WISER
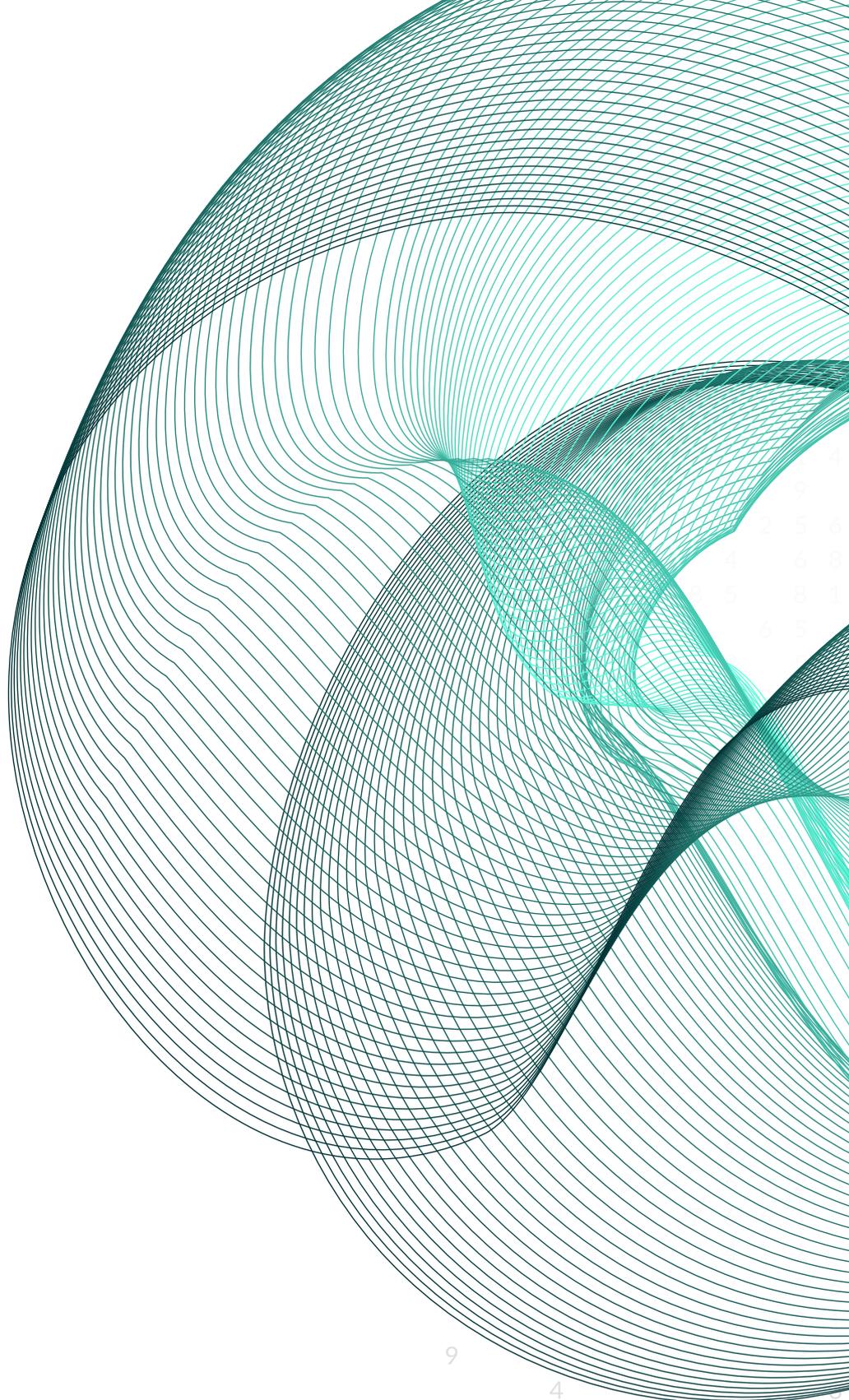
WOMEN IN SUSTAINABILITY,
ENVIRONMENT AND RENEWABLE
ENERGY FORUM

ARTIFICIAL INTELLIGENCE + GENDER PARITY:
A WiSER Perspective

Principal partner

ABU DHABI GLOBAL MARKET

An initiative by

Masdar
A MUBADALA COMPANY

AI + Gender Parity

The ability to leverage digital technologies effectively can make it easier for women to join the workforce, access online education, tap into new methods of financing and much more. Encouraging digital gender parity is one of the most effective ways of ensuring that women participate equally with men in the global economy, which will accelerate development across all of society.

Giving men and women an equal footing in the labor market could add as much as US$ 28 trillion to global GDP by 2025, according to McKinsey Global Institute estimates[i]. Unfortunately, we are still far short of achieving gender parity in technology skills. Across the globe, women and girls are less likely than men to have even the most basic skills[ii], such as accessing apps on a smart phone. For more sophisticated skills, such as programming computers, the gap rises exponentially.

> " **THERE IS NOTHING ARTIFICIAL ABOUT ARTIFICIAL INTELLIGENCE – THE DIGITAL TOOLS THAT ARE IMPACTING OUR WORLD WERE BUILT BY HUMAN BEINGS, WITH HUMAN BIASES"**

This is only going to become a bigger challenge in the world we will live in tomorrow. Artificial intelligence is already pervasive in society, and its use is only going to increase – some of us may already have more conversations on a daily basis with a digital persona than we do with a human being. Decisions made in the digital world already have real-world impact; an AI system may decide if you are invited to be interviewed

for a job, are eligible for a loan, or can receive medical treatment.

However, as has been said, there is nothing artificial about artificial intelligence – the digital tools that are impacting our world were built by human beings, with human biases. Those builders are increasingly likely to be male, with research suggesting that women may make up 10 per cent or fewer of researchers in AI projects[iii]. This lack of gender diversity in AI's development is reflected in greater gender bias within the systems – bias in, bias out.

The growing importance of AI, and its potential impact on gender parity, was why we dedicated the 2020 Women in Sustainability, Environment and Renewable Energy (WiSER) Forum to this topic, there is no time to waste.

If we are not careful, the proliferation of AI could turn the gender gap into a chasm: as AI technologies become more entrenched in society, governments, businesses, and other stakeholders must invest to ensure that women and girls are involved in their development and are equipped to leverage them effectively. Our future depends on it.

Dr. Lamya Fawwaz,

Executive Director for Brand & Strategic Initiatives at Abu Dhabi Future Energy Company (Masdar) and Program Director of WiSER

Introduction

The United Nations 2030 Agenda for Sustainable Development is the most ambitious undertaking ever to transform our world to end poverty, protect the planet and improve the lives and prospects of everyone. The UN Sustainable Development Goals (SDGs) encompass 17 key Goals, 169 targets and 232 indicators[iv], all interlocking to form a shared blueprint for peace and prosperity for people and the planet.

With less than a decade to go, we urgently need to accelerate efforts to achieve the 2030 Agenda's ambitions. Artificial intelligence (AI), which can potentially enable us to solve the type of complex challenges presented by the SDGs, is being heralded in some quarters as enabling us to speed their delivery. However, this optimism is tempered by concern that AI could also inhibit progress on some SDGs – not least for SDG 5: attaining gender parity – and create new inequalities.

In the words of Audrey Azoulay, UNESCO Director-General, "Artificial intelligence can be a great opportunity to accelerate the achievement of sustainable development goals. But any technological revolution leads to new imbalances that we must anticipate[x]."

The purpose of this white paper is to examine some of the new imbalances AI may create – and how best to counter them – while also aiming to provide guidance on how best to utilize the positive potential of AI to achieve all the SDGs, including SDG 5.

The white paper was produced following the 2020 Women in Sustainability, Environment and Renewable Energy (WiSER) Forum, which was held during this year's Abu Dhabi Sustainability Week, one of the world's leading platforms for accelerating sustainable development.

> **ARTIFICIAL INTELLIGENCE CAN BE A GREAT OPPORTUNITY TO ACCELERATE THE ACHIEVEMENT OF SUSTAINABLE DEVELOPMENT GOALS. BUT ANY TECHNOLOGICAL REVOLUTION LEADS TO NEW IMBALANCES THAT WE MUST ANTICIPATE ."**
>
> Audrey Azoulay,
> UNESCO Director-General

The WiSER Forum has become one of the key events of ADSW, and was held this year under the theme of "Digitalization, artificial intelligence and the new digital economy: opportunities and challenges in promoting female inclusion". More than 100 people – including government ministers, senior business leaders, technical experts and youth representatives – attended the event, which featured a number of presentations from public figures, including a keynote address by His Excellency Dr. Armen Sarkissian, President of the Republic of Armenia.

