

1 Introduction

On the 18th of February, Singapore's Deputy Prime Minister and Finance Minister, Heng Swee Keat, delivered his budget statement. During the budget statement, the Deputy Prime Minister dedicated an entire chapter to the risk and opportunities that arise in Singapore due to climate change, presenting the ambitious Government initiatives to prepare the nation to transition to the low-carbon economy.

In this publication engeco presents the analysis of the 2020 budget speech, with a particular focus on the items that relate directly to climate change and the energy transition. It is clear that there are global headwinds in terms of overall economic performance, and the recent challenges of COVID-19 do not help, but the budget as presented shows a good balance between short-term stimulus and long-term resilience to potentially major challenges.

There are a number of areas where Singaporean businesses can take advantage of budget priorities from the Government and potentially receive grants and other sources of co-investment. Importantly, this budget sends strong signals to the business community that the Government is taking climate change and sustainability seriously – and may look to strengthen this resolve in the future. Key for businesses is to understand the impacts of current and potential future policy on their future performance – and to explore what stronger climate change action may look like both from a policy point of view and on business resilience.

2 Summary of the budget speech

2.1 SUPPORTING INTERNATIONAL EFFORTS TO FIGHT CLIMATE CHANGE

The minister announced the government's intention to support global efforts by updating Singapore's commitment to the Paris Agreement and take a further step to chart Singapore's path to a low-carbon, sustainable future. More details will be communicated by The Prime Minister's Office during 2020.

2.2 MANAGING CARBON CONSTRAINTS

To manage the transition to a low-carbon economy the minister announced several key current and new initiatives including:

- **Circular economy:** The Government is exploring ways to progress the move to a circular economy. This includes a field trial to use NEWSand, made from incineration ash, in road construction
 - **Committing close to \$1 billion for research in urban solutions and sustainability** focused on renewable energy, cooling Singapore, carbon capture and other related research priorities
 - **Putting in place the right incentives, tax structures, and regulations.**
 - Introduction of carbon tax in 2019
 - introduction and enhancement of the Minimum Energy Performance Standards to raise the energy efficiency of energy-intensive household and industrial appliances
 - **Phasing out ICE vehicles and have all vehicles run on cleaner energy by 2040**, promoted with three measures in the 2020 Budget.
 - Enhancement of incentives to encourage the adoption of cleaner and more environmentally friendly vehicles
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- Expansion of the public charging infrastructure for EVs, working with the private sector to step up from the current 1,600 charging points island-wide, aiming to deploy up to 28,000 chargers at public carparks island-wide by 2030
- the Government will take the lead through progressively procuring and using cleaner vehicles

2.3 A RESILIENT VEHICULAR TAX STRUCTURE

Fuel excise duties today yield around \$1 billion per year, but EVs do not pay fuel excise duties. In the future, the revised ERP system, that tracks vehicles and charges fees based on actual kilometres travelled, will be used to account for the fact that EVs don't pay fuel excise. This technology is in progress but is still some years away. In the interim a lump-sum tax will be imposed and built into the road tax schedule for EVs to partly account for the loss in fuel excise duties.

With this lump-sum some EV vehicles will be paying higher tax but on balance will save costs as a result of the incentives for purchasing electric vehicles.

2.4 BUILDING A SUSTAINABLE SINGAPORE, TOGETHER

The 2020 budget speech emphasized on the importance for everyone to make conscious decisions to lower our carbon footprint to deal with climate change

- households should purchase energy-efficient household appliances, incentives to help lower-income households with the cost of these appliances and adding more greenery to HDB estates will be introduced
- new housing developments will have around 45% to 60% green cover
- residents are contributing through the community garden movement
- a new HDB Green Towns Programme with three key focus areas: reducing energy consumption, recycling rainwater, cooling our HDB towns

2.5 LONG-TERM ADAPTATIONS TO CLIMATE CHANGE

Preparing Singapore island for rising sea levels. Prime Minister Lee Hsien Loong mentioned at the National Day Rally last year that climate change adaptation might cost \$100 billion or more over 100 years.

A new coastal and flood protection fund, with an initial injection of \$5 billion will be set up. A 'grow local' strategy is also being implemented, to minimize risks relating to food security, with further details to be provided during 2020.

