



**Does environmental
sustainability make economic
and business sense?**

MAS-ESS ESSAY COMPETITION 2020

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Executive Summary

Climate change has held the global consciousness captive for more than thirty years. In that time, mankind has struggled to coordinate efforts in creating a greener world, but the dire need for economic growth has always stalled the sustainability agenda and relegated it as secondary.

Unlike 30 years ago when the devastating consequences of our unsustainable exploitation of the Earth went under the radar, the world today faces disruptions in the form of rising sea levels, extreme weather and worsening health conditions. Pursuing environmental sustainability is no longer just a moral imperative but the only viable route to economic growth and survival. With innovation and technology as enablers, we must reconcile economic growth and environmental sustainability.

In Chapter II, we argue that with increasing public awareness of climate change and a shift towards green consumerism, businesses that strive to be sustainable can increase profits, offsetting the potential risks and financial loss by changes in their business model. To ensure that targets are meaningful and practical, we propose that businesses set intra-industrial benchmarks, science-based goals and create a sustainability department to take charge.

In Chapter III, we argue that the transition to a circular economy revolving around sustainability creates opportunities for the economy to improve. Transitioning to green finance helps to create a virtuous cycle of sustainable economic growth. Furthermore, a green economy not only secures livelihoods in primary industries but also creates new and better jobs, thereby reducing inequality.

As a low-lying urban city, Singapore is particularly vulnerable to climate change. In Chapter IV, we propose that Singapore establish herself as a regional environmental

hub, helping her neighbours pursue sustainability amidst rapid urbanisation, to spur regional efforts against climate change. Building upon current sustainability measures and establishing a national framework for sustainability are also pivotal steps in securing Singapore's future.

Word Count: 300

ENVIRONMENTAL SUSTAINABILITY



BUSINESS



OPPORTUNITIES



Green Trends

Riding on the wave of green consumerism to increase profits while avoiding punitive measures such as carbon tax



Brand Recognition

Earning patronage of increasingly eco-conscious consumers and utilising social media as a potent platform for free advertising



Dynamic Work Culture

Going green boosts morale in the workplace and can be used as an avenue to create a culture of innovation



TARGETS



Industrial Benchmarks

Comparing sustainability efforts with rival firms ensures that goals are financially feasible and practical



Science-based Goals

Setting targets based on scientific data allows goals to be meaningful and impactful



Sustainability Department

Creating a sustainability department dedicated to identify and rectify unsustainable practices



ECONOMY



Green Finance

Creating a virtuous cycle of growth where money is invested into green sectors to generate more wealth



Creating Jobs

A shift to a green economy creates new and better jobs in green sectors



Reducing Inequality

Protecting the environment preserves the livelihood of those working in primary industries



SINGAPORE



Environmental Hub

Sharing our technology and experience with our neighbours experiencing rapid urbanisation



National Sustainability Metrics

Setting reporting standards and guidelines for businesses



Toughening Existing Measures

Meting out harsher punishments, pursuing renewable energy and leveraging on technology through Smart Nation blueprint

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Chapter I: Background

1.1 Definition of Sustainable Development

According to the Brundtland Report¹, sustainable development is defined as “development that meets the needs of the present generation without compromising the ability of future generations to meet their needs” (Brundtland Commission, 1987).

To protect future generations, economic growth should not come at the expense of irreversible environmental damage.

1.2 The Problem of Environmental Sustainability: Why It Matters

The environment, society and the economy are inextricably linked (Figure 1.1).

A polluted environment can impact society by compromising non-material standards of living². Air pollution, identified as the single biggest environment-related health risk across the globe (WHO, 2014), can increase the risks of heart disease, stroke, respiratory diseases and infections (WHO, 2018; Burnett et al. 2018). However, air pollution should not be viewed in isolation (UNEP, 2016) as other forms of pollution can also cause premature death (Figure 1.2).

¹ The Brundtland Commission released the Brundtland Report in 1987 and proposed the concept of sustainable development as an ideal for the global economy and corporations. The report also listed out the three key pillars of sustainability: economic growth, environmental protection and social equality. For the purpose of this essay, we will be focusing more on environmental protection, though we will also inevitably discuss the other two pillars due to their interdependent relationship.

² Other factors apart from material goods, like the environment (which includes climate and clean air), provide utility and are part of the defining unit of standard of living (Hawthorn & Sen, 2004).

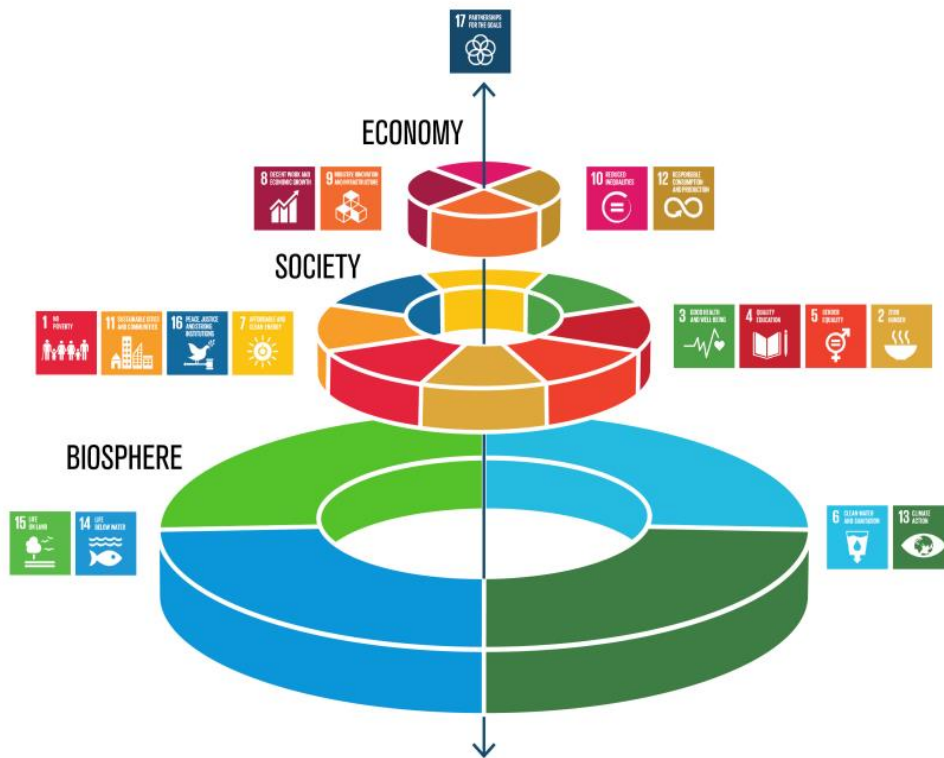


Figure 1.1: Figure showing the classification of the 17 SDGs and the interdependent nature of the environment, society and the economy (Stockholm Resilience Centre, 2016)

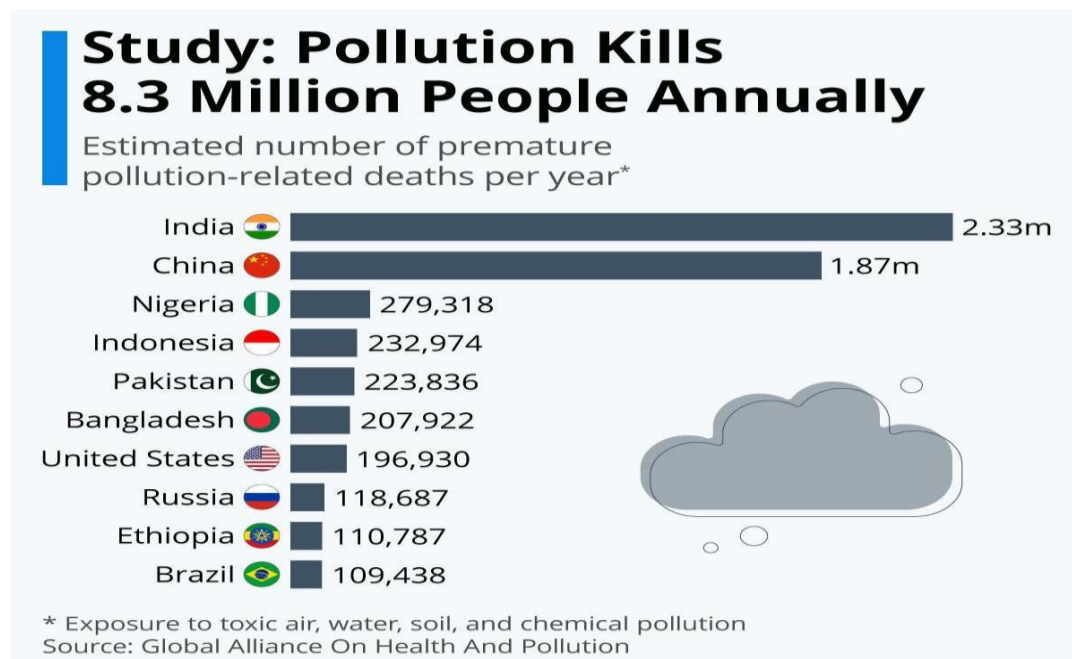


Figure 1.2: Bar chart showing the number of deaths caused by pollution annually (GAHP, 2019)

A polluted environment also has adverse impacts on the economy. The aforementioned societal impacts affect the well-being of individuals, resulting in direct financial costs³ due to loss in labour productivity (He, Liu, & Salvo, 2019). Government expenditure on protection measures can impose additional strain on a country's resources as well⁴. Furthermore, natural resources are necessary FOPs⁵ in many industries, yet large-scale production depletes these resources faster than they can regenerate, thereby threatening the very source that drives economic growth.

Environmental degradation is an exigent issue that threatens immediate repercussions if left unaddressed. Global average temperatures are already at an all-time high (Figure 1.3), resulting in melting polar ice caps and increasing sea levels which can disrupt global supply chains⁶.

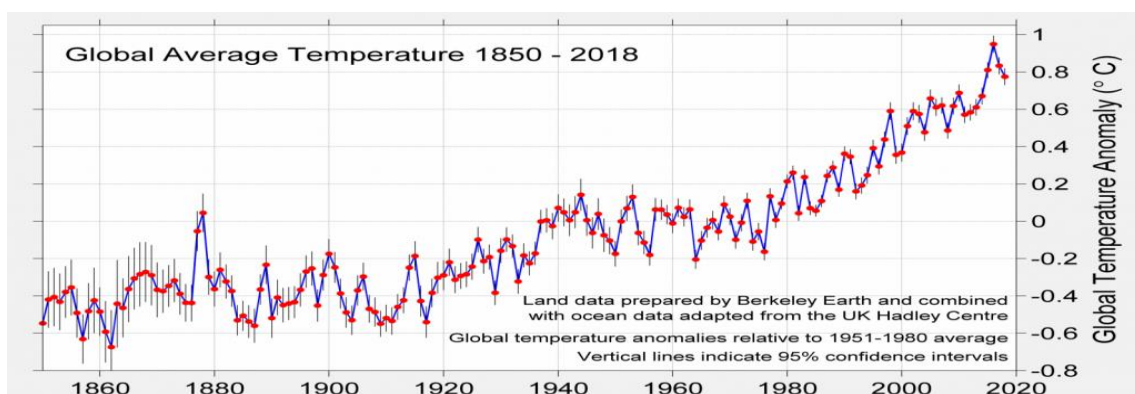


Figure 1.3: Line graph shows global average temperature reaching record heights since 1850 (Berkeley Earth, 2019)

³ The United Nations Environment Programme (UNEP) estimates financial loss in the range of 5-10% of GDP, which is corroborated by the “Going for Growth” report published by OECD in 2019 which conservatively puts the figure at around 4.3%.

⁴ During the 2019 National Day Rally, Prime Minister Lee Hsien Loong warned that around \$100 billion or more may be needed to protect Singapore from rising sea levels in the long-run (PMO, 2019).

⁵ Factors of Production

⁶ The severe flooding in Thailand in 2011 caused widespread damage to the local manufacturing industry. This heavily disrupted the supply of components to the automobile, IT and other industries worldwide. More than 14,500 companies reliant on Thai suppliers suffered business disruptions worldwide and total insured losses were estimated between US\$15 billion and US\$20 billion (Amado, Adams, Coleman, & Schuchard, 2012). HP lost approximately US\$ 2 billion as a result, while NEC cut 10,000 jobs worldwide due to the global shortage of hard disk drives. While the immediate impact was on the hard disk manufacturers, the domino effect extended across the world and into consumers' pockets (WBCSD, 2015).

1.3 A Polarised World: Trump vs. Thunberg

Despite numerous scientific reports on the severity of climate change, skepticism has grown in recent years with regards to the need for heightened sustainability measures. This is best demonstrated by Donald Trump. Despite cementing his position as a “climate nihilist”⁷⁸ throughout his presidential campaign, he was still elected which is indicative of a wider, public mindset shift away from the need to protect the environment. His term as president saw the rollback and reversal of some 95 environmental regulations (Figure 1.4) as well as the withdrawal of the US from the Paris Climate Agreement⁹.

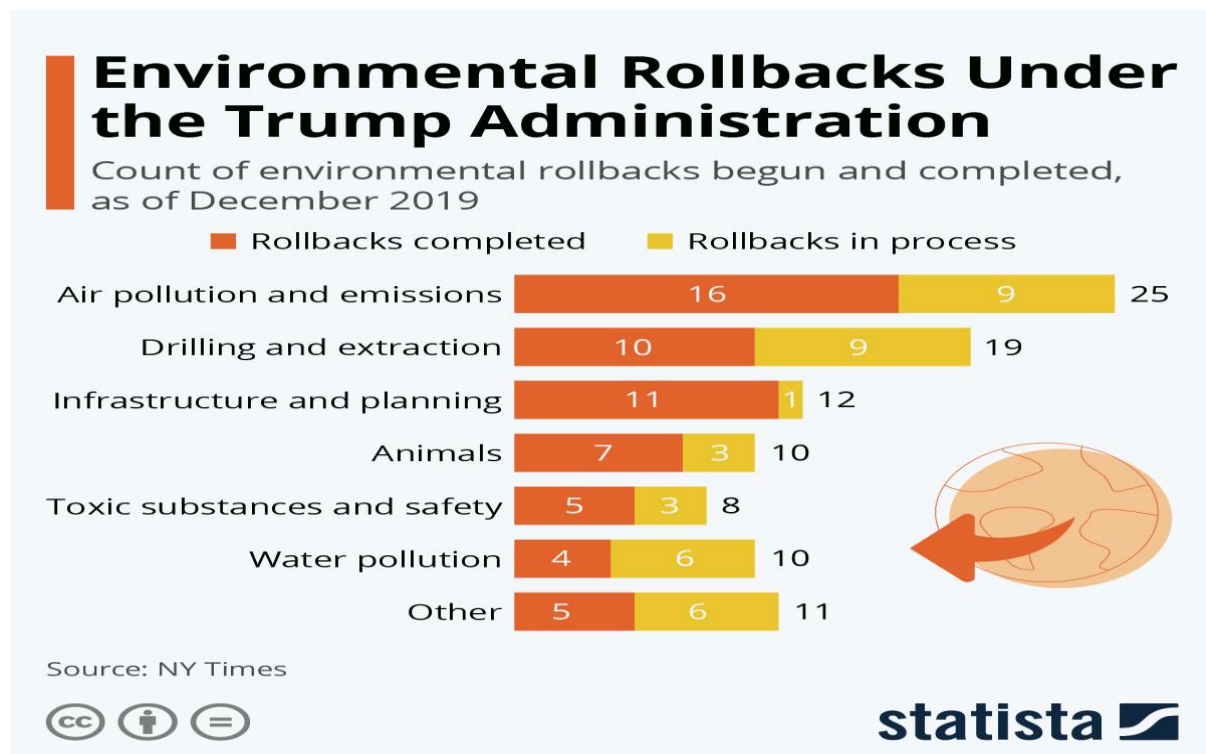


Figure 1.4: Bar chart categorising the 95 environmental rollbacks under the Trump Administration (Popovich, Albeck-Ripka & Pierre-Louis, 2018)

⁷ Joseph Goffman, executive director of Harvard's Environmental Law Programme, argues that Mr Trump "believes nothing on climate change - he's a climate nihilist" (Cheung, 2020).

