مؤسسة دبي للمستقبل
DUBAI FUTURE FOUNDATION

FORE-WORD

Trends are signals of a new direction. They are not random noise, but a steady pattern. If we can separate signals from noise effectively, we can plan for the future. We can match our actions to our visions.

This is the Dubai Future Foundation's first trends report. It supports our ongoing work to ensure we have access to the best insight for decision-making about tomorrow. Instead of looking at the individual signals and exploring their impact, we see things from the perspective of Megatrends.

We have picked ten important areas and sectors in flux which have global significance. If we understand these Megatrends and the factors that drive them, we can identify areas for intervention. For example, we are using technologies like Artificial Intelligence to design and manufacture materials that will help solve challenges of the future in computing and health. Similarly, the continuous growth of user- and machine-generated data is likely to have unintended consequences. The value will drop and instead new value will be found in improved analytics and alternative business models.

The trends identified in this report underline the ever-advancing pace of innovation. For this reason, we must ensure progress benefits everyone. The risks of exposing the weakest members of any society to complex systems will be shouldered by all – the benefits must be equally shared. And so, whether it is access to energy or to life-saving medicines or whether it is about defining who we are as a species, we need to recognise the collective challenges and work out global solutions. That was certainly a key message expressed by the hundreds of futurists who joined us during the Dubai Future Forum in October 2022.

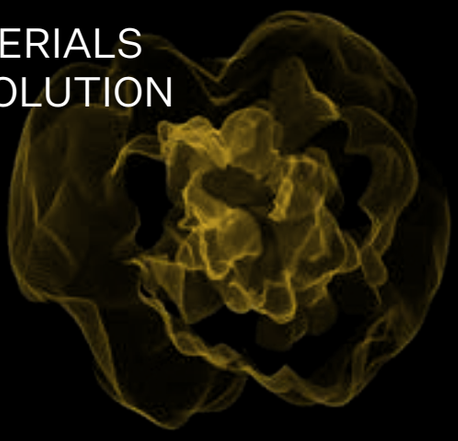
In that same spirit of collaboration, sharing and engaging in a dialogue, I am pleased to offer this report as a way for the world to engage with Dubai and the Dubai Future Foundation.

KHALFAN JUMA BELHOUL

Chief Executive Officer of
Dubai Future Foundation

MEGATREND 1

MATERIALS REVOLUTION

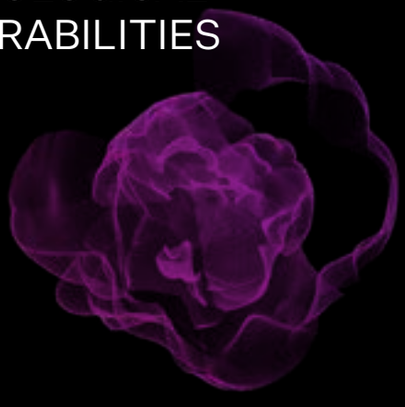


MEGATREND 2

DEVALUATION OF RAW DATA

MEGATREND 3

TECHNOLOGICAL VULNERABILITIES

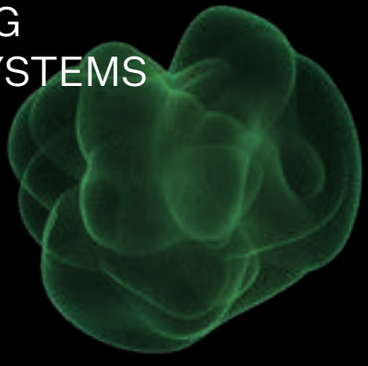


MEGATREND 4

ENERGY BOUNDARIES

MEGATREND 5

SAVING ECOSYSTEMS



MEGATREND 6

BORDERLESS WORLD – FLUID ECONOMIES

MEGATREND 7

DIGITAL REALITIES – IMMERSIVE VIRTUAL AND DIGITAL SPACES

MEGATREND 8

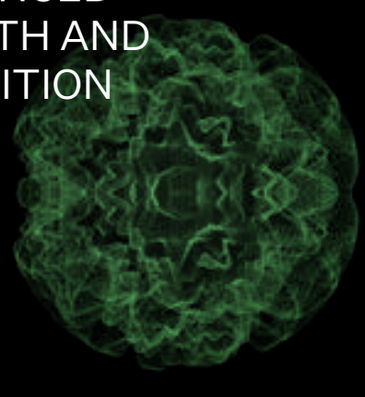
LIFE WITH AUTONOMOUS ROBOTS

MEGATREND 9

FUTURE HUMANITY

MEGATREND 10

ADVANCED HEALTH AND NUTRITION



INTRO DUCTION

Things happen all the time. Sometimes they are one-offs like for example a pipe bursting on the street. Other times they are repeat events or occurrences, in which case they would form a trend: something that becomes, even if only for a while, part of everyday life for a growing number of people. Trends are the directions of travel of an emerging topic like, for example, the fashion or consumer trends apparent with every new season. Trends are identified through signals that point in the direction of the trend, like the growing number of people connected to the internet or the increasing number of phishing attacks. Both are part of a larger trend of more of our lives being online – a megatrend. Such megatrends are the higher-level directions that are unlikely to change year on year, providing important insight into the way the world is going over the coming decades. Unless something major, like warfare or global disease, derails all of this.

There are several challenges inherent in a trends report which this one seeks to overcome. The main one is the expectation to 'be right' in that if a trend is identified then some information about the future can be gleaned. In this report we emphasise the megatrends by describing trends or signals, with the latter representing the narratives of the direction of travel. As such the signals may vary annually, while the megatrends will take longer time to change direction because they are complex, large and interrelated with varied intersections. This allows us to inject some element of certainty in a world of uncertainty: megatrends will require larger forces to change them, compared to trends or signals.

Another challenge of a trends report is that there is a proliferation of them, so the need to distinguish this from others is immense. That said, this brief report reviews the ten megatrends that are relevant to future growth, prosperity and well-being. The ten megatrends are not exclusive and others may be relevant, but we chose the ten that have global significance and, together with the signals that drive them, offer areas for future innovation and growth. We're coming at this with a positivist perspective: what to do to improve the future. The emphasis on megatrends carves out additional time to shape the future in a productive and inclusive manner.

Finally, this report was informed by our own analysis of the megatrends and, for each of the megatrends, we provide some facts on today and some outlooks for tomorrow. As you read through the megatrends think of how each would have an impact on future growth, prosperity and well-being. Though in this report we offer some assessment of why each megatrend matters, readers will come to their own conclusions reflecting their contexts and priorities.

MEGATREND 1

MATERIALS REVOLUTION

What matters:

Wood, stone, iron: these were the materials of the past which were carved from nature and shaped by hand for a specific purpose. The materials of the future will be designed and tested by machines and will come from sources and places undiscovered today. The latest digital technologies will be used to create these materials which, similarly to natural materials, will have highly specific properties. Materials may well represent the new frontier for the 5th industrial revolution.

SIGNAL - 1

Materials will be key to advances in energy, manufacturing and communications.

Materials science will offer possibilities in 3D and 4D printing[1] covering ceramics, polymers and inks as well as semiconductors. Semiconductors are the basic building blocks for the devices we use, the cars we drive and the manufacturing and supply chain systems that provide us with food, packaging and medicine.[2] The absence of a single chip, often costing less than a dollar, can prevent the sale of a device.

SIGNAL - 2

Industrial processes will deliver bespoke, application-specific materials.

The materials of the future will be of atomic size and assembled, or even grown, to provide their unique benefits at any scale. New materials will be at nano- or industrial scale, depending on requirements.[4] This will be true for the electronics industry as well as for other industries that address the challenges of the future for which current off-the-shelf solutions are not satisfactory.

SIGNAL - 3

Materials will respond to our future needs.

The applications for novel materials are manifold: from sustainable substances for consumer products, construction and synthetic fuels[5] to carbon capture and sequestration, environmentally friendly battery storage and advances in semiconductors to achieve more efficiency in solar cell design.[6] Graphene is one of the materials that are expected to have a revolutionary impact. It is a nanomaterial that is carbon-based, highly conductive, light and environmentally beneficial. It can also cross biological barriers. Hence it has applications for medicine. It can enable antimicrobial and antiviral properties by inhibiting growth in other microorganisms or it can act as an antiviral agent.[7]

SIGNAL - 4

The number of patents related to materials science will continue to grow.

China and the United States lead the way, owning nearly 70% of all materials-related patents (China owns 59%).[8] This is largely the result of long-term national investment strategies. The United States Government launched the Materials Genome Initiative in 2011. It focused on 'discovering, manufacturing, and deploying advanced materials twice as fast and at a fraction of the cost compared to traditional methods' (MGI Website, 2022).[9] R&D activities were particularly focused on computer and electronic products followed by transportation and medical devices.[10] Funding of materials science in China has quadrupled since 2008 and the number of scientific papers tripled between 2006 and 2017 to around 40,000 papers.[11]

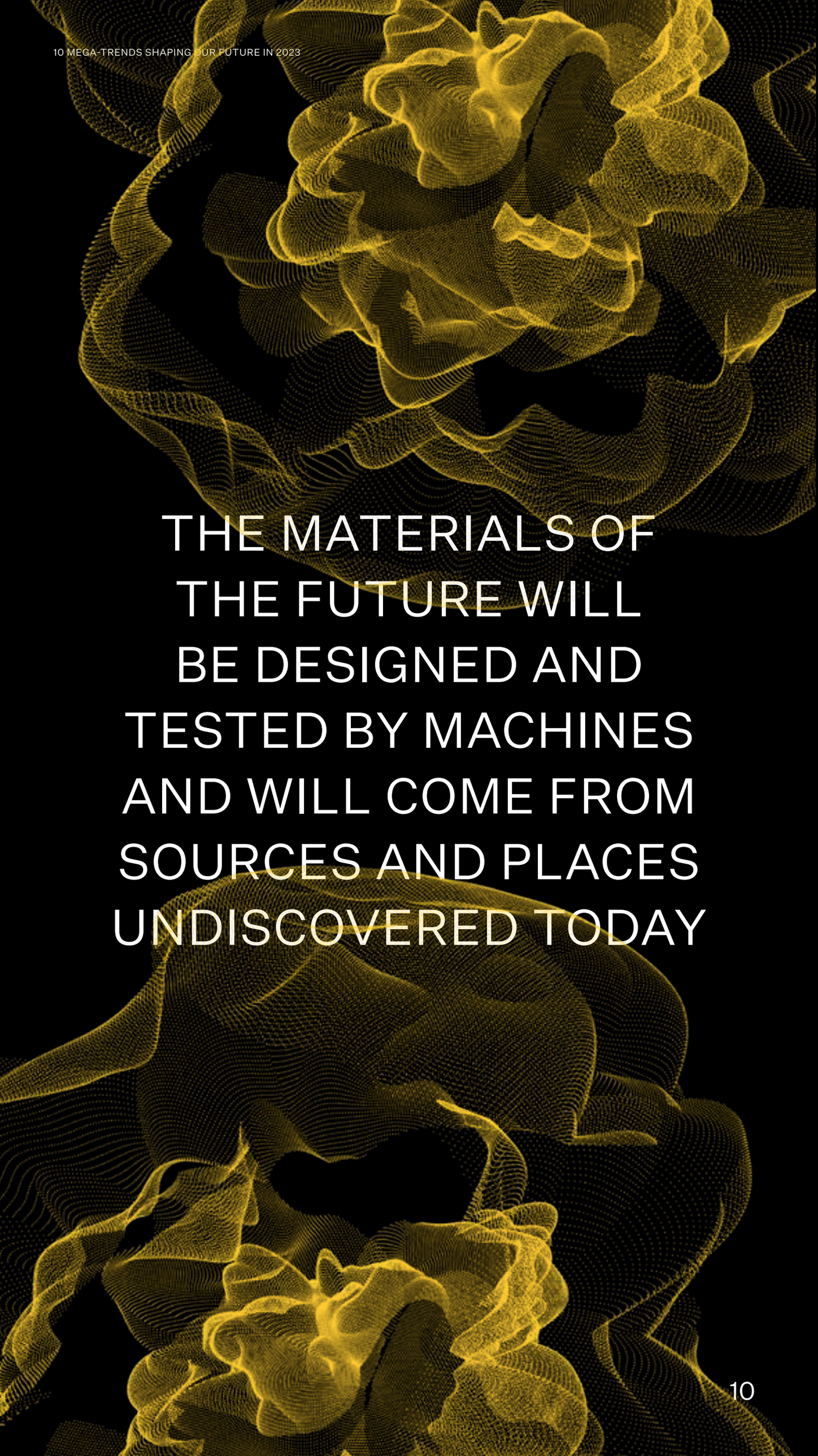
70% **China and US**

Global share of materials-related patents

SIGNAL - 5

Materials research continues in MENA.

An area of future growth and opportunity, the Advanced Materials Research Center (AMRC) within the Technology Innovation Institute (TII) in the UAE is focused on advancing knowledge of materials science.[12] [13] The King Abdulaziz City for Science and Technology (KACST) also studies advanced materials to capture greater value through industries like petroleum, water desalination, construction and medicine.[14]



THE MATERIALS OF THE FUTURE WILL BE DESIGNED AND TESTED BY MACHINES AND WILL COME FROM SOURCES AND PLACES UNDISCOVERED TODAY

MEGATREND 2

DEVALUA-TION OF RAW DATA

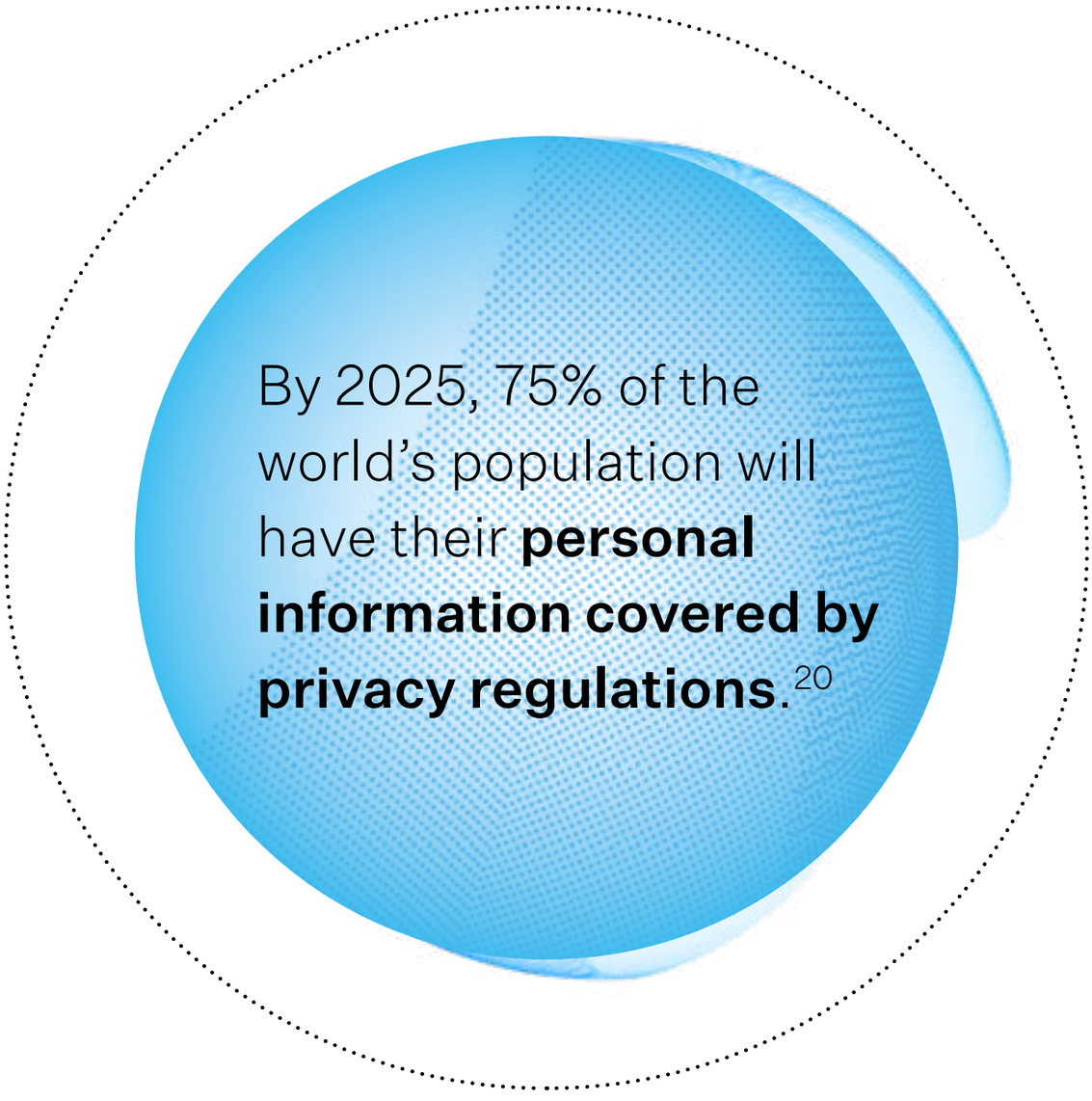
What matters:

The proliferation of data will reach the limits of practical application. The process will also be limited by the introduction of data privacy regulations. Opportunities will lie in new and better use of available data applied to emerging business models. The digital trade of goods and services represents the next frontier of profitable data use enhanced by greater sharing of aggregate data across industries and countries, generating greater economic returns.[15] [16] [17]

SIGNAL - 1

Personalised marketing will change.