3 Analysis of budget announcements

3.1 SUPPORTING INTERNATIONAL EFFORTS TO FIGHT CLIMATE CHANGE

In the budget speech, the announcement was made that Singapore's commitments under the Paris Agreement will be updated during 2020. This should be no surprise as 2020 marks the fifth year of the Paris Agreement and the year that all nations should be updating their nationally determined contributions (NDC). There is an expectation, though not a requirement, that all nations increase their ambition to reduce emissions as NDCs are updated. Furthermore, there is an expectation that the 2020 NDC updates for all nations reflect long-term ambitions for decarbonization out to 2050. António Guterres, UN Secretary General has set out his 2020 priorities, which include all nations setting a goal of net-zero emissions by 2050 – which is a long-term target that is compatible with the Paris Agreement goals. The 2019 Climate Action Summit in New York had 75 countries committing to “enhance” their mitigation efforts in their revised NDCs and a further 37 countries committing to “update” their NDCs with new information. It is commendable that Singapore is also committing to updating its NDC this year. It is important however that new decarbonization pathways be consistent with the current scientific basis and that a long-term, net zero emissions target is set – with a strategy on how to deliver that underpinning it. Being a signatory to the Paris Agreement implies that net-zero emissions around the year 2050 is achieved for the majority of nations. The Singapore Government is currently taking the time to understand the decarbonization pathways available at a national level (such as hydrogen usage, carbon capture, utilization and storage and electric vehicles) and this will inform the decarbonization effort and the updated NDC.

From a business point of view, companies should be mindful of the changes to Singapore's NDC when they are announced and develop an understanding of how this may translate to national policy and have an impact on business operations – for example, through an expanded carbon pricing mechanism. Companies should also explore business resilience to a Paris Agreement aligned scenario and set business strategy in line with expected decarbonization scenarios, whilst maintaining optionality for the future. All companies should also be considering short-, medium- and long-term emissions targets and what decarbonization looks like for them. This can even take the form of a marginal abatement cost curve that shows what carbon abatement options they have and the business cases for those.

3.2 MANAGING THE CARBON CONSTRAINTS

The Deputy Prime Minister announced the government's commitment to spend close to \$1 billion for research in urban solutions and sustainability. This budget refers to the Urban Solutions and Sustainability (USS) domain, part of the RIE – Research and Innovation Enterprise – 2020 plan portfolio.

The RIE 2020 plan is a five-year plan, running from 2016 to 2020, with a total of \$19 billion of public investment in research, innovation and enterprise. This plan is a cornerstone of Singapore's national strategy to develop a knowledge-based innovation-driven economy and society to transform Singapore into a smart nation.

The Urban Solutions and Sustainability (USS) initiative, which has been allocated 5% of the RIE budget (\$900M) is dedicated to research and development of integrated solutions for a sustainable and liveable city. It aims to consolidate Singapore as an international hub for sustainable urban solutions for Singapore and the world.

The USS has a strong focus on mobility solutions, creating and optimising liveable space, building the next generation smart grid, and lowering the energy consumption of used water treatment, seawater desalination, and NEWater production.

The USS agencies, who have been allocated this budget will provide support to companies embracing innovation through equity co-investment schemes, and research consortia formed from industry and research performers to co-create and commercialise these sustainable urban solutions. For example, the Separation Technologies Applied Research and Translation (START) Centre for water technologies, the Green Buildings Innovation Cluster integrated R&D hub at the Building and Construction Authority Academy, and Waste-to-Energy test-bed facility in Tuas will all serve to accelerate the translation of R&D to commercial use and encourage greater industry adoption.

There is also a plan for the build up of manpower capabilities in the USS domain, through graduate scholarships and post-doctoral fellowship programmes.

In terms of opportunities for companies, the USS initiative has two key schemes open to industry:

- USS competitive research programmes for energy (e.g., solar, power systems, green buildings, waste-to-energy, and green data Centres), water, land and liveability, and urban mobility proposed to support cutting-edge research with potential impact to Singapore
- USS Living Lab Initiatives for energy (e.g., power systems, green buildings, waste-to-energy, and green data centres), water and urban mobility proposed to support piloting and test-bedding of new technologies in the USS space to accelerate their commercialisation and adoption

Since 2020 is the last year of this 5 year plan, it is unclear how much of the key schemes have already been allocated, but considering the increase in budget allocated to research and innovation the last 25 years which went from \$2 billion in 1995 to the \$19 billion 5 year budget described above, it is possible that this trend continues past 2020 and, given the Government focus on sustainability, that the portion allocated to sustainable urban solutions increases as well.

With this commitment the Singaporean Government is sending a strong message to businesses that Singapore is the right place, and it is the right time to invest in the research and commercial development of sustainable solutions to mitigate urban problems, taking into consideration resource scarcity and climate change risks. There is a view that the country can take advantage of opportunities by selling sustainable technology to the world.

Key schemes can be found on the USS website: <https://www.nrf.gov.sg/rie2020/urban-solutions-and-sustainability>

Another interesting scheme available for entrepreneurs that are interested in raising funds to start a company in Singapore to develop and commercialize USS solutions is the Startup SG Equity scheme. With this scheme the government will co-invest with independent, qualified 3rd party investors into a startup. This scheme aims to stimulate private-sector investments into innovative, Singapore-based technology startups with intellectual property and global market potential.

SEEDS Capital Pte Ltd (SC) and SGInnovate have been appointed to manage the funds under Startup SG Equity.