⁸ During the recent 2020 World Economic Forum held in Davos, President Trump urged those in attendance to ignore environmental “alarmists” and to “reject the perennial prophets of doom and their predictions of the apocalypse”. This is in line with his “I don’t believe it” comment when asked about the Fourth National Climate Assessment in 2018 that highlighted the potential impact of climate change across every sector of American society.

⁹ The Paris Agreement is the first truly global commitment to fight the climate crisis. In 2015, 195 countries and the European Union signed on to a single, sweeping agreement that aims to keep global warming well below 2°C —and make every effort to limit the increase to 1.5°C or lower (WWF, 2020).

Fortunately, there are grounds for optimism such as the advocacy efforts by Greta Thunberg in recent years which have garnered the attention of millions worldwide. Images of a teary-eyed Thunberg speaking to a panel of world leaders during the UN Summit have been etched into the minds of many, galvanising international support¹⁰. Notably, the stark contrast in narratives presented by Trump and Thunberg in Davos is symbolic of a desperate plea by the younger generation for the protection of the environment (Figure 1.5) to safeguard the quality of life for future generations.

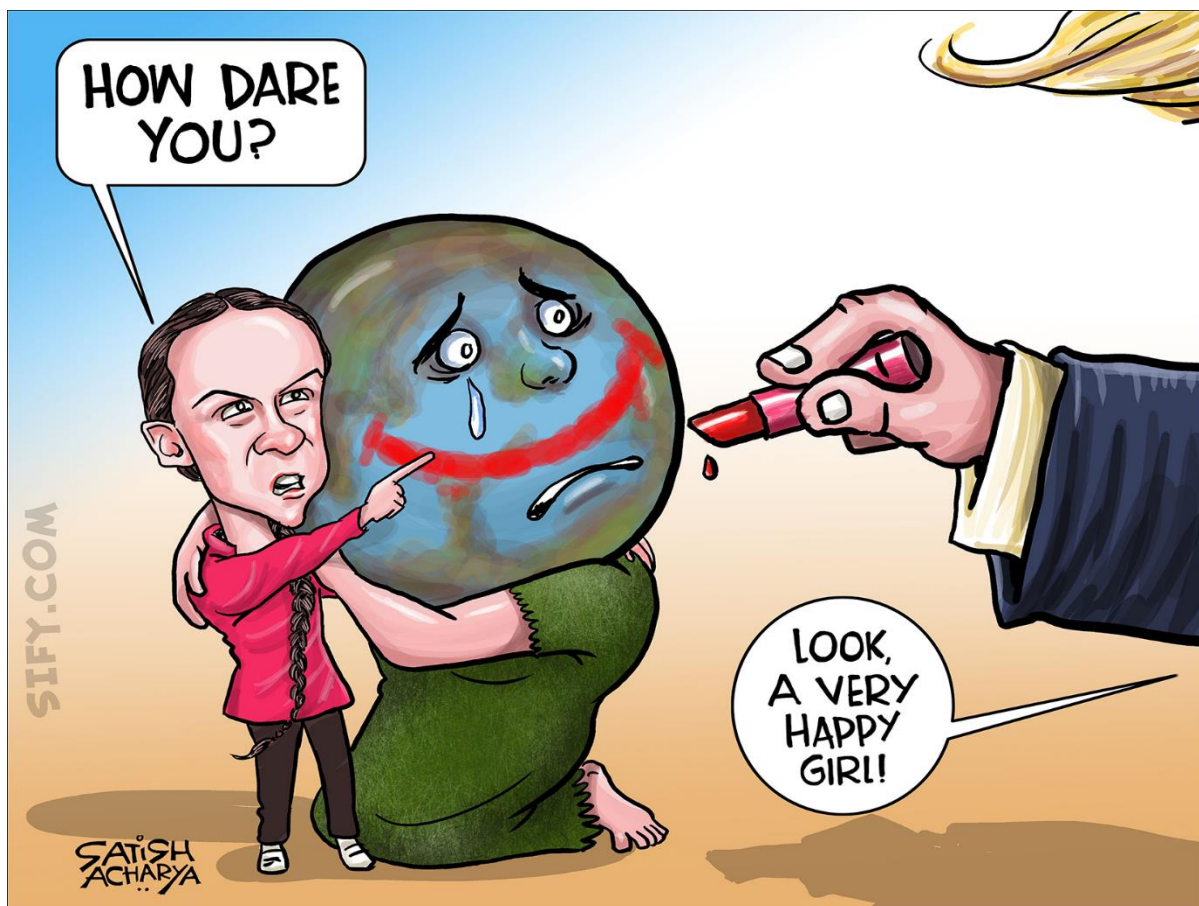


Figure 1.5: Cartoon illustrating Donald Trump mocking Greta Thunberg (Satish Acharya, 2019)

¹⁰ Even long before Thunberg's historic speech at the 2019 UN Climate Action Summit, her advocacy efforts had already struck the hearts of many who drew inspiration from her "Fridays for Future" climate strikes involving school children. On September 20, 2019, students around the world staged the largest climate change protest in history, with some 4 million people participating in 2,500 events in more than 160 countries on all seven continents (McGrath, 2019).

Singapore is particularly vulnerable to climate change disruptions and shares Thunberg's view on the urgency of sustainability measures. In this essay, we will be evaluating the different strategies businesses can take to minimise environmental damage while retaining profits, as well as propose how Singapore can heighten measures to gear herself up towards a more sustainable and resilient future.

Chapter II: Environmental Sustainability in Business

2.1 Introduction

The Second Industrial Revolution heralded a new age of mass production. Increasingly efficient machinery powered by natural resources allowed businesses to produce immense amounts of goods at low costs. However, with finite natural resources and the environment heading towards decline, the sustainability movement has gained traction in recent years, placing the spotlight on greener alternatives to profit-maximisation.

2.2 Opportunities

The idea of a “take-make-waste”¹¹ system from the previous era as the only way for companies to profit-maximize is no longer relevant nor realistic¹². Change is daunting, and businesses might think that there is no business case for sustainable production. Yet, it is a myth that profits and sustainability are mutually exclusive¹³ (Nielsen, 2015). In fact, consumers are willing to buy and pay more for sustainable products (Figure 2.1). Businesses can hence offset potential risk¹⁴ against increased sales.

¹¹ The “take-make-waste” linear production approach that predominates our current global economy is a 3-step process. Raw materials are first collected before being repurposed into consumer products which are used before they are disposed of as waste.

¹² Current “take-make-waste” linear production and consumption models are not sustainable. At this rate, three planet Earths will be needed to replenish the resources consumed and absorb the pollution generated by consumer good suppliers by 2050 (Lacy, Drewell, Hazelzet, Rheinbay & Pietrzyk, 2019).

¹³ In 2014 alone, sales of consumer goods from brands with a demonstrated commitment to sustainability grew more than 4% globally, while those without grew less than 1%. (Nielsen, 2015)

¹⁴ Pursuing environmental sustainability in originally unsustainable businesses can pose a big risk in terms of increased uncertainty about profit trends, making it hard to justify the move to stakeholders. However, with a projected increase in short-term revenue, businesses can offset the potential costs incurred from R&D or the change to sustainable suppliers by passing said costs to consumers. It must also be noted that pursuing environmental sustainability may not necessarily entail financial losses - in the Singapore F&B industry, not providing straws to consumers allows businesses to cut costs while going green.

CONSUMERS CARE AND PAY EXTRA FOR SUSTAINABILITY

Percent willing to pay extra for products and services that come from companies who are committed to positive social and environmental impact



Figure 2.1: Infographic showing the percentage of consumers willing to pay extra for sustainable products which has seen a year-on-year increase across all regions (Nielsen, 2015)

By riding on the new wave of green consumerism helmed by millennials¹⁵, businesses can stand to make short-term profits while investing part of said profits into researching long-term sustainability ideas. This encourages continued support from eco-conscious consumers, leading to greater profits in the long-run¹⁶.

¹⁵ The chief executive of media, creative and digital communications agency Dentsu Aegis Network Asia Pacific, Nick Waters, asserted that many people are becoming more environmentally aware, especially younger consumers who place an emphasis on a brand's sustainability practices in their purchasing decisions (Baker, 2018).

¹⁶ Lars Voedisch, managing director of PRevious Communications - which represents many international brands - said that while it does not hurt a company's reputation if it is trying to do the right thing, there is less love for companies that have one-off eco-friendly initiatives in the name of corporate social responsibility. He added that consumers have patience for companies that show that they are on a journey towards sustainability (Baker, 2018).

2.2.1 Benefiting from Global Trends

As the world transitions towards the use of renewables, it is gradually shedding its dependence on exhaustible natural resources. In the U.S. energy market, renewables represent the fastest-growing energy source, increasing by 100 percent from 2000 to 2018 (C2ES, 2018). Governments worldwide are picking up on this trend and enacting national and subnational carbon pricing initiatives¹⁷ (World Bank & Ecofys, 2018). Already, green policies are being increasingly (Figure 2.2) adopted in Asia and the Americas (Figure 2.3).

Regional, national and sub-national carbon pricing initiatives: number and share of global greenhouse gas emissions covered

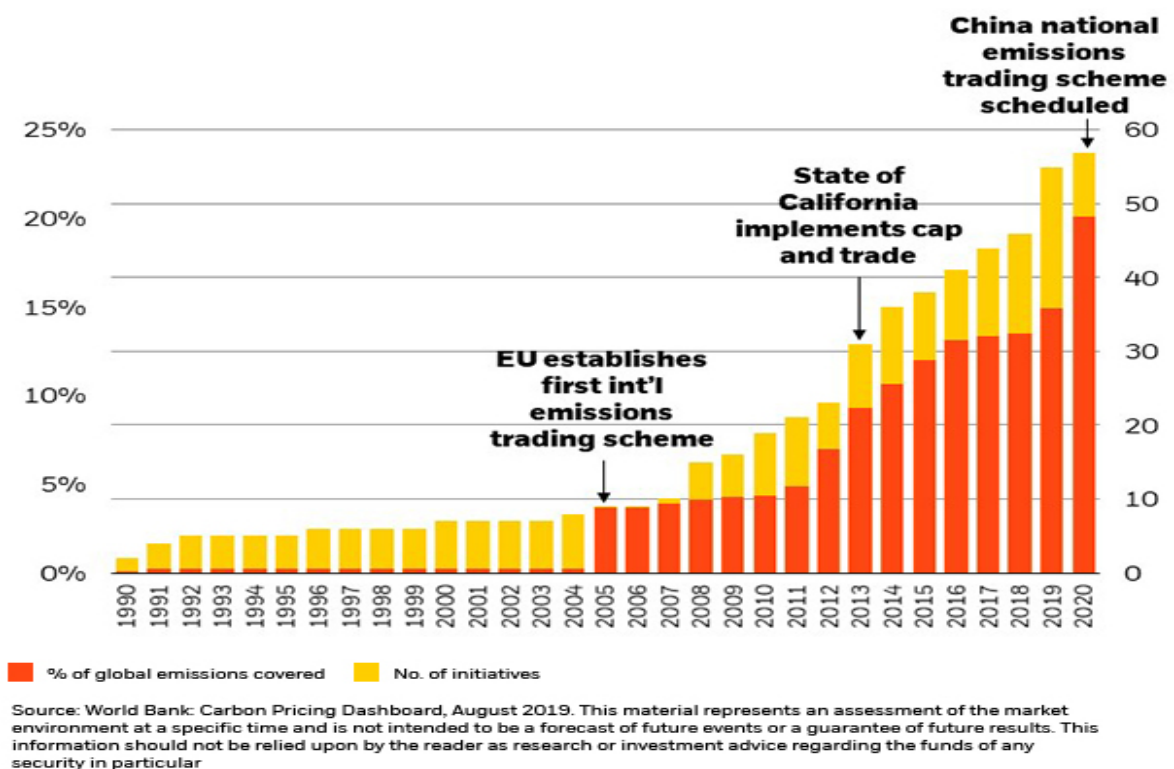


Figure 2.2: Bar chart showing an increasing trend in number of carbon pricing initiatives worldwide (BlackRock, 2020)

¹⁷ By putting a price on carbon, businesses that are heavily reliant on carbon will be incentivised to change their production methods to renewables. Governments should not simply impose punitive measures on the use of carbon – they should also play a proactive part in helping businesses transition to the use of renewables.

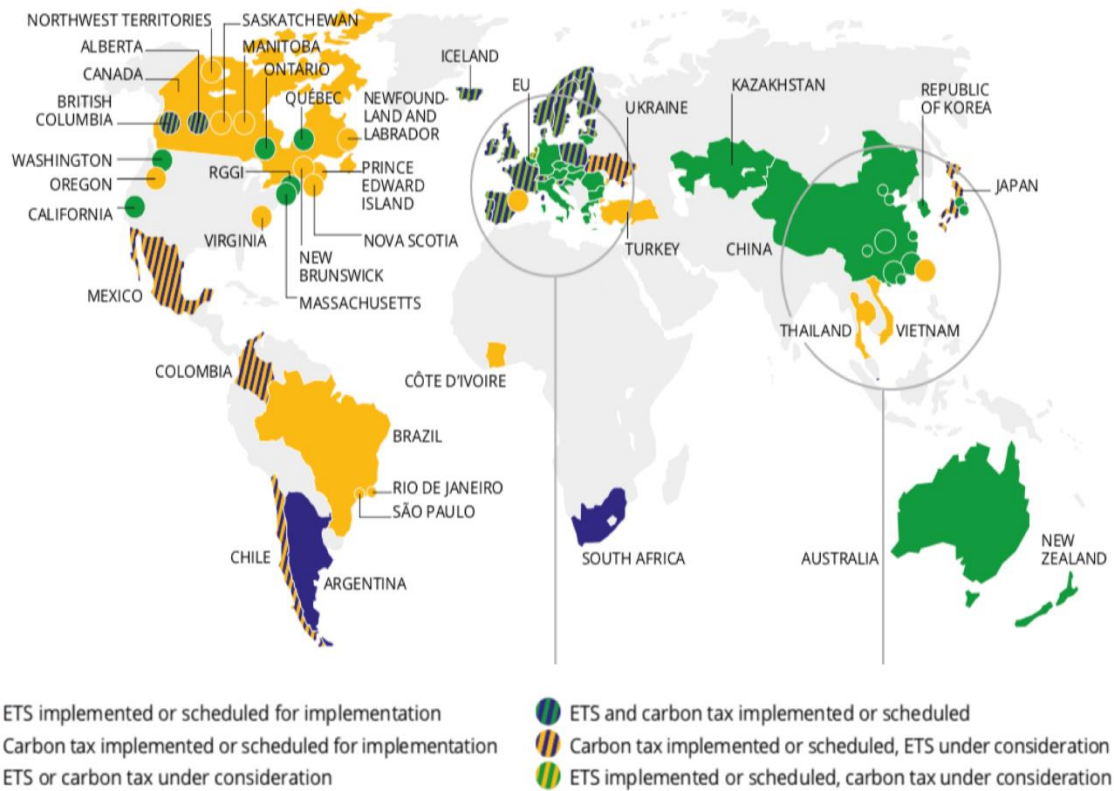


Figure 2.3: Summary map of carbon pricing initiatives implemented, scheduled for implementation and under consideration - Emission Trading System and carbon tax (World Bank & Ecofys, 2018)

Locally, Singapore implemented the carbon tax in 2019 and is looking to do more to commit to the Paris climate agreement by capping her CO2 emissions by 2030 (Lee, 2019). The government has provided the carrot alongside the stick with both the RIE2020¹⁸ (Figure 2.4) and EIEEP¹⁹ (Figure 2.5) initiatives that help Singapore firms become more energy efficient and improve competitiveness. Pre-emptively going green will hence place companies in a position to benefit from green funding while avoiding the penalties of punitive measures.