Advertising has long been the one critical revenue source for providers of ‘free’ services and content to the growing numbers of internet users. While personalised marketing can drive 5% to 15% increases in revenue,[18] it is not always effective and can be considered an 'old school' business model. And so, despite all this growth, four marketers out of five are expected to abandon personalisation efforts by 2025 as consumers see such advertising as invasive or unhelpful.[19]

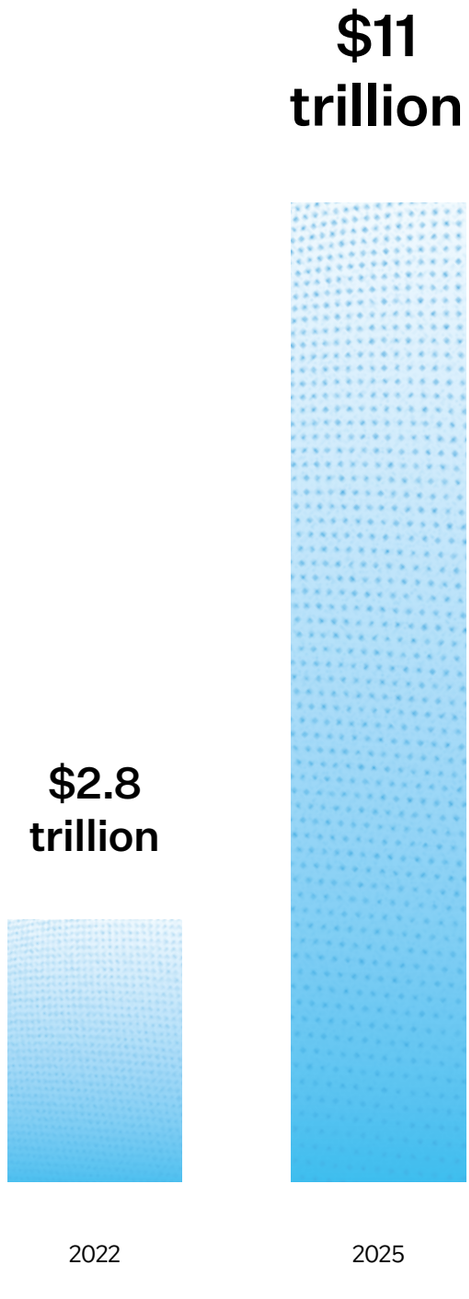


DESPITE GROWTH IN MARKETING REVENUE, FOUR MARKETERS OUT OF FIVE ARE EXPECTED TO ABANDON PERSONALISATION EFFORTS BY 2025

SIGNAL - 2

The value of digital trade will continue to grow.

Focus on data aggregation will grow with a growing digital economy under the umbrella of data protection. As the value of personalised data wanes, the worth of digital trade will continue to grow. Over the past decade, digital trade has been expanding at 5.4% per year on average.[21] Data transfers are estimated to contribute $2.8 trillion to global GDP — a share that exceeds the global trade in goods and is expected to grow to $11 trillion by 2025.[22]



Data transfers contribution to global GDP

The number of countries that have introduced data regulation has nearly doubled within four years.

35

countries introduced data regulations in 2017

62

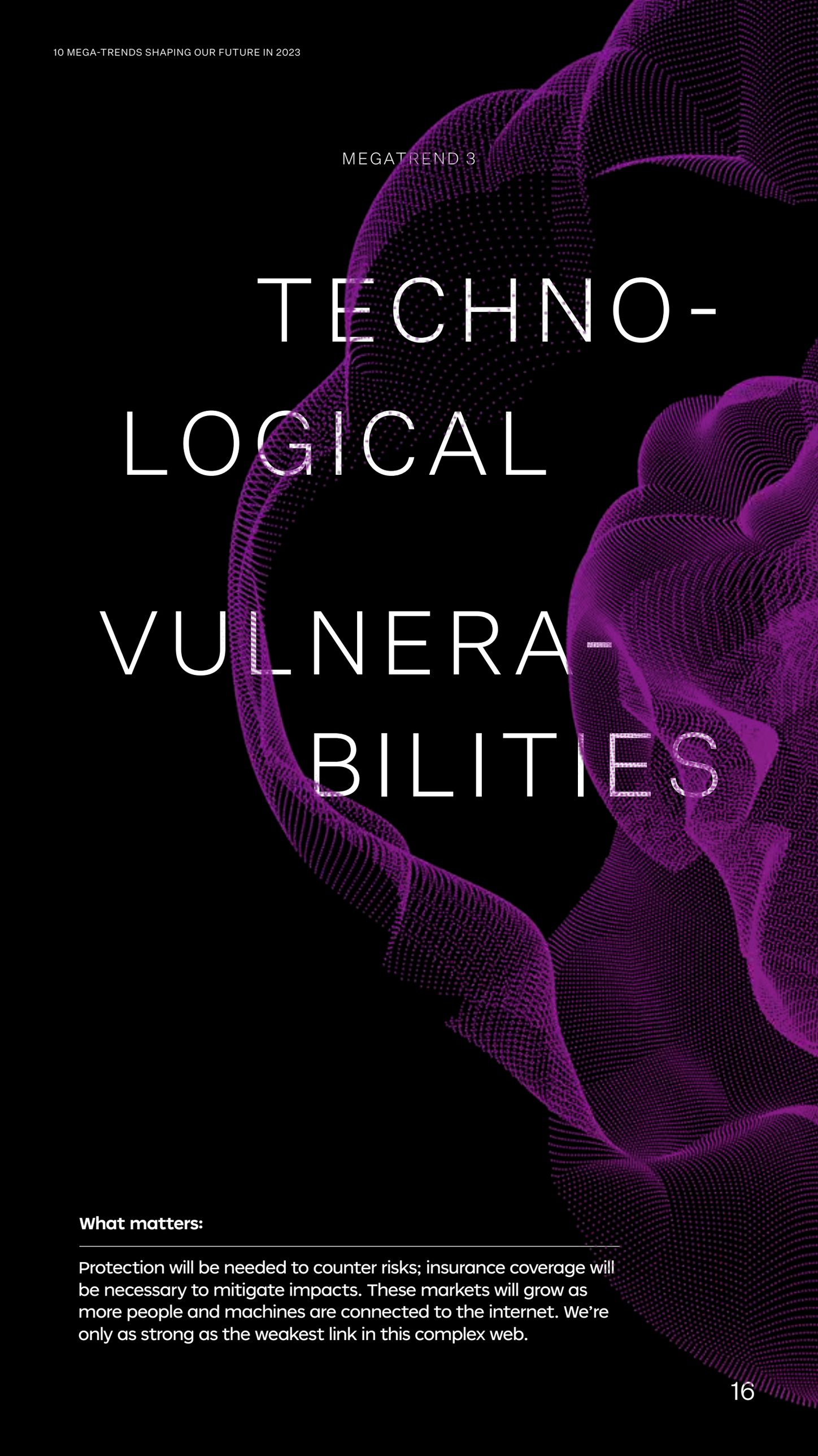
countries introduced data regulation in 2021

71%

of countries now have privacy laws

MEGATREND 3

TECHNO-LOGICAL VULNERA-BILITIES



What matters:

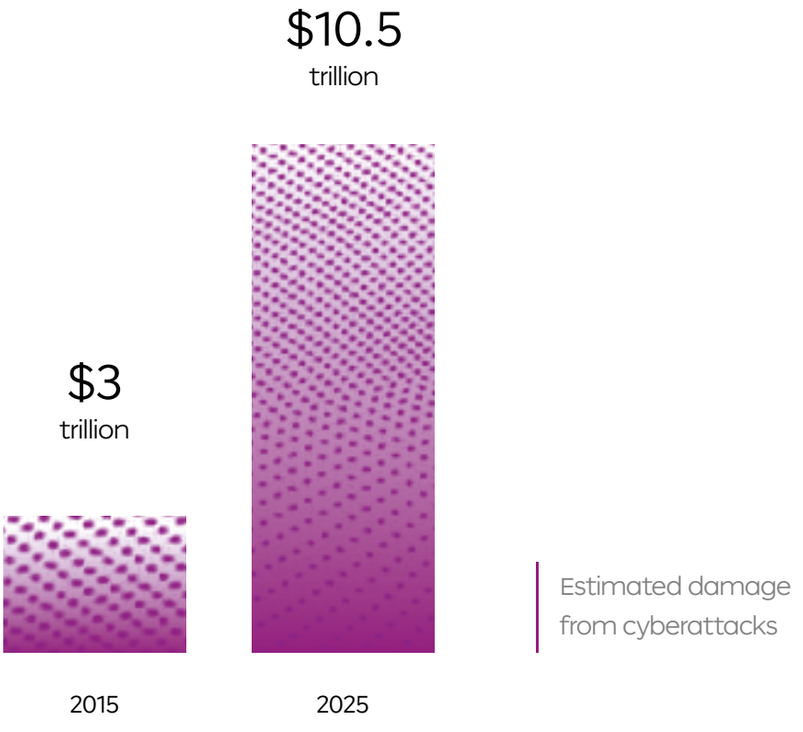
Protection will be needed to counter risks; insurance coverage will be necessary to mitigate impacts. These markets will grow as more people and machines are connected to the internet. We're only as strong as the weakest link in this complex web.

SIGNAL - 1

Cyberattack damage will continue to grow.

The average cost of a data breach in the US is $9.4 million and globally about half of that.[23] The most common (24.5%) cyberthreats are in healthcare where each breach costs an average of $5 million. Time is money: in 2022, it took an average of 277 days to identify and contain a breach. Reducing the time required for detection will save money and make it easier to restore data.[24]

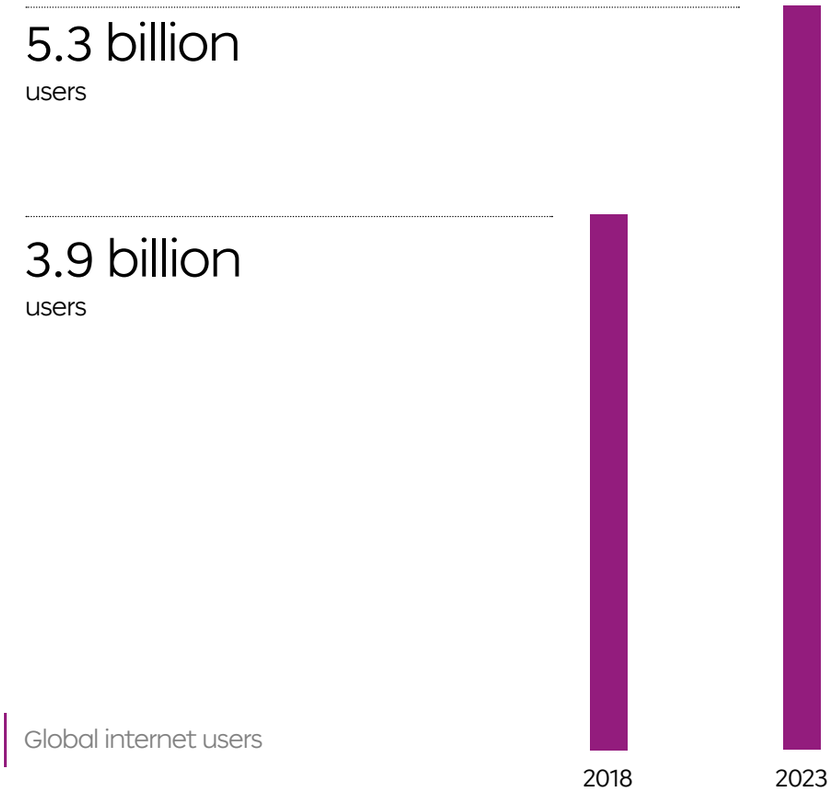
By 2025, the estimated damage from cyberattacks will amount to $10.5 trillion annually, a three-fold increase from 2015.[25] To counter even greater damage, cyber security installations have increased, leading to the cyber security market being valued at $220.6 billion in 2021. Because of the growing threat, the cyber security industry is predicted to grow at a compound annual growth rate (CAGR) of 8.7% to 2026.[26]



SIGNAL - 2

Impacts growth the rise in internet traffic.

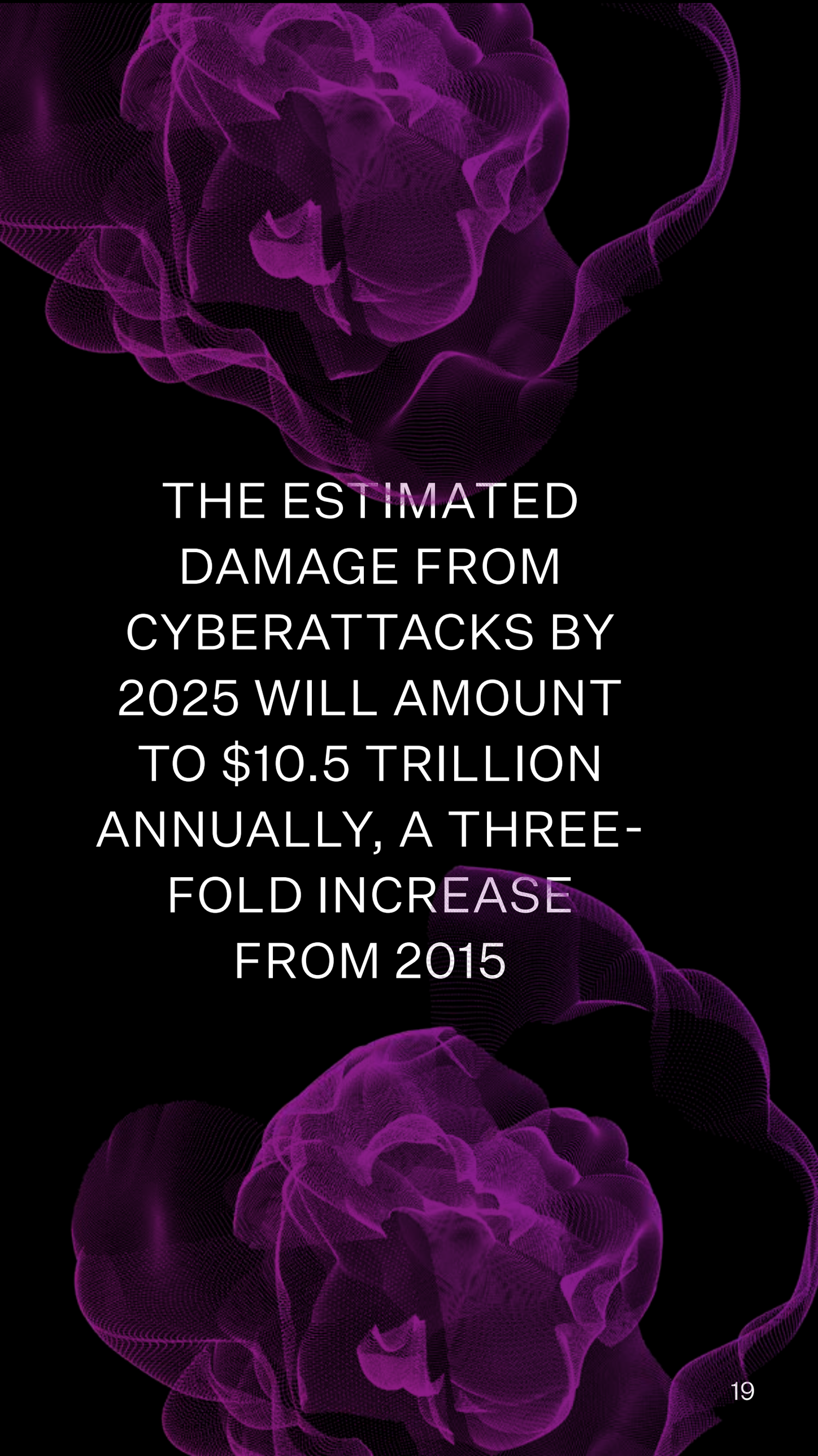
In 2023, there will be 5.3 billion internet users (two-thirds of the global population) with 3.6 global devices per capita, at an average connection of 110 Mbps compared to 3.9 billion with 2.4 global devices at an average connection of 45.9 Mbps in 2018.[27] Machine-to-Machine (M2M) connections will represent half (14.7 billion) the global connected devices in 2023. Connected home applications will have nearly half of the M2M share. Car applications are growing the fastest at 30% CAGR.[28]



SIGNAL - 3

Countries mindful of threats will invest more funds to ensure protection.

