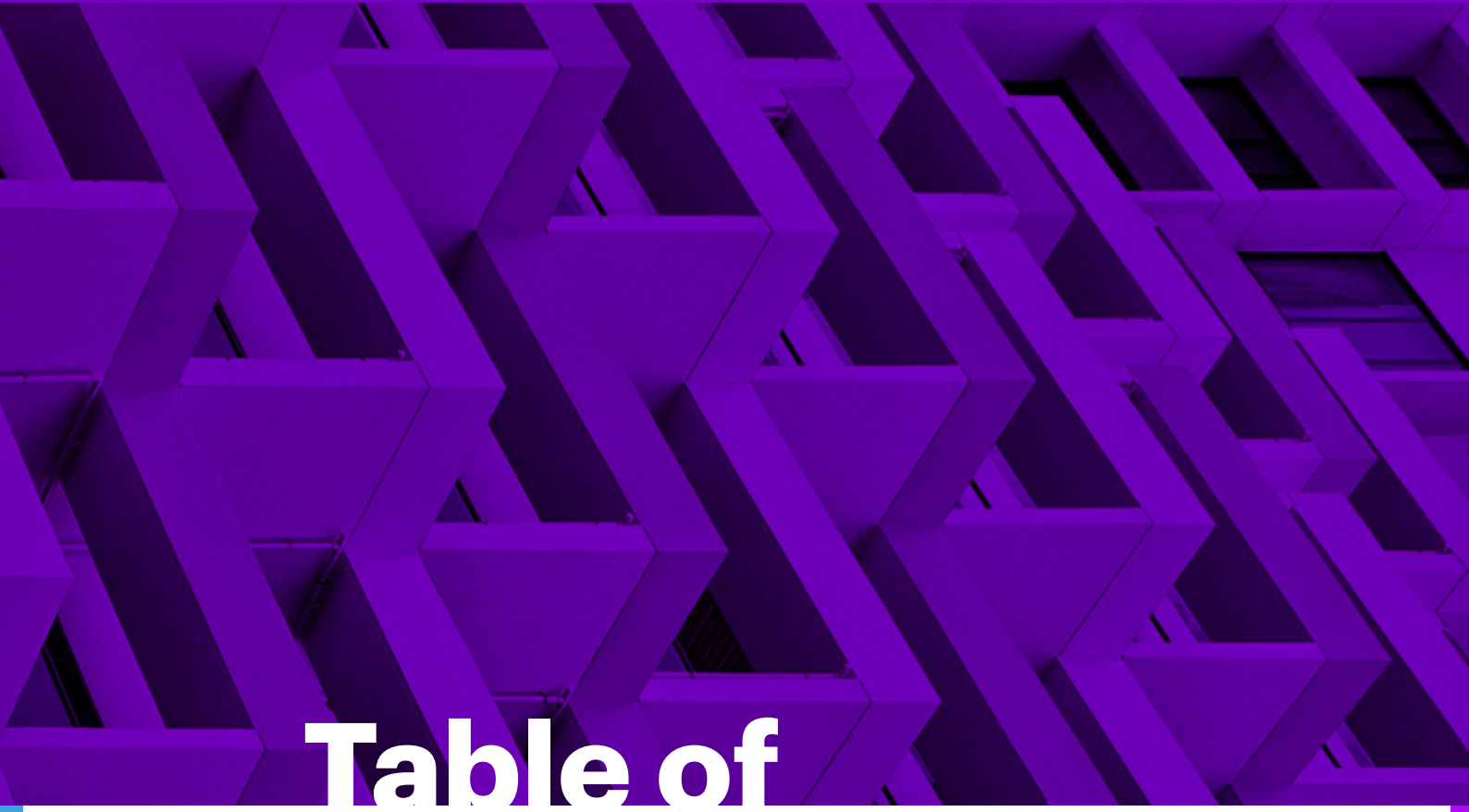
GREEN SKILLS FOR A NATION WHOSE TIME HAS COME

Charting the Path for Future Generations

accenture



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Executive Summary

Climate-related weather events are growing more extreme and widespread, wreaking havoc on our planet. Businesses are being pressed to act on climate change from all sides, with the public, regulators, and investors all calling for faster progress on environmental, social and governance (ESG) goals.

Beyond the urgent imperative of mitigating climate risks and minimising our carbon footprint, sustainability presents a sizable business opportunity. In Asia alone, sustainability solutions are projected to be worth over $1.8 trillion USD annually by 2030. Singapore stands to capture more than our fair share of this opportunity, thanks to our unique trading position and legacy of sustainable development.

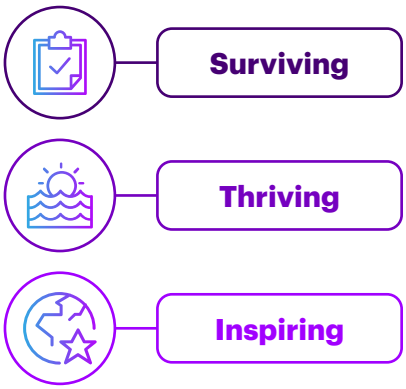
It's true that Singapore has long blazed a green trail with pioneering examples of sustainable design and innovation, from the launch of the Garden City vision in 1967 all the way through to more recent projects like NEWater and the Green Mark Scheme.

But these beacons of progress alone won't be enough to spur the step change that's needed to thrive in the new green normal. To become a global sustainability leader, we must spark a movement that goes beyond just a few shining examples. Our success rests on a critical mass of individuals, organisations, industry leaders, and government, working together to accelerate change.

To understand how our economy as a whole is tracking towards green readiness, we need to look beyond statements of intent found in sustainability pledges and strategic plans. So, for this report, we turned to skills demand and supply data, digging deeper into how companies are investing in the skills and capability needed to make real progress on ESG goals. Specifically, we looked at 430 million job ads across four countries and 10 years to understand how Singapore is performing historically, as well as against select international peers.

The data show positive progress – but also reveal that we still have a long way to go. Only 1 in every 44 jobs advertised in Singapore in 2021 required a green skill. Meanwhile, green skills development remains unevenly distributed across the economy. Green skills are mostly concentrated in traditional technical, research, and compliance-related roles. Large local and multinational corporations (MNCs) continue to capture the lion's share of green talent supply and demand. That poses a particular risk for the small and medium-sized enterprises (SMEs) who play a vital role in our value chains and industry ecosystems, and will be key to our sustainability journey.

That journey will look different for every business, owing to their unique circumstances, priorities, and motivations for making the transition. It has resulted in organisations sitting across a spectrum of sustainability maturity, which we divide into three main horizons:



Each horizon is characterised by different mindsets and motivations, characteristics, cultural aspects, and mixes of skills and attributes. Our analysis suggests that the majority of Singapore businesses remain in survival mode. While most organisations show support for sustainable and environmental initiatives, many fall short when it comes to translating this positive sentiment into concrete commitments and meaningful progress towards ESG goals.

Yet, there is a small group of evolutionists who have managed to bridge this gap and advance faster along the sustainability maturity spectrum. We explore how thriving and inspiring companies in Singapore have fuelled success through a synthesis of mindset, navigation, skills, and capability. Their progress can serve as a guiding light for other organisations looking to accelerate their own green transitions.

While sustainability leaders serve as a valuable source of inspiration, we can't overlook the central role that Singapore's SMEs have to play in our sustainability story. These organisations face unique hurdles on their green journeys, and will require additional time and support to develop their sustainability maturity.

It's vital that SMEs are brought along in the green transition, because realising Singapore's full sustainable potential will take shared collaboration and initiative from all actors in the ecosystem. We close this report by distilling immediate actions and impact that should be made at every level—from the heights of government all the way down to individuals—to accelerate progress towards a more sustainable Singapore.

Together, we can shape a future where business thrives, people prosper, and the planet is protected for generations to come.

Everything to play for

Addressing climate change is widely recognised as the biggest existential challenge of our time, but what's easily forgotten is the business opportunity that comes with it

In Asia alone, sustainability solutions are projected to be worth over US$1.8 trillion annually by 2030[1]. More recently, the Singapore Government announced that the public sector will issue green bonds up to the value of S$35 billion by 2030, starting with their inaugural sovereign green bond, Green Singapore Government Securities (Infrastructure), issued under the new Singapore Green Bond Framework[2].

Responses to the issuance of green bonds align with earlier analysis by DBS Bank. It estimates that demand for additional ASEAN green investment will rise to reach the order of US$3 trillion by 2030 for projects across infrastructure, renewable energy, energy efficiency, and food, agriculture and land use[3].

What's more, new research from Accenture reveals that organisations performing better on ESG have a higher likelihood of performing better financially[4]. It signals that the pursuit of profit and purpose don't necessarily have to come at each other's expense.

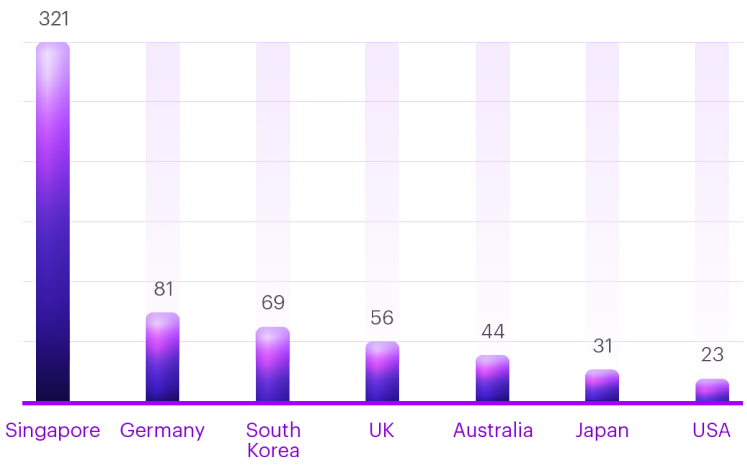
> *When we look at things from a green point of view, we tend to look at it as a trade-off between cost and green. I think this is something we will definitely overcome. The green economy should give you a more sustainable, reliable and long-term economy that meets the demand of the growing population, so there is a good long-term risk profile with being green.*
>
> **Paul Smith**
> **Vice President Supply Chain, Haleon**

Singapore's unique position as a major global trading hub also increases our exposure to the effects of sustainable development. Singapore's total trade is more than three times the value of its GDP, much higher than any of our peers in the region and the third largest globally. This unique structure means that in addition to Singapore's own domestic transition, we are also exposed both upstream (in our imports) and downstream (through exports) to the impacts of sustainability transitions undertaken by our trade partners.

Our trading position has the potential to serve as a competitive advantage, leveraging trade partnerships in the region to capitalise on emerging and growing markets for sustainability solutions and products. We already see examples of home-grown companies, such as sustainable packaging provider Greenpac, making their mark as industry leaders in the region.

Trade exposure

% Ratio of total trade (imports + exports) to GDP; selected countries; 2020



Source: World Bank; GDP, imports and exports tables

Spotlight: Greenpac

Singapore to the world: local SME leads sustainable packaging

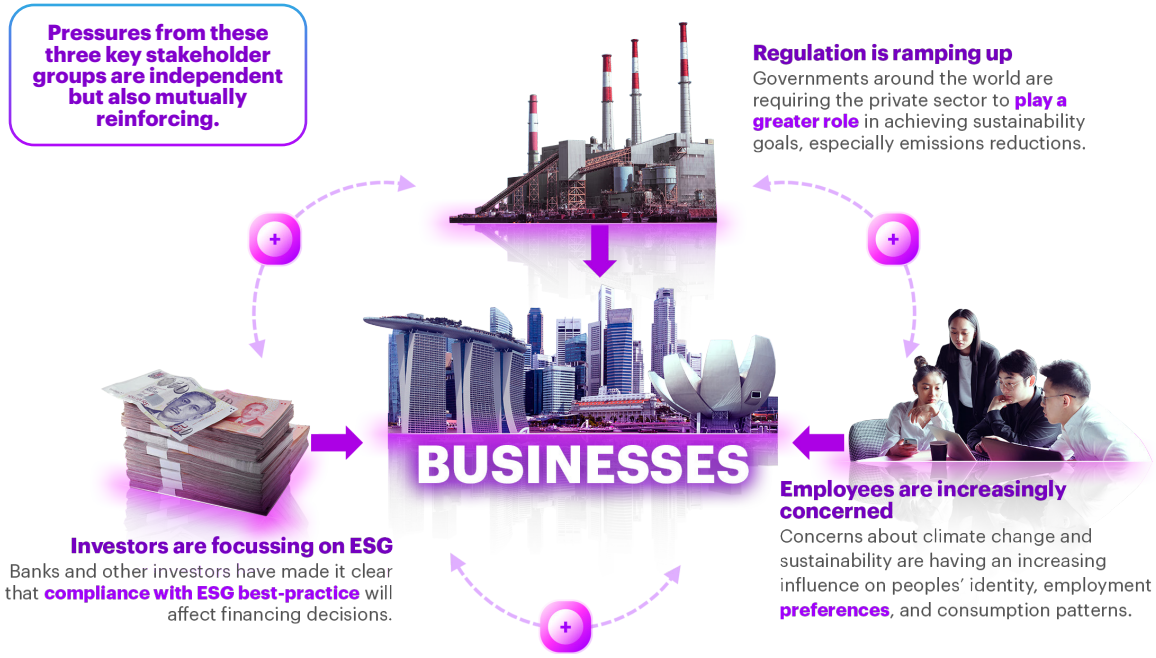
When Founder and CEO Ms. Susan Chong first started Greenpac 20 years ago, she "already had a vision that green and sustainable is the way to go." During that time, the concept was still unexplored territory and a low priority for many. Recognising the massive amount of waste that industrial packaging generates, Greenpac's mission is multi-fold: provide environmentally friendly packaging solutions, as well as achieve bottom-line savings and supply chain efficiency. Clearly, they have justly achieved these for their customers. In fact, Greenpac's innovative, sustainable packaging solutions have garnered multiple awards and accolades both locally and internationally, including wins at the Singapore Packaging Star Awards, Asia Packaging Star Awards, World Packaging Organisation's WorldStar Global Packaging Awards and at Singapore's National Environmental Agency's 3R Packaging Awards.

Over the years, Greenpac has continued to evolve in line with larger sustainability developments involving policy and technology. Susan notes: "As you grow, you have to continue to innovate because you want to create better value for the customer, and so you just need to, not only do different things, but also do things differently." Susan credits her ability to provide clients with cost-saving packaging services to her strong fundamentals, IP, and knowledge that she has gained over the years.

These approaches have helped Greenpac grow its business and establish its reputation in sustainability leadership, all while becoming a prime example of how SMEs possess the capability to be powerhouses for green innovation and drive the sustainability agenda to greater heights.

New business opportunities are rapidly emerging in response to a range of market forces that are driving a changing landscape onshore and offshore

Singapore is at a critical juncture in its journey to meeting both local sustainability priorities and global aspirations for a sustainable future. And, crucially, this presents a major opportunity for businesses to unlock new value pools in response to changing preferences and pressures from all sides: the public, regulators, and investors.



Regulation is ramping up

The regulatory environment in Singapore is changing rapidly when it comes to climate change and sustainability, with financial, operational and strategic implications for businesses[5].

Singapore was the first country in Asia Pacific to introduce a carbon tax in 2019, and the government has recently announced significant increases, which will see the carbon tax rise 16-fold in the eight years to 2030[6].

The Singapore Exchange has also recently implemented a new approach to mandatory climate reporting, starting with a "comply or explain" process from 1 January 2022 for all listed companies. Over the course of 2023 to 2024, industries will be phased onto the more stringent reporting and disclosure practice that will demand requisite acumen from listed companies[7].

In addition, Singapore is uniquely exposed to trade partners' regulation around emissions, such as the EU's Carbon Border Adjustment Mechanism (CBAM), with Japan and Canada planning comparable mechanisms to minimise carbon leakage[8].

Investors are focusing on ESG

Banks and other investors have made it clear that compliance with ESG best practices will affect financing decisions. Singapore's leading financial institutions are publicly highlighting credit and reputational concerns in dealing with firms with poor ESG performance.

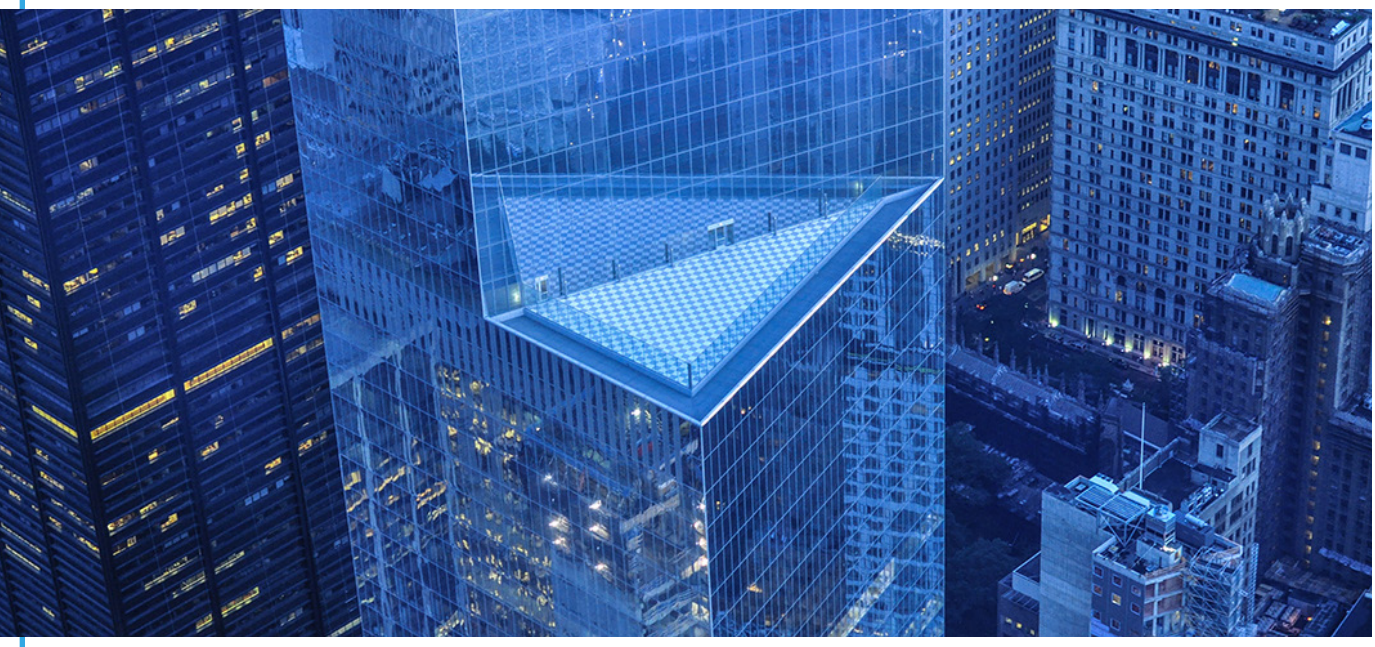
Globally, low ESG performers are experiencing higher costs of capital, at the same time as sustainable assets under management has been growing rapidly[9,10].