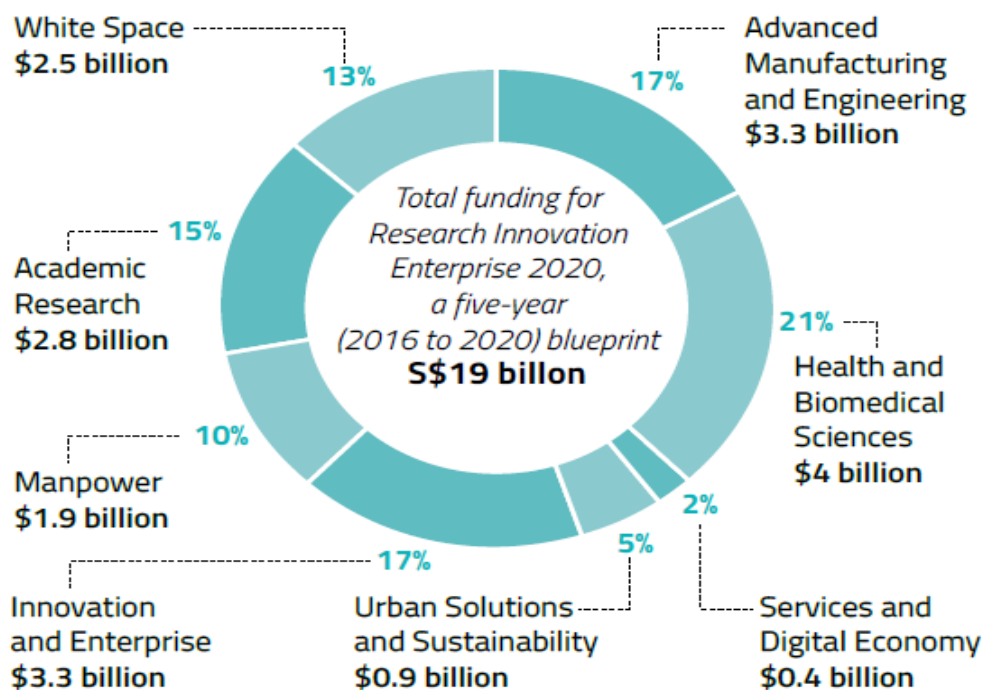


Figure 2.4: Pie chart showing the breakdown of the funding for RIE2020 (Today, 2016)

¹⁸ The Research Innovation Enterprise 2020 plan (RIE2020) is a \$19 billion five-year-plan aimed to help Singapore develop a knowledge-based, innovation-driven economy and society. It serves to build on the progress made to date and to continue to leverage on public sector R&D investments to grow industry R&D capabilities, nurture innovative enterprises, and meet Singapore's national needs (MTI, 2016). Under the Urban Solutions and Sustainability domain, there will be support for companies to embrace innovation through equity co-investment schemes, and research consortia formed from industry and research performers to co-create and commercialise these urban solutions which include finding alternate ways to recover energy (National Research Foundation, 2016).

¹⁹ The Enhanced Industry Energy Efficiency Package (EIEEP) seeks to give stronger support to companies in their drive to become more energy efficient and reduce carbon emissions. In an increasingly carbon-constrained future, improving energy efficiency will not only help companies to reduce costs, it will also improve their competitiveness both locally and internationally. At the same time, companies will also stand to benefit from smaller carbon emissions and hence lower carbon tax liability. Singapore will continue to play her part as a responsible member of the international community in addressing climate change, and develop Singapore as a liveable and sustainable city for the future. (Economic Development Board, 2018)

Power Your Business with the Enhanced Industry Energy Efficiency Package

The National Environment Agency (NEA), Singapore Economic Development Board (EDB), and Energy Market Authority (EMA) will each be rolling out initiatives under the Enhanced Industry Energy Efficiency package to support Singapore companies to become more energy efficient and improve competitiveness.

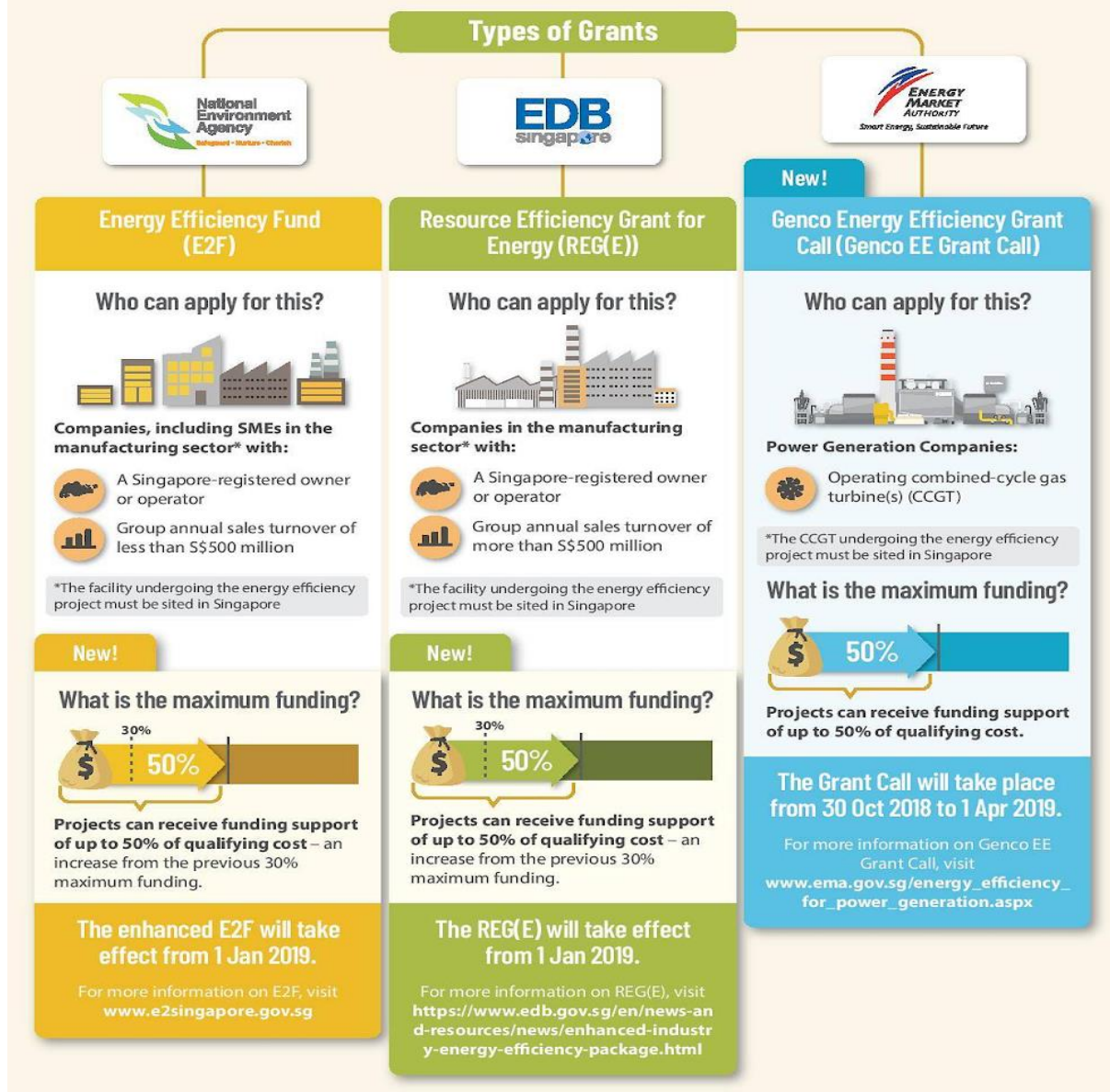


Figure 2.5: Infographic detailing the Enhanced Industry Energy Efficiency Package (Economic Development Board, 2018)

Dwindling natural resources and a paradigm shift towards sustainable production can also disrupt unsustainable supply chains which are prone to disruptions²⁰, harming businesses reliant on them²¹. By sourcing for sustainable producers, businesses can secure a resilient supply chain which allows them to be less susceptible to supply disruptions.

2.2.2 Brand Recognition

Consumers often buy products to express their values and identities (Co, 2019). Hence, buying sustainable products allows consumers to take pride in their contributions to the greater good²². By making genuine efforts towards sustainability, companies can bolster their reputation and earn the loyalty and patronage²³ of increasingly eco-conscious consumers. News of the goodwill of these companies can also easily spread through social media²⁴, which is a free and more potent alternative²⁵ to traditional advertising (Figure 2.6), thereby establishing their branding as altruistic and green.

²⁰ The adoption of clean tech – particularly solar generation, along with the rise of electric vehicles (EVs) has the potential to create significant disruption in the industry. There are growing proof points that solar energy is on the verge of becoming the cheapest source of power on a global basis, without any subsidies. India cancelled 14 Gigawatts of coal fired power generation in 2017 because of the falling cost of solar. Worldwide demand for coal peaked in 2013 after growing for 150 years, and while it grew slightly in 2017, it continues to decline. (Maguire, 2019) The broad-based disruption in the power industry will replace carbon-based fuel with many other sustainable sources of power, putting unsustainable power companies out of business.

²¹ Unforeseen disruptions can create shortages that are not dissimilar to the demand spikes caused by supply/demand imbalances; resilient enterprises can thus react to changing market demand ahead of their competitors (Sheffi, 2007).

²² Social signalling plays a significant role in the purchasing decisions of consumers. In a 2007 survey, more than half of the owners of the hybrid car model Prius stated that the primary reason behind their purchase was because “it makes a statement about me” and that they “wanted others to know they care about the environment” (Maynard, 2007).




²³ Companies who communicate their stance on corporate social responsibility can induce pronounced benefits on their marketing identity, appealing to the eco-friendly crowd (Butler, 2018).

²⁴ Sustainability has also gained traction on social media in recent years. Green hashtags such as #sustainability have over millions of views, and businesses have also jumped on the bandwagon with hashtags like #sustainablebusiness to promote their products online.

²⁵ In the book “Confessions of a Radical Industrialist: Profits, People, Purpose -- Doing Business by Respecting the Earth”, Ray Anderson, founder of multi-billion dollar company Interface Inc., claimed that by defying conventional wisdom to revolutionise their production process and achieve sustainability, they gained “more positive visibility and goodwill among [their] customers than the slickest, most expensive advertising or marketing campaigns could possibly have generated.”

Where are eco-consumers actively researching brands/products?

% who mainly use these online sources when actively looking for more information about brands, products or services

	Social networks	41%
	Product/brand sites	34%
	Video sites	25%
	Independent review sites	22%
	Blogs on products/brands	22%

* Eco-consumers are those who say they try to buy organic/natural products and would pay more for sustainable/eco-friendly products

Question: Which of the following online sources do you mainly use when you are actively looking for more information about brands, products, or services? **Source:** GlobalWebIndex Q2 2019

Base: 44,733 eco-consumers aged 16-64

Figure 2.6: Infographic revealing that eco-consumers most actively research brands on social networks (GlobalWebIndex, 2019)

2.2.3 Building a Dynamic Work Culture

Employee satisfaction is positively impacted when a company is perceived as doing well environmentally²⁶ (Walsh & Sulkowski, 2009), and empirical evidence shows that happier employees are more productive (Bellet, De Neve & Ward, 2020). Happiness is also contagious in the workplace (Seppälä & Cameron, 2015), thereby creating a ripple-like effect which improves the well-being and productivity of employees.

²⁶ This finding is corroborated by a 2017 KPMG report titled "Meet the Millennials" which suggests that social impact is the best way to engage and motivate millennials in the workplace. Given that millennials are the largest generation in today's labour force (Fry, 2018), the positive correlation between employee satisfaction and a company's efforts on going green should thereby not come as a surprise.

Furthermore, when a company engages in green practices, they instill a mindset geared towards sustainability in their employees which can translate to green behaviour in the workplace²⁷. Likewise, encouraging employees to push for innovation in the field of sustainability will also have a viral effect on the company's creative culture²⁸, drawing out the entrepreneurship spirit in its members and forging a conducive environment for innovative thinking.

2.3 Setting Targets

As noted in Chapter 1.2, Earth is reaching a tipping point, issuing a final clarion call for companies to implement the radical changes necessary for Earth's preservation. Instead of setting small incremental goals²⁹, companies must break beyond conservative goal-setting and set ambitious, measured goals that will make a difference.

²⁷ Green behaviour in the workplace can help businesses cut costs. Reducing paper wastage, turning electrical appliances off when not in use and reusing scrap paper to jot down notes are some habits that can help businesses reduce wastage while benefiting the environment.

²⁸ As one of the biggest pharmaceutical companies in the world, MSD's approach to commercial innovation can be characterised as bottom-up. The company has been active in Singapore for over 20 years and now takes advantage of the country's well-educated workforce at its Biomanufacturing Sciences & Training Center. According to Eileen Teo, Executive Director of Commercial Operations, it is about "creating a climate that stimulates innovation, where passionate innovators are encouraged, feel safe and are celebrated to experiment with new, differentiating approaches to solve our business, customer and patient needs" (Economic Development Board, 2018).

²⁹ Professor Jeff Gowdy, contributor to "Pivot Goals" - a database of global environmental targets, posits that it was the business norm to set incremental goals for sustainability in the same way that you would for other aspects of a business – aim to do incrementally better than the previous year. However this framework only makes sense if the boundaries and effects of the goals were limited to the company. Since all businesses operate in an external, finite system, this means that the goals set for businesses need to take the broader system into account. While reducing emissions by 4% is laudable, the Earth requires a reduction of 80% by 2050, or more, without which there may not be a viable place to do business (Westervelt, 2019).

2.3.1 Intra-industrial Benchmarks

One effective way businesses can measure their sustainability efforts is by comparing with intra-industrial companies with similar consumer base and production methods. This allows them to set goals that other firms have proven to be financially feasible³⁰. This enables companies to alter the amount of time and resources dedicated to sustainability goals to ensure that their sustainability efforts are minimally in line with their peers³¹.

2.3.2 Science-based Goals

From a scientific viewpoint, collective ambition under the Paris Agreement must increase fivefold over current levels to deliver the cuts needed over the next decade (UNEP, 2019). In addition to complying with local and international emission guidelines, companies must also set sustainability goals that are in line with planetary measurements. This can be done by pinpointing which of the nine planetary boundaries³² (Figure 2.7) the company is transgressing and coming up with targeted goals that categorically reduces the company's harm on the environment.

³⁰ In the automobile industry, Elon Musk's Tesla has been touted to have single handedly changed the industry's narrative in creating a sense of urgency and innovation for the electric car (Hawkins, 2017). Major automakers have pushed out different models of electric cars since then, as electric cars are proven to be profitable and predicted to be the dominant model by 2040 (Scott, 2019).

³¹ In the local F&B industry, KFC was the first global fast food chain to stop the provision of plastic caps and straws to its diners across its 84 outlets. Over the span of a year, some 270 F&B outlets joined their cause to phase out the use of plastic straws that are harmful to marine life.

³² In 2009, former centre director Johan Rockström led a group of 28 internationally renowned scientists to identify the nine processes that regulate the stability and resilience of the Earth system. The scientists proposed quantitative planetary boundaries within which humanity can continue to develop and thrive for generations to come. Crossing these boundaries increases the risk of generating large-scale abrupt or irreversible environmental changes. Since then, the planetary boundaries framework has generated enormous interest within science, policy, and practice (Stockholm Resilience Centre, n.d).

