



FIRST NATIONS FOREIGN POLICY: THE INTERNATIONAL EXPERIENCE

Getty Images: July 2, 2017: Sydney Opera House 'Badu Gili' projection to celebrate Australia First Nation culture

Australia has committed to implementing a First Nations approach to foreign policy. This paper looks at how other countries include Indigenous¹ perspectives in their foreign, trade and international development policies.

EXPLAINER

What constitutes a First Nations approach to foreign policy?² How do we maximise its potential to advance our national interest internationally and embed the approach into how Australia conducts diplomacy? This paper sets out some examples of how other countries are shaping similar initiatives or building Indigenous perspectives, experiences and interests into foreign, trade and development policy settings to broaden understanding of existing international engagement on these issues. **This paper is explicitly focused on non-Australian experiences**, as an input to work being led by Ambassador for First Nations People developing a First Nations foreign policy.

DFAT acknowledges the work of many current and former officers, Indigenous and non-Indigenous, on the Indigenous Diplomacy Agenda and other initiatives. The Department is building on the work of many who have championed Indigenous diplomacy within and beyond DFAT.

¹ People who identify as Aboriginal and Torres Strait Islander, hundreds of groups with their own distinct set of languages, histories and cultural traditions.

² This paper does not make any recommendations for the First Nations foreign policy in recognition that the First Nations Ambassador will lead the process to craft the policy. This paper may be a possible input into that process.

Advocacy in international institutions

Key UN institutions that focus on First Nations peoples include the UN Permanent Forum on Indigenous Issues (UNPFII), the Expert Mechanism on the Rights of Indigenous Peoples (EMRIP), and the UN Special Rapporteur on the Rights of Indigenous Peoples.³ The Food and Agriculture Organisation (FAO) has an Indigenous Hub to share knowledge to improve sustainable agriculture. The UN Decade of Indigenous Languages is being celebrated over the period 2022 – 2032.

There are also international non-governmental organisations that advocate on First Nations issues in global settings. For example, the International Working Group for Indigenous Affairs (IWGIA) is a global human rights organisation with observer status at the UN. It advocates for Indigenous land rights, climate action and participation in local and international decision-making processes. IWGIA's annual update (the most recent is 'The Indigenous World 2022') is a detailed stocktake of domestic challenges and international initiatives across the globe.

International commitments

The UN Declaration on the Rights of Indigenous Peoples (UNDRIP), a non-binding resolution adopted by the UN General Assembly in 2007, is an internationally agreed framework for the protection and promotion of the rights of Indigenous Peoples. Canada has enacted legislation to implement UNDRIP (*Implementing the United Nations Declaration on the Rights of Indigenous People Act 2021*) and Bolivia and Colombia have incorporated it into their constitutions. UNDRIP highlights the importance of cultural heritage, self-determination, language, employment, health, and education for First Nations peoples. It also highlights the importance of state support to First Nations institutions, cultures, and traditions.

International Labour Organization (ILO) Convention 169 is a treaty that sets out the rights of Indigenous and tribal peoples to maintain their own cultures, languages, traditions, and rights to lands and resources. Once ratified by a state,⁴ it requires governments to consult with, and obtain consent from, First Nations groups when making decisions that may affect them.

³ Mechanisms also exist for consultation and advocacy within specialist organisations, such as the Indigenous Peoples' Forum at the International Fund for Agricultural Development (IFAD); the Indigenous Peoples Advocacy Team in the Green Climate Fund (GCF); the International Indigenous Peoples' Forum on Climate Change in the UN Framework Convention on Climate Change (UNFCCC); and the Intergovernmental Committee on Intellectual Property and Genetic Resources, Traditional Knowledge and Folklore at the World Intellectual Property Organization (WIPO).

⁴ Only 24 countries have ratified this treaty to date:

https://www.ilo.org/dyn/normlex/en/f?p=NORMLEXPUB:11300:0::NO::P11300_INSTRUMENT_ID:312314

First Nations principles in foreign policy

In Aotearoa New Zealand, the appointment of the first Māori Foreign Minister, Nanaia Mahuta⁵, reinforced momentum for reflecting First Nations perspectives and priorities in foreign policy.⁶ Minister Mahuta has spoken about NZ foreign policy incorporating Māori principles, namely:

- *manaaki* – kindness or the reciprocity of goodwill
- *whanaunga* – connectedness or shared sense of humanity
- *mahi tahi* and *kotahitanga* – collective benefits and shared aspiration, and
- *kaitiaki* – protectors and stewards of our intergenerational wellbeing.