To be eligible to the scheme the following criteria has to be met:

- Be a Singapore-based company with core activities carried out here
 - Be incorporated as a Private Limited company for less than five years
 - Have paid-up capital of at least \$50,000
 - Be able to prove substantial innovative and intellectual content for its products and/or services and applications
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- Have high-growth potential with clear scalability for the international market
- Have identified a ready, independent third-party investor(s)
- Business must not be involved in the following business activities: gambling, tobacco-related products, or any other activities which are in violation of law, or against public interest
- Company cannot be a subsidiary or joint venture

Companies and startups that meet the eligibility criteria and are progressing technology and services in the urban solutions and sustainability sector should consider whether they can take advantage of these arrangements and qualify for this seed capital.

Minimum Energy Performance Standards

Energy efficiency is crucial in the global energy transition, reducing energy costs and emissions for companies. Considering the industry sector is the largest energy-consuming sector in Singapore, the Government is pushing for this sector to increase its energy efficiency through energy savings and sustained energy management.

The Energy Conservation Act came into force in June 2012 with the associated regulations being introduced in April 2013. Through this act, mandatory energy management practices were introduced for the industrial sector. Through this Act, and the subsequent enhancements in 2017/2018, large energy users must appoint energy managers who are then required to monitor and report on energy consumption and greenhouse gas emissions annually. In addition, the energy managers are required to review this information and submit energy efficiency improvement plans. Additional improvements to the Act now require new facilities and major expansions to conduct energy efficiency opportunity assessments and potentially develop those opportunities that have a positive business case.

Detailed in the budget speech and new for 2020 is the Minimum Energy Efficiency Standards (MEES) introduced for water-cooled chilled water systems in industrial facilities. The scope of this standard covers electrically driven, water-cooled chilled water systems in industrial facilities that:

- have a total installed capacity of 1,055 kW (300 RT) or more; and
- produce chilled water at a temperature of 3°C or higher

Chillers utilising brine or glycol and air-cooled chillers that form part of the water-cooled chilled water system are exempted. The definition by the NEA of chilled water systems that applies can be found [here](#).

Under the MEES, chillers must meet the minimum energy efficiency standards, depending on the chilled water temperature. The energy efficiency is expressed in kW (electricity)/kW (cooling) or kW (electricity)/RT. Different compliance timelines apply according to whether the installation is new or existing.

For businesses who are planning to start up new industrial facilities including water-cooled chilled water systems that requires Planning Permission (PP) clearance or equivalent on or after 1 December 2020 must conform to the MEES:

- one year after the temporary occupation permit (TOP) is issued for a new single-user industrial facility
 - within three years after TOP or when 80 per cent of occupancy is reached, whichever is earlier, for a new multi-user industrial facility
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For existing installations of water-cooled chilled water systems in industrial facilities, that meet the criteria in the scope, the minimum energy efficiency levels must be met by 1 December 2025 for facilities that are covered by the ECA and by 1 December 2029 for all other covered installations.

The enforcement of the MEES for chillers may mean that facilities will need to either complete upgrading work on existing equipment to meet the minimum standards (if it is running inefficiently) or existing equipment may need to be replaced.

The introduction of this new standard underlines the importance for all businesses to include energy efficiency considerations in purchasing decisions. There is often a positive business case long term when purchasing efficient equipment as any additional capex in the purchase process may be offset by long term decreased opex – particularly if energy prices are escalated year on year at a reasonable level.

More details of the MEES can be found [here](#).

The Carbon Tax

Announced in 2018 by the Government under the Carbon Pricing Act, the carbon tax is a key lever to help reach the nation's goals under the Paris Agreement.

The carbon tax came into operation at the start of 2019 for all companies emitting 25 kt CO₂-e or more of reckonable greenhouse gases annually. Under the Act, emissions from 2019 are paid for in 2020, with an expected revenue of \$191M SGD detailed in the budget. As the carbon tax is currently set at \$5/tCO₂-e, this translates to 38 Mt CO₂-e of reckonable emissions.

Total emissions in 2017 were estimated to be 52.5 Mt CO₂-e so the carbon tax covers approximately 70% of the national emissions. This is considered to be relatively broad coverage – achieving a large impact but only directly impacting approximately 50 facilities.

However, the majority of Singapore businesses may be indirectly affected by the carbon tax since the additional cost applied to power generating facilities will likely be passed through to end customers, impacting all energy users, who may see increased costs.

Additionally, \$5/tCO₂-e is a price set for the initial stage of the carbon price implementation, the Government has already announced its intention to review this price in 2023, indicating it will probably increase to \$10 or \$15 SGD per tonne of CO₂-e.

In the future, depending on what long-term decarbonisation target was set for the country, the carbon price could be increased further to achieve the goals of the Paris Agreement. The International Energy Agency, in their Sustainable Development Scenario (which is consistent with the aims of the Paris Agreement to keep the temperature rise well under 2°C by the year 2100) models the following set of carbon prices to drive decarbonisation.

