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Driven by Purpose

In Partnership with

EDB: SINGAPORE

Introduction:
A Global Challenge

The world stands at a moment of both unprecedented challenge and opportunity.

The challenges humanity faces are both numerous and daunting, from worsening food insecurity, to climate change, to widening social inequality.

The global population is growing, and in the coming decades countries will find it increasingly difficult to feed people sustainably and healthily. Societies are becoming more prosperous, particularly in Asia.[1] Much of that wealth will be created in the digital economy, but maximising the potential of digitalisation means ensuring opportunities are equitable.

Rising affluence also intensifies pressure on resources, and nations are faced with the conundrum of finding a way to drive prosperity, while reducing the carbon emissions that threaten the natural environment on which modern society still depends.

Despite the scale of these challenges, we are also remarkably well-equipped to tackle them. Finding the best solutions cannot happen in isolation, however. It requires governments, companies, and individuals to work together in an environment that fosters collaboration and innovation.

Many of the world's best minds are focused on solving these problems, and they are finding that Singapore provides what they need to tackle these challenges head-on.

In partnership with like-minded companies, the city state is creating an environment where companies and top global talent determined to balance profit with purpose can drive innovation and create a better future for generations to come.

For decades, Singapore has been known around the world as a country that's good for business. Now, companies committed to positive change are recognising that it's also a place to do Business for Good.

[1] HSBC

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I. Harvesting for the Future

The global population is forecast to reach 9.7 billion by 2050,[2] almost quadrupling from just 2.5 billion in 1950.[3] This is placing enormous pressure on the world's food-supply system.

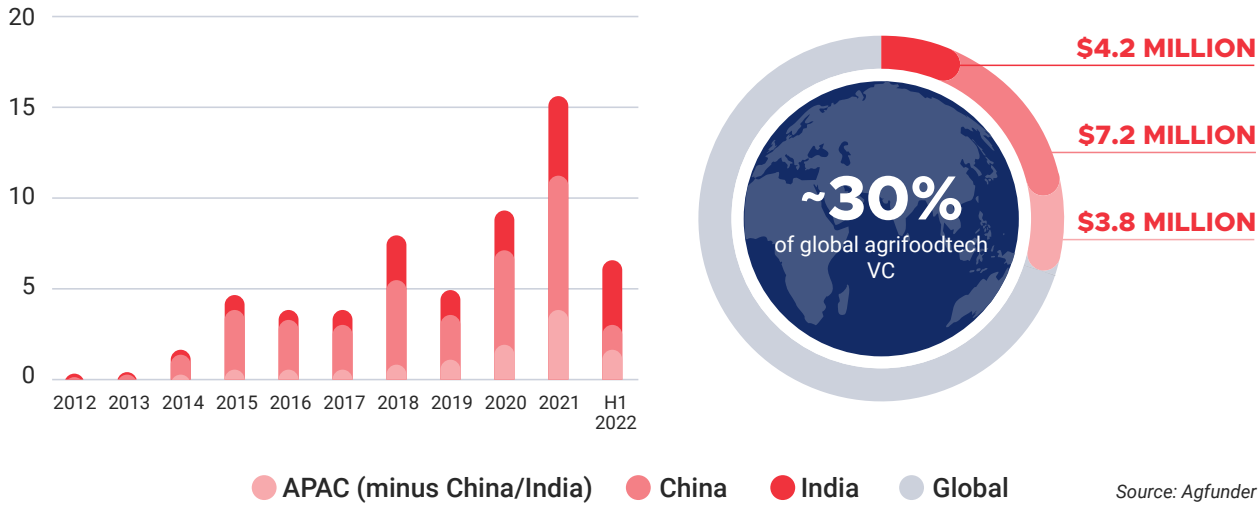
The most recent evidence suggests that the number of people worldwide unable to afford a healthy diet rose by 112 million to almost 3.1 billion by the end of 2021.[4] By 2030, 8% of the global population will still be undernourished, according to estimates from the Food and Agriculture Organisation of the United Nations (FAO).[5]

The task of ending hunger, food insecurity and malnutrition is not just a matter of ending poverty.

In more prosperous societies too, the standard of food for many people continues to fall short of minimum standards. Obesity and diet-related non-communicable diseases are on the rise, and have reached epidemic levels in many of the world's wealthiest societies, where fresh nutritious food is often more expensive than unhealthy, highly processed alternatives.[6]

The challenge, then, is how to produce healthier food in greater quantities to ensure everyone has access to a balanced diet. Part of the solution entails closing the "protein gap". At the end of the decade, people in wealthier nations will be eating 48g more animal protein a day than those in low-income countries.[7]

20 Years of Agrifoodtech Investment in Asia Pacific



Source: Agfunder

[2] UN
[3] UN
[4] FAO
[5] FAO
[6] Global Nutrition Report
[7] OECD/FAO

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I. Harvesting for the Future

An Aquatic Solution

Increasing animal agriculture is not the answer. Livestock farming is already the biggest source of greenhouse gas within the food production system – accounting for 15% of global emissions.[8] And while agriculture occupies about half of the world's habitable land, about 75% of that farmed area is used for rearing animals, even though meat and dairy accounts for a relatively small percentage of total human calorie consumption.[9]

Without the development of more sustainable meat and dairy production, livestock farming threatens efforts to decarbonise economies. Aquatic foods, meanwhile, are playing a critical and growing role in food security, especially in Asia. They are a key source not only of protein but also essential fatty acids and micronutrients. Aquaculture already accounts for half of the world's fish production, and is on course to surpass capture[10] as soon as 2027.

This is good news for the environment. Fish farming contributes to the protection of ocean life, uses substantially less water, requires less space, and emits less carbon than livestock. If aquaculture accounted for all the world's expected additional protein requirements by 2050, it could save an area of land twice the size of India[11] – as much as 747 million hectares.

Progress is being made. Driven by new technologies, investment and regulation, alternative proteins are on course to account for 11% of all protein consumption by 2035. If the world remains on track to reach this level, carbon dioxide-equivalent emissions will be cut by 0.85 gigatons – equal to decarbonising 95% of the aviation industry.[12]

Carbon Footprint by Source of Protein

A carbon footprint measures the total greenhouse gas emissions caused directly and indirectly by the production of a product. *Carbon footprint is measured in kilograms of carbon dioxide equivalent (kgCO2eq)* per typical serving (40g) of edible protein of the product. Data are median values.