The US House of Appropriations Committee released its funding bill for 2023: the Cybersecurity and Infrastructure Security Agency's (CISA) budget has grown almost nine-fold to $2.93 billion.[29]



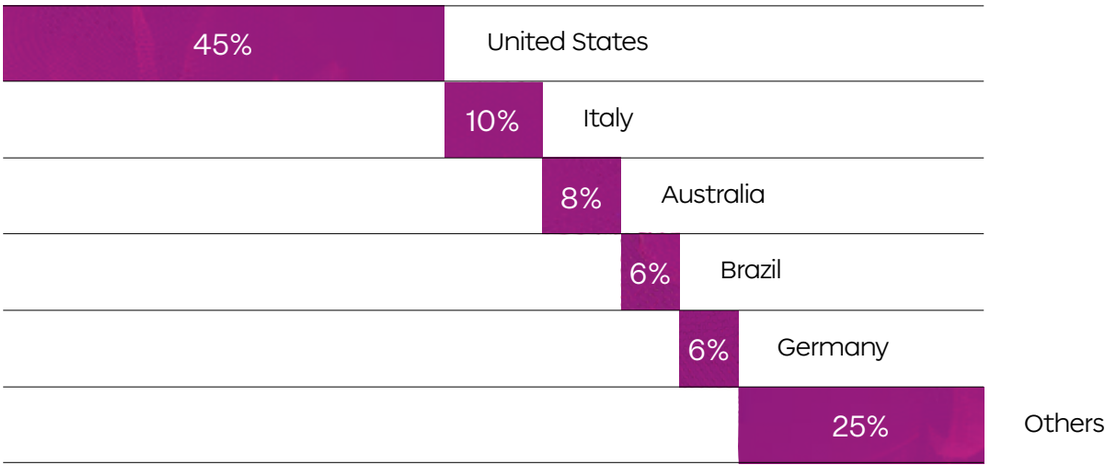
THE ESTIMATED DAMAGE FROM CYBERATTACKS BY 2025 WILL AMOUNT TO $10.5 TRILLION ANNUALLY, A THREE-FOLD INCREASE FROM 2015

SIGNAL - 4

The growth of the global cyber insurance market.

The global cyber insurance market is expected to expand at a CAGR of 25.7% by 2029 when it will reach $63.62 billion.[30] Between 2020 and 2022, ransomware and extortion operations more than doubled.[31] Almost half (45%) of these incidents were in the United States followed by Italy (10%), Australia (8%), Brazil (6%) and Germany (6%).[32] On average a ransomware attack costs $4.54 million,[33] while a growing risk is ransomware as a service (RaaS), which pays affiliates only when a breach is successful, earning them a 10-30% commission.[34]

Ransomware and extortion incidents



SIGNAL - 5

Cyberattacks also grow in the UAE.

Compared to 2020 levels, cyber attacks increased by 50% globally and 71% in the UAE in 2021. During the fourth quarter of 2021, there were 925 cyber-attacks per week per organisation globally on average, while in the UAE the average was 408 attacks. In 2020 throughout the pandemic, the UAE experienced a 250% increase in cyber attacks, which included 1.1 million phishing incidents, the most popular technique for carrying out ransomware attacks. Ransomware increased considerably as a result, with more than 33% new ransomware threat groups affecting 78% of UAE organisations in 2020 (up from 66% in 2019).[35]

MEGATREND 4

ENERGY BOUND-ARIES

What matters:

Energy is the fuel of life and economic activity. It will increasingly be renewable and carbon-efficient. Carbon-based energy will remain an important element in the energy mix but growth in investments is likely to be driven almost entirely by renewables and decarbonisation technologies.

SIGNAL - 1

The world’s investment in energy is set to rise.

It is estimated that the world's investment in energy is expected to reach over 8% in 2022 to reach a total of $2.4 trillion. Easing the burden on consumers is an immediate priority for many policymakers. For this reason, the total energy bill paid by the world’s consumers is likely to top $10 trillion for the first time in 2022. This will hit the poorest in society hardest and put further pressure on governments to cushion the blow via fiscal measures and price interventions.[36]

SIGNAL - 2

The world will continue to push for net zero.

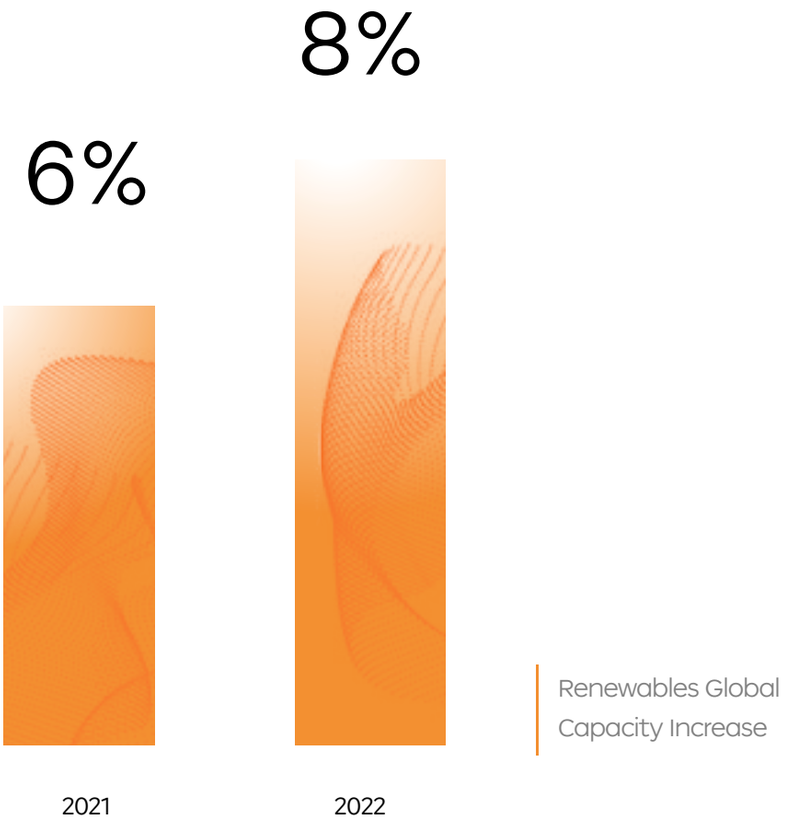
Over 70 countries have pledged to achieve net zero in the coming decades.[37] This means the sources of energy will rapidly shift towards synthetic fuels and hydrogen. They are likely to constitute a third of the global energy mix by 2035 and half by 2050. This means that net zero will not be achieved by a reduction in energy consumption as a 3–4% annual growth rate in electricity demand to 2050 is forecast. By that date, fossil fuels will meet 43% of global energy demand. However, growth in energy investments could be driven almost entirely by renewables and decarbonisation technologies.[38]

Despite the persistent pandemic-induced supply chain challenges, construction delays and rising raw material and commodity prices, renewable capacity increased by 6% in 2021 reaching almost 295 gigawatt (GW). This growth was higher than forecast and includes a 17% decline in annual wind capacity and an increase in solar photovoltaic (PV) and hydropower installations.[39] Initial estimations are that renewable capacity increased by over 8% in 2022 providing more than 300 GW of global energy.[40]

SIGNAL - 3

Solar PV will continue to be the most popular renewable energy source.

Photovoltaic (PV) is forecast to account for 60% of the global renewable capacity and utility-scale projects account for almost two-thirds of overall PV expansion in 2022. The strong policy environment in China and the European Union contribute to driving faster deployment.[41] China largely maintained its market share of deployment in 2021, accounting for almost half of worldwide renewable capacity additions, even though new Chinese capacity declined 2% year on year.[42]



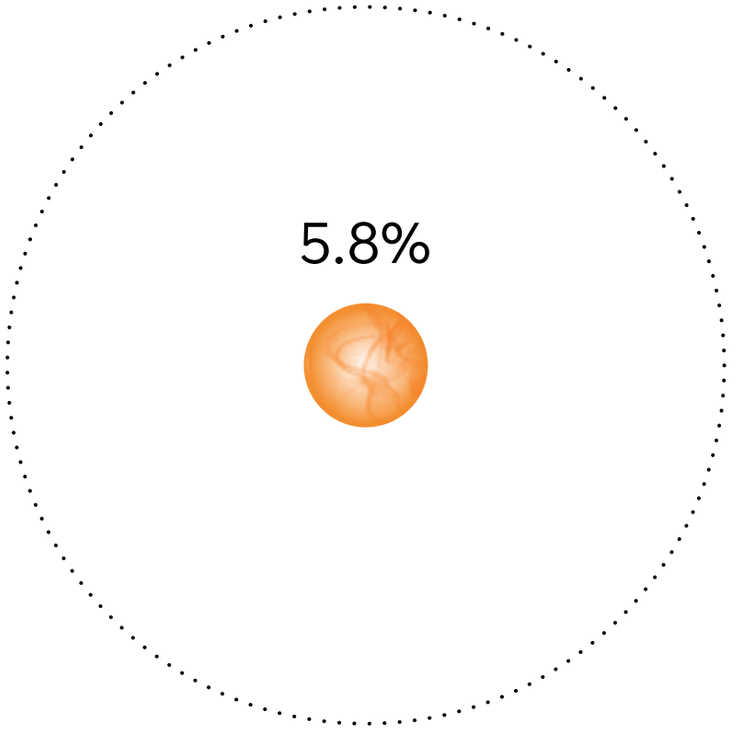
SIGNAL - 4

The MENA region has enormous growth potential.

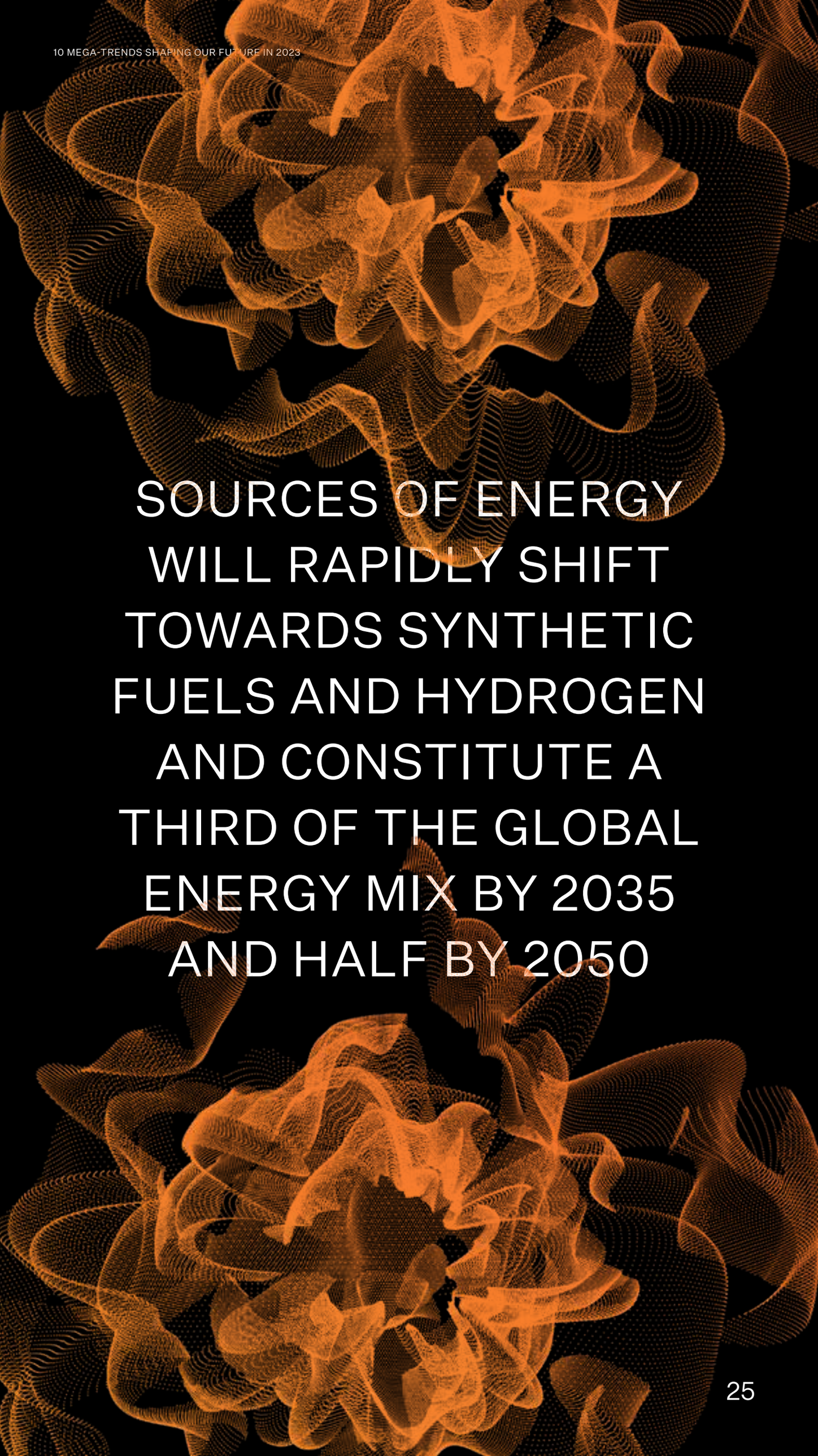
The Middle East and North Africa region has about 57% of the world's oil reserves and 41% of natural gas resources. MENA is also endowed with unique solar resources. Over the next 30 years, the total investment needs in energy in MENA are estimated at over $30 billion a year.[43] In this region, an estimated 28 million people still lack access to electricity, especially in rural areas, and about 8 million people rely on traditional biomass for all their energy needs.[44]

MENA region's share of global oil reserves today

MENA region's share of global natural gas resources today



MENA population lacking access to electricity



SOURCES OF ENERGY WILL RAPIDLY SHIFT TOWARDS SYNTHETIC FUELS AND HYDROGEN AND CONSTITUTE A THIRD OF THE GLOBAL ENERGY MIX BY 2035 AND HALF BY 2050

MEGATREND 5

SAVING ECO-SYSTEMS

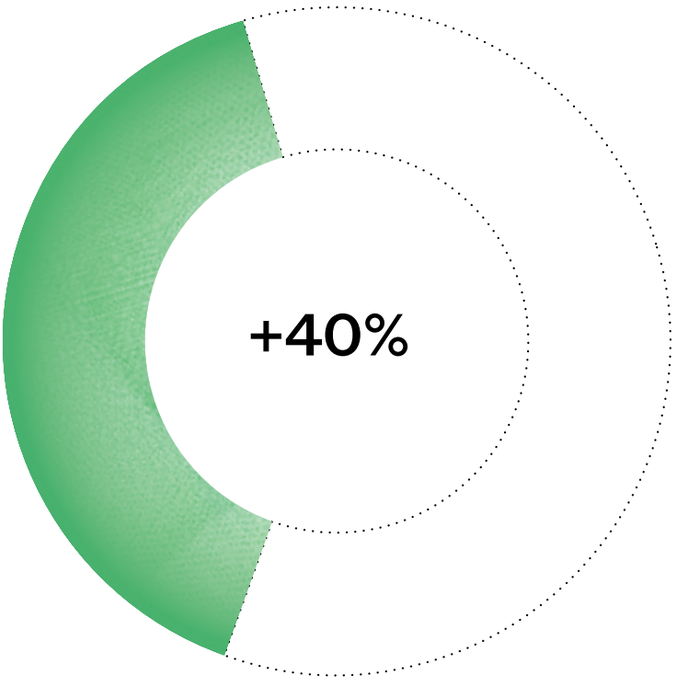
What matters:

The trend towards environmental, social and governance (ESG) audits continues. Investors, regulators and rating agencies are requiring large corporations to play their part in sustainability. Europe has been leading historically, but Asian and American markets are catching up. Companies are taking the lead not just to reduce their carbon footprint but to become net-positive.

SIGNAL - 1

The growth of ESG assets.

Global ESG assets continue to grow and may surpass $41 trillion by 2022 and $50 trillion by 2025. This represents one-third of the projected total assets under management globally. Europe accounts for half of global ESG assets and, while it dominated the market until 2018, the US is taking the lead with more than 40% growth in the past two years, exceeding $20 trillion in 2022.[45]



Growth of ESG assets in the US from 2020 to 2022

SIGNAL - 2

ESG will become central to future investment.