What is the CBAM?

The EU's Carbon Border Adjustment Mechanism seeks to mitigate "carbon leakage" that can arise from EU based companies moving carbon-intensive operations offshore to jurisdictions with lower emissions standards and/or import of more carbon-intensive products.

The CBAM requires EU importers to buy carbon certificates commensurate with the carbon price that would have been applied if the goods were produced under EU carbon pricing. This incentivizes greening of non-EU producers.

> *"We've seen the financial sector reward the focus on the corporate ESG agenda. Even though we have strong borrowing strength in the market, we have been able to get even further discounts on the basis of ESG commitments. That's a form of value creation for organisations."*
>
> **Andrew Buay**
> **Group Sustainability Vice President, Singtel**



Employees are increasingly concerned

Compared to international peers, people in Singapore appear to be more concerned about climate change and feel more personally affected by it[11]. In 2019, over 95% of residents surveyed by the National Climate Change Secretariat supported shifting to a low carbon economy[12].

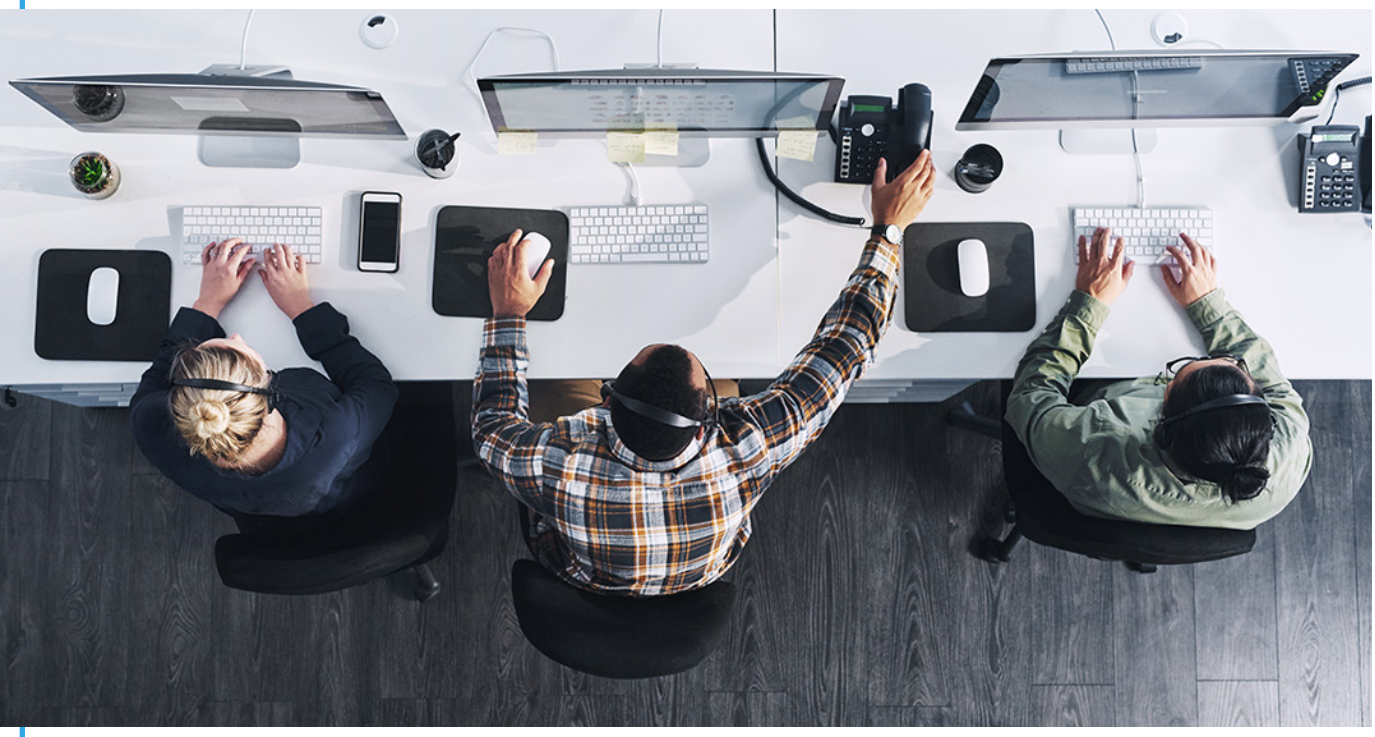
These concerns are starting to translate into new attitudes and behaviours related to the organisations that people work for and with, as well as their consumption of goods and services. Today's workforce increasingly wants their own ideals and values to be genuinely reflected by their employers[13]. Meanwhile, 75% of young people in Singapore aspire to work in the green economy within the next 10 years[14].

As individuals place greater importance on environmental and sustainability issues, there is an opportunity for businesses to become talent destinations for the workforce of today and tomorrow by demonstrating their commitment towards ESG goals.

Sustainability is here to stay, and much like the digital revolution, the pace of change is speeding up

Just as digital transformation demanded that every company become a technology company, now every business must act fast to become a sustainable company. Every day of inaction multiplies the effort required to catch up, let alone lead.

This transition presents plenty of exciting business opportunities for those that are willing and ready to take them. But even for those less ambitious, a rapidly changing regulatory, financing, and consumer environment will necessitate some degree of transformation to remain viable in the green economy. Every organisation must adapt to the new sustainable normal; those who fail to do so will be left behind.



It's ours for the taking - but are we ready?

Singapore has a long legacy of sustainable leadership, but these beacons of progress won't be enough to lead the step change into the new green normal. A whole-of-economy movement is needed to make sure the sustainability transition leaves no-one behind

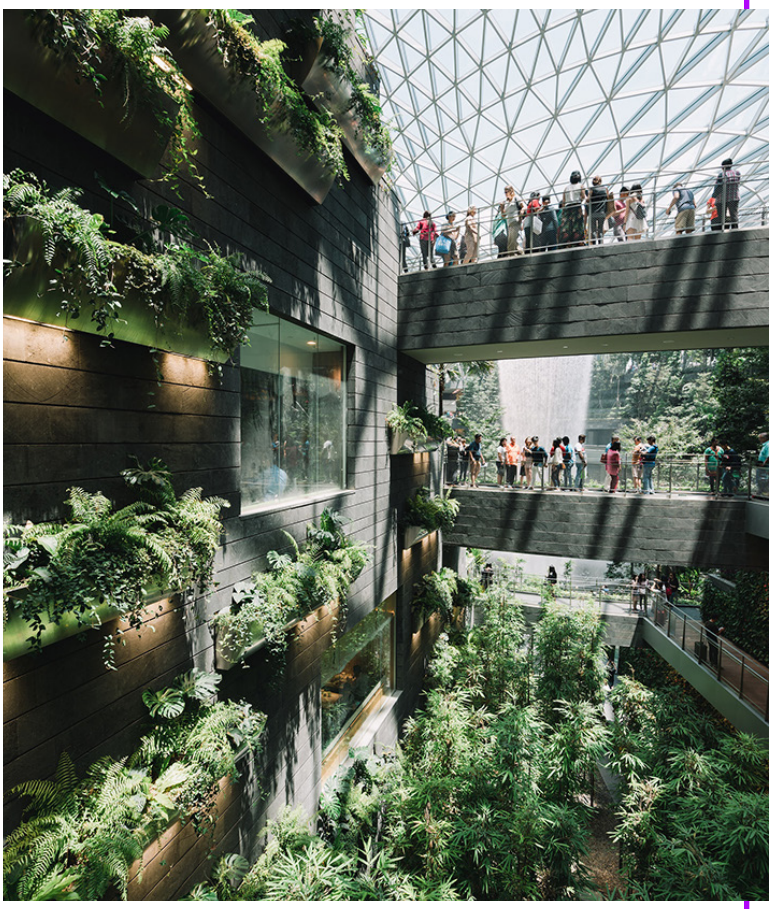
Singapore has been at the forefront of some of the world's most sustainable projects even before we became independent, motivated by the need to secure access to critical resources for our population, chief of which was water.

The creation of a national water agency in 1963 cleaned up waterways and built vital infrastructure to capture rainwater. Fast forward 40 years, and NEWater revolutionised Singapore's water sustainability, enabling used water to be recycled into ultra-clean, high-grade reclaimed water, meeting WHO and USEPA's safety and quality requirements for drinking water.

With the Parks and Trees Act of 1975, we protected our natural environment and grew greener. Now, while comparable cities are concrete jungles, Singapore truly is a "city in a garden" with nearly 50% green cover and 72 hectares of rooftop gardens and green walls.

Gardens by the Bay exemplifies this in Singapore's built environment. It's a national green icon that stands out as a renowned tourist destination, as well as beacon of sustainability. Gardens by the Bay's unique design and construction have earned it a multitude of international accolades, and it showcases a range of different sustainable technologies, including efficient temperature and water management.

From an enterprise perspective, Greenpac is a shining example of a local business putting sustainability front and centre. The company launched 20 years ago, with sustainability as a foundation of their B2B model to deliver efficient and environmentally friendly packaging. Since then, Greenpac has received multiple accolades locally and globally, in recognition of their innovation and success in uniting commercial and environmental excellence.



We've been able to deliver these awe-inspiring beacons of sustainable innovation by bringing together talent, investment, and government support

As a small island nation, Singapore's greatest resource has long been our talent and ingenuity. We have faced up to environmental, social, and political challenges head on, transforming from a humble fishing village to the thriving metropolis we are today – a city and a nation that is not just a regional, but a global magnet for talent[15].

The Global Talent Competitiveness Index, which Accenture publishes annually with INSEAD and the Portulans Institute, has ranked Singapore top three in the world, and number one in Asia, every year since it was first published in 2013[16].

Singapore's strong competitiveness on the global stage reflects not only the talent of our workforce, but an environment and culture that is highly conducive to establishing and succeeding in business. This has seen us consistently ranked in the top two of the World Bank's annual "Doing Business" reports from 2016 to 2020[17]. In 2021, Singapore was also named the top-ranking innovation hub globally outside of Silicon Valley/San Francisco, coming in ahead of New York, Tel Aviv, Beijing and London, among others[18].

Our government continues to drive the acquisition of targeted green skills for individuals and enterprises. The Continuing Education & Training (CET) ecosystem, under the charge of SkillsFuture Singapore (SSG), is helping power the effort in broad-skilling citizens and the workforce in foundational knowledge and awareness of the green economy, while ensuring an adequate supply of upskilling opportunities in various sectors and business functional areas.

> *"Singapore is well-positioned to attract and train talents. And eventually, this skillset can be shared across the region."*
>
> **Jackson Seng**
> **Vice-President for Sustainability and Strategy, Schneider Electric**

Catalysing our progress has been a government that knows how to invest in research and development (R&D) and bring in cutting-edge technology from all corners. The National Research Foundation has steadily increased research, innovation and enterprise (RIE) investment over the last 3 decades, with a renewed commitment of S$25 billion—1% of Singapore's GDP—for the 2021 to 2025 period[19]. RIE investment has delivered world-class research and innovation, with Singapore competing with other small advanced economies in worldwide citations of publications.

Singapore's government has always understood the importance of our strengths, and has supported them through investment and policy responses to continue fostering a world class hub of innovation, finance, and trade.

It's these factors combined that have enabled Singapore to produce awe-inspiring innovations in sustainable technology and infrastructure.

While beacons of innovation provide inspiration, they do not make a movement. Our skills analysis shows that most of Singapore is yet to start the journey towards a sustainable future

No matter how proud we are as a nation of these pioneering examples of sustainable design and innovation, we need a critical mass of individuals, organisations and industry ecosystems to seize our moment. Change on this scale requires nothing short of a movement. Yet, it appears the majority of Singapore is not yet equipped to make such a monumental transition.

Gaining a whole of economy view of green readiness is not easy. It goes beyond statements of intent readily found in policies, board papers, and strategic plans, and extends to prioritising and investing in the skills and capability to take action. Skills demand and supply are, therefore, a useful indicator to track the progress of sustainability uptake and the extent to which occupations and industries are shifting within an economy.

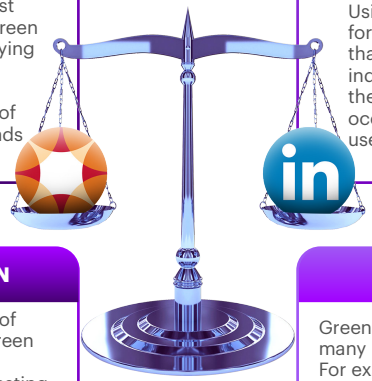
For our analysis, we looked at over 430 million job ads across four countries and 10 years to get a view on how Singapore is tracking historically, as well as against select international peers. A green skills taxonomy was developed to define which skills are considered "green". This was built using the existing skills taxonomy developed by Burning Glass which contained over 17,000 skills, narrowed down to a subset of just over 370 green skills. This taxonomy was then matched where possible against the LinkedIn skills taxonomy for supply side insights in the LinkedIn Talent Insights platform[1] (further details can be found in the Methodology section on pg 63).

Skills Demand

The Burning Glass dataset collates job ads to form a comprehensive view of labour demand. Each job ad contains certain attributes such as job title, industry, occupation, employer and requisite skills.

Using this source of data, it's possible to form a view of the number of job ads that request green skills. This involved developing a green skills taxonomy for Burning Glass, identifying over 370 skills out of 17,000.

With this, we can gain a strong indicator of labour demand, however it is limited by ads that are publicly listed and the types



Skills Supply

The LinkedIn dataset collates professionals on the LinkedIn platform to form a view of labour supply. Each professional profile contains attributes such as job title, employer, and skills which are self-published.

Using this source of data, it's possible to form a view of the number of employees that hold green skills. This provides a strong indicator of labour supply, but is limited by the skills updated by LinkedIn users and the occupations and industries more likely to use the LinkedIn platform

GREEN DEMAND PENETRATION

Green demand penetration is a measure of how many job ads request at least one green skill. A lower green demand penetration indicates a smaller share of job ads requesting green skills, while a higher green demand penetration indicates a higher share of job ads requesting green skills. Green demand penetration can be calculated at an economy-wide scale, or be calculated for a subset such as a specific industry, occupation or job title where data allows.

GREEN SUPPLY PENETRATION

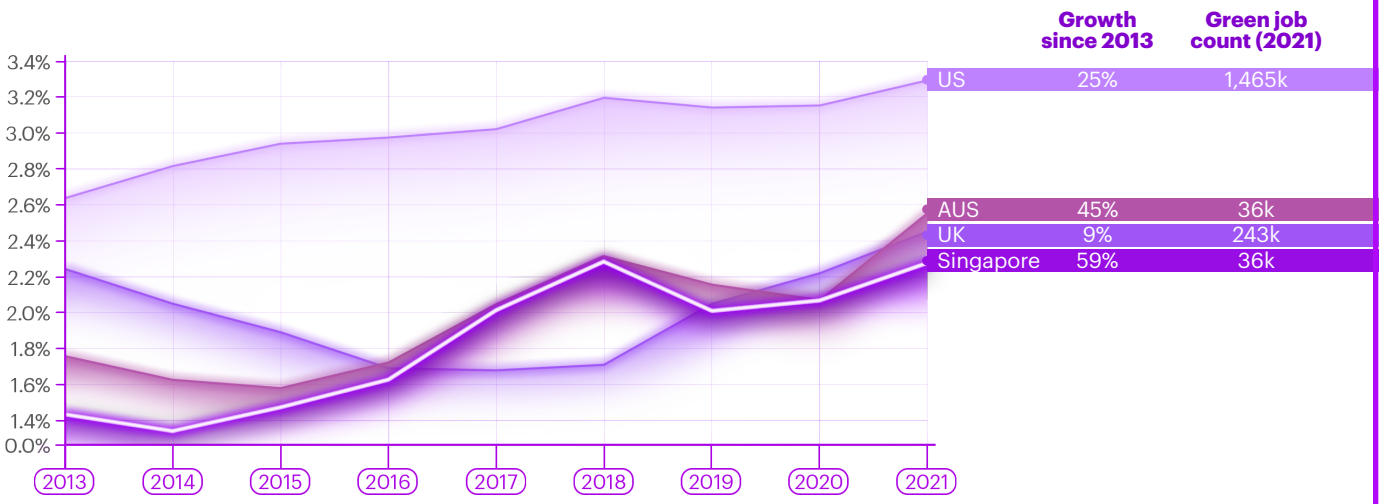
Green skill penetration is a measure of how many LinkedIn users have specific green skills. For example, an economy-wide green skill supply penetration would represent the total number of users with a green skill listed as a share of all users on the platform. This can then be calculated for specific occupations, job titles, or employers, to understand how the uptake of green skills varies.

[1] LinkedIn Talent Insights data is derived by aggregating profile data voluntarily submitted by LinkedIn members. As such, LinkedIn cannot guarantee the accuracy of LinkedIn Talent Insights data.

Growth observed over the last nine years has seen Singapore close the gap on key international peers who rank highest in green skill intensity, according to the LinkedIn Global Green Skills report[20]. Despite this progress, there is a long way to go, with only 1 in every 44 jobs advertised in Singapore in 2021 requesting a green skill.

Green skill demand penetration across countries

% share of job ads requesting green skills out of all job ads by year, 2012-2022, Singapore, International peers (UK, US, Australia)



Source: Burning Glass SG, UK, US, ANZ

On the supply side, LinkedIn Talent Insights shows a comparable, if not slightly lagging picture for Singapore, with less than 2% of professionals listing at least one green skill.

The green skills transition across the economy is patchy, with traditional technical and research roles dominating skills demand and supply

Digging deeper, it is evident that demand for green skills is unevenly distributed, with specific occupations being overrepresented. These occupation groups are associated with a more traditional view of sustainability, not the contemporary application and proliferation that will be required to be competitive in the global green economy.

A prime example is engineering roles: they represent 7% of total jobs demanded, but 23% of engineering jobs require at least one green skill. There is a comparable picture of supply, with 29.5% of green skilled professionals also having engineering skills according to LinkedIn Talent Insights.