0.60	0.88	1.30	5.92
Farmed Salmon	Chicken	Pork	Beef

Source: Global Salmon Initiative

[8] FAO
[9] Our World in Data
[10] FAO
[11] PNAS
[12] BCG

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I. Harvesting for the Future

Hotbed of Innovation

Asia-Pacific generates almost one-third of the world's financing for agri-food technology. This is encouraging, but given that the region is forecast to account for almost two-thirds of consumption by the end of this decade,[13] more investment is needed.

In global and regional terms, Singapore is a small consumer, but it is also the ideal testbed for solving these challenges, for several reasons. Firstly, the country's progressive regulatory approach offers innovators an unshackled environment in which to explore solutions. For example, Singapore was the first country in the world to grant regulatory approval to "cultivated meats", and recently signed an agreement to standardise the term.

Less than 1% of the island nation is devoted to agriculture, and only 10% of its food is produced locally.[14] By supporting and accelerating innovations in production, however, Singapore hopes to produce 30% of its own food by 2030.

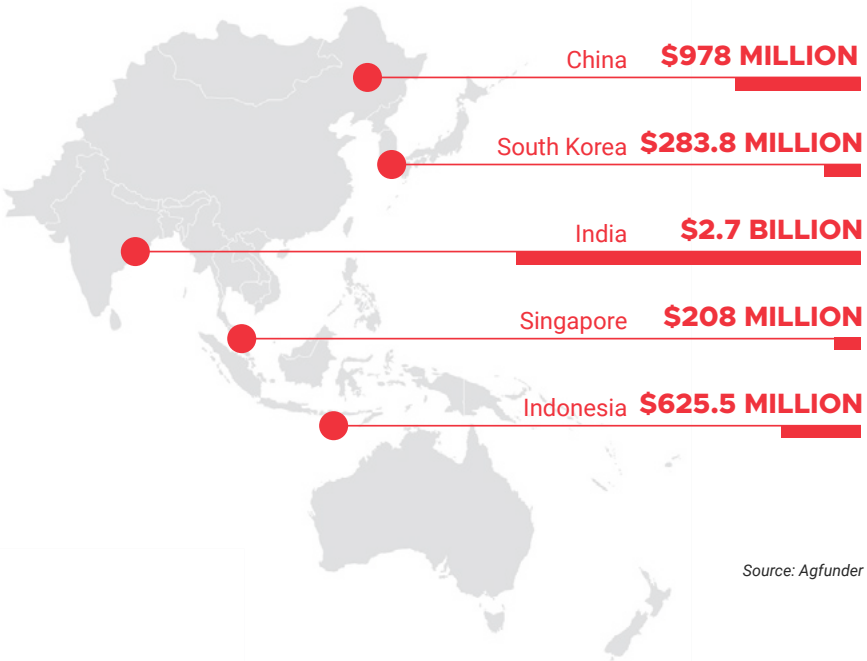
This ambition has helped to turn it into a hotbed of innovation, where the government is partnering with businesses to develop laboratory-to-kitchen solutions. Startups and young businesses have open access to the country's rich ecosystem of venture capital firms, business accelerators, and large multinationals, which can support each phase of a company's growth.

Programmes such as the government's Agri-Food Cluster Transformation Fund, and grants for R&D in sustainable urban food production have accelerated innovations including data-driven fish farms, artificial-intelligence-driven vegetable production, and rooftop/vertical farms.

$5.3 BILLION
$USD investment
H1 2022

$4.3 BILLION
$USD investment
H1 2022 APAC ex. China

363 DEALS
across APAC region
H1 2022



Source: Agfunder

[13] AgFunder
[14] UNDP

I. Harvesting for the Future

CASE STUDY 1

The Fruits of Innovation

Founded in 1851 in Hawaii, Dole plc has grown into one of the world's largest fruit producers, with plantations and facilities across the globe. Inevitably, a lot of produce goes to waste, either as trimmings (skin, peel, seeds) or because it doesn't meet strict consumer standards. This wastage contributes to as much as 10% of global greenhouse gas emissions.

But as Wei Tze Ooi, Managing Director at Dole Specialty Ingredients (DSI), explained, that's about to change, with Singapore's help. By 2030 at the latest, the company aims to fully utilise all fruit waste.

What currently happens to Dole's waste produce?

Currently the waste is either going to low-value applications, regenerative farming practices or landfill. Now we are looking to repurpose fruit waste and side streams into high-value natural ingredients packed with nutrition and health benefits.

We have designed various production lines involving technologies such as physical separation, cold pressing, drying, and purification. The end results, which we are calling "future core products," include enzymes (such as bromelain), specialty fruit powders, seed oil, dietary fibre, and more. These can be used in nutraceuticals, cosmeceuticals, or food & beverages.

Is this kind of upcycling cost-effective?

Transporting fruit waste is costly and will be the key challenge for ventures like ours, so we set up our pilot processing facility in the Philippines to eliminate the need to transport fruit waste over long distances.

This is just the first step. We intend to develop the know-how and replicate this model in other Dole facilities, and perhaps at a later stage work with other major fruit industry stakeholders to reduce waste.

What are the benefits of this circularity to countries where your plantations are based?

Countries like the Philippines are very big in the fresh produce industry, which provides access to large amounts of nutrition-rich feedstock. On one side, that works really well from a supply chain perspective, and on the other hand hundreds of jobs are created across the entire supply chain.

Why did Dole set up a separate corporate structure dedicated to repurposing and upcycling?

In June 2020, we launched the Dole Promise, six highly ambitious and interconnected commitments around goals such as providing good nutrition to 1 billion people, eliminating fruit loss, and using

I. Harvesting for the Future

zero processed sugar. As part of that mission, we partnered with the Singapore Economic Development Board (EDB) to launch the Dole Specialty Ingredients (DSI), repurposing fruit waste into high-value natural products.

Why did you base this venture in Singapore?

Singapore is a leading tech innovation hub, making the country the perfect jumping board for DSI to demonstrate that a circular economy can create a strong business model that all stakeholders can benefit from. Furthermore, Dole's global headquarters is located here, enabling DSI to leverage existing functions like finance, supply chain and marketing. DSI will also tap into Singapore's technology ecosystem and work with institutions like the Agency for Science, Technology and Research (A*STAR) in research and development. Together with the help of local R&D institutions, DSI will explore and create novel ingredients and product applications that are upcycled from fruit and fruit side streams.

> **"Singapore is a leading tech innovation hub, making the country the perfect jumping board for DSI to demonstrate that a circular economy can create a strong business model that all stakeholders can benefit from.**
>
> **Wei Tze Ooi,**
> **Managing Director,**
> **Dole Specialty Ingredients (DSI)**

Our ambition is to scale DSI globally, so headquartering in Singapore made the most strategic sense.

