

Working Paper 2023/02

Comparing climate-related strategies of five selected Commonwealth countries: Australia, Canada, New Zealand, Singapore and the United Kingdom

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1.0 Introduction

1.1 Purpose

The aim of this research was to identify and compare country-wide climate-related strategy documents of five selected Commonwealth countries – Australia, Canada, New Zealand, Singapore and the United Kingdom. The purpose of this is twofold. Firstly, to identify the direction of the climate responses of other countries (with similar systems to New Zealand). And secondly, to gather an external perspective on how New Zealand’s climate strategy fares (which will inform *Report 18* – see more below). This working paper has a specific interest in climate change and strategy.

As an extension of the Institute’s research into Government Department Strategies (GDSs), we were also interested in identifying the use of strategy maps in these documents to visually communicate the strategic direction. Strategy maps are an extremely useful tool to test strategies quickly, affordably and effectively. The Institute strongly advocates their use to communicate the government’s approach to all stakeholders. Due to their visual nature, quick turnaround and endless repeatability, they are well suited to the task of guiding complex, long-term transitions. See Appendix 1 for excerpts of strategy documents presented in Section 4.

1.2 Background

The information and observations presented in this paper aim to contribute to an evidence base that the Institute will use to develop core assumptions that will influence and develop the narrative underpinning future *ClimateChangeNZ* research – namely the latest *Project 2058* report, *Report 18: Climate Change Strategy for Aotearoa New Zealand*, which the Institute is currently developing. The aim of *Report 18* is to explore what an actionable and inclusive climate strategy would look like for Aotearoa New Zealand.

1.3 Purpose of *StrategyNZ*

The overall aim of *StrategyNZ* is to contribute to a discussion on how to improve strategic decision-making, strategy stewardship and implementation in both the private and the public sector. Strategy development explores the means to achieve a preferred future (the ends). When working on strategy, we tend to focus on values, objectives/goals, resources, capabilities, limitations, relationships, key results, and actions (what to do and what not to do).

2.0 Methodology

2.1 Method

This research provides a qualitative overview and comparison of the main climate-related strategies from Australia, Canada, New Zealand, Singapore and the United Kingdom. The Institute selected these countries as they are the largest economies in the Commonwealth and are most comparable to New Zealand (e.g. in terms of governmental, judicial, educational and societal systems).

Step 1: Identify the climate-related strategy documents of interest (the data set).

The scope of this research covers climate-related strategies that have a nationwide, country-specific focus on mitigation and adaptation. More often than not, mitigation and adaptation strategies are published separately.

Step 2: Find a soft copy of available climate-related strategy documents.

Strategy documents were found on each respective country’s Government (or relevant government department) website. In cases where a country had published earlier versions of such strategies, we retrieved the most recent iteration. Strategy documents were then downloaded and organised into soft and hard copy folders.

Step 3: Create high-level categories for analysis.

Topics were selected and used to identify and organise relevant information. In doing so, this enabled a platform for the comparison and analysis of strategy documents. The categories were:

- Strategy type (i.e. mitigation or adaptation)
- Title
- Date released
- Summary
- Purpose
- Vision
- Principles
- Goals
- Priorities
- Targets/actions
- Legislative architecture
- Paris-aligned (Paris Agreement)
- Indigenous input
- Monitoring/review

Step 4: Search through the document and extract points of interest.

Where a specific term or figure was of interest (e.g. quantifiable emission budgets, commitment to the Paris Agreement) staff searched in Adobe Acrobat Pro to quickly identify the information. Otherwise, relevant information was derived by manually searching through documents. Results were recorded in a spreadsheet and were checked by an independent staff member.

2.2 Limitations

This research process had several limitations:

- While the countries covered in this research share the same targets (stipulated by international commitments – e.g. Paris Agreement), different countries are at different stages of the development and implementation of climate-related strategies, which may have reduced the ability for comparison.
- The manual process of gathering information may have meant that some content was missed.
- Australia is currently updating its' mitigation and adaptation strategy after a change of Government, but has signalled that it will carry out the commitments made in the previous adaptation strategy. For this reason we have analysed only the adaptation strategy.

3.0 Emissions data by country

Section 3.0 provides a summary of each country’s most current emissions data. All strategies included in section 4.0 were future-focused – usually relating to 2030 and 2050 (to coincide with domestic and international targets). The Institute included this section to contextualise the mitigation strategies presented in section 4.0, particularly to gather a better understanding of how each country has been tracking.

This section presents, for each country:

- a summary of emissions data;
- breakdown of emissions by sector;
- breakdown of energy supply; and
- breakdown of electricity supply.

3.1 Australia

Figure 1: Summary of 2021 GHG emissions, Australia¹

Sector	Annual emissions (Mt CO ₂ -e) year to December 2020	Annual emissions (Mt CO ₂ -e) year to December 2021	Change (%)
Energy – Electricity	167.5	160.4	-4.2%
Energy – Stationary energy excluding electricity	99.3	102.6	3.3%
Energy – Transport	87.4	90.9	4.0%
Energy – Fugitive emissions	49.9	50.8	1.8%
Industrial processes and product use	32.0	32.5	1.4%
Agriculture	74.1	77.2	4.2%
Waste	13.0	13.0	-0.1%
Land Use, Land Use Change and Forestry	-39.3	-39.5	-0.4%
National Inventory Total	483.9	488.0	0.8%

Figure 2: Share of total emissions, by sector, Australia, 2021²

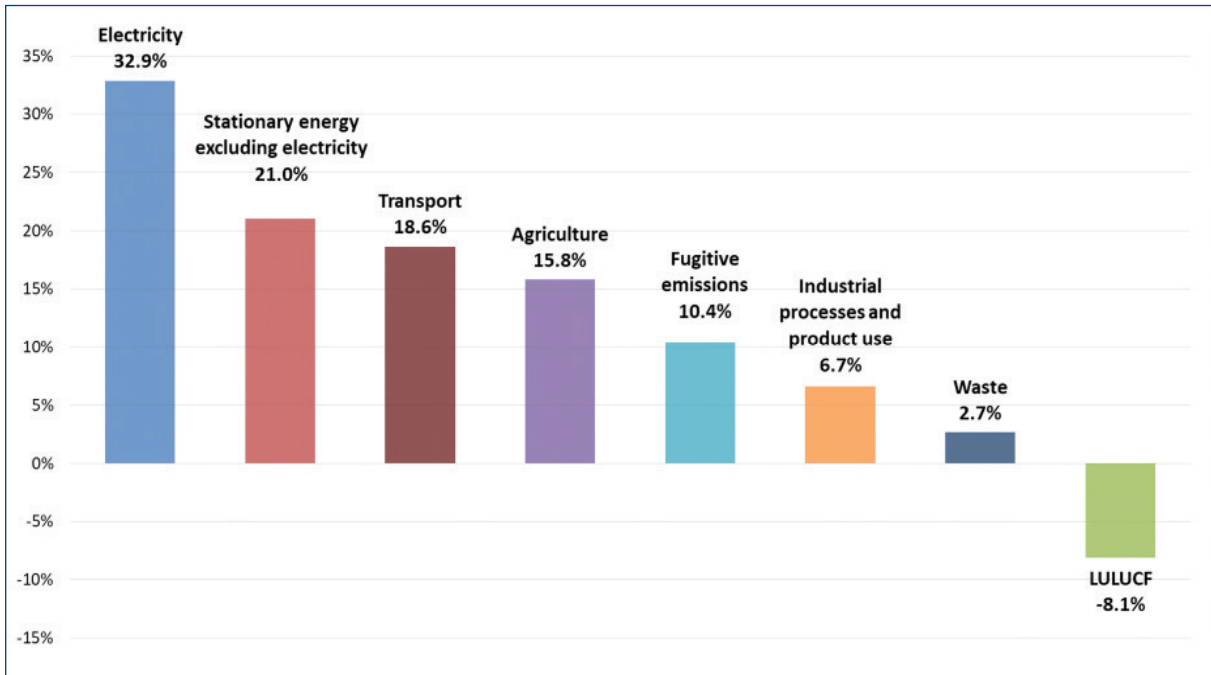


Figure 3: Energy consumption by source, Australia³

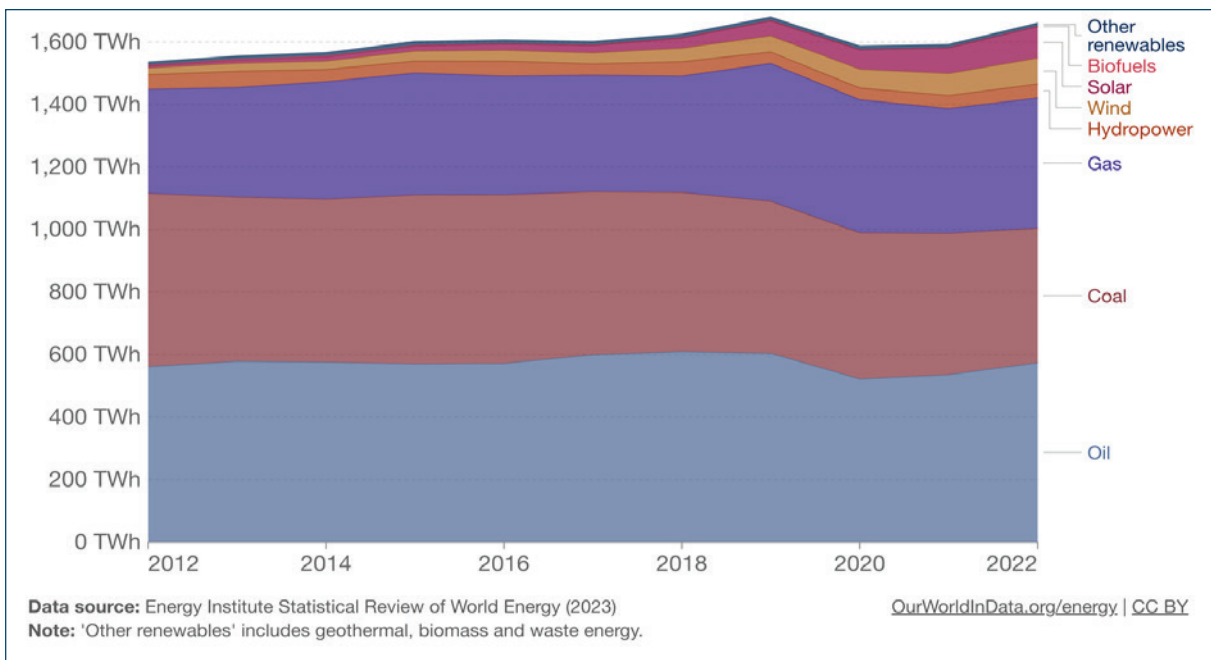
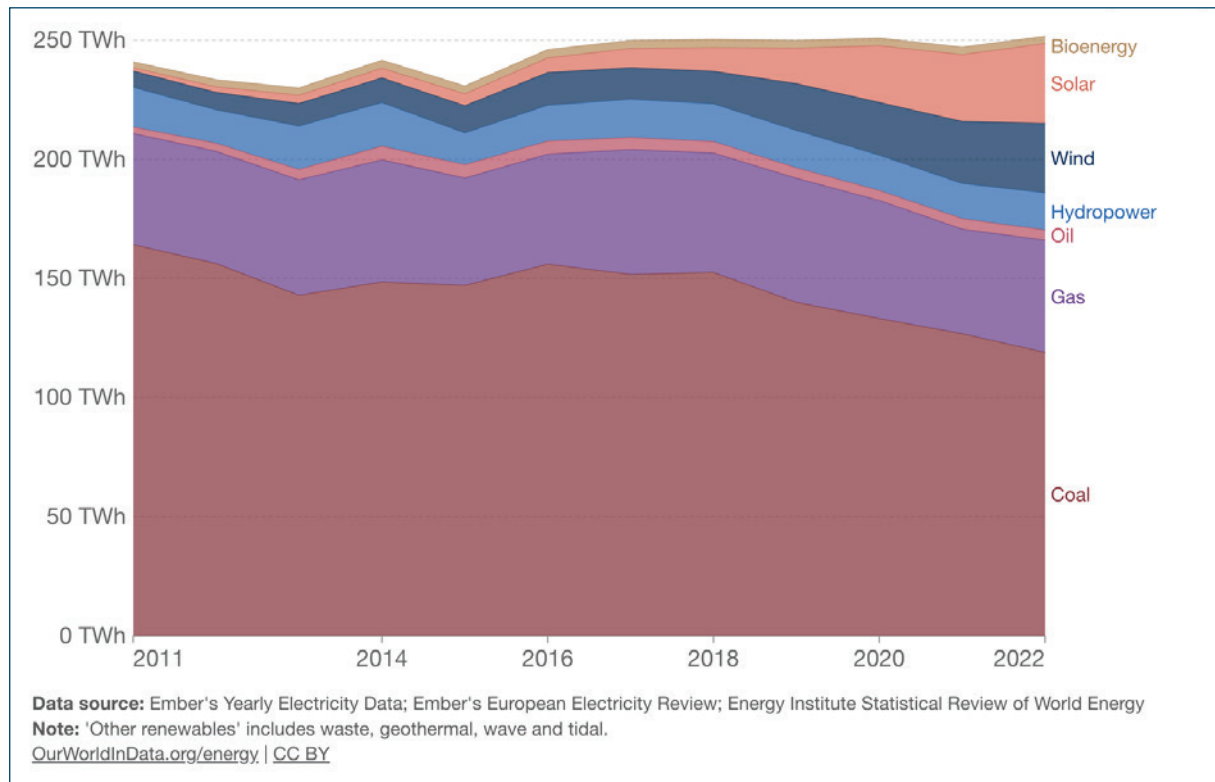


Figure 4: Electricity production by source, Australia⁴



- Australia's overall emissions in 2021 were 488.0mtCO₂-e. Australia's first Nationally Determined Contribution (NDC1) commits to reduce greenhouse gas emissions to 43% below 2005 levels by 2030 including land-use, land-use change and forestry (LULUCF) (which is 354mtCO₂-e by 2030)⁵. Considering Australia's emissions increased by 0.8% from 2021, and it currently does not have an emissions reduction plan in place, it is quite the undertaking to meet this target. This seems likely to be achieved through offsets.
- Electricity was Australia's largest emitting sector at 160.4mtCO₂-e.
- In terms of both energy and electricity, renewables are increasing. A larger proportion is used in electricity production.
- Oil, gas and coal-generated energy remained stable for energy consumption. For electricity production, these energy sources were decreasing.
- Australia has the largest percentage share of coal-generated electricity out of all countries in this data set.

3.2 Canada

Figure 5: Summary of 2021 GHG emissions, Canada⁶

Greenhouse gas emissions

Climate change is one of the most important environmental issues of our time. Climate change is caused by the increase in concentrations of greenhouse gases (GHGs) in the atmosphere. These increases are primarily due to GHG emissions resulting from human activities such as the use of fossil fuels or agriculture. This changing climate has [impacts](#) on the environment, human health and the economy. The indicators report estimates of Canada's emissions of GHGs over time.

Since 2015 and the signing of the Paris Agreement, Canada adopted 2005 as the base year for its GHG emission reduction target. In 2021, Canada committed to reduce its GHG emissions by 40-45 percent below 2005 levels by 2030. Historically, following Canada's ratification of the Kyoto Protocol, the base year was 1990.

The latest year reported (2021) coincides with the 2nd year of the COVID-19 pandemic which affected a wide range of economic sectors, including the energy and transport sectors. The long-term trends presented must be interpreted in the context of the economic slowdown that influenced results from 2019 to 2021.