Attendees also participated in a series of roundtables, giving them the opportunity to examine the role digitalization and AI could play in empowering women in society, and especially in the sustainability sector.

Participants considered how the responsible use of digital technologies could break down various barriers to barriers to female inclusion, such as inadequate training, limited access to financing, inflexible work environments, limited engagement with decision makers, and other obstacles that were highlighted in the 'WiSER: Making Her Story Count in Sustainability' white paper published in 2019.

This white paper will highlight the key perspectives, observations and conclusions that arose from the 2020 WiSER Forum, and provide a set of recommendations to help address the key issues.

The 2020 Forum also featured a panel discussion that included speakers from three countries with very distinct approaches to, and histories of, gender parity – namely, India, Rwanda, and the United Arab Emirates.

This white paper also includes brief profiles of each country –not least because one of the key conclusions of the 2020 Forum is that a one-size-fits-all approach will not solve an issue as complex as gender parity, even if it is a global challenge.

SUSTAINABLE DEVELOPMENT GOALS

ABOUT WISER

The 'Women in Sustainability, Environment and Renewable Energy' (WiSER) platform was officially launched on the sidelines of the 70th United Nations General Assembly in September 2015. WiSER is a Masdar-led impact focused initiative dedicated to inspiring women and girls to play an active role in addressing global sustainability challenges.

The platform is founded on the three core pillars of education, engagement and empowerment and strives to position women and girls of all nationalities as drivers of change and innovation, while ensuring that their voices are heard across the sustainability debate – whether on issues of policy, technology or business.

Founding partners

ABU DHABI SUSTAINABILITY WEEK

ZAYED SUSTAINABILITY PRIZE

The Fourth Industrial Revolution:
what does it mean for women?

His Excellency Dr. Armen Sarkissian, President, Republic of Armenia

The first three industrial revolutions can be described very simply: in the first, we were basically discovering how to burn fuel to mechanize production, in the second we used electricity to make our lives better, and in the third we learned how to use computers.

Each of these previous industrial revolutions was met with concern about how they would impact on our lives and whether they would take away jobs, from the Luddites who fought against mechanization to the fear that computers would put us all out of work.

Today, we are in the Fourth Industrial Revolution, and this one is, perhaps, creating the greatest fear of all, not least because we don't know how this new field artificial intelligence will work with our own natural intelligence.

As a former mathematician and computer scientist, who had worked on the early models for AI, let me make it short – we have nothing to fear about. AI and humans will co-exist, not compete, and AI will serve us, not the other way round. Moreover, just as every previous revolution ended up creating far more jobs than they displaced, the same will happen with the Fourth. And these new jobs will benefit both men and women.

Firstly, the world we are creating today with this Fourth Industrial Revolution needs to be more sustainable. Climate change is happening today because of activities we undertook in the previous industrial revolutions – without properly understanding the consequences.

So, we have come to a crossroads – we need to find solutions to climate change, and those solutions will be found in technology. Without the preceding revolutions, we would never have got to the Fourth – but the Fourth must help us undo the damage we have already caused to our environment.

> **AI AND HUMANS WILL CO-EXIST, NOT COMPETE, AND AI WILL SERVE US, NOT THE OTHER WAY ROUND.**

We live today in a rapidly-changing world. Indeed, the world today is changing so fast that I predict we will not be able to distinguish today's Fourth Revolution from the fifth, or the sixth, and so on. There will not be further Industrial Revolutions, only evolution, with changes following one on top of the other.
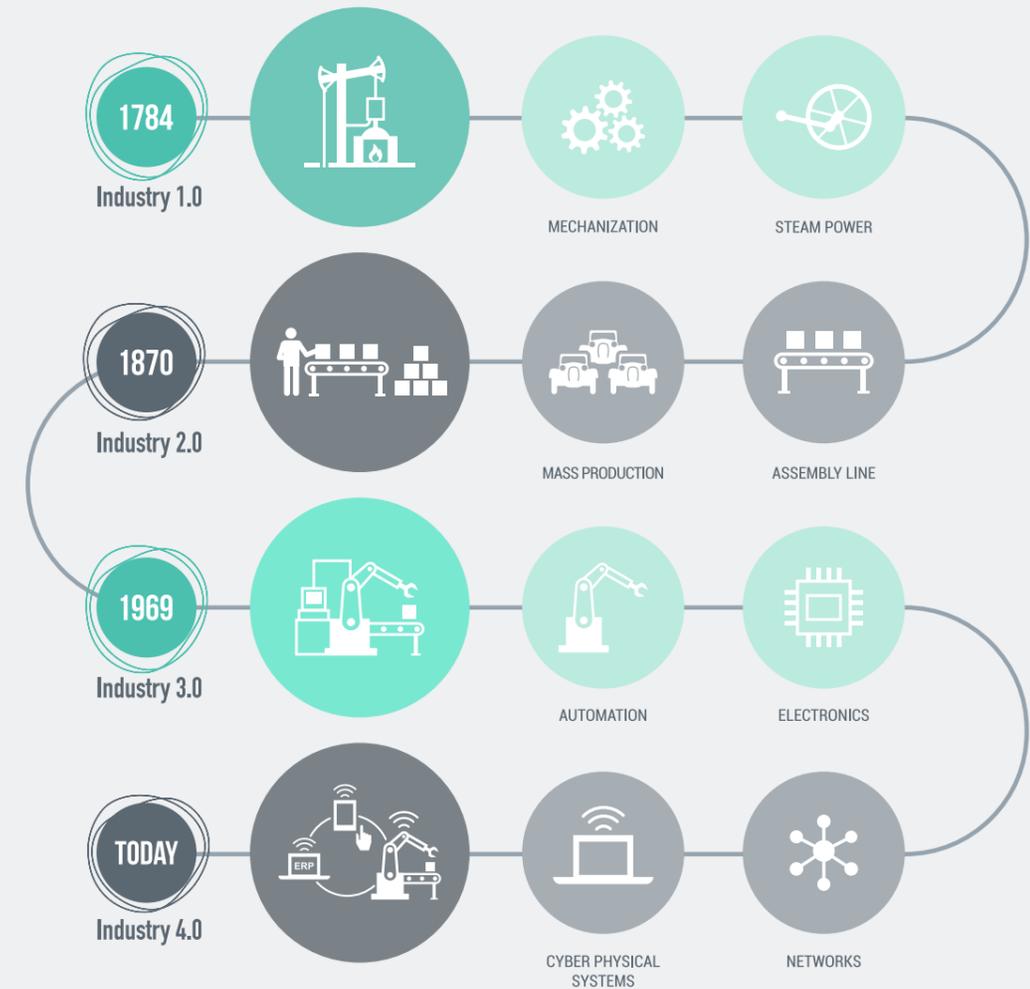
The new technologies that will help us make the world a better place need to be much more energy- efficient, and our methods of production will have to change dramatically.

All of this means that we urgently need to upskill our existing workforces and we need men and women that are able to adapt quickly to these rapid changes. We will need new ideas, and to draw on a broader range of talents than we have in the past. Women will, therefore, have more opportunities than they have had in the past.

I also believe that women, by their nature, are well equipped to address sustainability issues. Women have traditionally sustained families, nurtured children and been at the heart of cultures – they have been central to sustainability. The question now is: are we WISE enough to give women the opportunity to tackle the challenge?

His Excellency Dr. Armen Sarkissian, President of the Republic of Armenia

HISTORY OF INDUSTRIAL REVOLUTIONS

1784
Industry 1.0
MECHANIZATION   STEAM POWER

1870
Industry 2.0
MASS PRODUCTION   ASSEMBLY LINE

1969
Industry 3.0
AUTOMATION   ELECTRONICS

TODAY
Industry 4.0
CYBER PHYSICAL SYSTEMS   NETWORKS

She is We

Linda Fitz-Alan, Registrar and Chief Executive of ADGM Courts

In the Middle East, the role of women is transforming. The UAE has set ambitious targets to significantly boost female participation in the workforce. The hiring goals of the UAE Vision 2021 initiatives are reshaping workplaces and elevating the importance of women's contribution to society and the wider economy. In 2019, the UAE advanced 23 positions on the UNDP Gender Equality Index and became the highest-ranking Arab country on the index.