One outcome of this approach is that Pacific states that share these principles may identify more easily with NZ, facilitating quicker and deeper connections. This common understanding may also serve to reinforce a shared approach to norms and behaviours that reinforce mutual priorities across the region.⁷

Canada is also incorporating First Nations⁸ perspectives into foreign policy. Global Affairs Canada (GAC) has established an Action Plan on Reconciliation with Indigenous Peoples.⁹ The Action Plan commits the Canadian government, through GAC, to understand perspectives, rights, histories, and cultures, as well as address systemic challenges. Core principles of this policy are for Canada to take human rights-based approaches to foreign policy development and implementation, assist its First Nations peoples to strengthen relationships with other Indigenous peoples, and apply lessons learnt from domestic experiences in an international context.

Trade

The Indigenous Peoples Economic and Trade Arrangement (IPETCA)¹⁰, initiated by New Zealand at APEC in 2021, commits member economies to enhancing the ability of Indigenous peoples and businesses to access international trade opportunities, including through promoting Indigenous-owned businesses, improving Indigenous peoples' digital skills and facilitating access to online business tools. Activities under IPETCA may include sharing experiences and best practices; identifying barriers to Indigenous participation in trade; promoting the participation of Indigenous women-owned businesses; and exploring options

⁵ Appointed on 2 November 2020.

⁶ <https://www.lowyinstitute.org/the-interpreter/foreign-policy-s-Indigenous-moment-here>

⁷ <https://www.usip.org/publications/2022/05/what-Indigenous-foreign-policy-lessons-australia-and-new-zealand>

⁸ Indigenous peoples of Canada include First Nations, Inuit and Metis Peoples.

⁹ <https://www.international.gc.ca/transparency-transparence/Indigenous-reconciliation-autochtones/index.aspx?lang=eng>

¹⁰ Current membership of IPETCA includes Australia, Canada, New Zealand and Chinese Taipei.

to support Indigenous peoples' cultural heritage, traditional knowledge, and traditional cultural expression.

Under the US-initiated Indo-Pacific Economic Framework for Prosperity (IPEF) countries¹¹ across the Indo-Pacific are working on improving economic conditions through connectivity, resilience and fairness. One component of IPEF is to expand access to the regional economy for Indigenous peoples, including through sustainable and inclusive growth, environmental management, and technical assistance and economic cooperation.

The Organisation for Economic Cooperation and Development (OECD) has established a new work programme on trade and Indigenous People. Canada's Trade Diversification Strategy underpins its efforts to negotiate inclusive provisions in free trade agreements and general trade to address Indigenous-specific trade barriers. For example, the Canada-U.S.-Mexico Agreement (CUSMA) includes protections for Indigenous rights. New Zealand's Trade for All approach informs new free trade agreements (FTAs) and trade policy, including a Treaty of Waitangi exclusion, which enables the government to

take actions in its obligations to Māori under the treaty that may be inconsistent with an agreement. Meanwhile, the Comprehensive and Progressive Agreement for Trans-Pacific Partnership (CPTPP) includes a general reference to Indigenous peoples in the preamble, and there is specific, yet limited, mention of the Indigenous groups of some countries in other parts of the agreement.

First Nations Advocacy Themes

Across the globe, different First Nations peoples advocate on a variety of issues, including:

- Implementing self-determination
- Driving recognition and incorporation of Indigenous legal systems into domestic legal systems, including criminal justice
- Ensuring First Nations people are included in representative bodies, multilateral settings, consultative fora and political processes
- Preserving and promoting culture and history, including repatriation of artifacts and human remains
- Tackling environmental issues, such as biodiversity, degradation, pollution, and climate change
- Optimising land and water/ocean resource management
- Improving cross-cultural relations and implementing reconciliation
- Developing the policy and legal capability of First Nations people
- Solving youth disadvantage
- Protecting Indigenous knowledge and data sovereignty within an intellectual property framework

¹¹ Participants include Australia, Brunei, India, Indonesia, Japan, Republic of Korea, Malaysia, New Zealand, the Philippines, Singapore, Thailand, US, and Vietnam.