National greenhouse gas emissions

Key results

- Canada's total GHG emissions in 2021 were 670 megatonnes of carbon dioxide equivalent (Mt CO₂ eq), a 1.8% increase from 659 Mt CO₂ eq in 2020
- From 2005 to 2021, Canada's GHG emissions decreased by 8.4% (62 Mt CO₂ eq)
- Between 1990 and 2021, Canada's GHG emissions increased by 13.9% (82 Mt CO₂ eq)

Figure 1. Greenhouse gas emissions, Canada, 1990 to 2021

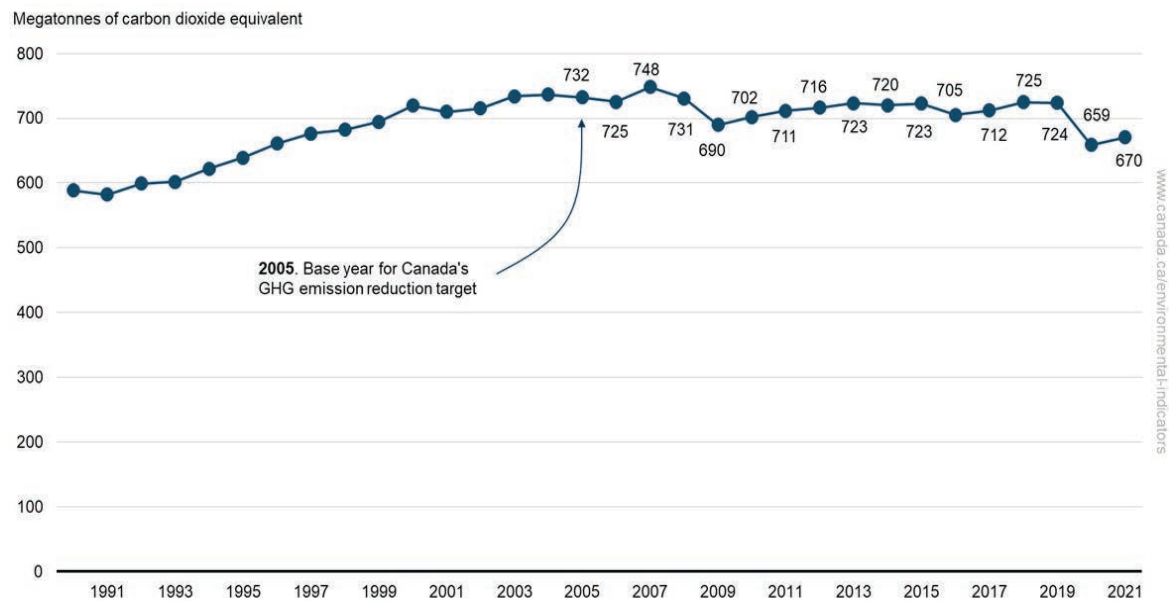


Figure 6: Share of total emissions, by sector, Canada, 2021⁷

Greenhouse gas emissions by economic sector

This indicator shows GHG emissions reported by the economic sector in which they are generated. Indicators focusing specifically on the oil and gas, transport, agriculture and electricity sectors follow.

Key results

- In 2021, the oil and gas sector and transport sector were the largest GHG emitters in Canada, accounting for 28% and 22% of total emissions, respectively
- From 2020 to 2021, GHG emissions from the oil and gas, transport, heavy industry, and "waste and others" sectors grew by between 2% and 5%, while emissions from the buildings, electricity and agriculture sectors decreased by between 2% and 4%
- From 1990 to 2021:
 - an increase in emissions was observed for the oil and gas (+88%), transport (+27%), buildings (+21%) and agriculture sectors (+39%)
 - a decrease in emissions was observed for the electricity (-45%), heavy industry (-22%) and "waste and others" (-14%) sectors

Figure 3. Greenhouse gas emissions by economic sector, Canada, 1990 to 2021

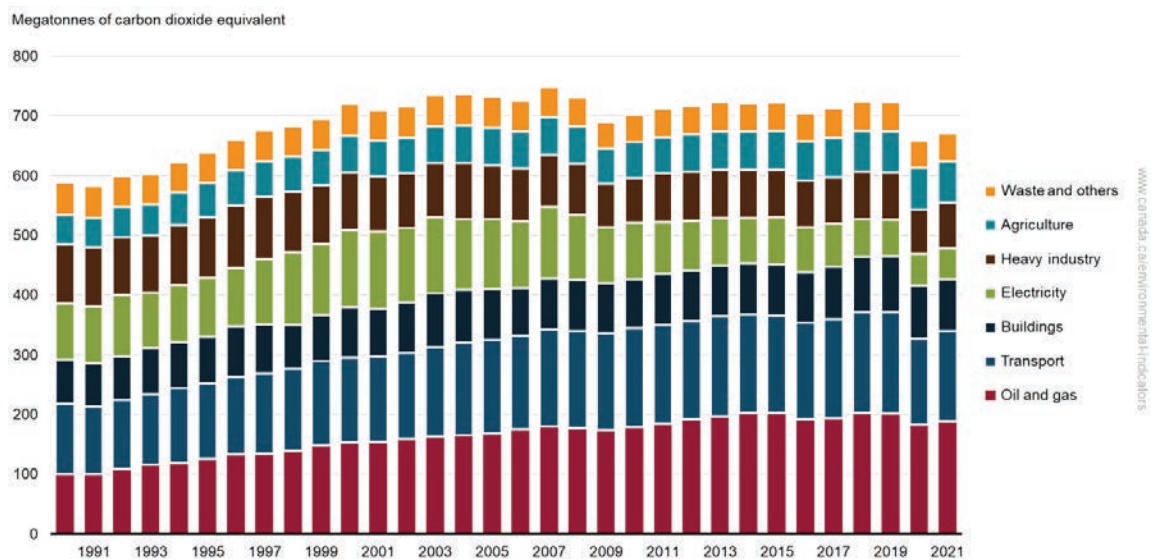


Figure 7: Energy consumption by source, Canada⁸

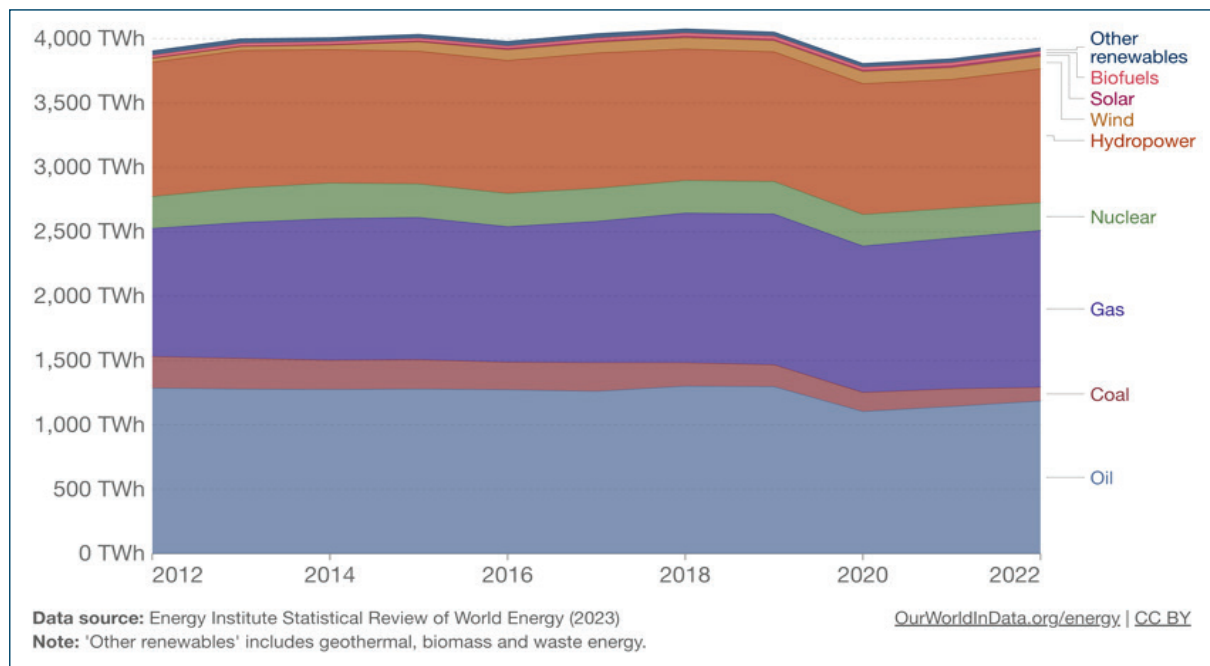
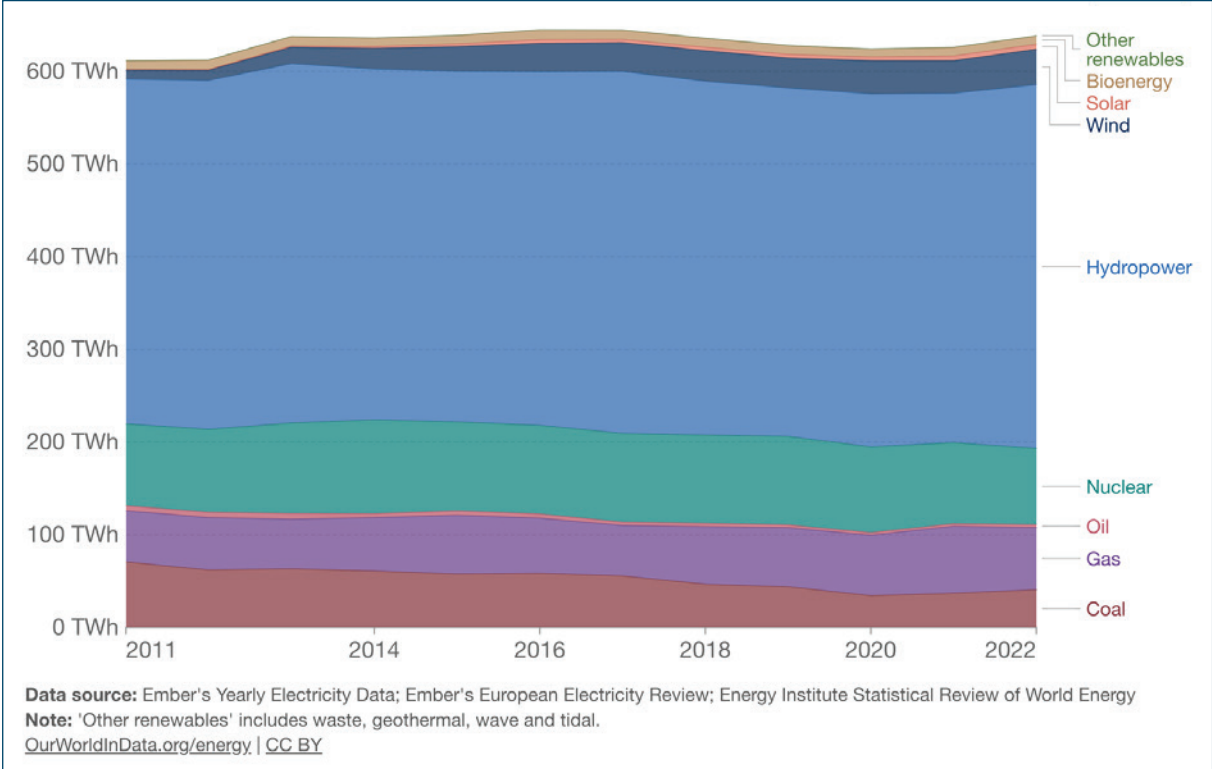


Figure 8: Electricity production by source, Canada⁹



- Canada’s overall emissions in 2021 were 670 mtCO₂-e, which is an increase of 1.8% from 2020. Canada's target of 443 mtCO₂-e by 2030 is looking rather ambitious at this rate. However, considering the large percentage share of renewable energy and therefore renewable infrastructure, it is possible for this to be achieved if necessary priority is placed and investment undertaken.
- Oil and gas was Canada’s largest emitting sector with 187.6 mtCO₂-e in 2021.
- Hydropower is responsible for a very large percentage share of both the energy and electricity mix of Canada. Renewables play a larger role in electricity production than energy consumption.
- There is still a large reliance upon oil, coal and gas-generated energy, much more so than electricity.
- The appears to be a slight increase in the production of all renewable sources for both energy and electricity. All other sources appear to have remained relatively consistent over the last ten years.
- Interestingly, nuclear energy and electricity also play a major role. All Canadian nuclear generation facilities use Canadian Deuterium Uranium (CANDU) reactors, which use uranium from Saskatchewan as fuel.¹⁰ Nuclear energy produces zero carbon emissions.¹¹