I. Harvesting for the Future

CASE STUDY 2

Small Products, Big Solutions

Worldwide, the market for shrimp is poised for an unprecedented boom. Asia-Pacific produces 85%[15] of supply for a market that's forecast to grow in value from US$38 billion in 2021 to US$85 billion by 2030.[16]

Shrimp are high in protein and low in carbohydrates and saturated fats, and farming them requires only a small area and few resources. As such, they are a sustainable, low-carbon food source, a valuable component of a healthy diet, and an important source of national income.

However, "the industry faces challenges from disease and high feed costs," said Ting Cheong Ang, Chief Executive Officer of AquaEasy, a venture grown from the business accelerator platform of Robert Bosch GmbH and supported by the EDB's New Ventures programme, a scheme to support companies that want to branch into new growth areas beyond their core businesses.

"Climate change also affects aquaculture through rising sea levels, extreme weather events and higher water temperatures that make aquatic species more susceptible to disease," Ang added.

Also, since shrimp are farmed in turbid sea water, farmers are unable to see what is happening to their crop over the typical 120 days of culture, relying instead on intuition and experience.

AquaEasy has developed Artificial Intelligence (AI) and the Internet of Things (IoT) technologies that use automation and digitalisation to solve these problems. AquaEasy's solutions enable real-time monitoring of pond-water quality and shrimp-feeding demand to optimise feed use, and shrimp stress levels to ward off disease outbreaks.

By deploying these technologies, farmers can make fact-based decisions that reduce costs and eliminate guesswork, resulting in more productive crops and a lower carbon footprint.

AquaEasy is implementing its solutions in Southeast Asia, signing partnership agreements with companies such as VietUc in Vietnam and eFishery in Indonesia.

"We are committed to sharing our technology to support farmers to address their challenges and improve their livelihoods," said Ang. "Recognising the diverse cultural richness and local practices in the region, we leverage on collaborations with the right partners to engage with the farming community.

[15] Inter Fisheries
[16] Straits Research

I. Harvesting for the Future

"We are blessed to be in Singapore because EDB New Ventures is very supportive in helping companies like AquaEasy get off the ground. EDB has invested in AquaEasy to help us build our team, linked us up with other VCs, and contributed to AquaEasy's business with their insights.

"AquaEasy started its initial R&D with the Aquaculture Innovation Centre (AIC) at Singapore's Temasek Polytechnic to build our key products, and without such resources AquaEasy would not have been able to get to this stage."

"EDB has invested in AquaEasy to help us build our team, linked us up with other VCs, and contributed to AquaEasy's business with their insights.

Ting Cheong Ang,
Chief Executive Officer,
AquaEasy

II. Generating Sustainable Prosperity

Most of the world recognises by now that human society must transition away from burning fossil fuels as rapidly as possible to contain the rise in global temperatures.

Just to limit global warming to 1.5°C above pre-industrial levels, we need to cut current greenhouse gas emissions by 45% before the end of the decade. Currently, the gap between promised and needed emission reductions points to a 2.6°C increase by 2100, far beyond the goals of the Paris Agreement.[1]

While the rate of emissions growth plateaued in the years before the pandemic,[2] and falling prices of renewable power make it possible to sharply curtail them, atmospheric carbon dioxide is not yet decreasing because societies are not pursuing anything resembling the far-reaching changes required.

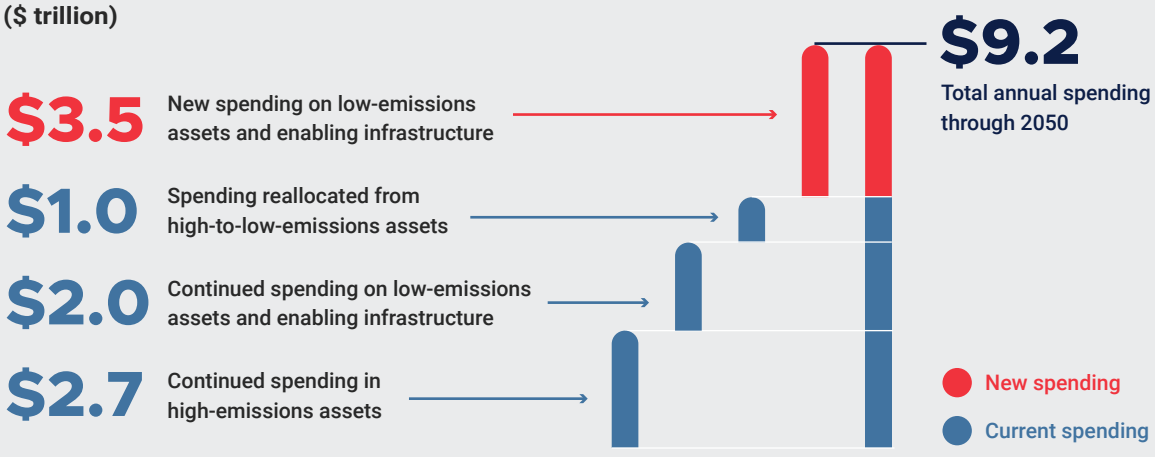
Still, there is hope. In the past decade, several clean-energy technologies – wind and solar power, battery storage, and electric vehicles – have been improved to the point where they can outcompete fossil fuel-burning equivalents.[3]

But the success of this mission depends on a dramatic uptick in investment, innovation, cross-border collaboration, climate policies, and a relentless commitment to decarbonisation. The expansion of carbon services is also important as governments and companies will likely need to turn to external expertise to manage their carbon footprints.

