050 Pathway – construction, domestic transport, heavy industry (including oil and gas), power and water, and waste management – have scores of initiatives underway that will be critical to achieving climate objectives. For instance, the UAE is at the forefront of district cooling, which provides chilled water for indoor cooling purposes to industrial, commercial and residential buildings through a closed loop pipe network, saving energy. District cooling will be critical both to achieve net zero targets and ensure that cities in the region remain liveable. Tabreed,

“Regionally, the UAE, is going further – and faster – than any comparable country.”

Third Update of Second NDC vs. Updated Second NDC pathway and target
GHG emissions (excl. F-gases, international shipping and aviation), MtCO2e

FIGURE 1



Source: Accelerating Action Towards a Green, Inclusive and Resilient Economy
Third Update of Second Nationally Determined Contribution for the UAE, 2023

31%

Previous target emission level under updated 2nd NDC

-40%

Emissions reduction level of Third Update of 2nd NDC would be expressed in comparable terms to the updated 2nd NDC, as a reduction from business-as-usual-scenario

-19%

New target emission level under third update of 2nd NDC with revised methodology (i.e., base year instead of BAU)

THE UNITED ARAB EMIRATES: COMMITTED TO CLIMATE ACTION.



the UAE’s pioneering district cooling company, is leading the charge with the 235,000-refrigeration ton capacity fully autonomous Downtown Dubai network, which is the first of its kind globally.

When it comes to transport, the UAE faces high hurdles. Despite much of the country being heavily urbanised, car ownership is higher – at around one car for every two Dubai residents, for example – than London or New York, resulting in a higher city vehicle density. Until recently, the UAE had neither metro rail services nor a national rail network.

Now, Dubai runs the world’s longest (74.6 km) driver-less and fully automated metro network and Abu Dhabi has plans for a 131 km metro system. Phase one of the project, totalling 60km, is underway. Equally, Etihad Rail is now embarking on a mission to convince both freight customers, who prize cost competitiveness, and passengers, who want convenience, that rail is important. The stakes are high: rail has an important role to play in driving economic growth and encouraging companies to move to the UAE and the wider Gulf Cooperation Council (GCC) region. For passenger services,

commuters will be a key initial target and ultimately the availability of passenger rail services could change where people choose to live.

Likewise, the power sector faces formidable challenges. The UAE’s climate means that, according to 2018 International Energy Agency figures, it is the world’s 10th highest per capita consumer of electricity. The country began financing clean energy projects more than 15 years ago and now has 9.2 GW of clean energy capacity, up from about 100 MW in 2015 and 2.4 GW in 2020. In January, Dubai announced that the share of renewables in its total energy production capacity had reached 14%. Moreover, in July, the UAE announced plans to invest up to Dh200 billion (\$54 billion) in renewables over the next seven years, with the aim of tripling the share of energy coming from renewable sources to 30% by 2031.

While nuclear power remains controversial in some countries, it is a key part of the UAE’s clean energy strategy. When the fourth unit of the Barakah Plant comes online shortly, it will crown an amazing achievement for the UAE, whose nuclear journey only began in 2009. The UAE’s approach to minimising delays

in nuclear plant construction has many lessons for the rest of the world and public opinion in the UAE is steadfastly supportive, with 83% of respondents to a recent poll having a positive perception of nuclear energy.

Inevitably, not all sectors have progressed to the same extent or at the same speed. The waste management sector in particular has struggled to overcome the challenges of high rise living and a large expatriate population. Nevertheless, there are home-grown examples that can serve as a template for the rest of the country. Sharjah’s development of an integrated waste model shows how the rest of the UAE might successfully reduce landfill and emissions in the years to come.

We hope that this report, which highlights many impressive developments across the UAE, will act as a source of inspiration and prompt discussion in the country, across the GCC, and throughout the world, about the practical steps that will help make net zero a reality in 2050.

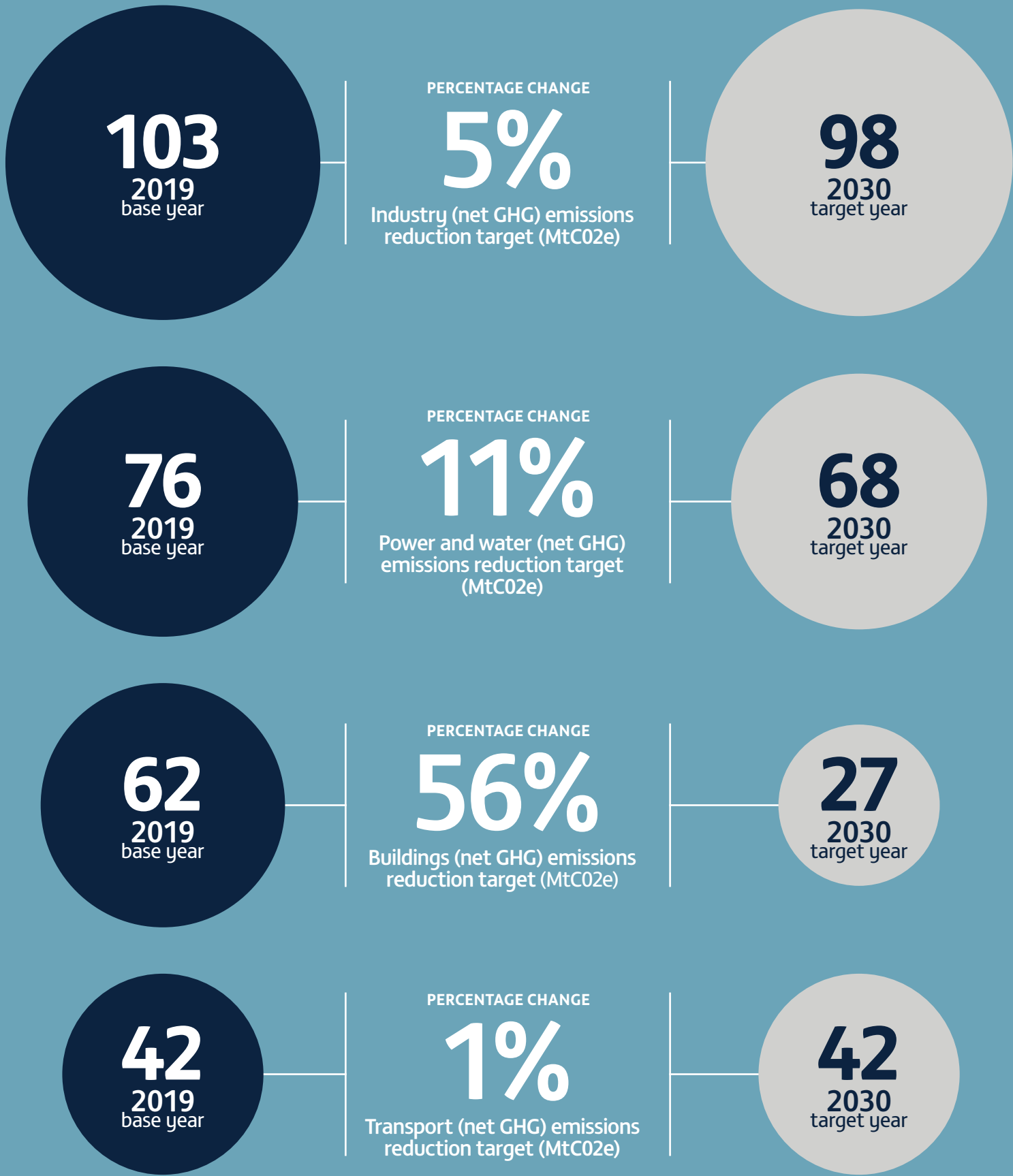


Dh200bn

Will be spent on renewables over the next seven years

Overview of UAE sector net GHG emissions reduction targets to 2030 (MtC02e / millions)

FIGURE 2



CHAPTER ONE BUILDINGS: TACKLING EMBODIED AND OPERATIONAL CARBON.

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BUILDINGS: TACKLING EMBODIED AND OPERATIONAL CARBON.