> **IN 2019, THE UAE ADVANCED 23 POSITIONS ON THE UNDP GENDER EQUALITY INDEX AND BECAME THE HIGHEST-RANKING ARAB COUNTRY ON THE INDEX.**

The female workforce is an instrumental pillar to the growth and development of the UAE and the wider region. For example, it was a UAE woman, Minister of State Reem Al-Hashimi, who was instrumental in bringing the global Expo 2020 to Dubai next year. Minister Al-Hashimi is one of nine women in the UAE government's 33-member cabinet, the country's top policy-making forum. According to the UAE's official government website, women in the UAE now run projects worth AED 40 billion.

> **ACCORDING TO THE UAE'S OFFICIAL GOVERNMENT WEBSITE, WOMEN IN THE UAE NOW RUN PROJECTS WORTH AED 40 BILLION.**

But as a lawyer, a CEO and a woman, I will not pretend that our work is done. Many hurdles remain. Good words must be followed by more good deeds and actions. We are at the beginning of our journey and must maintain momentum. As key partners of WiSER, Abu Dhabi Global Market is deeply committed to harnessing the power of innovation to advance gender equality in the workplace. Initiatives such as WiSER are a crucial contributor to promote equality, and we are proud to be partners and supporters of this cause.

Principal partner

ABU DHABI GLOBAL MARKET

Hearing Her Story

Kelsey Warner, Future Editor at The National

At the 2020 WiSER Forum, I got to speak to a young Egyptian woman studying mechanical engineering at Khalifa University. One of the deans of her school, a warm and forward-thinking Emirati man, was at a nearby table.

Bringing those two perspectives together, alongside a large group of many voices there that day, is where the magic of progress will happen. Let's be honest: it is going to take no small amount of effort to get gender parity in the field of renewable energy, where proficiency in science, engineering and mathematics are so important - vocations that are traditionally male-dominated. In high-income countries, gender inequality is often most visible in the workforce. Men are 73 per cent more likely to be executives than women of the same age. These numbers are even worse for women of colour, who are doubly marginalised by the combined pernicious biases of sexism and racism, according to the Bill and Melinda Gates Foundation.

> **MEN ARE 73 PER CENT MORE LIKELY TO BE EXECUTIVES THAN WOMEN OF THE SAME AGE. THESE NUMBERS ARE EVEN WORSE FOR WOMEN OF COLOUR"**

Meanwhile, the pace of change driven by technology threatens to leave society's most marginalised even further behind. In 2018, researchers from the Pew Research Center and Elon University's Imagining the Internet Center asked the following to 1,000 technologists: 'By 2030, do you think it is most likely that advancing AI and related technology systems will enhance human capacities and empower them?' About two-thirds predicted most of us will be better off, with a third thinking otherwise.

The challenges are big and tough to surmount, no doubt. But on reflecting upon this year's WiSER Forum, I came away believing that the best technology in the world cannot replace the power of meeting people in person and learning from other perspectives. Entrepreneurs, academics, government workers, decision-makers in the private sector, all of the voices in the room for the WiSER Forum represent a heap of collective knowledge.

> **THE BEST TECHNOLOGY IN THE WORLD CANNOT REPLACE THE POWER OF MEETING PEOPLE IN PERSON AND LEARNING FROM OTHER PERSPECTIVES.**

Connecting that knowledge together - on technology's potential, on being a woman in the world, on working in energy and pursuing a sustainable future - can drive a massive amount of organisational transformation. Social networks are, in my mind, the central nervous system of progress. Inclusive dialogue is what has the potential to bring about the most amount of change and empower the greatest number of people. We're on the right track, but the conversations must continue.

Artificial Intelligence in Sustainability

AI is an umbrella term covering the development of computer systems that perform tasks normally requiring human intelligence, such as visual perception, problem solving and pattern recognition. While AI systems are often represented as robots with human-like characteristics, AI systems are now part of our everyday lives; Google's predictive searches, music recommendations on Spotify and Uber's ride-sharing app are all powered by AI.

Of course, AI's potential extends far beyond helping us to find new songs we like or to get home faster. Combined with other technologies, such as robotics, sensors in the Internet of Things, and tools such as data analytics, AI amplifies our ability to analyze and act on complex problems, and can have real-world impact.

AI is already being widely used to address sustainable development issues, and its deployment in this field is almost certainly going to increase. For instance, AI could enable the development of smart grids that can use predictive capabilities to better utilize solar and wind farms by matching electrical demand to periods of greater sunlight or wind. AI-enabled transport systems could predict periods of traffic congestion, support vehicle-sharing schemes and support the deployment of autonomous vehicles.

Further, AI could make it possible to identify and address potential synergies and trade-offs between the 17 SDGs and their 169 targets, making it possible to better prioritize efforts and accelerate progress. Analysis[xi] conducted by PwC and Microsoft suggests that using AI for environmental applications in just four sectors – agriculture, water, energy and transport – could boost global GDP by as much as US$ 5.2 trillion by 2030, while also reducing global greenhouse emissions by up to 4 per cent.

However, while AI undoubtedly has tremendous potential to help us achieve many of the SDGs, there is growing concern that it could also negatively impact the attainment of others. Not least of these concerns is that AI could exacerbate existing global inequalities

-for instance, the PwC and Microsoft research suggests China and North America will receive by far the largest economic benefit from AI.

Another major concern is the impact of AI and automation on the employment market. As highlighted, by His Excellency Dr Armen Sarkissian, such fears were raised in previous Industrial Revolutions, and those previous waves of mechanization and automation ultimately resulted in more jobs being created. PwC and Microsoft estimate AI's application to sustainability could add over 38 million net new jobs to the global economy in the next ten years.
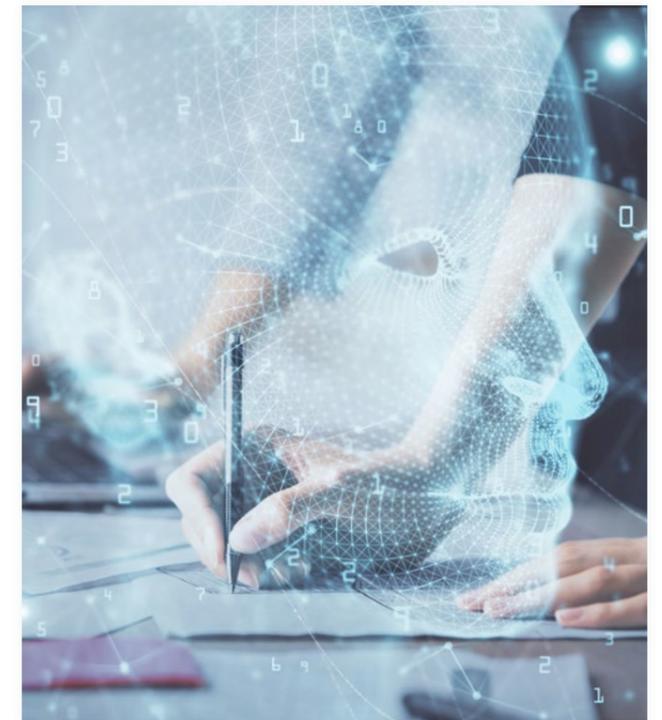
However, even if AI does lead to more jobs being made available than are lost, it is inevitably going to create massive disruption, across just about every industry. Governments and businesses will need to look at upskilling and reskilling their workforces so that workers are able to take advantage of the positive benefits that AI brings – and mitigate its negative effects. For instance, a role programming autonomous vehicles may be more satisfying than driving a taxi-cab through rush hour traffic, but that is going to require very different skills.

Some organizations have recognized this. Last year, Amazon – a company very closely associated with developing AI – announced it would invest over US$ 700 million in the next five years to provide upskilling training programmes for one in three of its employees across the US, enabling workers to move into more highly skilled roles within or outside the company[xii].

Ultimately, businesses and governments around the globe are going to have to invest in developing their people – or risk being left behind. AI will create a new competitive landscape, with its own winners and losers.

Finally, just as the benefits of AI may not accrue equally to all countries or geographies, there is also the risk that not all members of the workforce will get the same opportunities – it may widen the gender gap.