There are other examples where, despite lower volumes overall, green demand penetration still far outstrips overall economy demand according to our analysis. This includes occupation groups of science and research; law, compliance, and public safety; and maintenance, repair, and installation.

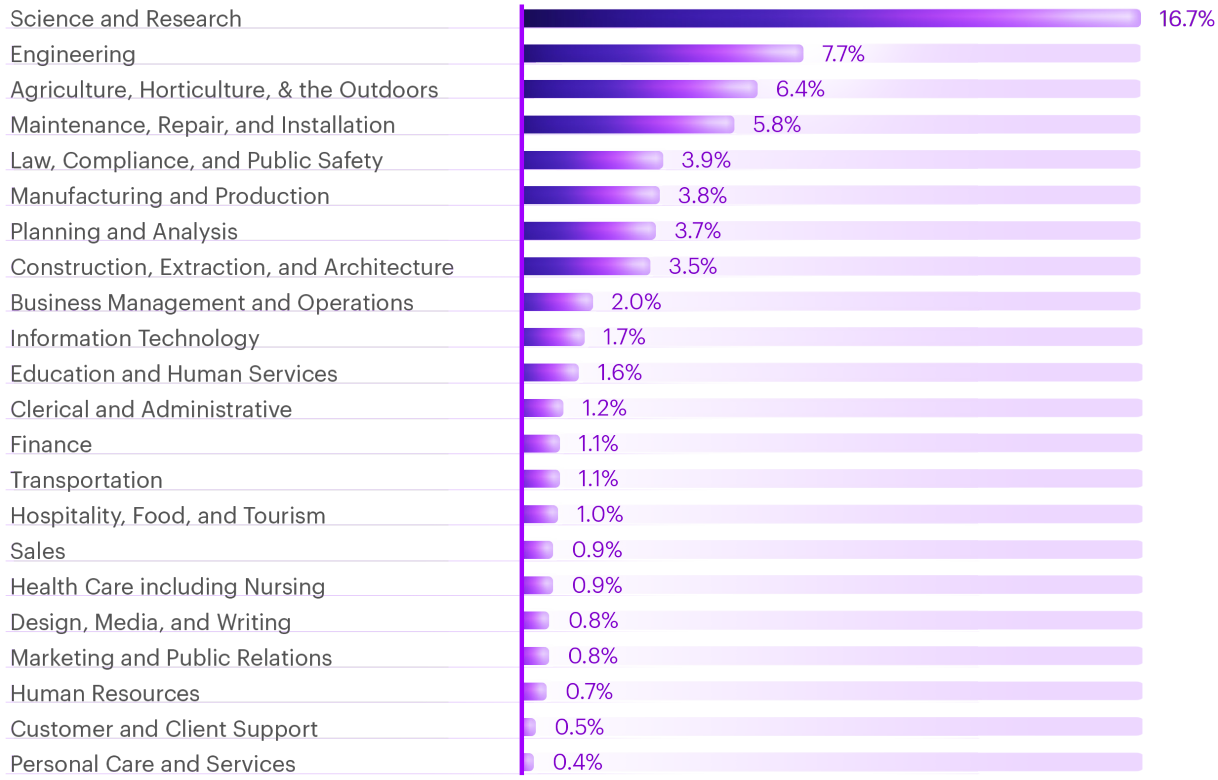
Looking at green demand penetration between these occupation groups shows vast variation. Despite 1 in 44 roles across the economy demanding green skills, this ranges from a low of 1 in 250 in personal care and services, through to 1 in 6 in science and research. The high degree of green demand penetration in science and

research is also reflected on the supply side: environmental services, renewables and environment, and utilities industries have highest rates of supply penetration in Singapore, according to LinkedIn Talent Insights.

For a closer look at how green skills are penetrating across the built environment supply chain, see pg 53.

Green skill demand penetration by occupation group

% share of job ads requesting green skills out of all job ads by occupation group, 2021



Source: Accenture analysis, Burning Glass data; occupation groups as defined in Burning Glass

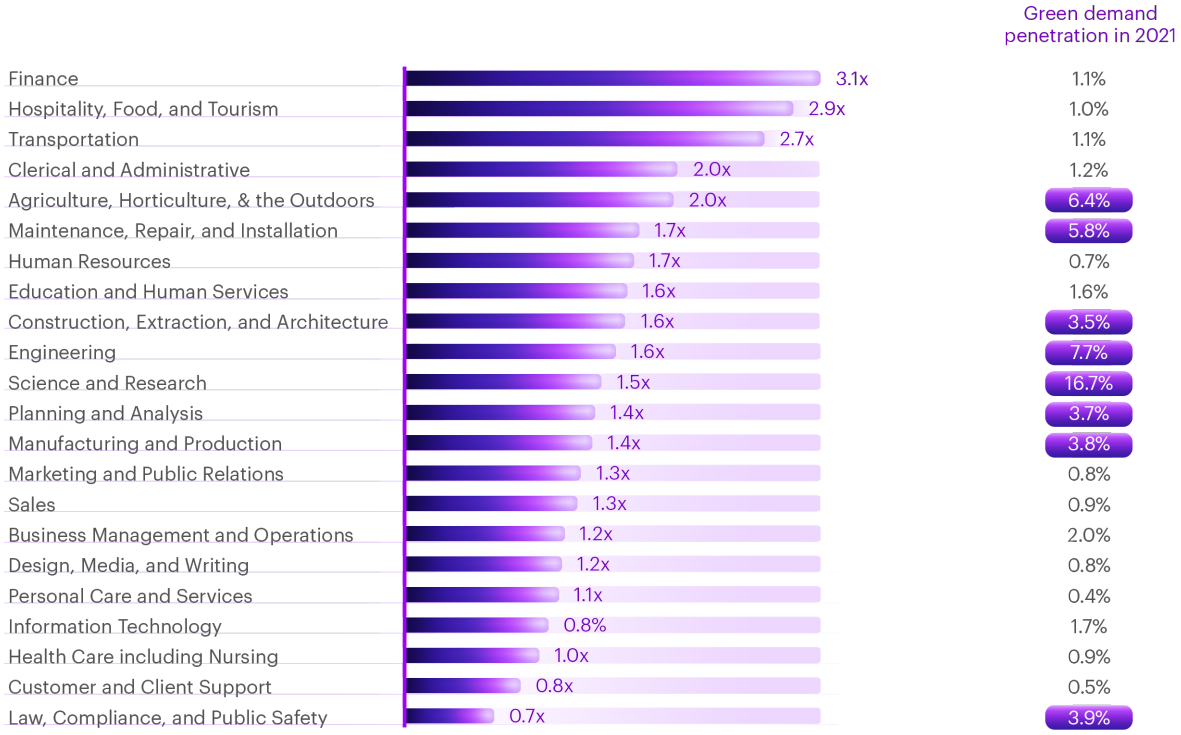
Despite growth across other occupations and industries, green skills remain highly nascent outside of traditional settings

There are indications that other occupations and industries are starting to move towards demanding and acquiring green skills. The highest growth over the last 10 years has been in finance, hospitality, and transportation occupation groups. This broader reach of green demand penetration, while growing, is still below the economy average, with only 1 in 100 jobs across these occupation groups demanding any green skills.

In finance, the workforce is responding to this trend of growing demand. There has been strong relative growth over the last year in the supply of people with green skills in industries of banking (32%), venture capital and private equity (30%), insurance (26%), and financial services (24%), according to LinkedIn Talent Insights. Notably, this strong growth in supply of green skills in venture capital and private equity now sees almost 1 in 10 professionals with at least one green skill, close to catching up with supply in architecture and planning, which has shown slower green skills growth.

Increase in green demand penetration by occupation group

Multiple increase from 2012 - 2021



Source: Accenture analysis, Burning Glass data. Notes: Purple boxes represents green demand penetration above economy average

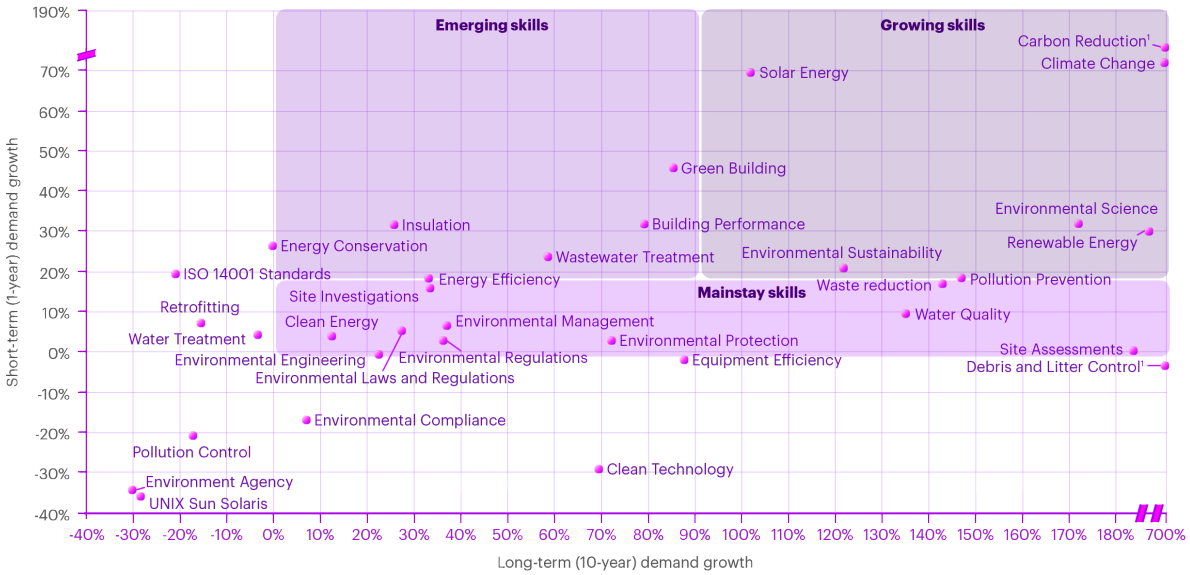
There has been promising growth in demand and supply of more contemporary green skills, but compliance and regulation remain the mainstay

Proliferation of green skills demand and supply across the economy will be foundational to Singapore's success, but there's still a long way to go. The specific green skills, and growth over time, tell us that green skills are evolving, and demand is shifting. In 2021, the green skills in highest demand across the economy were water treatment (0.14%), environmental engineering (0.13%), ISO 14001 standards (0.13%), renewable energy (0.12%) and climate change (0.09%).

These are also among the top green skills in supply in Singapore.

Skills such as water treatment and ISO 14001 standards are important technical and monitoring green skills, and indicative of more traditional environmental management and regulatory domains. These skills are amongst a number of others which have seen modest short-term (1 year) and long-term (10 year) growth in demand, indicating they are mainstays skills. In contrast, growing skills such as solar energy, climate change and carbon reduction have grown rapidly historically, and are still on an upward trajectory. While emerging skills such as building performance and insulation show lower long-term demand growth, but high short-term demand growth.

Long-term and short-term demand growth of green skills



Source: Accenture analysis, Burning Glass data. Notes: Long term growth change from 2012-2021, Short term growth change from 2020 to 2021.[1] There was no demand for Carbon reduction and Debris and litter control in 2012, therefore it is not possible to quantify the increase in demand.

There are some indications that supply is rising to meet demand for growing and emerging skills, with increasing numbers of Singapore-based professionals acquiring skills in green building, climate change, sustainable design, energy efficiency, and renewable energy. This is alongside growth in supply of mainstay green skills such as water treatment and ISO 14001.

Large companies are leading demand and supply of green talent in the private sector

Green skills demand over time has been dominated by MNCs, large employers, and government agencies, according to analysis of Burning Glass data. In sectors such as manufacturing, the second-highest green skill intensity sector according to LinkedIn's Global Green Skills Report[21], MNCs have captured an increasingly high share of green skills demand in Singapore over time.

The supply of talent is also largely concentrated in the public sector, research, and MNCs, though there are indications that some large organisations are reskilling their workforces rather than hiring new workers with green skills. Many organisations with the highest supplies of green skills workers have grown this cohort over the past 12 months, without showing the same prominence in demand.

One such is example is Singtel, Asia's leading communications technology group, with almost 30% growth in green skills over the last 12 months, according to LinkedIn Talent Insights. For Singtel, continuous investment in talent acquisition and development has been key to driving the group's sustainability transformation.

Reaching new sustainability horizons

Singapore organisations stand at different horizons on a broad spectrum of sustainability maturity – advancing along it takes a synthesis of the right mindset, frictionless navigation, and skills and capability

The journey towards sustainability is not a straight line, and the path will look different for everyone. In Singapore, we see organisations sitting across a spectrum of maturity regarding sustainability. That spectrum can be further divided into three main horizons:1) Surviving, 2) Thriving, and 3) Inspiring. Each horizon is characterised by different mindsets and motivations, cultural aspects, and mixes of skills and attributes.

From our analysis, it appears that the majority of Singapore organisations still stand on the surviving horizon. There is vast opportunity to thrive – but what does it take to get there?

Consultation and research show us that there are three key factors to advancing along the sustainability maturity spectrum:

1. Right mindset

The majority of companies in Singapore appear to remain in a survival frame of mind. They're motivated not by their own business aspirations and the opportunities that exist, but by more skin-deep drivers such as reputation, regulatory compliance, and alignment with supply partner preferences. To grow on the sustainability maturity spectrum, organisations must move beyond the mindset of burden, to one of bounty.

> *"I think organisations have a choice to see this either as a compliance exercise, in which case it will always be like a checkbox, [and just doing the] minimum necessary. Or [they can be] the ones that [recognise], 'the future of my business relies on me creating some sort of sustainable and competitive advantage out of this'."*
>
> **Marie Cheong**
> **Founding Partner, Wavemaker Impact**

2. Frictionless navigation

While there's no shortage of government funding and incentives around sustainable development, many organisations face challenges in accessing and utilising this support effectively. The sheer abundance of available options alone can be overwhelming to navigate, leading to choice paralysis. Organisations need ways to navigate this landscape with as little friction as possible, so they can easily access the information, support, and resources required to drive their ESG objectives.

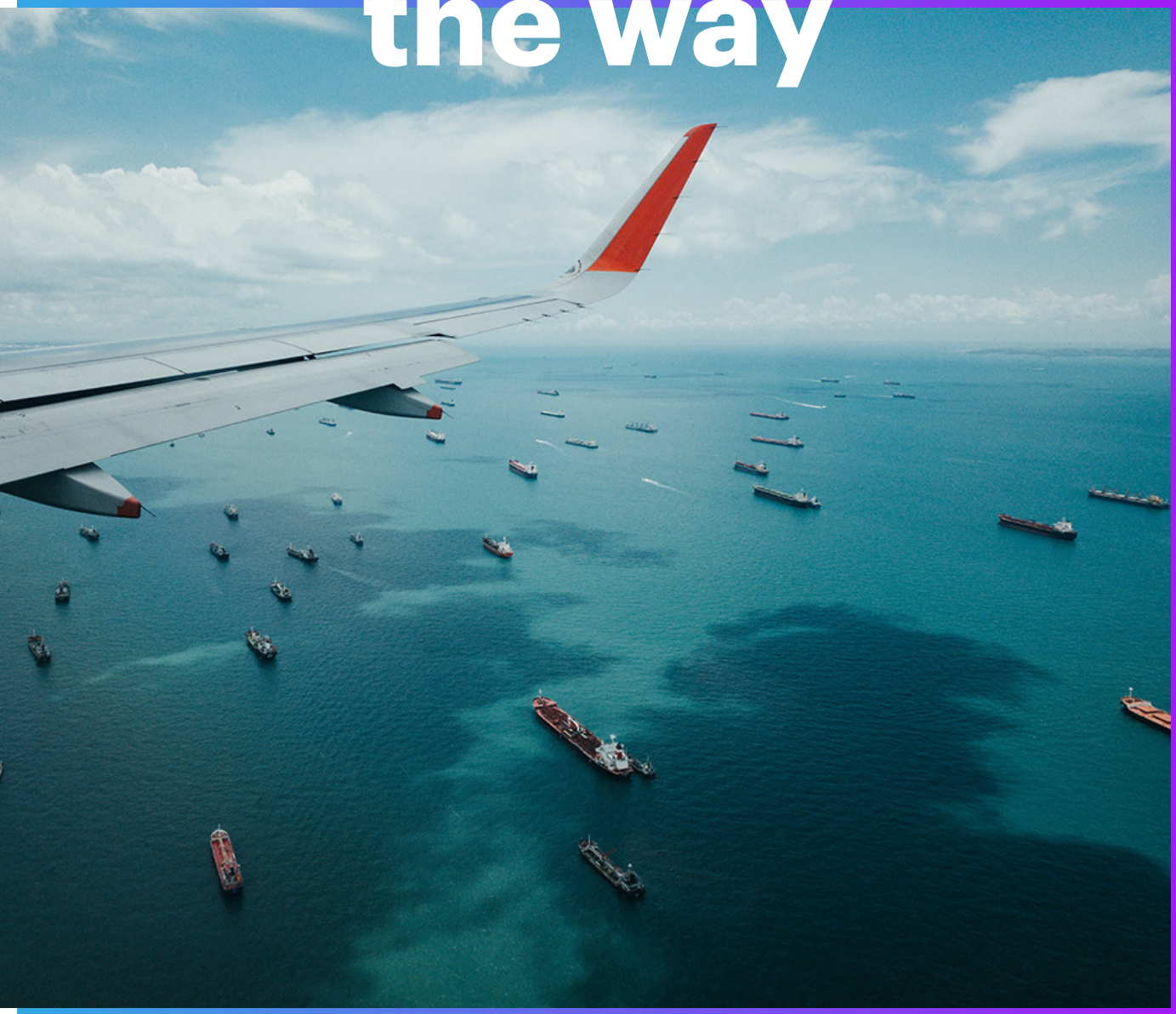
3. Skills and capability

Organisational progress towards sustainability objectives requires skills and capabilities across roles and teams to drive action. However, green skill supply and demand across Singapore remains very low. Meanwhile, an incredibly tight labour market globally adds to the difficulty of acquiring the skills and capabilities needed for the green transition.

Alongside skills building, organisations must also make more effective use of available digital tools and green technologies to accelerate their sustainability initiatives. This relates both to understanding the impact of current technologies in use, and identifying tools and technologies to enhance the sustainability of operations and products.

> *"To accelerate the transition towards a low-carbon future, the right skill sets, and resources are critical in helping a business move towards its climate goals."*
>
> **Esther An**
> **Chief Sustainability Officer, CDL**

Leading the way



Our research and consultation show a select group of Singapore organisations making great strides to reach thriving and inspiring horizons.