As the UAE shifts towards a decarbonised economy, a new approach to construction will be fundamental. According to the United Nations Environment Programme, buildings are responsible for 39% of global energy-related carbon emissions: 11 percentage points of this is so-called embodied emissions resulting from the production of construction materials, and the remaining 28 percentage points is the energy needed to heat, cool and power buildings (known as operational carbon).¹

Addressing embodied emissions will take a coordinated effort across sectors: consultant McKinsey calculates that construction accounts for more than 50% of global steel demand; steel, in turn, is responsible for about a quarter of emissions in the building construction process. While alternative materials such as low carbon steel exist and could cut embodied carbon in commercial buildings by up to 70% by 2030, they are costly: major advances are likely to require regulatory action (see Industry chapter).²

Nevertheless, there is much that the construction and real estate sectors can do right now. “We work with our suppliers to transition to more sustainable materials that are low carbon, durable, reusable or recyclable,” says Salwa Al Maflahi, director of sustainability and corporate social responsibility (CSR) at real estate developer and manager Aldar. “We adopt sustainable and low carbon material specifications in our design guidelines, and our construction policies and procedures contain

sustainable principles and activities such as Aldar’s ‘green site practice’, a monthly sustainability check list for contractors.” Likewise, addressing operational emissions can appear challenging at first glance. “The UAE is one of the world’s highest per capita users of energy given its climate, the role of tourism in the economy and the large expatriate population, who typically do not have complete ownership of their assets,” explains Fazil Abdul Rahiman, group vice president, sustainability & climate change, Abu Dhabi National Energy Co. (TAQA).

However, construction and real estate firms have significant agency when it comes to operational emissions and – as most of the necessary technology is already available – rapid progress is possible. For existing assets, energy and water consumption can be reduced by as much as 20% through retrofits. Dubai’s Supreme Council of Energy has set a target of retrofitting 30,000 buildings by 2030; by January this year, more than 5,300 buildings had been retrofitted in the emirate, saving 532 GWh of electricity and 1.577 billion litres of water.

“Construction represents more than 6% of the UAE’s GDP and the real estate sector accounts for almost the same proportion,” says Neal Lindsay, managing director, head of real estate finance, at First Abu Dhabi Bank. “As a result, there can be a tendency for some to see the drive for net zero 2050 as a potential burden. But in reality, the government’s focus on 2050 will accelerate construction

and infrastructure development. To seize the opportunities available, the industry needs a farsighted and open-minded approach as well as financing that aligns with the long-term net zero benefits that are delivered from more sustainable construction techniques and buildings.”

Leadership in district cooling
Given the UAE’s climate, cooling is one of the most critical issues to address if the energy consumption and CO2 emissions of residential and commercial infrastructure are to be reduced. Air conditioners and electric fans account for about 20% of the total electricity used in buildings around the world today and cooling accounts for up to 70% of energy demand in the Gulf during peak summer periods, according to Adel Al Wahedi, chief financial officer, Tabreed.

Finding more efficient ways of cooling is therefore imperative to reduce energy consumption and CO2 emissions. “District cooling is already up to 50 per cent more efficient than conventional methods, and the next generation of advancements in digital technologies offers the opportunity to further reduce carbon emissions and the cost of services for customers,” adds Al Wahedi.

District cooling is already popular in the UAE (especially in Dubai and Abu Dhabi) given its relatively low costs. By integrating district cooling networks, Tabreed reduced



Key business opportunities:

1

Low carbon steel

2

Retrofitting

3

District cooling

CASE STUDY

ALDAR: ANATOMY OF A NET ZERO PLAN

In January 2023, Aldar published its science-aligned Net Zero Plan, outlining the company’s targets and transition pathway to become net zero across Scope 1, 2 and 3 emissions. (Scope 1 are Aldar’s direct emissions; Scope 2 relates to indirect emissions, such as the emissions generated by power or water that Aldar uses; Scope 3 emissions are those associated with Aldar’s supply chain or tenants occupying Aldar’s developments).

“One of the biggest challenges that we face is Scope 3 emissions, which come from a wider value chain, such as suppliers and tenants,” says Al Maflahi at Aldar. “To help to address this, we work with our suppliers to transition to more sustainable materials and offer training to support the transition. This collaboration supports the delivery of our low-carbon design principle which we started implementing to all our new developments since the beginning of the year. Through low-carbon design, we target between 20% and 30% reduction on embodied emissions and 30% to 40% reduction on operational emissions.”

Another opportunity to reduce carbon emissions is to incorporate local green building certifications and standards such as Estidama certifications into global standards, explains Al Maflahi. “This supports the net zero transition, provides international recognition and attracts diversified capital. The real estate sector will also benefit from grid decarbonisation which is already a very promising proposition in the UAE and will help us to decarbonise our Scope 2 emissions.”

Alongside the ministry of climate change and environment, Aldar recently led the launch of a Real Estate Climate Pledge, which has seen an initial 29 UAE real estate and construction companies, consultants and manufacturers that work directly with Aldar, committing to publishing their own decarbonisation targets before COP28. Ultimately, this initiative could create opportunities for Aldar to reduce its Scope 3 emissions.



39%
Of global energy-related carbon emissions are from buildings

“District cooling, which provides centralised cooling services to multiple buildings and facilities to reduce each building’s energy consumption and environmental impact, is already up to 50% more efficient than conventional air-cooled chillers.”

BUILDINGS: TACKLING EMBODIED AND OPERATIONAL CARBON.

annual energy consumption by 2.31 billion kWh in 2022 and prevented 1.38 million tons of CO2 emissions. The company’s downtown Dubai network supplies cooling to many of the world’s most iconic buildings and venues, including the Burj Khalifa, the Dubai Mall and Dubai Opera.

Now the UAE – and Tabreed – are taking the next step for district cooling by leveraging data generated from decades of operating district cooling plants and networks. The fully autonomous 235,000 refrigeration ton Downtown Dubai District Cooling Scheme is the first of its kind and the largest around the world. Algorithms will be used to forecast customer demand and make all operation-related decisions, such as chilled water flow, temperature set points, equipment sequencing and network mix, optimising energy and water consumption.

Al Wahedi says that collaboration is essential to gain access to best practices, opportunities to source funding and accelerate the transition and the integration of district cooling. “For example, we partnered with ADNOC

[Abu Dhabi National Oil Company] to harness and channel geothermal energy for use across district cooling projects,” he notes. “We recently concluded testing on two wells at Masdar City which produced hot water at temperatures exceeding 90 degrees Celsius. This water, heated by temperatures deep underground and pumped to the surface via the wells will pass through an absorption cooling system, producing chilled water, which can then be supplied to our cooling network at Masdar City. This project in particular demonstrates the value of investments in R&D and partnerships, and how they can help the building and construction sector’s drive for net-zero by 2050.”

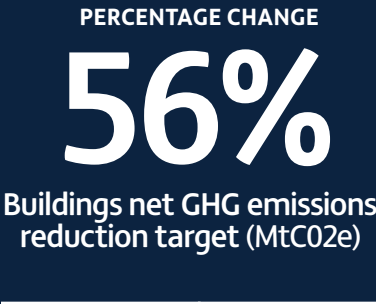
While efficient cooling is critical, Al Wahedi says that reaching net zero will require multiple other technologies. “Achieving net-zero emissions in the building and construction sectors requires a comprehensive approach of integrating energy-efficient design, and renewable energy sources like solar panels and wind turbines, as well as the adoption of technology and sustainable materials such as low-carbon or green infrastructure,” he explains.

Three buildings now under construction at Masdar City demonstrate the potential for an integrated approach to technology: they leverage high-tech features, including air-tight building envelopes, and architectural features such as window shading and orientation to minimise direct sun, as well as solar power, to achieve net zero status, requiring no grid energy for operations.

Conclusion

As the UAE transitions towards a decarbonised economy, a new approach to construction will be fundamental to achieving net zero targets. In particular, greater use of and investment in low carbon steel, retrofitting and district cooling could be game changing.

“We work with our suppliers to transition to more sustainable materials that are low carbon, durable, reusable or recyclable.”



¹<https://www.weforum.org/agenda/2022/09/construction-industry-zero-emissions/>
²<https://www.mckinsey.com/capabilities/sustainability/our-insights/net-zero-steel-in-building-and-construction-the-way-forward#/>

CHAPTER TWO DOMESTIC TRANSPORT: FULL SPEED AHEAD WITH RAIL.

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DOMESTIC TRANSPORT: FULL SPEED AHEAD WITH RAIL.

Globally, domestic transport is a significant contributor to greenhouse gas (GHG) emissions, with road transport – in the form of private cars, trucks, motorcycles and buses – accounting for 11.9% of the world’s total. Around 60% of this comes from passenger vehicles, with the remainder from road freight. In contrast, a negligible 0.4% of global emissions come from passenger and freight rail travel.³

According to the UN Environment Programme, the transport sector is the fastest-growing source of GHG emissions, and is projected to account for more than 30% of the total by 2050. It is also a major emitter of short-lived climate pollutants and contributes significantly to air pollution. The global vehicle fleet is set to double by 2050, exacerbating the problem.⁴

“The change in how we get around will be one of the most visible shifts as we transition to a decarbonised world,” says Moataz Khalil, managing director and global head of diversified industrials group, at First Abu Dhabi Bank. “The transport sector will play a pivotal role in the UAE’s journey towards net zero 2050.” To this end, in July HE Mariam Al Mheiri, UAE minister of climate change and environment, announced a plan to achieve a 40% reduction in transport emissions by 2030 – up from

“The UAE National Rail Network is expected to generate substantial economic opportunities, amounting to Dh200 billion over the next 50 years. It will redefine the future of transportation in the UAE.”