Investment in new infrastructure and technologies needed to meet climate goals is estimated to be about US$9.2 trillion a year through 2050. That's at least US$3.5 trillion more than the world is currently spending.[5]

Capital Spending Required to Realise a Net-Zero Economy

($ trillion)



Source: McKinsey Global Institute

[1] UNEP
[2] IPCC
[3] BNEF
[4] McKinsey

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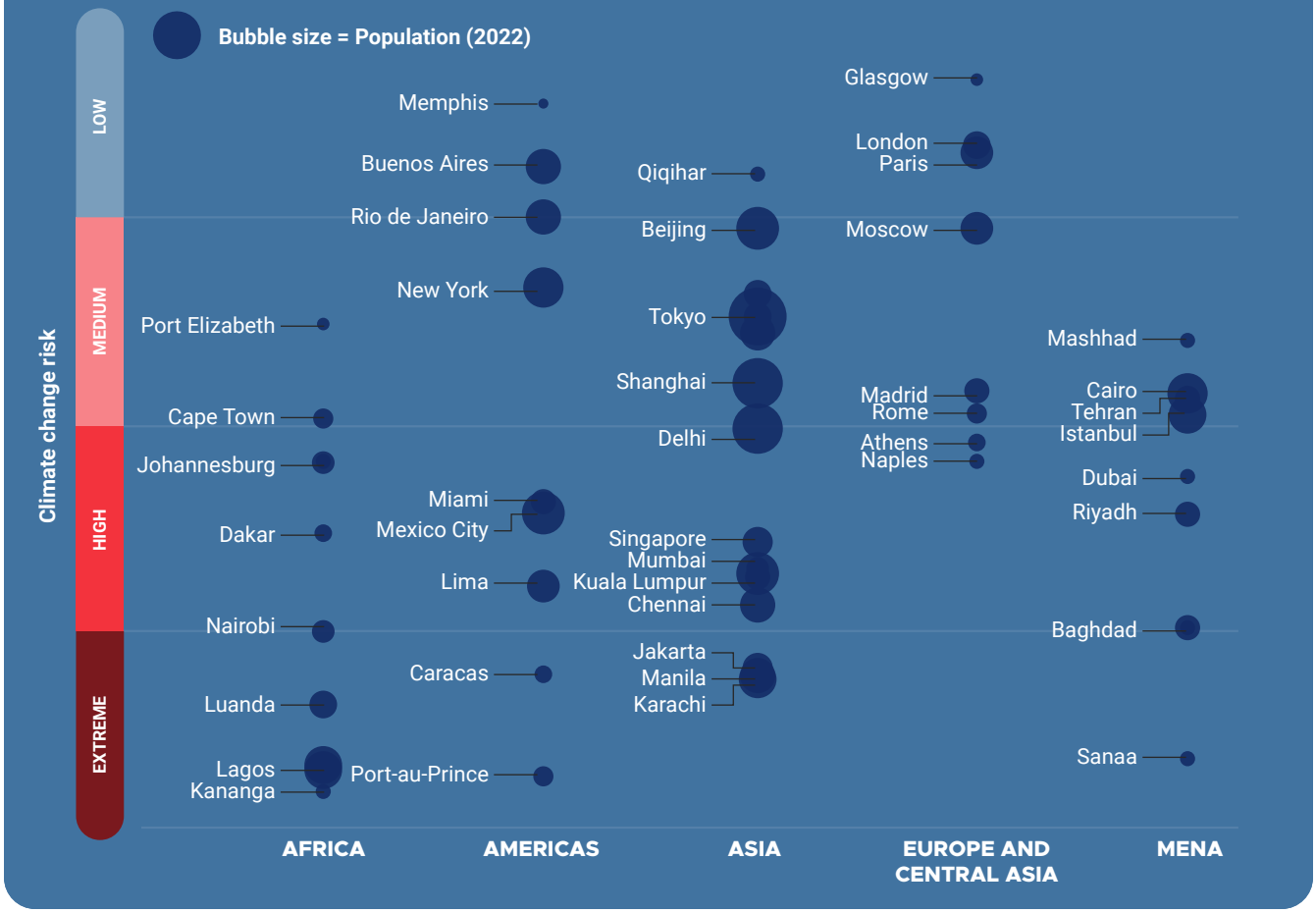
II. Generating Sustainable Prosperity

In Asia, the need for this investment and innovation is particularly acute. Asian cities are among the most at risk from a continued shortfall in action. A recent report shows that 99 of the 100 cities most exposed to environmental and climate-related threats are in Asia, including 37 in China and 43 in India. In Southeast Asia, cities including Singapore, Kuala Lumpur, and Jakarta are considered at High or Extreme environmental risk from the effects of climate change.[5]

Climate Change a Significant Threat to Major Asian And African Cities



Source: Verisk Maplecroft 2021

[5] Verisk Maplecroft

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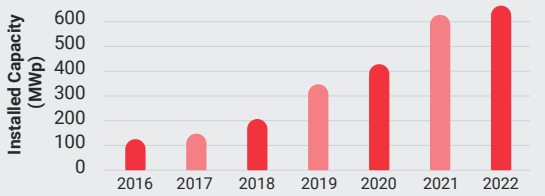
II. Generating Sustainable Prosperity

Many of the key technologies needed to achieve net-zero are still in the early phases of commercialisation, or have yet to be deployed at any significant scale. These include hydrogen fuels, carbon capture and storage, and sustainable aviation fuels. Meanwhile, there is a need to continue developing technologies with an already strong uptake, including wind and solar.[6]

In land-scarce countries like Singapore, uptake of some technologies is accelerating, resulting in the growing prevalence of residential rooftop solar installations and floating solar farms, for example. Installed capacity has boomed, from 125 MWp (Megawatt peak) in 2016 to 670 MWp last year, while the number of installed systems grew from 1,827 to 5,455 in the same period.[7]

Singapore is also a regional hub for solar, with more than 100 international and local clean energy companies such as EDPR APAC, ENGIE, Sembcorp and TotalEnergies based in the country. Singapore also has a vibrant ecosystem, with players across the value chain ranging from R&D providers, project and legal advisories, project financiers to ESS system integrators that support clean energy players in developing and executing projects in the region.

Installed Solar PV Capacity in Singapore



Source: Singapore Energy Market Authority

The country's progressive technological culture and deep clean energy ecosystem will become an increasingly important model in Southeast Asia, where solar is forecast to account for the lion's share of added renewable power capacity through the end of this decade.

Beyond solar, Singapore is investing in the research and development of emerging low-carbon technologies. The government awarded US$40.7 million for projects under Phase 1 of its Low Carbon Energy Research (LCER) programme to advance research in low-carbon hydrogen and carbon capture utilisation and storage (CCUS). A further US$95.5 million has been set aside for Phase 2 of the LCER programme, with low-carbon hydrogen as a key focal area.

The country is also keen to partner companies to pilot-test and commercialise new technologies in the above-mentioned areas such as the generation of green electrons. The country's commitment to sustainability policies is drawing a new generation of investors and innovators, too.

In addition to this, Singapore has emerged as a regional hub for the growing field of carbon management services. Leading organisations in sustainability such as South Pole, McKinsey, Conservation International, and The Nature Conservancy have chosen the country as their base to serve the region.