CARBON PRICES - IEA SUSTAINABLE DEVELOPMENT SCENARIO				
AREA	2025 CARBON PRICE		2040 CARBON PRICE	
Advanced economies	\$63 USD/tCO ₂ -e	+/- \$89 SGD/tCO ₂ -e	\$140 USD/tCO ₂ -e	+/- \$196 SGD/tCO ₂ -e
Developing economies¹	\$43 USD/tCO ₂ -e	+/- \$60 SGD/tCO ₂ -e	\$125 USD/tCO ₂ -e	+/- \$177 SGD/tCO ₂ -e

Reference – IEA World Energy Outlook 2018

USD/SGD exchange rate based on the rate of 24th of February 2020

¹ Under the Kyoto Protocol, Singapore is considered to be a non-Annex I country indicating that it is a developing economy



Carbon pricing is a relatively economically efficient way for countries to achieve broad decarbonization. Introduction of strong carbon prices, in line with desired decarbonization pathways forms part of regulatory risk exposure for all businesses, both directly and along their supply chain. Regulatory risk is likely to be a material source of risk for many businesses.

To understand how this transition risk can affect their business, companies should be analysing their business resilience under different scenarios for climate change action and including estimation of future carbon price coverage and price points. This assessment can be completed under a regular climate change strategy review or following the TCFD Framework.

Commercial Vehicle Emissions Scheme & EV Early Adoption Incentive

One of the strongest announcements made in the 2020 Budget with regard to tackling climate change and preparing for the transition to the low-carbon economy is the commitment to phase out ICE – Internal Combustion Engine - vehicles and have all vehicles run on cleaner energy by 2040.

Electric vehicles are a key part of the decarbonized future; therefore, it is good news that Singapore has decided to create the conditions to increase penetration of electric vehicles in the Singapore market. Ultimately, Singapore will be a market taker and with plans for most car manufacturers to transition towards electric vehicles, the supportive policy framework is timely.

One of the barriers in the adoption of electric vehicles is the cost of upfront ownership. To address this, the government, through the Land Transport Authority, will launch an EV Early Adoption Incentive (EEAI) for the next three years, from January 1st, 2021 to December 31st 2023.

Owners who register fully electric cars will receive a rebate of 45% off the Additional Registration Fees (ARF), capped at \$20,000 (subject to a minimum ARF of \$5,000). This will lower the upfront cost of an electric car by an average of 11% and narrow the upfront cost gap between electric and internal combustion cars. This scheme will apply to individual and fleet vehicle owners, such as taxi and car rental companies, and will cost Government an estimated \$71 million over the next 3 years.

The Vehicle Emissions Scheme which came into effect in 2018 is extended until the end of 2020, offering an upfront rebate of up to \$20,000 and \$30,000 respectively to car buyers and taxi operators.

For commercial vehicles, the announcement of a Commercial Vehicle Emissions Scheme will be made at COS – the Committee of Supply. Similar to the Vehicle Emissions Scheme, this new scheme is aimed at encouraging the uptake of cleaner car models by reducing the gap between of upfront ownership between ICE vehicles and EV.

For businesses, these schemes and incentives are an opportunity to invest in greener vehicles to reduce Scope 1 carbon emissions, as well as the costs of their vehicle fleet. The incentive schemes that can apply should be incorporated into the business case for purchase of new/upgraded vehicles. Electric vehicles will often have a total cost of ownership that is less than traditional vehicles, especially when taking into account lower refuelling and maintenance costs, and these incentives will further improve this whilst reducing upfront capital expenditure.

EV Charging Infrastructure

Another barrier for the adoption of EVs is the availability of a charging infrastructure, especially in the residential areas where Singaporeans will need to charge their EVs when parked. To address this, the Government has announced the deployment of up to 28,000 chargers at public car parks island-wide by 2030.



3.3 A RESILIENT VEHICLE TAX

One downside of the increase in electric vehicle penetration from a Government point of view is a reduction in fuel excise collected. To address this issue, Singapore Government is adjusting the vehicular tax structure, including a lump-sum tax in the road tax schedule, that will be phased in over three years starting from January 2021, with the full quantum implemented by January 2023.

For a better understanding of this announcement engeco analysed all the changes in tax treatment presented in Appendix D of Budget 2020.

Summary of changes in tax treatment for electric and hybrid vehicles:

For electric vehicles the power rating schedule of the 5 categories has changed. The number of categories is unchanged, but the boundaries of each category have changed slightly.

Compared to 2019, the 6-Monthly road tax formula has changed according to the changes in power rating categories and an additional 6-monthly lump-sum component applies as shown in the table below:

Power Rating (kW)	6-Monthly Road Tax Formula (excl. EV lump sum component)	Lump sum component		
		2021 calendar year	2022 calendar year	2023 onwards
PR ≤ 7.5	$\$200 \times 0.782$	\$100	\$200	\$350
7.5 < PR ≤ 30	$[\$200 + \$2(\text{PR} - 7.5)] \times 0.782$			
30 < PR ≤ 90	$[\$250 + \$3.75(\text{PR} - 30)] \times 0.782$			
90 < PR ≤ 230	$[\$475 + \$7.50(\text{PR} - 90)] \times 0.782$			
PR > 230	$[\$1,525 + \$10(\text{PR} - 230)] \times 0.782$			

Ultimately, the road tax system will move to a fee-for-use style system, linked to the next generation ERP. Under this system, road users will be charged for the use of roads – with information being provided by the in-car GPS systems. As this system is still some years away, the lump sum component is designed to compensate the Government for lost fuel excise. The lump sum is intended to be interim in nature, until the new ERP system is fully implemented.