Key business opportunities:

- 1 Electric vehicles
- 2 Rail freight
- 3 Passenger rail

the previous target of a 31% reduction. “To achieve this ambitious goal, the government is adopting a multi-pronged approach,” says Khalil.

One focus is to drive the adoption of electric vehicles (EVs). The Zero Emission Transport Association is urging a ban on non-EV sales by 2030, though policy has yet to be set. One major barrier is charging infrastructure. In July, ADNOC Distribution, the UAE’s largest fuel and convenience retailer, and TAQA announced plans to create a joint venture called E2GO which aims to become the principal provider of EV charging points across Abu Dhabi. Separately, Dubai has announced plans to expand its public EV charging network by 170% (to 1000) by 2025 and electrify its taxi fleet by 2027.

As well as building a national network of EV chargers, the UAE government has announced plans to develop incentives to encourage EV adoption, so that they reach 50% of total vehicles by 2050. However, subsidy details have yet to be announced and currently EV sales represent just over 1% of the car market.⁵

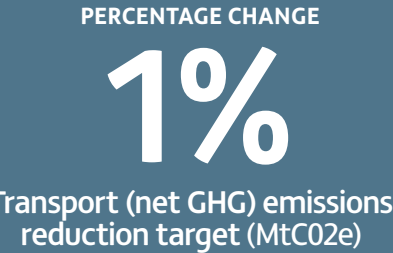
Rail freight is growing
Etihad Rail was established in 2009 with the mandate to manage the development, construction and operation of the UAE’s national

freight and passenger railway network. “In February of 2023, we completed our network expansion, extending 900 km across the UAE, and connecting main ports and key industrial hubs,” explains Günther Ferk, CEO, Etihad Rail Freight.

Trains are equipped to transport various types of bulk freight and general shipping containers, including aggregates, petrochemicals, raw steel, limestone, cement, building materials, industrial and household waste, aluminium, and food.

Freight volumes are now growing and the company is working with several customers to help them move from road to rail, especially over long distances. “In addition to our existing customers, including ADNOC, Stevin Rock, and Borouge, Etihad Rail is expanding its portfolio of clients,” says Ferk. Etihad Rail most recently formed a partnership with DHL Global Forwarding.

Rail will enable customers to significantly reduce CO2 emissions from freight transport compared to road haulage. Etihad Rail will play a major role in the planned reduction of UAE transport emissions by 21% a year by 2050, equivalent to removing 8.2 million tonnes of CO2 annually. “Not only will rail reduce CO2 emissions, but it will also lead to an increase in road safety and reduction



DOMESTIC TRANSPORT: FULL SPEED AHEAD WITH RAIL.

in accidents, as each train trip is estimated to remove up to 300 trucks off the roads, resulting in decreased air pollution,” says Ferk. Furthermore, rail should reduce transport costs by up to 30%, especially for large shipments or long distances, according to Ferk.

In December 2021, Etihad Rail announced passenger services to connect 11 cities and regions across the UAE, from Al Sila to Fujairah. To finance this development, Etihad Rail recently signed a green loan agreement with First Abu Dhabi Bank. “This financing framework also contributes to executing our sustainability goals,” says Ferk.

The goal of Etihad Rail’s passenger services is to significantly reduce travel times and offer a comfortable and convenient solution, according to Ferk. “The existing infrastructure will serve the passenger train, with future planned expansions into residential areas and centres of population. Furthermore, Etihad Rail will develop passenger stations, integrating with other modes of

transportation, and further improving connectivity,” he explains.

“For UAE residents, we are working to enhance everyday journeys by introducing an efficient and comfortable transportation option that is interlinked with other mobility services across the UAE, ensuring a smooth trip to their final destination,” adds Adhara Almansoori, head of economic policies at Etihad Rail.

A broader benefit
While the UAE’s rail network is important in itself, it will also play an important role in driving economic growth and expanding opportunities for businesses within and beyond the UAE.

“The UAE National Rail Network is expected to generate substantial economic opportunities, amounting to Dh200 billion over the next 50 years,” explains Ferk. “It will redefine the future of transportation in the UAE, resulting in streamlined trade, optimised freight

movement, and eventually improved passenger connectivity, bolstering the country’s position as a global hub for trade, transport, and logistics.”

Almansoori adds: “In line with the goals of the UAE Centennial 2071, the National Rail Network exemplifies the broader ambitions of our leadership to create a competitive economy by increasing productivity, supporting local companies, and enabling social cohesion.”

Conclusion

Domestic transport – cars, trucks, motorcycles and buses – is a significant contributor to a country’s GHG emissions, which is why the sector plays a pivotal role in the UAE’s journey toward net zero 2050. Indeed, greater investment in electric vehicles, rail freight and passenger rail will help ensure the success of this journey.



³<https://ourworldindata.org/emissions-by-sector#energy-electricity-heat-and-transport-73-2>
⁴<https://www.unep.org/explore-topics/transport/what-we-do/electric-mobility/supporting-global-shift-electric-mobility>
⁵<https://www.thenationalnews.com/uae/2023/07/13/uae-aims-for-50-electric-vehicles-on-roads-by-2050/>



CHAPTER THREE

INDUSTRY:

TECH IS ALMOST
READY...ARE CUSTOMERS?

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INDUSTRY:

TECH IS ALMOST READY...ARE CUSTOMERS?

The UAE economy is an oil and gas superpower, supplying around 3% of the world’s oil. Despite a concerted effort to diversify the country’s economic base, oil and gas continues to contribute around 30% of it’s GDP and 13% of total exports. Mining, steel and other heavy industrial sectors with difficult to abate greenhouse gases (GHGs) are also strategically important to the UAE’s economy.

“Careful management of the transition to net zero in 2050 is therefore critically important to the future of UAE,” says Fawaz Abusneineh, manging director and acting head of global corporate finance, at First Abu Dhabi Bank. “While decarbonising the economy is clearly a priority, the UAE’s ability to do so depends on it continuing to be able to generate wealth from its natural resources – most obviously oil and gas – and industrial capacity.”

Certainly, the UAE’s goals are impressive. “There are ambitious plans to reduce CO2 emissions in absolute terms by 40% by 2030,” notes Angelo Di Martino, chief strategy officer at Emirates Steel Arkan (ESA), who agrees that this could put pressure on economic growth.

Despite this, in July, ADNOC – a lynchpin of the economy – advanced its net zero carbon goal to 2045 and, ahead of many global peers, revealed its operational

emissions, which totalled around 24 million tonnes of CO2 equivalent in 2022. It also set a target of eliminating methane emissions by 2030. And ADNOC is partnering with a startup to pilot ways of extracting atmospheric CO2, mixing it with sea water and injecting it into rock formations using clean energy from Masdar.

The role of carbon capture
Carbon capture and storage (CSS) is an important part of the UAE’s decarbonisation strategy. ADNOC already operates Al Reyadah, the region’s first commercial scale carbon capture facility, which opened in 2016. ESA captures and supplies up to 800,000 tonnes of CO2 annually (equivalent to taking 178,024 cars off the road for a year) to ADNOC for the facility. It is then purified and compressed before being used and stored in ADNOC’s upstream operations.

In August, ADNOC and Occidental announced a strategic collaboration that will, among other objectives, develop further carbon management hubs in the UAE to leverage Abu Dhabi’s geological formations to store carbon from the UAE’s carbon-intensive and hard-to-abate sectors. In the steel industry, in addition to CSS, recycling of scrap and, to a lesser extent, direct reduced iron (DRI) technology, based on hydrogen, are also valuable in abating emissions, according to Di Martino. “However,

much of the technology [required to reduce emissions] remains very expensive,” he notes. “Carbon capture becomes costly above 30% of CO2, for instance.” The CO2 that ESA sells to ADNOC is not seen as a source of revenue but is primarily beneficial in terms of carbon sequestration and mitigating costs associated with carbon taxes.

ESA holds an industry-leading position in low emissions steel, according to Dimitrios Dimitriou, group CEO advisor at ESA. “As a natural gas DRI [direct reduced iron] player, ESA’s emissions are 45% lower than the World Steel Association average and its DRI peers,” he says.

Blast furnace production, which is still prevalent in many European countries, is roughly twice as carbon intensive as natural gas DRI. More generally, ESA is energy efficient by industry standards, utilises clean power and increasingly uses scrap: Di Martino says the company hopes its scrap use will reach the global average of 20% of inputs in the future.