ANALYSIS CONDUCTED BY PWC AND MICROSOFT SUGGESTS THAT USING AI FOR ENVIRONMENTAL APPLICATIONS IN JUST FOUR SECTORS COULD BOOST GLOBAL GDP BY AS MUCH AS US$ 5.2 TRILLION BY 2030, WHILE ALSO REDUCING GLOBAL GREENHOUSE EMISSIONS BY UP TO 4 PER CENT
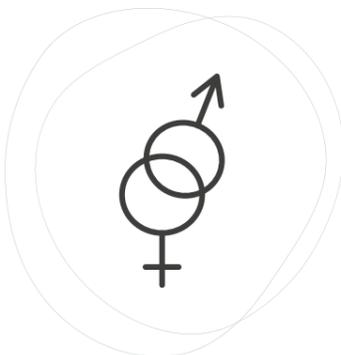
38 MILLION
number of jobs that could be added to global economy in next 10 years if AI applied to sustainability

$700 MILLION
amount Amazon is investing in upskilling its workforce

The Gender Gap in the Workplace

In the economic sphere, progress on gender parity continues to be uneven around the world, with the proportion of women in managerial positions remaining disproportionally low. According to the UN's Sustainable Development Goals Report 2019, women comprised 39 per cent of the global workforce in 2018, but held only 27 per cent of all managerial positions worldwide[xiii].

In fact, the economic position for women may actually be worsening. According to the World Economic Forum's Global Gender Gap Report 2020[ix], the economic gender gap will take a staggering 257 years to close at the current rate of progress, compared to the 202-year gap reported a year earlier.

Women's representation in the workforce also varies widely by industry, with women being particularly under-represented in the science, technology, engineering and mathematics fields – the so-called STEM roles that are becoming increasingly important in the Fourth Industrial Revolution.

The energy sector has also traditionally been very male-dominated, although the picture is more encouraging for renewables.

According to a report[x] last year from the International Renewable Energy Agency (IRENA) – "Renewable Energy: A Gender Perspective" – women make up 32 per cent of the renewable energy workforce, compared with an average of just 22 per cent in the global oil & gas sector. This could be because renewables offer a more multi-disciplinary dimension than traditional fossil fuel companies, making the field more appealing to women, the report suggests. Even in the renewables segment however, IRENA found that women were more likely to have administrative roles, rather than STEM-based roles. Women's comparatively higher representation in many of the jobs that are being most affected by automation, such as administrative roles, may further reduce their participation in the labour force.

WOMEN MAKE UP 32 PER CENT OF THE RENEWABLE ENERGY WORKFORCE, COMPARED WITH AN AVERAGE OF JUST 22 PER CENT IN THE GLOBAL OIL & GAS SECTOR.

PwC has estimated[xi] that automation will disproportionality affect women through to the late 2020s, as many administrative tasks will be replaced by technology solutions. As AI develops however, and enables new technologies such as self-driving vehicles, a second wave of automation will hit traditionally male-heavy industries, such as transport and construction, according to PwC, so the long-term effects may be more gender-balanced.

Still the under-representation of women in STEM-based roles can lead to them missing out on "emerging" jobs where remuneration is rising comparatively faster than more traditional roles – making it harder for them to close the gender gap. Worse, women may not be getting sufficient opportunities to contribute to the development of the technologies that will shape our collective futures.

Numerous studies suggest that women hold as little as one quarter of jobs in the tech sector, and this imbalance can also be seen in AI. Worldwide, only 22 per cent of AI professionals are female, according to research conducted by LinkedIn[xii], and they are more likely to work in traditionally "women-friendly" industries, such as the nonprofit, healthcare, and education sectors.

Men are also more likely to work in the development of the technology, being skilled in areas such as deep learning and neural networks, according to LinkedIn, while women tend to be more focused on the application of AI. This lack of representation in AI's development can exacerbate issues of gender bias in AI systems, as we shall see.

Around the globe, many countries have attempted to address this gender disparity by encouraging more females to study STEM subjects – however, the gender gap can prove difficult to overcome. In Europe[xiii], a 2018 study showed that women's enrollment in information and communications technology (ICT)-related studies in European Union countries had actually declined in the past seven years, despite an increase in job opportunities in the field. Further, another EU study showed that while more than half of men who graduate with ICT degrees work in digital roles, only a quarter of women do likewise.

Artificial Intelligence:
a new form of intelligence - or a new form of bias?

AI is increasingly being used to automate the decision-making process across a growing range of industries and sectors – and with increasingly more serious consequences. AI may be used to decide whether somebody qualifies for a loan, is interviewed for a job, receives medical treatment, or qualifies for insurance.

While is AI becoming pervasive in all our lives, the technology is being developed by a very narrow segment of society – one that is almost overwhelmingly male. While women make up around a quarter of the technology sector, the percentage working on the "coal face" of AI development is almost certainly considerably lower. Research conducted by technology magazine WIRED suggested that women make up only 10-15 per cent of AI researchers at leading technology companies such as Google and Facebook, with only 12 per cent of researchers attending the most important conferences in the sector.

The limited representation of women on AI research teams may partially explain why the – mostly male – researchers are more likely to depict AI "virtual assistants" as female. Apple's Siri, by far the most popular such virtual assistant, is represented as female in its default setting in 17 out of 21 languages available. Given the importance of positive role models in promoting gender parity, the fact that hundreds of millions – if not billions – of consumers have a subservient female example on their device is concerning.

> **WOMEN MAKE UP ONLY 10-15 PER CENT OF AI RESEARCHERS AT LEADING TECHNOLOGY COMPANIES SUCH AS GOOGLE AND FACEBOOK, WITH ONLY 12 PER CENT OF RESEARCHERS ATTENDING THE MOST IMPORTANT CONFERENCES IN THE SECTOR.**

But what if AI is being used to evaluate prisoners' eligibility for parole, the likelihood that benefit claimants are committing fraud, or to decide which adverts are seen by prospective job seekers – all of which are real-world use cases.

Numerous examples exist of AI exhibiting gender bias. Amazon had to scrap an AI-based recruiting system because the company couldn't make it gender-neutral[xiv]. As the system was trained on resumes that had previously been submitted to Amazon, which were predominantly from men, it downgraded applications that referenced women – such as a candidate saying they were "women's chess club captain."

> **NUMEROUS EXAMPLES EXIST OF AI EXHIBITING GENDER BIAS.**

In another example, when sets of photos used by number of technology companies to "train" image recognition systems were found to contain gender bias, the systems not only repeated that bias but amplified it[xv]. For instance, If the images disproportionality associated women with cooking or men with playing sports, then the software was more likely to predict that an image about cooking should be associated with women, as its programmed to try to be as accurate as possible.

While companies can edit programs to eliminate such biases, this is often easier said than done. Reuters reported that Amazon did attempt to make its recruiting tool gender-neutral but ultimately abandoned the project over concern that the system would prove discriminatory.
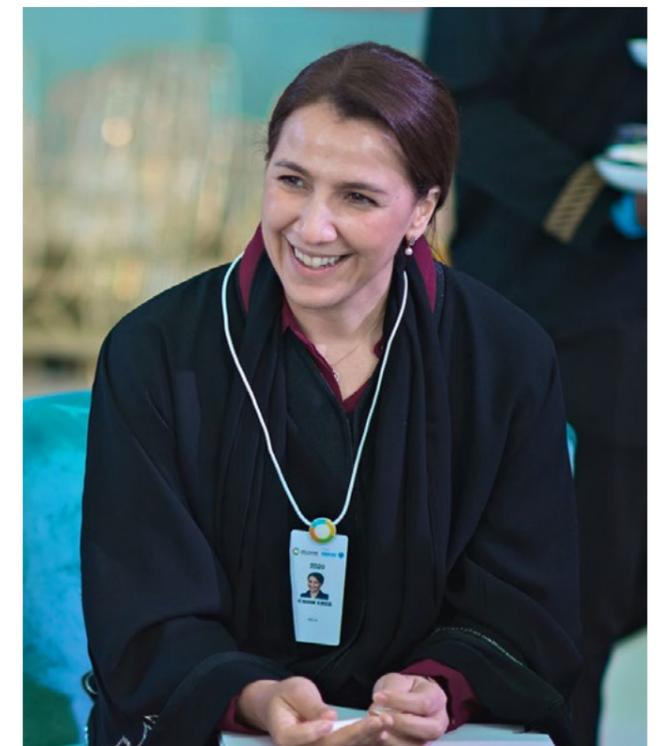
It can also often be extremely difficult to establish exactly why an AI system has made a decision. Last year, a credit card launched by Apple attracted controversy after one prospective customer complained that it had treated him and his wife differently, offering him a much higher credit limit, despite his spouse having a better credit score. After he complained on Twitter, another customer reported a similar experience – namely Steve Wozniak, one of Apple's original founders, who said he had found it difficult to get "human" intervention.