These evolutionists demonstrate common qualities that can provide a roadmap to others looking to accelerate the journey to sustainability maturity

Adopting a growth mindset around sustainability

Rather than seeing sustainability as a burden, evolutionists recognise that it can unlock a bounty of opportunities, both for their business and industry, the wider economy, and society as a whole.

Among Singapore organisations that have made the leap ahead in sustainability maturity, we see that they have all undergone a holistic mindset shift, with change starting from the top and emanating across every level of the business. Their leaders make a conscious choice to care about and commit to sustainability, and they embed it into every aspect of their organisation, infusing sustainability into high-level values and decision-making, and translating into business operations.

Transformation of this magnitude can be daunting, however. After all, it's not always easy to know where to start, what steps you should be taking, and if you're making real progress towards your goals. That's why it's up to leaders – at the level of organisations, industry, and government – to shape a strong mindset and mission to get everyone on the same page, keep them inspired, and ensure they are continuously improving on sustainability priorities and being held accountable to track progress against clear and measurable KPIs.

Lendlease, an international real estate group, is a great demonstration of organisation leadership engaging the right people across all levels to create influence within their own sphere. They have appointed Sustainability Champions across project teams that own the sustainability initiatives from end-to-end and focused on going above and beyond in driving sustainability practices at project sites. This group of Champions are the key in instilling new mindsets and spurring behaviour change.

The leadership required to reach Singapore's aspirations must also be collaborative. No organisation can do it alone. No industry can do it alone. Not even one nation can do it alone. All ecosystem players must be willing to work together. Rather than competing against one another to gain a potential advantage, organisations should join forces for mutual gain and greater impact. Only then can we fully maximize the benefits and mitigate the risks of the sustainability transition.

We see this attitude clearly reflected by Singtel. In their view, collective action towards sustainability is often seen by companies as a dilution of brand, but is in fact an opportunity to problem-solve and share lessons together as a sector, providing cost-leverage to the entire ecosystem towards a common goal.

Spotlight: Singtel

Scaling the sustainability learning curve

Singtel was one of the first companies in Singapore to put in place common ESG-related KPIs for all their top management as part of their long-term incentive (LTI) plan. The focus on LTI KPIs was to drive a long-term mindset as ESG issues cannot be tackled overnight. In the subsequent year, people and sustainability was included as one of the four key strategic pillars in the company's "strategic reset".

This was accompanied shortly after by the launch of a new corporate purpose to "empower every generation" which enabled sustainability to be clearly linked to a bigger purpose.

According to Group Sustainability Vice President, Andrew Buay, "It is about helping to embed sustainability and ESG, not only as mindset and knowledge, but especially as accountability within the broader organisation."

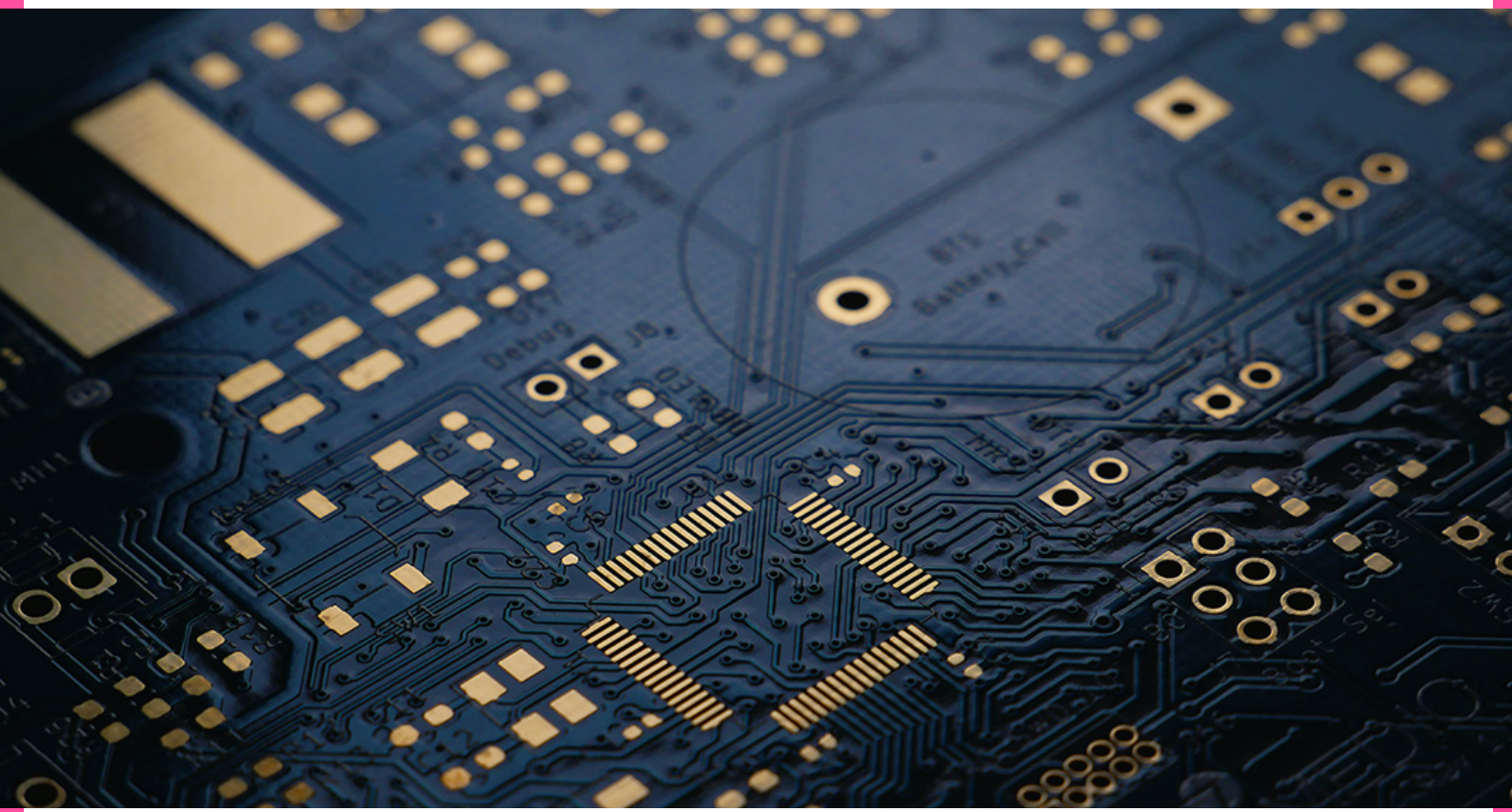
He recounts the ESG KPIs, strategic reset, and new group purpose as catalysts for accelerating Singtel's sustainability agenda. At the same time, Andrew believes that Singtel is still only at the "cusp of the transition". For him, true sustainability can only come about from all employees being passionately driven by purpose and social responsibility, and applying their technical and organisational knowledge towards creating greater environmental and social value for the company, its broader stakeholders, and customers.

Andrew also cautions that training in green skills and sustainability knowledge needs to come at the right time. "We tried to do it too early with online modules, and a lot of effort didn't work as we lacked some of the macro context in the early years before sustainability was externally topical, and before we had sufficient opportunity to involve everyone," he recalls.

There must be alignment between upskilling and the opportunity to apply these skills, otherwise the training quickly becomes "irrelevant". As such, Andrew believes that the best learning model to be successful is: 10% formal training, 20% experiential training, and 70% application. The experiential learning involves workshopping and ideating with the business on how sustainability can be executed in different parts of the organisation.

"The diverse topics in sustainability are all complex systems issues that cut across the organisation and the broader value chain we operate in. As such, to get an outcome and impact, people need the ability to understand how the whole organisation works, its culture, operating model, governance, accountabilities, and interdependencies, including with external stakeholders. While you can learn about the theory, you've got to, in many ways, integrate it and adapt it to how things are being done," notes Andrew.

With this approach, companies can not only train and leverage existing talent within the company, but also strengthen personal accountability towards achieving an organisation's sustainability goals. This is critical because there will always be an external shortage of people readily trained and experienced in sustainability.



Finally, organisations must keep in mind that shifting the thinking on sustainability is a major cultural and change management exercise – one that will be as total and far-reaching as the digital revolution. To make this transformation truly successful, companies will need to go far beyond simple surface-level adaptations, and make deep and purposeful changes to their very DNA.

Tapping technology to unlock sustainability's full business value

Digital and green technologies have a critical part to play in making Singapore more sustainable. Organisations looking to move up the sustainability maturity curve can accelerate change by make use of the many tools at their disposal to enable and accelerate their ESG efforts.

> *Sustainability is becoming the forcing function of digital. You cannot track and commit to a sustainability target like net zero until you have created the digital thread to understand the past and present, enabling you to manage, measure, and automate processes.*
>
> **Digital Solutions Vice President**

Crucially, evolutionists are able to see beyond the common misconception that implementation of green technologies has to be cutting-edge and, by extension, expensive. Local business leaders emphasised that this does not necessarily have to be the case. In many instances, mature technology, like solar panels, can be a harnessed to facilitate many business use cases around sustainability in a cost effective way. Organisations should be less concerned about catching up to the bleeding edge of new technology development, and more focused on identifying commercially available technologies that can be applied to their specific ESG use cases.

Digital tools and data can also act as key enablers at multiple stages on the sustainability transition. They can be applied at the level of compliance and reporting, to gather and share data for the disclosure of sustainability targets, accounting of emissions, and other data-driven sustainability initiatives. Accenture research also shows that AI, cloud, blockchain, analytics, IoT, and more can be significant contributors to reducing carbon emissions. AI is a particularly powerful tool: of the companies in our sustainable tech survey that successfully reduced emissions in production and operations, 70% used AI to do it[22].

One of the sustainability leaders we consulted, Lendlease, is leveraging digital technologies to support more sophisticated use cases, including reducing energy usage during operations, building digital twins for design simulations, and analysing materials data to reduce embodied carbon during construction.

Haleon (formerly GSK Consumer Healthcare business), is another company that sees digital technology as a "game changer" for addressing climate change, with key applications in their business across manufacturing practices, sustainable sourcing, and packaging to enable circularity.

For a closer look at how digital technologies can accelerate the green transition in the built environment, see pg 53.

Digital can also be an important driver of cost efficiencies. Applying digital skills to improve sustainable technology and solutions helps increase their cost-effectiveness and can unlock valuable efficiencies for a business.

Spotlight: Atelier Ten

Plugging into digital for greater sustainability

Technology is critical in enabling companies within the built environment (BE) sector to scale sustainability within their operations and services. For global environmental design consultant Atelier Ten (A10), digital tools like Building Information Modelling (BIM) are "absolutely essential" for the design and construction process. In particular, A10 Director Henry Woon points out that Singapore buildings are highly optimised in their performance because of the top-end design tools and digital capability that has been put into the design process.

Even then, "there's so much depth that we can go into that we have still yet to deploy; it hasn't been fully optimised," admits Henry. Speaking about the potential for AI and digital twin capabilities to be applied in design and construction performance, he believes that technology can enable improved productivity of buildings, as well as reduce their overall carbon footprint. That's largely by improving performance on material checking and embodied carbon.

A10 has exemplified how technology and innovation go hand-in-hand to push the boundaries of sustainable green building design. Their iconic Gardens by the Bay project features photovoltaic panels that produce enough annual power to light the Supertrees, and uses horticultural waste (a zero-carbon fuel stock) from Singapore's National Parks to generate electricity and heat to minimise operational carbon footprint for the gardens. With companies like A10 integrating smart and sustainable capabilities, they are building Singapore as the City in Nature.

Flip the script on skills and capability

With a scarcity of labour and skills comes an impetus to think differently about the skills and capabilities required to advance ESG initiatives, and the best way to go about attaining them.

By flipping their thinking from a deficit-based to a strengths-based approach, organisations can start to overcome barriers related to talent and skills, with opportunities to top up and augment existing skills and experience with technical green skills if and where they might be relevant. This approach also acknowledges the importance relevant business acumen – including first-hand knowledge of an organisation and its processes, products, people, and customers – to drive and embed organisational change.

Many are already finding success by adopting a homegrown approach for filling sustainability related roles; for instance, the majority of chief sustainability officers (CSOs) we interviewed were internal hires. Leaders have good insight into what skills already exist across their organisation, and where they can top-up existing capabilities to best meet their sustainability ambitions.

Indeed, as organisations strive to advance their sustainability maturity, the requisite skills and attributes of their workforce also evolve. The foundational skillsets required to thrive in the sustainable future of work aren't just built around hard-and-fast technical green skills. Instead, we see organisations evolving to a richer skills palette, where business acumen, soft skills, and digital literacy form an integral part of the essential skills to needed to thrive in the future of work, alongside occupation-specific technical capabilities, and underpinned by change management.

Skills Palette for the Green Economy- It's not "the" job; it is every job

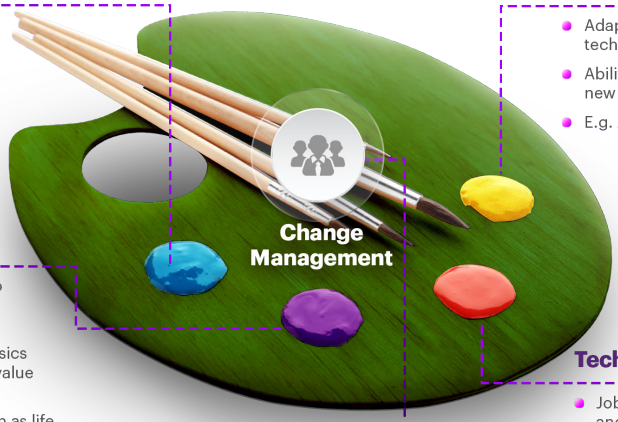
A future-proofed skill model that redefines the foundational skillsets required to thrive in the future of work. Business acumen, Green skills as well as digital literacy are an integral part of essential skills to perform jobs along side occupation-based technical capabilities, and underpinned by change management.

Business Acumen

- Understand business strategy, company's products and/or services, and its financial metrics
- Ability to sense market orientation and find new business opportunities
- E.g. Entrepreneurship, strategic thinking

Digital Literacy

- Adapt, manage and integrate technology based on job needs
- Ability to learn continuously through new technology applications
- E.g. Agile, digital transformation



Green Skills*

- Engineering and technical skills to design and construct sustainable developments and projects
- Science skills stemming from physics and biology, including related to value chains in utilities
- Operation management skills such as life cycle management and lean production
- Monitoring skills encompassing technical and legal aspects of environmental compliance and monitoring

Technical Capabilities

- Job-specific technical knowledge and expertise, functional driven
- Can be learned through on-the-job experience or structured learning
- E.g. Programming, Graphic Design

- Ability to drive mindset and behaviour shifts both at individual and organizational level
- Ability to see change as an opportunity to grow and innovate, identify key areas for change to improve efficiencies
- E.g. Leadership, stakeholder management

***Source:** United Nations Industrial Development Organisation; https://www.unido.org/stories/what-are-green-skills

Different roles, whether green or greening, and depending on their nature, will require talent to draw from different parts of the skills palette. For example, a business development manager will likely need more business acumen plus foundational green knowledge and skills, compared to a process engineer who will require more technical and green skills.

Thriving and inspiring leaders move beyond sustainability being the responsibility of people in designated roles. They make sustainability a part of their DNA, embedding sustainability horizontally across all levels and roles. They shape an environment where everyone understands what the organisation's aspirations are around sustainability, and their individual contribution to these goals. They also cultivate a culture of continuous learning and improvement, encouraging employees to keep developing their skills, and provide a safe and trusted environment where people feel empowered to apply their new skills.

> *"We expect to see the green wave touch every job. Different work functions from branding and marketing, to communications, finance, engineering, and operations will require new skills and knowledge in the green economy."*
>
> **Chelvin Loh**
> **Director of Jobs-Skills Insights Division, SkillsFuture Singapore**

Case study: Marie Cheong

Accelerating the green transition with transferable skills

For Wavemaker Impact (WMi) Founding Partner Marie Cheong, a career in the green economy had an intensely personal motivation: her five-year-old son. Thinking about his future spurred Marie to start reading about the climate crisis. And, as Marie learned more, she thought: "How can I dedicate the rest of my professional career to doing something about this?"

With WMi, Marie is certainly leading by example. In less than a year since its launch, the company has already set up three climatech ventures, and has identified dozens more candidates for future investment. Meanwhile, Marie's accomplishments with WMi are challenging assumptions about what skills are needed to lead the sustainability transition.

Instead of the typical research and policy path into sustainability, she spent most of her career in business development, management consulting and startups, working for companies like Kier Group, KPMG, and ENGIE. By focusing on things that she knew and making that her starting point, Marie went from "I didn't know anything about the space," to getting to "spend the rest of my career building startups that decarbonize the world."

This passion translates into Marie's mission at work to help WMi build a portfolio of high-growth companies with the potential to abate 10% of the global carbon budget. "I wake up every morning loving my job," she says.

Despite her success in her new greening job, Marie notes the pivot into the environmental and sustainability sector was not a walk in the park. “It took all the founding partners of Wavemaker Impact three or four years of their own climate journeys to understand the space,” she shares. “I was also very fortunate to join ENGIE, one of the largest renewable energy developers in the world, in their innovation and venture arm in APAC, where we built 10 climatech ventures, which gave me a fantastic foundation in the energy transition.”

Nonetheless, when asked about what skills are needed to be good at impact investing, Marie lists only three things: curiosity, an open mind, and willingness to learn. In fact, to her, it’s “all of the skillsets that one has prior to joining us that are incredibly valuable.”

When it comes to growing a green workforce, companies need to focus on finding and attracting individuals who are not only inherently passionate about solving sustainability challenges, but fundamentally capable of adapting and applying their existing skillsets towards this goal. Often, all it takes is a push in the right direction towards areas with the largest impact—leadership that investors like WMi strive to provide. As for individuals, making the transition to a green or greening job is more than just positioning yourself well for the future, but a way to do better work more meaningfully to build a sustainable future for generations to come.

Spotlight:

Accenture Sustainability Academy

SQ is the new IQ: building a green workforce

Modelled on the successful Technology Quotient training that maintains the digital acumen of 750,000 employees globally, Accenture launched the Sustainability Academy in March 2021, providing cutting-edge self-paced online modules to educate and elevate the 'Sustainability Quotient' (SQ) of all our global employees.