More generally, the Middle East, and the UAE in particular, have several advantages in steel production in the new era. “We have plenty of land, renewable energy, raw materials, availability of finance from local, regional and global banks, government commitment and strong commitment from the major industry players,” says



Key business opportunities:

1

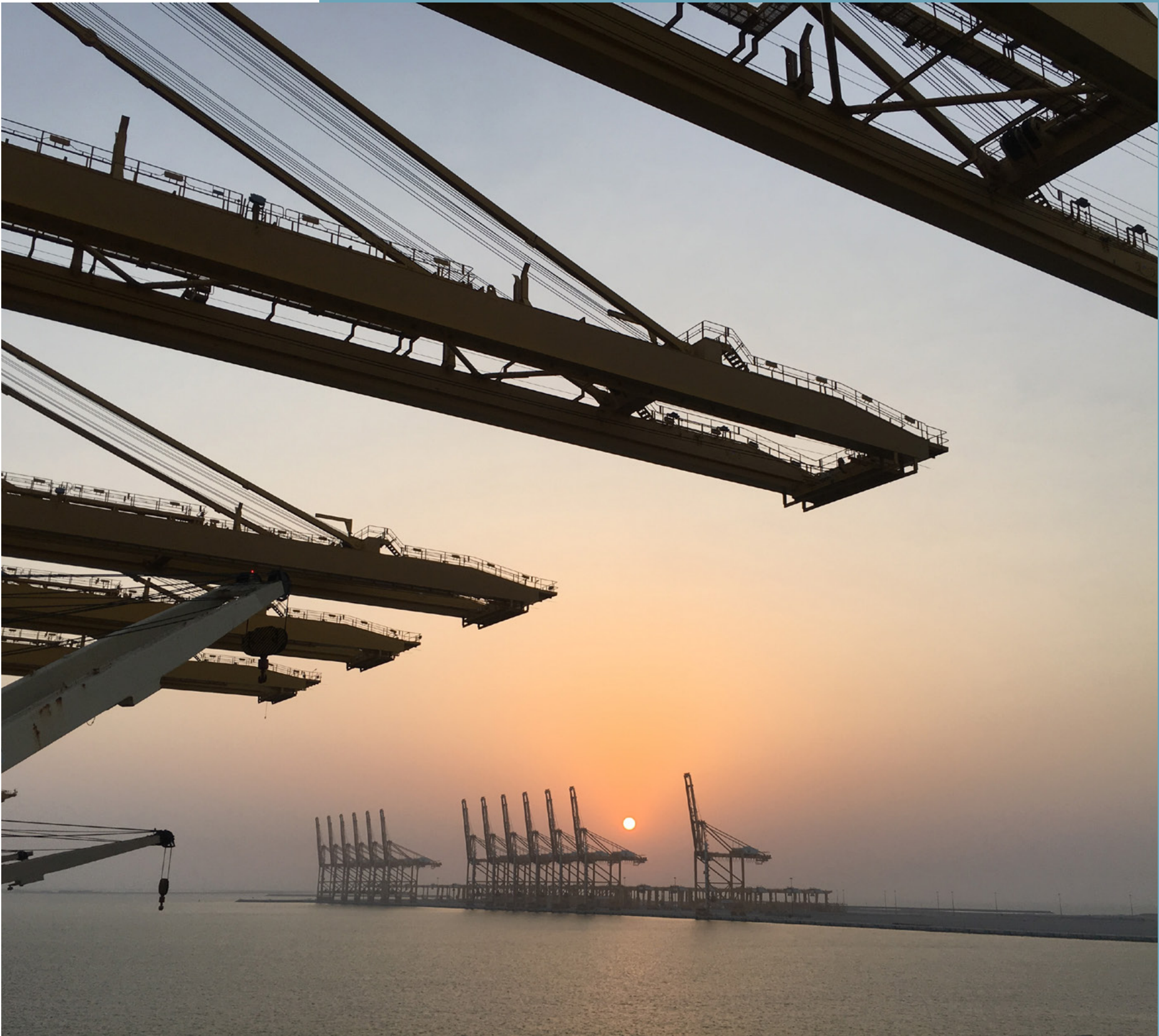
Carbon capture and storage

2

Scrap recycling

3

Direct reduced iron (DRI) technology



INDUSTRY: TECH IS ALMOST READY...ARE CUSTOMERS?

Di Martino. “In addition, logistics are favourable as the UAE is located midway between Europe and Asia.” And while in some markets, such as Europe, governments are taking risk in order to lower the cost of finance (and in some cases are even providing grants), ESA says competitively priced finance is not currently a concern.

Green steel market develops
Despite many advantages, future success for ESA – and for heavy industry in the UAE generally – depends on finding customers for low carbon products. “The global steel market is 2 billion tonnes a year – even if only 5% of those buyers are willing to pay for low carbon steel, that is still 50 million tonnes,” says Di Martino. Some sectors, such as flat steel for cars or steel for renewable facilities, are more advanced than others. “Green steel will start as a luxury product because the luxury market can more easily absorb costs. If there is one tonne of steel in a car, it is far easier for a luxury product to absorb high steel costs than for a \$15,000 car, where steel might represent 10% of its value.”

For companies such as ESA, it is a “chicken and egg situation”, says Di Martino. “Until customers are willing to pay for it, it’s difficult to apply new technologies at scale. That’s why regulation is critical because regulators can define the

timeframe for industry changes, impose CO2 taxes, and provide incentives for technology implementation.”

Certainly, the global industry is a long way off being a level playing field. “Europe – which is a 100 million tonne market – aims to reduce carbon emissions by 30% (or 30 million tonnes) by 2030, although its efforts have been temporarily postponed after the Ukraine crisis led to an increase in energy prices,” explains Di Martino. “On the other hand, India is adding 300 million tonnes of additional steel capacity using blast furnaces – the least emissions-efficient way to produce steel – in the next seven years.”

Conclusion

While decarbonising the economy is a priority, the UAE’s ability to do so depends on it continuing to be able to generate wealth from its natural resources – most obviously oil and gas – and industrial capacity. It is a complex challenge, but key technologies including carbon capture and storage, scrap recycling, and DRI technology, are helping to solve it.



30%
Oil and gas sector’s contribution to the UAE’s GDP



PERCENTAGE CHANGE
5%
Industry (net GHG) emissions reduction target (MtCO2e)





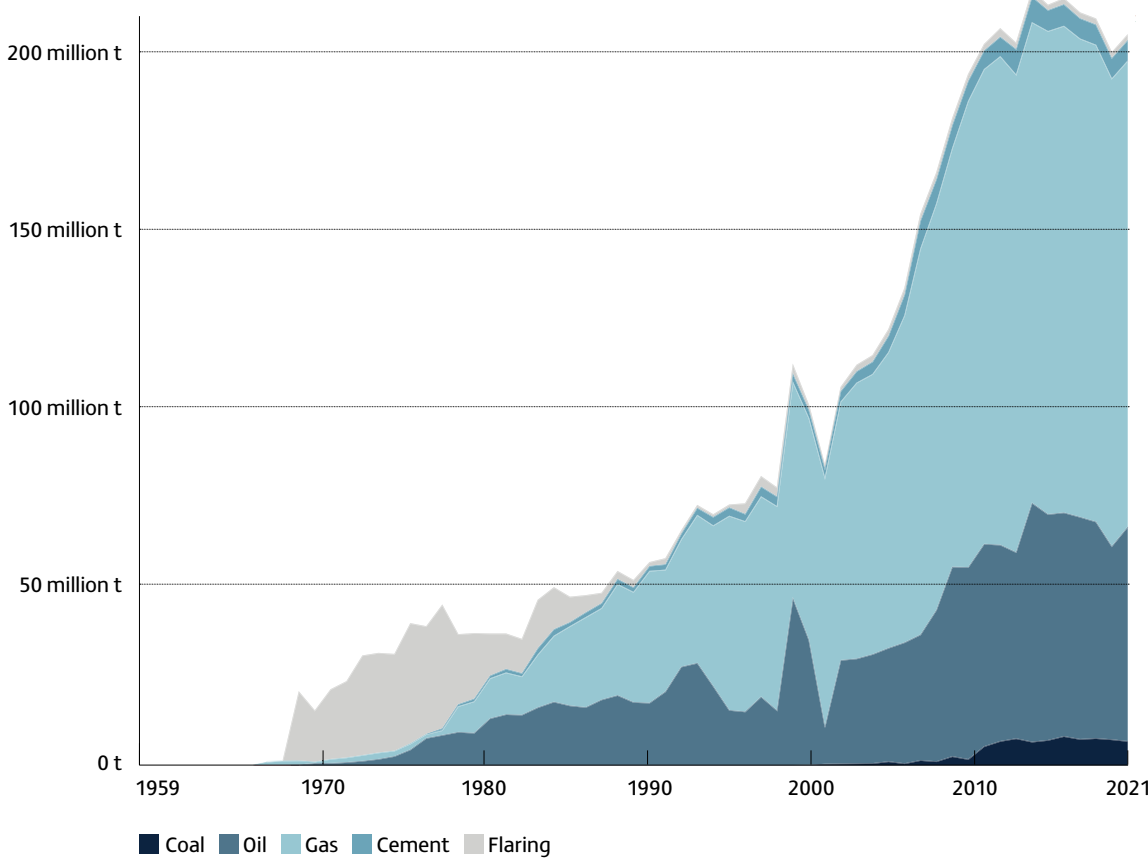
INFOGRAPHIC UNITED ARAB EMIRATES: A TRANSFORMATIONAL JOURNEY.