International development assistance

Many aid donors provide funding for projects in developing countries that are intended to support Indigenous people. For example, the US Agency for International Development (USAID) has adopted a Policy on Promoting the Rights of Indigenous Peoples¹² that commits it to making use of First Nations knowledge in its development programs¹³. The efforts of USAID to empower Indigenous peoples is led by its Senior Adviser for Indigenous Peoples' Issues.¹⁴ Complementing this, the US 'Indigenous Knowledge Guidance for Federal Agencies'¹⁵ applies across government, including to the Department of State and USAID. The guidance assists US agencies to understand Indigenous knowledge, build relationships with First Nations peoples and apply Indigenous knowledge in federal research, policies, management, and decision making.

Climate change

COP27, the last meeting of the United Nations Framework Convention on Climate Change (UNFCCC), saw the highest participation rate of Indigenous peoples in conference history. More than 300 First Nations delegates attended and advocated for direct financing for environmental protection projects¹⁶ and transitioning to clean energy generation while protecting Indigenous rights.¹⁷ Key issues raised included recognition of Indigenous knowledge on environmental management, the long-term impacts of climate change on Indigenous communities and the need for funding for Indigenous communities to enter climate offset markets. The Indigenous Peoples Pavilion at COP27 also hosted over 70 side events.

The Local Communities and Indigenous Peoples Platform (LCIPP) is a platform established under the UNFCCC to support Indigenous peoples to exchange knowledge, experiences, and best practices with other Indigenous peoples, local communities, and policymakers on climate change mitigation and adaptation, and participate in the development and implementation of climate change policies and programs. The LCIPP recognizes the unique contributions of Indigenous peoples to climate change mitigation and adaptation, and their vulnerability to the impacts of climate change, and seeks to promote their rights and interests in the global climate change process.

¹² <https://www.usaid.gov/policy/Indigenous-peoples>

¹³ <https://www.usaid.gov/Indigenous-peoples>

¹⁴ <https://www.workwithusaid.org/blog/ask-an-expert-q-and-a-with-luis-felipe-duchicela-on-how-usaid-partners-with-Indigenous-peoples>

¹⁵ <https://www.whitehouse.gov/wp-content/uploads/2022/12/OSTP-CEQ-IK-Guidance.pdf>

¹⁶ <https://earthjournalism.net/stories/Indigenous-peoples-have-their-own-agenda-at-cop27-direct-financing>

¹⁷ <https://nit.com.au/16-11-2022/4312/Indigenous-representatives-make-an-impact-at-cop27>

The US is proposing to establish an International Indigenous Conservation Network to harness the knowledge and stewardship practices of Indigenous communities to conserve biodiversity.

International engagement on domestic policy issues

There are a range of global conferences on key domestic First Nations policy issues (e.g. education and health). For example, Australia hosted the 2022 World Indigenous Peoples' Conference on Education¹⁸ bringing together Indigenous educators, students, and researchers to promote Indigenous knowledge, language, and culture in education systems. The conference provides a platform for sharing best practices, innovations, and challenges and fosters connections and networks among Indigenous peoples.

Next steps

This paper is intended to be an input into the process, led by the Ambassador for First Nations People, of development of a First Nations foreign policy.

Contact: [s22\(1\)\(a\)\(ii\)](#)

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¹⁸ <https://wipce2022.net/>



What is a developing country? Who decides? Why does it matter?

In describing countries, one of the most widely used distinctions is between ‘developed’ and ‘developing’. These terms have become ubiquitous and are now used (and abused) in a range of international agreements and instruments. But they are poorly understood and interrogated. And behind this seemingly simple partition lies a wealth of nuance, and a complex web of rhetoric and strategy.

This situation is problematic on two main fronts. First, ‘developing country’ is a catch-all term that doesn’t capture the complexity of what ‘development’ means or differentiate between the status and trajectory of over 150 countries around the world, from China to Cabo Verde. But once they are categorized as a ‘developing country’, we start to think of them as a unified group and make assumptions about their essential nature and how they should be treated.

Second, this term becomes a shield (and sometimes a sword) used by China, India, Brazil, and other major emerging economies to safeguard their interests, while coalescing support for their positions under the banner of solidarity for the developing world. These issues have real implications for the operation of the UN and multilateral institutions and the integrity of the rules-based global order.