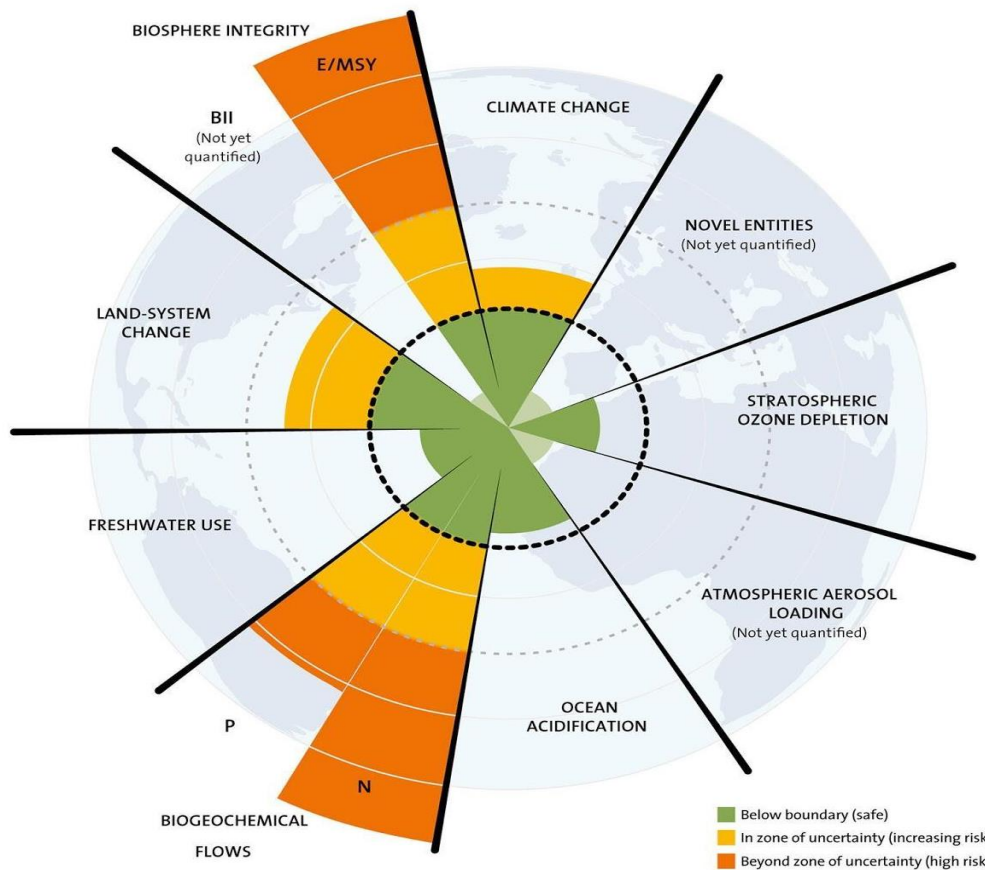


Figure 2.7: Diagram representing the nine processes that regulate the stability and resilience of the Earth system, of which two are already under high risks (Stockholm Resilience Center, n.d)

2.3.3 Sustainability Department

Companies would do well to create a sustainability department and specific appointments³³ to measure the company’s impact on the environment³⁴ and propose corrective measures that suit the company’s processes.

³³ The role of CSOs (Chief Sustainability Officer) has been garnering popularity since the start of 2000. CSOs work with company officials who oversee compliance and issues, devise strategies for implementing change that aligns with the workforce and ensure sustainability remains on the agenda of executive meetings. Harvard Business School associate professor George Serafeim, co-writer of the paper "Chief Sustainability Officers: Who Are They and What Do They Do?" with Kathleen Miller, CEO of Miller Consultants, posits that the CSO is the steerer of the ship, the change agent, and the ambassador with the vision of what sustainability means for the company (Gerdeman, 2014).

³⁴ In view of the essay question, our proposal to create sustainability departments focuses solely on tracking the company’s environmental impact. In reality, we believe that the job scope of the department should also incorporate social and economic sustainability, such as gender equality in the workplace and wage differences, which are the other key pillars of sustainability as discussed in the Brundtland report. The sustainability department can work closely with human resources department to handle staff relations, data management and public relations.

In addition to taking charge of industrial benchmarking and setting science-based goals, the sustainability department should also spearhead sustainability efforts in the workplace by encouraging colleagues to highlight unnecessary wastage and set green targets³⁵. In large companies, the sustainability department can liaise with department heads to consolidate feedback from employees and to set specific goals tailored to each department (Figure 2.8).

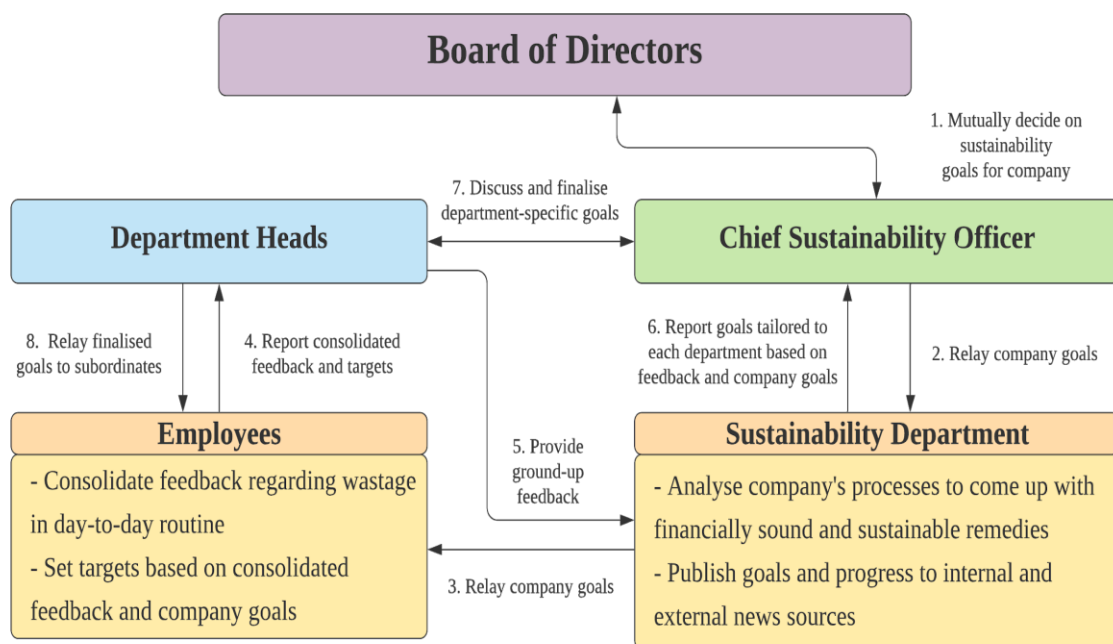


Figure 2.8: Proposed communication chart for sustainability department and other stakeholders

³⁵ There are two conventional approaches to attaining sustainability: a top-down approach and a bottom-up approach. While there is extensive research about the merits and detriments of each approach, we propose a mix of both to supplement each other. Companies should allow employees who are more familiar with day-to-day work routines to step up and propose green targets to sustainability departments which is a bottom-up approach. Sustainability departments can then assess the feasibility of proposed targets and make adjustments before releasing it as a company-wide mandate which is a top-down approach.

Chapter III: Environmental Sustainability in Economy

3.1 Introduction

Increasingly, the world is seeing a shift away from a linear economy to a circular economy (Figure 3.1) which seeks to reduce waste, recover resources at the end of a product's life and channel them back into production (MEWR, 2020). Unlocking the potential of funding from the private sector to complement public funding is key to making this vision a reality.

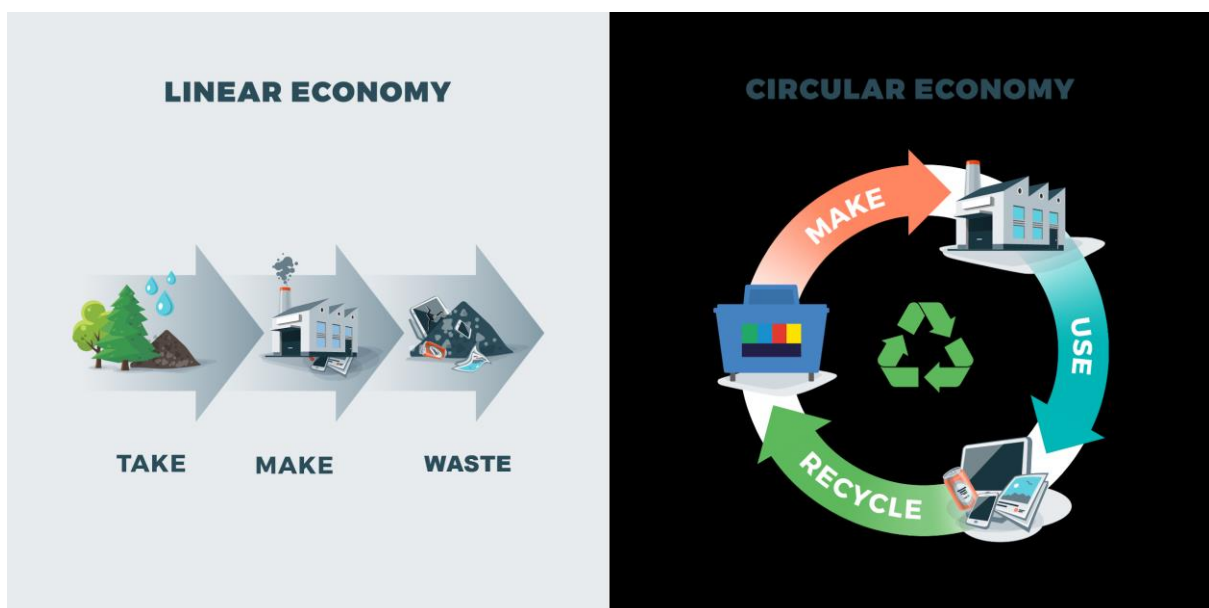


Figure 3.1: Infographic illustrating the difference between a linear economy and a circular economy (MEWR, 2020)

3.2 Opportunities

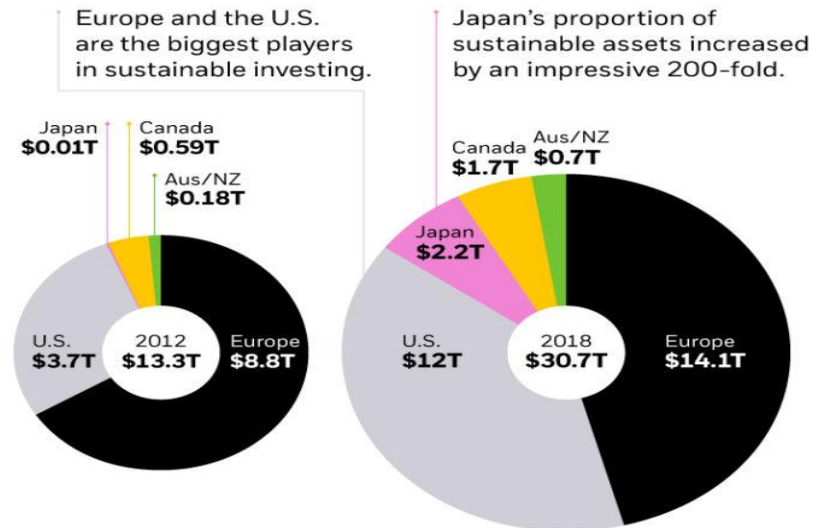
Pursuing environmental sustainability not only ensures that long-term economic growth is viable but also creates opportunities to improve the economy.

3.2.1 Green Finance

Globally, financial institutions and corporations are championing³⁶ the cause of sustainability (Figure 3.2). Green funding³⁷ is increasingly being made available to flow into private markets and back firms displaying solid environmental practices.

Global growth in sustainable investments (USD\$ Trillion)

Europe is well ahead of the sustainable investing curve, and specific legislation is fundamentally shaping the industry.



Source: Global Sustainable Investment Alliance, Mar 2019

Figure 3.2: Infographic illustrating global surge in sustainable investments (Global Sustainable Investment Alliance, 2019)

Countries should actively promote advancement for green FDI³⁸ through greener government policies³⁹ (Pisani, Kolk, Ocelík & Wu, 2019), which can serve as a major catalyst for economic growth (OECD, 2002). Channelling new investments back into green companies and technology starts a virtuous cycle of environmentally sustainable economic growth (Ong, 2019).

³⁶ In a recent study by the World Economic Forum, using a comprehensive sample of 185 Chinese cities of different sizes over a seven-year period, they investigated whether air and water pollution reductions pay off in terms of increasing FDI inflows. For both air quality and wastewater treatment, they found that it does indeed pay for cities to be green for attracting FDI inflows. A significant improvement of air quality in a city like Shanghai may lead to up to a \$1 billion increase in FDI inflows yearly. They explain this with two reasons: Firstly, international firms prefer to invest in greener cities because of their increasing commitment to employees' wellbeing. Secondly, by choosing greener cities, international firms aim to bolster their reputation and show their corporate responsibility in times of increasing environmental awareness and stakeholder pressure (Pisani, Kolk, Ocelík, Wu, 2019).

³⁷ The head of Deutsche Bank's asset management division shifted his \$6-7 billion green investment fund away from the US when American lawmakers were unable to pass legislation putting a price on carbon (Cowan, 2010).

³⁸ Foreign Direct Investment

³⁹ The International Finance Corporation of the World Bank Group found that the Paris goals would open up an estimated \$23 trillion in investment opportunities in developing markets through 2030 (IFC, 2016).

3.2.2 Creating Jobs, Reducing Inequality

The poor are clustered in primary industries⁴⁰ which rely heavily on a healthy environment⁴¹ (U.S. Global Change Research Program, 2018). Therefore, sustainability measures that protect the environment also protect the livelihood of the poor, preventing the gulf between the rich and the poor from widening.

The shift towards a green economy will inevitably result in short-term employment losses as workers in unsustainable industries get displaced. Yet, with the right policies⁴² set in place, displaced workers can seek better⁴³ employment in the approximately 24 million jobs⁴⁴ (ILO, 2018) that will be created globally by this shift (Figure 3.3).

⁴⁰ Primary industries are industries acquiring natural raw materials such as farming, mining and fishing.

⁴¹ Findings of the Fourth National Climate Assessment under the U.S. Global Change Research Program corroborates with the International Labour Organisation. Currently, 1.2 billion jobs rely directly on the effective management and sustainability of a healthy environment, in particular: jobs in farming, fishing and forestry dependent on natural processes such as air and water purification and protection against extreme weathers like storms, floods and strong winds. Environmental degradation threatens these ecosystem services and the jobs that depend on them. The effects of environmental degradation are particularly acute for the most vulnerable workers. Workers from lower-income countries, rural workers, people in poverty and other disadvantaged groups are affected the most by the impact of climate change (ILO, 2018).

⁴² Government-backed programs that impart new skills to these displaced workers can facilitate their transition into newly-created jobs. An example of such a program is Singapore's SkillsFuture program, where the government collaborates with learning institutes and private educators to empower Singaporeans with the skills and knowledge needed to transition between careers.

⁴³ By virtue of their broad acceptance and universal relevance for workers, workplaces and the various sectors, international labour standards provide a social pillar for the green economy and can help to ensure that emerging sectors offer decent working conditions (ILO, 2018).

⁴⁴ In the "World Employment and Social Outlook 2018" report, the International Labour Organisation (ILO) estimates that measures taken in the production and use of energy will lead to job losses of around 6 million, as well as the creation of some 24 million jobs, leading to a net increase of 18 million jobs (ILO, 2018).