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C02 emissions by fuel or industry type, UAE

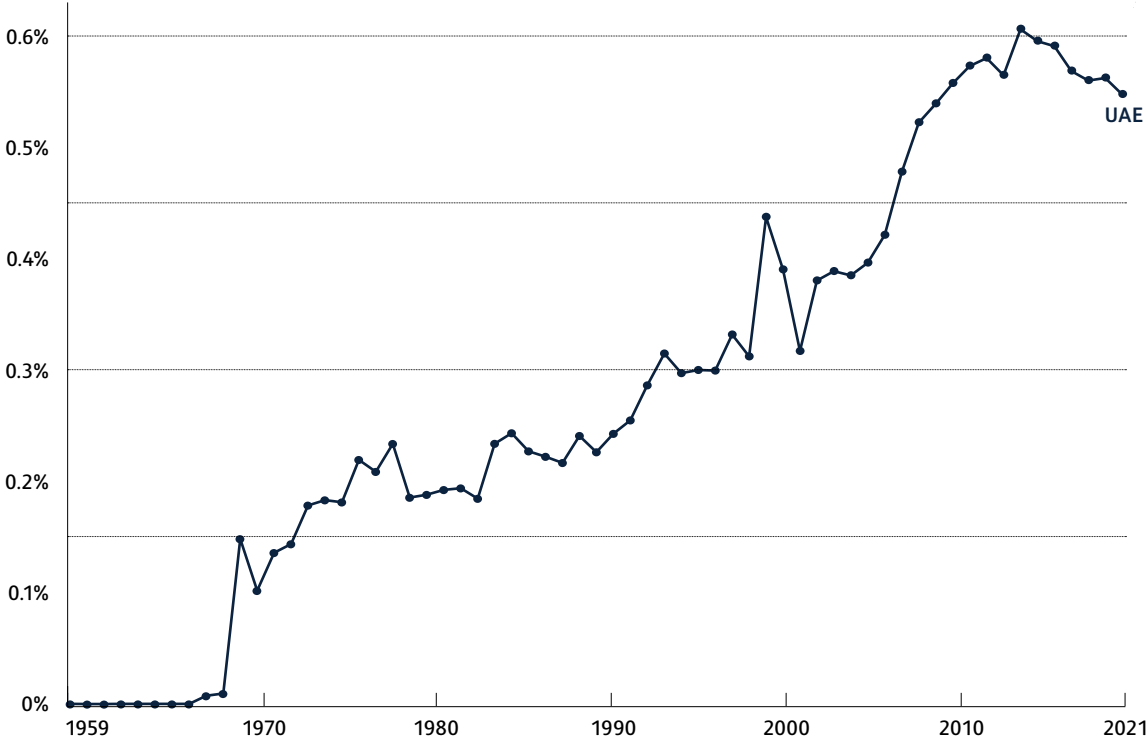
Source: Global Carbon Budget (2022)



Annual share of global CO2 emissions

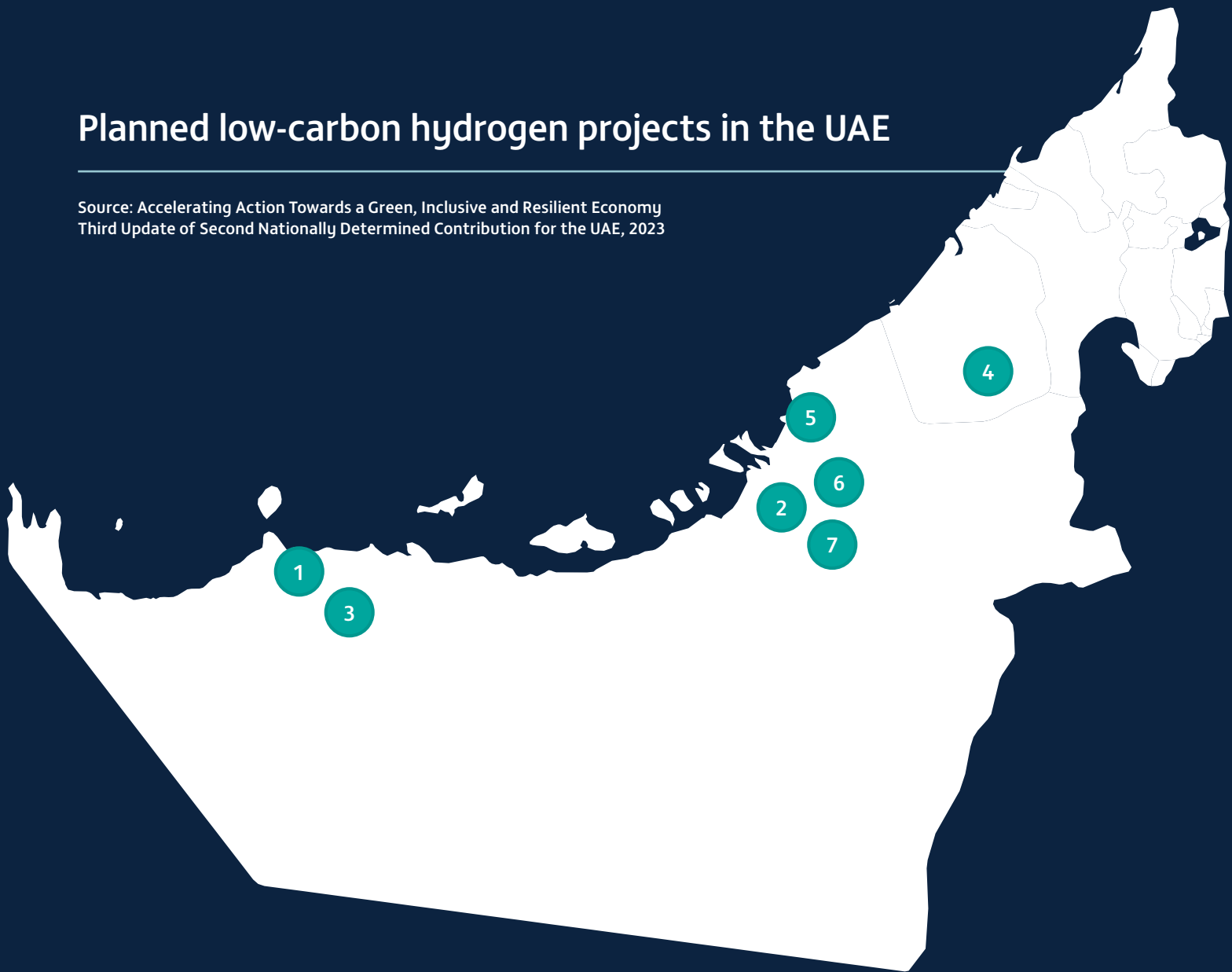
Carbon dioxide (CO2) emissions from fossil fuels and industry⁶. Land use change is not included.


Source: Global Carbon Budget (2022)





Planned low-carbon hydrogen projects in the UAE


Source: Accelerating Action Towards a Green, Inclusive and Resilient Economy
Third Update of Second Nationally Determined Contribution for the UAE, 2023





- 1  **Taziz (ADNOC and ADQ) Ruwais chemical hub**


 - 1 mtpa blue ammonia production plant located in the Taziz chemicals hub
 - 0.2 mtpa H2 equivalent capacity
- 2  **Masdar Demonstration plant**

 - Green H2 initially for road transport, then expanding to e-kerosene synthesis and ocean shipping
 - Demonstration scale
- 3  **UAE Hydrogen hub**

 - Initial development of 1GW of low carbon hydrogen together with BP as well as pioneering decarbonised air corridors between the UK and UAE
 - 0.1 0.2 mtpa H2 equivalent capacity
- 4  **Mohammed Bin Rashid Al Maktoum Solar Park**

 - First solar PV and green hydrogen producing facility in the MENA region
 - Demonstration scale
- 5  **Abu Dhabi Khalifa Industrial Zone**