What is a ‘developing country’ and where does the term come from?

The use of the term ‘developing country’ came out of the post-WWII Bretton Woods-led reconstruction of the global economy, spurred by the emerging academic theory and literature on economic growth and development. It was picked up in World Bank

documents in the 1970s and gathered momentum after the end of the Cold War, when the categories 'First World' (the West), 'Second World' (Soviet Bloc) and 'Third World' (everyone else) categories became largely redundant.

There is no agreed definition of the term, though it is generally understood to reflect a combination of social and economic factors, such as levels of income, health, and education. **As a result, countries can self-identify as being a developing country** (see case studies below). In some ways, it is better characterised in contrast to the category of 'developed countries', also known as 'advanced' or 'industrialised' economies (although these terms are not without their own issues).

Developing countries are also often referred to by the umbrella term 'Global South'. This term carries implicit undertones of anti-colonialism directed towards the West. It is also often used to challenge Western models of development and foster a sense of solidarity through 'South-South cooperation'. It's very much part of the contest of narratives and battle for influence – at various times, China, India, and others will claim to be 'champions' of the Global South.

Interestingly, the OECD list of countries eligible to receive Official Development Assistance (ODA) does not refer to 'developing countries'. Instead, its list is based on World Bank categorisation of 'lower income countries', 'lower middle income countries' and 'upper middle income countries' based on Gross National Income (GNI) per capita, with a few exceptions (see [ODA Eligibility and Graduation Explainer](#)).

Case study: China

Is China a developing country? If you ask the Chinese Government, the answer is overwhelmingly yes. But in recent years, a former US President and Australian Prime Minister – and the current President of the European Commission – have questioned whether China should still be considered a developing country.

There is no simple answer, but we note, on the one hand, that China's GDP capita is around a third of the United States' – it is classified as an 'upper middle-income country' and eligible to receive ODA. And on the other hand, China is the world's largest emitter, has the second largest population and economy, and significant military power (second only to the US).

What is unequivocal is the benefits China derives from its developing country status:

- it helps moderate Chinese citizen expectations regarding their standards of living and the scale and pace of democratic reform, as the Chinese Communist Party strives to deliver a 'modern socialist country' by 2049;
- it allows China to access a range of benefits from multilateral institutions and agreements (APEC, WTO, ADB, World Bank, IMF, UN agencies);
- it supports China's efforts to reshape the rules-based global order, including by building coalitions around its world view and offerings (Belt and Road Initiative, Global Development Initiative, Global Security Initiative, Global Civilization Initiative);
- it facilitates China influence with the Global South by positioning itself as their champion, and a model of raising its people out of poverty over a short period of time; and
- it forms the basis of China's 'win-win' development cooperation model, which it promotes as an alternative to the West's aid that comes with 'strings attached'.

DFAT keeps a [list of developing countries](#) as declared by the Minister for Foreign Affairs for the specific purpose of determining the tax deductibility of donations under the Overseas Aid Gift Deduction Scheme. The list is based on the OECD ODA eligibility list, with some additions in the Pacific (Cook Islands, Wallis and Futuna) and some European nations that border Ukraine and have taken in refugees fleeing Russia's invasion (Hungary, Poland, Romania, and Slovakia).

Why does it matter?

Depending on the situation, **developing country status can confer a range of benefits**. Sometimes these are concrete – being eligible to receive ODA or entitled to 'special and differential treatment' under WTO rules. In one example, under rules set by the Universal Postal Union (UPU), developing countries pay less to foreign carriers for delivering overseas mail than developed countries. This was costing the United States hundreds of millions of dollars a year delivering packages ordered by US consumers from China. This situation brought the US to the brink of leaving the UPU, until an eleventh-hour compromise was negotiated to address this imbalance.

Perhaps as significantly, **developing country status can provide negotiating leverage**. This is particularly the case when it manifests through the "Group of 77 plus China" (G77+China) coalition,¹ which can be a powerful tool to advance developing country interests. The term is also sometimes used (erroneously) as code for developing country coordination writ large. As effective as it can be at times, the G77+China is not a monolith, and its cohesion is under pressure from the divergent interests of its members, and the emergence of alternative coalitions such as the Africa Group, Arab Group and Alliance of Small Island States.