3.3 New Zealand

Figure 9: Summary of 2021 GHG emissions, New Zealand¹²

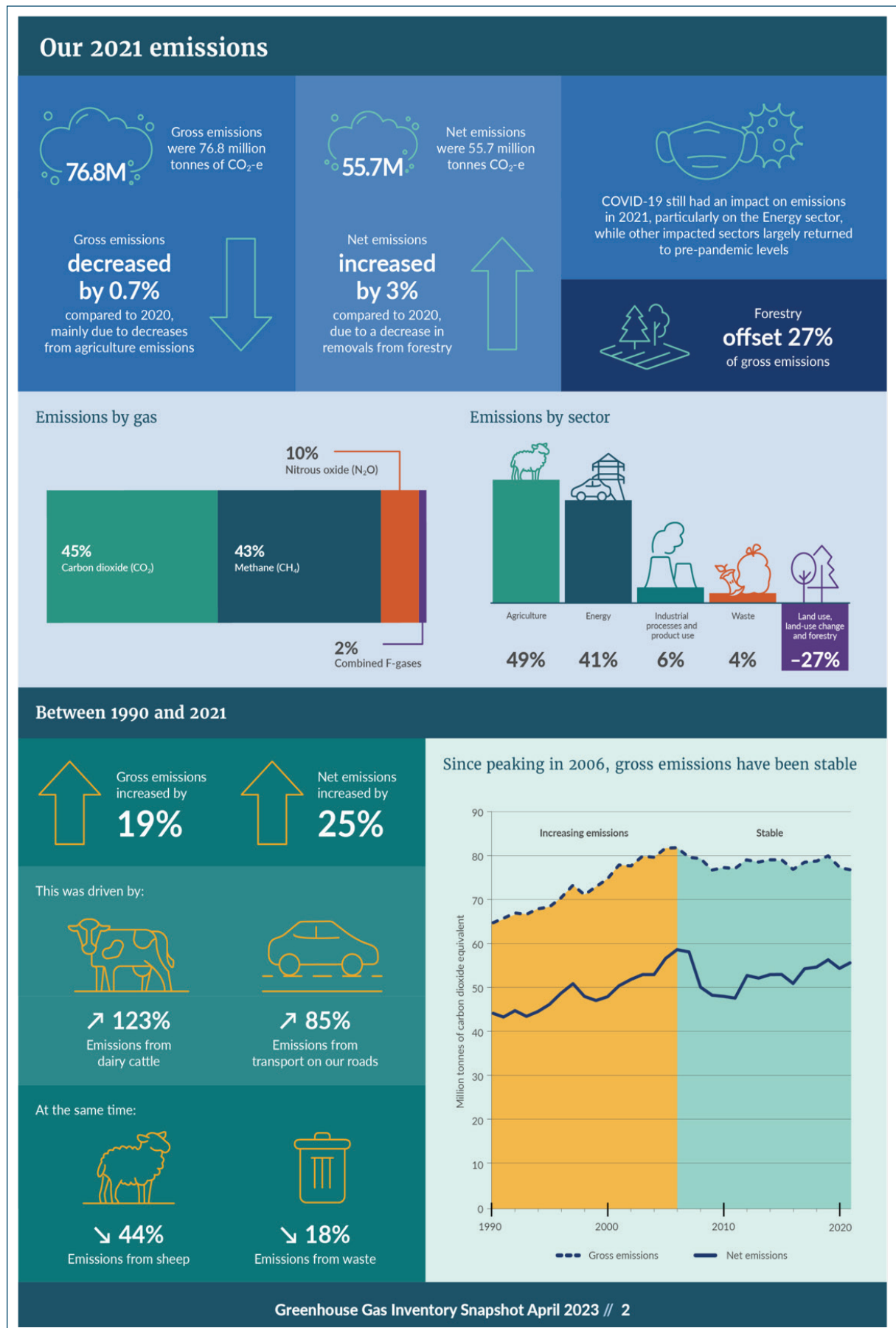


Figure 10: Share of total emissions, by sector, New Zealand, 2021¹³

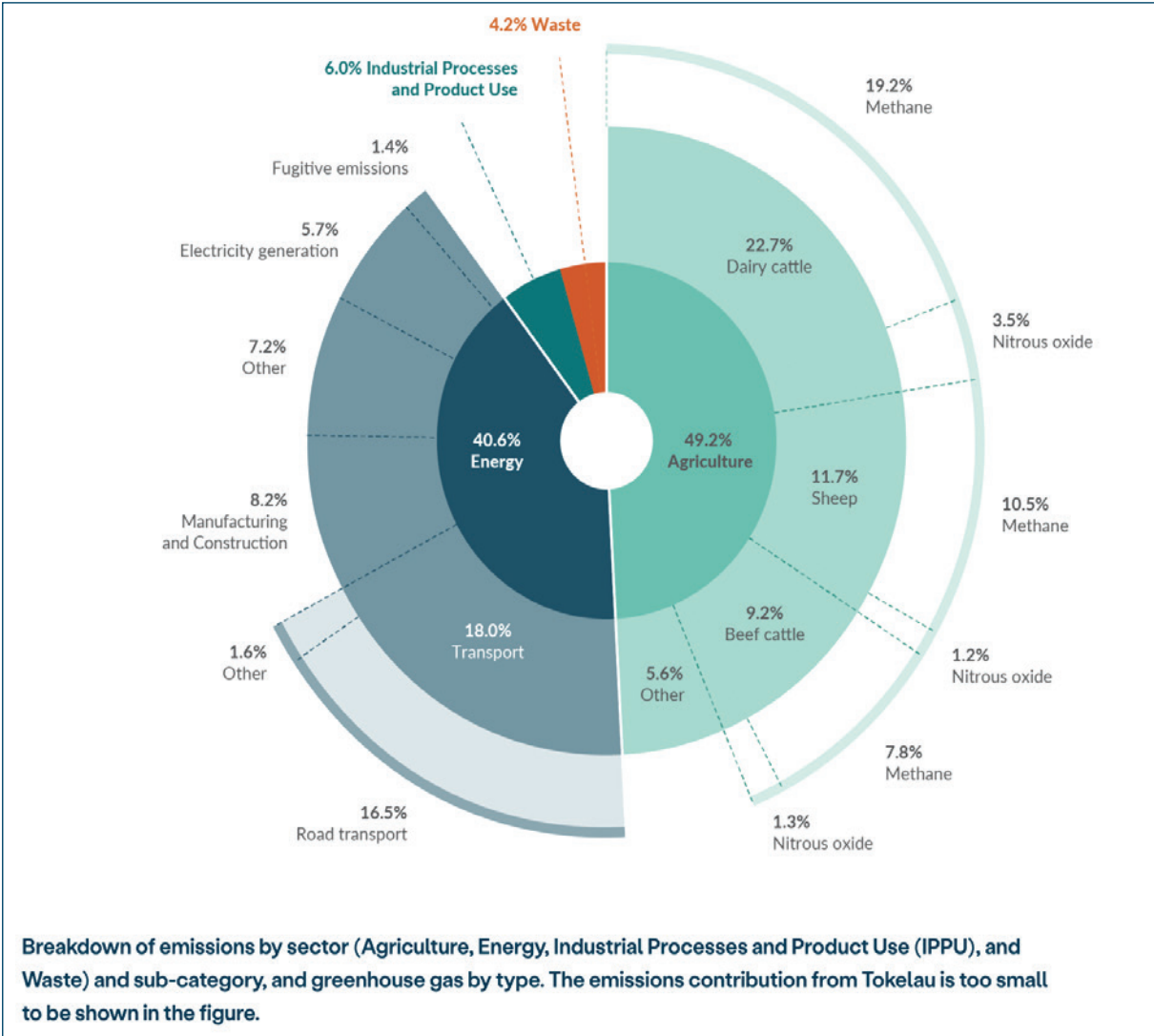


Figure 11: Energy consumption by source, New Zealand¹⁴

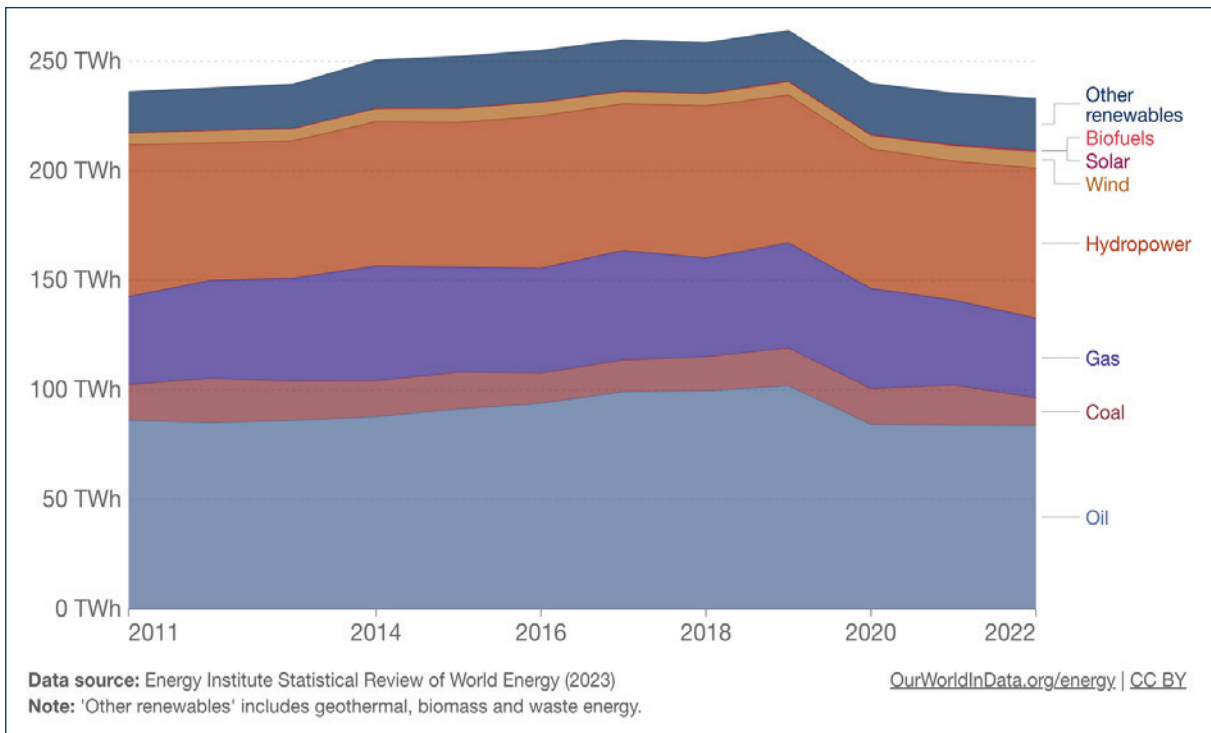
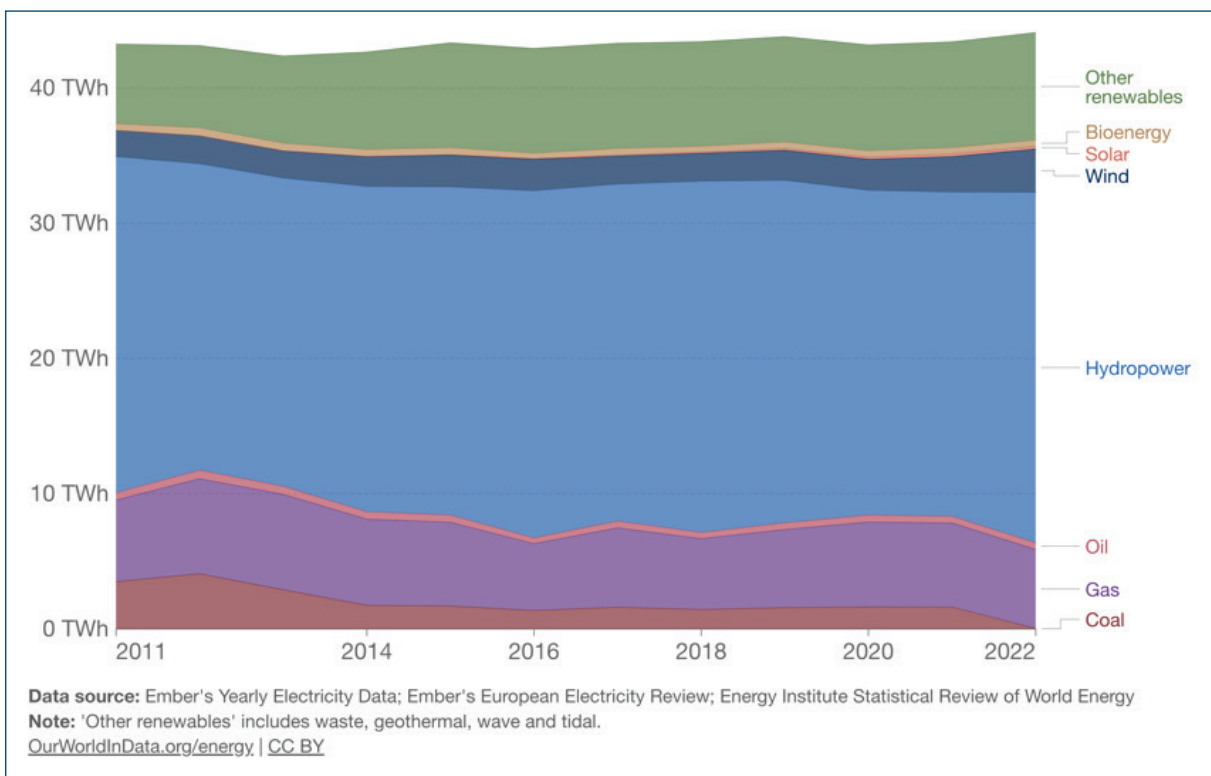


Figure 12: Electricity production by source, New Zealand¹⁵



- New Zealand's overall emissions in 2021 were 76.8 mtCO₂-e. This suggests that New Zealand should not have much trouble in achieving its first emissions budget of 72.5 mtCO₂-e by 2025.
- New Zealand's largest emitting sector was agriculture, responsible for 37.6 mtCO₂-e.
- The majority of New Zealand's electricity is generated by renewable sources (approx. 82%)¹⁶. For electricity production, renewables are also slightly increasing. Renewables play a smaller role in energy consumption, contributing approximately 40%. And interestingly, in contrast to electricity, renewables are on a decreasing trend for energy consumption.
- Further, it appears that all energy sources except oil are trending downwards – with gas falling the most. Contributing to this was Methanex (methanol company) reducing its natural gas usage from January to July and mothballing its Waitara Valley plant.¹⁷