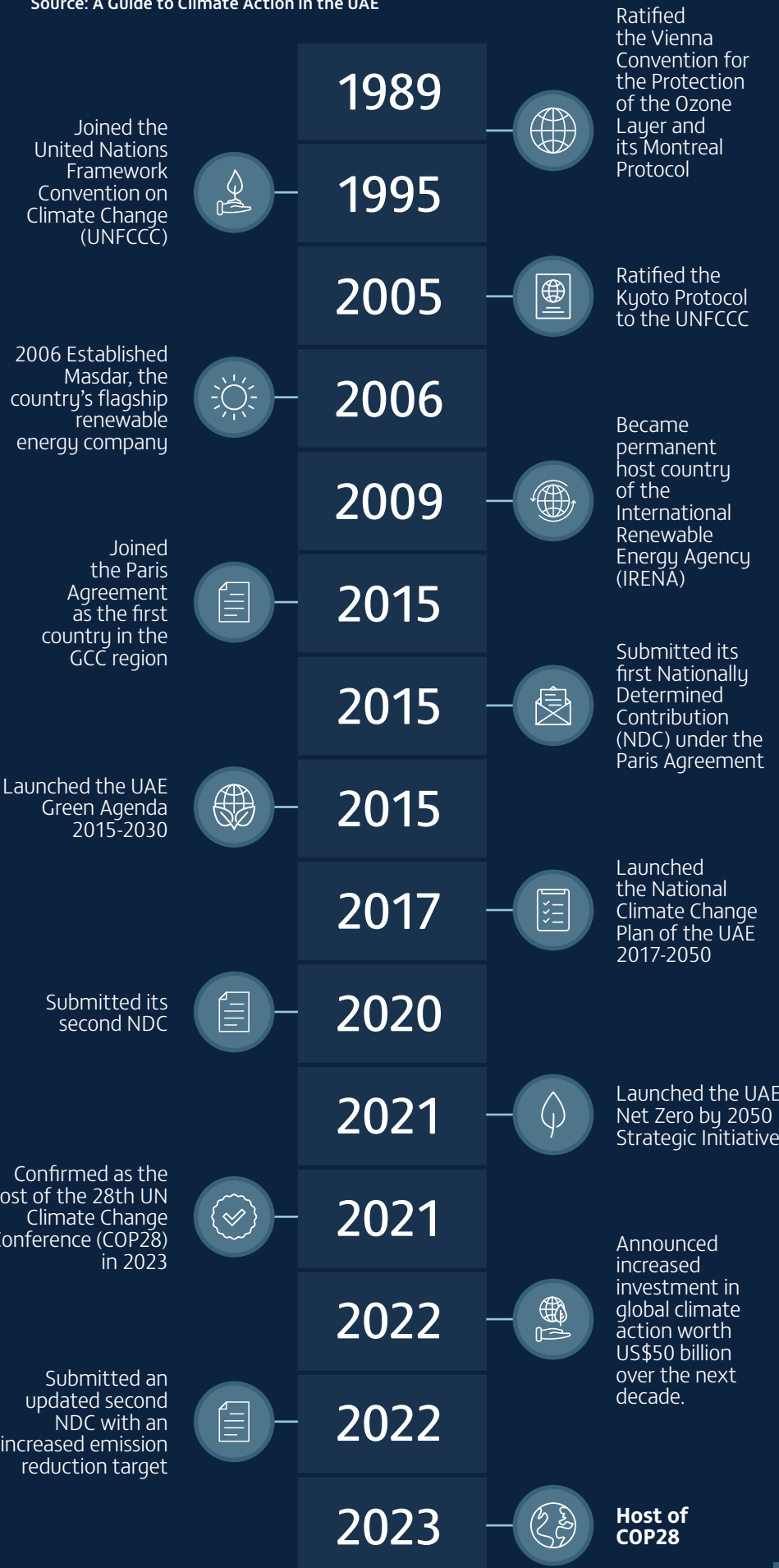
 - Final goal of 200kt of ammonia and 40kt of H2 annual production
 - 0.1mtpa H2 equivalent capacity
- 6  **TAQA and Abu Dhabi Ports**

 - Green ammonia project under discussion powered by a 2GW solar based electrolyzer facility
 - 0.1 mtpa H2 equivalent capacity
- 7  **TAQA and Emirates Steel**

 - MOU for large scale green hydrogen project enabling the first green steel produced in the MENA region

UAE Climate Change Journey

Source: A Guide to Climate Action in the UAE



⁶ Fossil emissions measure the quantity of carbon dioxide (CO₂) emitted from the burning of fossil fuels, and directly from industrial processes such as cement and steel production. Fossil CO₂ includes emissions from coal, oil, gas, flaring, cement, steel, and other industrial processes. Fossil emissions do not include land use change, deforestation, soils, or vegetation.

CHAPTER FOUR POWER & WATER: CREATING CHANGE.

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POWER & WATER: CREATING CHANGE.

Power, together with water – which in a region with limited resources such as the GCC necessarily requires huge amounts of energy to produce – is at the heart of most countries’ net zero strategies. The UAE is no exception and has taken a farsighted approach to the development of clean energy projects

“There have been discussions and initiatives underway for many years to reduce emissions, including a 2050 UAE energy strategy announced in 2017 with targets for renewables, energy efficiency, and demand management,” explains Fazil Abdul Rahiman, group vice president, sustainability & climate change, Abu Dhabi National Energy (TAQA). This strategy was updated in July, with a new target to invest up to Dh200 billion in renewables over the next seven years in order to reach net zero emissions by 2050.

Having begun investing over 15 years ago, the UAE is now a leading producer of utility scale solar power, with facilities such as the 1.2 GW Noor AD PV plant already online, and the world’s largest single site solar PV, the 1.5 GW Al Dhafra site, due to come online shortly. In Dubai, 1 GW of the planned 5 GW capacity solar park is now operational; Dubai also has 500 MW of consumer solar installed.

Including nuclear (which the UAE counts as a clean energy source), 35% of Abu Dhabi’s energy capacity now comes from clean sources, while Dubai hit 14% at the

end of 2022 and is now thought to be at about 16%. By 2050, the UAE anticipates that 44% of its energy will come from renewable sources – with capacity growing from today’s 9.2 GW to 14 GW. Of this, 38% will come from gas, 12% from clean fossil fuels and 6% from nuclear energy. By 2050, emissions from power generation should be 70% lower than in 2017.

Nuclear: An essential component
While the huge growth of renewables in the UAE gets the headlines, its nuclear capacity is essential to the country’s net zero plans. The UAE’s nuclear energy journey began in 2007, when the government conducted a study that looked at future energy demand and the potential technologies that could be used to meet it, according to Gary O’Connor, CFO at Emirates Nuclear Energy Corporation (ENEC). With a goal of lower emissions from power production, while bolstering energy security and grid stability, ENEC was launched in December 2009, with Korea Electric Power Corporation (KEPCO) as the prime contractor.

ENEC’s 5.6 GW Barakah Plant is now one unit away from full-fleet operations, which will enable it to support up to 25% of the UAE’s electricity demand, carbon free. The first multi-unit operating plant in the Arab world, Barakah already generates more than 80% of Abu Dhabi’s clean electricity. Once fully operational, the plant will run for at least 60 years: it will effectively prevent

the emission of 22.4 million tons of carbon annually.

“It was a significant challenge as every single aspect of the programme had to be carefully analysed, studied and mapped out,” notes O’Connor. ENEC’s project management strategy staggered the development of each unit by 12 months, so that lessons could be learned. “This iterative improvement approach allowed Unit 3 to be delivered four months faster than Unit 2 and five months faster than Unit 1,” he adds.

The UAE took a unique approach to funding for a nuclear programme. The original financing of \$24.4 billion mostly came from the Abu Dhabi government (\$2.5 billion was from the Export-Import Bank of Korea). “However, the refinancing of the full outstanding balance under the loan facilities was recently completed through a competitive market process to two leading UAE banks – Abu Dhabi Commercial Bank and First Abu Dhabi Bank,” says O’Connor. “The refinancing reflects a natural progression in the development of the Barakah Plant as the project continues to progress through to full, four-unit commercial operations. It also demonstrates strong ongoing investor confidence in the project and how it is creating economic value in the UAE.”

With Unit 4 about to come online, ENEC is now looking at opportunities for increasing nuclear energy capacity in the UAE and through international projects. “Furthermore, the development of the Barakah Plant in the UAE is a catalyst for innovation in new

Key business opportunities:

- 1 Renewable energy (solar, nuclear)
- 2 Battery energy storage systems
- 3 Electrification



CASE STUDY

WATER: THE SHIFT TO REVERSE OSMOSIS

Producing water in the countries without adequate fresh water resources is extremely energy intensive. In 2021, 28% of the UAE’s energy was used to produce water. However, as in other countries across the GCC, a transformation is underway.

The UAE is rapidly shifting from thermal production of water – where it is a byproduct of energy production – to reverse osmosis (RO). As RO pulls energy from the grid (and can therefore depend on renewables), it can be important driver to reach net zero targets, according to Charles Dexter, CFO, AMEA Flexible Generation Business: Asia, Middle East and Africa at Engie.