For hybrid petrol electric vehicles, the engine capacity schedule and monthly road tax formulas remain unchanged, but the power rating schedule has changed to match the EV power schedules. There have been some relatively minor changes to the way in which road tax is formulated to these vehicles also.

For light goods vehicles (LGV) and goods passenger vehicles (GPV), a new tax treatment has been established for electric LGVs and GPVs, with formulas that change according to the registration date. In general, the road tax applicable to this class of electric vehicle is higher than that for petrol or petrol hybrid versions of the same vehicle, but lower than that for diesel or diesel hybrid.

For businesses, these changes in the tax treatment will impact the operating costs of the vehicle fleet and companies should take the time to understand these costs and, when appropriate, incorporate the new tax regime into business cases for purchase of new vehicles.

There may be opportunities for businesses to consider the use of electric light good vehicles though a total cost of ownership model should be created to fully understand the economics of

such a move. This should include changes to maintenance costs as well as the requirement to install charging infrastructure, potential downtime for charging etc.

The analysis above excludes motorcycles, the figures are extracted from [ANNEX D-1: TAX CHANGES](#).

3.4 BUILDING A SUSTAINABLE SINGAPORE, TOGETHER

After announcing the policy measures that will be put in place to reduce emissions, the Deputy Prime Minister raised the importance of mobilising the entire nation to address the threat of climate change. This was also emphasised in the recent consultation on long-term climate strategy in the sections relating to collective action. To emphasize the importance of this collective action he quotes Robert Swan who once said, "The greatest threat to our planet is the belief that someone else will save it." And he calls all individuals, including business leaders and community leaders to make conscious decisions to lower Singapore's carbon footprint.

For individual actions, the government continues to encourage households to purchase energy-efficient household appliances, after introducing the Mandatory Energy Labelling Scheme (MELS) and the Minimum Energy Performance Standards (MEPS) under the Energy Conservation Act, the Government has made the announcement of incentives that will be given to lower-income households living in HDBs to help them purchase energy-efficient household appliances. Further elaboration on this needs to be made to understand the budget allocated and the impact for businesses who manufacture and distribute energy-efficient household appliances.

The announcement made regarding new housing developments that will have around 45% to 60% green cover, refers to HDB guidelines which, referring to the Housing and Development Board, started in 2016, specifying the amount, type, locations and intensity of greenery in estates, including:

- Green plot ratio, a 3-dimensional measurement of a development's "green density", or the total leaf area of the plants provided as compared to site area
 - From 2016, all new HDB developments have to meet minimum 4.5 GnPR, meaning the "leaf area of greenery" will have to be at least 4.5 times the site area
- Green cover provision, which measures the percentage of land area covered by greenery, as seen from the sky; this includes canopies of trees over paved areas, shrubs, and turf planting areas – all of which add shade and improve thermal comfort
 - From 2016, new housing developments have an estimated green cover of 45% to 60%

The announcement of an enhanced HDB Green Towns Program, that will include reducing energy consumption, recycling rainwater, and cooling HDB towns was revealed. Details of this initiative were not disclosed, but one of them could be the UrbanWater Harvesting System (UWHS), which collects and stores rainwater for non-potable water usage, reducing potable water demand and that is currently being piloted in Punggol Northshore.

For businesses an important message communicated in this chapter, is in the call to business leaders and community leaders to make conscious decisions to lower Singapore's carbon footprint.

For businesses and organizations embedding smart carbon management at every level of their organization will help the nation reach its targets but it will also help their business model be more resilient to climate change risks. To achieve this, businesses should consider embedding strong climate change strategy as part of normal operations and incorporate climate related impacts into decision making processes. This starts with understanding exposure to climate change risk and

identifying the opportunities available to businesses to minimize that risk and maximise the opportunity. This then forms the basis of a climate change strategy – in conjunction with a roadmap for embedding climate change into business processes.

3.5 LONG-TERM ADAPTATION TO CLIMATE CHANGE

The Singapore Government clearly communicated their understanding of the physical risks due to climate change, which for the low-lying island of Singapore is in great part the rising sea levels. The Deputy Prime Minister recalled that the Prime Minister Lee mentioned that climate change adaptation might cost \$100 billion or more over 100 years at last year's National Day Rally. While the magnitude of the expenditure may be correct for a country the size of Singapore, it may be that will need to be spent much sooner than over the next 100 years as coastal protection should be front-end loaded rather than be reactive.