The city-state is also growing its base of homegrown carbon services, ranging from carbon exchanges (Climate Impact X, Air Carbon X) to carbon accounting and advisory firms such as Terrascope. Today, more than 70 carbon services firms are established in Singapore, and the sector could add as much as US$5.6 billion to its economy by 2050.[8]

[6] BNEF
[7] EMA
[8] EDB

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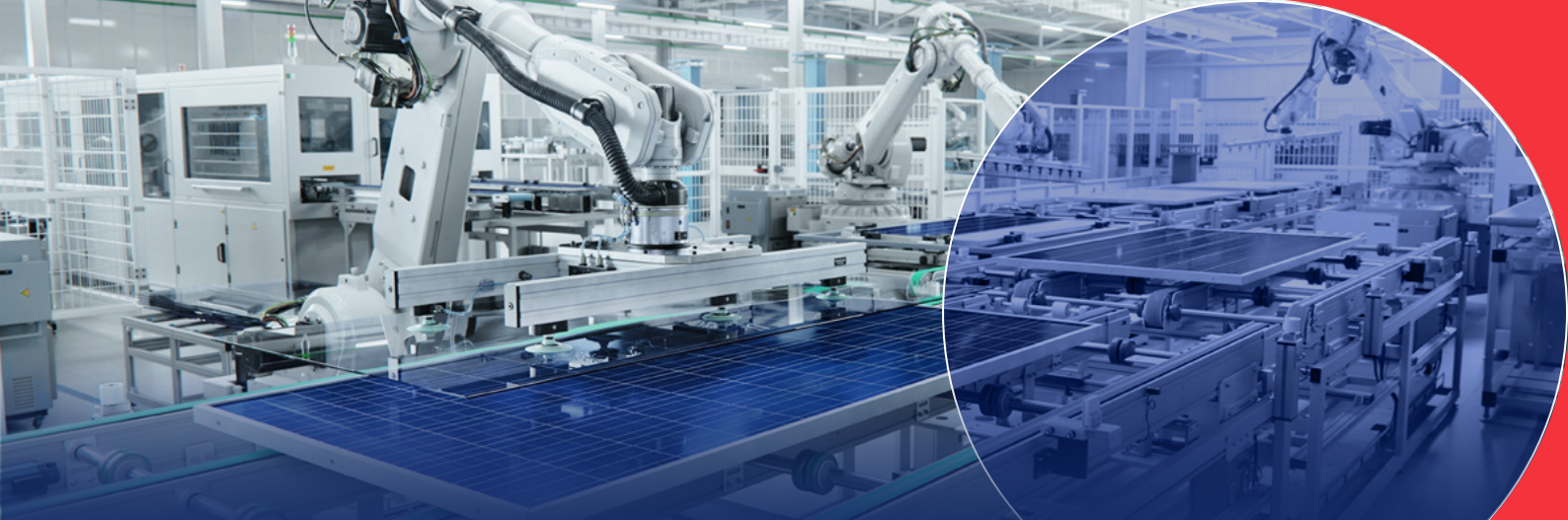


II. Generating Sustainable Prosperity

CASE STUDY 3

Material Gains

Producing cleaner energy needed to reduce emissions and curtail rising global temperatures is complex and requires specialty materials. The Arkema Group is a leading developer of speciality chemicals that address the ever-growing demand for sustainable and innovative materials.

Arkema's materials are used in the solar panels, wind turbine blades, and batteries that support society's transition to cleaner energies, making them more efficient and cheaper to produce. Danny Foong, General Manager & Project Business Director of the High Performance Polymers Business Unit at Arkema, explained how the company is using its Singapore base to help drive the region's transition to a more sustainable economy.

Where are the biggest opportunities in innovation and advanced manufacturing?

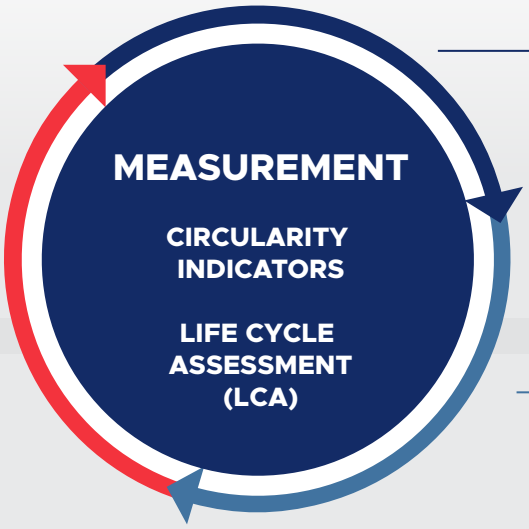
We are seeing huge potential to address economic and societal challenges such as in new energies, new technologies, avoiding the depletion of resources, clean mobility, and increasing urbanisation. With an expertise in specialty materials, we have shifted our focus to specific innovations linked to these challenges:

i. Developing bio-sourced products
ii. Supporting development of new energy resources
iii. Designing solutions that provide access to clean drinking water
iv. Reducing the weight of materials used for transportation systems
v. Developing new materials for electronic products
vi. Developing materials to improve home insulation and efficiency

From decarbonising your own processes to providing carbon-reducing solutions for customers, how is Arkema advancing sustainability?

Arkema places sustainable development solutions at the heart of its innovation policy and the evolution of its product offering, with a vision to replace existing materials based on crude oil with materials that are bio-based and fully recyclable. As a pioneer of green chemistry and a world leader in advanced bio-circular polymers, Arkema's materials are often lighter, more resistant or simply more energy-efficient during manufacturing.

II. Generating Sustainable Prosperity



IMPLEMENTATION, USE, END-OF-LIFE

Maintain products & materials in the use-loop

- Ecodesign
- Reduce presence of hazardous substances
- Development of recycling streams & ecosystems

MATERIALS

Maximise use of

- Renewable materials & packaging
- Recycled materials & packaging

TRANSFORMATION PROCESSES

Manage resources on our sites

- Materials & wastes
- Water
- Energy

Arkema has opened a new state-of-the-art bio-based materials plant in Singapore. What's the strategy behind it?

Arkema's Singapore plant will be the world's largest integrated bio-factory dedicated to advanced bio-circular polymers, and is set to be a transformational catalyst in creating sustainable material solutions throughout the region. The plant will produce Rilsan® polyamide 11, an advanced polymer derived entirely from renewable castor seeds, a crop that does not compete with food or cause deforestation.

Polyamide 11 offers significantly higher performance than fossil fuel-based alternatives and a carbon footprint reduction of approximately 60%. It can be used for products as varied as high-end running shoes, consumer electronics, durable powder coatings, medical devices, and lightweight automotive parts.