Developing country solidarity also often **coalesces around grievances over the legacy of colonialism**. This can provide fertile ground for anti-West narratives propagated by Russia and China to take root and flourish. One key narrative is that the rules-based international order was set up by the West to further the interests of developed countries. This can undermine our ability to influence countries' positions on issues such as Ukraine, AUKUS, UN reform and human rights. Even some countries that share our values and could be likeminded have other (conflicting) identities and allegiances: for example, South Africa is a democracy with a progressive constitution founded on the rule of law, but it also identifies as an African country, a member of the BRICS (Brazil, Russia, India, China, and South Africa) minilateral grouping, and a leader of the 'Global South'.

China's narrative about its own economic success and ability to invest quickly, at scale, and in accordance with host country priorities, reinforces its claims to be a preferred development and investment partner. By comparison, Western donors are seen as slow and demanding, and concerned with self-interest (such as imposing Western values). In this context, some developing countries sympathise with China's

¹ The G77 is named after its 77 founding members in 1964 and now comprises over 130 members. The G77 lists China as a member, but China does not consider itself a member – though it has consistently provided political and financial support.

de-prioritisation of human rights (which links Xinjiang to the Papuan provinces and Bougainville) in a narrative that prioritises development before other considerations.

Efforts to **import or deepen differentiation between developed and developing countries** into the international system have intensified in recent years. India has been a key driver, seeking to introduce the UNFCCC concept of ‘common but differentiated responsibilities’ (CBDR) into other spheres, notably the WTO (where it conflicts with the existing principle of ‘special and differentiated treatment’ for developing countries). India has also been working with Indonesia and Brazil to introduce a developed/developing country divide into the G20 agenda and communiqués. It also pops up consistently in various draft UN declarations and resolutions, from which it can set deeply unhelpful precedents.

Similarly, China has sought to gain UN endorsement of its **various ‘Global X Initiatives’**, including through statements of support by high-ranking UN officials (often of Chinese nationality). The Global Development Initiative (GDI) seems pitched at galvanising a growing appetite amongst developing countries to protect differentiation and resist efforts to make any international obligations – from climate mitigation to human rights – universal. By crowding in support, China can make its own reluctance to meet obligations a matter of principle and developing country solidarity.

Case study: International climate change negotiations

Under the 1992 United Nations Framework Convention on Climate Change (UNFCCC), the world was divided into ‘Annex I Parties’ that had a range of obligations to monitor and take measures to reduce their emissions, and ‘non-Annex I Parties’ whose actions were primarily voluntary.

‘Annex I’ comprised countries that were industrialised OECD members in 1992, plus several ex-Soviet Union ‘economies in transition’ and Turkey. This was justified on the basis of the principle of ‘common but differentiated responsibilities and respective capacities’ (CBDR-RC) – in other words, that wealthy countries bore greater responsibility for climate change and had greater means to take action. The 1997 Kyoto Protocol also operated on this basis.

This bifurcation frustrated progress on international climate negotiations on a successor to Kyoto for several years. It created perverse situations whereby petro-rich Gulf States could demand compensation for economic losses due to reduced oil exports. It also ignored the huge strides in development (and increases in emissions) that China and other major emerging economies had undergone, meaning they should no longer be exempted from taking action.

It wasn’t until the Copenhagen Accord in 2009 that this impasse was broken, by reference more generally to developed and developing countries (although it still mentioned Annex I and non-Annex I Parties). This trend was cemented in the Paris Agreement, which dropped all reference to Annex I and non-Annex I. It also further softened bifurcation by adding ‘in light of different national circumstances’ to the CBDR-RC principle, which gave room for further nuance between the needs and obligations of different countries.

Nevertheless, CBDR-RC has remained a lightning rod for discussions around fairness, equity, and burden-sharing in the UNFCCC. Most recently, developed countries united at COP27 to challenge China’s self-proclaimed developing country status and its ability to access funding for ‘loss and damage’ from climate impacts. The eventual COP document referenced developing countries ‘that are particularly vulnerable’ – including small island developing states in the Pacific.

What are some alternatives?

Differentiation is so deeply entrenched across the UN and multilateral system that it is here to stay. There are several ways it can be adapted, however, to better reflect the reality of today's world.