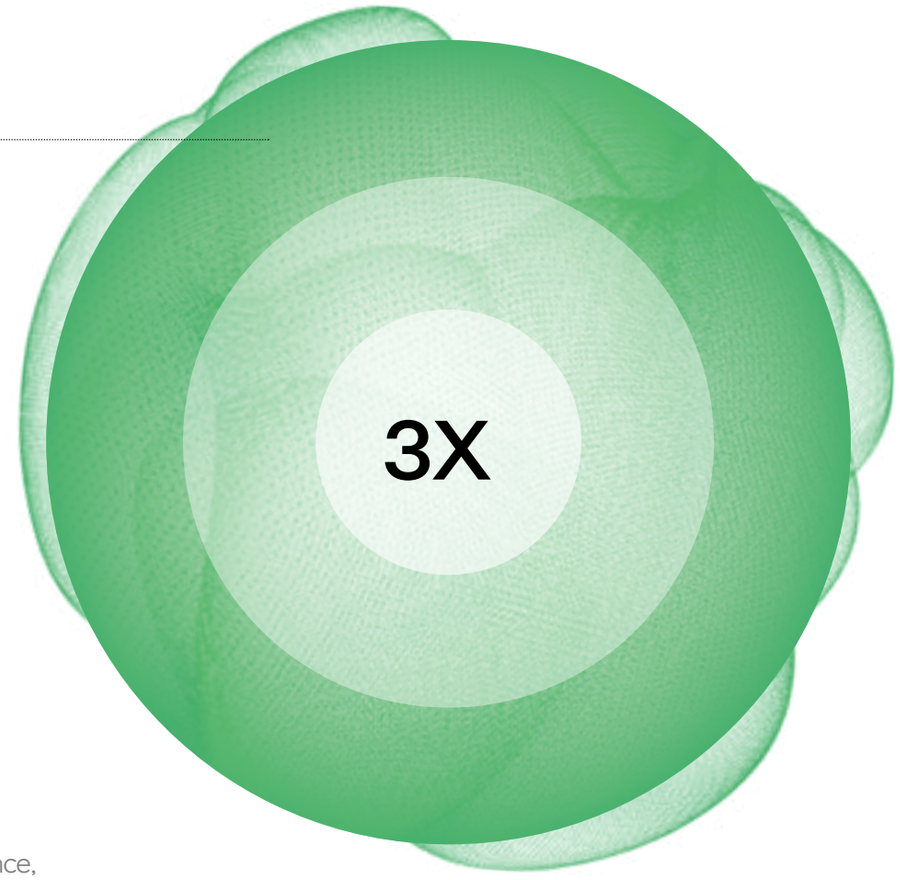
ESG-linked bonds are also growing. ESG-linked debt issuance, to finance 'green projects', more than tripled in 2022 to $190 billion and sustainability-related equity fund flows also rose to $25 billion. ESG investments make up almost one-fifth of foreign financing for emerging markets excluding China, four times the average since 2017.[46]

SIGNAL - 3

Institutions to move from net-zero to net-positive.

Institutions are looking beyond net-zero emissions to a net-positive impact on the planet; regenerative capitalism and microeconomies are expected to flourish. In April 2021, PepsiCo announced plans to practise regenerative farming on more than seven million acres of land worldwide, the equivalent of its entire agricultural footprint.[47] Similarly, IKEA has made commitments to become 'climate' positive by 2030. That means reducing emissions across its entire value chain and supporting reforestation efforts to remove carbon dioxide from the atmosphere.[48]

$190
billion



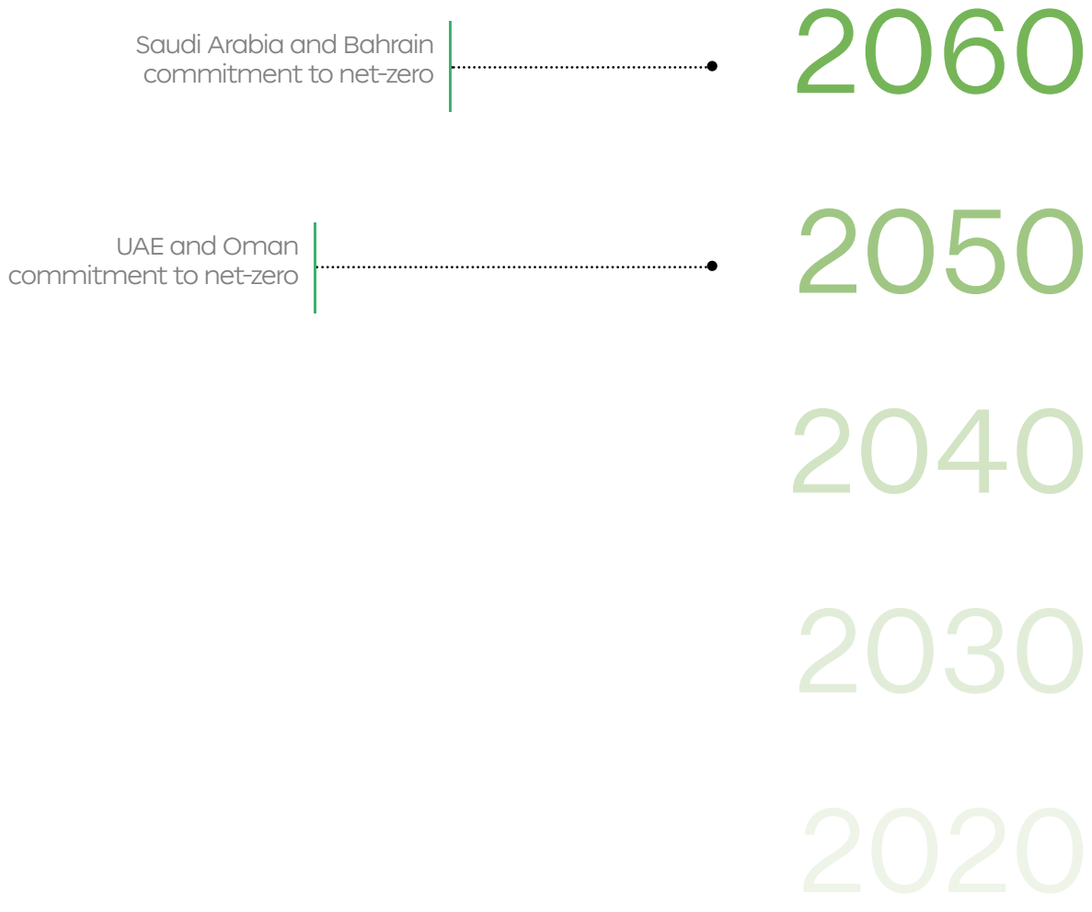
ESG-linked debt issuance, to finance 'green projects', more than tripled in 2021 globally

GLOBAL ESG ASSETS CONTINUE TO GROW AND MAY SURPASS $41 TRILLION BY 2022 AND $50 TRILLION BY 2025

SIGNAL - 4

The UAE can become the region's sustainable finance hub.

The UAE government has taken numerous regulatory actions, including mandatory ESG reporting, female board appointments and organising public awareness campaigns, amongst which was the appointment of a dedicated Climate Change Special Envoy. It also announced a detailed Sustainable Finance Strategy issued by its Ministry of Climate and Environment, as well as the Net Zero 2050 Strategic Initiative with associated funding commitments valued at $163 billion for investment in clean energy. The Zayed Sustainability Prize continued for its 14th year to promote grassroots solutions, awarding $3 million in prize money.[49] Oman[50] has made a commitment to net-zero by 2050, while Saudi Arabia[51] and Bahrain have committed to net-zero by 2060.[52]



MEGATREND 6

BORDER— LESS WORLD —FLUID ECONO— MIES

What matters:

The COVID-19 pandemic has accelerated an ongoing trend: super-apps are managing trade, money transfers and jobs. That trend is likely to speed up and draw millions into the gig economy and to operate across borders without them having to leave their countries.

SIGNAL - 1

The digital economy will continue to define the borderless world.

This new economy includes digital-enabling infrastructure, digital transactions or the remote sale of goods and services. It also covers digital services related to computing and communications.[53] An estimated 70% of new value created over the next decade will be based on digitally enabled platform business models.[54] In 2021, the US digital economy accounted for 10.2% of US GDP and created up to 7.8 million jobs, outpacing growth in the overall economy, which had contracted by 3.4%.[55]

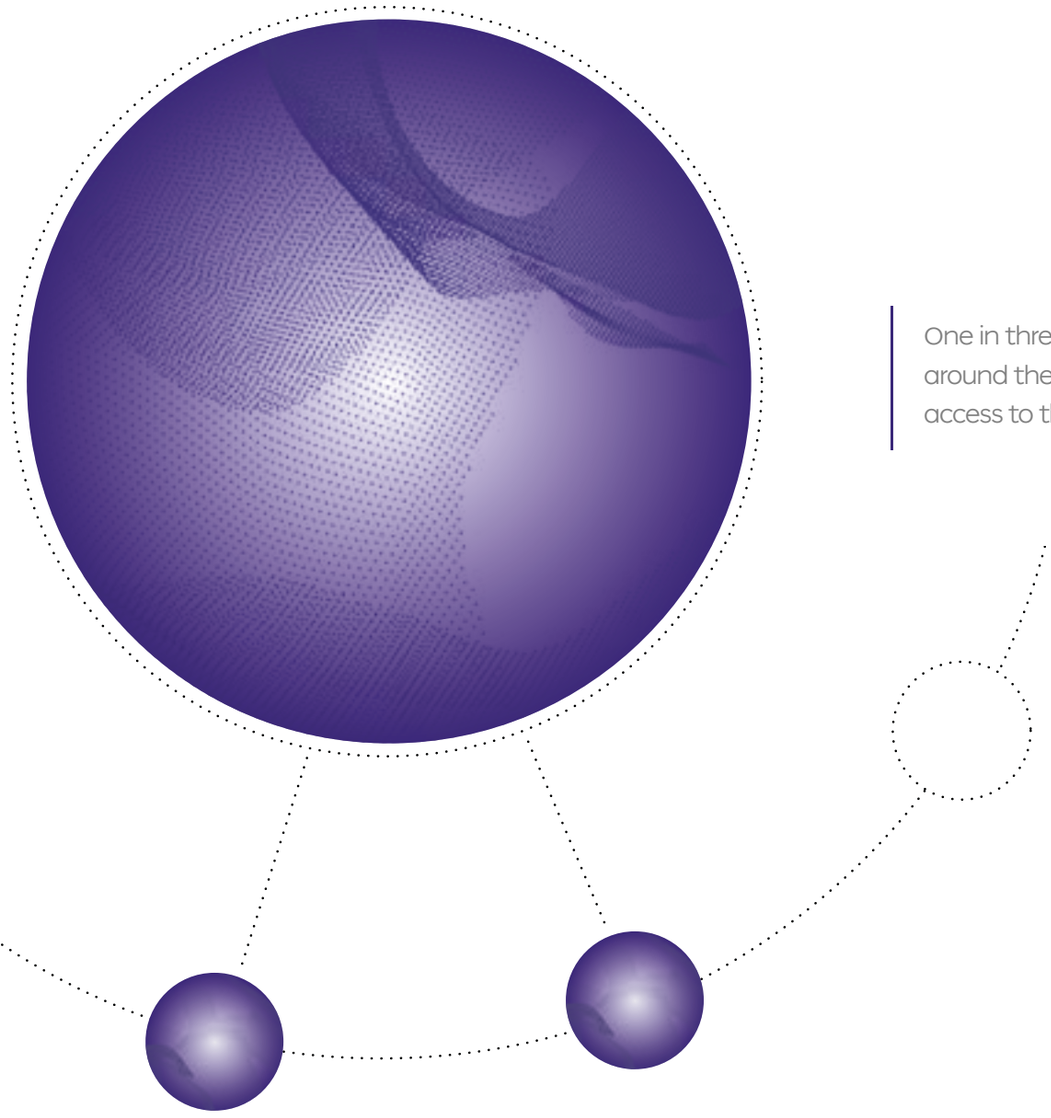
70%

of new value to be created over the next decade will be based on digitally enabled platforms

The digital economy contributed to more than

10%

of US GDP in 2021



One in three individuals around the world lacks access to the internet

SIGNAL - 2

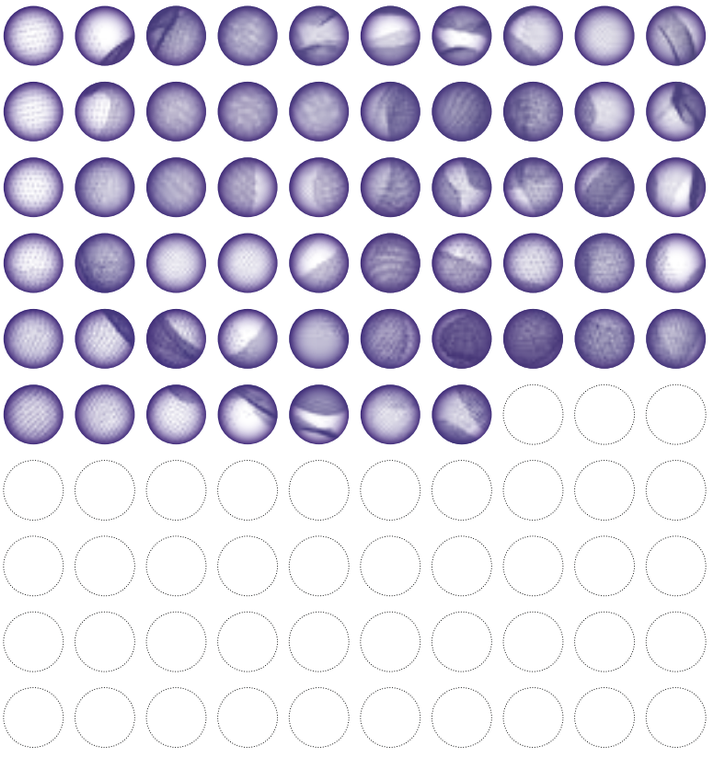
Internet access continues to be out of reach for many.

Close to 100% of the global population is now in range of a mobile broadband network but one in three individuals who could go online cannot, mainly due to costs, lack of access to a device and/or lack of awareness and skills.[56] This illustrates the massive growth potential yet to come, but also underlines the current inequality of opportunity.

SIGNAL - 3

Digital payments account for a growing number of transactions.

The pandemic has sped up the transition to digital payments. Some 57% of cross-border payment users preferred online payments, including nearly 80% in Mexico and India. Almost three-quarters of consumers in Mexico and Brazil[57] who send and receive international payments do so through mobile apps and digital wallets. It's not a stretch to state that online payments – using mobile-based apps and digital wallets – are now commonplace.



57%

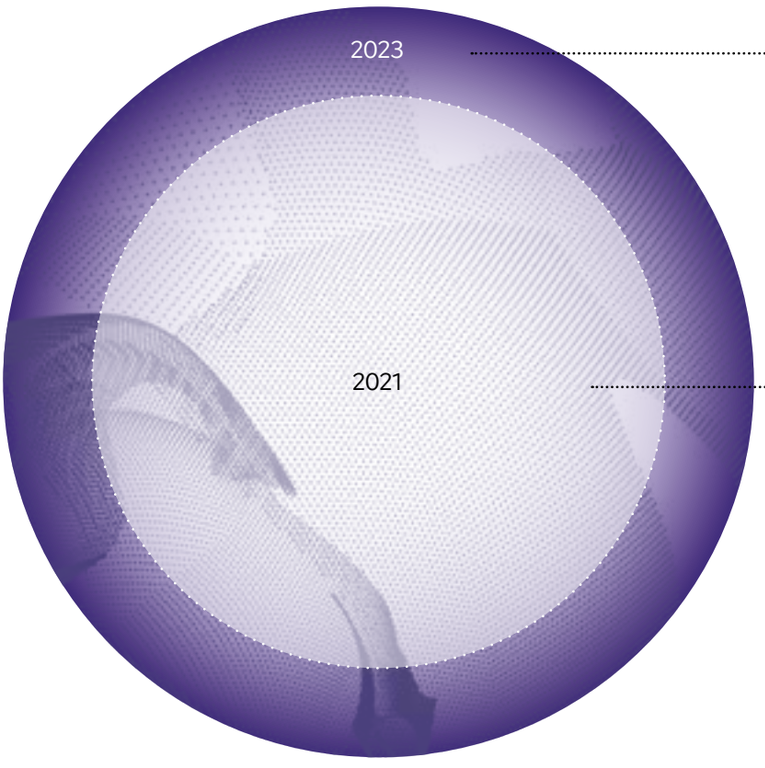
Percentage of online cross-border payment users

SIGNAL - 4

The shared and gig economies will grow significantly.