3.4 Singapore

Figure 13: Summary of 2021 GHG emissions including sector breakdown, Singapore¹⁸

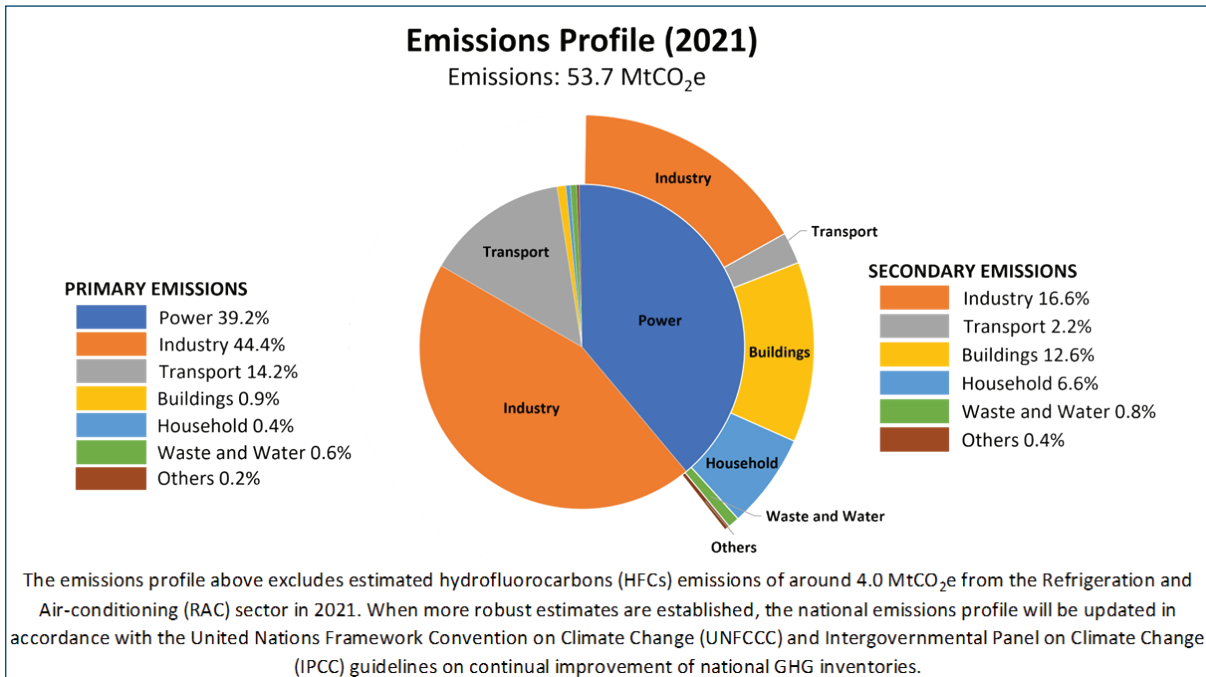


Figure 14: Energy consumption by source, Singapore¹⁹

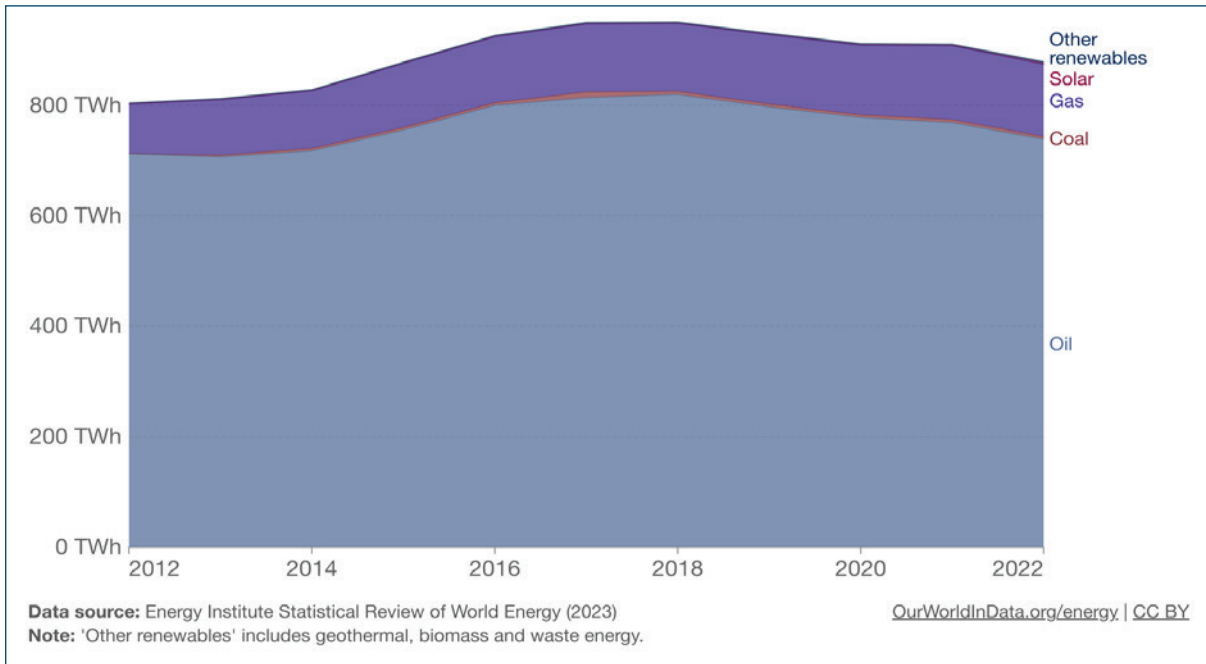
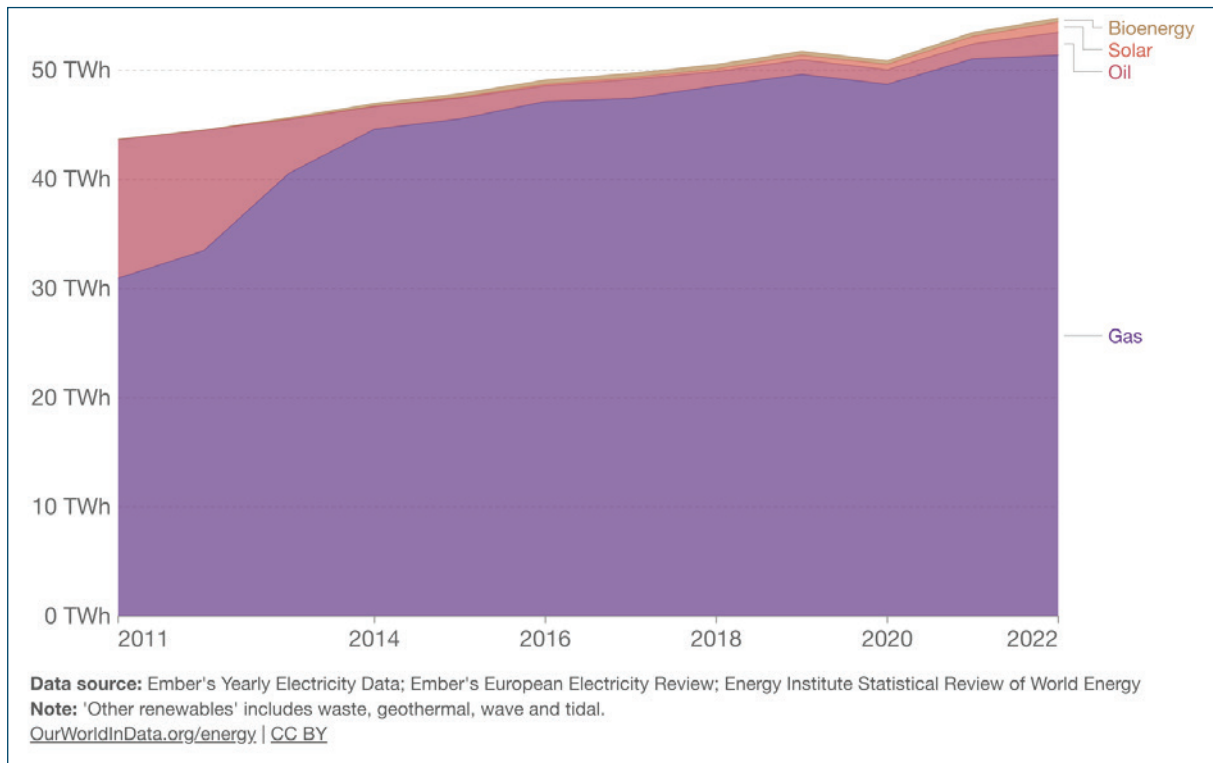


Figure 15: Electricity production by source, Singapore²⁰



- Singapore's overall emissions for 2021 were 53.7 mtCO₂-e. The largest emitting sector was industry at 23.6 mtCO₂-e.
- Singapore's energy and electricity source is largely oil and gas, far more than any other country in this data set. Interestingly, Singapore generated about 95% of its electricity from natural gas in 2021, compared to 18% in 2000.²¹
- Singapore had the lowest percentage share of renewables out of all countries in this data set. While this finding may be surprising, Singapore is a country that is alternative energy disadvantaged. Singapore is a low-lying island state with one of the world's highest population densities (7,485 persons per km²). Its urban density and limited land area, relatively flat land, low wind speeds and lack of high-quality hydrothermal resources present serious difficulties in pursuing alternative energy options. Given its small land area and high population density, current nuclear fission technologies are not suitable for deployment in Singapore.²²

3.5 United Kingdom

Figure 16: Summary of 2021 GHG emissions, United Kingdom²³

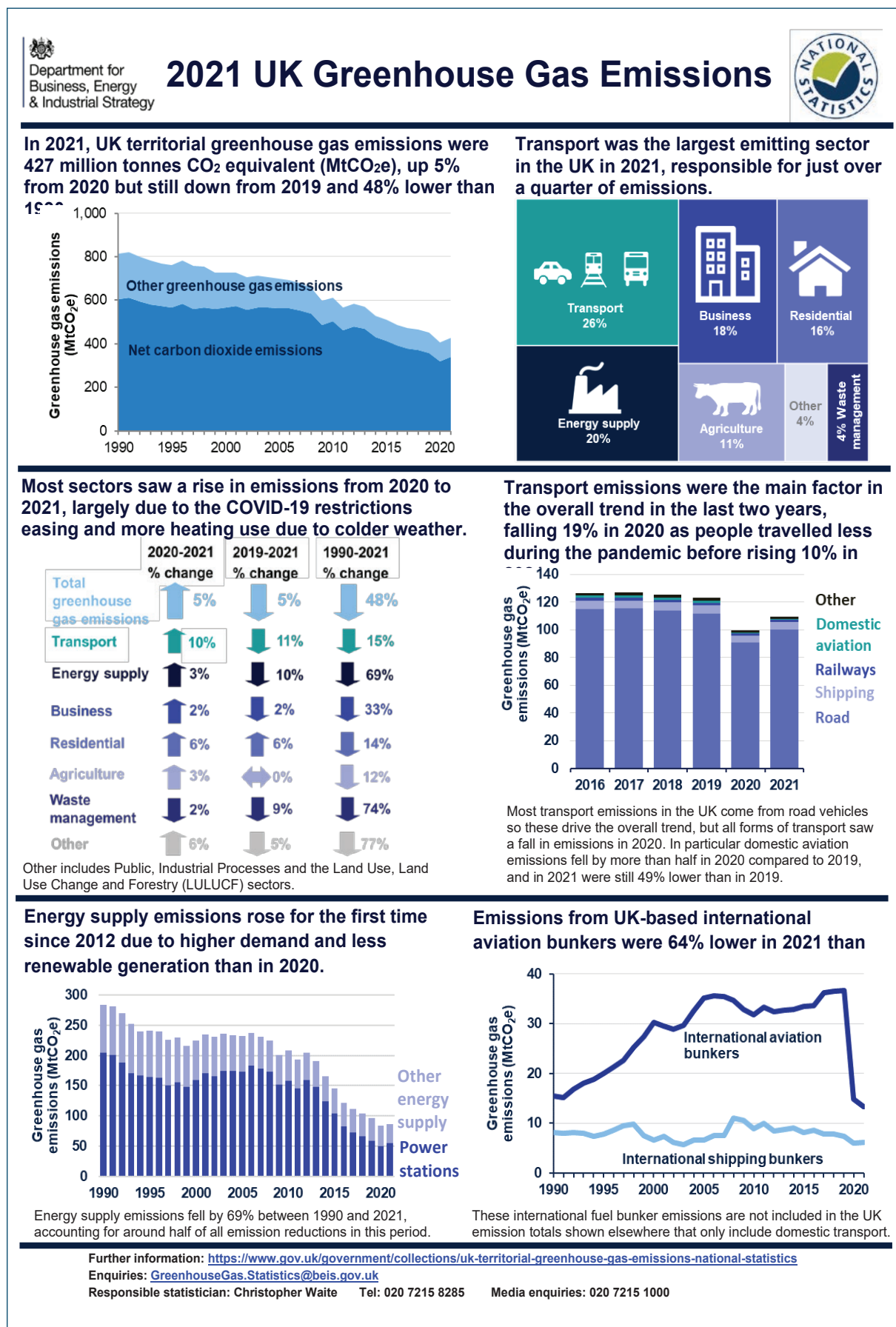


Figure 17: Share of total emissions, by sector, United Kingdom, 2021²⁴

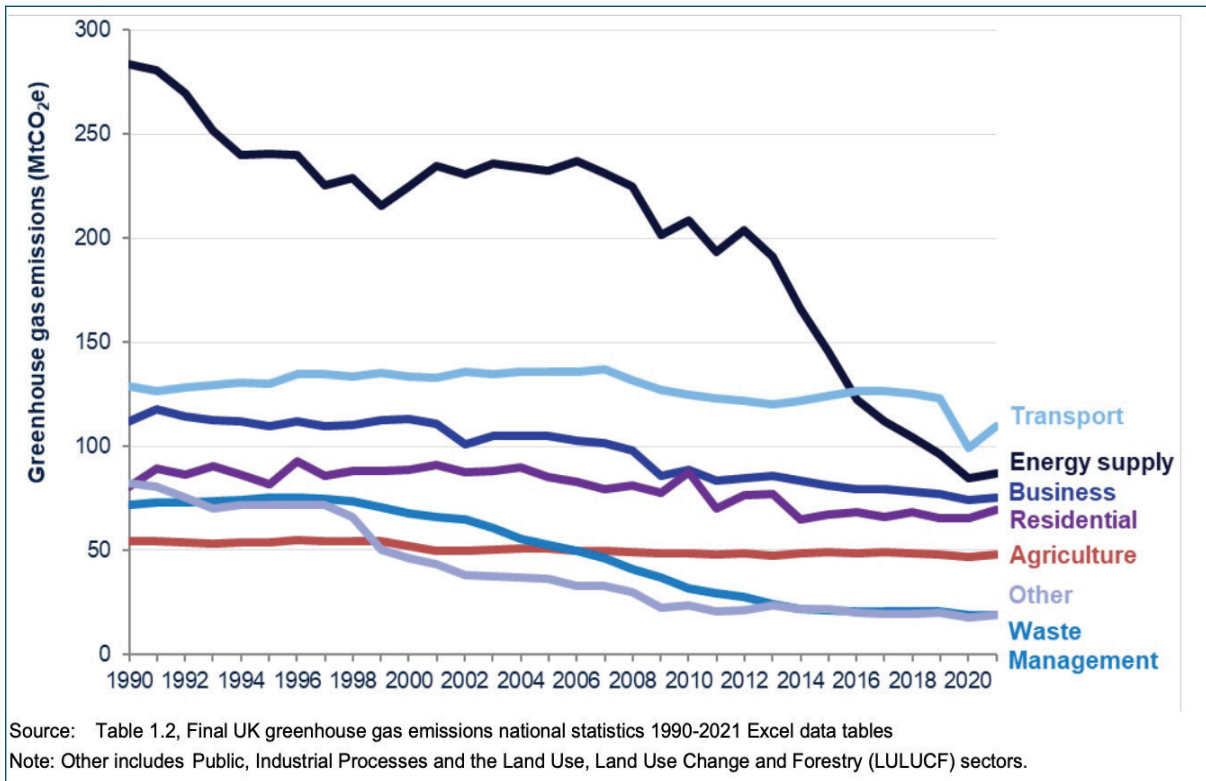


Figure 18: Energy consumption by source, United Kingdom²⁵

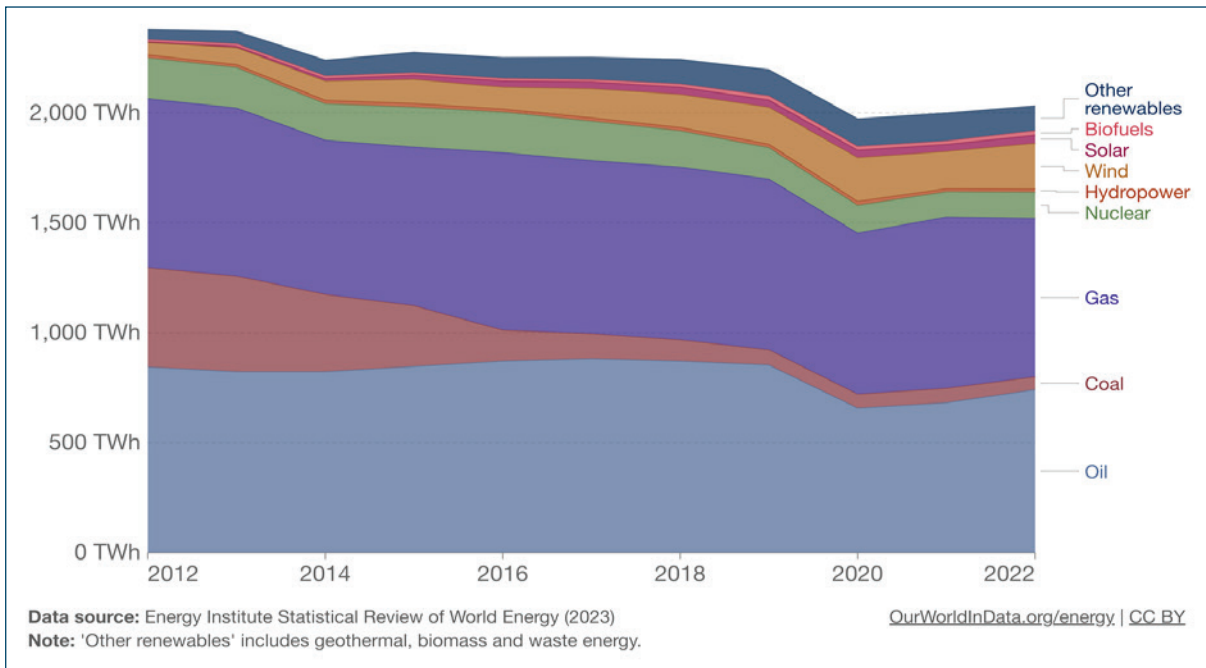
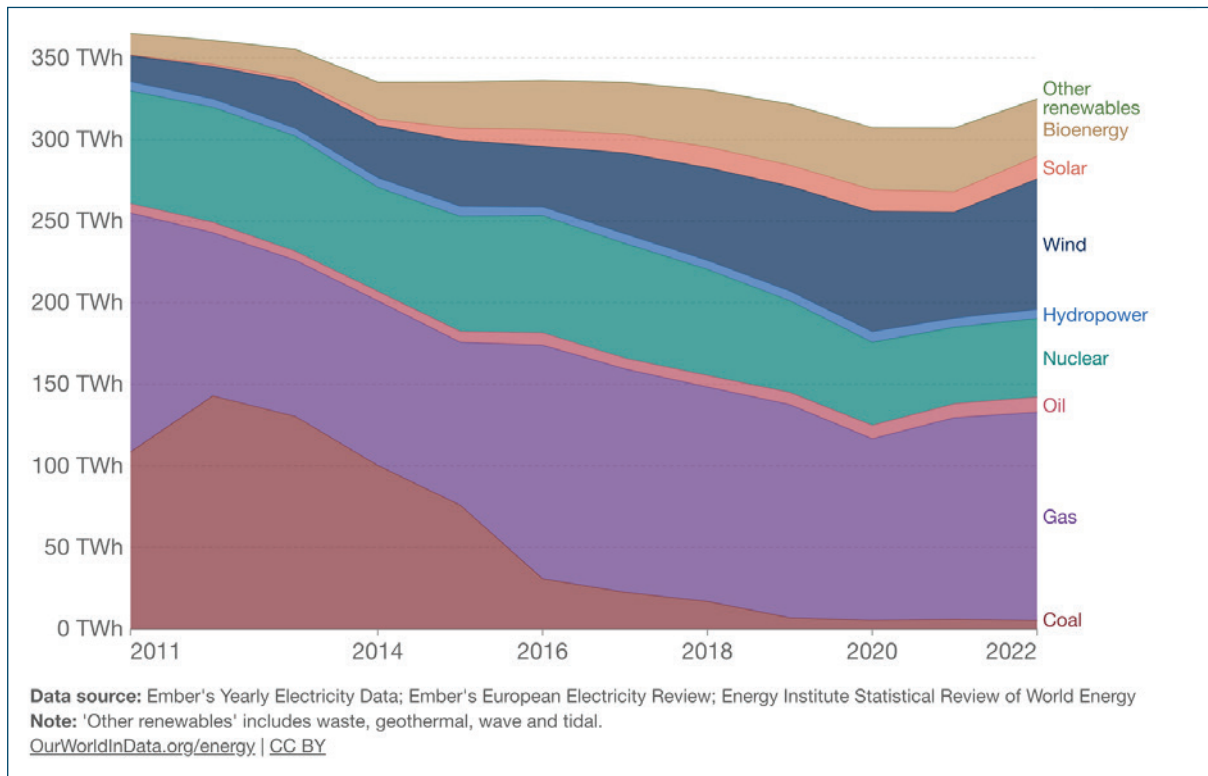


Figure 19: Electricity production by source, United Kingdom²⁶



- The UK's overall emissions for 2021 were 427 mtCO₂-e. This is a reduction of 48% from 1990 levels, which suggests that the target of a 68% reduction from 1990 levels by 2030 is potentially achievable.
- The UK's largest emitting sector for 2021 was transport, with 119.6 mtCO₂-e.
- The UK has the most evenly spread mix of electricity production source out of countries in this data set.
- Regarding energy consumption, the UK has made quite considerable reductions in gas and coal-generated energy. In terms of electricity production, coal-generated electricity has decreased by a large amount.
- There has been an observed increase in the role of renewables in both energy and electricity sources over the last ten years. This trend appears to be increasing.