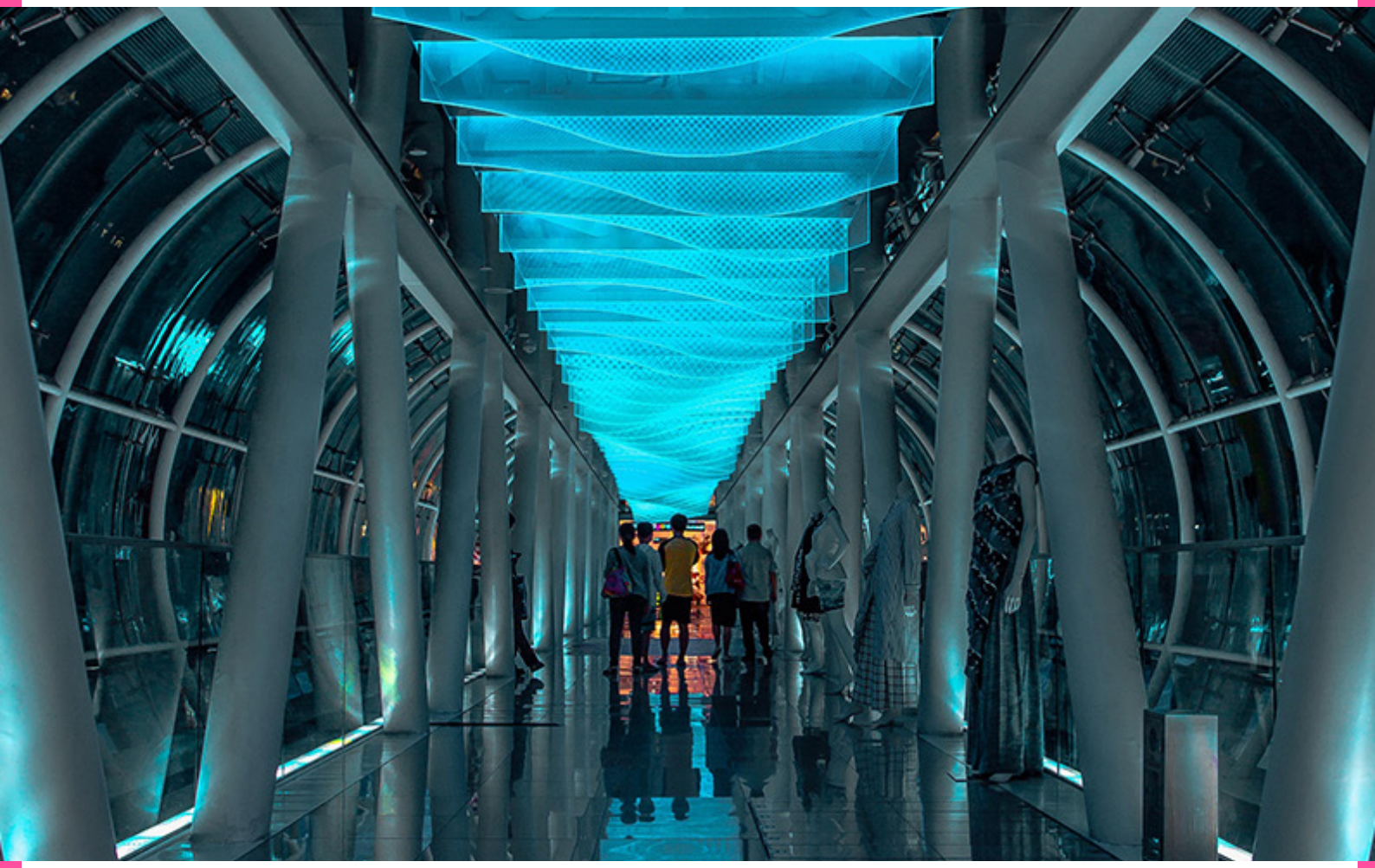
"We're embedding sustainability into everything we do, from helping our clients achieve their sustainability goals to reinventing how we do business at Accenture," says Accenture CEO Julie Sweet. The Accenture leadership felt that the sustainability journey must begin at home and this is the genesis and vision behind the SQ learning program.

In all, the SQ Learning curriculum comprises: Sustainability Foundations of bite-size video and other content hosted on Accenture "Learning Boards" (visual, curated content collections); a core of self-paced courses to help learners become "conversant" in key SQ topics such as carbon footprint and emissions reduction, circular supply chain, and green software; External Collaborations to aid in becoming "job ready" including academic partnerships with Oxford and the Massachusetts Institute of Technology (MIT); along with a broad range of resources and tools complementing the formal learning.

Since the SQ program's deployment in March 2021, 79,000+ course modules have been completed, covering more than 562,000 hits on on-demand video lessons and digital books covering a myriad of business-centric sustainability topics. An impressive 114,604 hours of training have been recorded on the portal as of April 2022.

Learning by doing is another way that Accenture is building a green workforce with the necessary skills to drive the sustainability transition. Accenture has developed a Sustainability Innovation Challenge, a 6-month competition, and the Social Innovators Accelerator program to harness expertise for our employees with the support of leading private sector, non-profit, academic, and client stakeholders. The goal is to design market-ready solutions to deliver tangible impact and shape a more sustainable future by addressing seven challenges (Future of Sustainable Consumers, Future of Energy, Future of Climate Resilient Communities, Future of Food, Future of Sustainable Software, Future of Net Positive Water, and Future of Climate Action Education).

By taking a strengths-based approach to upskill the existing workforce and create a culture of continuous learning and innovating, Accenture is embedding sustainability into everything we do, and with everyone we work with, creating both business value and sustainable impact.



Cultivating collaboration across the ecosystem

As large multinationals themselves, many of the thriving and inspiring companies we interviewed highlighted the need for MNCs to blaze a trail for others. With more resources, global reach, and greater exposure to sustainability, MNCs have a crucial role to play in advancing the sustainability agenda – as well as important lessons to share with other organisations.

Know-how and best practices are perhaps some of the most useful assets that MNCs can lend to the green transition. The ability to tap into a shared pool of knowledge and resources would be a valuable accelerator for other companies, allowing them to access information, skills, and capabilities that they might find difficult or otherwise impossible to acquire on their own.

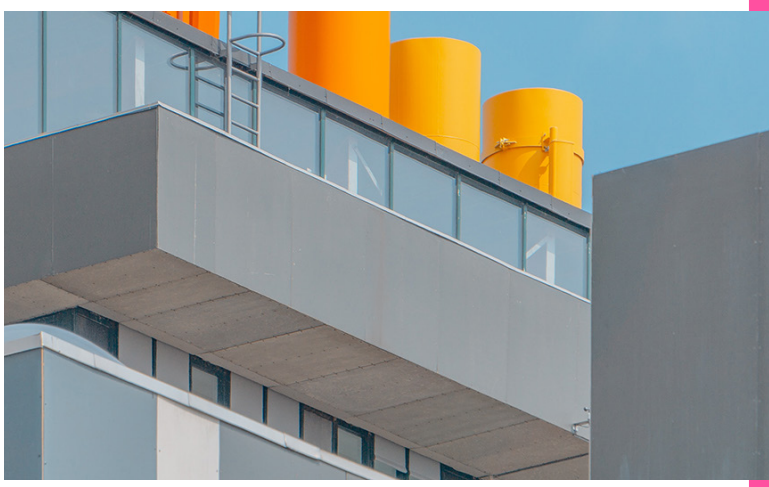
Singapore currently stands at a relatively early phase in its sustainability evolution, where there is still much to be learned by all ecosystem players. At this point, fostering a culture of sharing and learning will be vital to driving sustainable development – and our thriving and inspiring leaders believe government should be steering this effort. By encouraging greater collaboration on sustainability among industry players, even traditional competitors, we can move faster towards shared success.

Spotlight: Schneider Electric

Greening the supply chain

Schneider Electric believes that sustainability is more than just a brand image, it means embracing the full environmental, social, and corporate governance (ESG) spectrum. And as Vice-President for Sustainability and Strategy, Jackson Seng emphasises, they do indeed "walk the talk". Besides having numerous sustainability initiatives, such as a climate consultancy team to build an internal decarbonisation pathway and an innovative climate-tech investments arm, Jackson believes that the company has a larger role to play in leading the industry in this transition. "We need to make sure that we have some programme or initiative to clean up our supply chain as well, otherwise our story as a sustainable company will not gel with the customers."

So, as part of their Schneider Sustainability Impact (SSI) program, the Zero Carbon Project brings the company's top 1,000 suppliers together and helps them set and achieve their own carbon reduction targets. The end goal is to reduce suppliers' carbon footprint by 50% in 5 years' time between 2021 and 2025. This is how Schneider's sustainable procurement policy is influencing the greening of the supply chain for the whole of the digital automation industry.



Spotlight: CDL

Leading the way for others to go green

Ranked as the world's most sustainable real estate management and development company for the fourth consecutive year, and fifth on the list of the Most Sustainable Corporations in the World (Corporate Knights 2022), City Developments Limited (CDL) is a shining example of Singapore companies taking the lead on going green. But even large MNCs like CDL can't drive the wider sustainable transition all on their own. With 99% of all businesses in Singapore being SMEs, how can the skills and knowledge barrier for sustainability be lowered to bring them along in the green transition?

CDL's Chief Sustainability Officer, Esther An, believes that MNCs need to take on a leadership role to create an ecosystem that drives collaboration and knowledge sharing across the whole economy. "We are talking about saving the world, not about selling a car or a product. We can't just do it alone. You need to collaborate with partners and stakeholders who share a similar vision – not just within your own company, your own industry, or your own country," she emphasises.

That's why CDL has launched numerous initiatives to help others follow in their footsteps. For one, they have an open-access resource platform that provides transparent records of their sustainability reports, value creation model, and green community initiatives, including the Women4Green and Youth4Climate networks. In addition, CDL set up the Singapore Sustainability Academy (SSA), Singapore's first ground-up initiative and zero-energy facility dedicated to advocacy, thought leadership, collaboration, and capacity building for climate action, in support of global sustainable development goals (SDG's) and national climate goals. This People, Public and Private (3P) initiative is an extensive partnership involving six government agencies and 15 founding industry and non-governmental organisation partners. Since its opening in 2017 to date, the SSA has organised over 700 sustainability-related training programmes and advocacy events that have reached more than 23,700 people.

In partnership with Global Green Connect, CDL also launched Sustainability Connect, a platform to connect and empower sustainability professionals amidst growing demand for ESG training in January 2022. This collaboration expands CDL's focus on capacity building and aims to equip sustainability professionals with practical knowledge, helping them to scale up their skillsets and support their employers to future-proof their businesses.

Meanwhile, Esther also sits on numerous board committees, including Global Reporting Initiative, GRESB Foundation Board, World Green Building Council Corporate Advisory Board, and most recently the Singapore Sustainability Reporting Advisory Committee, allowing her to share her knowledge and expertise to help others in their sustainability journey.

In leading by example and sharing crucial guidance gained from its own journey, CDL serves as an important beacon of sustainability that's lighting the way for many more businesses to go green.

SMEs in the spotlight

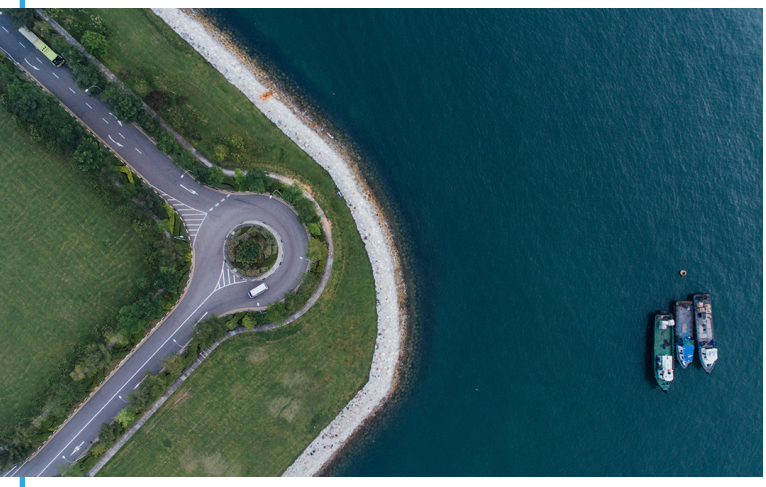
Whilst we can take inspiration from the actions of sustainability leaders, the reality is different for many SMEs in Singapore. They face unique hurdles on their green journeys, and will require more time and support to develop their sustainability maturity

SMEs are the engine room of our economy, making up 99% of businesses and employing over 70% of the population in Singapore. They already play a vital role in value chains and industry ecosystems. If SMEs are not included in the green transition, we will lose out on the vital contribution of their niche expertise and agile mindsets – and that puts the wider sustainability movement at risk.

Yet SMEs face a particularly tough road ahead when it comes to getting on board with Singapore's sustainability movement, and reaping the benefits of this evolution. That's largely due to the fact that smaller organisations often lack the global agendas to drive the necessary mindset and planning for sustainability initiatives. They're also limited in terms of the resources needed to navigate a complex landscape of sustainability related support schemes and incentives, as well as build the requisite skills and capabilities for the green transition.

Below, we dive deeper into the unique hurdles that SMEs face on their sustainability journey. But first, it bears emphasising that with the right strategies and support, these barriers can be overcome – and SMEs shouldn't let fear paralyse progress towards a greener future.

After all, the pace of both regulatory change and public sentiment around sustainability are changing fast. Companies that don't act on ESG priorities will soon find themselves on the wrong side of regulation and in a weaker position to attract the talent they need. Even more crucially, SMEs have everything to gain from growing their sustainability maturity. New and sizable value pools are opening up in this space, and companies who commit to making the shift stand to gain a great advantage in terms of new business opportunities and revenue streams.



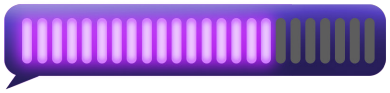
Shifting the thinking

As a whole, SMEs face greater difficulty in making the mindset shift needed to advance from surviving to thriving and inspiring. They might consider the risk of pursuing ESG initiatives to be larger, due to their comparatively smaller size and tighter fiscal situation. Many SMEs are also still in survival mode following pandemic-related disruption, and sustainability might not be viewed as a top priority at present.

Recent research from UOB supports this view, revealing that 40% of SMEs still do not believe it is important to incorporate sustainability practices in their businesses[23]. Among those that do, government and industry regulations were lower down their list of motivations, with reputation and branding being at the top.

Outsize focus on reputation-driven motivations could be holding back the wider business from getting on board with ESG initiatives. Research by Accenture in collaboration with the World Economic Forum tells us there's a disconnect between leadership and employee perceptions of sustainability planning and progress[24].

Executives



68%

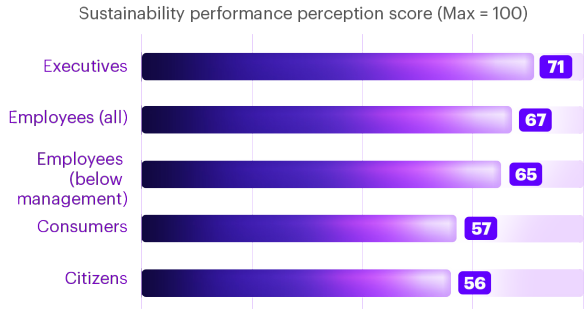
Say they have developed a "robust" sustainability plan.

Employees

21%

Say their employer's commitment goes beyond the "superficial".

Executives rate the sustainability performance of their organizations higher than other stakeholders



Source: Accenture in collaboration with the World Economic Forum, Shaping the Sustainable Organization (2022)

This disconnect can create cultural change issues, making it difficult for the broader organisation to feel aligned with organisational values, and limiting their ability to contribute to building a business that can thrive in the green economy.

When it comes to shifting the mindset on sustainability, SMEs could also face similar challenges to those linked to digital adoption, as identified in behavioural science research from Xero[25]. This research revealed an "adoption gap" among small businesses, stemming from "several behavioural barriers – mindsets and perceptions about technology and change." SMEs' beliefs about the utility of ESG initiatives and concern over the perceived complexity and cost such undertakings could be a huge hurdle to advancing the sustainability agenda.

Navigating a dizzying array of options

Organisations in Singapore have a host of support schemes at their disposal, from the $50 million SG Eco Fund to the Grant for Energy Efficient Technologies (GREET) and the Sustainable Bond Grant Scheme.

However, many SMEs lack the necessary awareness of available grants and schemes, as well as the resources to leverage them to best effect. In fact, according to UOB's SME Outlook study, among the biggest challenges cited in implementing sustainable practices is insufficient knowledge to identify and to execute relevant initiatives for the organisation (43%)[26].

Even when SMEs are aware of the different support schemes available to them, choice paralysis can still pose a significant barrier. Drawing parallels with digital transformation, it is not uncommon for businesses to be overwhelmed by the volume of information and options available on their organisational green transition.

These challenges tend to go hand-in-hand with financial constraints, concerns about upfront costs and about sustainability's impact on profits, which also feature in research undertaken by Accenture in collaboration with UOB[27]. Speaking with business leaders, they observe variation in the ability of their peers across the economy to independently identify and evaluate viable sustainability market opportunities and sustainability investments – like they would any other commercial opportunity or investment. This can stem from uncertainty about the size of addressable markets, access to capital, value of benefits, and future of regulatory environments that may impact viability.

"There's just so much opportunity in sustainability. And there is a return to invest on skill set and expertise in sustainability as well, because if you interpret it right, and then if you actually strategize it correctly, sustainability very often doesn't necessarily need to cost money. [You] don't necessarily need additional investment to achieve sustainability goal[s]."

Henry Woon
Director, Atelier Ten

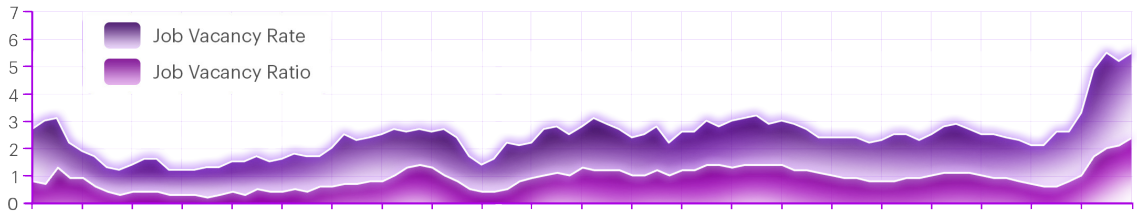
Bridging the skills and capability gap

Achieving sustainability demands action. An organisation's capacity to act largely depends on its ability to access the right skills and capabilities, and deploy them effectively. Historically, Singapore has been able to draw talent from other countries to meet its aspirations.