Around the world, peer-to-peer, access-driven businesses models are appearing. Whether borrowing goods, renting homes or serving up micro-skills in exchange for access or money, consumers are showing a robust appetite for this new style economy.[58] The global gig economy is projected to grow by almost one-third to $455 billion in 2023 from an estimated $347 billion in 2021.[59]

More workers around the world are reporting side hustles, gig work and freelance income. Almost six in ten survey respondents (57%) globally work outside their main jobs[60] and 36% of the US workforce as of April 2022 is made up of independent workers, up from 27% in 2016.[61] It is not yet clear whether this side-hustle phenomenon will have positive or negative impacts for employers.

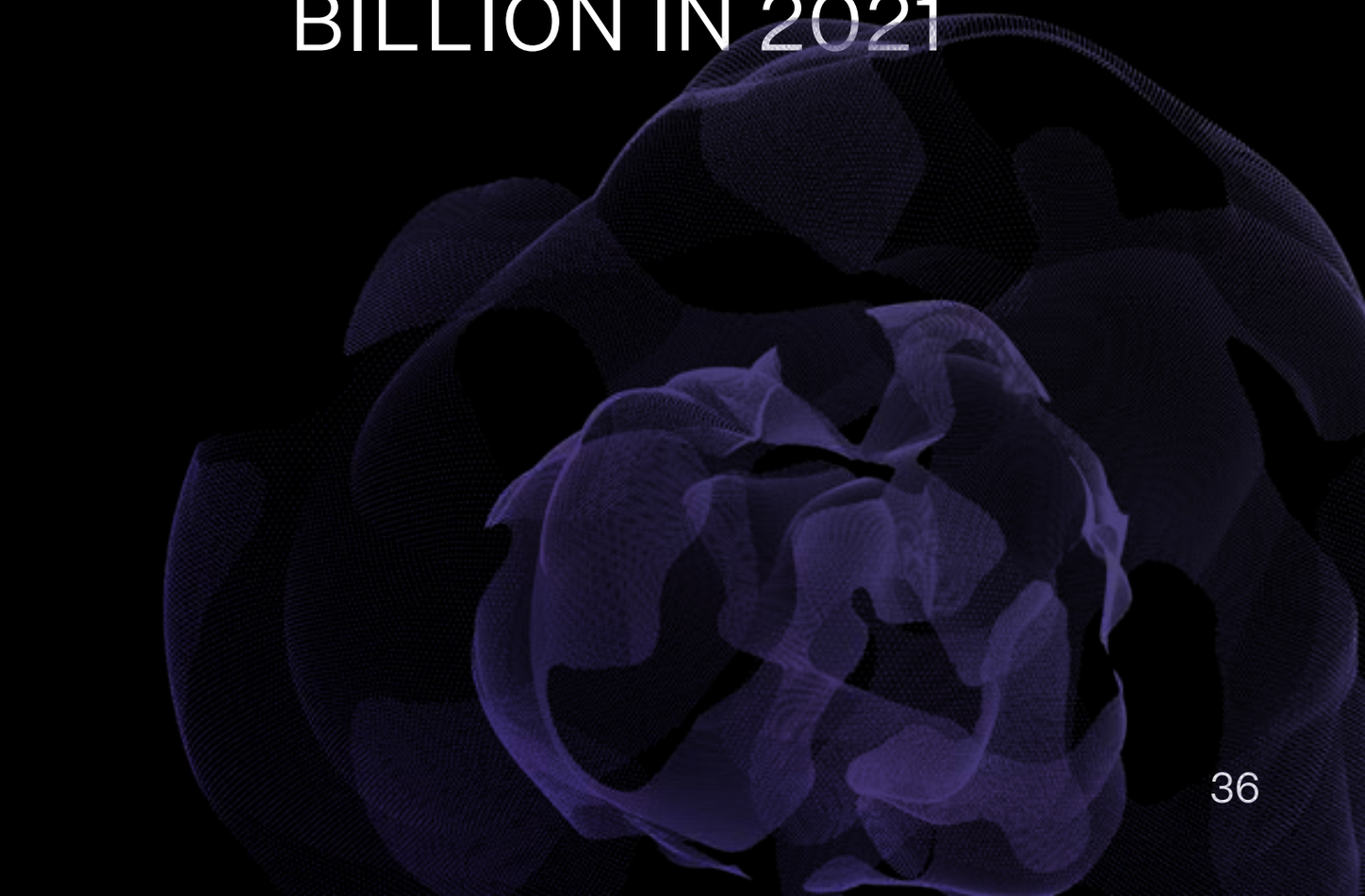


$455 billion

$347 billion

Global gig economy growth

THE GLOBAL GIG ECONOMY IS PROJECTED TO GROW BY ALMOST ONE-THIRD TO $455 BILLION IN 2023 FROM AN ESTIMATED $347 BILLION IN 2021



+19%

The UAE retail mobile-commerce market growth between 2020 and 2025

SIGNAL - 5

Increasing e-commerce adoption in the Gulf Cooperation Council (GCC).

Countries are driven by a young population that is earning more and spending more time on the internet. Retailers now need to compete with a growing number of digital market entrants, including super apps, social media players, aggregators and global e-marketplaces. The UAE retail mobile-commerce market is projected to grow at 19% CAGR between 2020 and 2025. The outlook for the UAE's overall e-commerce retail market is equally strong, with expectations that it could reach $8 billion by 2025. The number of people in the UAE and the Kingdom of Saudi Arabia who shop online on a weekly basis has doubled between 2021 and 2022. Some 42% of online shoppers surveyed buy groceries online at least once a week, as well as household cleaning products, toys, baby supplies, consumer electronics, footwear and apparel. Traditional retailers that haven't yet built a strong online presence are losing out.[62]

MEGATREND 7

DIGITAL REALITIES

IMMERSIVE VIRTUAL AND DIGITAL SPACES

What matters:

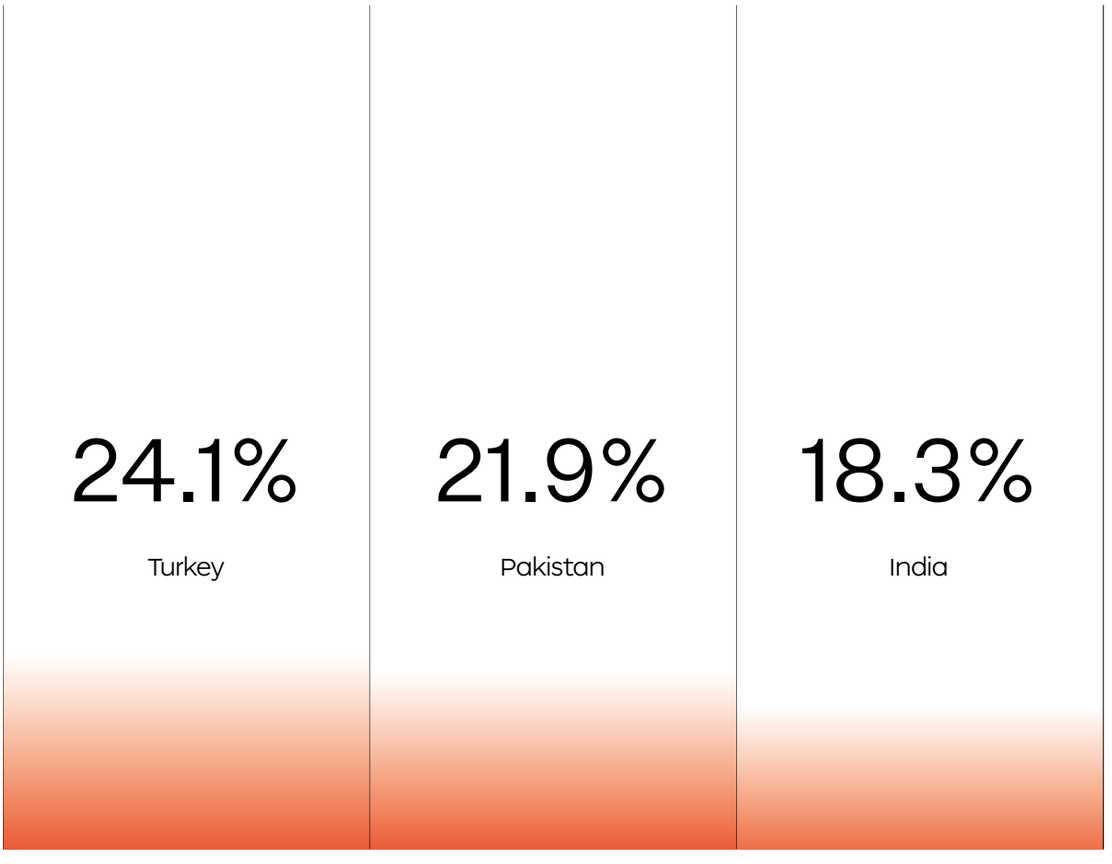
Gaming is big business. If we include the metaverse investments seen in 2022, the amounts run into the hundreds of billions. And that is just the beginning. These markets will continue to grow as games and online social interactions become more realistic and tied to product offerings in the virtual world.

SIGNAL - 1

The gaming industry is growing.

It's also growing up. With 3.2 billion gamers,[63] the revenue from video games, which expanded by 32% between 2019 and 2021, will rise at an 8.4% CAGR through 2026, creating a $321 billion industry. China and the US accounted for around half of global gaming and e-sports revenues in 2021. The fastest-growing country by revenue from video games is Turkey with a projected CAGR of 24.1% between 2021 and 2026, followed by Pakistan (21.9%) and India (18.3%). In 2017, global video games made up 6.1% of total entertainment and media spending. By 2026, they will account for close to 11%. This growth is attributed to in-app advertising, which amounted to $54 billion in 2021 and will exceed $100 billion by 2025.[64]

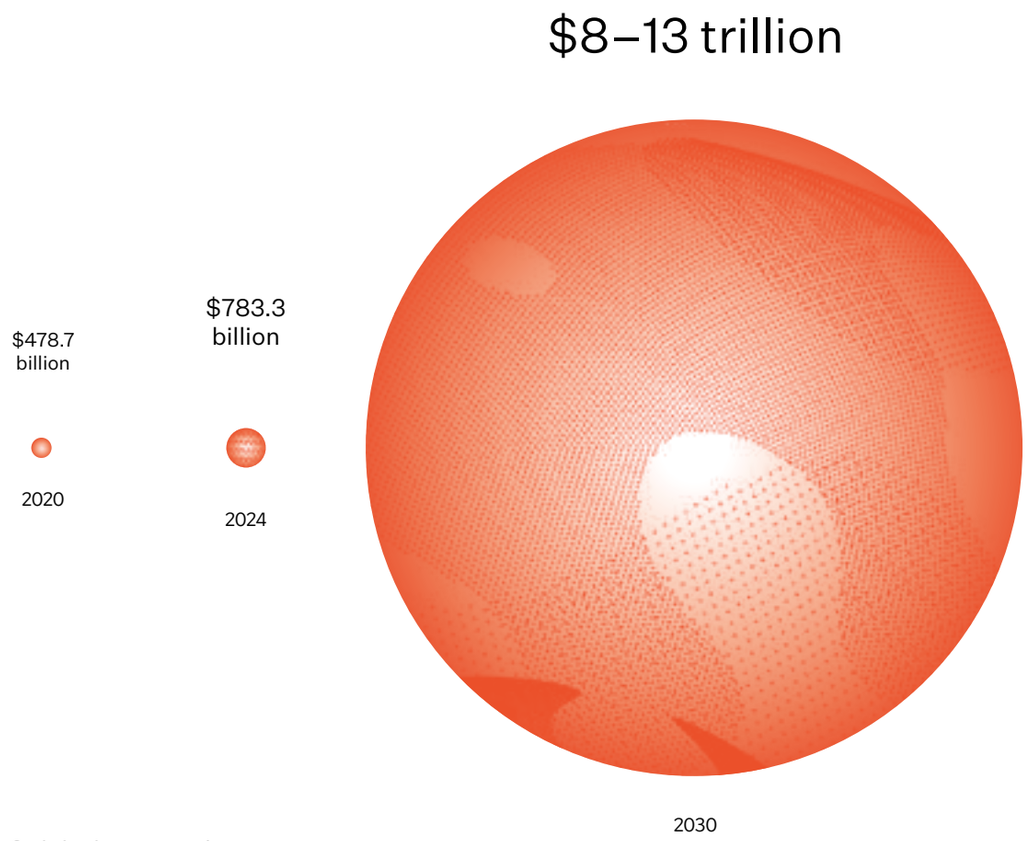
CAGR of the fastest-growing revenues from video games between 2021 and 2026



SIGNAL - 2

The market opporunity of the metaverse will grow in the next year and beyond.

Though not yet clearly defined, the metaverse will grow. The immersive experiences of gaming are paving the way to the metaverse. And with it the next generation of digital advertising, entertainment and brand experiences. This emerging digital space may represent an opportunity ranging from $8 trillion[65] to $13 trillion[66] by 2030, up from $478.7 billion in 2020 and $783.3 billion expected in 2024. Online game makers and gaming hardware are expected to capture $400 billion in 2024 while opportunities in live entertainment and social media will capture the rest. Video game makers such as Roblox, Microsoft, Activision Blizzard, Electronic Arts, Take-Two, Tencent, NetEase and NexOn will continue to upgrade existing titles into 3D online worlds. The trend is towards games that better resemble social networks. The market is likely to expand to include live entertainment, concerts and sports events. This will lead to fierce competition for advertising revenue. In 2024, turnovers in excess of $200 billion[67] are expected from live entertainment companies. Films, live music and sports will become part of the metaverse concept.

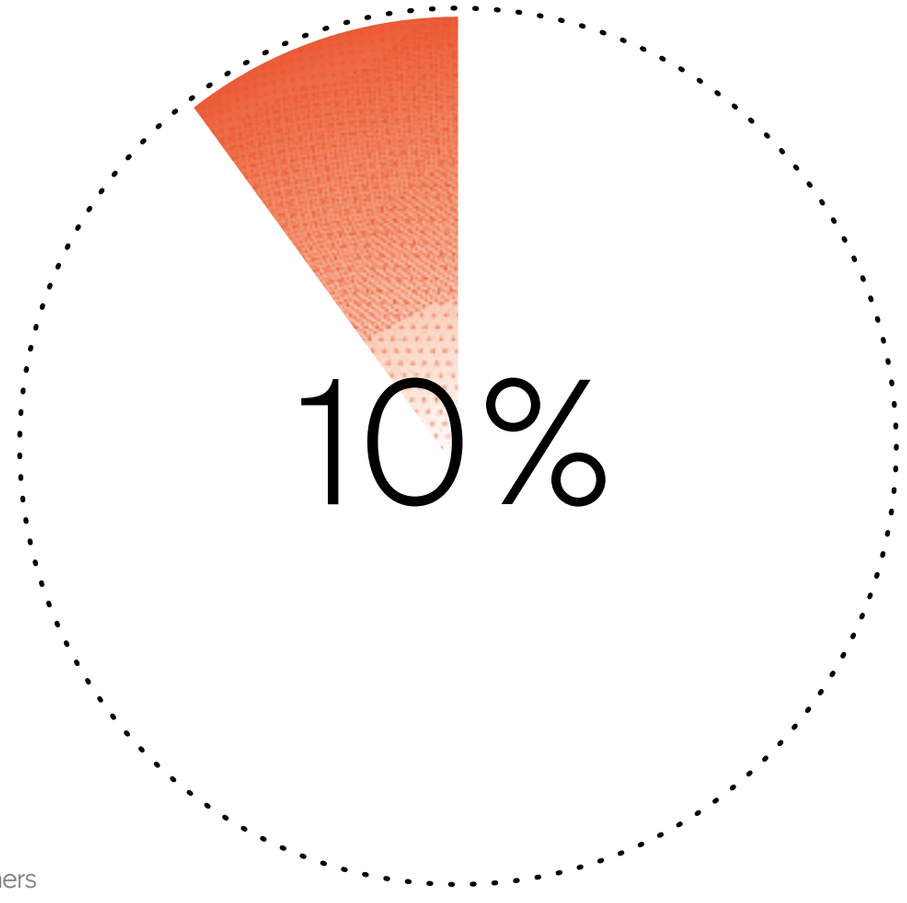


Growth of global economic opportunity of the digital space

SIGNAL - 3

Digital realities are diversified.