While RO has high initial and ongoing costs (including for membranes), it is also more energy efficient and – depending on the type of facility being replaced – can reduce emissions by between 60% and 90%. “More importantly, from a system planning point of view, it gives the flexibility to produce electricity and water separately,” says Fazil Abdul Rahiman, group VP Sustainability & Climate Change at TAQA. “This is very important for the region, as water demand is steady throughout the year while electricity demand is three to four times higher in the summer.” TAQA aims to use RO for two-thirds of water desalination capacity by 2030. In May, its Taweelah plant surpassed 90% capacity, making it the world’s largest operating reverse osmosis facility: it will be fully operational shortly.

More generally, the UAE Water Security Strategy 2036 aims include a reduction in total water demand of 21% and an increase in the reuse of treated water to 95%.



70%
Lower emmissions from power generation in 2050 than in 2017

POWER & WATER: CREATING CHANGE.



areas, including small modular reactors, which we are currently evaluating, alongside other next-generation technologies,” says O’Connor.

What’s next?
“The UAE has achieved much in the 15 years since it began its clean energy journey, both in terms of the scale and pace of its energy transition,” says Gido van Graas, managing director and global head of natural resources, at First Abu Dhabi Bank. “But the next stage of development may require a new approach, new technology and – potentially – new types of financing.”

To date, tenders have been focused on achieving the lowest possible tariffs: indeed, the UAE has set a global record low for solar. “However, development often goes in cycles, with an initial phase where players are willing to take significant risk and price extremely aggressively,” says Charles Dexter, CFO, AMEA Flexible Generation Business: Asia, Middle East and Africa at Engie. “Over time, as the market matures, pricing may orientate towards economic levels and the structure of the industry may evolve so that risk settles at acceptable levels.”

It might be valuable for the industry if tariffs evolved to incentivise market participants by ensuring a more stable and satisfactory return in order to encourage

investment, says Dexter. “Tenders, regulations and policy need to be aligned with the industry’s needs,” he notes. “A government mandate requiring offtakers to incorporate ESG and net zero carbon targets into tenders could help to level the playing field in this regard.”

While the generation sector may require a rethink at some point, the shift in the balance of capacity toward renewables also has consequences that will need to be addressed. In the medium term, gas will continue to act as a balance for the system to address demand changes within days and between seasons, explains Dexter: “Our [gas-fired] power station portfolio will be critical to providing the flexibility and stability that the system requires so that the lights stay on and the economy grows.”


However, as renewables become the majority of production, battery energy storage systems (BESS) will become critical, says Dexter, whose firm operates one of the world’s largest battery storage projects in Australia. Not everyone agrees that BESS is ready for the big time in the UAE, though.

“While storage prices have fallen by a fifth in the past decade and there have been a number of pilots, costs still mean that it is unviable at a utility scale especially if not integrated into the system effectively,” says TAQA’s Rahiman. “That said, storage is likely to play an

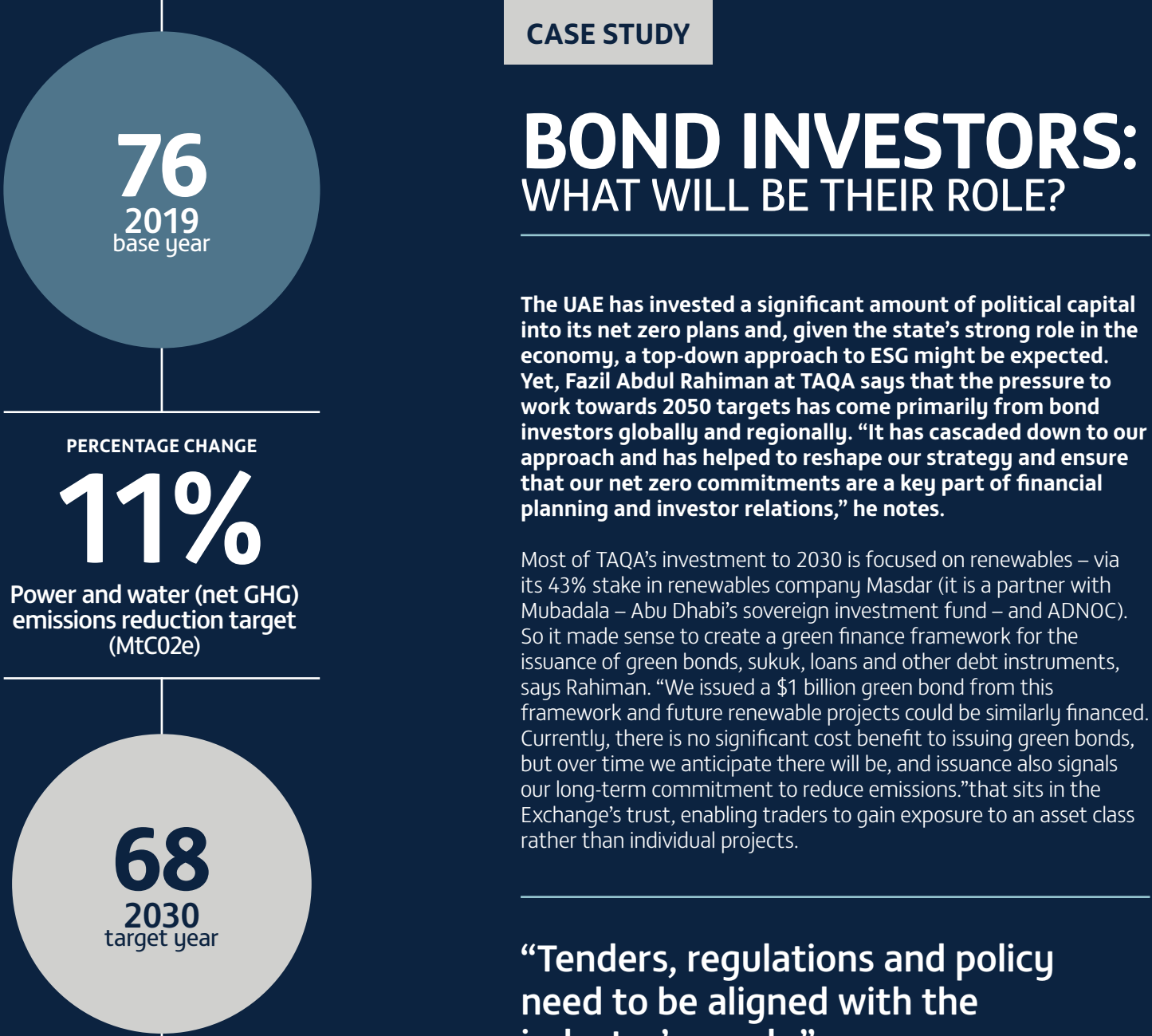
important role, possibly later this decade.” The electrification of other sectors, such as aluminium, steel, cement and transportation will also be critical to the UAE’s energy future. “At the moment, [several sectors use] captive gas-based power plants, which have higher emissions than the grid,” says Rahiman. “If electrification is supported by large-scale nuclear and renewables, it would be the biggest contributor to decarbonisation in the UAE.”

Many of TAQA’s most recent projects have been in support of electrification. For instance, in May TAQA announced a \$2.4 billion project to connect ADNOC’s Bab and Bu Hasa oilfields in Abu Dhabi to TAQA’s nuclear and renewable energy sources, reducing water injection-related energy consumption by up to 30%.

Conclusion
Over the past 15 years the UAE has made great strides on its clean energy journey. Critical to this has been the country’s considerable investment in solar and nuclear. Over the coming years, renewable energy will remain critical, together with areas including cross-sector electrification and battery energy storage systems.



25%
Of Abu Dhabi’s energy capacity
now comes from clean sources



A hand is reaching down towards a discarded, crushed plastic bottle lying on a sandy beach. The scene is set at sunset, with the sun low on the horizon, creating a warm, golden glow. The bottle is covered in water droplets, suggesting it was recently used. The background shows the ocean and a few distant structures.

CHAPTER FIVE WASTE MANAGEMENT: INTEGRATION IS KEY.



Key business opportunities:

1

Circular economy

2

Recycling credits

3

Waste to energy facilities

4

Refuse-derived fuel

WASTE MANAGEMENT: INTEGRATION IS KEY.

The world generates 2.01 billion tonnes of solid waste annually, with at least a third of that managed in an environmentally unsafe manner, according to the World Bank. Based on 2016 figures, 1.6 billion tonnes of greenhouse gas (GHG) emissions are generated from solid waste treatment and disposal – or 5% of global emissions. With global waste expected to grow to 3.40 billion tonnes by 2050, emissions are set to increase to 2.38 billion tonnes of GHG a year by 2050.⁶

Waste management in the UAE is complex. “The UAE is wealthy and, like several other Middle Eastern countries, generates a large amount of waste per capita,” says Sarah Pirzada Usmani, managing director, head of loan capital markets and sustainable finance, at First Abu Dhabi Bank. The UAE’s urbanised nature, with myriad high-rise buildings, makes waste collection and management challenging. With expatriates making up 85% of the population, it is also difficult to engage with consumers to change their behaviour.