However, more recent labour market dynamics, including border closures and labour shortages caused by COVID, present considerable challenges when it comes to attracting the right talent. Labour supply remains a pressing concern, with job vacancies jumping 160% since the beginning of 2020, even as unemployment returns to the pre-pandemic baseline.

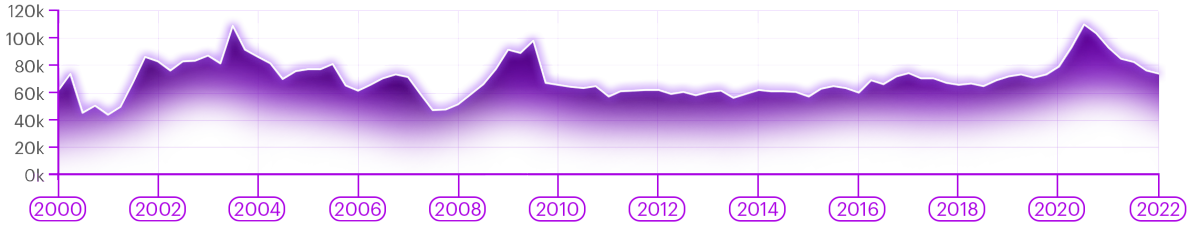
Vacancy Rate

Seasonally adjusted job vacancy statistics. Job vacancies rate is the percentage of vacant jobs among the total demand for labour; job vacancy ratio is the number of unemployed persons per vacant job



Unemployed Residents

Seasonally adjusted unemployed persons (Thousands residents)



Source: Accenture analysis, SingStats data

Labour and skills shortages are felt more acutely by SMEs, and these organisations also face a tougher battle when it comes to bridging the gap. The reality is that MNCs have priority pick of skilled labour thanks to their scale and enhanced networks. They can also afford the higher price that in-demand green skills command—something that smaller companies with limited hiring budgets cannot match.

SMEs may also find it more challenging to access the training needed to equip their workforce with relevant green skills. In fact, 39% of participants in UOB's SME Outlook study cited inadequate non-financial support, such as sustainability training, as one of the main obstacles to implementing sustainability practices[28].

Compounding the skills acquisition challenge is a lack of knowledge about and exposure to digital tools and green technologies that can be leveraged to accelerate the sustainability transition for companies. This relates both to understanding the impact of current technologies in use, and identifying tools and technologies to enhance the sustainability of operations and products. In many cases, organisations also struggle to deploy and use such tools in a cost-effective way.

These challenges can be especially burdensome for SMEs, who already tend to be slower to adopt new technologies, and less likely to invest in more sophisticated solutions[29]. Without a clear understanding of what technologies are available and how they can enable sustainability efforts, companies may overlook the cost play and connected business opportunities that technology can deliver. This can hold enterprises back from tapping into technology's multiplier effect when it comes to advancing ESG efforts, further slowing SMEs' journeys to a more sustainable future.

While it's undeniable that the barriers to advancing sustainability maturity are felt more strongly by SMEs, they are certainly not insurmountable

Local businesses like Greenpac have already been blazing a green trail for years, showing that size doesn't have to stand in the way of sustainability goals. And Yan San Metals offers a similarly valuable example of how a change in mindset can be the catalyst to bring about new viable business opportunities.

While SMEs may be smaller in size and resources, they have huge strategic value as incubators and accelerators for sustainable innovation. When correctly leveraged and supported, this can create significant impact in the green transition. That makes it especially vital for government and industry leaders to recognise the potential of SMEs, and to connect them with the knowledge, resources, and opportunities that can help them create greater gains for planet, people, and profit.

Case study: Yan San Metals

Small but mighty: the SME sustainability story

Yan San Metals (YSM) got their start in the aluminium manufacturing sector, and are now expanding business operations in greener directions. After recognising that pursuing a greener portfolio presented opportunities to create greater business value, the company was motivated to diversify from its core function and start up a successful sustainability-based subsidiary, the Singapore Indoor Farm (SIF).

SIF is an agricultural company that was born out of a simple aim: YSM founder Don Quah's wish to maximise the resources he already owned. "There's about 20% of redundant space in my factory. So, my strategy is: how do we utilise this 20%?" With that, Don invested in building the 1,200 sq ft indoor farm that is now located on the top floor of one of YSM's factory spaces.

But it took some serious commitment, as well as trial and error, to get there. With no prior agricultural knowledge or training, Don spent two years visiting vertical farms in other countries to learn how their growing racks work, and subsequently making numerous reiterations and modifications to refine the technology for SIF.

His hard work and dedication to learning the fundamentals of vertical farming has indeed paid off. Today, SIF feeds 75 of YSM employees, and donates the remaining harvest from its farms to people in the heartlands. However, the real value is the technology that Don has created from learning about sustainability and developing technical know-how over time. "Instead of selling vegetables, we want to sell the racking system," he says. When it comes to building a sustainable business, SIF's example shows that there are double benefits: it allows you to serve a social and environmental good, as well as develop opportunities for future commercialisation.

Don's astute business acumen and eye for opportunity also led him to invest in Bluefield Renewable Energy (BRE), which focuses on waste-to-energy offerings. BRE's flagship solution is a waste handling machine that cooks waste and turns it into useful resources. For example, waste is processed into biochar, a type of fertilizer; and also produces Syngas, a mixture of hydrogen and carbon monoxide, which can be routed into a generator to create electricity. Just as with SIF, Don obtained critical know-how from overseas, bought a machine, modified it, and now, he can sell renewed "waste."

Both businesses are living proof that sustainability can be profitable. "A lot of people thought that starting any business is cost plus. You must think of how you do it costs minus. The mindset is very important," says Don. And, borrowing some lessons from him, the key ingredients for success are simple: knowledge, innovation, and technology. It's about taking time to learn the basic know-hows, especially from overseas, and to understand the entire value chain. In doing so, a green entrepreneur can build the necessary knowledge foundation upon which they can apply innovative skills, and leverage relevant technologies to achieve more efficient operational outcomes.

Case study: Wavemaker Impact

Scaling sustainability by building businesses

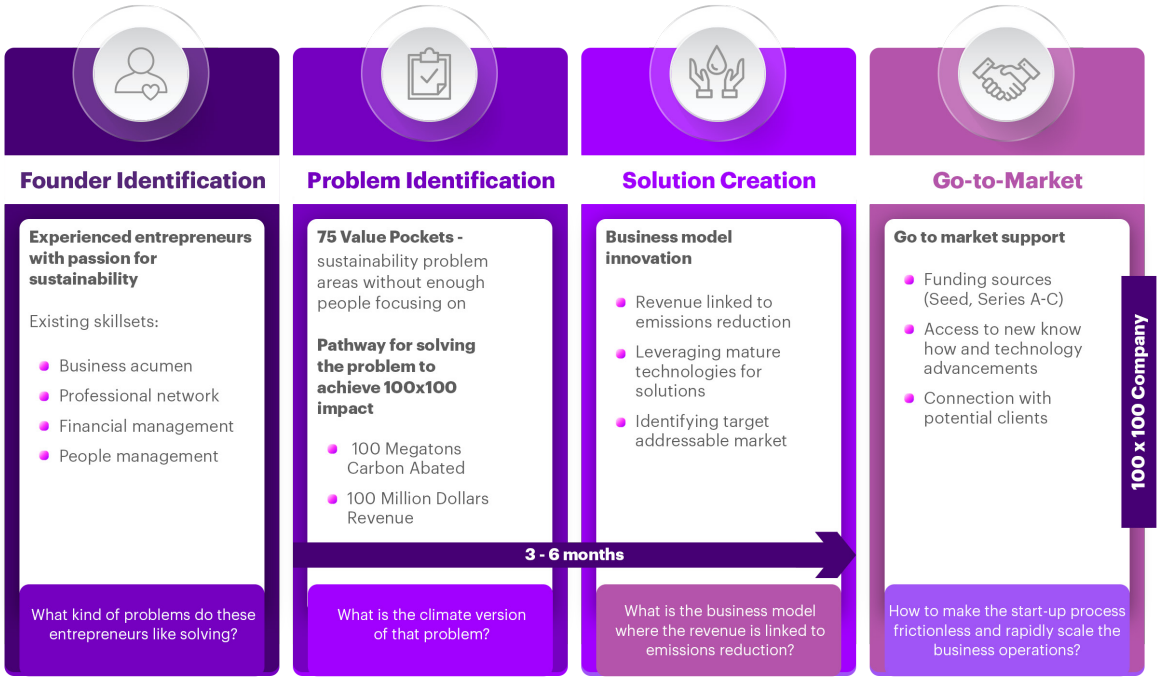
Green growth in Southeast Asia has huge climate-saving potential. In fact, the region can be a green superpower in the years to come[30]. Not to mention, the green investment opportunity for the region is worth an estimated S$2.7 trillion dollars[31].

As Southeast Asia's first VC-backed climate tech venture builder, Wavemaker Impact (WMi), believes that people, or more specifically, sustainability entrepreneurs, are the key to unlocking this planet-protecting, profit-making opportunity. How? By building 100x100 companies. That is, companies with the potential to abate 100 million metric tons of carbon at scale, and also be 100-million-dollar businesses.

"Why I think it's so exciting to do it in Southeast Asia is because market fragmentation and inefficiency means that there's a lot of these value pockets hanging around," says WMi Founding Partner Marie Cheong. WMi has already identified 75 potential pockets where it's possible to build 100 x100 companies, and has already launched three new climatech ventures. The team focuses its efforts in five key areas: land-use and carbon sinks; agriculture and food; transport and fleets; industrial processes; and electricity for buildings and industry. The goal? Proliferate sustainable development in the region to reduce 10% of the global carbon budget by 2035.

WMi's "founder-problem-fit" approach starts with identifying experienced entrepreneurs with existing business acumen and a passion for solving a specific sustainability problem. "We work with them over a period of three to six months to build conviction over a business model where the revenue of the startup is linked to emissions reduction in some way, shape, or form," explains Marie.

Wavemaker Impact's Founder-Problem-Fit framework - making sustainability start-up process frictionless



A big part of their process includes leveraging mature technologies in their sustainable solutions, coupled with a strong focus on business model innovation. So, how does WMi use commercially available tech to create business models that make the unit economics of sustainability solutions more interesting? Their first investment, Agros, offers a powerful example of just that. The company is working to decarbonise smallholder farmers in the region by replacing diesel-powered irrigation with solar-powered irrigation. Through this sustainable innovation, Agros aims to help 2 million smallholder farmers increase their annual income while reducing 100 megatons of carbon per year – and make $100 million dollars in the process. For every dollar of revenue that Agros earns, it's linked to emissions savings. It's a great showcase of the 100x100 pathway that WMi helps develop.

WMi also helps to provide companies with access to the know-how, technology, and funding they need to bring their innovative and commercially viable environmental solutions to the market. For them, it's about making the start-up process as frictionless as possible for green entrepreneurs to rapidly establish and scale their business operations and sustainable impact. By facilitating the creation and scaling of impact start-ups in Southeast Asia, WMi are leaders in enabling green innovation to drive the sustainability agenda forward.

Our research has identified that there are a range of problems to solve if SMEs are to fulfil their vital role in Singapore's sustainability story. Removing these friction points in a practical and integrated way will enable SMEs not only to comply with evolving regulation, but stay competitive and capitalise on opportunities for growth through this transition.

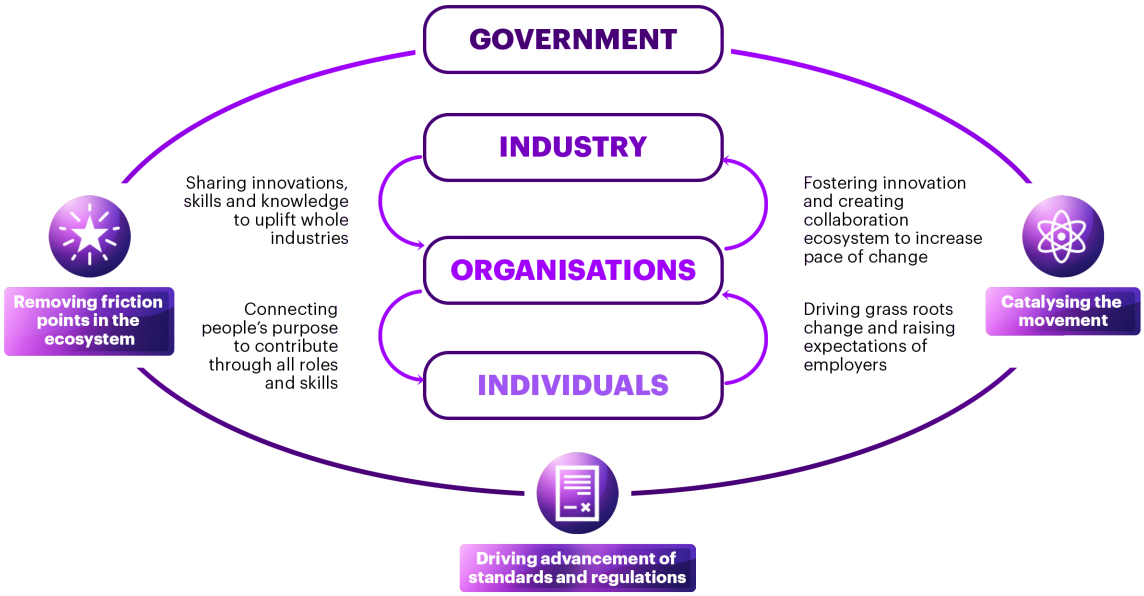
Bringing SMEs along the sustainability journey starts with removing their key friction points

Why should SMEs care?	Comply with evolving regulations	Stay competitive in the market	Capitalise on sustainability for growth
How can they be supported with a frictionless experience	• Tailored policies/ incentives/fundings to specific industry needs • Coaching support for SMEs to enable more seamless navigation • Access to high quality carbon credits at reasonable cost points	• Exposure to green technologies • Exposure to green materials • Access to industry related sustainability experts • Access to readily available data across the industry • Accreditation for developing green fingerprint	• Exposure to new value pools and addressable markets that are ripe for business opportunities • Consistent awareness campaigns to drive the mindset shift

Everyone has a role to play in Singapore's sustainability story

There's no green bullet where sustainability is concerned – success depends on combined action across the ecosystem to accelerate change

Realising Singapore's sustainable potential will take collective action and initiative at all levels, from government and industry leaders to organisations and individuals. Everyone has different ways to influence and different roles to play in affecting change.



Our research and insights from local sustainability evolutionists in Singapore, as well as those abroad, has distilled immediate actions that can be taken to journey towards new sustainability horizons. We divide these actions by target group, looking at the specific impact to be made by government, industry, organisations, and individuals.

Government: Integrated enablement

Singapore's government has demonstrated a clear commitment to sustainability, including through the development of the Singapore Green Plan and the creation of numerous incentives and subsidies for SMEs to access sustainability-related training and financing.

However, these initiatives and advances alone may not be enough to drive the scale of change that is needed. While regulation and funding continue to be important interventions, the role of government can evolve to adopt a more integrated approach to drive mindset change and catalyse action across the ecosystem, tailored to the contexts of different industries.

For a closer look at practical actions to progress to enable a thriving built environment sector, see pg 53.

Leadership and messaging from government can help to drive the mindset change required, by addressing misconceptions and tapping into the commercial and entrepreneurial motivations of SME leaders across the country. This is about tailoring messaging to be less about environmental imperatives and more about the importance of greening not only to remain viable, but to stay competitive and to drive growth.

Translating intent and motivation into action still has its hurdles. This is where the government can catalyse the ecosystem by removing friction points that make it harder for SMEs to access high quality knowledge and capital to proceed on this transition with confidence and with a higher chance of success.

A clear plan of action is needed to engage the entire ecosystem and ensure that SMEs are included and central to Singapore's green transition. Key considerations for government should include shaping a trading agenda and incentives that maintain the competitiveness and viability of SMEs, ensuring that they don't miss out on opportunities in the global green economy.

A key part of this is assisting SMEs to baseline their emissions so progress can be captured and certified. By contributing to trade competitiveness, this also increases SMEs' confidence in the likelihood of recouping investments in decarbonisation.

Similarly, any action plan must take into consideration that SMEs lack the scale and resources (like carbon offset credits, for example) to achieve net zero in the same way as MNCs, and will require a different approach to educate and support adoption and implementation.

Navigation support has proved successful in its application in the venture capital context for sustainability entrepreneurs, with the Wavemaker Impact model providing a framework of the type of approach that could enable SMEs to transition their businesses to thrive in the green economy. Key components include:

- Taking a founder-problem-fit approach to match strengths and acumen of founders with suitable product opportunities
- Identifying value pockets and addressable markets using industry and geography value maps
- Leveraging suitable and ready to implement technology solutions to hasten impact
- Linking drivers of profit to drivers of emission reduction
- Developing stepwise plans to enable efficient expansion through economies of scope and/or scale.

Practical solutions to drive sustainable SMEs

- **Sustainability as a service:** Equitable access to sustainability advice and support
- **Green registry:** Verification of products and services to enhance trade competitiveness
- **Carbon offset purchasing power:** Curating projects and striking deals as a collective, enabling SMEs to buy into a piece of the portfolio
- **Exposure to green technologies:** increasing knowledge of the availability, application and benefits of industry-relevant green technologies and materials

By shifting mindsets and avoiding friction points, SMEs will be ideally poised to take advantage of the skill and capability building programs and courses that are offered through SSG. As the national skills authority, one of their roles in supporting the Singapore Green Plan is through curating and ensuring adequate supply of CET courses for re-skilling and up-skilling across sectors and job functions.

> *"I think what the government can really do at this time [is] not so much about funding grants, but focus more on advocacy: educate people on the importance [of sustainability] and, through it, how that impacts businesses and impacts the economy."*
>
> **Susan Chong**
> **Founder & CEO, Greenpac**

Actions for government to take

Drive the mindset change by emphasising the commercial imperative alongside the environmental

Catalyse the ecosystem by removing friction points and tailoring responses and interventions to industry needs

Continue supporting skill development through high quality and cost-effective education and training opportunities

Industry: Collaborative leadership

In the green transition, Singapore's industries will miss the moment if everyone tries to go it alone. Industry ecosystems thrive where a diversity of organisations play their role, with smaller specialist enterprises supplying goods and services across value chains alongside large MNCs. In a strong industry ecosystem, competition should drive innovation and advance industry-wide progress.