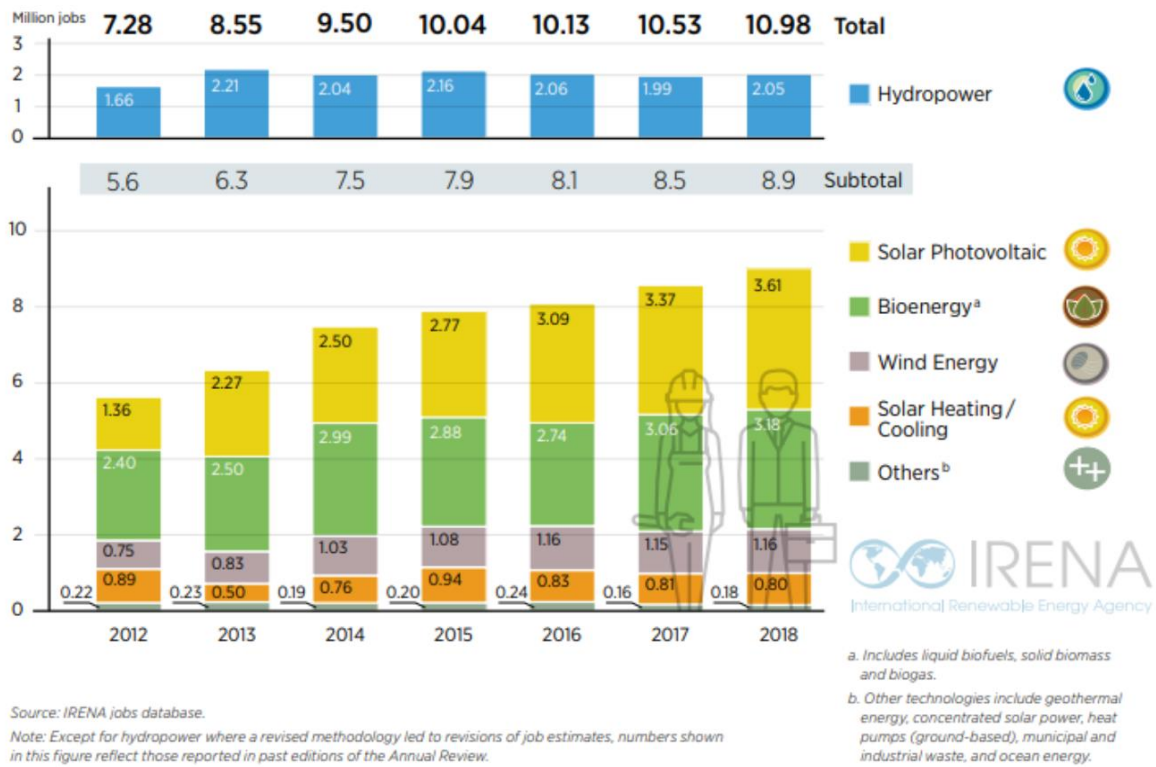


Figure 3.3: Bar chart showing an increasing trend in employment in the renewables industry (International Renewable Energy Agency, 2018)

Chapter IV: Securing Singapore's Future

4.1 Introduction

Singapore is susceptible to both environmentally unsustainable practices⁴⁵ and the effects of climate change⁴⁶. It is in our national interests to push for environmental sustainability in our economy and uphold the spirit of international cooperation⁴⁷, thereby encouraging other countries in the region and beyond to protect our natural environment.

CLIMATE CHANGE IN SINGAPORE

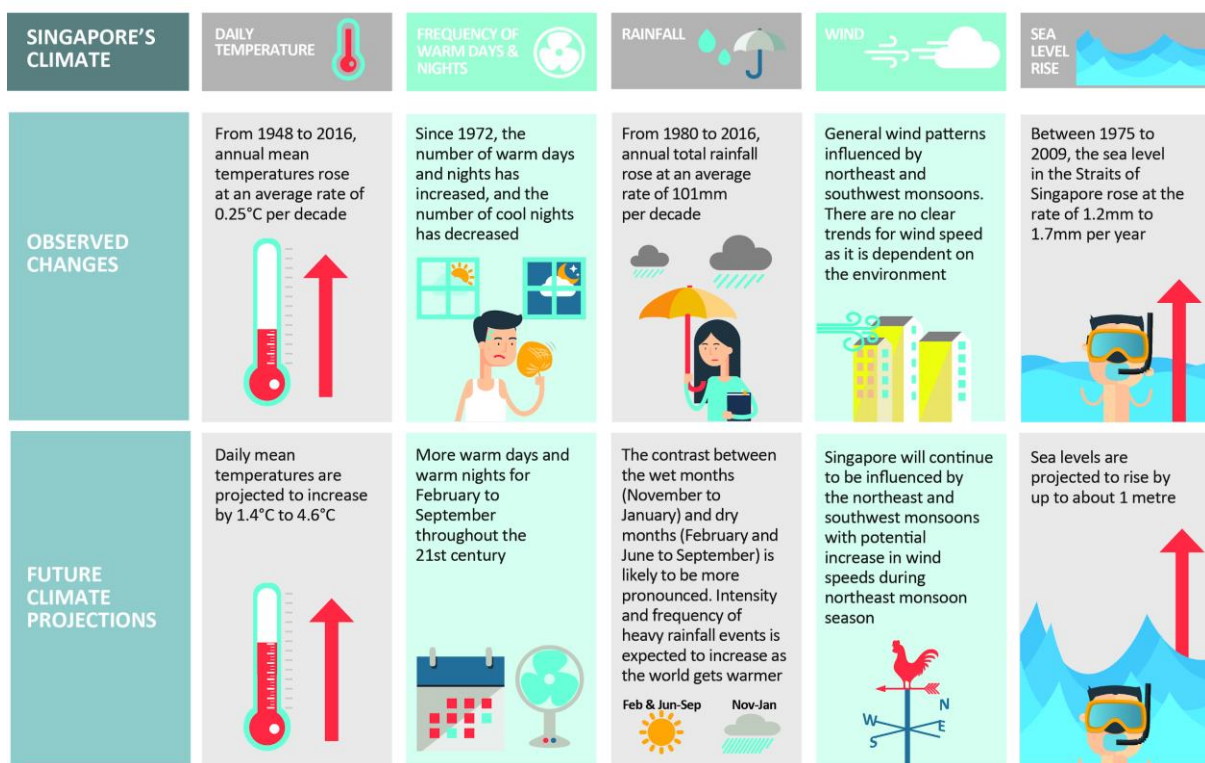


Figure 4.1: Infographic stating the major impacts climate change will have on Singapore (MEWR, 2020)

⁴⁵ Singapore's main landfill island Semaku is running out of space, set to be filled with trash by 2035 (MEWR, 2019). Our indiscriminate use and disposal of products as a first world country will soon catch up to us in the form of unwanted detritus.

⁴⁶ Rising sea levels is a problem that Singapore is taking very seriously. As mentioned in the 2019 national day rally, Singapore is foreseeing tide levels to surge by 4m, which could potentially overwhelm low-lying coastal areas and cost roughly a \$100 billion in protection measures (PMO, 2019).

⁴⁷ Singapore has been lauded as a country that "punches above its weight" despite its small population - thanks to the wise policies of the country's leaders and its "ability to work with all countries", according to US President Barack Obama (Chuang, 2015).

4.2 Environmental Hub

With neighbouring countries set to experience rapid economic growth (Figure 4.2), environmental sustainability may take a backseat which is characteristic of emerging markets⁴⁸. This has adverse impacts on Singapore⁴⁹. As a “Garden City”⁵⁰, Singapore should leverage on her reputation and push for her status as a regional environmental hub and lend a helping hand to her neighbours.

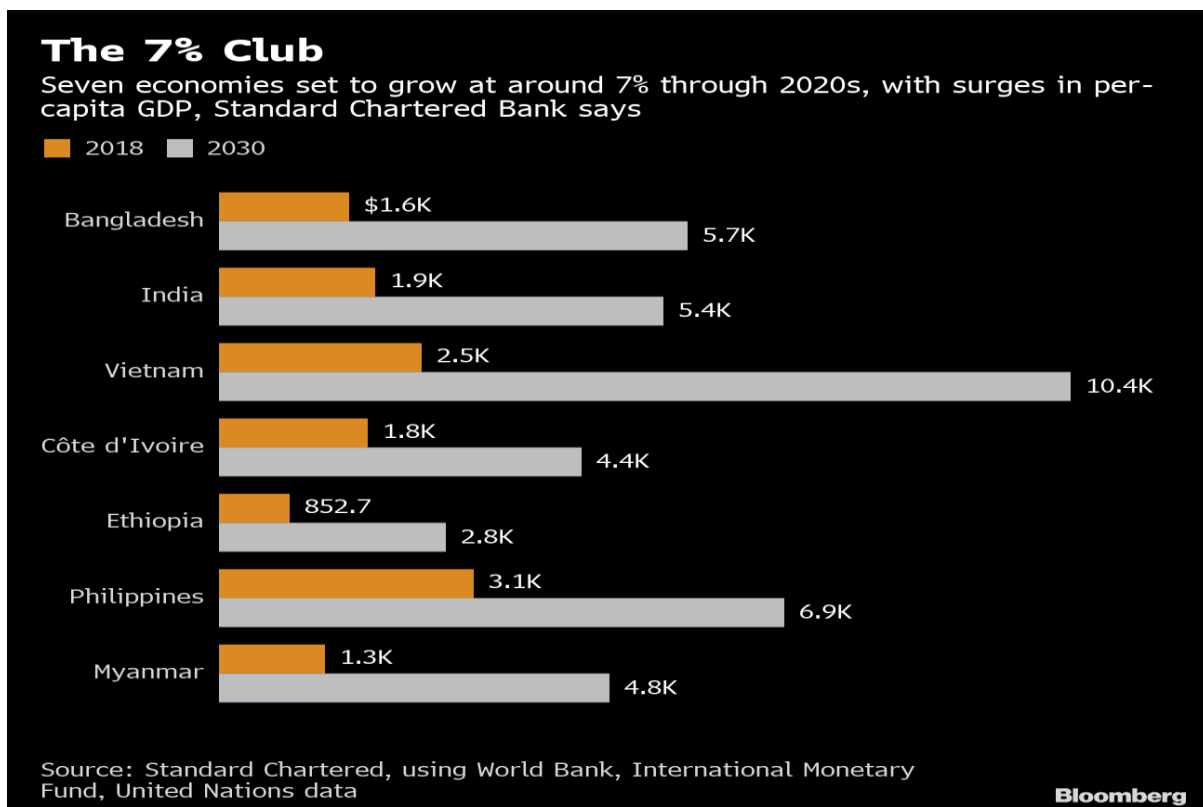


Figure 4.2: Bar chart showing economies expected to hit 7% growth, of which the majority are Asian countries (Bloomberg, 2019)

⁴⁸ In the past, environmental pollution was associated with emerging economies in part due to lax government regulations and in part due to the lack of technology. Families in developing nations also often did not possess the financial resources needed to invest in an environmentally sustainable lifestyle (Energy Policy Institute at the University of Chicago, 2015).

⁴⁹ An example is the haze issues caused by rampant slash-and-burn practices in Indonesia which led to a new 3-hour Pollutant Standard Index (PSI) high of 471 in 2015. A PSI reading above 300 is classified as “Hazardous”.

⁵⁰ Singapore has always called herself the Garden City, and for good reason. According to Treepedia, a platform released by MIT Senseable City Lab and the World Economic Forum to measure and compare canopy coverage in cities, Singapore was ranked 2nd globally with a canopy coverage of 29.3%. This is in line with Singapore’s urban development plan which seeks to intersperse parks, rivers and ponds amid high-rises. Such examples include the Marina Bay financial area, where prime land was set aside for the construction of Gardens by the Bay and Marina Barrage, a reservoir in the heart of the city (Kolczak, 2017).

Apart from enacting green policies in recent years such as the implementation of the carbon tax⁵¹ in 2019 and plans to adopt the EPR⁵² approach by 2021, Singapore also has experience dealing with pollution during the nascent stages⁵³ of nation building. With experience tackling older forms of pollution and modern-day pollution such as e-waste, Singapore is well-poised to share her insights⁵⁴ and technology⁵⁵ with her neighbours.

Financially, Singapore's sovereign wealth funds should consider divesting from unsustainable industries⁵⁶ and businesses to maintain her image as an environmental hub.

⁵¹ Taxable facilities, defined as direct emission of greenhouse gas (GHG) equal to or above 25,000 tCO₂e annually, will have to pay a carbon tax from 1 Jan 2019 onwards for reckonable GHG emissions. The carbon tax is set at a rate of \$5 per tonne of GHG emissions (tCO₂e) from 2019 to 2023. Singapore will review the carbon tax rate by 2023, with plans to increase it to between \$10 and \$15 per tonne of GHG emissions by 2030 (NEA, 2019).

⁵² The Extended Producer Responsibility (EPR) approach makes producers of electronic and electric products responsible for the collection and treatment of their products when they reach end-of-life. Processing electronic waste allows companies to retrieve valuable resources while lessening improper disposal which is harmful to our environment and our health (NEA, 2020).

⁵³ The clean-up of Singapore River and Kallang Basin took place largely between 1977 and 1987. Besides the physical cleaning of the heavily polluted rivers, the massive exercise also involved the removal of various sources of pollution, the provision of proper sewage infrastructure and new facilities for resettled residents and businesses, and the implementation of anti-pollution measures to minimise future pollution (Centre for Liveable Cities, 2019).

⁵⁴ Singapore shares its development experience and knowledge with other nations via the Singapore Cooperation program. Since 1992, 107,000 foreign officials have taken part in courses hosted by Singapore, which range from trade and economy to governance and climate change. Singapore will implement a new Sustainable Development Programme to help other developing countries progress towards the 2030 Agenda for Sustainable Development, offering leadership programmes on good governance and public sector leadership in partnership with the United Nations Development Programme (UNDP) Global Centre for Public Service Excellence (MEWR, 2018).

⁵⁵ In 2018, the ASEAN Smart Cities Network was established as part of Singapore's ASEAN chairmanship, as a collaborative platform where member cities exchange best practice and urban solutions, and catalyse bankable smart city projects. The ASCN seeks to harness the opportunities presented by rapid urbanisation, while building resilience against its increasingly complex strategic challenges, like cyber-threats and trade friction. The goal is to improve the lives of people in this region, using technology as an enabler (Smart Nation, 2020).

⁵⁶ As of 2019, over USD\$11 trillion has been committed by institutions globally to divest from fossil fuels (Tyler-Davies, 2019). Sovereign wealth funds such as Norway's \$900 billion sovereign wealth fund and New Zealand Super Fund are among those reducing their exposure to fossil fuels to protect their portfolio from rising environmental risks (Milhench, 2017).

4.3 Toughening Existing Sustainability Measures

Singapore needs to substantially strengthen her sustainability targets⁵⁷ which are highly insufficient (Figure 4.4).