Gaming, digital 'products', virtual skins for avatars and accessories, immersive ecosystems and other possibilities are all available in digital realities. The metaverse is not just for gamers. One-tenth of all consumers already engage with the metaverse through other means such as using a crypto-wallet, buying virtual products or experimenting with virtual reality and augmented reality.[68] These new ecosystems offer consumers a creative extension – or an escape – from the everyday, experiencing new types of brand value and realities divergent to their own.[69] Fashion shows and concerts are hosted on platforms attended by audiences of millions. Familiar consumer brands produce digital collectibles in art, sport and music. A virtual Gucci bag sold online for over $4,000 on Roblox – fetching a price that exceeds the cost of the physical version of the same bag.[70]



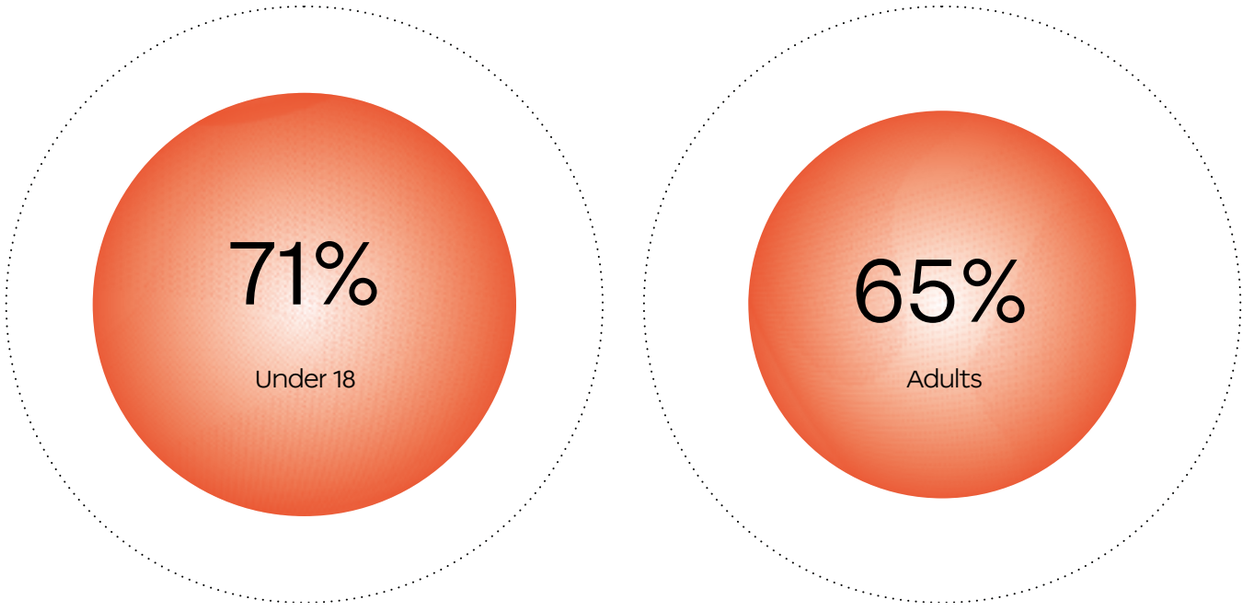
10% of metaverse consumers use a crypto-wallet

THE FASTEST-GROWING COUNTRY BY REVENUE FROM VIDEO GAMES IS TURKEY WITH A PROJECTED CAGR OF 24.1% BETWEEN 2021 AND 2026, FOLLOWED BY PAKISTAN (21.9%) AND INDIA (18.3%)

SIGNAL - 4

Digital realities will evolve with generation Alpha.

Gen Alpha consumers born after 2009 are meeting and socialising with friends through multiplayer games like Roblox and Fortnite. Roblox boasts over 50 million active daily users.[71] While global data is limited, 71% of US children under 18 play video games and 65% of American adults play video games.[72] Online activity is becoming a mainstream hobby which drives aggressive investments and R&D in the digital space: in the first five months of 2022, more than $120 billion had been invested in the metaverse, more than double the $57 billion invested in all of 2021.[73] The keyword search 'virtual world' in patent databases shows that 9,868 patents have been published since 2013 with the peak in 2020 at 1,042 patents and the US holding 3,762 patents followed by China's 1,761 with international protection. Microsoft and IBM filed 484 and 340 of the patents.[74]



Percentage of US population playing video games

$120 billion

Investments in the metaverse in the first five months of 2022

$57 billion

Investments in the metaverse in 2021

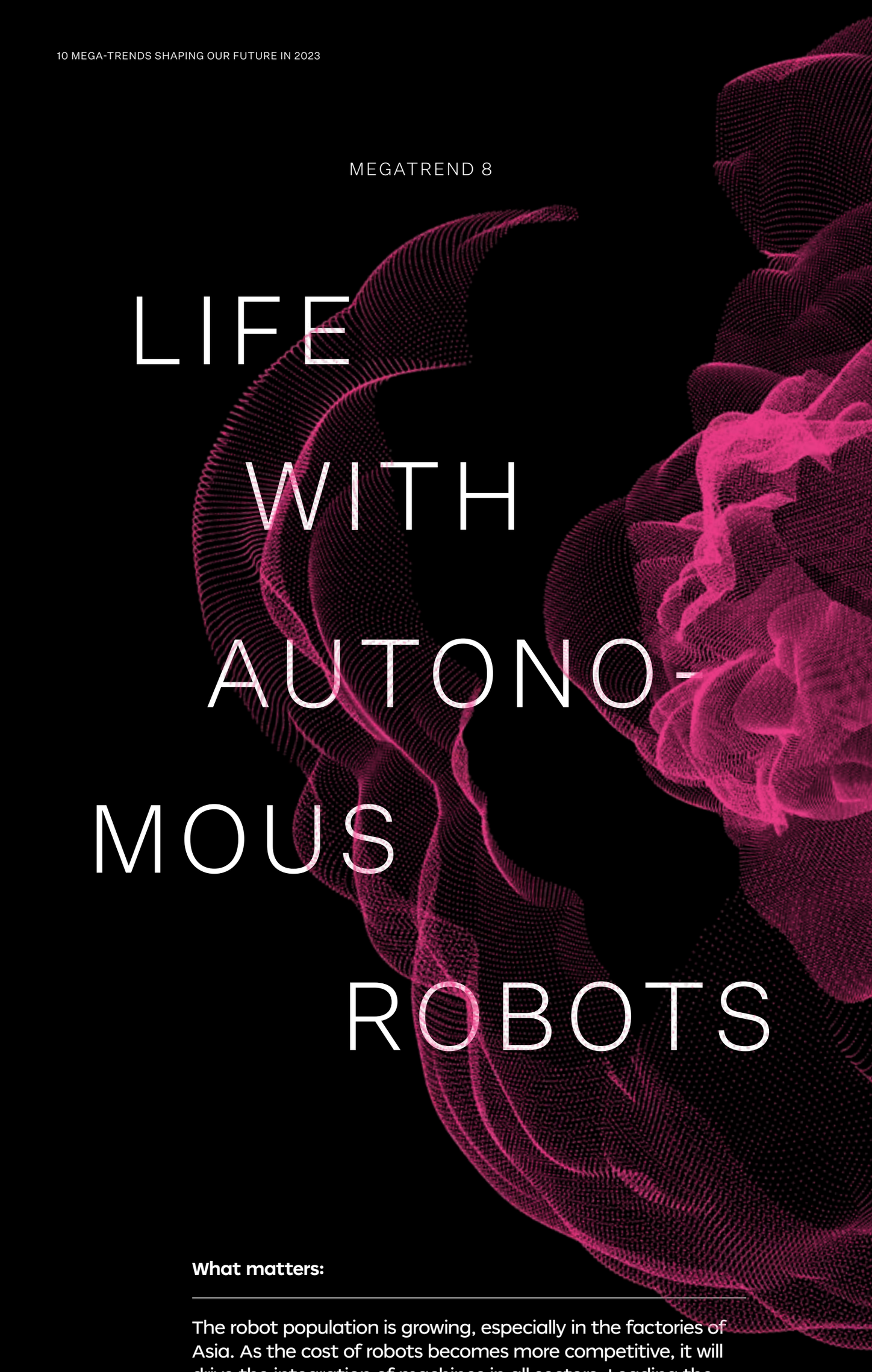
SIGNAL - 5

Gaming will be just as influential in the MENA region.

Gamers in MENA have spent 24% more time playing in the digital world in 2020 than in 2019. This increase is understandable given the COVID-19 constraints. It's also more than double the global average increase in the same period. Hence, in the years 2019 to 2024, video games revenue is expected to increase in the region to an estimated $4.1 billion (at an estimated growth rate of 8.1%), outpacing the global increase of 6.4% CAGR. E-sports continue to be a small part of entertainment and media spending in the region.[75]

MEGATREND 8

LIFE WITH AUTONO-MOUS ROBOTS



What matters:

The robot population is growing, especially in the factories of Asia. As the cost of robots becomes more competitive, it will drive the integration of machines in all sectors. Leading the charge are small and medium-sized enterprises, which supply 80% of robots in the service sectors.

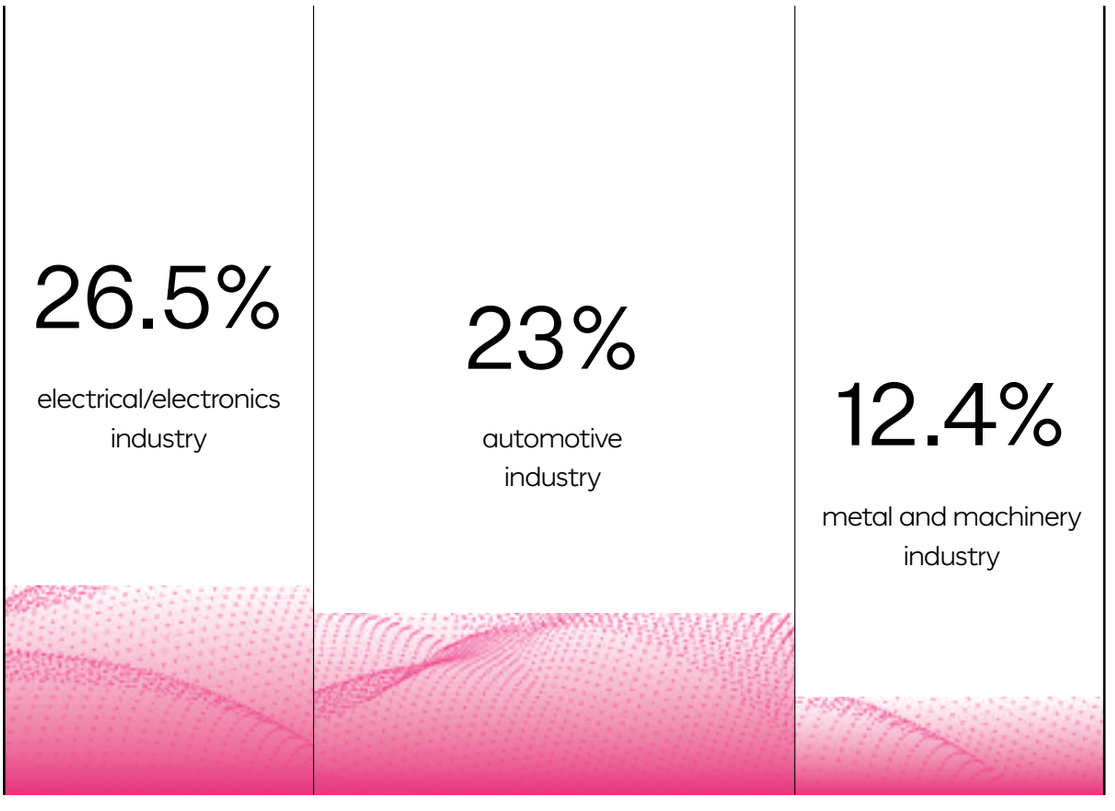
SIGNAL - 1

The robotics market continues to grow.

The adoption of robotics in the manufacturing sector accelerated during the pandemic and the global robot market was valued at close to $30 billion in 2021. It is expected to exceed $94 billion by 2028.[76] The global average industrial robot density on the factory floor reached an all-time high of 126 robots per 10,000 employees in 2021, compared with 66 robots in 2015.[77]

There are 3.5 million industrial robots already in operation. And 517,000 new robots were installed in 2021: 26.5% in the electrical/electronics industry followed by the automotive industry (23%) and the metal and machinery industry (12.4%). The most impressive growth was recorded in Asia and Australia, which are now home to three-quarters of all industrial robots. Global growth is set to continue at an annual rate of 7%.[78]

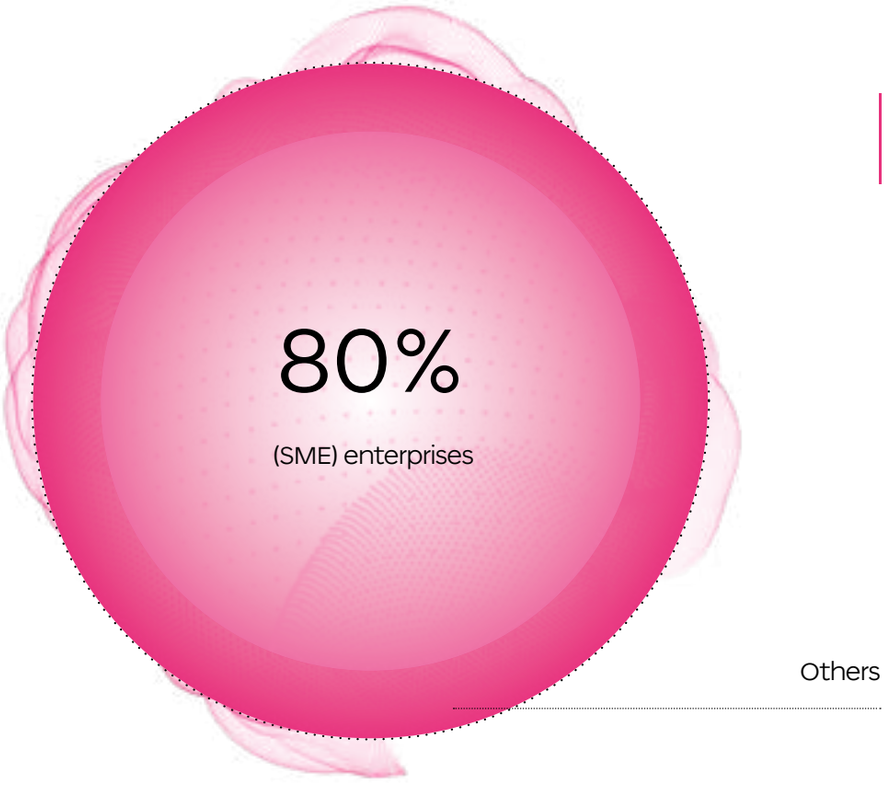
Installed robots in 2021 by industry



SIGNAL - 2

Serivces will be more automated.

The number of service robots grew by 37% (that's 121,000 units) and 9% in consumer service robots – the machines that interact with customers – representing a population of 19 million robots. Where do these machines come from? What is perhaps surprising is that 80% of robot suppliers in this sector were small and medium-sized enterprises (SME) with fewer than 500 employees.[79]



Robot suppliers by company size

SIGNAL - 3

Robots are becoming scalable.

As the costs associated with adopting robots fall, they become more accessible to small and medium-size enterprises (SME). Cost-savings become critical to SMEs as the price of labour rises. The average cost is expected to drop 50% to 60% by 2025. A decrease in material and technology costs, improvements in IoT and cloud infrastructure and the ease of connecting robots to existing systems all permit easier and cheaper transitions for manufacturers.[80]

80% OF SERVICE ROBOT SUPPLIERS WERE SMALL AND MEDIUM-SIZED ENTERPRISES WITH FEWER THAN 500 EMPLOYEES

SIGNAL - 4

The future of the MENA region with AI and robotics.

As the fourth industrial revolution unfolds, governments and businesses across the Middle East are taking advantage of the shift towards artificial intelligence. The Middle East is expected to accrue 2% of the total global benefits of AI by 2030, equivalent to $320 billion.[81] The annual growth in the contribution of AI is expected to amount to 20–34% across the MENA region, with the fastest growth in the UAE (14% of 2030 GDP) followed by Saudi Arabia (12.4%), contributing over $135.2 billion in 2030 to the economy.[82]

$15.7 trillion

AI contribution to global economy by 2030

$320 billion

AI contribution to MENA region economy by 2030

MEGATREND 9

FUTURE HUMANITY

What matters:

We are a complex species. Our population is growing in some countries while contracting in others. We struggle with mental health, socialise less and try to find purpose in work. There are solutions to our shared challenges, but implementing them is hard. The greatest returns may be found among the least advanced countries and the least educated populations.