Just as change management practices can inform approaches for organisations to shift the dial, they also apply in guiding leaders to drive change at whole-of-industry levels. This encompasses aligning the industry mindset and culture to one that fosters innovation and knowledge creation, as well as supporting the whole industry with the ability contribute to advancement.

This can be achieved through collaboration, mentoring, and sharing of knowledge and learnings. MNCs have a responsibility to bring SMEs along by setting expectations that align with the aspirations of the industry and by supporting access to talent, training and technologies so they can meet them.

Practical solutions to drive sustainable SMEs

- **Best practices hubs:** Setting up industry clusters where organisations can come together to share learnings and develop green capabilities
- **Demystifying knowledge sharing:** Campaigns, open communication, and collaboration initiatives, to dispel fears of losing IP and drive mutual exchange of ideas and information
- **Readily available data:** Industry-wide open-source data and knowledge bases to enable SMEs to undertake data- and evidence-driven evaluations of green investments

Actions for industry to take

Foster mindset shifts within industries

Lead by collaborating for impact across industry ecosystems, sharing information and data to advance innovation

Spotlight: Keppel Infrastructure

The whole is greater than the sum of its parts

One way to bridge the imbalance between demand and supply of green skills and innovation is collaboration between industry and academic institutions. This is exactly what Keppel Infrastructure has been doing for the past year with some of Singapore's top universities. Keppel have established a master research collaboration agreement and memorandum of understanding with the National University of Singapore (NUS) and Nanyang Technological University (NTU), respectively, to develop and scale up innovative clean energy and decarbonisation technologies[1,1].

These strategic partnerships are enabling Keppel to have input into early-stage R&D, stay ahead of the innovation curve for greater market competitiveness, enjoy first-hand access to a wide pool of green talent, and accelerate the translation of research into new products and services.

1: National University of Singapore, NUS News: Keppel Infrastructure and NUS collaborate to jumpstart smart grid, clean power, renewables and sustainable environmental technology solutions (2022), https://news.nus.edu.sg/keppel-infrastructure-nus-living-laboratory/
2: Keppel Infrastructure, Keppel and NTU Singapore collaborate to boost development of zero-emissions, decarbonisation and circular economy solutions (2021), https://www.kepinfra.com/en/news-item.aspx?aid=11338&title=keppel-and-ntu-singapore-collaborate-to-boost-development-of-zero-emissions-decarbonisation-and-circular-economy-solutions

Organisations: Alignment and activation

Organisational leadership is critical to driving the green transition, as the major catalyst and orchestrator of change within an enterprise. Moving from surviving to thriving requires the whole of organisation to be activated to contribute to this goal.

Creating a movement within the organisation starts with alignment on a shared vision. It's important to enable leaders at all levels to become catalysts, igniting enterprise transformation that's anchored to the organisation's shared ambitions and mission.

Once the whole organisation is aligned around the new purpose and direction, it's crucial to translate the vision into the structure, talent, skills, and behaviours needed across the enterprise for the transformation. In the meantime, through ongoing upskilling and coaching, organisations can activate people's mindset, behaviour, and new ways of working to create long-lasting and sustainable change.

The activation and empowerment of people and teams, driven by a shared purpose, accelerates uptake and application of new skills, processes, and systems to deliver change. Operationally, this is reinforced with KPIs, operating models, talent strategies, financing, governance structures, and reward systems.

> *"Change management is a core capability that we play close attention to. Starting from individuals, assuming the role of change leader to initiate change. Where are the business opportunities? Who should I partner with? How do I create a compelling narrative?".*

Dr Soon Joo Gog
Chief Skills Officer, SkillsFuture Singapore

Actions for organisations to take

- Establish your mission and aspirations with sustainability at the core, which speaks not only to the what, but the why
- Flip the script on skills by rethinking your organisation's assets, and how these can be leveraged and augmented to realise the mission
- Align on the mission by cascading down through levels and teams, activating the organisation with clarity about what role each person can play
- Reinforce with KPIs, operating models, talent strategies, financing, governance structures, and reward systems
- Play your part in your industry ecosystem, connecting and creating networks and clusters of likeminded peers and mentor organisations to start sharing knowledge and learnings

Individuals: Reframing

It's evident that a thriving green economy in Singapore will require a diverse range of roles along a spectrum of green skills intensity. What this means for individuals is that it's not just about "green" jobs: all jobs can contribute to Singapore thriving in the new green normal. This is about seeing green skills as an augmentation, not necessarily a requisite foundation, for individuals to play their part in the green economy.

And just as individuals can reframe their own role in the transition, history has shown us the power of individuals collectively driving change in organisations and institutions. This can take the form of grass roots campaigns to raise expectations and change practices of who you buy from, and who you work for.

Actions for individuals to take

Use a holistic and strengths-based approach to reframe your current skills and role

Adopt a growth mindset: engage in lifelong learning and share experiences and knowledge with your peers

Follow green skills courses, such as the SSG's SkillsFuture Series of training programmes, to stay relevant and prepare for the future

Keep up-to-date on green skills and industry trends to guide your skills development and stay informed about new and emerging roles; SSG's Job-Skills Insights, for example, offers an umbrella of resources into skills demand

A range of resources are available for those wanting more information about training and skilling opportunities in Singapore:

- https://www.skillsfuture.gov.sg/-/media/Skills-Report-2021/Skills-Reports-Brochures/SSG-Skills-Report_Green-Economy.pdf
- https://linktr.ee/greeneconomy/courses
- https://go.gov.sg/jsi-webinar
- https://skillsfuture.gov.sg/skills-framework

Now is the time

The barriers that we face in moving to a thriving green economy are not insignificant, but equally not insurmountable. The time to be daunted has passed – it's time to be energised to take action, given the enormity of what's at stake.

If we look back over our history and what we have overcome as a nation, we should be buoyed by our achievements and triumphs from rallying together and rising to the challenge. Every time we put our mind to it, our ingenuity, talent, and pioneering spirit has seen Singapore succeed and inspire our peers in the region and around the globe.

Our green transition is no different. In fact, it may be the most important challenge of our lifetime. Singapore has a prosperous green future ahead, but it will take a movement across government, industry, organisations, and individuals to seize it. Like the Kallang Wave, we need everyone to stand up and start writing the next chapter of our sustainability story.

Built environment supplement

Singapore's built environment sector plays an integral role in orchestrating and accelerating the transition towards a sustainable urban landscape

Singapore is a fully urbanised city-state with ~25% of land already reclaimed from the ocean, making it especially vulnerable to climate change. This vulnerability requires the development of the city to be undertaken in a sustainable manner to ensure a first-rate living environment not only for current, but also for future generations.

The built environment sector, which contributes 20% of carbon emissions and 1/3 of Singapore's total energy consumption, needs to be at the forefront of this national effort. Around 50% of carbon emissions from the built environment originates from energy consumption for cooling of buildings.

The other 50% is embedded CO2, which is associated with the manufacture of construction materials and the processes used to construct and maintain the built environment.

The motivation to green the built environment in Singapore has shifted over the last 50 years beyond necessity, rapidly striving towards leadership

Progress of Singapore's Built Environment

Necessity
1960s - 70s

- Muddy rivers, polluted canals, uncontrolled wastewater discharge
- Creation of **Environmental Ministry** (1973)
- Parks and Trees Act (1975)
- Journey started off as a **branding, PR and comms** issue with focus on avoiding operational reputational risks

Compliance
2000s - 10s

- Journey evolved to **benchmark** and **performance standards** with creation of Green Mark
- 17 green buildings in 2005, increasing to 40% in 2020
- Known for the **robustness and quality of infrastructure**, ranked 1st in IMD Smart City Index

Leadership
2020s beyond

- Focus is now on change of mindset and behaviors, embedding **sustainability in DNA** driven by leadership
- Ambitious '80-80-80 by 2030' goal
- 'One Million Trees' project
- Green bond issuance
- Leadership in **tropical design**
- 80 cities have adopted Green Mark Scheme

Singapore's greening journey started out of necessity, as a coastal city-state with muddy rivers and badly polluted canals in the 1960s. It then evolved to the compliance stage with the introduction of key regulations like the Green Mark in 2005. The Green Mark played a vital role in the rapid greening of buildings in Singapore from merely 1.1 million[32] square metres of gross floor area (GFA) in 2005 to 12 million[33] square metres (equivalent to more than 40%) of Singapore's built environment in 2020.

The robustness and quality of Singapore's infrastructure is reflected in awards such as ranking first for the Institute for Management Development (IMD) and the Singapore University of Technology and Design (SUTD) Smart City Index for three consecutive years (2019 to 2021), and being rated AAA (the best rating possible) for the structures (i.e. refers to the city's existing infrastructure) category[34].

Now, Singapore is at the cusp of a new transition. The moment has come for the nation to become the global digital, innovation, and sustainability thought leader, leveraging on its first-mover advantage in the region. Singapore is already leading in tropical design with more than 300 overseas developments across 16 countries in Asia-Pacific having adopted the Green Mark Scheme[35]. It's also known worldwide for iconic green infrastructure like Gardens by the Bay and Jewel Changi, which have become key tourist attractions and landmarks of sustainable design.

To propel the industry even further forward, the government is setting ambitious targets, including the "80-80-80 by 2030" goal for the Built Environment[36]:

- Green 80% of buildings (by Gross Floor Area) by 2030
- 80% improvement (from 2005 levels) in energy efficiency for best-in-class buildings by 2030
- 80% of new development to be Super Low Energy buildings from 2030.

Whilst promising, the progress and effort required to deliver on these ambitions will be profound. Progressing to a sustainable built environment demands different types of skills and capabilities, and different levels of intensity and combination of those skills, in roles across the different stages in the value chain.

Built Environment Value Chain

Source: University College of Estate Management, Accenture analysis, Burning Glass occupations taxonomy

Meanwhile, it is important to acknowledge that while multinational corporations (MNCs) are leading the pack in this green transition, there are still many small- and mid-sized enterprises (SMEs) who are a key part of the industry supply chain. SMEs make up approximately 80% of the sector, but are yet to really jump on the green bandwagon due to limited financial resources and gaps in talent supply[37].

What could the future of Singapore's built environment sector look like?

For Singapore to become the global digital, innovation, and sustainability thought leader, it needs to leverage on these three opportunities to rapidly green the built environment sector:

- **Smarter design**
- **Constructing to last**
- **Operating at net zero**

Smarter design

The first opportunity is for the industry to be more forward-thinking at the design stage by focusing on sustainable material selection that seeks to lower environmental impact and reduce carbon footprint. Sustainable material selection is a fine balance between the design requirements, minimising environmental impact, maximising performance whilst managing costs. For instance, companies could use more timber that has been harvested responsibly or green concrete (i.e. CO2 mineralised concrete) produced through a process that reduces carbon emissions.

In Singapore, there are two massive projects that have solely used green concrete to construct their buildings. One of them is the 32,000m2 JTC semiconSpace located at the Tampines Wafer Fab Park, and the other is the Tuas Megaport. Utilising 5 million cubic metres of green concrete has enabled the Tuas Megaport to reduce 1.3 million tonnes of carbon emissions, which equates to removing 260,000 petrol cars from the roads[38]. Furthermore, through leaner and smarter design, construction waste can be reduced before any works commence, reusing existing assets where possible and practical.

Constructing to last

The second opportunity is to focus on the materials used during the construction stage. Through locally sourced and consciously selected material, embodied carbon can be reduced and offset. Understanding and extending the lifespan of materials used ensures the industry looks towards renewing and re-using as an option, before demolishing and re-constructing.

The Quay Quarter Tower in Sydney is an excellent example. It is a 45-storey commercial office space tower built from concrete, glass, and steel in 1976 as the AMP Centre. This building has just undergone a major rebuild, growing in height to 54 storeys. Through smart design and engineering, plus adaptive reuse, over 65% of the original building core (columns, beams, and slabs) was retained including 95% of the internal walls[39]. All this embodied energy re-use saved more than 6,000,000 tonnes of carbon[40], equivalent to 20,000 flights from Singapore to Kuala Lumpur.

Operating at net zero

The third opportunity is to leverage digital technology as an accelerator for buildings to achieve net-zero operations. Achieving net zero encompasses cutting greenhouse gas emissions as much as possible and minimising the impact that is being placed on the earth. Through effective building and facility management, energy consumption can be decreased, the building can be harnessed for its own power through renewable sources and performance can be continually optimised through monitoring, simulation and effective maintenance.

This is showcased in buildings such as the Building and Construction Authority's (BCA) zero-energy building and Keppel Bay Tower. Instead of the typical central system approach, BCA adopts a smart energy management methodology, allowing its occupants to adjust the air-conditioning and lighting for their workspace to reduce energy wastage and avoiding overcooling the space.

Keppel Bay Tower is Singapore's first commercial building to be awarded the Green Mark Platinum (Zero Energy) award. Besides maintaining a low energy use index, buildings in this award category need to acquire all their energy only from renewable sources, both on-site and off-site. Keppel achieved this through the pilot of innovative green technologies like the cooling tower water management system, integrated sensor technology to optimise fresh air intake, intelligent building-control system, high-efficiency air distribution system, and smart LED lighting in the building. Upon completing the implementation of these technologies, Keppel will lower its annual energy consumption by more than 30% in comparison to its 2017 baseline and save an estimated S$400,000 annually[41].

Breaking through the barriers

As organisations in the built environment are progressing from compliance to thought leadership, they will experience roadblocks preventing them from accelerating their green transition, especially around these three key areas:

- **Regulations:** updating local regulations to keep up with global standards
- **Mindset:** sustainability is a cost
- **Skills gap:** we do not have sufficient talent

Here, we will dive deeper into the roadblocks and explore why it is more challenging for SMEs to overcome them.

Regulations: there are gaps within local regulations that require updating to keep up with global standards

Driving a mindset shift at a national level starts with having the right foundation in place. The BCA Green Mark certification scheme has been that foundation and has served Singapore extremely well through the years. The Green Mark was updated in 2021 to place a stronger focus on specific sustainability areas such as energy performance, carbon reduction, usage of smart technologies, and the well-being of building occupants. All of these are aligned with the United Nations' Sustainable Development Goals (UNSDGs). Today, however, for the nation to collectively accelerate to truly embedding sustainability in the DNA of the entire built environment, the regulations across the entire industry ecosystem need to be, once again, leading from the front.

Globally, the industry has seen a recent shift to include digital information focused on conceptual energy analysis, sustainable material selection, and green building code tracking all within the Building Information Model (BIM). This information set is commonly known as 6D BIM and shows how BIM and the path to the digital twin now have a deeper role to play in enhancing and creating a sustainable environment.

BIM has been mandated by Singapore's Building and Construction Authority (BCA) for all construction projects since circa 2015. Yet, the Singapore Virtual Design & Construction (VDC) guide has yet to include any reference to sustainability. Therefore, to lead from the front again, there is a need to update the VDC guide to include sustainability and also make it a mandatory part of the BCA BIM Standards. This would give companies the much-needed push and would guide them to embed sustainability into their DNA and, subsequently, the entire project lifecycle.

Mindset: sustainability is a cost

Another key challenge is the lack of awareness about how the drive towards greening the sector can lead to significant value creation for companies. For most leaders, sustainability must first make business and economic sense. There is still a perceived need for incentive or pay-off to embark on this transition, with 58% of leaders assuming that operating more sustainably requires a trade-off with growth[42]. This is even more prevalent among SMEs, where many are still in survival mode, focused on generating short-term profits to keep the business running. Therefore, there is a need to communicate clearly and consistently that companies (both big and small) that embrace sustainability are more likely to reap lasting financial

gains by future-proofing their business. Overcoming this challenge would require a mindset shift from seeing sustainability as a cost to a long-term investment.

To accelerate the mindset shift and get people to start taking action, there's a need to build in the environmental impact of construction projects as a cost to the developers, building owners, and homeowners by monitoring those who do not actively reduce the carbon emissions of their project through renewing and re-using of buildings, instead of demolishing and re-constructing, and by incorporating green technology.

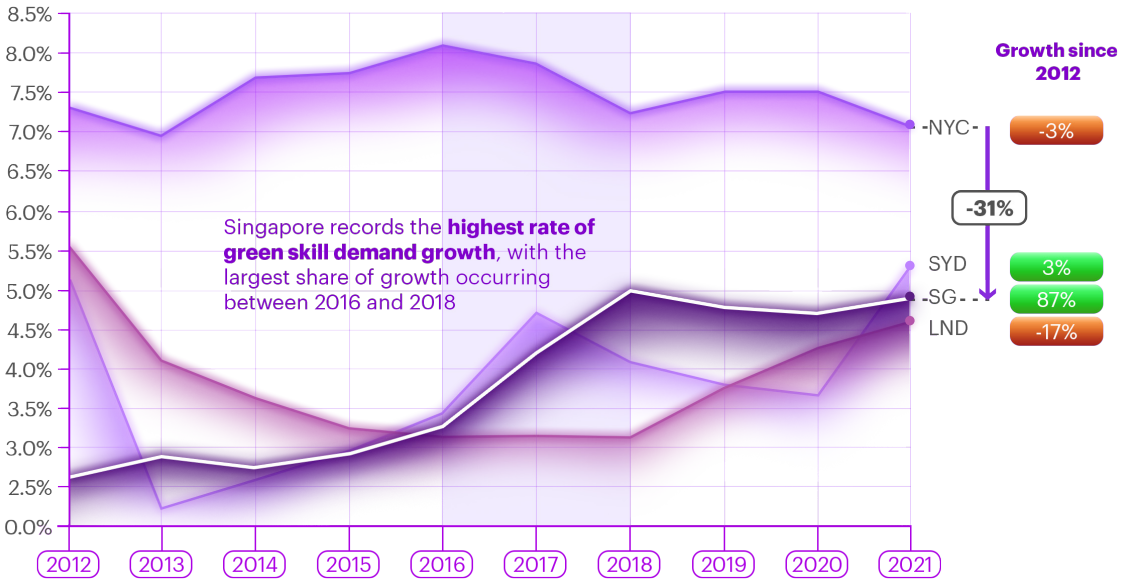
Skills gap: we do not have sufficient talent with deep experience and green knowledge

Companies that understand the benefits of going green will need to acquire the skills required to translate intention to action. This can be achieved through recruitment and/or educating and training their workforce.

Demand for green skills (4.9%) in Singapore's built environment has had significant growth over the last 8 years, with demand penetration now more than double that of Singapore's economy average (2.3%).