4.0 Strategy overview and comparisons

Section 4.0 presents all research findings for each country.

4.1 Australia

Table 1: Australia’s mitigation and adaptation climate strategies

Note: Australia is currently updating its mitigation and adaptation strategies after a change of Government. However, it is continuing to implement the commitments made in the previous adaptation strategy, which included the establishment of the National Adaptation Policy Office and the delivery of Australia’s first National Climate Risk Assessment and a National Adaptation Plan. (Personal communication, 2023). For this reason, the Institute has included the adaptation strategy in this analysis and intentionally left the mitigation section blank.

Strategy type	Mitigation	Adaptation
Title		<i>National Climate Resilience and Adaptation Strategy 2021-2025*</i>
Date released		October 2021
Summary		This strategy positions Australia to better anticipate, manage and adapt to climate change. It is designed to support governments, communities and businesses to better adapt, recognising that adaptation is a shared responsibility that requires sustained and ongoing action. The strategy uses four domains – natural, built, social and economic – to frame its approach to coordinated adaptation. (pp. 4, 6, 20)
Purpose		To set out what the Australian Government will do to support efforts across all levels of government, business and the community, to better anticipate, manage and adapt to the impacts of climate change. (p. 7)
Vision		Australia can better anticipate, manage and adapt to climate change. (p. 20)
Principles		<ul style="list-style-type: none"> • Shared responsibility • Factor climate change into decision making • Evidence-based, risk management approach • Assist the vulnerable • Collaborative values-based choices • Revisit decisions and outcomes over time (p. 13)
Goals		<ul style="list-style-type: none"> • People coming together to develop solutions, share best practice and scale individual adaptation investment to deliver value for all Australians. Australia evaluates and reports on progress, climate impacts and opportunities, prioritising adaptation investments and ensuring continual learning. • The information, tools and the support we need is readily available and used to build community resilience, ensure economic prosperity and protect our natural systems. • Our regional neighbours and international partners derive lasting benefit from Australian support and co-design solutions to ensure a stable, secure Pacific and a prosperous, sustainable global community. (p. 38)
Priorities		<ul style="list-style-type: none"> • Provide enhanced national leadership and coordination. • Partner with governments, businesses and communities to act and invest. • Deliver coordinated climate information and services to more users. • Continue to deliver world class climate science that informs successful adaptation. • Deliver national assessments of climate impacts and adaptation progress. • Monitor and independently evaluate progress over time. (p. 20)

Strategy type	Mitigation	Adaptation
Targets/actions		<p>Drive investment and action through collaboration – Governments, businesses and communities collaborate to build resilience and adapt. Supported by:</p> <ul style="list-style-type: none"> • providing enhanced national leadership and coordination • partnering with governments, businesses and communities to act and invest. <p>Improve climate information and services - Australia has information to better predict, manage and adapt to climate change. To support this, the Australian Government will:</p> <ul style="list-style-type: none"> • deliver coordinated climate information and services to more users • continue to deliver world class climate science that informs successful adaptation. <p>Assess progress and improve over time – Australia assesses national climate impacts, evaluates adaptation progress and continuously improves. To support this, the Australian Government will:</p> <ul style="list-style-type: none"> • deliver national assessments of climate impacts and adaptation progress • independently assess progress over time. (p. 20)
Legislative architecture		No
Paris-aligned?		Yes (p. 7)
Indigenous input?		Yes (p. 4)
Monitoring/review		The Strategy establishes an ongoing cycle of national assessments, targeted action, monitoring and review, to support learning and strengthen our national adaptation response over time in line with our commitments under the Paris Agreement. (p. 7)

4.2 Canada

Table 2: Canada’s mitigation and adaptation climate strategies

Strategy type	Mitigation	Adaptation
Title	<i>2030 Emissions Reduction Plan: Canada’s Next Steps for Clean Air and a Strong Economy</i>	<i>Canada’s National Adaptation Strategy: Building Resilient Communities and a Strong Economy</i>
Date released	June 2022	November 2022
Summary	The 2030 plan is a comprehensive roadmap to guide emissions reduction efforts in each sector. As governments, businesses, non-profits and communities across the country work together to reach these targets, we will identify and respond to new opportunities. (p. 7)	The National Adaptation Strategy outlines a shared path to a more climate-resilient Canada. It establishes a shared vision of what we want our future to look like and sets out a common direction for action across five interconnected systems that are at the heart of our lives and communities. (p. 2)
Purpose	To guide emissions reduction efforts in each sector and present Canada’s bold next steps forward as it keeps air clean and builds a strong economy for everyone. (p. 7)	To help all key actors and people in Canada begin moving together in the same direction by building on existing efforts and outlining clear roles and responsibilities. (p. 14)
Vision	Climate action must go hand in hand with keeping life affordable for Canadians and creating good jobs. (p. 7)	Taking ambitious and collective action to adapt in ways that are equitable and inclusive will help us ensure that everyone’s lives and welfare are protected from the impacts of a changing climate. (p. 2)
Principles	<ul style="list-style-type: none"> • Good, sustainable jobs • Strong, resilient economy • Clean air • Making life more affordable • More opportunity to enjoy nature • Fighting inequality • Climate resilience (p. 11) 	<ul style="list-style-type: none"> • Respect jurisdictions and uphold Indigenous rights • Advance equity and climate and environmental justice • Take proactive, risk-based measures to reduce climate impacts before they occur • Maximize benefits and avoid maladaptation (p. 16)
Goals	<ul style="list-style-type: none"> • 2030: (40% reduction compared to 2007) • 2040: (60% reduction compared to 2007) • 2050: (80% reduction compared to 2007) (p. 103) • Under the Act, the Government of Canada is also required to set progressively more ambitious GHG emissions targets for 2035, 2040, and 2045. 	<ul style="list-style-type: none"> • Reducing the impacts of climate-related disasters • Improving health and well-being • Protecting and restoring nature and biodiversity • Building and maintaining resilient infrastructure • Supporting the economy and workers (p. 18)
Priorities	<ul style="list-style-type: none"> • Helping to reduce energy costs for our homes and buildings • Empowering communities to take climate action • Making it easier for Canadians to switch to electric vehicles • Driving down carbon pollution from the oil and gas sector • Powering the economy with renewable electricity • Helping industries develop and adopt clean technology in their journey to net-zero emissions • Investing in nature and natural climate solutions • Supporting farmers as partners in building a clean, prosperous future • Maintaining Canada’s approach for pricing pollution. (pp. 7–9) 	<ul style="list-style-type: none"> • Disaster Resilience; • Health and Well-being; • Nature and Biodiversity; • Infrastructure; and • Economy and Workers (p. 18)
Targets/actions	<ul style="list-style-type: none"> • Net zero GHG emissions by 2050. [Domestic] • Reduce domestic methane emissions by more than 35% by 2030, compared to 2020 levels [note: under a different strategy – see below]. [Domestic] • 40–45% emissions reductions below 2005 levels by 2030. [International] (p. 7) <p>Under its domestic climate legislation, Canada is required to set its 2035 target by 1 December 2024. (p. 15)</p>	For each priority, the National Adaptation Strategy (NAS) sets a long-term transformational goal (5 in total), medium-term objectives (33 in total), and near-term targets (25 in total) for ensuring climate resilience in Canada. Too many to display here. (See pp. 23–34)
Legislative architecture	Canadian Net-Zero Emissions Accountability Act (passed June 2021) (p. 15)	Not legislation, but the <i>Government of Canada Adaptation Action Plan (GOCAAP)</i> is the policy and programme framework that shows how the Government of Canada contributes to achieving the goals, objectives, and targets laid out in the NAS. (p. v of <i>Government of Canada Adaptation Action Plan</i>)
Paris-aligned?	Yes (p. 15)	Yes (p. 5)
Indigenous input?	Yes (p. 91)	Yes (p. 4)

Strategy type	Mitigation	Adaptation
Monitoring/review	<p>Government must prepare at least one progress report for each 5 year intermediary target as well as an assessment report after that particular target year has passed to evaluate whether the target was achieved. There is no obligation to achieve the target, only to explain why the target was not reached and to provide a description of the actions being taken in the case of failure.</p> <p>Progress under the plan will be reviewed in progress reports produced in 2023, 2025, and 2027. Additional targets and plans will be developed for 2035 through to 2050. (p. 7) Provides for a comprehensive review of the Act, five years after it comes into force. (p. 15)</p>	<p>Monitoring and evaluation is an important step to document progress in implementation, support transparency, and enable better decision-making in adapting to climate change. The Strategy’s monitoring and evaluation framework aims to establish a consistent mechanism to regularly review and evaluate progress on the Strategy, and to understand which adaptation actions are working and where adjustments to plans and priorities should be made. Over time, consistent monitoring and evaluation will ensure that future versions of the Strategy and action plans build on achievements and lessons learned. (p. 37)</p>

4.3 New Zealand

Table 3: New Zealand’s mitigation and adaptation climate strategies

Strategy type	Mitigation	Adaptation
Title	<i>Te hau mārohi ki anamata: Towards a productive, sustainable and inclusive economy: Aotearoa New Zealand’s first emissions reduction plan</i>	<i>Urutau, ka taurikura: Kia tū pakari a Aotearoa i ngā huringa āhuarangi Adapt and thrive: Building a climate-resilient Aotearoa New Zealand – New Zealand’s first national adaptation plan</i>
Date released	May 2022	August 2022
Summary	The plan updates New Zealand’s system settings – including emissions pricing, funding, research, science, innovation and technology – to ensure they support our climate change objectives. It also sets out detailed actions to reduce emissions in key sectors of our economy, including transport, energy and industry. (p. 4)	The NAP sets out policies, strategies and proposals that will help New Zealanders adapt to the changing climate and its opportunities and challenges. (p. 12)
Purpose	To ensure New Zealand’s transition to a low-emissions sustainable economy is equitable and benefits everyone. (p. 4)	To enable New Zealanders to prepare for and adapt to the impacts of climate change. (p. 12)
Vision	New Zealand is a climate-resilient country with clean air, water and transport; more stable weather; warmer homes; and new, sustainable opportunities for business and employment. (p. 5)	New Zealand’s people, places and systems are resilient and able to adapt to the effects of unavoidable climate change in a fair, low cost and ordered manner. (p. 12)
Principles	<ul style="list-style-type: none"> • Playing our part • Empowering Māori • Equitable transition • Working with nature • A productive, sustainable and inclusive economy (p. 11) 	<ul style="list-style-type: none"> • Be proactive • Think long-term • Maximise co-benefits • Promote equity • Collaborate • Adjust as we go • Mainstream adaptation • Make well-informed decisions • Work with nature • Adapt locally (p. 34)
Goals	EB1 (2022–2025): 72.5 Mt CO ₂ -e EB2 (2026–2030): 61 Mt CO ₂ -e EB3 (2031–2035): 48 Mt CO ₂ -e (p. 14)	<ul style="list-style-type: none"> • Reduce vulnerability to the impacts of climate change – reducing the sensitivity and susceptibility of people and systems to climate impact • Enhance adaptive capacity and consider climate change in decisions at all levels – helping people, institutions and systems to adjust to climate change by building their capacity to respond and embedding climate resilience across and through all levels of government • Strengthen resilience – taking action that strengthens the way people and systems cope with immediate climate impacts, as well as building capacity for learning and transformational adaptation. (p. 33)
Priorities	<ul style="list-style-type: none"> • Prioritise domestic action by reducing gross emissions and increasing removals from forestry. (p. 38) • Prioritising low-emissions research, science and innovation. (p. 142) • Support to those most affected and least able to adjust. (p. 58) • Improve waste data and prioritise a national waste licensing scheme. (p. 295) • Prioritise nature-based solutions in our planning and regulatory system. (p. 17) • Transitioning the government fleet to electric vehicles. (p. 122) • Low-carbon options for new government buildings. (p. 122) • Purchasing low-emissions stationery/process heating system. (p. 122) • Purchasing low-waste office supplies. (p. 122) 	<ul style="list-style-type: none"> • Enabling better risk-informed decisions. • Ensuring our planning and infrastructure investment decisions drive climate-resilient development in the right locations. • Adaptation options including managed retreat. • Embedding climate resilience in all government strategies and policies. (p. 14)

Strategy type	Mitigation	Adaptation
Targets/actions	<ul style="list-style-type: none"> Net zero GHG emissions other than biogenic methane by 2050. [Domestic] (p. 12) 24% to 47% reduction below 2017 biogenic methane emissions by 2050, including 10 per cent reduction below 2017 biogenic methane emissions by 2030. [Domestic] (p. 12) NDC1 under the Paris Agreement is to reduce net GHG emissions to 50 per cent below gross 2005 levels by 2030. [International] (p. 38) 	<p>The plan lists 126 actions, of which 100 are current – meaning they have funding and mandate (critical and/or supporting) and 26 are proposed, which means whether they go ahead, and in what form, will depend on a range of factors.</p> <ul style="list-style-type: none"> Critical actions are the actions that will make the most difference and we must start now. Supporting actions are either less urgent, or are dependent on the critical actions. Future work programmes are proposed actions that reflect current thinking about what will be needed in future. (p. 39)
Legislative architecture	<ul style="list-style-type: none"> Climate Change Response (Zero Carbon) Amendment Act (passed in 2019) Climate Change Response Act 2002 	<ul style="list-style-type: none"> Climate Change Response (Zero Carbon) Amendment Act (passed in 2019) Climate Change Response Act 2002
Paris-aligned?	Yes (p. 38)	Yes (p. 33)
Indigenous input?	Yes (p. 15)	Yes (p. 13)
Monitoring/review	<p>The Commission and central government agencies will be responsible for monitoring and regularly reporting on progress towards the sub-sector targets and emissions budgets, as well as the success and implementation of the emissions reduction plan.</p> <p>Regular reporting will allow risks and uncertainties to be proactively managed. The CE Board will play a key role in advising on how policies can be adjusted so that we stay on track to meeting our emissions budgets and achieving the 2050 target. (p. 25)</p>	<p>Every two years, He Pou a Rangi – Climate Change Commission will report to the Minister of Climate Change on the implementation and effectiveness of the national adaptation plan (figure 10). The Minister must respond to these reports within six months of receiving them. This provides an opportunity for the Government to adjust the actions and manage uncertainty and risk. The Government also has international commitments to report on Aotearoa New Zealand’s progress towards building resilience. (p. 174)</p>