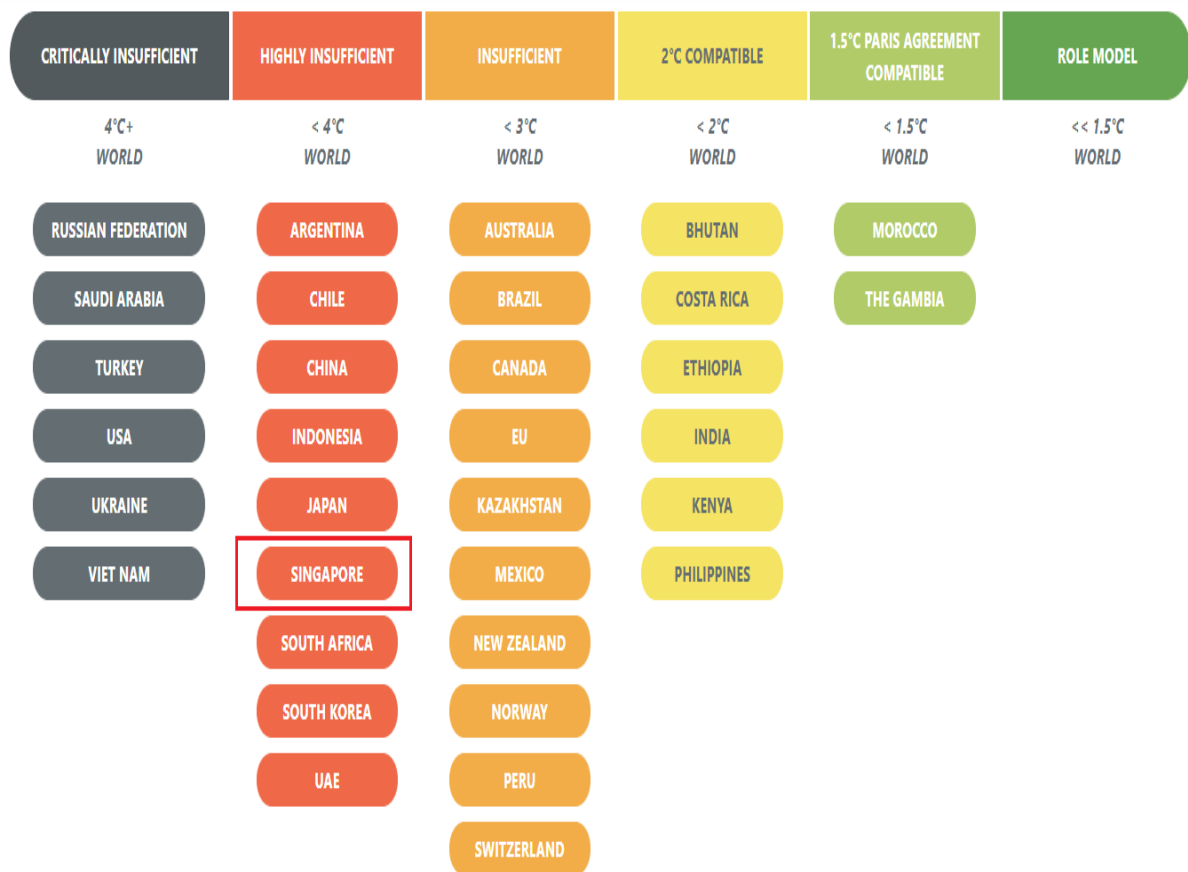


Figure 4.4: Chart categorising countries according to how sufficient their sustainability goals are in meeting the Paris Climate Agreement (Adapted from Climate Action Tracker, 2020)

⁵⁷ Singapore has a very weak climate target which she is likely to over-achieve without implementation of additional policies. Under her 2030 Nationally Determined Contribution, Singapore said it would become greener economically and reduce the amount of greenhouse gases emitted to achieve each dollar of gross domestic product by 36 per cent from 2005 levels, come 2030. It also pledged to stop any further increases to its greenhouse gas emissions by the same timeline (Tan, 2019).

First, since energy and transformation industries represent 38% of total emissions (NEA, 2018), Singapore must transition from her reliance on natural gas⁵⁸ (Figure 4.5) to renewable energy⁵⁹ (Figure 4.6). We propose that Singapore establishes herself as a global solar energy hub⁶⁰ through sustained government funding⁶² and urban testing⁶³.

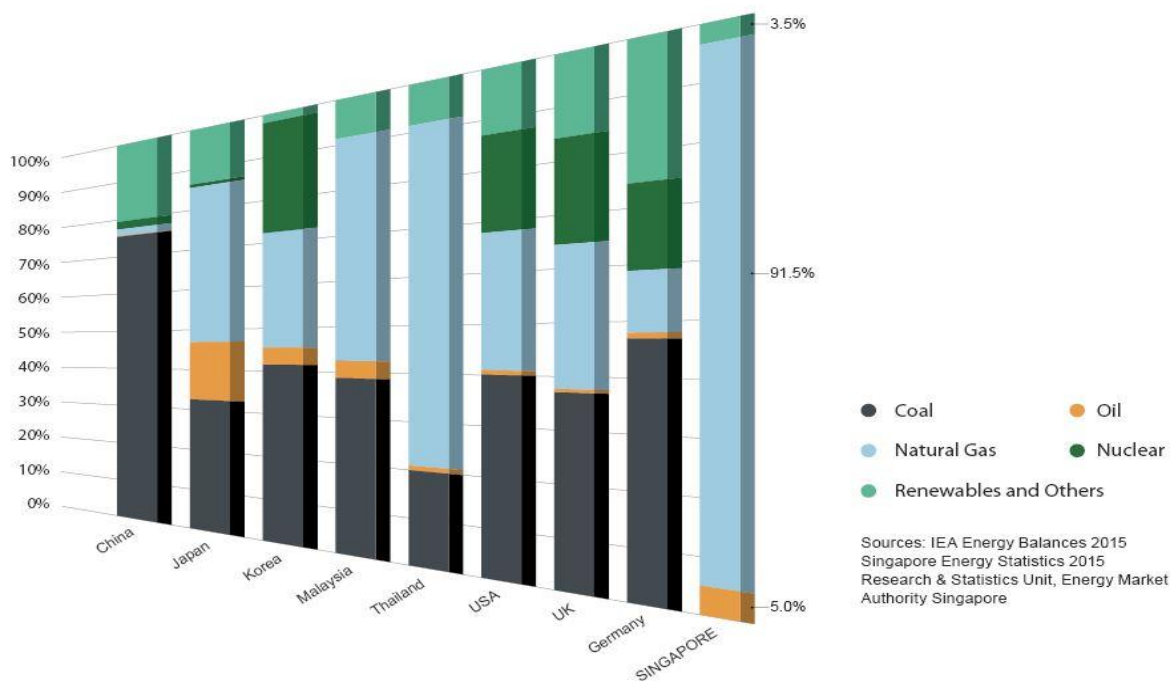


Figure 4.5: Bar chart showing fuel mix for power generation by country (NCSS, 2015)

⁵⁸ Gas remains the dominant energy source in the power sector, accounting for 96% of electricity generation. At a speech to the Singapore International Energy Week in October 2019, Minister for Trade and Industry Chan Chun Sing noted that natural gas would continue to play a role in meeting the country's energy needs for the next 50 years. Singapore's energy mix is likely to remain very uniform in the future, resulting in a prolonged dependence on fossil-fuels (SIEW, 2019).

⁵⁹ Minister Chan Chun Sing announced that by 2030, Singapore wants to ramp up its solar capacity by more than seven times from current levels, and increase the current 260 megawatt-peak (MWp) of installed solar capacity to 2 gigawatt-peak (GWp). This marks an increase in the contribution of solar energy to Singapore's total energy mix from less than 1% to about 4% (Straits Times, 2019).

⁶⁰ Singapore has limited access to alternative or renewable energy due to space constraints and geographical limitations. Coupled with the fact that Singapore has a high average solar irradiation of about 1,580 kWh/m² (Energy Market Authority, 2018), solar energy is hence the most promising source of renewable energy that Singapore can adopt.

⁶¹ According to Dr Thomas Reindl, deputy chief executive officer of the Solar Energy Research Institute of Singapore (SERIS), "Singapore has established itself as a regional hub for solar companies across the value chain, from developers to financing all the way to operation, maintenance and asset management." (Eco-Business, 2017). We propose that Singapore leverages on her status as a regional hub for solar companies and her commitment to solar energy to forge a global presence by attracting more international experts and companies in the industry.

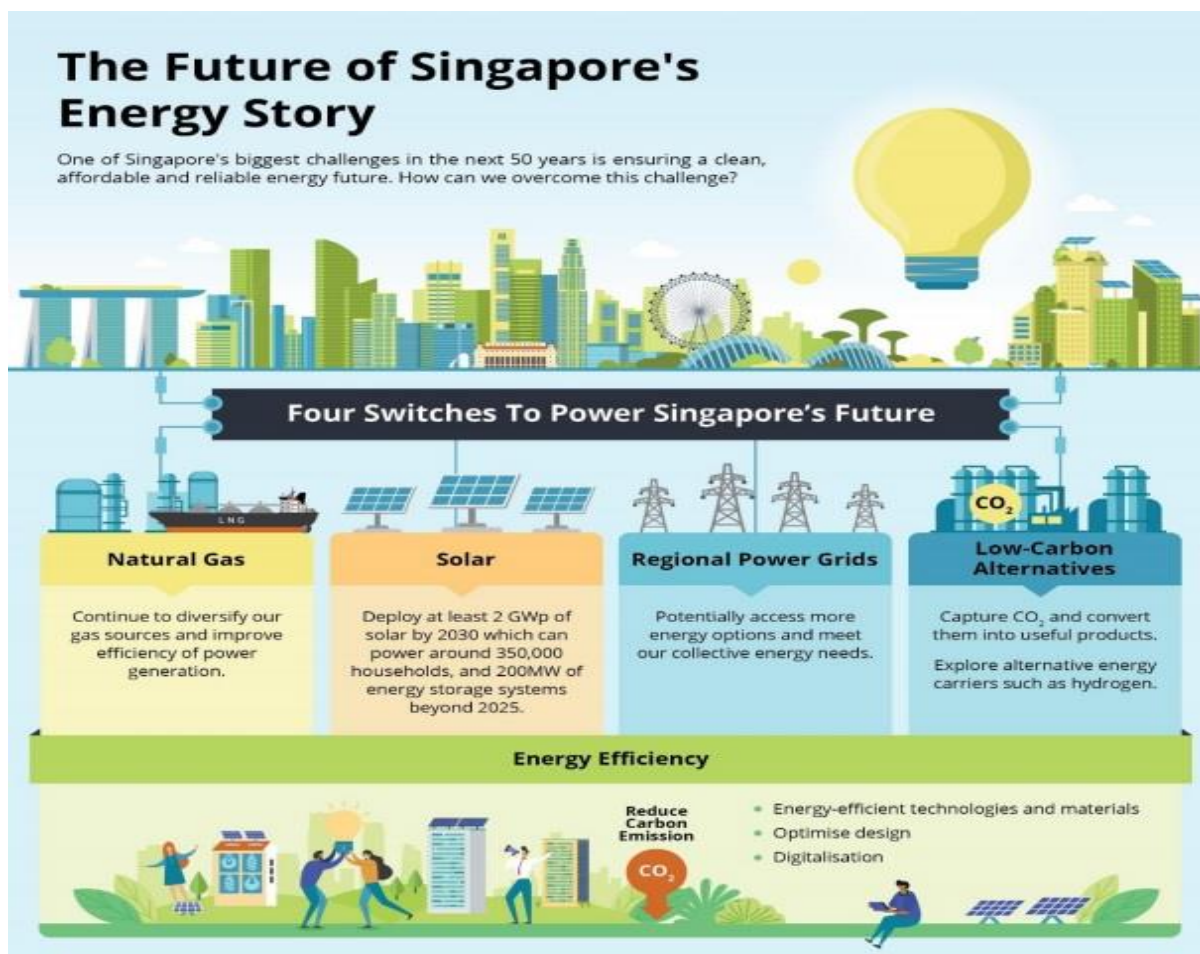


Figure 4.6: Infographic detailing Singapore's proposed energy plans (Straits Times, 2019)

⁶² Government policies and funding are key factors in achieving progress in renewables. In 2007, Prime Minister Lee Hsien Loong announced clean energy as a growth area, supported by \$350 million in research investment. Later that same year, major solar technology firm REC Solar decided to locate its solar manufacturing complex in Singapore after evaluating 200 locations globally. The government further renewed its commitment by injecting a total of S\$700 million for R&D into the areas of energy, green buildings and water in 2011, attracting further private sector investments and collaboration in the areas of energy management such as microgrids and energy storage (Eco-Business, 2017).

⁶³ Aggressive urban testing is needed to access the feasibility of new ideas as Singapore cannot simply adopt practices from other countries for the most part due to Singapore's limited land space and high population density. For example, due to land constraints, Singapore cannot afford to construct large-scale land-based solar farms that other countries use. The Floating Solar (PV) Pilot was hence launched to assess the feasibility and cost effectiveness on installing floating solar photovoltaic (PV) systems on freshwater reservoirs. This ultimately culminated in the scheduled construction of one of the world's largest floating systems at Tengah Reservoir which, when completed in 2021, can generate enough energy to power about 16,000 four-room Housing Board flats (Yong, 2020).

Second, current carbon taxes are too lax⁶⁴ (Figure 4.7) and require an increase to encourage a significant shift to decarbonising the power sector.

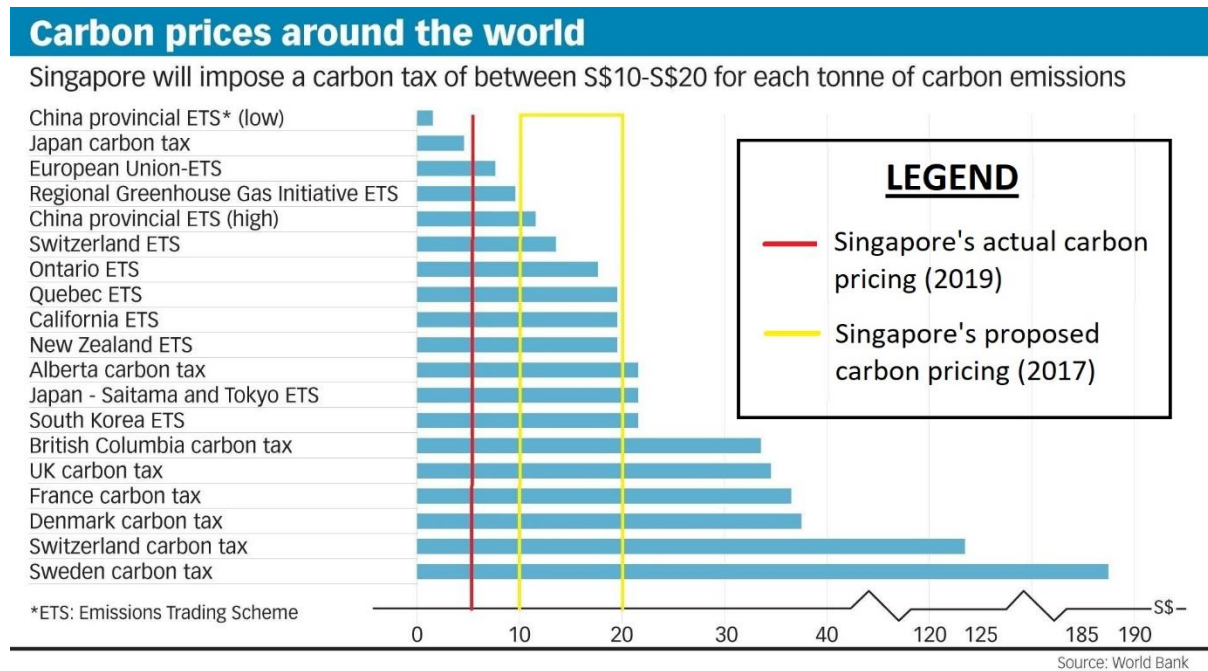


Figure 4.7: Bar chart comparing carbon tax of different countries (Adapted from Soh, 2017)

⁶⁴ In 2019, Singapore began implementing a carbon tax for industrial facilities of \$5 SGD/tCO₂e (roughly 3.7 USD/tCO₂e) with the intention of increasing it to between 10 SGD/tCO₂e and 15 SGD/tCO₂e by 2030. This low starting level is unlikely to generate the right incentives for a large-scale switch to carbon-free generation technologies in the medium term that would set emissions reductions on a trajectory compatible with the Paris Agreement.

Lastly, 4IR⁶⁵ has the potential to streamline current processes⁶⁶ (Figure 4.8) and should be aggressively incorporated nationwide (Figure 4.9) through the Smart Nation blueprint⁶⁷ (Figure 4.10).