Technology researcher Gartner predicts that through 2022, 85 percent of AI projects will deliver erroneous outcomes due to bias in data, algorithms or the teams responsible for managing them.
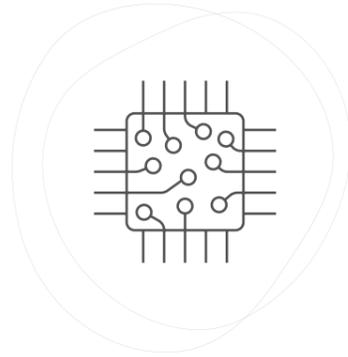
> **THROUGH 2022, 85 PER CENT OF AI PROJECTS WILL DELIVER ERRONEOUS OUTCOMES DUE TO BIAS IN DATA**

Of course, humans are also capable of bias. Research by LinkedIn shows that recruiters are more likely to look at profiles of male candidates, rather than female – even if they treat profiles they do examine equally[xviii].

Still, "algorithm bias" remains a serious concern. This year, a Dutch court ruled it was unlawful to use an AI system for welfare surveillance as it was in violation of human rights, and facial recognition systems have been banned in a number of US cities over concern about racial discrimination.

A WiSER Perspective:
the participant view

The 2020 WiSER Forum concluded with a series of in-depth roundtables, giving all participants the opportunity to express their views on the opportunities and challenges that AI and digitalization present for gender parity.

The audience make-up covered a diverse range of experiences, with both men and women represented, and members also being at different career levels. From government ministers and senior business leaders to people that have just started careers in sustainability, the aim was to provide everybody with a platform for their voice to be heard.

While their backgrounds were very different, participants also found that they had much in common. A major concern was the lack of senior-level representation in the energy sector – especially in STEM roles. If women are under-represented in parts of a company, this can become self-perpetuating – male managers may hire "like-for-like" and prefer to hire more male employees, as they may think they "fit in" better with other team members.

A MAJOR CONCERN WAS THE LACK OF SENIOR-LEVEL REPRESENTATION IN THE ENERGY SECTOR – ESPECIALLY IN STEM ROLES.

Male-dominated workplaces can also be uncomfortable – or even unsafe – environments for women, with one participant suggesting that women would be reluctant to work somewhere such as an oil rig if there weren't already other females there.

Even when women do succeed in entering a male-dominated environment, they can still experience gender-bias; one participant, a senior team leader, said she was frustrated when she travelled to events as she was generally perceived – or expected – to be there to handle logistics functions for the team. A number of other participants recounted similar experiences.

One obvious solution to counter this would be to having other women working in an organization, as role models. The importance of role models was one of the strongest themes running across the roundtables, with participants broadly agreeing on the need for more positive examples of women working in science and technology-related roles. Without other women being in positions of authority in an organization – and being seen to be in such positions – there was a concern that women employees face a "glass ceiling," limiting their ability to progress.

THERE WAS A CONCERN THAT WOMEN EMPLOYEES FACE A "GLASS CEILING," LIMITING THEIR ABILITY TO PROGRESS.

Indeed, the "glass ceiling" effect was cited by respondents in IRENA's survey as the most important factor impacting their career progression, with the survey also showing that in almost half of all participating private-sector firms, men represented at least 75 per cent of board members.

The media also perpetuates stereotypes, with scientists routinely being depicted as male characters on television and in films – as one participant noted, even the "Despicable Me" film franchise can be seen as reinforcing gender stereotypes, with the "mad scientist" characters being male and the girls liking ballet.

While such cartoons can be seen as harmless entertainment, the cumulative effect of gender biases can be more damaging, and it was generally felt that entertainment-industry depictions lagged behind the reality of women's participation in STEM disciplines.

These negative representations can lead to girls not being encouraged to pursue careers in science and technology from an early stage, with their parents and other family members perceiving that these are unsuitable career choices for them. Alongside their importance in the professional sphere, participants also saw positive role models within females' families as extremely important.

Of course, having these positive role models, and having other women present in the workplace, requires women to have the opportunities in the first place – the issue is "how to break the cycle", as one participant referred to it.

According to a report last year from the Women's Leadership Institute Australia, journalists quoted women as sources in only a third of science news stories[xx]. Further, female journalists were significantly more likely to use women as a source (40 per cent) than their male counterparts (24 per cent). So, how to break the cycle?

QUESTIONS

Women make up more than half of the world's total workforce, but only 30% of the workforce in the tech industry. Do you think digitalization has the power to change this statistic?
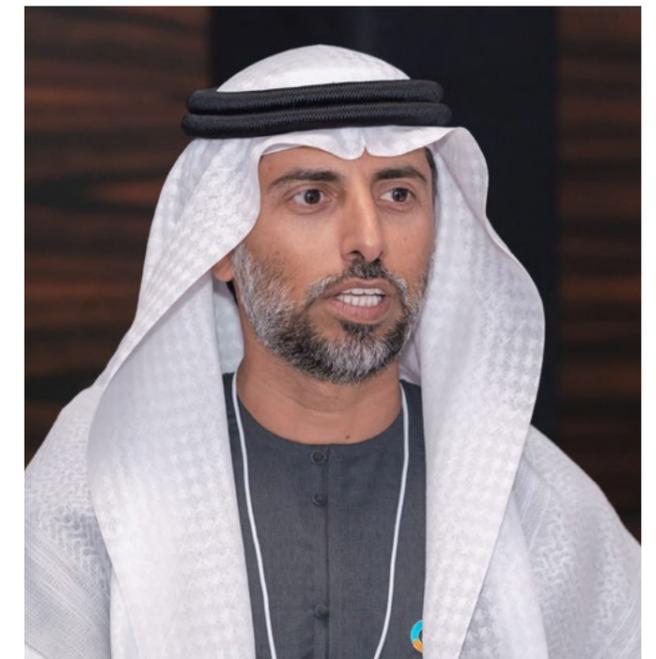
Yes	78.31%
No	21.69%

Gender bias is one of the challenges of AI systems. Do you think that our society is doing enough to change some of the gender biases that exist?

Yes	30.23%
No	67.77%

Do you think that the historical barriers faced by women could be eliminated by digitalization?

Yes	53.26%
No	46.74%

Do you think that young girls are encouraged to study technology and given equal opportunities?

Yes	44.44%
No	55.56%

2020 WiSER Forum:
10 key findings

STARTS FROM THE HOME

Females need to be encouraged from a young age to pursue careers in technology and other STEM roles – this requires familial support. Accordingly, education efforts need to be directed at different generations, helping parents to see the opportunities available for their children if they can grasp them and providing young girls with positive representations of older females that they can aspire to emulate.

As our societies become increasingly technology-saturated, then the possession of digital skills will acquire ever-greater importance, on par with numeracy and literacy. Accordingly, there is a need to ensure that girls as well as boys are equipped with the right skills to succeed in future. Educational establishments could work with families, such as hosting workshops to encourage parents to support girls' development in science.

BETTER SUPPORT IN EDUCATION

Given the greater importance that technological skills will have in societies of the future, governments need to be promoting them from a young age. Promoting technology skills within education – even from kindergarten age – is vital if we are to achieve gender parity.

However, females are put off pursuing technology careers at an early age; boys in Organization of Economic Co-operation and Development (OECD) countries are ten times as likely as girls to favour a career in information and communications technology (ICT) by the age of 15. UNESCO estimates that men are around four times more likely than women to have advanced ICT skills, such as computer programming skills[xxi].