At one end of the spectrum, the IMF uses alternative terminology, distinguishing between 'advanced economies' and 'emerging market and developing economies'. The UN also has articulated some sub-categories – least developed countries (LDCs), landlocked developing countries (LLDCs), and small island developing states (SIDS). Knowing when to use these terms is core to our multilateral diplomacy.

Another way to approach this issue is to look beyond income or wealth as a measure of a country's level of development – arguably an overly simplistic indicator that does not consider factors such as stability, inequality, economic resilience, social capital, and environmental degradation. The UNDP's [Human Development Index](#) is one attempt to address this by incorporating considerations around health and education.

Some have tried to add adjectives like the 'most vulnerable' developing countries to try to differentiate between the Saudi Arabias and the Samoas of this world. But vulnerability is poorly understood. A UN Panel established to define vulnerability and develop an index to ensure vulnerable countries have access to finance and other support is currently finalising a report on an initial prototype. The preliminary scores can be found [here](#).

There have also been moves in the other direction to do away with the distinction between developed and developing countries. In 2015, the World Bank declared that the 'developing/developed world' categorisation had become less relevant, and it would phase out its use. Around the same time, the UN 2030 Agenda for Sustainable Development defined 17 Sustainable Development Goals (SDGs), which apply to all countries (though some indicators are specific to developing countries).

The Addis Ababa Action Agenda – 2030 Agenda's counterpart which sets out how the SDGs will be financed – grapples with the diversity of developing countries by recognising there are 'countries in special situations, in particular African countries, least developed countries, landlocked developing countries, and small island developing States, as well as the specific challenges facing middle-income countries'.

Another approach is the move away from the traditional 'donor-recipient' view, where developed countries form the traditional donor base. An example of this is the ongoing negotiations of post-2025 climate finance target (to succeed the US\$100 billion goal agreed by developed countries) where it remains an open debate as to who will be 'responsible' for meeting the target and who would be 'eligible' to receive support. This reflects the expanded donor base, including emerging donors such as Qatar, Saudi Arabia, United Arab Emirates that are engaged in the OECD DAC, and countries such as Chile, Indonesia, Mexico, and Vietnam which have made financial contributions to the Green Climate Fund.

So what does it mean for the future?

First, we need to continue to be **alert to attempts to introduce or reinforce differentiation overtly**, or by stealth (e.g., through CBDR), and push back accordingly. Pressure on the rules-based global order and attempts to undermine international rules and norms are only going to continue to intensify and proliferate.

Second, we should seek to **mitigate against differentiation by injecting nuance in ways that make sense and advance our interests**. For example, we should look for opportunities to broaden the donor base and to champion greater recognition of the special circumstances of SIDS, including through the proposed UN vulnerability index.

Third, we should **work with other countries to broaden awareness of this issue and plot strategies to counter it**. We should raise this in our dialogues with likemindeds on development, multilateralism, and China, and deepen coordination at multilateral posts. We should also consider how to bring along non-traditional partners to find common ground and build coalitions across the developing/developed country divide. For example, in 2021 we partnered with Namibia to co-facilitate the political UN Declaration on HIV and AIDS. These initiatives help demonstrate the multilateral system works for all countries and counter attempts to sow division and discord.