4.4 Singapore

Table 4: Singapore’s mitigation and adaptation climate strategies

Strategy type	Mitigation	Adaptation
Title	<i>Charting Singapore’s Low-Carbon and Climate Resilient Future 2022 Update [Addendum to Singapore’s Long-term Low-emissions Development Strategy] (LT-LEDS)</i> Including the original document (<i>Charting Singapore’s Low-Carbon and Climate Resilient Future 2020</i>)	<i>Singapore’s Fifth National Communication and Fifth Biennial Update Report: Vulnerability and Adaptation Measures (Chapter 4)</i> . Note, this is one chapter of a larger document. Including the original document (<i>Charting Singapore’s Low-Carbon and Climate Resilient Future 2020</i>) and the Prime Minister’s strategy group website.
Date released	November 2022	2022
Summary	Singapore has reviewed its climate targets, policies and strategies, and has updated them in this addendum, which builds on our LEDS submitted in 2020 – <i>Charting Singapore’s Low Carbon and Resilient Future</i> . (p. 1)	As a component of Singapore’s 5th National Communication, this chapter (Chapter 4) on “Vulnerability and Adaptation Measures” is concurrently submitted as Singapore’s first Adaptation Communication, pursuant to the Paris Agreement, and prepared taking into account Decision 9/CMA.1. (p. 1)
Purpose	Accelerating low-carbon transition in industry, economy and society. (p. 4)	Extreme climate conditions are likely to become more intense and frequent in Singapore in future. Singapore is hence systematically building up climate science capabilities and preparing long-term infrastructure adaptation plans to address our physical vulnerabilities in climate change. (p. 104 of 2020 LT-LEDS)
Vision	Singapore will continue to find innovative ways to reduce emissions whilst remaining competitive in the face of our geographical constraints. (p. 1)	Adaptation measures are a necessity for Singapore to prepare for the effects and to increase resilience to the effects of climate change. (Prime Minister’s strategy group website)
Principles	<ul style="list-style-type: none"> • Considered (Singapore’s climate policies and strategies are carefully and thoroughly considered) • Committed (Singapore is committed to play its part in supporting global climate action) • Collective (Government, individuals, households and businesses must work together in a whole-of-nation effort) (pp. 2 and 3 of 2020 LT-LEDS) 	<ul style="list-style-type: none"> • Prepare for and adapt early – early adjustments will make the transition easier. (pp. 22, 33) • Tackle the risks identified in a dynamic and flexible manner. (p. 23) • Action must involve the entire community. (p. 33) • Ensure adaptation plans are coordinated across the Government. (p. 24) • Adaptation actions, capability support and sharing of good practices through multilateral or bilateral agreements can improve knowledge and awareness of how to better mitigate and adapt to climate change. (p. 33)
Goals	<ul style="list-style-type: none"> • Peak public sector emissions around 2025 and achieve net zero emissions around 2045, ahead of the national targets (p. 9) • Public sector: Achieve net zero emissions across public sector around 2045 as part of GreenGov.SG (p. 5) • Private sector: Develop and adopt low-carbon solutions and pursue green growth opportunities (p. 5) • Individuals: Contribute to climate friendly initiatives (p. 5) 	<ul style="list-style-type: none"> • Enhancing knowledge and expertise • Coastal protection • Water and resource management • Drainage and flood prevention (Prime Minister’s strategy group website)
Priorities	<ul style="list-style-type: none"> • Catalysing business transformation (e.g. improving energy efficiency, shifting towards a more sustainable Energy and Chemicals sector) • Investing in low-carbon technologies (e.g. carbon capture, utilisation and storage (CCUS), and use of low-carbon fuels) • Pursuing effective international cooperation (e.g. international climate action, regional power grids and market-based mechanisms) • Adopting low-carbon practices. (e.g. greener commutes with cleaner vehicles and Walk-Cycle-Ride.) (p. 2 of addendum) 	<ul style="list-style-type: none"> • Adapting to Sea Level Rise and Building Flood Resilience • Ensuring Water Sustainability • Safeguarding our Biodiversity and Greenery • Strengthening Resilience in Public Health and Food Security • Keeping Essential Services Running Well • Keeping Buildings and Infrastructure Safe • Mitigating the Urban Heat Island Effect (pp. 25–27)

Strategy type	Mitigation	Adaptation
Targets/actions	<ul style="list-style-type: none"> To achieve net zero emissions by 2050. To reduce emissions to around 60 MtCO₂e in 2030 after peaking emissions earlier. (p. 2) Progressively raise the carbon tax to around S\$50/tCO₂ e to S\$80/tCO₂ e (-US\$36.90/tCO₂ e to US\$59.00/tCO₂ e) by 2030 (p. 8) 	<ul style="list-style-type: none"> Enhance Singapore's adaptive capacity, Strengthening resilience capabilities, Reducing vulnerability to climate change. (p. 24)
Legislative architecture	No	No
Paris-aligned?	Yes (p. 2)	Yes (p. 21)
Indigenous input?	N/A	N/A
Monitoring/review	The government has not yet committed to a legally-binding review process for the target nor to track achieved progress against it at regular intervals. ²⁷	Monitoring and evaluation are critical to ensure transparency, manage the progress, and measure the results of Singapore's national adaptation plans. The Resilience Working Group (RWG) Secretariat oversees and takes stock of the data collection and reporting mechanisms across various government agencies for the focus areas mentioned in this chapter. (p. 30)

4.5 United Kingdom

Table 5: United Kingdom’s mitigation and adaptation climate strategies

Strategy type	Mitigation	Adaptation
Title	<i>Powering Up Britain – The Net Zero Growth Plan</i> (also including the overview policy paper)	<i>The Third National Adaptation Programme (NAP3)</i> and the <i>Fourth Strategy for Climate Adaptation Reporting</i>
Date released	March 2023	July 2023
Summary	This document focuses on the UK’s long-term decarbonisation trajectory and how it can improve the UK’s competitiveness, deliver an industrial renaissance and level up the whole of the United Kingdom. (p. 22)	This document sets out how the UK will maintain living standards and protect the environment by making sure the country is resilient and can effectively adapt to changes in the climate. (p. 8)
Purpose	To set out how the government will enhance the UK’s energy security, seize the economic opportunities of the transition, and deliver on our net zero commitments. (p. 4 of overview policy paper document)	To establish a clear basis for action over the next 5 years. It sets the actions that government and others will take to adapt to the impacts of climate change in the UK. (p. 8)
Vision	The transition to a green and sustainable future will provide new opportunities to grow and level up the UK economy and support hundreds of thousands of green, high skilled jobs, whilst ensuring the environment is in a better state for the next generation. (p. 6)	The UK effectively plans for and is fully adapted to the changing climate, with resilience against each of the identified climate risks. (p. 8)
Principles	<ul style="list-style-type: none"> Minimise the ‘ask’ from the public by ‘sending clear regulatory signals.’ Make the green choice the easiest. Make the green choice affordable. Empower people and businesses to make their own choice. Motivate & build public acceptability for major changes. Present a clear vision of how we will get to net zero and what the role of people and business will be. (p. 114) 	<ul style="list-style-type: none"> Action – getting the policy framework right, leveraging major government programmes and private investments to build resilience. Information – driving improvement in our capability through better evidence and tools. Coordination – taking an integrated approach through governance, engagement and coordinated policymaking. (p. 18)
Goals	<ul style="list-style-type: none"> Energy security: setting the UK on a path to greater energy independence. Consumer security: bringing bills down, and keeping them affordable, and making wholesale electricity prices among the cheapest in Europe. Climate security: supporting industry to move away from expensive and dirty fossil fuels. Economic security: playing our part in reducing inflation and boosting growth, delivering high skilled jobs for the future. (p. 4 of overview document) 	<ul style="list-style-type: none"> Too many to list here. Each chapter is supported by an annex that includes objectives for addressing each risk and opportunity (risk reduction goals), and proposals and programmes to achieve those objectives (actions), in accordance with section 58 of the CCA 2008. (p. 18)
Priorities	<ul style="list-style-type: none"> Delivering Great British Nuclear (GBN) Making a world-leading commitment to Carbon Capture, Usage and Storage Delivering a Hydrogen economy Accelerating deployment of renewables Reducing our reliance on fossil fuels to heat our buildings Reducing household bills by increasing energy efficiency Decarbonising transport Speeding up planning and networks Mobilising private investment Building on our COP26 Presidency (pp. 7–9 of overview document) 	<ul style="list-style-type: none"> Infrastructure Natural environment Health, communities and the built environment Business and industry International dimensions Working Together (pp. 4–5)
Targets/actions	<ul style="list-style-type: none"> Too many to list here. UK to reduce all greenhouse gas emissions by at least 68% by 2030 on 1990 levels. (p. 23) 	<ul style="list-style-type: none"> Too many to list here. Each chapter is supported by an annex that includes objectives for addressing each risk and opportunity (risk reduction goals), and proposals and programmes to achieve those objectives (actions), in accordance with section 58 of the CCA 2008. (p. 18)
Legislative architecture	Climate Change Act 2008 (amended in 2019)	Climate Change Act 2008 (amended in 2019) See section 58. (p. 18)
Paris-aligned?	Yes (p. 23)	Yes. More in regards to the climate risk assessment. (p. 17)
Indigenous input?	N/A	N/A

Strategy type	Mitigation	Adaptation
Monitoring/review	<p>The UK has a legally binding process in place to review progress on achieving the net zero target. The Secretary of State is obliged to provide an annual statement on UK emissions trends, as well as a statement on whether each successive carbon budget has been met. There is also a provision that allows for the amendment of the 2050 target if there have been significant developments in scientific knowledge about climate change or in international law or policy.²⁸</p>	<p>Monitoring and evaluation is an important part of tracking progress and informing future adaptation decisions. A better understanding of which actions work best can help to focus resources more effectively and enable private investment and smarter regulation.</p> <p>New indicators will form a crucial part of a forthcoming Monitoring and evaluation framework to evaluate the success of NAP3, which will inform the Climate Change Committee's (CCC) next progress report in 2025. Annex 3 includes further information about the government's approach to adaptation and plans for a M&E framework. (p. 23)</p>

5.0 Observations

5.1 General observations

- Overall, the observed mitigation and adaptation strategies have been developed with similar levels of care, depth, and commitment. It was encouraging to see these strategies respecting and representing many different groups and sectors across society. Furthermore, there was equal acknowledgment of biodiversity and priority given toward nature-based solutions.
- Singapore was the only country to not have a stand-alone adaptation strategy. The adaptation strategy analysed was submitted as its first adaptation communication (as a component of their fifth National Communication) under the Paris Agreement.
- The quality and scope of adaptation strategies indicate that countries are beginning to place more emphasis and priority on adaptation measures, as the world is experiencing more frequent and severe weather systems at unprecedented levels of warming.
- Singapore is the only country in this data set to have implemented a carbon tax (currently priced at S\$5/tCO_{2e}). The carbon tax will be raised to S\$25/tCO_{2e} in 2024 and 2025, and S\$45/tCO_{2e} in 2026 and 2027, with a view to reaching S\$50-80/tCO_{2e} by 2030.
- While countries shared similar high-level commitments due to the standardised methodology under the Paris Agreement, there were observed differences in the actions taken to achieve these commitments. This is understandable given each country's different geographical and demographical situations, but is still interesting as it shows that there is not a 'one size fits all' approach.
- The United Kingdom's mitigation strategy has a heavy focus on the economic opportunities of transitioning toward a net-zero economy as a main catalyst for change.

5.2 Specific observations

Vision:

- All countries' mitigation and adaptation strategies contained a high-level vision statement. They were all relatively brief and clearly communicated what the success of the strategy would look like.
- Mitigation vision statements tended to emphasise the need for a balanced approach towards achieving emissions reduction without negatively impacting the economy (e.g. climate action must go hand in hand with keeping life affordable). Adaptation vision statements, by contrast, appeared to be more general in nature (i.e. ensuring systems and society can adapt to the impacts of climate change).

Principles:

- The guiding principles underlying both types of strategy were usually presented in the executive summary or introduction of the strategy documents.
- Both mitigation and adaptation principles generally had an aspirational and broad focus, but provided a level of transparency enabling the audience to understand the thinking that underpinned each strategy in a succinct manner.

Goals:

- Mitigation strategies tended to have very specific qualitative goals, which were more target-based in nature and almost always solely related to reducing emissions, for example, future emission budgets.
- Adaptation strategies' goals had more breadth, scope, and vision-like qualities. They tended to be more high-level, action-oriented and purpose-driven.

Priorities:

- All mitigation strategies expressed similar types of priorities: namely reducing energy costs through improved energy efficiency, the uptake of EVs and nature-based solutions.
- Interestingly, one of Canada's mitigation priorities was to 'support farmers as partners in building a clean, prosperous future'. This is relevant for New Zealand as the pricing of agricultural emissions is likely to be delayed until 2030 under the new National-led Government.
- Both the United Kingdom and Singapore expressed priority around developing and implementing carbon capture, utilisation and storage (CCUS) technologies.

Domestic targets:

- All countries have set the domestic target of becoming net-zero by 2050.
- New Zealand's and Canada's net zero targets exclude methane. New Zealand's methane target is 24% to 47% reduction below 2017 biogenic methane emissions by 2050, including 10% reduction below 2017 biogenic methane emissions by 2030. Canada's methane target is to reduce domestic methane emissions by more than 35% by 2030, compared to 2020 levels.

Nationally determined contributions (NDC) under the Paris Agreement:

- All countries except Singapore expressed their targets in terms of reductions compared to a base year. Singapore, instead, has opted for an economy-wide absolute GHG emissions limitation target of reducing emissions to approximately 60 MtCO₂e in 2030 after peaking emissions earlier. Interestingly, this is the same number as New Zealand's second emissions budget for 2026–2030.
- Australia, Canada and New Zealand have expressed 2030 emission reduction targets with reference to the base year of 2005. Of these, New Zealand has the highest reduction target of 50% below gross 2005 levels by 2030, followed by Australia at 43% below 2005 levels by 2030 and Canada at 40–45% below 2005 levels by 2030. The United Kingdom's target is against the base year of 1990 – for a reduction of at least 68% by 2030.

Legislative architecture:

- In 2019, New Zealand and the United Kingdom were among the first countries in the world to enshrine the net-zero by 2050 target into domestic legislation, with the Climate Change Response (Zero Carbon) Amendment Act 2019 and the Climate Change Act 2008 (amended in 2019) respectively. Canada followed in 2021 with the Canadian Net-Zero Emissions Accountability Act and Australia in 2022 with the Climate Change Act 2022.
- Singapore is yet to enshrine a net-zero target into domestic law.

Paris Agreement alignment:

- All countries' mitigation and adaptation strategies referred to alignment with the goals of the Paris Agreement.

Indigenous input:

- Both New Zealand and Canada expressed, in both mitigation and adaptation strategy documents, the importance of working with indigenous communities.