Countries around the world are increasingly making technology subjects a mandatory part of the school curricula, such as in Finland, where ICT courses have been integrated in at all levels. Governments should look at making ICT a core part of their academic programmes, and look to make all students competent in digital skills

PROVIDE MENTORING

As discussed, the importance of positive role models was one of the most commonly recurring themes across the roundtable discussions. Having a female science advisor substantially increases women's likelihood of majoring in STEM subject and eventually graduating with a STEM-related degree, studies have shown[xxii].
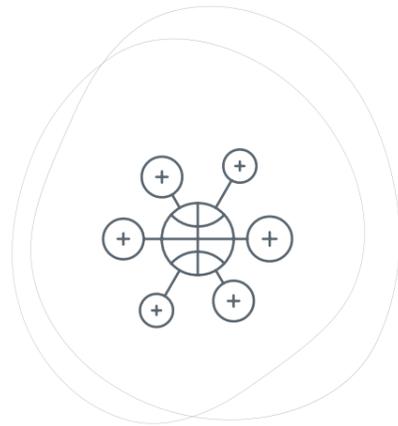
A number of participants also spoke about the importance of seeing positive examples of female progression in the workplace, and of having female mentors to support them.

ENHANCE VOCATIONAL TRAINING

As part of initiatives to improve education levels, establishments should work more closely with employers to provide vocational training in relevant sectors. Schools and colleges should also ensure that they are providing equal opportunities for male and female students, and encourage employers offering placements to focus on ability and not gender.

Schools should also make educational materials gender-neutral, such as avoiding referring to gender when discussing professions, such as engineering or nursing.
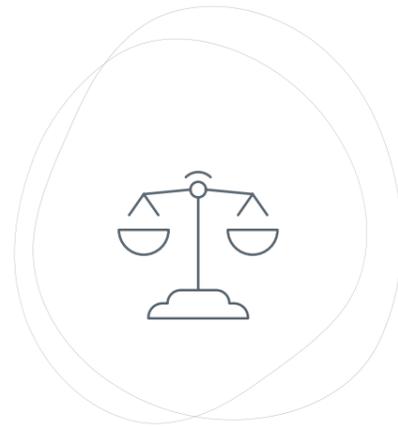
DEVELOP NETWORKING

Informal networking is still extremely important to career progression in many countries and professions. This can impede women if they aren't able to access these informal networks to the same degree as their male counterparts. According to IRENA "leveling the playing field for the genders could be achieved by creating supportive networks and mentorship arrangements for women."

Here, some women highlighted that concern over the "glass ceiling" effect prevented them supporting each other – if there is a perception that only so many women will be allowed to progress within an organization, then the impact of networking will be diluted.

Conversely, as one women said, by participating in networking activities, women can increase their confidence and be more willing to pursue opportunities in the workplace. Women need to be in the spaces where decisions are made: on the golf course or in the majlis for example.
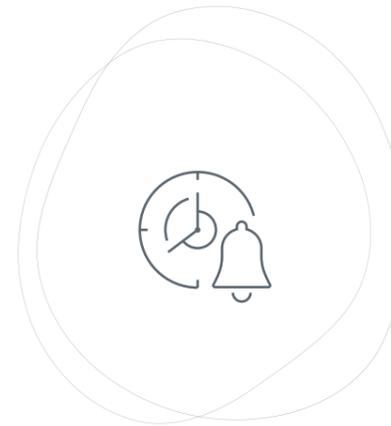
CREATE A LEVEL PLAYING FIELD

Companies and organizations should be encouraged to take a more gender-neutral approach to hiring and recruitment, starting from the initial application. LinkedIn research shows that recruiters are more likely to open a man's profile, rather than a woman's – even though they were equally likely to reach out to male or female candidates.

Some organizations are now removing any information from initial applications related to gender, thereby helping to ensure that candidates are assessed more accurately on their merits.

Alternatively, companies could be incentivized to be more gender-balanced – such as through having procurement processes specify a minimum level of female representation for a contract to be awarded.

PROVIDE MORE FLEXIBLE WORKING ENVIRONMENTS

A number of women highlighted how employers' flexibility made it easier to combine work and family-life, with many companies offering provision for remote working or flexi-time. Government legislation is important here, such as the UAE mandating that women should be given time at work for breast-feeding, which some participants said had been beneficial for them.

However, some participants said that legislation alone is not sufficient – progressive policies on flexible working also require positive buy-in from senior management, otherwise women may find that they are still discriminated against, even if it is not overtly visible.

MAKE CHILD-RAISING GENDER NEUTRAL

The issue of how much responsibility women should take in parenting was contended at the Forum, with some participants – both male and female – suggesting that societal pressures mean women should take a greater role.

Still, the top four countries in the Global Gender Gap Report 2020 – Iceland, Norway, Finland and Sweden – are all noted for progressive childcare policies. In Iceland, both men and women get 90 days leave, meaning mothers don't have to take on all the burdens of child-caring.

If both men and women are equally engaged in parenting, this could help address the high attrition rate[xxiii] among women working in technology-related roles and ensure that there are more women working in more senior positions in the industry. One study in the US found female attrition rates in the digital sector were twice as high as for men. Women are also far more likely than men to cite gender bias, discrimination and harassment as reasons for leaving a role.

ENCOURAGE WOMEN TO UNDERSTAND THEIR STRENGTHS

An oft-cited statistic, which originated in an internal report by Hewlett Packard, is that men will apply for a more senior role when they meet 60 per cent of the qualifications listed, while women tend to only apply if they meet 100 per cent of criteria.

This lack of confidence was perceived as a major barrier, with women often comparing themselves unfavorably with their male counterparts. Rather than simply trying to emulate men in the workplace, women should focus on their own strengths and what they can bring to their roles.

SUPPORT ALL TYPES OF COMMUNITIES

While much of the discussions at the Forum related to women's careers in urban areas, it was also acknowledged that different communities have different needs. Governments also need to promote policies that support rural communities if we are to achieve global gender parity.

Indeed, as digital technologies are going to increasingly impact all areas of society, then there is a greater need to ensure that women and girls in rural areas receive digital skills training. This will enable them to access resources, such as digital financing options and online education services, and benefit from entrepreneurial opportunities. This also means that women can better reinvest in their families and communities, supporting the achievement of other sustainable development goals.

Her Story:
WiSER Pioneer view

The WiSER Pioneers Program was launched at the 2018 Mohammed Bin Zayed Majlis for Future Generations, held under the patronage of its namesake, His Highness Sheikh Mohammed Bin Zayed Al Nahyan, Crown Prince of Abu Dhabi and Deputy Supreme Commander of the UAE Armed Forces.

Each new cycle of the Pioneers Program formally begins at ADSW, in which 20 UAE national women embarking on their careers are granted special access to high-level training and professional development opportunities, including access to advanced workshops, global networking events, and internships.

Amna Al Baloushi, Program Manager, The Catalyst, and WiSER Pioneer Alumni, participated in the 2020 WiSER forum. This is her story:

STEM and digital skills are some of the fastest-growing skillsets in the labour market, however the proportion of women represented in these areas is not equally fast growing. One of the main views expressed at the Forum is that all too often women are discouraged from careers in these fields because they feel they are male-dominated sectors – a view shared with me by Fatima Al Kaabi, known as the UAE's youngest inventor. For example, according to the Wold Economic Forum, across the globe just 3 per cent of students joining information and communication technology (ICT) courses and 5 per cent for mathematics and statistics courses are women.

On the roundtable I participated in during the forum, we all emphasised the role of the UAE government, and the importance of individuals, in introducing girls to technology skills, encouraging them to pursue further education in STEM subjects and to apply for roles in these "male-dominated" fields. My own mother, Mariam Abdullah, is an inspirational women who led me to become an engineer – she advised me to search for my strengths and capabilities and then decide which career path to follow. This led to me studying and qualifying with a Bachelor's Degree is in Electronic Engineering.

The WiSER Forum raises awareness of the importance of achieving equal opportunity for the next generation of females in the workforce; it does so by helping empower women with the skills and knowledge, to adapt to technological changes.

The Forum began by posing the question of whether digitalization has the power to change the proportion of women working in technology; I believe that the development and deployment of digital technologies can change business models and create new revenue and value-producing opportunities for women. For this to happen, we need to invest more in higher education programmes, and digital literacy initiatives, and we need agreement at industry level to get more women represented at technology companies. We need to accelerate the rate of change.

Country Perspective:
India

INDIA

By a number of measures, gender parity in India is declining. Only one-quarter of women, compared with 82 per cent of men, engage actively in the labour market – in 2004, women made up more than a third of the work force. Further, estimated income for women is one fifth of that for men, with women accounting for only 14 per cent of leadership roles.