SIGNAL - 1

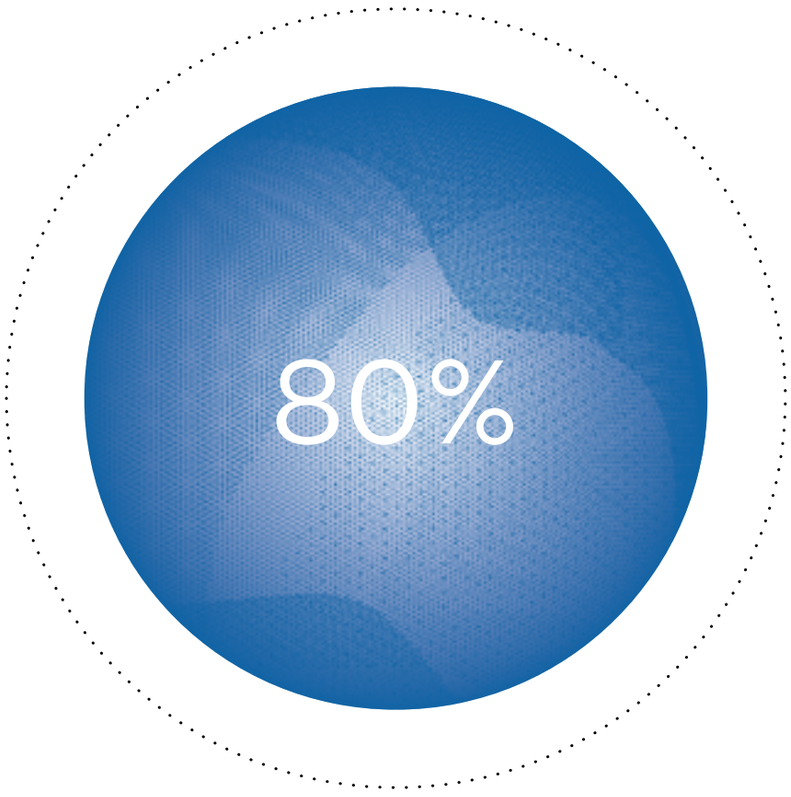
Global access to eduation shows room for growth.

Some 90% of the world's population completed primary education in 2020; two-thirds participated in secondary education, while 40% took part in tertiary education.[83] Despite a massive jump in online course uptake during the pandemic, only three million online learners came from Africa - a continent with a population of 1.2 billion. Yet Africa saw the highest regional growth in both student registrations (up 43% from 2019) and course enrolments (up 50%). The most significant rate of new learner growth came from emerging economies including Paraguay, Lebanon, Indonesia, Kenya, Vietnam and Kazakhstan.[84]

SIGNAL - 2

The global workforce growth will ease.

Through to 2040, the growth of the working-age population (aged 15 to 64) is expected to slow in eight out of ten countries globally: fewer people are entering and more people are exiting the job market. This reflects declining fertility rates, ageing populations and falling immigration. Working-age populations in East Asia and the Middle East will slow down twice as fast as those in the US and the European Union. The acquisition of education is greatest in elderly populations, lowest in populations with the youngest demographic profiles. Perhaps reflecting this, 27% of manufacturing firms and 35% of services firms reported that a lack of staff undermined production in 2022. Slowing immigration, especially in more developed regions, presents an impediment to raising national productivity. The United Nations indicates that net migration (immigrants minus emigrants) will slow through to 2040 in nearly 60% of developed economies. The situation will be most challenging in Europe, where the working population is expected to shrink.[85]



The growth of the working-age population is expected to slow in 80% of countries globally

SIGNAL - 3

Mental health illness continues to be a global concern.

Mental health is important and needs to be better managed. Depression and suicide affects families from all countries, contexts and ages. Mental health diorders are generally under-reported. However, globally suicide accounts for more than one in every 100 deaths.[86] It is the fourth leading cause of death among young people aged 15 to 29.[87] Mental disorders also contribute to years living with disability (YLDs - a measure that reflects the impact an illness has on quality of life before it resolves or leads to death), accounting for one in every six YLDs. Those diagnosed with schizophrenia and other severe mental health conditions die on average 10 to 20 years earlier than the general population, often of preventable physical diseases.[88]

SIGNAL - 4

Depression is a leading cause of disability worldwide.

It is estimated that 5% of adults suffer from depression.[89] One in seven 10- to 19-year-olds experience a mental health disorder.[90] Scaling up treatment for depression and anxiety provides a benefit–cost ratio of 5 to 1 and a broadly defined set of mental health conditions cost the world economy approximately $2.5 trillion in 2010. This is projected to rise to $6 trillion by 2030, which is more than the researchers projected for the costs of cancer, diabetes and chronic respiratory disease combined. Costs range from $1,180 to $18,313 per treated person, depending on the condition, which include both direct costs of treatment and other services as well as other costs such as lost production and income.[91]

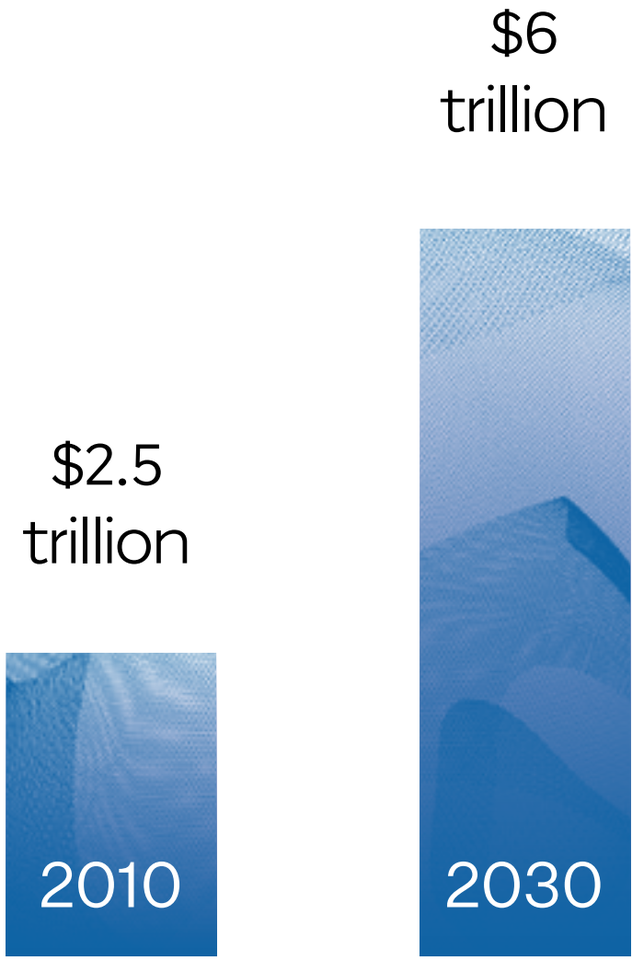
One in seven individuals aged 10 to 19 suffer from a mental health disorder

SIGNAL - 5

Mental health research investments will need to grow.

Investments in mental health research is not commensurate with its impact. Only about $3.7 billion a year is spent on mental health research worldwide. That amounts to an estimated 7% of total funding. More than half (56%) of all funding goes on basic research rather than clinical or applied research. Just $1 per capita annually allocated to a package of evidence-based care for the most severe mental health conditions could reduce YLDs by close to 5,000 per million population each year; at $2 per capita, the burden of mental health conditions could be reduced by 13,000 YLDs per million population.[92]

Global mental health conditions cost



SIGNAL - 6

Unemployment in MENA is a real risk.

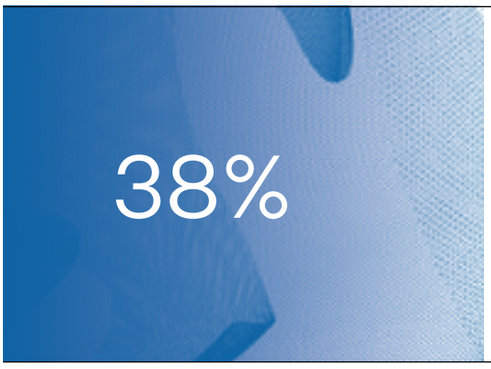
Almost one-third of young people surveyed in the Arab world have concerns about unemployment and the rising cost of living. Eight out of ten young Arabs have reservations about the quality of education in their country. Almost 40% of young people aspire to work in government, down 10% from 2019, while 28% of them want to work for themselves or their family business, up from 16%. Globally, the United Arab Emirates has the most supportive environment for entrepreneurship and Sudan the least supportive. The United Arab Emirates has the highest score by a clear margin, as a direct result of policy adjustments that have promoted favourable business conditions for entrepreneurs.[93]


MENTAL HEALTH
CONDITIONS COST
THE WORLD ECONOMY
APPROXIMATELY $2.5
TRILLION IN 2010 AND
$6 TRILLION BY 2030

SIGNAL - 7

Mental health of young people in MENA will impact on the future.

In 2021, in the MENA region, a study found close to 40% of young people aged 18 to 24 were struggling with their mental health. It also said the surge in mobile phone and internet usage meant people spent less time making human connections, a trend the study's authors believe needs 'immediate attention'. Some 38% of young adults aged 18 to 24 polled in Middle Eastern countries – Iraq, Saudi Arabia, UAE and Yemen – reported struggle or distress. At the same time, statistics in the report showed that people spend an average of seven to ten hours online per day, depending on the country.[94]

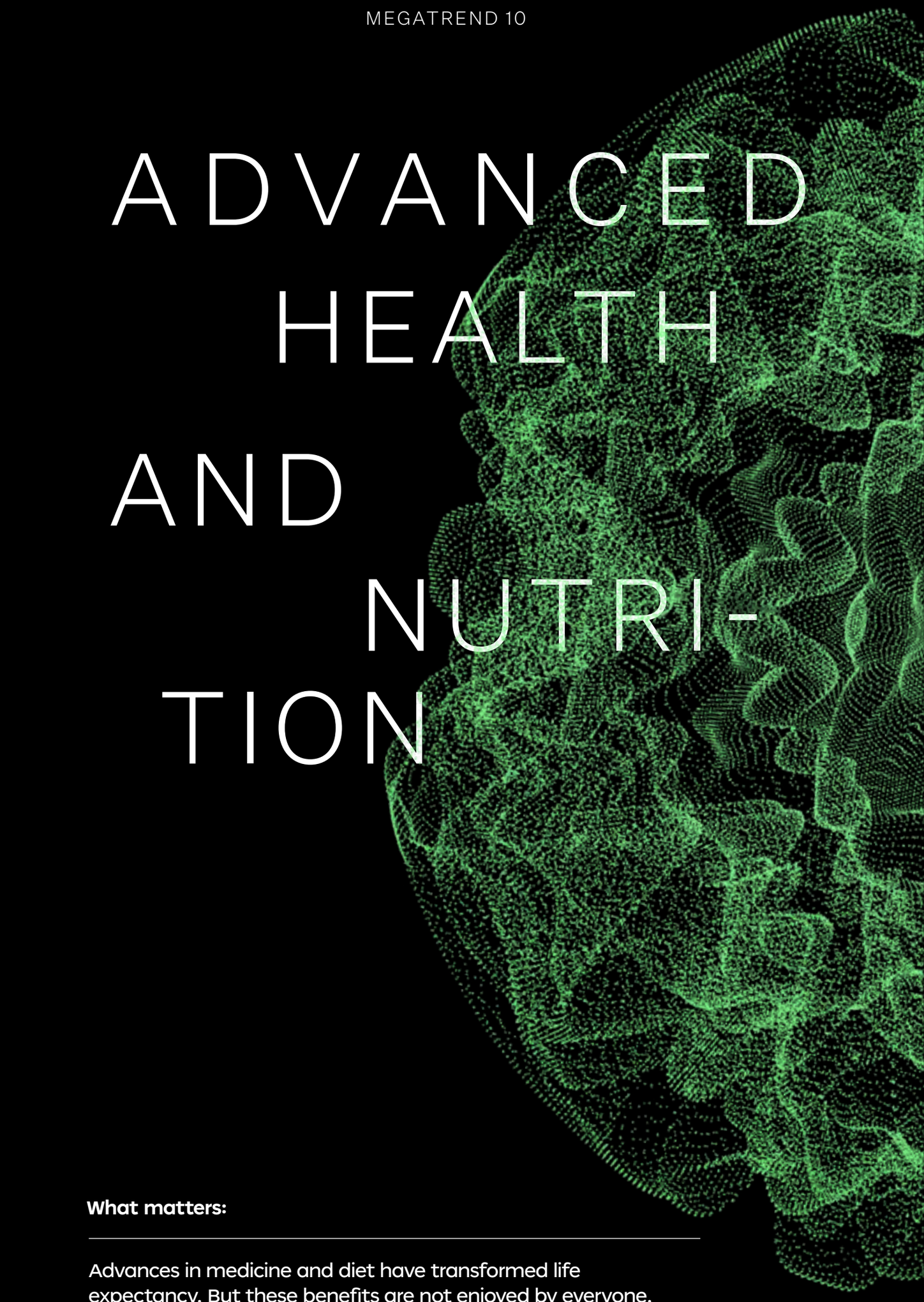


Percentage of reported distress among young adults aged 18 to 24 in some countries of the region

In 2021, **40% of young people aged 18 to 24 in the MENA region struggled with their mental health.**

MEGATREND 10

ADVANCED HEALTH AND NUTRI-TION



What matters:

Advances in medicine and diet have transformed life expectancy. But these benefits are not enjoyed by everyone. Further progress is at risk due to under funding of interventions in non-communicable diseases.

SIGNAL - 1

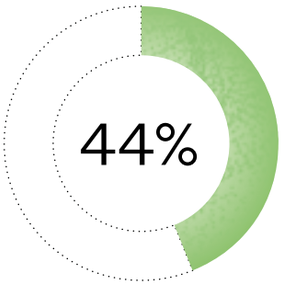
Non-communicable diseases overtake infectious diseases.

From heart disease to cancer and diabetes, non-communicable diseases (NCDs) now have greater impact than infectious diseases. One person under 70 dies every two seconds from cardiovascular disease followed by cancer, diabetes, chronic respiratory diseases and mental health illnesses. Together, they account for nearly three-quarters of deaths worldwide, costing approximately 41 million lives a year. Investing $18 billion a year across all low-and middle-income countries could generate economic benefits of $2.7 trillion by 2030.[95]

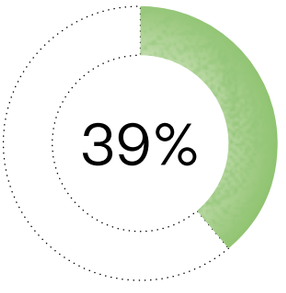
SIGNAL - 2

Access to healthcare remains limited in some countries.

Any significant progress requires renewed focus on NCDs from prevention through to follow-up care, with the biggest gap in diagnostics. For example, among those with diabetes and heart disease, only 44% and 39% of patients, respectively, are aware they have the conditions. Nearly half of the global population (47%) has no access to diagnostics of any sort. For every 1% increase in diagnosis for hypertension and diabetes in low- and middle-income countries (LMICs), 12,000 lives and 500,000 healthy years of life would be added annually. Today, 1.2 billion people live with uncontrolled hypertension, a number that is excessive given the interventions available. By 2030, the WHO estimates the world will have 15 million fewer healthcare workers.[96]



Of diabetes patients aware of their condition



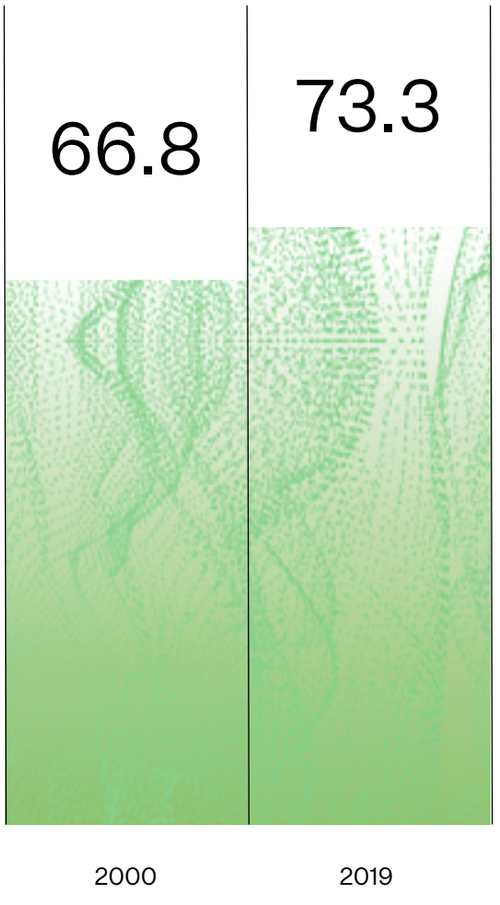
Of heart disease patients aware of their condition

SIGNAL - 3

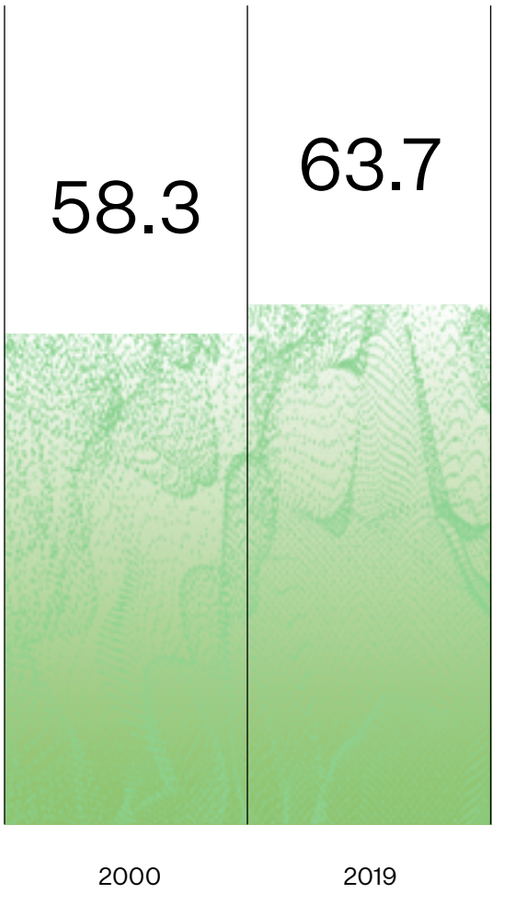
Life expectancy at birth for both genders has improved.