The budget discussed a new Coastal and Flood Protection Fund, with an initial injection of \$5 billion. With this announcement the Government shows it understands the urgency of the climate crisis, and the short-term physical risks that arise from it. By allocating \$5 billion, which is 6.5% of the \$76 billion estimated budget for 2020, the Government shows the financial impact and the level of criticality it allocates to this risk.

Additionally, the Minister mentioned the 'Grow Local' strategy to minimize risk on food security, adding that details would be provided at the COS - Committee of Supply.

engeco has inferred that the "Grow Local" strategy relates to the "30 by 30" goal announced in 2019, which aims to reach 30% of the nutritional requirements for Singapore being supplied locally by 2030. To reach this new target, Singapore is planning to invest in expanding local production capabilities, including research and development in the agri-food industry, some details of current funding schemes available can be found <https://www.sfa.gov.sg/food-farming/singapore-food-supply/funding-schemes>.

This initiative shows the Government understands that one of the biggest physical risks due to climate change is the impact on the supply chain the nation is dependent on to supply food to its residents and citizens. To reduce this risk the government wants to invest in research and development of resilient, sustainable, high-tech and innovative solutions that can provide up to 30% of locally produced food.

All organizations and businesses should have a clear understanding of their exposure to transition and physical risks from climate change. To determine the financial impact of climate change risks and to disclose it to the market, the TCFD – Task Force on Climate-Related Financial Disclosure – framework provides a solid base from which to work. Ultimately, the risk analysis will inform a company's climate change strategy, ensuring the organization's business model resilience as the world moves toward a zero-carbon future.

Overall, through all the policies and measures presented the Singaporean Government has also shown its understanding of the risks inherent to climate change; the nation's citizens and residents' expectations that the Government must do its best to protect them against the physical risks of climate change.

All organizations should be mindful that the more informed their stakeholders are regarding climate change, and the more their expectations to see mitigation and adaptation initiatives increase, exposing all businesses to new social risks and opportunities.

4 APPENDIX A - FULL EXTRACT OF THE CHAPTER ADDRESSING CLIMATE CHANGE - FROM THE BUDGET SPEECH HELD ON THE 18TH OF FEBRUARY INCLUDING RELEVANT EXTRACTS OF APPENDIX D

D. SUSTAINING SINGAPORE'S SUCCESS FOR OUR FUTURE GENERATIONS

ADDRESSING CLIMATE CHANGE

D5. To build a liveable and sustainable home, we must address climate change. As a low-lying island nation, rising sea levels threatens our very existence.

D6. So what can we do as a small island nation?

Supporting International Effort to Fight Climate Change

D7. First, we must continue to support global efforts to combat global problems. Singapore must continue to do our part as a responsible member of the international community. Singapore plays an active role at the UN Framework Convention on Climate Change. Besides representing our interests, Team Singapore is regarded as an honest broker, helping to build bridges and consensus.

D8. This year, we will update our commitment to the Paris Agreement and take a further step to chart our vision for a low-carbon, sustainable future Singapore.

- a. The Minister in the Prime Minister's Office will elaborate on this later.

Managing our Carbon Constraints

D9. Second, we must manage our transition to a low-carbon, low-emissions economy.

- a. We must turn our carbon constraints into a strength, just like how we have turned our water vulnerabilities into an area of strength, with radical innovations in

NEWater and desalination. Today, Singapore is a global hub of water research and innovation.

D10. The circular economy – turning waste into a resource that can be reused in the production cycle – is one way we can reduce our carbon footprint, and open up new opportunities.

- a. NEA will soon begin a field trial to use NEWSand, made from incineration ash, in road construction along Tanah Merah Coast Road.

D11. We will do more to develop new ideas and solutions. We are committing close to \$1 billion for research in Urban Solutions and Sustainability. The research will focus on renewable energy, cooling Singapore, and carbon capture, among others.

- a. As climate change is global, innovative solutions created here can be commercialised, turning our constraints into a strength.
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D12. More broadly, we have to manage our greenhouse gas emissions, by putting in place the right incentives, tax structures, and regulations.

1. We introduced a carbon tax in 2019, and supported enterprises in improving energy efficiency.
2. We introduced and enhanced the Minimum Energy Performance Standards to raise the energy efficiency of energy-intensive household and industrial appliances.

D13. The domestic transport sector contributes a significant amount of greenhouse gas emissions. Vehicles with internal combustion engines, or ICEs, also contribute to pollution, adversely affecting our health and quality of life.

3. Many major cities have already set ambitious goals to phase out ICE vehicles and shift to cleaner technologies.
4. Car manufacturers are actively developing cleaner engine technologies such as hybrids and electric vehicles, or EVs, and are exploring new areas such as hydrogen fuel cells.

D14. As a small city-state, we are able to, and have strong reason to stay abreast of these major technological changes.