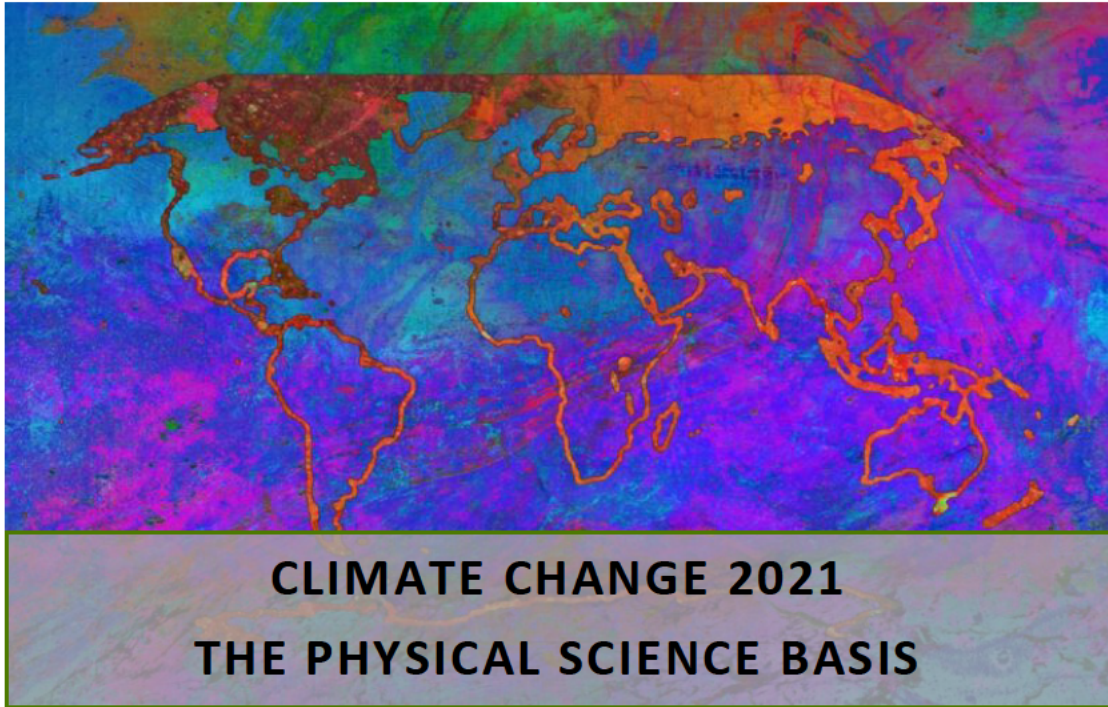
Fourth, we need to **continue to support developing countries to address poverty and enhance sustainable development**. Critical to this will be implementation of the Government's new international development policy, which places an emphasis on listening and responding to the needs of our partners. This will help counter China's narrative that we lack respect for partner government priorities and are focused on our own interests. It will also demonstrate Australia's commitment to international institutions, rules, and norms, including the 2030 Agenda and SDGs.

Finally, we should **consider ways of changing the narrative**. As the Prime Minister has said, 'the success and survival of the rules-based order depends on it both being fair - and being seen as fair. On working - and being seen to work.' We should avoid the use of terms like the 'Global South', which unhelpfully split the world into 'us' and 'them', while being ready to engage constructively with alternate narratives. We should emphasise our focus on shared challenges and solutions, and our shared interest in shaping a region – and a world – that is peaceful, stable, and prosperous.

In the age of information warfare, and in the context of our increasing global engagement with our UNSC and COP31 bids, the importance of building a cohesive and persuasive narrative that advances our interests in effective global cooperation and maximises our influence has never been higher.

Contact: [s22\(1\)\(a\)\(ii\)](#) (and DPD/DGB/GDS)

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The latest IPCC report warns that human activity is warming the planet to dangerous levels. Current pledges are unlikely to reverse this trend.

[*Climate Change 2021: The Physical Science Basis*](#): Intergovernmental Panel on Climate Change (August 2021) ¹

The latest report from the Intergovernmental Panel on Climate Change (IPCC) provides a stark warning: global warming is real, caused by human greenhouse gas emissions, and the impacts are increasingly severe. Urgent action is required to prevent temperatures increasing to 1.5 degrees Celsius above pre-industrial levels.

Chapter One outlines the framing, context and methods of analysis used in the report. It concludes with high confidence that the **plans countries so far have put forward to reduce emissions are insufficient to keep warming well below 2°C, the goal enshrined in the 2015 Paris Agreement.** The longer we delay, the harder it will be to reverse negative trends and stabilise the climate. There is **unequivocal evidence that human influence over the last six decades has warmed the atmosphere, ocean and land.**

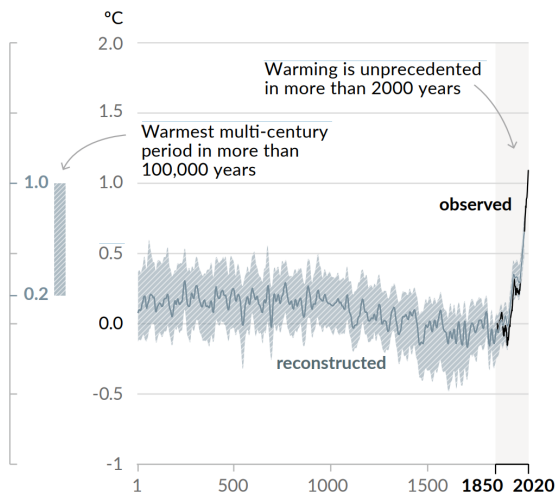
Chapter Two looks back to compare the current rate of climate change with historical data. That comparison provides clear evidence for **human impact on the climate system.** The last time global temperatures were comparable to today was **125,000 years ago.** The concentration of atmospheric carbon dioxide is higher than any time in the last **2 million years,** and greenhouse gas emissions are rising faster than any time in the last **800,000 years.**