But it cannot be taken for granted. Prior to the pandemic, access to clean drinking water, basic hygiene and clean fuels pushed up life expectancy from 66.8 years in 2000 to 73.3 years in 2019. Healthy life expectancy has increased from 58.3 years to 63.7 years. This was driven by mother and baby care and major improvements in communicable disease programmes, such as HIV, tuberculosis and malaria.[97]

Increase in life expectancy before COVID-19



Increase in healthy life expectancy



SIGNAL - 4

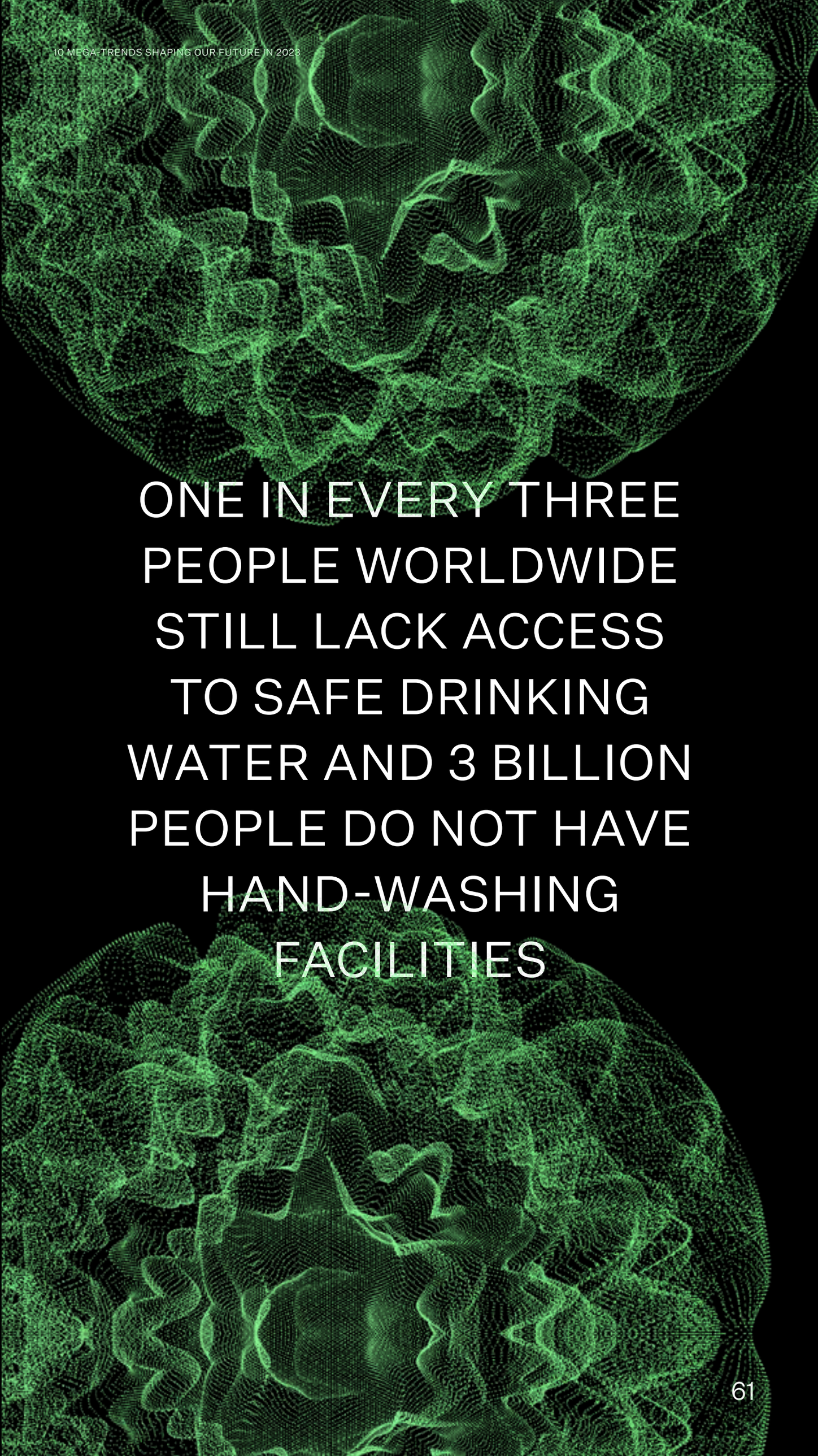
Global spending on health doubled in the last two decades.

Between 2000 and 2019, global health spending reached 9.8% of global GDP. However, approximately 80% of that spending occurred in high-income countries with the bulk (some 70%) coming from government budgets. In low-income countries, out-of-pocket spending was the main source of health expenditure (44%), followed by external aid (29%). Global healthcare spending – both public and private – is estimated to rise at a CAGR of 3.9% in 2020–2024, reaching a value of $10 trillion by 2024.[98] In the meantime, data from 2020 shows how service disruptions contributed to an increase in deaths from tuberculosis and malaria between 2019 and 2020.[99]

SIGNAL - 5

Water is our most vital – and at-risk – resource.

Groundwater accounts for 99% of liquid freshwater on earth. It is the source of one quarter of all the water used by humans. However, this large volume of freshwater is unevenly distributed over the continents. An easy and open access resource to numerous people, groundwater offers tremendous opportunities to society for gaining social, economic and environmental benefits. Groundwater already provides half of the volume of water withdrawn for domestic use by the global population. This includes drinking water for the vast majority of the rural population who do not enjoy public or private supply systems. It also includes around 25% of all water withdrawn for irrigation.[100] But one in every three people worldwide still lacks access to safe drinking water and three billion people do not have hand-washing facilities.[101]



ONE IN EVERY THREE PEOPLE WORLDWIDE STILL LACK ACCESS TO SAFE DRINKING WATER AND 3 BILLION PEOPLE DO NOT HAVE HAND-WASHING FACILITIES

SIGNAL - 6

Access to food is a priority.

As many as 828 million people go to bed hungry every night. The number of people facing acute food insecurity has soared from 135 million to 345 million since 2019. Today, 2022, 50 million people in 45 countries are on the edge of famine and $24.5 billion is needed to reach 153 million people.[102]

SIGNAL - 7

Countries in the MENA region will continue to face problems with obesity.

This can develop into a major risk factor for noncommunicable diseases.[103] A regional review of data compiled by the World Obesity Federation in late 2020 found that in Saudi Arabia 42% of women and 31% of men were obese, while in the UAE 31% of women and 25% of men were obese.[104]

More broadly, the three leading causes of death in the UAE are ischemic heart disease (42.5%), stroke (21%) and kidney disease (13%). In Saudi Arabia, ischemic heart disease is the top NCD, with 115 deaths per 100,000 population, followed by stroke at 50 deaths per 100,000 population and road injuries leading to 37 deaths per 100,000 population. In Lebanon, heart diseases account for 190 deaths per 100,000, stroke for 30 deaths per 100,000 population and trachea, bronchus and lung cancers 25 deaths per 100,000.[105]

People facing food insecurity globally

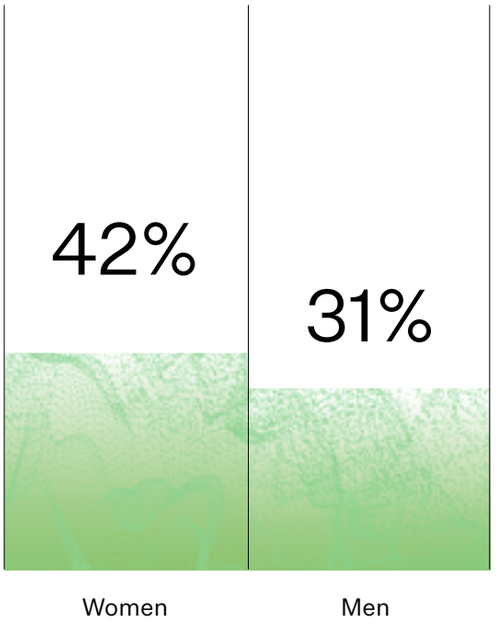
135 million

2019

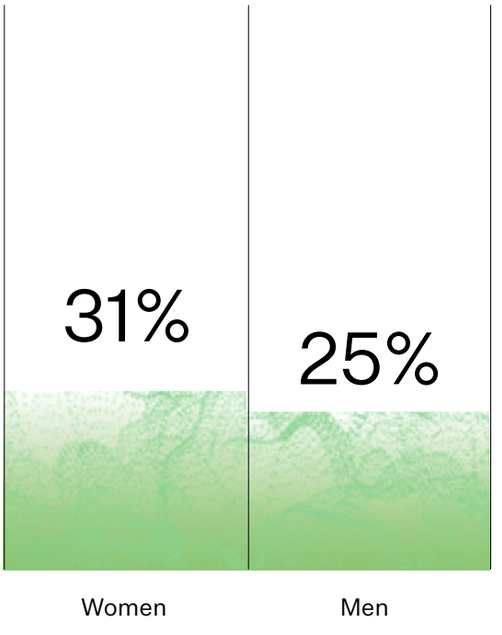
345 million

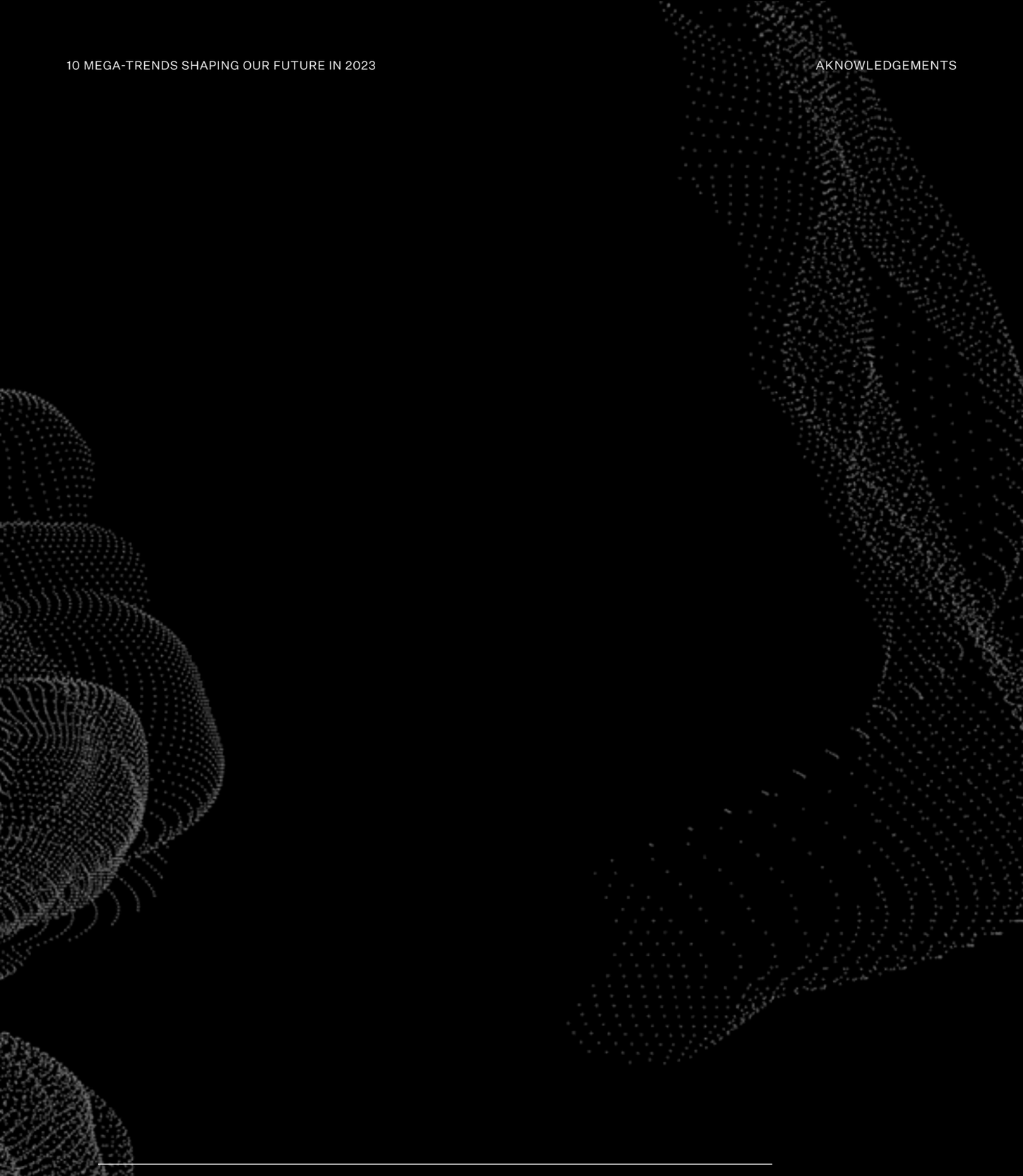
2022

Percentage of adult population who are obese in Saudi Arabia



Percentage of adult population who are obese in the UAE





This research was undertaken by Dubai Future Research, the research arm of Dubai Future Foundation. Dubai Future Foundation produces insights and foresight reports using evidence-based analysis and imagination that enable stakeholders to anticipate and better navigate the future. Our publications can be found at www.dubaifuture.ae/insights/.

ABOUT THE DUBAI FUTURE FOUNDATION

Dubai Future Foundation aims to realise the vision of His Highness Sheikh Mohammed bin Rashid Al Maktoum, Vice President and Prime Minister of the UAE and Ruler of Dubai, for the future of Dubai and to consolidate its global status as a leading city of the future. In partnership with its partners from government entities, international companies, start-ups and entrepreneurs in the UAE and around the world, Dubai Future Foundation drives joint efforts to collectively imagine, design and execute the future of Dubai.

Under the supervision and with the support of His Highness Sheikh Hamdan bin Mohammed bin Rashid Al Maktoum, Crown Prince of Dubai, Chairman of the Executive Council of Dubai and Chairman of the Board of Trustees of Dubai Future Foundation, DFF works on a three-pronged strategy: to imagine, to design and to execute the future. It does this through the development and launch of national and global programmes and initiatives, preparing plans and strategies for the future, issuing foresight reports and supporting innovative and qualitative projects. These contribute to positioning Dubai as a global capital for the development and adoption of the latest innovative solutions and practices to serve humanity.

Dubai Future Foundation focuses on identifying the most prominent challenges facing cities, communities and sectors in the future and transforming them into promising growth opportunities by collecting and analysing data, studying global trends and keeping pace with and preparing for rapid changes. It is also looking at future sectors, their integration and the reshaping of current industries.

Dubai Future Foundation oversees many pioneering projects and initiatives, such as the Museum of the Future, Area 2071, The Centre for the Fourth Industrial Revolution UAE, Dubai Future Accelerators, One Million Arab Coders, Dubai Future District, Dubai Future Solutions, Dubai Future Forum and Dubai Metaverse Assembly. Its many knowledge initiatives and future design centres contribute to building specialised local talents for future requirements and empowering them with the necessary skills to contribute to the sustainable development of Dubai.

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N O T E S

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