- a. For both public health and climate change reasons, we should progressively phase out the use of ICE vehicles towards cleaner alternatives, such as hybrids and EVs. We will set a long-term strategic goal for Singapore to achieve this.

D15. Our vision is to phase out ICE vehicles and have all vehicles run on cleaner energy by 2040. To promote this, we will have three measures in this Budget.

D16. First, **we will enhance incentives to encourage the adoption of cleaner and more environmentally friendly vehicles.**

1. In 2018, we introduced the Vehicular Emissions Scheme for cars and taxis. Under the scheme, car buyers and taxi operators who choose cleaner car models can receive an upfront rebate of up to \$20,000 and \$30,000 respectively.
 2. We have seen promising results from the scheme. More car buyers and taxi operators are choosing environmentally friendly engines such as electric hybrids.
 3. Therefore, we will introduce a similar scheme called the **Commercial Vehicle Emissions Scheme** for light goods vehicles. The Minister for the Environment and Water Resources will announce the details at the COS.
 4. For cars and taxis, I will provide an **EV Early Adoption Incentive**.
 - i. Those who purchase fully electric cars and taxis will receive **a rebate of up to 45% on the Additional Registration Fee, capped at \$20,000.**
 - ii. This incentive will be implemented for three years, from January 2021.
 5. We will also **revise the road tax methodology for cars** to better reflect the current trends in vehicle efficiency from January 2021. This will lead to an across-the-board reduction in road tax for EVs and some hybrids. [See Annex D-1- Tax changes for vehicles] extract below.
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(III) Tax Changes for Vehicles

S/N	Name of Tax Change	Existing Tax Treatment	New Tax Treatment																																
Road Tax Revisions for Electric Vehicles and Hybrid Cars																																			
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Power rating of the 5 vehicle categories has changed from PR≤7.5, 7.5<PR≤32.5, 32.5<PR≤70, 70<PR≤157.5 and >157.5 to PR≤7.5, 7.5<PR≤30, 30<PR≤90, 90<PR≤230 and >230.

The 6-Monthly road tax formula has not changed compared to 2019 but an additional 6-monthly lump-sum component applies according to the table above.

Currently the tax treatment for LGVs and GPVs does not cover electric vehicles.

The existing road tax schedule for Electric LGVs and Electric GPVs is:

Vehicle Type	Maximum Laden Weight (metric tonne)	6-Monthly Road Tax Formula	
		Diesel & Diesel Hybrid	Green & Petrol
LGVs	mlw ≤ 3.5	\$213	\$170

Vehicle Type	Maximum Laden Weight (metric tonne)	6-Monthly Road Tax Formula	
		Diesel & Diesel Hybrid	Green & Petrol
GPVs	mlw ≤ 3.5	\$372	\$298
	mlw > 3.5	\$487	\$390

In 2020 budget a new tax treatment has been established for electric LGVs and GPVs, with formulas that will change according to the registration date as shown below:

For **Electric** LGVs and **Electric** GPVs registered from 1 January 2021 onwards, and for licensing period of 1 January 2021 - 31 Dec 2021, the road tax schedule will be the following:

Vehicle Type	Maximum Laden Weight (metric tonne)	6-Monthly Road Tax Formula		
		Diesel & Diesel Hybrid	Petrol & Petrol Hybrid	Electric
LGVs	mlw ≤ 3.5	\$213	\$170	\$195

Vehicle Type	Maximum Laden Weight (metric tonne)	6-Monthly Road Tax Formula		
		Diesel & Diesel Hybrid	Petrol & Petrol Hybrid	Electric
GPVs	mlw ≤ 3.5	\$372	\$298	\$323
	mlw > 3.5	\$487	\$390	

For **Electric** LGVs and **Electric** GPVs registered from 1 January 2021 onwards, and for licensing period of 1 January 2022 - 31 Dec 2022, the road tax schedule will be the following:

Vehicle Type	Maximum Laden Weight (metric tonne)	6-Monthly Road Tax Formula		
		Diesel & Diesel Hybrid	Petrol & Petrol Hybrid	Electric
LGVs	mlw ≤ 3.5	\$213	\$170	\$220

Vehicle Type	Maximum Laden Weight (metric tonne)	6-Monthly Road Tax Formula		
		Diesel & Diesel Hybrid	Petrol & Petrol Hybrid	Electric
GPVs	mlw ≤ 3.5	\$372	\$298	\$348
	mlw > 3.5	\$487	\$390	

For **Electric** LGVs and **Electric** GPVs registered from 1 January 2021 onwards, and for licensing period of 1 January 2023 onwards, the road tax schedule will be the following:

Vehicle Type	Maximum Laden Weight (metric tonne)	6-Monthly Road Tax Formula		
		Diesel & Diesel Hybrid	Petrol & Petrol Hybrid	Electric
LGVs	mlw ≤ 3.5	\$213	\$170	\$265

Vehicle Type	Maximum Laden Weight (metric tonne)	6-Monthly Road Tax Formula		
		Diesel & Diesel Hybrid	Petrol & Petrol Hybrid	Electric
GPVs	mlw ≤ 3.5	\$372	\$298	\$393
	mlw > 3.5	\$487	\$390	

The 6-monthly road tax formulas for Electric LGVs will start at \$195 for vehicles licensed during the year 2021, to 220\$ for vehicles licensed during 2022, to reach \$265 for vehicles licensed during 2023.