The UAE Governments Net Zero 2050 Charter and the Pathway do not include a specific target for the waste management sector. However, the medium-term aim is to reduce emissions associated with waste management by 23% by 2030. Waste management currently contributes 9% of the UAE’s greenhouse gas emissions, with landfill accounting for 60% of that total.

Despite the challenges of waste management in the UAE, the example of Sharjah – which has an integrated waste ecosystem encompassing collection,

transportation, treatment and disposal – points to an opportunity to make progress. “While the UAE has set a diversion target of 75% [of waste not sent to landfill], thanks to our circular economy model, Sharjah has not only achieved this target but surpassed it, with a diversion rate of almost 90%,” says Firas Wahbeh, chief marketing officer at BEEAH Group, a Sharjah-based 50/50 public-private partnership with the Sharjah government. “By applying the Sharjah model more extensively across the UAE, we can minimise emissions.”

Taking responsibility
BEEAH’s waste management business operates across various verticals, serving municipalities and real estate developers such as Emaar Properties, the owner of the Burj Khalifa, which have separate arrangements outside of municipal contracts. Additionally, it has independent commercial contracts with companies such as Emirates Airlines.

Sharjah’s integrated waste system means that once an item is disposed of, it becomes BEEAH’s responsibility, creating an incentive to divert waste from landfills whenever possible. BEEAH now has 11 recycling facilities that handle multiple different waste streams, covering all potentially recoverable materials.

Household waste is managed through BEEAH’s material recovery facility, where recyclables are separated from organic waste, and dry recyclables are recovered whenever possible. “Traditionally, organic waste has been sent to landfills,” says Wahbeh. “But we have



2.38bn tonnes

GHG emissions are set to increase to this value by 2050



CASE STUDY

FINANCIAL INNOVATION

As well as acting as a model for waste management in the region, BEEAH is at the forefront of financial innovation in the world of recycling. BEEAH already operates the re.life platform, a virtual marketplace facilitating business-to-business trading of recovered commodities. In 2022, the platform facilitated the trading of over 150,000 tonnes of recyclable materials. In May 2023, BEEAH announced a potentially groundbreaking partnership with the International Solid Waste Association (ISWA) and Roland Berger to develop a global standard for voluntary recycling credits.

“The introduction of extended producer responsibility (EPR) prompts global companies to set recycling targets for local markets,” explains Usman Tareen, group managing director, finance at BEEAH Group. “However, in many developing countries, recycling lacks incentives and remains limited. By utilising ISWA’s standardised methodology, the development of recycling credits would enable companies to fulfil their EPR responsibilities while promoting global recycling. The aim is to initiate the first transaction at COP28, utilising a waste-agnostic platform with blockchain technology to ensure traceability.”



9%

Current contribution of waste management to the UAE’s greenhouse gas emissions

WASTE MANAGEMENT: INTEGRATION IS KEY.

recently built a waste to energy facility (connected to the grid) which converts waste into electric power and avoids the greenhouse gases produced by landfill.”

The Sharjah Waste to Energy plant is operated in partnership with Abu Dhabi’s Masdar and received financing from a consortium of local and international banks through a soft mini perm loan, due to be refinanced by the end of the year. By May 2023, a year after opening, it had processed over 100,000 tonnes of waste, recovered over 250 tonnes of metal and generated enough energy to power over 2,000 homes per year while offsetting 150,000 tonnes of CO2 emissions. Ultimately, the facility will displace nearly 450,000 tonnes of CO2, divert up to 300,000 tonnes of waste away from landfills each year, and produce 30 MW of low-carbon electricity, enough to power 28,000 homes in Sharjah. “We are also looking at waste to hydrogen, using gasification, which produces fewer emissions and would generate hydrogen to power our new fleet of collection vehicles,” adds Wahbeh.

Together with Sharjah, Dubai and Abu Dhabi are also engaged in their own waste to energy plants. The Dubai plant in Warsan is now operational, while Marubeni Corporation, as part of a consortia, has been awarded the contract to develop Abu Dhabi’s first plant near the Al Dhafra landfill.

While household waste is important, a significant portion of the UAE’s waste comes from industrial, commercial, and the construction/demolition sectors. “Our largest facility handles construction waste, which is transformed

into aggregate, enabling 96% of waste to be redirected back into the construction sector,” explains Wahbeh.

Another net zero 2050 target is likely to focus on refuse-derived fuel (RDF), utilising wood and plastic waste as fuel in cement production as an alternative to coal, which is a major carbon emitter. Cement producers are mandated to source 20% of their fuel from RDF.

The Emirates RDF plant in Umm Al Quwain began operations in 2020 and now receives 1000 tonnes of municipal waste a day from Umm Al Quwain and Ajman’s 550,000 residents, which is converted into RDF. The ministry of climate change and environment has signed agreements with five cement factories to partially power their operations with alternative fuel generated by Emirates RDF instead of coal, diverting more than 800 tonnes of waste per day from landfill.

Conclusion

While waste management is a notable contributor to GHG emissions, some countries such as the UAE are investing substantially in areas including a circular economy, recycling credits, waste to energy facilities, and refuse-derived fuel, to address the problem. Such innovative areas are already beginning to deliver real impact, supporting the UAE’s decarbonisation drive.

“We have recently built a waste to energy facility (connected to the grid) which converts waste into electric power and avoids the greenhouse gases produced by landfill.”



⁶https://datatopics.worldbank.org/what-a-waste/trends_in_solid_waste_management.html

CONCLUSION

NET ZERO:
TIME TO SHIFT GEAR.

The UAE, its political, business and financial leaders have shown great resourcefulness, ingenuity and vigour in innovating to mitigate and manage the impact of climate change and achieve the country’s ambitious net zero 2050 goals. The examples highlighted in this report confirm the UAE’s leadership across many of the sectors that will determine the economic winners in the decarbonised economy of the future.

The news in August that the UAE’s non-oil foreign trade hit a record Dh1.24 trillion (\$337.6 billion) in the first half of 2023 – up 14.4% year-on-year – confirms the enormous progress the country is making in transforming its economy.

The UAE’s hosting of COP28 recognises the priority the country has given to tackling climate change. However, despite everything that has been achieved, there is a widespread acceptance that the hard work is yet to begin. The UAE cannot lose momentum.

Too often around the world, the net zero debate becomes transfixed by technologies which remain

speculative at best. In addition, in many countries the focus on 2050 has led to a failure to develop clear plans for interim milestones such as 2030 and 2040. The UAE must avoid falling into these traps. Stakeholders should be encouraged to move beyond concepts and focus on developing detailed plans with measurable outcomes and clearly defined deadlines.

For the UAE to achieve its 2050 net zero targets, a supportive regulatory, governmental and infrastructure environment is essential. Encouragingly, the UAE has backed its ambitious plans with a significant amount of political capital. Moreover, detailed consultations have been undertaken by many government ministries – spearheaded by the ministry of climate change and environment – with companies and other stakeholders across the UAE.

These discussions have reflected the imperative to take an integrated approach to delivering net zero given connections between different sectors – and the importance of all sectors to the development of the UAE’s economic ecosystem and to facilitating the UAE’s net zero 2050 roadmap. For instance, Etihad Rail has

been identified as a key stakeholder, not only for railways – where it has been part of discussions to identify possible incentives and subsidies that would benefit the development of transport infrastructure in the UAE – but also for broader city design.

While companies can do much to accelerate the UAE’s net zero plans – and all dialogue among stakeholders must be welcomed – ultimately the lead must come from government. In sectors such as steel where the cost of implementing new technologies such as green hydrogen is potentially vast – and different countries around the world are moving at different speeds raising concerns about unfair competition – only policy and regulation can drive change by setting timeframes, imposing taxes and providing incentives.

The ability of the UAE to survive – and thrive – economically in the coming years depends on the UAE shifting gear when it comes to net zero 2050 plans: the focus must now turn to delivery. Given its impressive track record to date, all stakeholders can be confident that the necessary clarity and leadership will be forthcoming.

“The UAE has backed its ambitious plans with a significant amount of political capital.”



- Key findings**
- 1 A supportive governmental, regulatory and infrastructure environment is critical for countries to achieve net zero 2050 targets
 - 2 Combined with this, companies across industries must be proactive and prioritise sustainability as a as an essential part of their business
 - 3 Enhanced data transparency, best practice visibility, and knowledge sharing all serve to improve decision-making that advances climate action

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