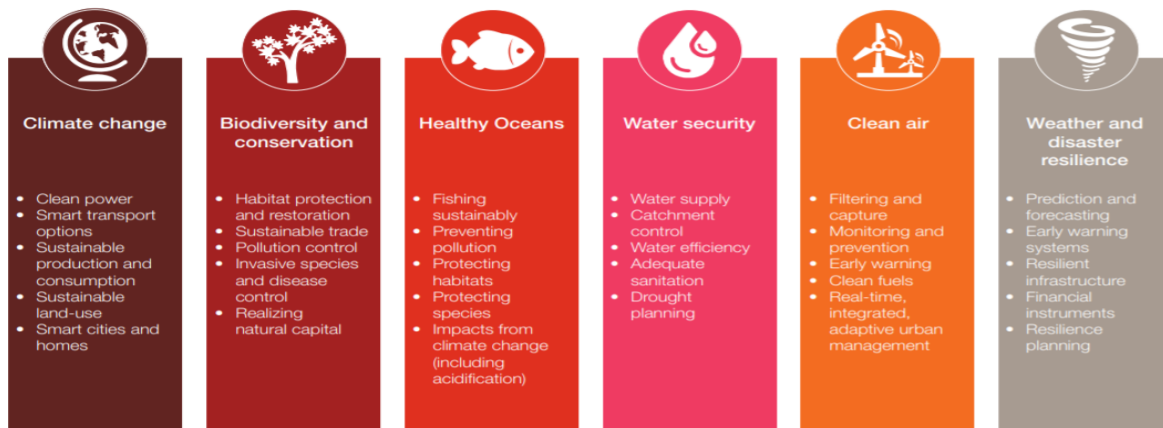


Figure 4.8: Infographics presenting the benefits of incorporating Artificial Intelligence (AI) into our environmental efforts (WEF, PwC, Stanford Woods Institute for the Environment, 2018)

⁶⁵ The fourth industrial revolution (4IR), unlike previous ones, is underpinned by the established digital economy and is based on rapid advances in artificial intelligence, the Internet of Things, robots, autonomous vehicles, biotechnology, nanotechnology and quantum computing, among others. It is characterized by the combination of these technologies, which are increasing speed, intelligence and efficiency gains (PwC, 2020).

⁶⁶ An example of artificial intelligence revolutionizing current sustainability measures is the waste sorting robot. Technology companies are rapidly coming up with recycling robots and artificial intelligence that can sort rubbish into their various components (Powell, 2017). Technology company Sadako Technologies has sold units of its recycling robot, Max-AI to more than four continents for the past two years, proving to be a shining star in the industry (Sadako Technologies, 2019). Max-AI uses 2D and 3D cameras to recognize objects, determining their identity in complex environments by using algorithms and real time massively parallel software, outperforming humans in accuracy and speed.

⁶⁷ Singapore’s Smart Nation initiative envisions a leading economy powered by digital innovation and a world-class city where the Government is responsive to the changing needs of citizens. Urban Living initiatives under the Smart Nation blueprint seeks to use innovative solutions to improve the urban environment, estates and homes for Singaporean residents, to make them safer, more sustainable and liveable (Smart Nation and Digital Government Office, 2020).

Water security

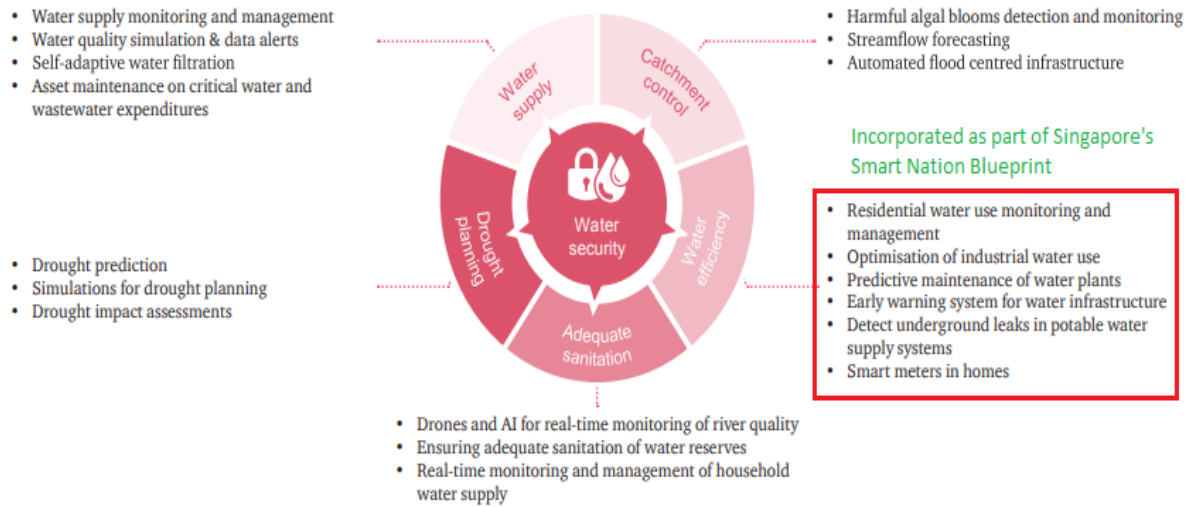


Figure 4.9: Diagram of the five facets of water security, one of which Singapore has already adopted under her national Smart Nation blueprint (Adapted from WEF, PwC, Stanford Woods Institute for the Environment, 2018)

TRACK YOUR WATER USAGE ANYWHERE YOU GO

Smart water meters allow customers to monitor their daily water usage, just like your mobile data.

- Obtain water usage data via a mobile app or online portal
- Receive high usage notifications and leak alerts
- Manage your usage on a daily basis
- Take action to save water and money

PUB to install **300,000** smart water meters at households and businesses by **2023**

Figure 4.10: Example of a Smart Nation initiative to track and reduce water usage with both residential and commercial application (Smart Nation, 2020)

4.4 National Sustainability Metrics

Singapore should create National Sustainability Metrics⁶⁸ that sets reporting standards for local businesses (Cohen, 2014). The 17 SDGs⁶⁹ (Figure 4.11) should undergird these metrics, where applicable, to provide businesses and governments⁷⁰ with a holistic⁷¹ perspective on their progress in sustainability and shed light on areas for improvement. Enforcing mandatory reporting⁷² will ensure data is accurate and representative of the nation's sustainability progress.



Figure 4.11: Illustration of the 17 Sustainable Development Goals (United Nations, 2015)

⁶⁸ Management guru Peter Drucker famously stated, “You can’t manage something if you can’t measure it.” Without measures, the government cannot measure whether actions taken by corporations are effective. Thus, governments must take it upon themselves to intervene and set environmental standards to be followed.

⁶⁹ Sustainable Development Goals. The 17 SDGs are the blueprint to achieve a better and more sustainable future for all. They address the global challenges we face, including those related to poverty, inequality, climate change, environmental degradation, peace and justice.

⁷⁰ Columbia University professor Steven Cohen likens sustainability metrics to accounting before the Great Depression. According to financial writer Andrew Beattie, the Federal Reserve published Uniform Accounting which attempted to set industry standards for how financials should be organized both for reporting tax and for financial statements. Initially, there were no laws to back such standards so they had little effect, but stricter measures were subsequently imposed after the stock market crash in 1929 which exposed massive accounting frauds by companies listed on the NYSE.

⁷¹ As mentioned in Chapter 1.1, there are three key pillars to sustainability and integrating the 17 SDGs into our national framework helps to ensure that social, economic and environmental sustainability are all factored into the equation towards achieving sustainable growth.

⁷² Countries around the globe, including many developing countries, are beginning to experiment with legislation that requires sustainability reporting and disclosures of environmental risks. A 2013 report by the United Nations Environment Programme found that in 2006, 58 percent of the 60 policies across 19 countries and regions regarding organizational disclosure of sustainability were mandatory, but in 2013, 72 percent of the 180 policies across 45 countries and regions were mandatory. This represents a significant trend in the field that going forward, more and more sustainability reporting policies will be issued by the government as mandatory (Miller, Loman, 2014).

Conclusion

An unbridled pursuit for economic growth has resulted in global inaction towards climate change in the past few decades. While recent activism efforts have galvanised public support for environmental sustainability, current measures are still inadequate to tackle this exigent problem. Governments, businesses and consumers worldwide need to realise the importance of pursuing environmental sustainability and unlock the untapped potential that lie within. As a “Garden City”, this also presents a unique opportunity for Singapore to cement her position as a pioneer in green practices and a global team player. Businesses and nations must make the economically sound commitment to stay ahead of the momentous push for sustainability if they want to make cents.

Total word count: 1998

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Annex A: How accurate is the Environmental Kuznets Curve model?

The Kuznets curve (Figure 5.1), named after Russian-American economist Simon Smith Kuznet who received the 1971 Nobel Memorial Prize in Economic Sciences, is a graphical illustration of the relation between income inequality and economic growth.

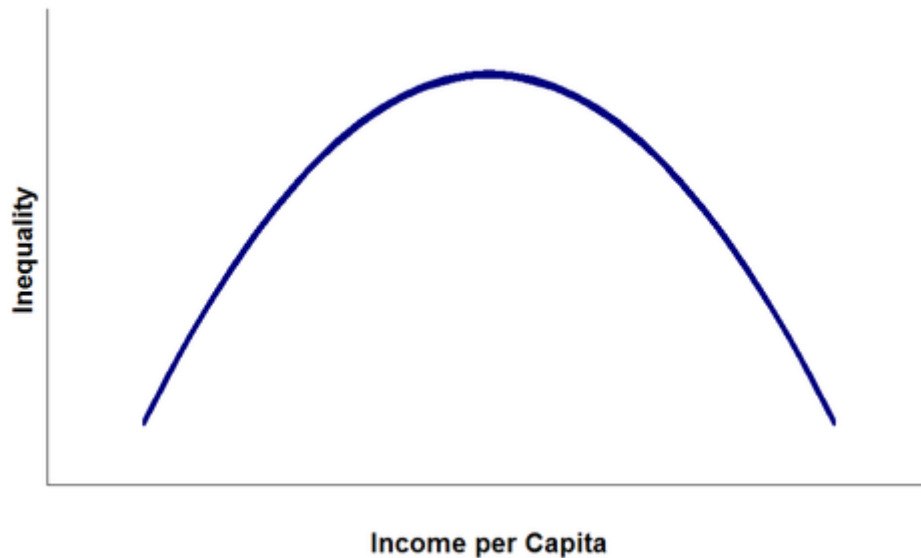


Figure 5.1: A simplified Kuznets curve model

A derivation of the Kuznets curve known as the environmental Kuznets curve (EKC) has seen greater success than Kuznet's original theory and has become standard fare in technical conversations about environmental policy (Grossman & Krueger, 1991).

Much like the Kuznets curve, the EKC (Figure 5.2) is an inverted U-shape curve that seeks to graph the relation between environmental quality and economic development.

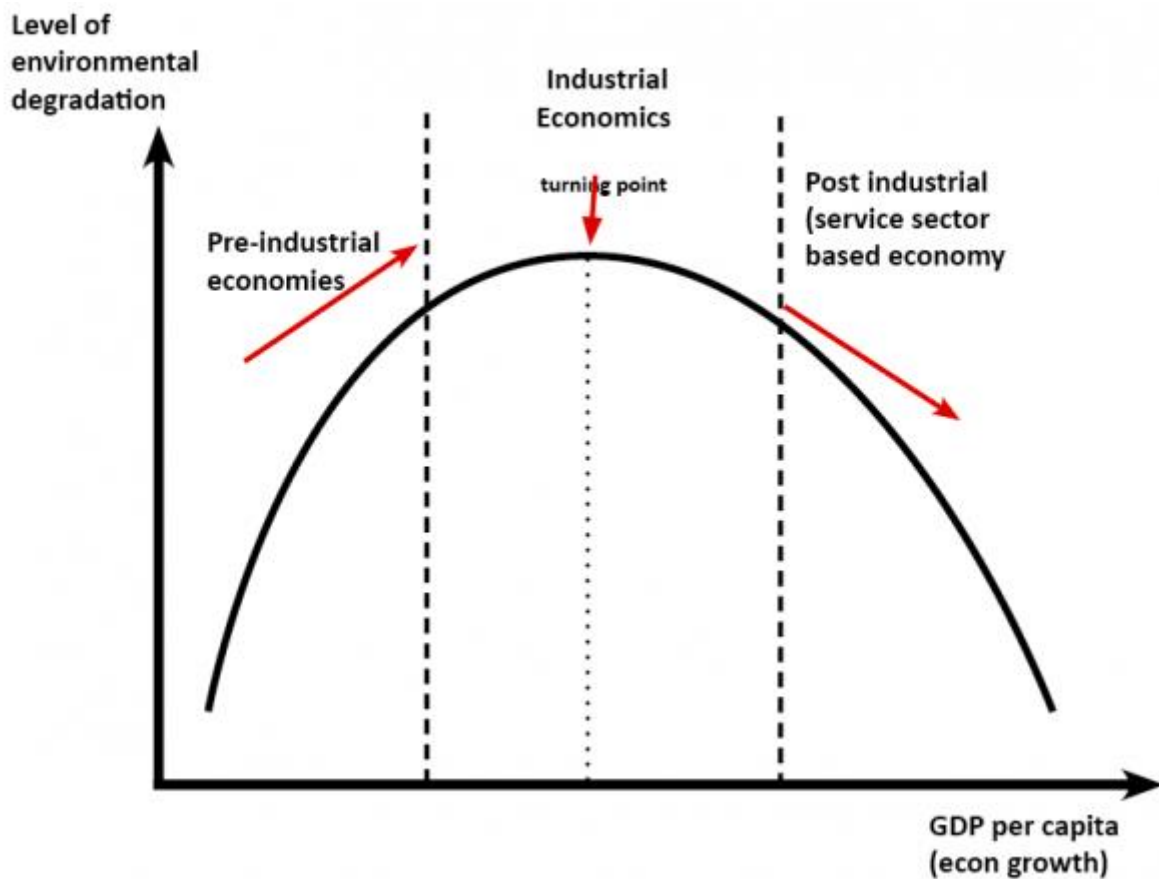


Figure 5.2: A simplified environmental Kuznet curve

The EKC proposes that environmental degradation and pollution increase in the early stages of economic growth, following which the trend reverses beyond a certain level of income per capita which results in the improvement of the environment at high levels of economic growth. In essence, the EKC posits that sustained economic growth is the solution to environmental degradation.

Yet, what the EKC concludes is a stark contradiction to the conventional wisdom that there is a strict positive correlation between economic growth and environmental degradation. This begs the question: Is the EKC model an accurate depiction of how the world works, or is conventional wisdom not that wise after all?

As a matter of fact, the earliest literature that promoted the idea of an EKC model dates back to 1991. In a report titled “Environmental Impacts of a North American Free Trade Agreement”, economists Gene Grossman and Alan Krueger (1991) discovered that the concentrations of two pollutants, sulfur dioxide and “smoke”, increased with per capita GDP at low levels of national income but decreased with GDP growth at higher levels of income. Their revolutionary approach to the topic of environment preservation was picked up by the World Bank, who popularised the concept in their 1992 World Development Report¹. Grossman and Krueger subsequently released a follow-up paper in 1995 titled “Economic Growth and the Environment” and identified that four other forms of pollution, namely urban air pollution, the state of the oxygen regime in river basins, fecal contamination of river basins, and contamination of river basins by heavy metal, also follow the EKC model with similar turning points for most indicators. Their theory of the existence of an EKC model was also consistent with other pollutants².

However, despite being backed by empirical data, many critics have cast doubts on the legitimacy of the EKC model. Most notably, given the wide range of environmental issues in the world today, critics argue that the EKC is parochial and may not be applicable to many other forms of environmental degradation. In their paper “Economic prosperity, biodiversity conservation, and the environmental Kuznets curve”, Mills and Waite (2009) concluded that wealth is not a reliable indicator of improved conservation practice and that an EKC for biodiversity is overly simplistic. Carbon dioxide emissions do not seem to follow the EKC model either (Uchiyama, 2016) and are rather an increasing function of per capita income (Shafik, 1994). As it turns out, the EKC model is only applicable to certain pollutants such as sulphur dioxide and particulate matter. Yandle et al. (2002) argues that this is because such pollutants have a direct and

immediate impact on local citizens and are thereby given priority and rapidly eliminated. On the other hand, the impacts of global pollutants like carbon dioxide are insidious, resulting in complacency manifested in lax government regulations and public neglect towards such issues, a textbook example of the tragedy of the commons expounded by Garrett Hardin in 1968. Some critics have also questioned the validity of the econometrics involved in older reports (Stern, 2004).