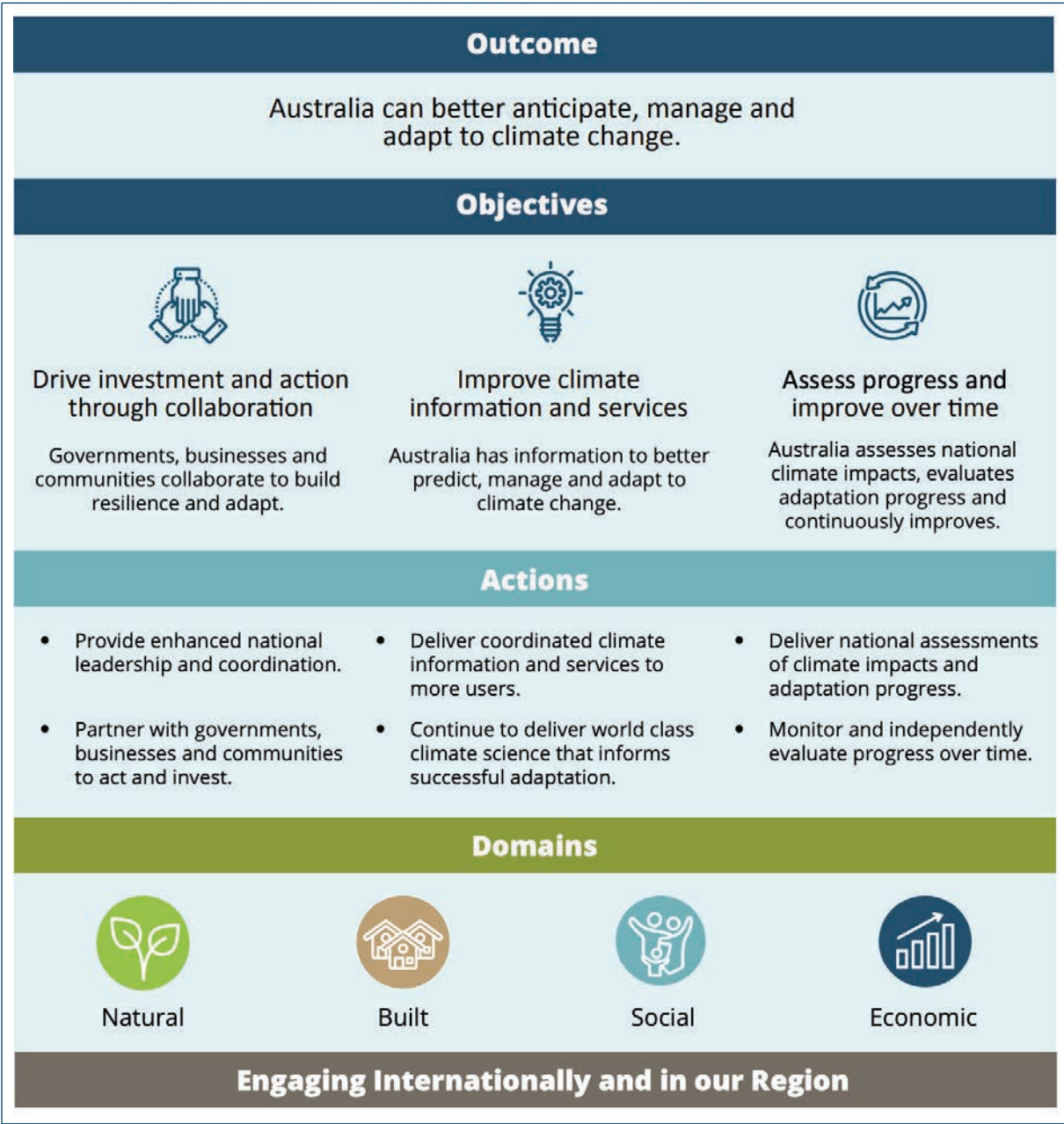
Monitoring/review:

- All countries apart from Singapore have legislated requirements for the regular monitoring of both types of strategy. This is encouraging as it ensures that lessons will be learnt, strategies will be fit-for-purpose and the strategies will be better positioned to bring about the necessary change they have been developed to do.

Appendix 1: Strategy map excerpts

A1 Australia

Figure 20: Strategy map as included in *National Climate Resilience and Adaptation Strategy 2021-2025*²⁹



A2 Canada

Figure 21: Strategy map as included in *2030 Emissions Reduction Plan: Canada's Next Steps for Clean Air and a Strong Economy*³⁰

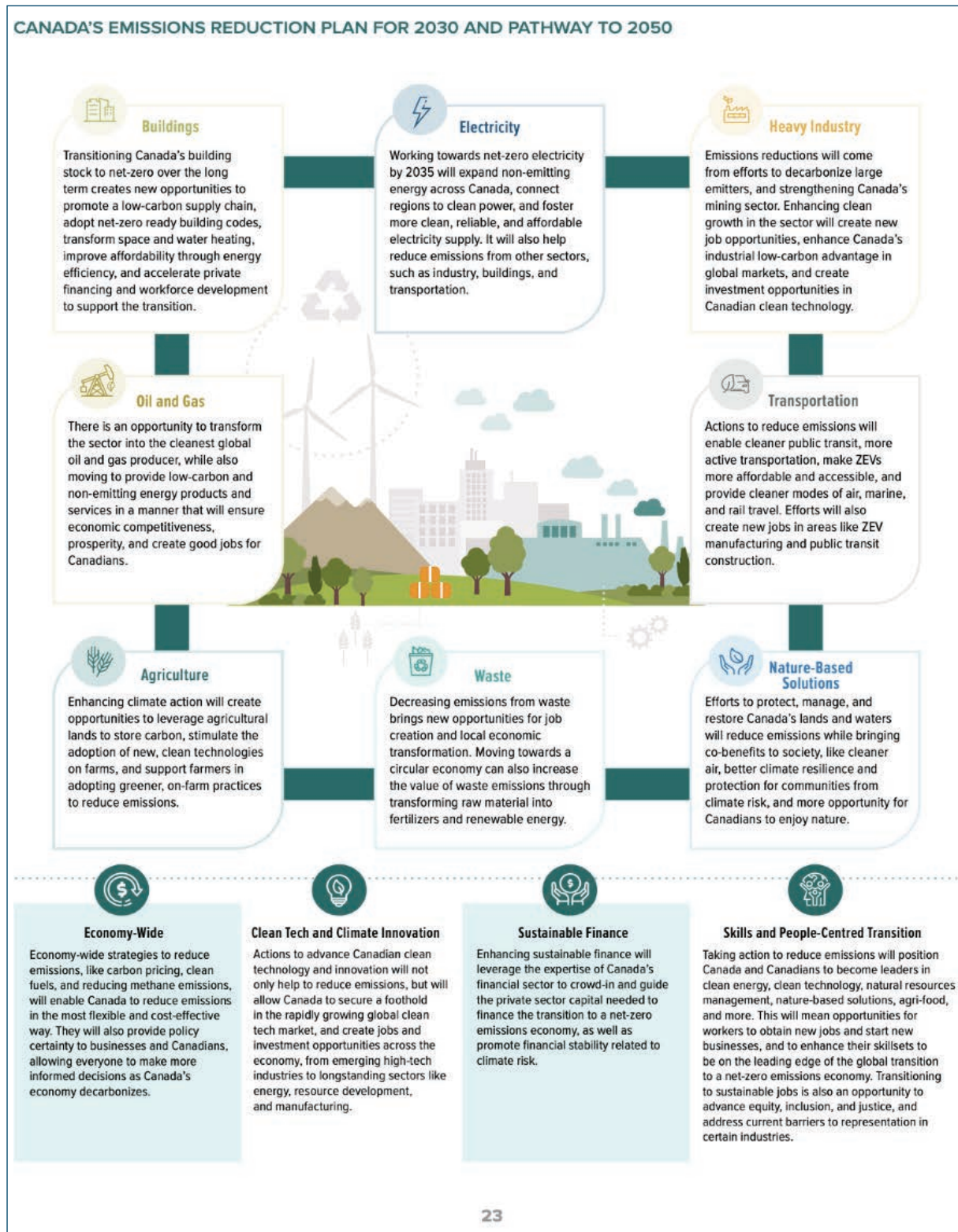
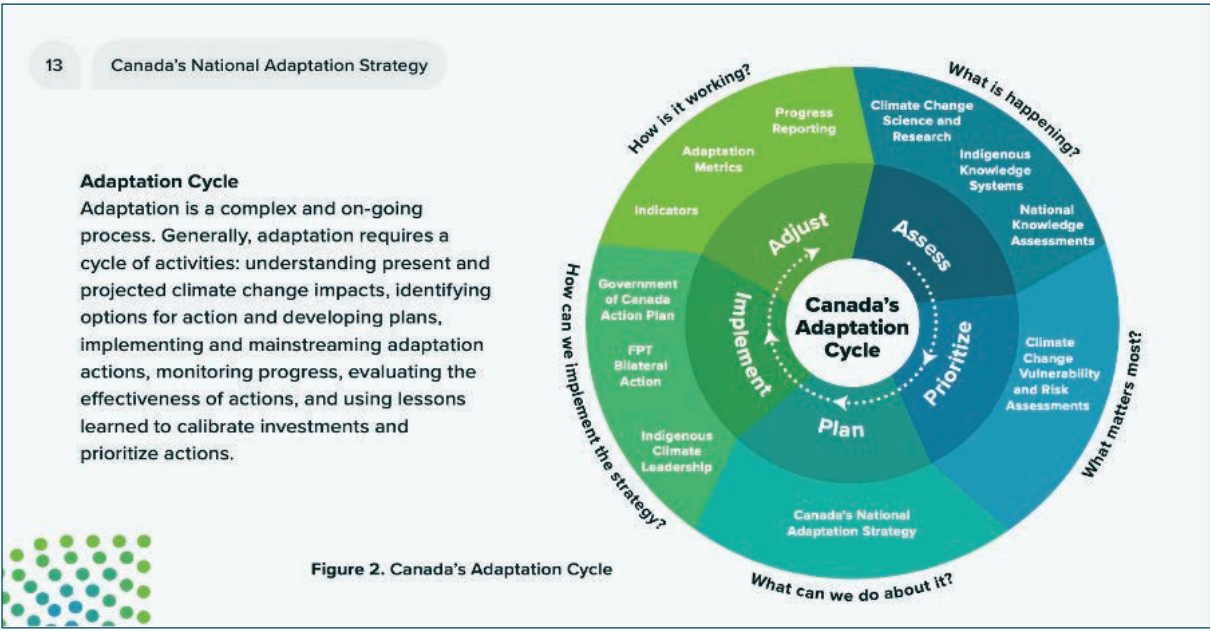


Figure 22: Strategy map as included in *Canada's National Adaptation Strategy: Building Resilient Communities and a Strong Economy*³¹



A3 New Zealand

Figure 23: Strategy map as included in *Te hau mārohi ki anamata: Towards a productive, sustainable and inclusive economy: Aotearoa New Zealand's first emissions reduction plan*³²

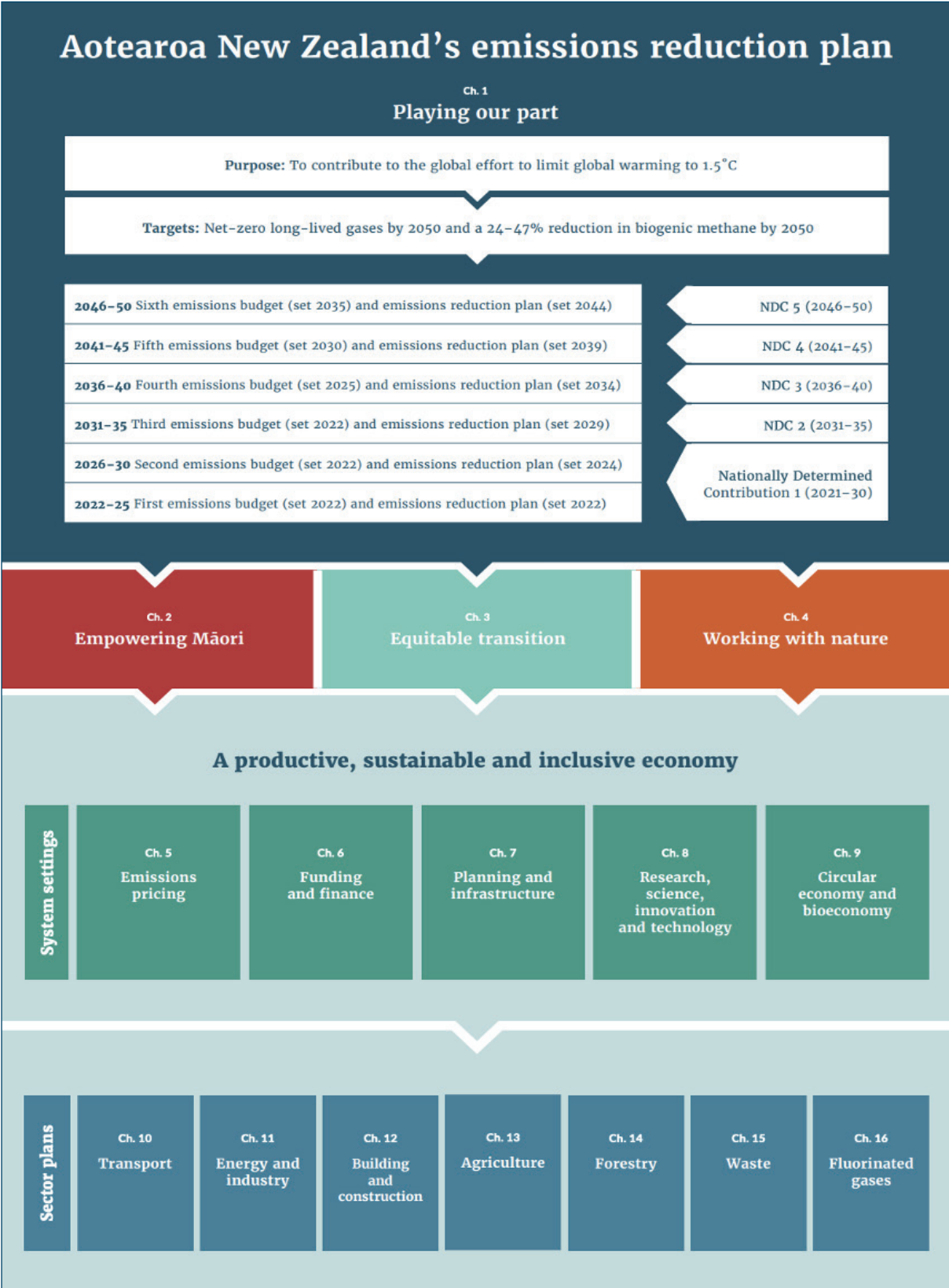
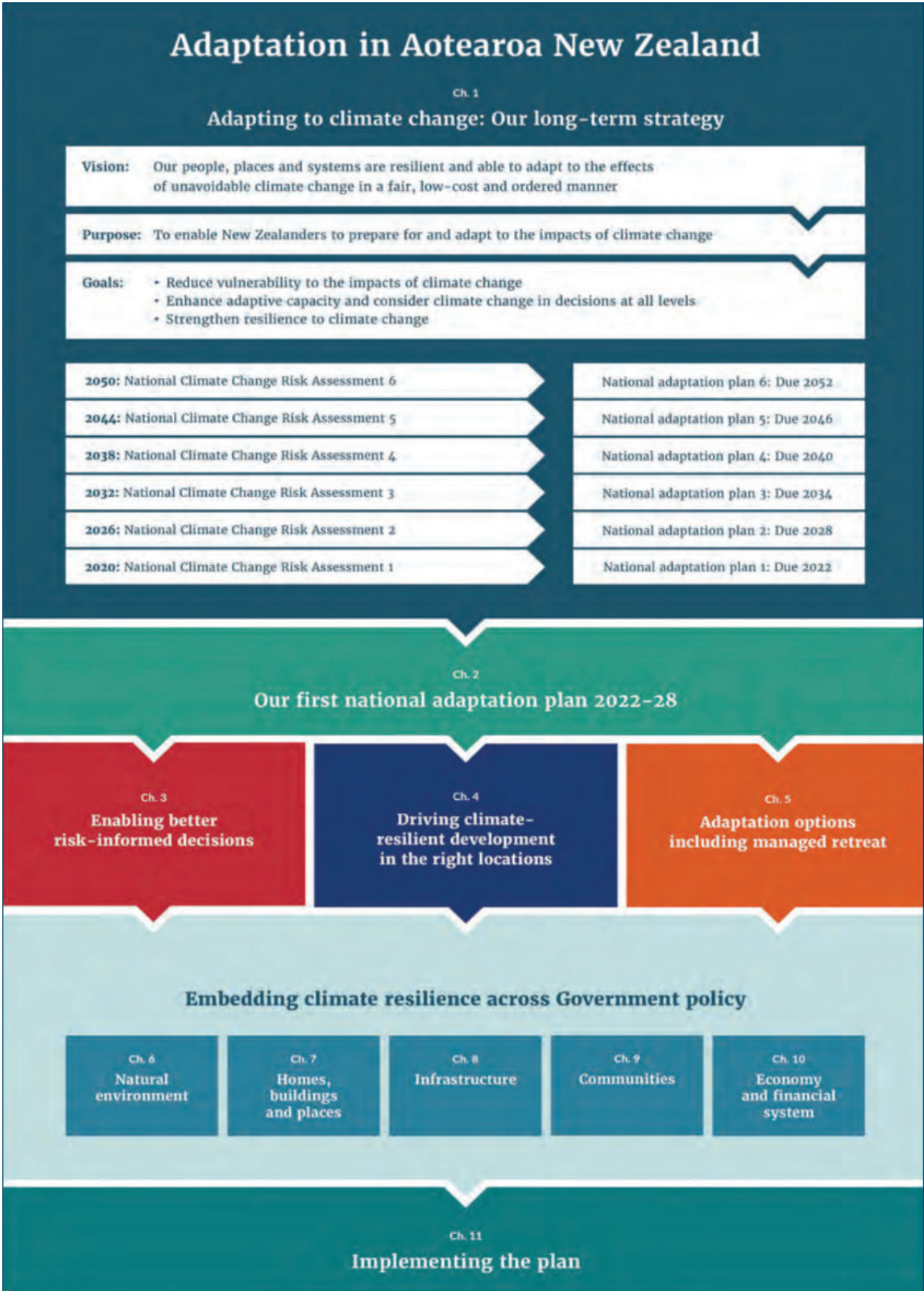