Green skills demand in built environment sector in SG and international peers

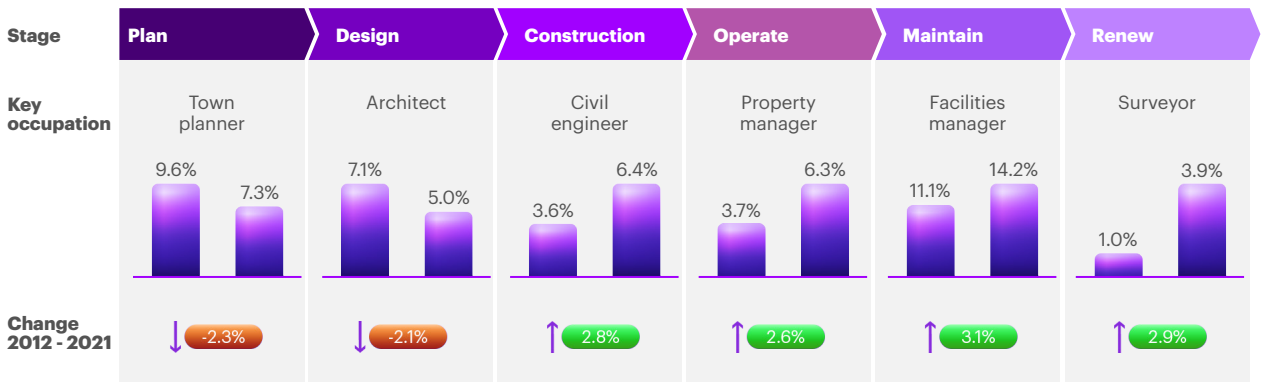
% share of jobs requesting green skills; 2012 - 2021



Source: Accenture analysis, Burning Glass data.

Green skills demand penetration by key occupation in built environment over time

% share of jobs requesting green skills; 2012, 2021



Source: Accenture analysis, Burning Glass data.

However, both the demand and supply of green skills are inconsistent across the value chain. As seen above, demand for green skills has grown in occupations such as civil engineer, property manager, facilities manager, and surveyor. Conversely, demand has dropped from a higher base, in town planning and architect roles.

This overall growth is also reflected in the composition of specific green skills growth across the economy, with emerging demand for green skills relevant to the built environment, including green building, building performance, insulation, and wastewater treatment.

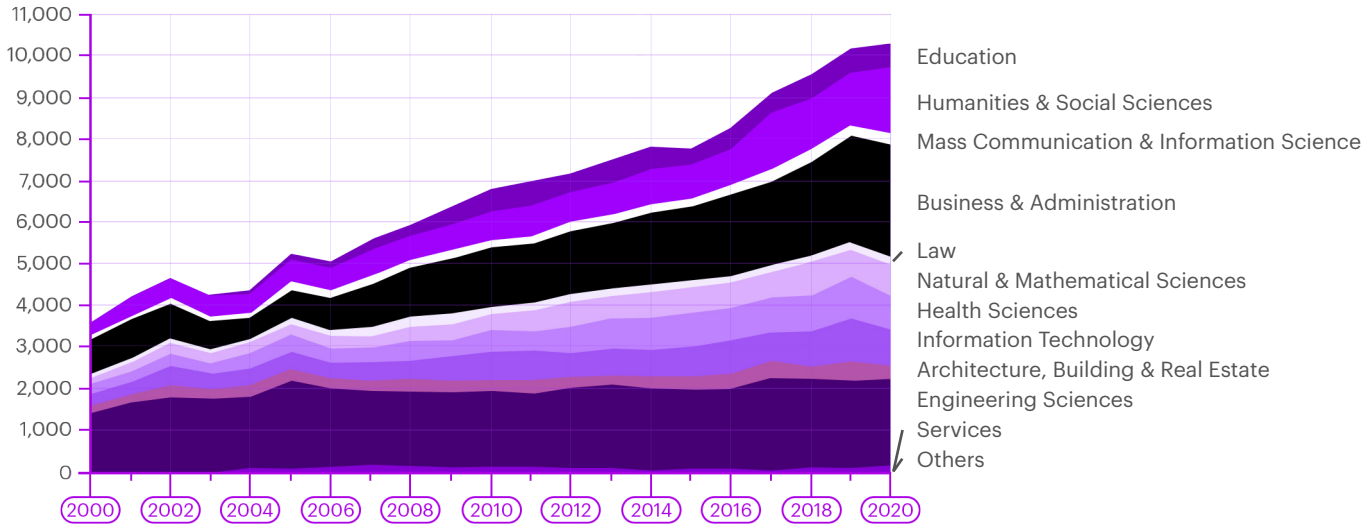
On the supply side, LinkedIn Talent Insights shows Architecture and Planning supply ahead of demand, with 12.3% green supply penetration, while supply in other areas such as Construction and Civil Engineering is lagging demand, at 2.3% and 4.0% green supply penetration, respectively.

Despite growth in green skill demand penetration and green skill supply in the built environment, both are still relatively low given the contribution of the built environment to emissions and the potential role it can play in shaping Singapore's sustainability story.

A potential contributing factor to the low supply of green skilled workers is the lack of new graduates from built environment-related courses. There's a stagnation in the number of graduates from Engineering Sciences, Natural & Mathematical Sciences, and Architecture, as well as Building & Real Estate. This is in contrast to the growth observed in other areas of study such as Business & Administration, Education, and Humanities & Social Sciences. Nevertheless, it is important to acknowledge that Institutes of Higher Learning (IHLs) are actively introducing green built environment courses such as the Diploma in Sustainable Built Environment and Specialist Diploma in Sustainable Facilities Management, amongst others, to increase the supply of talent pool.

Singapore domestic university graduation rates

Count of graduands from their first university degree (domestic), in total and in named fields



Source: Department of Statistics Singapore

According to the 2021 Joint Autonomous Universities Graduate Employment Survey, the starting pay for fresh graduates in the Built Environment (S$3,600) is comparable to the other industries such as the Sciences (S$3,600) and Arts, Design and Media (S$3,500)[43].

This brings us to the point that the lack of supply could be due to an image issue. The built environment sector is associated with the construction industry, which mainly comprises foreign workers. There's an impression that the sector is one that is low-skilled with long working hours and low pay. This makes it difficult for companies to hire young talent to join the sector as they do not find the sector an attractive one to work in. As quoted in a Today article[44], an employer from the construction industry said, "The first impression that [young jobseekers] have is that they'll have to go to the site, walk the site... that it is a tough job." Matters are made worse for the SMEs, as the green skills demand in Singapore has been largely driven by the MNCs who have a stronger financial power to hire expensive green experts.

To attract young talent, stronger efforts are required to re-brand the sector into one that is technology driven with the opportunity to do impactful work that contributes toward Singapore's net-zero goal, and bust myths such as being a low-paying sector.

According to SkillsFuture Singapore, these are the top and emerging skills required for the built environment with digital being a core element. It underscores that digital is a key catalyst for revitalising the built environment.

	Top Required Skills in Built Environment	Top Emerging Skills in Built Environment
1.	Integrated Digital Delivery Application	Building Information Modelling Application
2.	Continuous Improvement	Design for Manufacturing and Assembly
3.	Technology Application Application	Stakeholder Management
4.	Data Analysis / Analytics	Technology Application
5.	Quality System Management	Green Building / Facilities
6.	Project Risk Management	Design for Maintainability
7.	System Installation and Commissioning Management	Automation Application
8.	Critical Thinking	Computational Design
9.	Safety Management Framework	Smart Facilities
10.	Project Management	Engineering Management Of Change

Source: SkillsFuture Singapore, JobTech

Addressing the barriers require a collective effort across all players in the ecosystem

The building and construction sector is fragmented and project-focused, and no single actor can bring about the necessary transformation alone. Success relies on combined actions of the government and leaders of the sector to activate change and create a sustainable impact.

Government

As the regulator of the construction market, government is the driving force to ensure the optimal combination of policy interventions, financing resources, and efficient use of technology. Our recommendations for government actions to push the sustainability agenda in the built environment sector falls into the following categories:

Evolving the robust regulatory framework. For Singapore to progress and become the global digital, innovation, and sustainability thought leader, the mindset shift from seeing sustainability as a cost to a long-term investment, as well as renewing and re-using buildings instead of demolishing and re-constructing, needs to happen across the entire built environment value chain.

For this mindset shift to happen, everyone must understand the importance of sustainability, which needs to be led from the top. A key action for the government to consider is the adoption of sustainability requirements for the industry through the BCA BIM Standards, whilst also including it within the VDC Guide. Another key action is to introduce new guidelines on how to reduce the carbon emissions of projects and include a financial implication that developers will need to bear by not doing so. This would propel companies to start taking action, by educating their employees on sustainability and implementing measures to ensure adherence to the requirements, reductions in carbon emissions and construction waste can start to be realised.

To keep up with global standards, the government would also need to work closely with the private sector and research institutions to regularly update regulations based on the latest data, trends, and global insights.

Strengthen the branding for the sector. Government can support building a healthier and sustainable image for the sector. By raising awareness on the green jobs required throughout the value chain, influencing public perception via social media campaign and education to build a positive employer brand for the sector to attract more skilled talents.

Investment in talent & education. Investment should be deployed towards creating more green jobs, attracting new talent, and upskilling the current workforce. Government should work with the private sector to better understand existing skills gaps and work in tandem with universities to design courses to fill them.

Industry

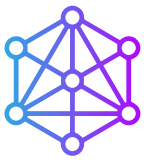
Across the Built Environment value chain, including developers, investors, owner/occupiers and lenders, each stakeholder has an important role to play in meeting the net-zero ambition during the journey to develop and retrofit green buildings.

Leverage digital to enhance green practices across the value chain. The two forces of digitalisation and sustainability are shaping how cities of the future will evolve. However, the benefit of technology has yet to fully deliver on the promise of improving the built environment. Much more can be done in enabling and scaling sustainability across the industry value chain, including:

- Using technology for better real-time tracking and information sharing for logistics supply chain emissions
- Using data for carbon footprint tracking, building performance, and energy modelling
- Digitisation of existing built assets to drive a culture of renew and reuse over demolish and reconstruct

Furthermore, digital twins can be leveraged for upfront planning via simulations, to improve efficiency of operations and optimising resources by testing solutions before modifications or operating parameter adjustments take place.

Smarter design to drive better exposure and usage of green materials. Through locally sourced and consciously selected eco-friendly material, embodied carbon can be reduced and offset. The entire industry should work together to take a whole-life approach to calculating impact and find alternative environmental-friendly materials such as new composites made from natural products or upcycled waste products, explore better ways of storing renewable energy and new forms of constructions that are greener.



Create an ecosystem for collaboration and knowledge-sharing. MNCs have been driving the greatest share of green skill demand in Singapore to date, yet SMEs must be actively included in the country's green transition given their centrality to Singapore's economy and role in the supply chains of MNCs. MNCs need to move faster on working with SMEs that are compliant with sustainability standards within their supply chains, and gradually increase the pressure for SMEs on greening the supply chain by exerting it through green public procurement. At the same time, MNCs need to enable sharing of knowledge and best practices, educating suppliers and equipping them with the right tools and skills to accelerate their sustainability journey.

Methodology

We employed a multi-method research approach in developing this report. Specifically, the research program combined desktop research, robust skills data analysis, and qualitative insights from an industry consultation.

Skills analysis

The skills analysis was composed of two key pieces of analysis: demand side and supply side.

The demand side analysis utilised job ad data from Burning Glass as a proxy to investigate the current green skills in demand across the economy in both Singapore and international comparators of Australia, United States, and the United Kingdom.

The supply side analysis was based on insights drawn from LinkedIn's members in Singapore, to give an indication of the supply of green skills across the economy in Singapore, using the company's Talent Insights platform.[2]

[2] LinkedIn Talent Insights data is derived by aggregating profile data voluntarily submitted by LinkedIn members. As such, LinkedIn cannot guarantee the accuracy of LinkedIn Talent Insights data.

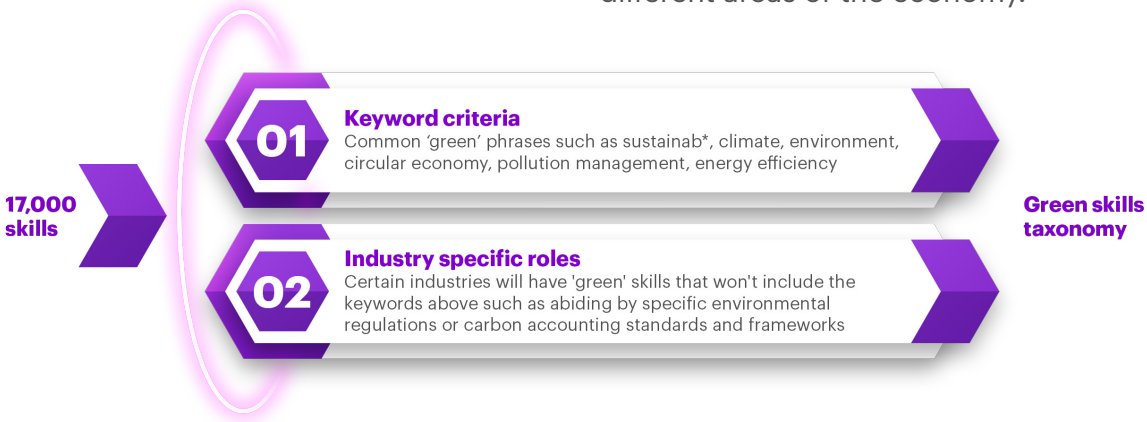
Green skills taxonomy

For both pieces of analysis, a green skills taxonomy was produced to define which skills are considered "green". This was built using the skills taxonomy developed by Burning Glass which contained over 17,000 skills. To ensure the exhaustiveness of the taxonomy, we developed it across two distinct stages.

The first stage involved a keyword search; where common "green" phrases such as sustainable, sustainability, climate, environment, and green were used to catch all relevant skills that contained the keyword or variant of the key word. This was then manually verified to ensure the captured skills were "green".

The second stage involved determining industry specific roles that performed green tasks and capturing the skills involved in these roles. For example, roles within architecture and construction that require insulation and insulation skills. These would not be captured in the keyword search, but are key to energy efficiency and emissions reduction.

Finally, the taxonomy developed was then mapped to the UN green skills framework to ensure exhaustiveness. The UN green skills framework classifies green skills into four groupings: engineering and technical skills, science skills, operation management skills, and monitoring skills. The taxonomy contained a large number of green skills in each category, confirming the exhaustiveness of green skills across different areas of the economy.



Note: * is a truncation modifier that enables searching of any word starting with the phrase preceding it e.g. "sustainab*" will yield results including "sustainability" and "sustainable"

Demand side analysis

Using the green skills taxonomy, we evaluated millions of job advertisements across four countries to capture those advertisements that requested green skills. The share of these "green" ads out of all ads provides a metric for the green penetration in the economy; in other words, the proportion of ads in a given time period that requested at least one green skill. This analysis spanned the last nine years of job ad data across four geographies, evaluating millions of job ads. We investigated the rate of penetration of green skills, how this varied across time, geographies, and occupations, and what trends can be observed.

This provided insight into the trends of green penetration for each geography. Through filtering the job ads according to the green taxonomy, a dataset of "green" ads and all ads was produced. These datasets of green ads and all ads can then be filtered by time period, location, or occupation to delve deeper into understanding the prominence or change thereof of green skills.

Skills Demand

The Burning Glass dataset collates job ads to form a comprehensive view of labour demand. Each job ad contains certain attributes such as job title, industry, occupation, employer and requisite skills.

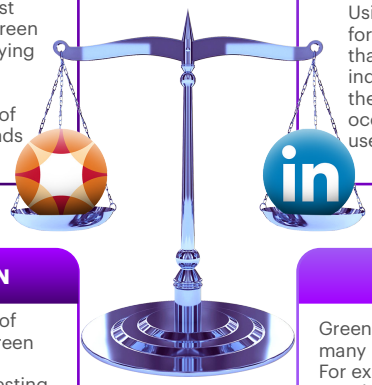
Using this source of data, it's possible to form a view of the number of job ads that request green skills. This involved developing a green skills taxonomy for Burning Glass, identifying over 370 skills out of 17,000.

With this, we can gain a strong indicator of labour demand, however it is limited by ads that are publicly listed and the types

Skills Supply

The LinkedIn dataset collates professionals on the LinkedIn platform to form a view of labour supply. Each professional profile contains attributes such as job title, employer, and skills which are self-published.

Using this source of data, it's possible to form a view of the number of employees that hold green skills. This provides a strong indicator of labour supply, but is limited by the skills updated by LinkedIn users and the occupations and industries more likely to use the LinkedIn platform



GREEN DEMAND PENETRATION

Green demand penetration is a measure of how many job ads request at least one green skill. A lower green demand penetration indicates a smaller share of job ads requesting green skills, while a higher green demand penetration indicates a higher share of job ads requesting green skills. Green demand penetration can be calculated at an economy-wide scale, or be calculated for a subset such as a specific industry, occupation or job title where data allows.

GREEN SUPPLY PENETRATION

Green skill penetration is a measure of how many LinkedIn users have specific green skills. For example, an economy-wide green skill supply penetration would represent the total number of users with a green skill listed as a share of all users on the platform. This can then be calculated for specific occupations, job titles, or employers, to understand how the uptake of green skills varies.

Supply side analysis

To gauge the supply side of green skills in Singapore, we utilised reporting from the LinkedIn Talent Insights platform. This platform provides point-in-time analysis of LinkedIn members' current occupations, skills, industries, and qualifications, with one-year comparison data available on select metrics.

Similar to the demand side analysis, we used the LinkedIn Talent insights platform to investigate green skill supply penetration according to the green skills taxonomy we developed. We undertook matching of our Burning Glass green skills taxonomy with the LinkedIn skills taxonomy; however, there were some limitations in direct comparability.

Filtering by the green skills taxonomy, we were able to derive the number of people on LinkedIn that list these green skills as a proportion of all people employed in different industries and occupations, and the growth in green skill supply penetration over the last year across these strata.

This provides an approximated indication of the green skill supply penetration of the workforce, compared to the green skill demand penetration, noting limitations of skills taxonomy matching, and the limitations of how representative the LinkedIn membership base is of the full economy.

Industry consultation

For this qualitative segment, we conducted 13 semi-structured interviews with sustainability leaders across multiple sectors in Singapore. These online interviews were carried out between May and July 2022. We spoke with senior executives across a variety of industries, including pharmaceuticals, real estate, manufacturing, and telecommunications, to gain a suitably broad range of perspectives.

Transcripts from the interviews were analysed to identify key themes, and synthesised with skill analysis and desktop research.

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