This is the largest investment in Arkema's history and a testament to our commitment to sustainability and becoming a pure player in specialty materials by 2024.

II. Generating Sustainable Prosperity

Why choose Singapore for this kind of investment?

Singapore's robust research and innovation environment makes it the ideal ecosystem for us to establish our world-class integrated bio-factory dedicated to high performance polymers. Singapore's Jurong Island -- an amalgamation of islands and reclaimed land to the southwest of the city that serves as a hub for the energy and chemicals sector -- offers many advantages in terms of infrastructure, logistics, industrial integration, and operational excellence, as well as carbon footprint optimisation.

In addition:

- Jurong Island is among the most securely guarded industrial areas in the world
- Singapore offers a cluster of talent and first-rate service providers, which promotes continuous improvement
- Singapore is among the world's best in terms of IP protection, which is a key consideration for our activity

What support have you received?

From the very beginning, Arkema has been cheered on by the Singapore authorities and local communities. Our bio-factory is a perfect fit for Singapore's ambitions to advance the circular economy and carbon reduction.

> **"Singapore's robust research and innovation environment makes it the ideal ecosystem for us to establish our world-class integrated bio-factory dedicated to high performance polymers.**
>
> **Danny Foong,**
> **General Manager & Project Business Director of the High Performance Polymers Business Unit, Arkema**

II. Generating Sustainable Prosperity

CASE STUDY 4

Leading the Transition

Singapore is at the forefront of the energy transition in Asia. As a regional hub for innovative companies, investment firms, and learning institutions, it's playing a leading role in efforts to transform the power grid at home and throughout Southeast Asia.

Domestically, Singapore's Four Switches policy is a far-reaching plan to turn the country into a beacon of sustainable energy, using a combination of Solar, Low-Carbon Alternatives, Regional Power Grids, and Natural Gas.[9]

As part of its Green Plan 2030, the country aims to quintuple its solar energy output to at least 2 gigawatt-peak – enough to power 350,000 homes per year. To help realise this goal, the Singapore government is partnering with renewable energy company EDPR APAC, which is part of EDP Renewables, a global leader in the renewable energy sector and fourth largest wind and solar energy producer worldwide.

"As a leader in the energy transition, EDPR APAC is committed to both scaling up and broadening renewables deployment in Singapore and the region to accelerate its decarbonisation," a spokesperson for EDPR APAC explained.

"Having a diversified energy mix is key, which is why EDPR APAC has projects across a full suite of alternative renewable energy sources such as solar utility scale, solar Distributed Generation (DG), floating solar, wind onshore, wind offshore, as well as green hydrogen. Singapore's government recently announced a national hydrogen strategy, and we are looking to expand EDPR APAC's strong renewable hydrogen ambitions here."

EPDR APAC has leveraged Singapore's status as a hub for regional talent and innovation, and even used the country's small size as a spur for solutions. At the time of this article, EDPR APAC has more than 400 MWp of fully owned solar capacity in Singapore as part of its 1.15GWp of committed capacity in the APAC region.

"To overcome Singapore's land-area limitations, for example, we have deployed solar distributed generation projects in underutilised spaces such as rooftops and open bodies of water," the EDPR APAC Spokesperson said.

EDPR APAC has built on these innovations to develop technologies that are resilient to the environments in Asia-Pacific. In 2021, the company completed one of the world's largest floating solar photovoltaic platforms on the open sea in the Straits of Johor between Singapore and Malaysia.

Designed with a robust constant tension mooring system, it can withstand changing weather conditions, thus keeping the platform and all its

[9] EMA

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II. Generating Sustainable Prosperity

operational equipment on-board on the open sea. In 2020, EDPR APAC led a consortium that designed, installed, commissioned and operated Singapore's first utility-scale, grid-tied Energy Storage System (ESS).

"Being based in Singapore means we benefit from political, economic and fiscal stability and a supportive government with a strong sustainability agenda," the EDPR APAC Spokesperson said.

"Singapore's economy is among the most innovative in the world based on capacity for and success in innovation, which is overseen, promoted and ensured by institutions like the EDB."

> **"Being based in Singapore means we benefit from political, economic and fiscal stability and a supportive government with a strong sustainability agenda.**
>
> **EDPR APAC Spokesperson**

III. A Digital Economy of Opportunities

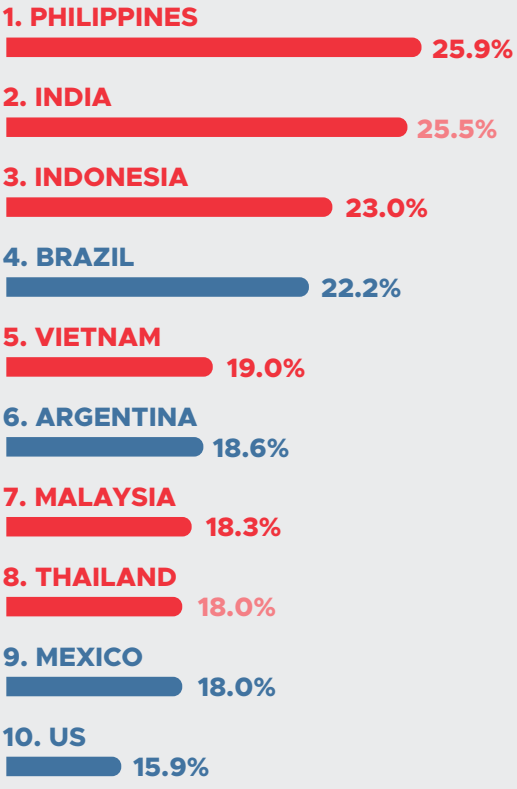
Southeast Asia has the fastest-growing Internet market in the world.[1] In 2022 alone, online spending increased by about 20%, reaching an estimated US$200 billion in gross merchandise value.[2] By 2025, the region's online economy is set to reach US$330 billion.[3]

Three key factors have fuelled this boom:

- Southeast Asia has a large and expanding youth population, most of whom are digital natives. The region will contribute 70% of the world's new consumer population through to the end of this decade[4]
- The rapid adoption of smartphone app-based financial services is helping millions make digital payments – from large companies to small business and their customers. It's also opening up a new world of financial inclusion in which people can manage their money. The region's digital payments market is expected to triple to US$2 trillion between 2020 and 2030[5]
- These trends have propelled a boom in regional e-commerce, which has seen sales surge fivefold between 2016 and 2021. E-commerce's share of retail sales grew from 5% to 20% during this period