The 6-monthly road tax formulas for Electric GPVs with a maximum laden weight ≤3.5 metric tonnes will suffer a smaller increase, starting at \$323 for vehicles licensed during the year 2021, to 348\$ for vehicles licensed during 2022, to reach \$393 for vehicles licensed during 2023.

For Electric GPVs with a maximum laden weight >3.5 metric the 6-monthly road tax will remain unchanged at 390\$.

D17. Second, we will **expand the public charging infrastructure for EVs**.

6. Today, there are about 1,600 charging points island-wide.
7. We will work with the private sector to step up the deployment of chargers in public carparks. By 2030, we aim to deploy up to 28,000 chargers at our public carparks island-wide.

D18. Lastly, the Government will take the lead. We **will progressively procure and use cleaner vehicles to do our part for the environment**.

D19. Here we are placing a significant bet on EVs, and leaning policy in that direction because it is the most promising technology. It also requires a significant increase in demand to justify the infrastructure investment. This is a significant undertaking involving multiple agencies.

A Resilient Vehicular Tax Structure

D20. The transition towards EVs will have a major impact on tax revenues.

D21. Fuel excise duties today yield around \$1 billion per year, and are significant contributors to Government revenues. They are also a form of mileage tax, which discourages excessive driving, especially in private cars, and thus helps to reduce road congestion.

D22. But EVs do not pay fuel excise duties. Therefore, we will need to update our vehicular tax structure to preserve these two considerations.

1. Ideally, we would like to implement a usage-based tax on EVs as an alternative to fuel excise duties.
2. But the technology to do this properly on EVs is the Next Generation ERP System, and distance-based charging using ERP is still several years away.
3. In the interim, **we will impose a lump-sum tax that will be built into the road tax schedule for EVs to partly account for the loss in fuel excise duties.**
4. This lump-sum tax will be phased in over three years starting from January 2021, with the full quantum implemented by January 2023. [See Annex D-1].
5. Total road tax, after the revision in methodology and the new lump-sum tax, will be higher for some EV models.

D23. However, EV buyers can expect to enjoy substantial cost savings because of the significant EV Early Adoption Incentive.

Building a Sustainable Singapore, Together

D24. I spoke about policy measures that the Government will put in place to reduce emissions. But the Government alone cannot address the threat of climate change. Therefore, mobilising all of us in this effort is the third thrust of our climate change strategy.

D25. Robert Swan, the first person to have walked to the North and South Poles, once said, "The greatest threat to our planet is the belief that someone else will save it."

D26. To deal with climate change, we have to foster a climate of change in our community – where everyone, whether as an individual, as a business leader, or as a community leader, makes conscious decisions to lower our carbon footprint.

D27. One such decision by individuals is our choice of household appliances.

a. To encourage households to purchase energy-efficient household appliances, we will introduce **incentives to help lower-income households with the cost of these appliances.**

D28. Outside our homes, we earlier announced plans to add more greenery to our HDB estates.

a. New housing developments will have around 45% to 60% green cover.

b. Residents are contributing through the community garden movement. Today, more than 36,000 gardening enthusiasts are nurturing over 1,500 community gardens island-wide. These gardens keep our shared neighbourhood vibrant, and bring people closer together.

D29. **To make sustainable living a key feature of our HDB estates, we will have a new HDB Green Towns Programme.** It will have three key focus areas:

- reducing energy consumption,
- recycling rainwater,
- cooling our HDB towns.

Long-Term Adaptations to Climate Change



D30. I spoke about how we are committing to global efforts, managing our carbon constraints, and building a sustainable Singapore, together. We must try hard and we will do our part. But the course of climate change depends on the commitment of all nations. The risk of rising sea levels remains significant. So our fourth strategic thrust is to prepare our island for rising sea levels.

a. The Minister for the Environment and Water Resources will elaborate on our immediate plans at the COS.

D31. PM mentioned at the National Day Rally last year that climate change adaptation might cost \$100 billion or more over 100 years. This is a major fiscal outlay in the coming years – so it is right and prudent that we set aside resources for this.

1. **I will set up a new Coastal and Flood Protection Fund, with an initial injection of \$5 billion.** I will top it up subsequently whenever our fiscal situation allows.
2. We must have the resolve to deal head-on with the existential threat of rising sea levels. Just as our pioneers planted the trees for us to enjoy, we must protect our island for future generations to come.

D32. Our food security may also come under threat, as imported supplies come under strain from climate change or geopolitical tensions. To improve our food resilience, the Minister for the Environment and Water Resources will provide more details of our 'Grow Local' strategy at the COS.