Figure 24: Strategy map as included in *Urutau, ka taurikura: Kia tū pakari a Aotearoa i ngā huringa āhuarangi Adapt and thrive: Building a climate-resilient New Zealand – New Zealand's first national adaptation plan*³³



A4 Singapore

Figure 25: Strategy map as included in *Singapore's Long-term Low-emissions Development Strategy*³⁴

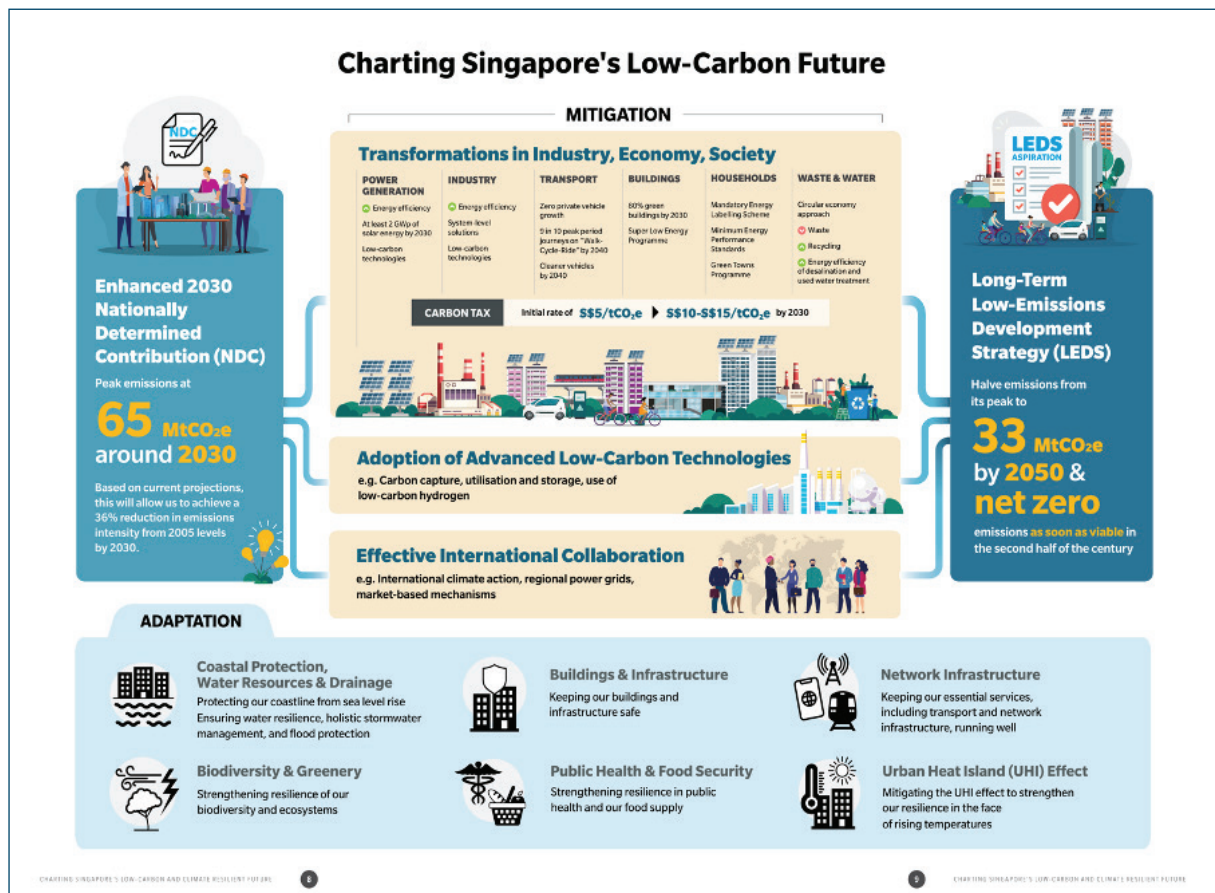
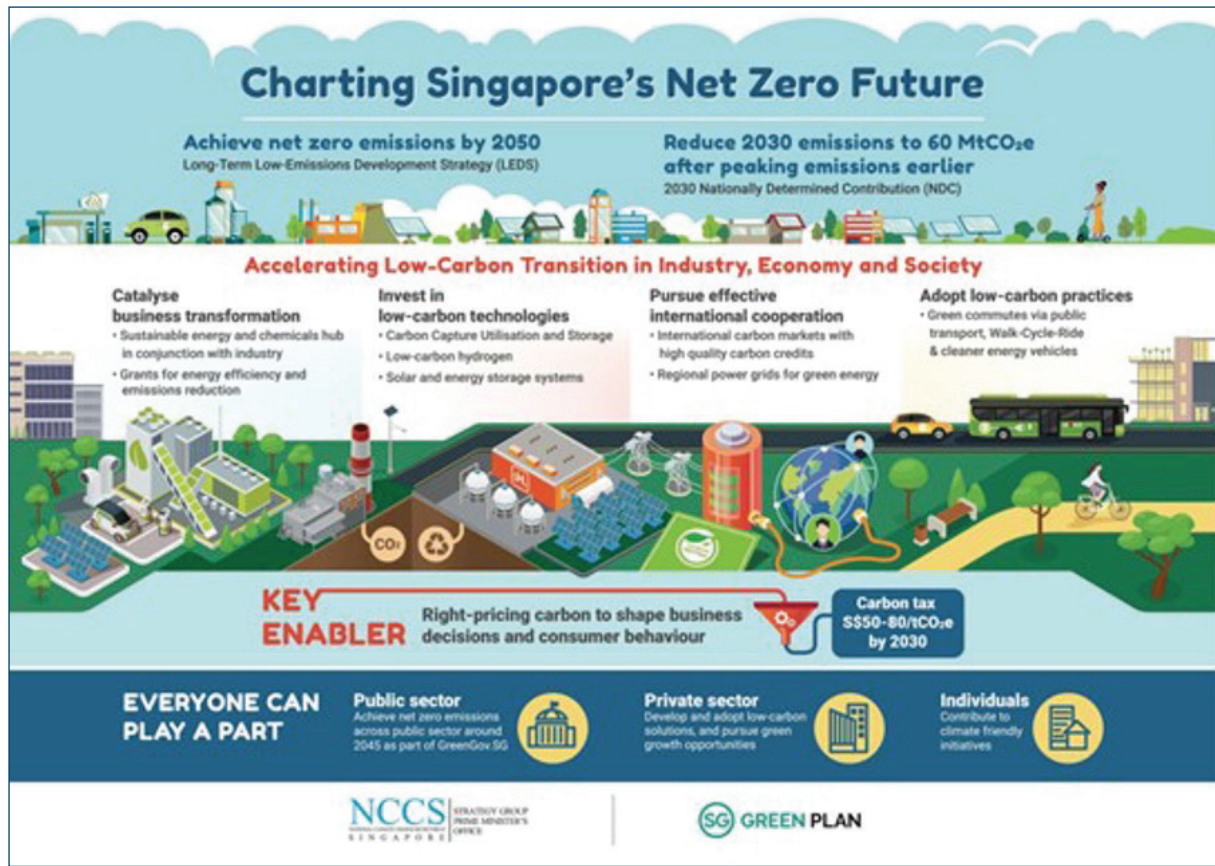
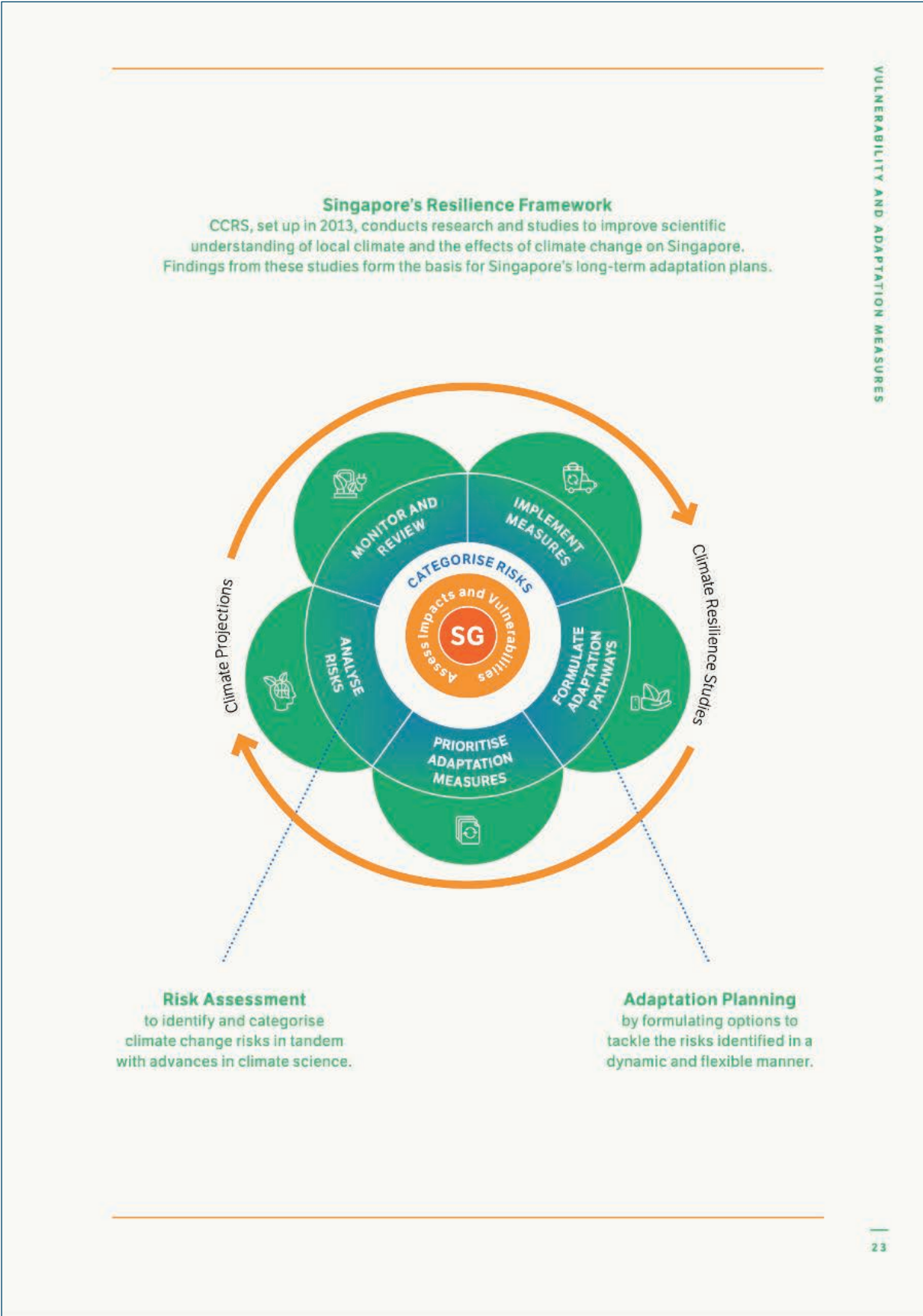
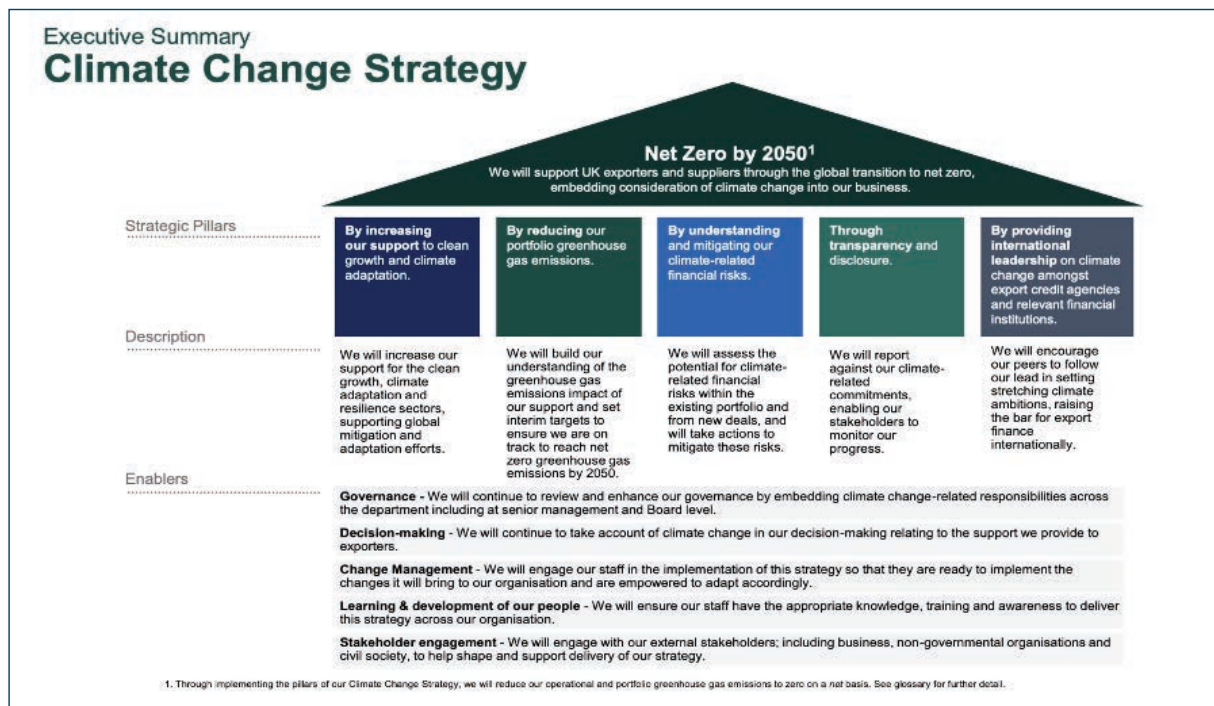


Figure 26: Strategy map as included in *Singapore's Fifth National Communication and Fifth Biennial Report: Update Report Vulnerability and Adaptation Measures* (Chapter 4)³⁵



A5 United Kingdom

Figure 27: Strategy map as included in *Climate Change Strategy 2021 – 2024*³⁶

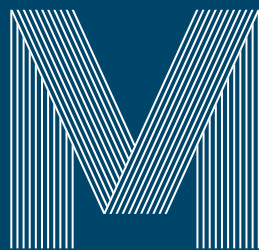


Endnotes

- 1 See Table 3, p. 9. Australian Government. Department of Industry, Science, Energy and Resources. (2022). *Quarterly Update of Australia's National Greenhouse Gas Inventory: December 2021*. Retrieved 26 October 2023 from www.dcceew.gov.au/sites/default/files/documents/nggi-quarterly-update-december-2021.pdf
- 2 See Figure 4, p. 9. Australian Government. Department of Industry, Science, Energy and Resources. (2022). *Quarterly Update of Australia's National Greenhouse Gas Inventory: December 2021*. Retrieved 26 October 2023 from www.dcceew.gov.au/sites/default/files/documents/nggi-quarterly-update-december-2021.pdf
- 3 See Ritchie, H. and Roser, M. Our World in Data. (2022). *Australia: Energy Country Profile. Australia: What sources does the country get its energy from?* Retrieved 26 October 2023 from ourworldindata.org/energy/country/australia?country=~AUS#what-sources-does-the-country-get-its-energy-from
- 4 See Ritchie, H. and Roser, M. Our World in Data. (2022). *Australia: Energy Country Profile. Australia: What sources does the country get its energy from?* Retrieved 26 October 2023 from ourworldindata.org/energy/country/australia?country=~AUS#what-sources-does-the-country-get-its-energy-from
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