Regardless, we should look beyond proving the existence of the EKC and instead consider the insights provided by the EKC model. Even under the assumption that the EKC curve models after the real world for certain pollutants, it is important to note that correlation is not causation - a high level of economic growth does not automatically result in lower pollution (Figure 5.3).



Figure 5.3: "It's the planet, stupid" (René Cattin, 2019)

Using the case of sulfur dioxide emissions in the US that many economists verified has an inverted-U relationship with income per capita, it must be noted that much of the decreased emissions can be attributed to government policies. In 1990, the US Environmental Protection Agency released the Acid Rain Program (ARP) under the 1990 Clean Air Act Amendments which mandated major emission reductions of sulfur dioxides and nitrogen oxides from the power sector. The program was done in phases, with the final 2010 cap set at 8.95 million tons which is a level of about one-half of the emissions from the power sector in 1980 (EPA, n.d). The importance of government policies is corroborated by a report released by Torras and Boyce (1998) which revealed that power to influence policies must be given to those who bear the costs of pollution in order for water and air quality to improve with income per capita. Their report also highlighted that literacy, political rights, and civil liberties are found to have particularly strong effects on environmental quality in low-income countries. What their findings imply is that while environmental pollution is inevitable for emerging economies as modelled by the EKC, emerging economies can and must impose environmental regulations and establish strong social institutions to limit environmental degradation sooner rather than later.

Globalisation and technological developments in recent years have also made it easier for developed nations to pave the way for emerging economies to pursue green growth, and emerging economies should embrace trade liberalisation and capitalise on the resources made available to them. Meanwhile, developed nations themselves should not rest on their laurels and naively subscribe to the idea that economic growth alone is the panacea to their environmental woes. In particular, the race to the bottom approach adopted by the Trump administration that prioritises the economy in exchange for environmental pollution should not be an acceptable model of economic

growth as global cooperation is needed to tackle environmental degradation which is an exigent global problem in our world today.

The question remains: How accurate is the EKC model? Until citizens and governments alike internalise the importance of protecting our environment and take concrete action, the answer will remain as “somewhat”.

Annex B: COVID-19: What a pandemic teaches us about climate change

At the time of writing, the global pandemic has left the world in shambles with over 2.8 million confirmed cases worldwide and the global death toll north of 200 thousand, with the numbers steadily rising with each passing day. Countries that were once reluctant to impose lockdowns have since had to re-evaluate their policy, resulting in governments worldwide imposing lockdowns similar to that of Wuhan where the virus originated from. Despite this, there have also been cases where global leaders remained adamant that lockdowns are not necessary.

Most notably, United States president Donald Trump openly criticised the lockdown policy of some states, showing his support for the anti-lockdown protestors and stating that some governors “have gone too far” on lockdown measures. Further to the south, Brazilian president Jair Bolsonaro showed his support for anti-lockdown protestors by joining them and even called the protestors “patriotic” for defending individual freedoms. Both political figures were lambasted by the international community for their acts.

With global leaders like Donald Trump and Jair Bolsonaro downplaying the severity of the pandemic, many have drawn comparisons to their stance on another topic - climate change. Under Trump’s administration, several dozen environmental regulations were either made to be more lax or removed entirely; his southern counterpart Bolsonaro, famed for his climate denialism not unlike Trump, has also scaled back efforts to fight illegal logging, ranching and mining in the Amazon rainforest, a region which climate scientists widely regard as the most valuable asset humanity possesses in our increasingly difficult battle to avoid climate catastrophes. Given the uncanny similarities in their attitudes towards these two issues, this article seeks to examine

the similarities between the two topics and whether the ongoing pandemic can provide insights on tackling climate change.

From the get-go, both COVID-19 and climate change remedies can be said to stymie economic growth. Tackling COVID-19 necessitates imposing sweeping quarantines and even the shutdown of non-essential services which greatly diminishes economic activity. In a similar vein, environmental regulations imposed to curb climate change can render certain industries obsolete. Other industries will also be adversely impacted as they have to limit production or switch to greener, albeit costlier methods of production. As it is a political imperative for the economy to do well, most governments strive to balance the well-being of its people and the economy. Yet, governments often place a singular focus on the economy, neglecting their people's wellbeing in the process and pursuing growth that will not last. By sacrificing short-term economic growth through enacting timely policies, countries stand to gain sustained economic growth.

This is exemplified by the case study of the United States and China in their response to COVID-19. After realising the rapidly deteriorating condition in Wuhan, the Chinese government quickly imposed draconian measures such as preventing movement in and out of Wuhan on 23th January and limiting the movement of the population to the bare minimum. The results of such measures were visible within a few weeks as new infections began to decline and new local infections reportedly stopped. Steps are now being taken to ease the lockdown, with the reopening of major transport links in Wuhan on April 8th. China's response was in stark contrast to the U.S. The U.S., despite having plenty of warning about the virality of COVID-19, was hesitant to take precautionary measures. This was in part due to Trump who downplayed the

coronavirus threat, wasting precious time before finally fulfilling his pledge to use the Defense Production Act to force private companies to manufacture vital equipment. As of 25th April, the US has over 900 thousand confirmed cases and over 52 thousand deaths, a sizable number as compared to mainland China which only has over 84 thousand cases and over 4 thousand deaths. The disparity between the figures in both countries is a testament to the importance of taking swift action to counter potential threats, even if said measures threaten economic growth in the short-run. In the same vein, governments should tackle climate change by swiftly pursuing environmental sustainability as an economic goal before environmental degradation worsens to a point beyond return.

Another similarity, as Wharton professor Howard Kunreuther suggests, is that “like the person-to-person transmission of the coronavirus, climate change is happening in small increments that can be easy to ignore until the cumulative effects can be measured.” Kunreuther argues that the human mind does not grasp the concept of exponential growth readily, citing a study conducted by Dutch psychologist William Wagenaar titled “Misperception of exponential growth”. Kunreuther also draws similarities between CO2 emissions (Figure 5.1.1) and global COVID-19 cases (Figure 5.1.2), stating that both graphs follow an exponential trend. If citizens and policymakers remain complacent towards climate change and apply a delayed, fragmented response as with COVID-19, he warns that there will be serious repercussions in the form of longer heat waves and more frequent natural disasters (UCUSA, 2018) which will cripple the economy.

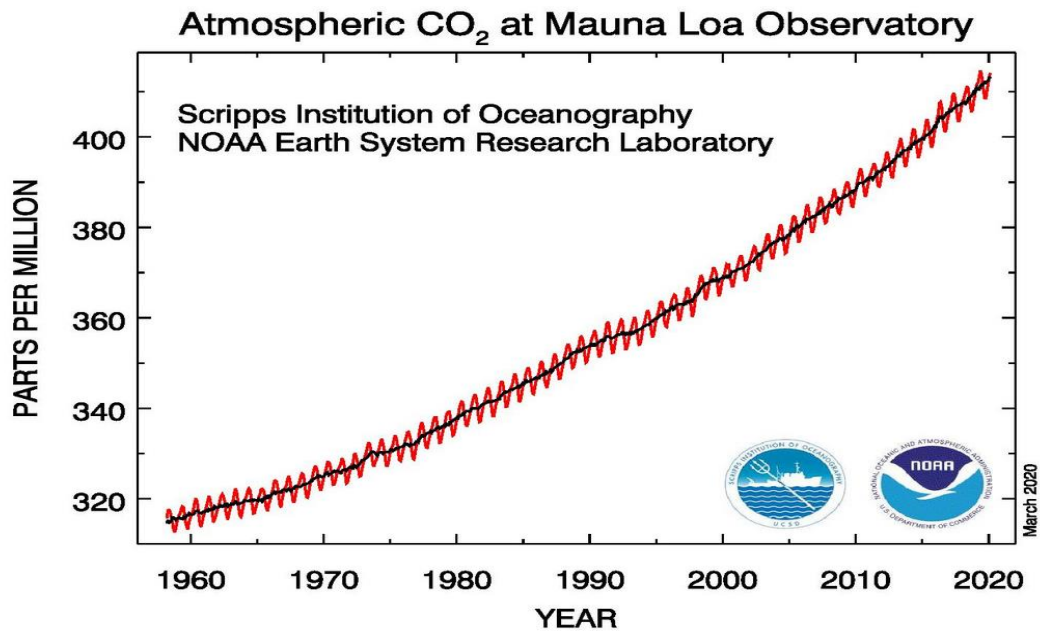


Figure 5.1.1: Mean carbon dioxide measured at Mauna Loa Observatory, Hawaii (NOAA ESRL Global Monitoring Division, 2020)

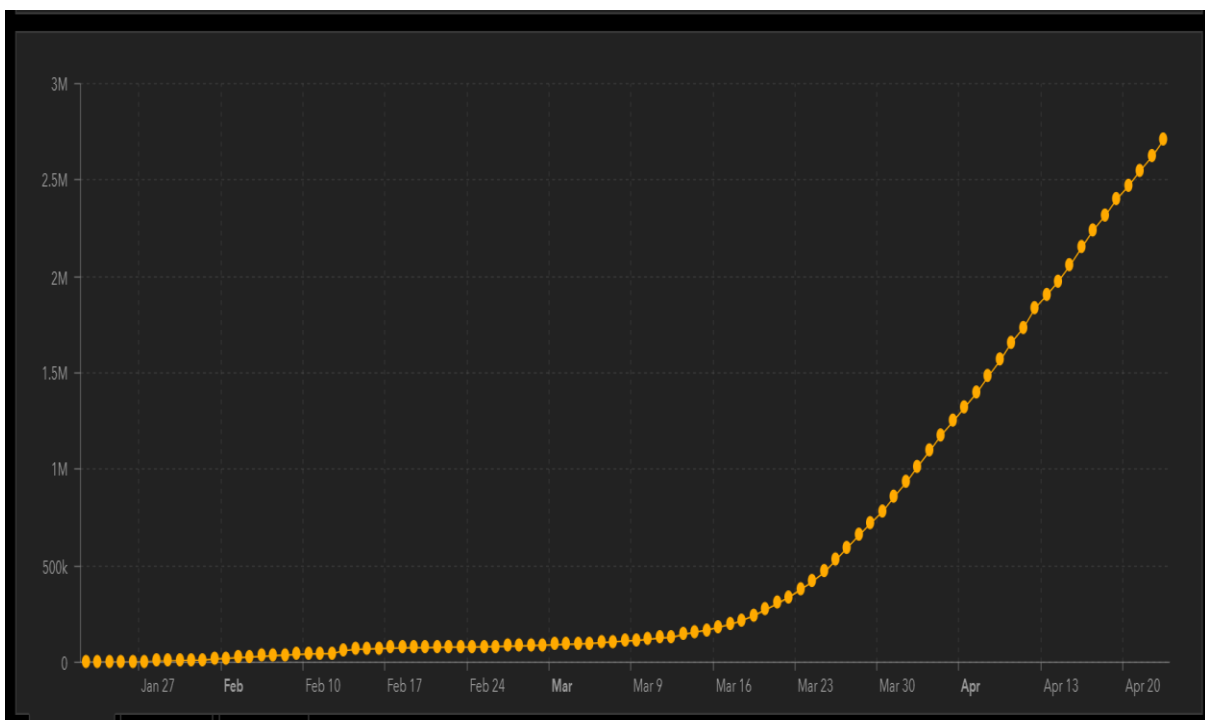


Figure 5.1.2: Number of global confirmed COVID-19 cases (John Hopkins Coronavirus Resource Center, 2020)

Furthermore, both issues accentuate the importance of tackling income inequality, as low-income groups are disproportionately affected in both cases. In the case of COVID-19, low-income communities may be unable to secure access to clean water and basic sanitation which are key in preventing the spread of COVID-19. Furthermore, social distancing is another factor that plays a part in the battle against COVID-19, yet in many cases the marginalised and the disenfranchised may not have the luxury to do so. Medical treatment may also be inaccessible to them. In fact, the bulk of the COVID-19 cases in Singapore are attributed to foreign workers in the country who live in dormitories that are usually cramped, thereby facilitating the transmission of the disease. The very fact that Singapore managed to gloss over the marginalised group of foreign workers despite having a wealth of experience tackling the SARS pandemic in 2003 goes to show exactly how easily the underprivileged can fly under society's radar.

Similarly, the health issues stemming from climate change as discussed in Chapter 1.2 will affect the poor to a larger extent as they will be unable to afford the hefty medical bills for treatment. In addition, rural areas often have agriculture-dependent economies, so the livelihoods of low-income residents are more vulnerable to changing environmental conditions caused by climate change (U.S. Global Change Research Program, 2018). Hence, there is a pressing need for governments to enact policies addressing inequality, and to also set safety nets in place to ensure that the underprivileged in society are not glossed over in times of crises.

Lastly, global collaboration and a coordinated response are essential in overcoming both challenges. Much like how climate change is a global issue that transcends geographical boundaries, the spread of COVID-19 around the globe is attributed to globalisation which facilitates the movement of people, including disease carriers,

around the world. A world without borders hence necessitates that governments worldwide work together to eradicate global threats. This can be done in several ways.

First, countries that are better equipped should lend a helping hand to countries in need. Heartening displays of global solidarity like Taiwan donating 100 thousand masks to Singapore and China sending teams of medics to Iran and Iraq set a good precedent on what can and must be done in the area of climate change - developed nations should provide loans and skilled labour for developing countries to pursue green growth.

Second, establishing global feedback cycles is important too. Governments should share the policies they implemented in their own countries with their counterparts in order for other countries to evaluate the feasibility and efficacy of the measures taken and to learn from their experiences. China's swift lockdown measures were adopted by countries worldwide like Italy and Malaysia, albeit to differing success rates due to the delay in implementation. Likewise, scientists around the globe are also working together and sharing their research findings with their peers in order to expedite the rate of creating a viable vaccine. Extending this principle to climate change, governments around the globe must put aside their political differences and collaborate by sharing their experiences in tackling climate change and the efficacy of their policies.

Third, a global cultural shift coordinated by governments and business leaders worldwide can help alleviate the problems brought about by global threats. The urgency in battling COVID-19 has opened up novel ways of executing day-to-day activities. These include the surge in cycling and expansion of bike lanes in Bogota as citizens avoid public transport, and the coronavirus work-from-home policy to prevent

physical interaction between co-workers in the workplace (Crawford, 2020). These arrangements do not require any additional technology, and are instead based on a willingness for global leaders to change the status quo and for the masses to accept such changes.

A similar concept can be applied to the area of climate change. It is crucial for world leaders to recognise the fact that climate change will result in deleterious consequences, most likely to a greater extent than COVID-19. They must act now and enact policies to tackle climate change, of which environmental sustainability measures play a key role. In fact, the current measures implemented to tackle COVID-19 already provide employers and governments with the perfect opportunity to kick-start their path to sustainability. Biking to work and telecommuting reduces the need for public or private transport which reduces carbon emissions, and such work arrangements should continue to be encouraged by global leaders even after the pandemic subsides. As it turns out, such arrangements implemented in the light of COVID-19 have already seen positive results on our environment, with many countries reporting improvements in air quality. In addition, the International Energy Agency expects global industrial greenhouse-gas emissions to be about 8% lower in 2020 than they were in 2019, the largest annual drop since the second world war.

The relentless onslaught of COVID-19 has shown the world exactly how underprepared we are in the face of sudden and unpredictable global threats. COVID-19 is but a glimpse of the devastation that climate change can bring should we continue putting economic interests at the forefront and the well-being of citizens in the backseat. The hundreds of thousands of COVID-19 deaths is already a hefty price to pay for a wake-up call, but if leaders worldwide continue to lack the political will

required to enact tried-and-tested policies and spur action, many more will die in the battle against climate change.