ESTIMATED INCOME FOR WOMEN IS 1/5 OF THAT FOR MEN

WOMEN ACCOUNT FOR ONLY 14 PER CENT OF LEADERSHIP ROLES

However, one area where women could be said to be making progress is in sustainability. As Gauri Singh, Deputy Director-General of the International Renewable Energy Agency, explained at the WiSER Forum, almost 45 per cent of India's village community bodies, known as panchayats, have women leaders. These grassroots communities were seen by Mahatma Gandhi as the building blocks of sustainable development, making women key to India's sustainability goals.

ALMOST 45 PER CENT OF PANCHAYATS HAVE WOMEN LEADERS

Studies at the panchayat level have demonstrated that women leaders place greater emphasis on sustainable development than their male counterparts, Singh told participants. Women leaders consider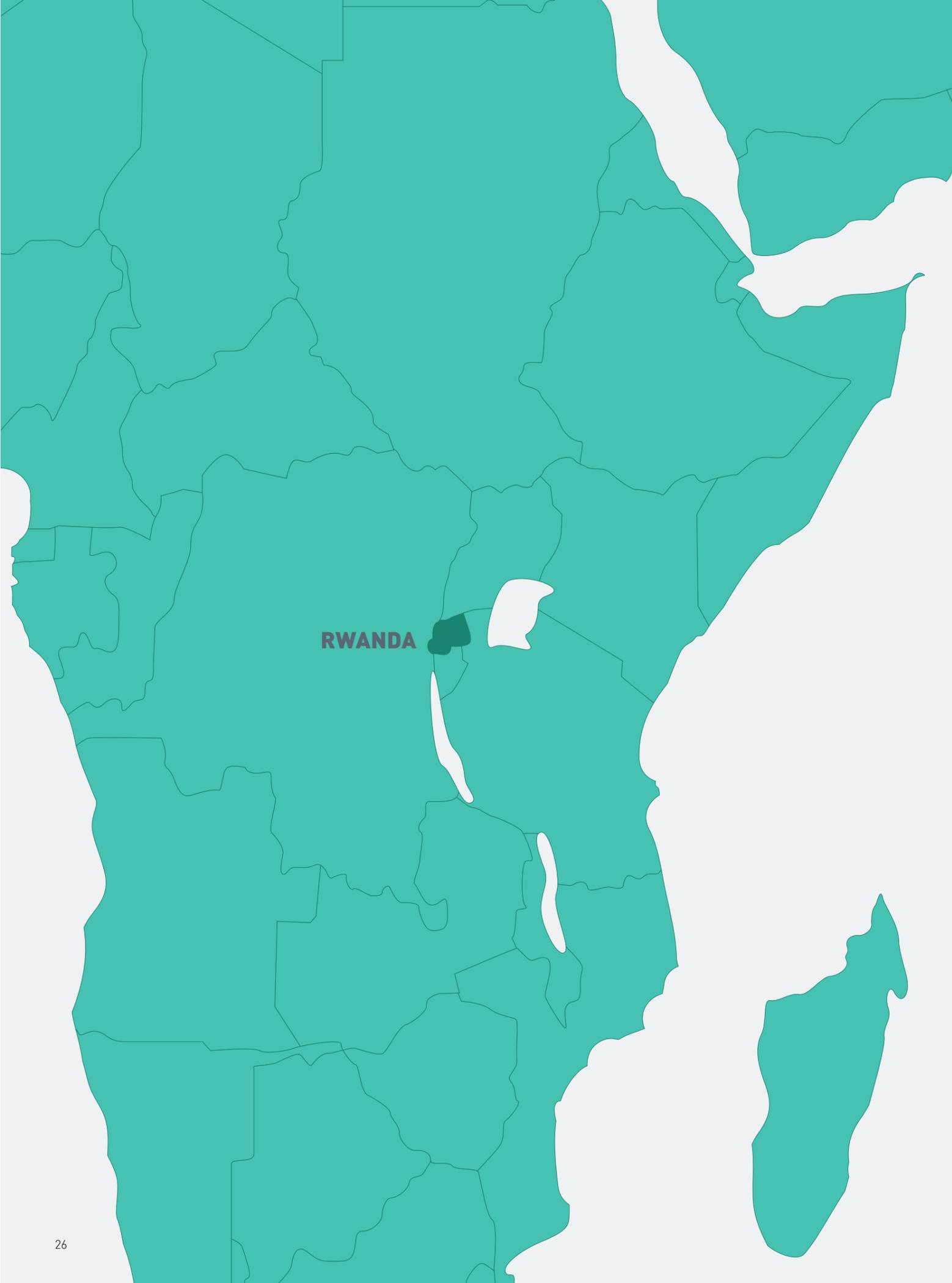 it more important to spend public money on agriculture and water management, and are more focused on sustainability initiatives, including education.

A woman also leads India's cleanest city, with Mayor Malini Gaur having taken Indore from 180th on a government index of 434 comparable cities to first place for the past four years by optimizing infrastructure, utilities, and waste and water management.

Digitalization could also lead to gender parity. India was among a number of nations identified by the World Economic Forum's 2020 report to be progressing in gender parity in cloud computing and engineering – the most 'male' roles of the future. The role India's female engineers have played in the country's space programme has also been widely celebrated, and there has been a substantial increase in the numbers of women studying and working in engineering.

As we have seen, such increases in women studying STEM subjects does not always correlate to an uptake in female employment. While women represent as much as 45 per cent of computer science enrolments at Indian universities, their representation in the ICT workforce is still considerably lower.

WOMEN REPRESENT AS MUCH AS 45 PER CENT OF COMPUTER SCIENCE ENROLMENTS AT INDIAN UNIVERSITIES

Country Perspective:
Rwanda

RWANDA

Some 25 years ago, as Jeanne D'Arc Mujawamariya, Minister of Environment, Rwanda, explained to participants at the WiSER Forum, the central African country was a "non-state," at risk of disappearing "off the map." During the genocide of 1994, an estimated 800,000 people were massacred, with the ensuing civil war leading to the displacement of a third of Rwanda's population.

Today, Rwanda is considered a model of development for the continent, being ranked 38th in the World Bank's most recent ease of doing business index, ahead of nations such as Portugal and the Netherlands. Key to the nation's recovery, Mujawamariya stressed, was the recognition that "you cannot develop a country by leaving over 50 per cent of the population behind."

With women making up 52 per cent of the population, their inclusion in all sectors has driven Rwanda's development – more than half the country's ministers and parliamentary representatives are female. Indeed, Rwanda is the ninth most gender-equal country in the world, according to the World Economic Forum's Global Gender Gap Report 2020.