The online marketplace boom has implications beyond dollar value. Digital tools are playing an important role in meeting the region's social as well as economic needs, such as improving access to education, extending financial services to the region's large unbanked populations, and providing financing to the small and medium-sized businesses (SMBs) that comprise up to 99% of Southeast Asia's enterprises.[6]

Top 10 Countries by Retail E-Commerce Sales Growth – 2022



Note: Includes products or services ordered using the internet via any device, regardless of the method of payment or fulfillment; excludes travel and event tickets, payments such as bill pay, taxes or money transfers, food services and drinking place sales, gambling and other vice good sales.
Source: eMarketer

[1] WEF
[2] Temasek/Google/Bain
[3] Temasek/Google/Bain
[4] WEF
[5] Temasek/Google/Bain
[6] ASEAN

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III. A Digital Economy of Opportunities

Extending Opportunity

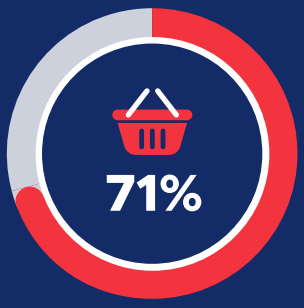
Ensuring the opportunities presented by the digital age are equitably spread remains an obstacle, however.

Almost two-thirds of SMBs that need credit or financing are unable to source it from traditional lenders, according to a 2021 study.[7] Now, almost three-quarters of those businesses access credit online, and the finance industry faces a challenge to innovate solutions that unlock opportunities for small companies.

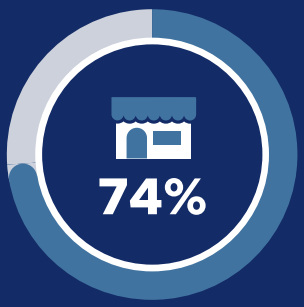
The issue of access extends to individuals, too. Despite recent progress, about 70% of Southeast Asians are either underbanked or unbanked entirely.[8] Research suggests that expanding digital financial services and opening access to mainstream capital will fuel regional growth and prosperity.[9] According to a Bloomberg global study in 2022, technological innovation and e-commerce are key drivers of investment decisions for about one-third of foreign direct investors (FDIs).[10]

Increased investment, in turn, boosts employment. To date, the digital economy has created an estimated 160,000 direct jobs and 30 million indirect jobs across the region.[11]

More Consumers and MSMEs Using Digital Financial Services



Surveyed consumers with digital loans, **previously unable to get financing from banks/lenders**



Surveyed MSMEs with digital loans, **previously unable to get financing from banks/lenders**

Source: Tech for Good Institute

[7] Tech for Good Institute
[8] Temasek
[9] Temasek
[10] Bloomberg Global FDI Study 2022
[11] Temasek/Google/Bain

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III. A Digital Economy of Opportunities

An Environment to Thrive

The digital economy is not solely about opportunities for tech-savvy millennials and Gen-Z, either. Societies in Asia are ageing rapidly, and this has spurred a raft of digital eldercare solutions, many of which leverage artificial intelligence (AI), robotics and augmented reality to empower seniors to maintain their health, wellbeing, and independence for longer.[12]

If these technologies are to thrive and reach their enormous potential, they require investment, collaboration, talent, and policy support. The Go Digital ASEAN initiative launched in 2020, for example, trained more than quarter of a million people from farmers and home-based handicrafts producers to small-scale hotels, restaurants, and shops in harnessing digital skills.[13]

Singapore has taken these ambitions a step further. Ranked fourth in the world for digital competitiveness,[14] it has set a goal to build an inclusive digital future that will act as a model for countries in Southeast Asia and beyond.[15]

The island nation has become a key regional hub for FDIs from Google and Microsoft, to startups that require high-tech solutions, a skilled workforce, and a climate of openness to drive their vision for a digital future forward. The Bloomberg study found that FDIs ranked financial services, advanced technology and innovation, and IT/digital/software services as the top three industries with investment potential in Singapore.

"Singapore has consistently ranked as one of the most innovative countries in the world,[16] with a strong focus on promoting creativity and fostering a supportive environment for innovation," said Ben King, Managing Director, Google Singapore.

"This is only possible because of its forward-thinking policy-making approach, the openness for tech talent to thrive, and its open and supportive environment for private-public partnerships. We see enormous potential both to empower more Singaporeans through technology, and to ensure Singapore continues to lead technology for the wider region."

Go Digital ASEAN Impact as of 2022

183,096
SME owners and
42,682
job seekers across
10 ASEAN COUNTRIES
benefited from digital skills training amid the Covid-19 pandemic

MSMEs

81% have seen an increase in their customer engagement

77% were able to move their business online

25% were able to keep their business running as a result of the training

JOB SEEKERS

93% felt more prepared to work remotely

58% acquired employment did so in two months or less

27% searched for a new job online as a result of the training

Source: The Asia Foundation

[12] YCP Solidiance
[13] Asia Foundation
[14] IMD
[15] SmartNation.Gov.Sg
[16] Global Innovation Index

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CASE STUDY 5

Innovation Nation

Google opened its first office in Singapore in 2007. Today, the city hosts Google's Asia-Pacific headquarters, leading the company's mission to support 2.5 billion online users across the region. Ben King, Managing Director, Google Singapore, discusses the company's latest innovations, and why Singapore is the ideal partner for businesses wanting to drive tech for good.

How is Google in Singapore helping to create a more inclusive future?

We feel a deep responsibility to effectively use our technology, resources, and expertise to create a positive impact on society. We do this by working closely with private and public partners to create economic opportunities for all.

One key area of opportunity that we invested in is leveraging the power of AI and machine learning in improving people's lives, through products like Maps, Google Lens, Live Transcribe, and Voice Access for people who are deaf and hard of hearing.

Secondly, we don't want any Singaporean to miss the opportunities offered by the digital economy, so we strive to provide a wide range of skilling and job opportunities for businesses and individuals from all walks of life to help them succeed, and bridge the tech gaps among local talent.

Through Skills Ignition SG, an upskilling programme in collaboration with the EDB, Infocomm Media Development Authority (IMDA), and industry partners, we want to provide Singaporeans with the tools to succeed in today's rapidly changing job market. In fact, we are offering 10,000 Google Career Certificates scholarships in areas like Data Analytics and IT Support to equip more locals with skills required to be job-ready in tech-related fields.

As more people continue to come online, they may lack the skills to assess the type of information they are finding, what's safe for them to engage with, or how to help their kids develop healthy digital habits. It's a true challenge, so we're always asking this question: how do we help more vulnerable Singaporeans use technology for good and stay safe from scams, misinformation or cyberbullying? This led us to design tools like Family Link and YouTube Kids for safer and healthier online exploration. We've also been working with nonprofits like RSVP Singapore to train seniors in how to safely use online payments like Google Pay.

Can you talk a little about how Mobile Payment Services like Google Pay have become a vital part of the Southeast Asian consumer landscape, allowing financial access for millions of previously excluded people?

Mobile payments in Singapore have experienced explosive growth, with the latest eConomy SEA 2022 report showing they reached US$107 billion in 2022.

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This trend can be observed throughout Southeast Asia. From 2020 to 2025, it is estimated that the number of mobile wallets in use will grow 311% to almost 440 million across Indonesia, Malaysia, the Philippines, Singapore, Thailand, and Vietnam.

With contactless payments gaining ground, we designed Google Pay to make money simple, helpful, and secure for everyone.

Innovating with purpose requires an environment that supports and nurtures creativity. How does Singapore rate in this regard?

The Google-Singapore partnership is well set to drive future tech development in the region, in three key areas:
Infrastructure investments: Last year, we announced the opening of our third data center facility in Singapore, further enabling us to provide the most reliable service possible to all of our users in Singapore, the region and the world.

Product innovation: We have a strong engineering presence in Singapore dedicated to creating and improving Google products for users here and worldwide.

Programmes to grow the ecosystem: We want to support entrepreneurship and create a climate that nurtures and rewards innovation. Google's programmes and the Singapore Google Developer Space help Southeast Asian developers, entrepreneurs and community groups grow and do more with their businesses. In the last three years, more than 25,000 developers and 650 startups have benefitted from the technical talks, accelerator programmes, hands-on mentorship, and networking opportunities with experts in the region.

Are you able to access the right kind of talent here?

We are fortunate to have Singapore as our Asia-Pacific headquarters as it plays a pivotal role in our global strategy. Consistently ranked as one of the world's most competitive environments, Singapore's workforce is highly educated and skilled and this strategic location allows us to reach millions of users across the region, while working alongside some of the most talented individuals in the world.

> **"Consistently ranked as one of the world's most competitive environments, Singapore's workforce is highly educated and skilled and this strategic location allows us to reach millions of users across the region, while working alongside some of the most talented individuals in the world.**

Ben King,
Managing Director,
Google Singapore

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CASE STUDY 6

Tech for Good

From its base in Singapore, Microsoft has been deploying innovative technology to address some of the world's most pressing problems, as Jeth Lee, Chief Legal Officer, Microsoft Singapore, explained.

How important a role is Singapore playing in support of companies innovating in the tech space for the greater good?

With support from Microsoft's deep ecosystem of partnerships across the public and private sector, Singapore is using technology in areas like cybersecurity and sustainability to narrow the gap between skilling and employability. This serves to improve the lives of those around us while building a resilient and digitally inclusive society. Initiatives include:

Datacenter Academy – A five-year commitment to empower over 300 students, with a focus on building applied datacentre skills for them to thrive in a growing ICT sector.

#GetReadySG – A Microsoft-Singapore government partnership to upskill, place and fill demand for tech-enabled jobs for Singaporeans.

Digital for Life – A programme enabling people with disabilities to narrow the digital divide and enable people with disabilities to participate in the workforce.

SG Cyber Safe Partnership Programme – A public-private collaboration with the Cyber Security Agency of Singapore to help companies practice good cyber hygiene in the face of common cyber attacks.

> **"With support from Microsoft's deep ecosystem of partnerships across the public and private sector, Singapore is using technology in areas like cybersecurity and sustainability to narrow the gap between skilling and employability.**
>
> **Jeth Lee,**
> **Chief Legal Officer,**
> **Microsoft Singapore**

Microsoft is also collaborating with Singapore's Infocomm Media Development Authority (IMDA) to address climate-related issues and improve sustainability outcomes for digital technologies.

IMDA and Microsoft will be jointly developing a framework for the development of sustainable software, which will be applied through the Singapore

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GreenTech Challenge. The framework will be shared globally, when ready.

This partnership will encourage the adoption of sustainable technology solutions for SMEs, allowing them to measure, track and report their carbon emissions so they can manage and optimise their resources in a frictionless manner.

The pandemic accelerated digital transformation across almost every sector, but healthcare was a critical area. How did Microsoft support vulnerable members of the community?

The number of people with complex care needs and chronic illnesses is increasing. Singapore's Ministry of Health responded by announcing the Healthcare Master Plan -- Beyond Healthcare 2020 -- to support precision in public health by maximising the use of digital technologies such as Data and AI and behavioural science to address complex healthcare issues and enhance disease management.

Microsoft partnered with IMDA and other organisations to launch Virtual Digital Clinics as part of its digital inclusion efforts. This programme helped seniors get advice from volunteers and access essential digital services from home.

As a small city state, Singapore is acutely aware of the need to balance economic development and environmental sustainability. Reducing and recycling waste and adopting a circular economy approach are key priorities. How does Microsoft strive to strike the same balance?

Singapore has already laid the groundwork for building an advanced circular economy infrastructure that can help it take advantage of those opportunities, thanks to its strong commitments from the public and private sectors and a flexible policy environment.

The opening, last year, of the Microsoft Circular Center in Singapore, the first in Asia, is just one example of Microsoft's commitment to sustainability and product stewardship in its data centers. Our Circular Center will ensure that hardware components are tracked and deployed in an optimised manner, from procurement to decommissioning, thereby reducing waste and carbon emissions.

The Microsoft Circular Centers are working towards our goal of 90% reuse of servers and components by 2025, currently processing 12,000 servers per month for reuse.

Microsoft is also working with companies like REC Group, Sembcorp, and EDPR APAC to create innovative, sustainable solutions for Singapore and the region in the pursuit of a green economy.

Conclusion

After a stream of global economic, geopolitical, and health crises since the turn of the millennium, it can seem as if the world faces a wall of insurmountable challenges. In fact, we have the financial and technological tools to meet these daunting problems, but what we often lack is the right environment to explore their potential.

Given the right mix of progressive thinking, unshackled innovation, collaboration between governments and the best minds of academic and private-sector institutions, and access to pools of investment capital, solutions can become a reality.

Singapore is tackling many of these pressing challenges head-on, through its resolute commitment to driving Business for Good. By stimulating a rich, open ecosystem where the hotbed of ideas can thrive in the greenhouse of opportunity, Singapore has created a place where like-minded companies, from the biggest multinationals to the smallest startups, can accelerate the journey toward a better future for all.