MORE THAN 50 PER CENT OF THE COUNTRY'S MINISTERS AND PARLIAMENTARY REPRESENTATIVES ARE FEMALE

RWANDA IS THE 9TH MOST GENDER-EQUAL COUNTRY IN THE WORLD

Rwanda is also looking at how the information and communications technology (ICT) sector can be leveraged to support women's development; the country has started a campaign to provide mobile phones to women in rural areas, giving them better access to medical services and making it easier for business owners to communicate.
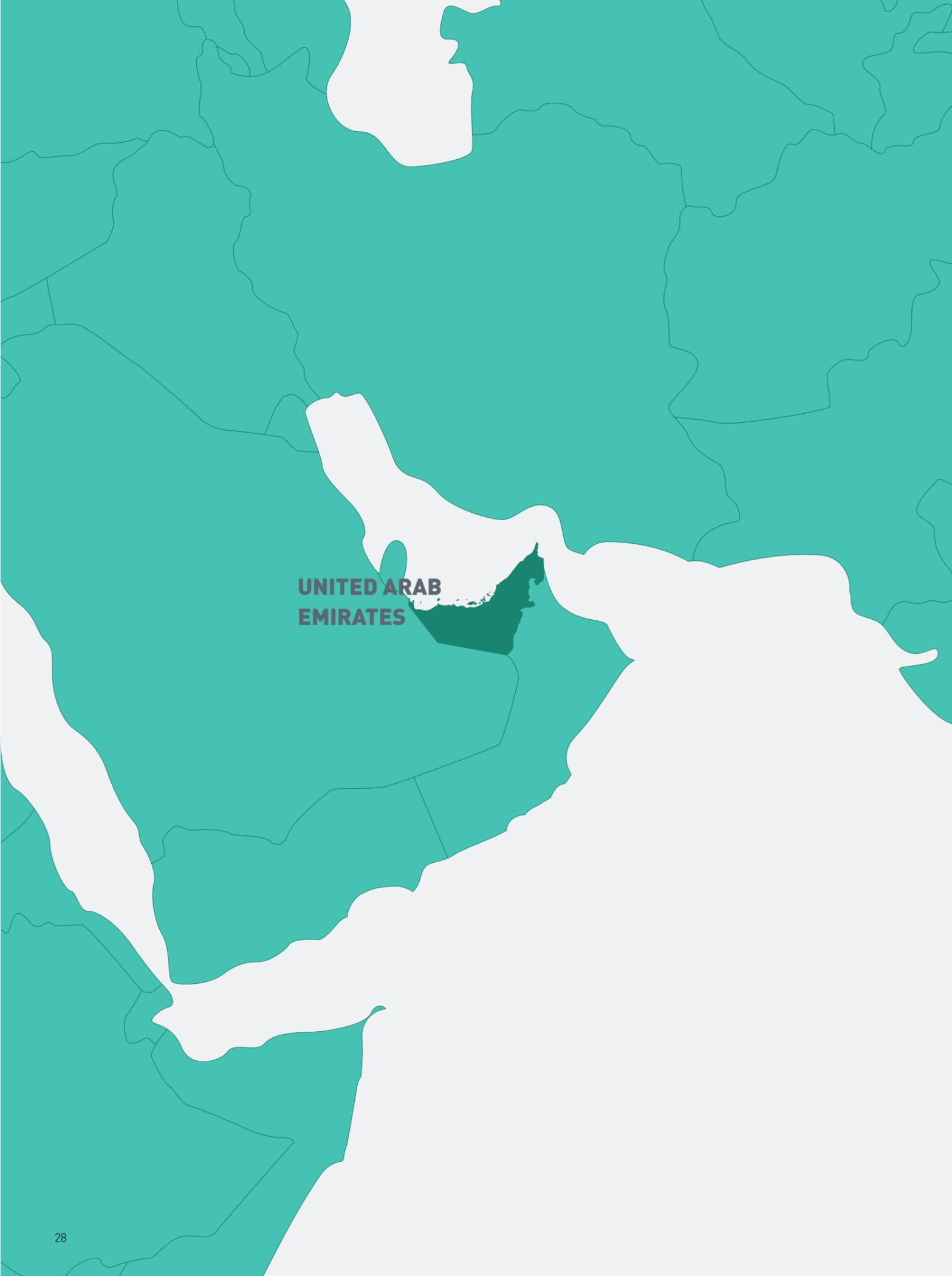
Women are also key to sustainability in Rwanda – not least, according to Mujawamariya, because women are at risk of being the biggest victims of climate change and so need to be involved in mitigation efforts. As Mujawamariya stresses, it is not about women taking men's jobs but both coming together for the development of their country.

The nation also actively encourages females to participate in ICT from a young age. The Ms. Geek Africa competition, supported by Rwanda's Universal Access Fund, for instance, aims to encourage girls to participate in STEM fields by designing innovative technology-based solutions to solve real-world problems faced by their communities

Still, challenges remain. According to the World Economic Forum, almost twice as many men than women obtain scientific and technical degrees. Also, while both sexes are equally active in the labour market, women are paid significantly less than men and make up a comparatively small proportion of the skilled workforce.

Country Perspective:
United Arab Emirates

The United Arab Emirates (UAE) is still a comparatively young nation, being founded only in 1971. As Her Excellency Sarah Al Amiri, the UAE's Minister of State for Advanced Sciences, explained at the WiSER Forum that meant the UAE needed to develop its infrastructure and society at a much faster pace than other countries – and it couldn't afford to leave half its people behind.

The UAE's hydrocarbon resources have been invested in both developing the nation's infrastructure and its people, and education has always been seen as equally important for both girls and boys. A number of participants from the UAE at the Forum expressed that they felt their situation to be better than their counterparts in other countries, as they have more opportunities in education and subsequently in employment.

While the Middle East and North Africa is the lowest ranked region on the World Economic Forum's Global Gender Gap Index, the UAE leads the Arab world, and the government has set a target of becoming one of the world's top 25 countries for gender parity by 2021. The UAE established a Gender Balance Council in 2015 to ensure that Emirati women continue to play a leading role in the nation's development, and gender balance is included in the UAE Vision 2021. The UAE's Federal National Council is also required to provide 50 per cent of seats to women. Last year, the UAE climbed 23 places on the UNDP Gender Equality Index, being ranked 26th, again the highest in the Arab world, and just one place below its target.

The UAE is also actively promoting opportunities for women in its emerging high-tech sector and the investment is paying off. More than half the UAE's STEM graduates are female, while women make up about 40 per cent of the team working on the UAE's Mars Mission and as much as 90 per cent of the scientists at the Mohammed Bin Rashid Space Centre are women.

> **THE UAE ESTABLISHED A GENDER BALANCE COUNCIL IN 2015**

> **WOMEN MAKE UP ABOUT 40 PER CENT OF THE TEAM WORKING ON THE UAE'S MARS MISSION**

> **90 PER CENT OF THE SCIENTISTS AT THE MOHAMMED BIN RASHID SPACE CENTRE ARE WOMEN**

The UAE is also committed to taking a leadership role in the development of AI and other emerging technologies. The UAE ranks 19th worldwide for government AI readiness, according to Oxford Insights, and it was the first country in the world to appoint a minister of state for AI. This year, Masdar City will host the Mohammad Bin Zayed University of Artificial Intelligence – the world's first graduate-level AI research institution.

> **UAE IS THE FIRST COUNTRY IN THE WORLD TO APPOINT A MINISTER OF STATE FOR AI.**

UNITED ARAB EMIRATES

WiSER Gallery

Index

i. https://www.mckinsey.com/featured-insights/employment-and-growth/how-advancing-womens-equality-can-add-12-trillion-to-global-growth

ii. https://www.oecd.org/social/empowering-women-in-the-digital-age-brochure.pdf

iii. https://www.wired.com/story/artificial-intelligence-researchers-gender-imbalance/

iv. https://www.un.org/sustainabledevelopment/

v. https://en.unesco.org/artificial-intelligence

vi. https://www.pwc.co.uk/services/sustainability-climate-change/insights/how-ai-future-can-enable-sustainable-future.html

vii. https://press.aboutamazon.com/news-releases/news-release-details/amazon-pledges-upskill-100000-us-employees-demand-jobs-2025

viii. https://unstats.un.org/sdgs/report/2019/The-Sustainable-Development-Goals-Report-2019.pdf

ix. https://www.weforum.org/reports/gender-gap-2020-report-100-years-pay-equality

x. https://www.globalwomennet.org/renewable-energy-a-gender-perspective/

xi. https://www.pwc.com/hu/hu/kiadvanyok/assets/pdf/impact_of_automation_on_jobs.pdf

xii. https://economicgraph.linkedin.com/blog/growing-but-not-gaining-are-ai-skills-holding-women-back-in-the-workplace

xiii. https://ec.europa.eu/digital-single-market/en/women-ict

xiv. https://www.reuters.com/article/us-amazon-com-jobs-automation-insight/amazon-scraps-secret-ai-recruiting-tool-that-showed-bias-against-women-idUSKCN1MK08G

xv. https://www.wired.com/story/machines-taught-by-photos-learn-a-sexist-view-of-women/

xvi. https://twitter.com/stevewoz/status/1193330241478901760?s=20

xvii. https://www.gartner.com/en/newsroom/press-releases/2018-02-13-gartner-says-nearly-half-of-cios-are-planning-to-deploy-artificial-intelligence

xviii. https://business.linkedin.com/talent-solutions/blog/diversity/2019/how-women-find-jobs-gender-report

xix. https://www.globalgovernmentforum.com/automated-welfare-fraud-detection-system-contravenes-international-law-dutch-court-rules/

xx. https://www.wlia.org.au/2019-women-for-media-report

xxi. https://ec.europa.eu/digital-single-market/en/women-ict

xxii. https://www.econ.ucdavis.edu/events/papers/118Canaan.pdf

xxiii. https://www.cio.com/article/3229355/why-are-women-leaving-technology-jobs.html

WISER

wiser@masdar.ae | ⊙ f ⑨ adswagenda
masdar.ae | adsw.ae