¹ This **snapshot** provides a brief overview of the 12 chapters in the (4000 page) report. Snapshots draw attention to analysis relevant to DFAT's policy agenda. They summarise the author's views and — in the concluding 'So what?' section — highlight possible policy implications for Australia. Article selections do not indicate an endorsement of the content.

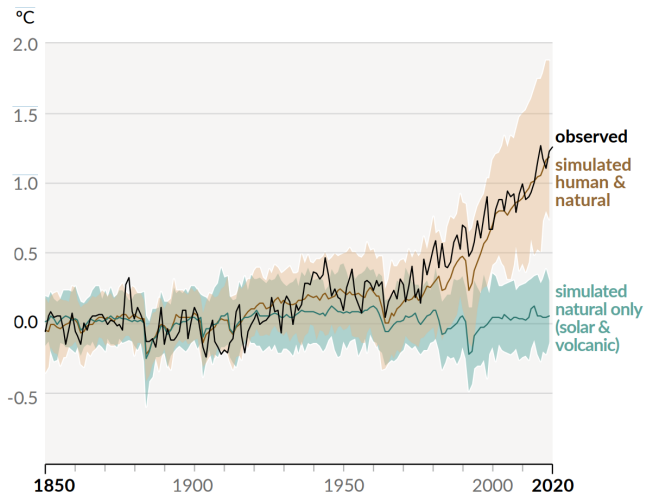
Human influence has warmed the climate at a rate that is unprecedented in at least the last 2000 years

Changes in global surface temperature relative to 1850-1900

a) Change in global surface temperature (decadal average) as reconstructed (1-2000) and observed (1850-2020)



b) Change in global surface temperature (annual average) as observed and simulated using human & natural and only natural factors (both 1850-2020)



[Chapter Three](#) leads with the IPCC’s strongest-ever statement on the human impact on the climate: **“It is unequivocal that human influence has warmed the global climate system since pre-industrial times”** (the last IPCC report said human influence was “clear”). Specifically, the report attributes nearly all the 1.1°C increase in global temperatures observed since the Industrial Revolution to human activity.

[Chapter Four](#) holds two of the report’s most important conclusions: the current pace change in the earth’s climate is **unprecedented** and the likelihood that the global temperature increase can stay within the Paris Agreement goal of well below 2.0°C is extremely slim. Whereas the 2018 IPCC report projected that temperatures could exceed 1.5°C in the 2040s; latest estimates suggest that a 1.5°C increase could be reached by the early 2030s.

[Chapter Five](#) quantifies the level by which **atmospheric CO2 and methane concentrations** have increased since 1750 (47% and 156% respectively) and addresses the ability of oceans and other natural systems to soak those emissions up. The more emissions increase, the less they can be offset by natural sinks—and in a high-emissions scenario, the loss of forests from wildfires becomes so severe that land-based ecosystems become a net source of emissions, rather than a sink (this is already happening to a degree in the Amazon).

[Chapter Six](#) assesses **methane, particulate matter, aerosols, hydrofluorocarbons**, and other non-CO2 gases that don’t last long in the atmosphere but exert a tremendous influence on the climate while they do. In cases, that influence might be cooling, but their net impact has been to contribute to warming. Because they are short-lived, the future abundance and impact of these gases are highly variable in the different socioeconomic pathways considered in the report. These gases have a significant impact on the respiratory health of people around the world.

[Chapter Seven](#) looks at **climate sensitivity** – a measure of how much the earth responds to changes in greenhouse gas concentrations. The chapter concludes that for every doubling of atmospheric CO2, temperatures go up by about 3°C. That’s about the same level scientists have

estimated for several decades, but over time the range of uncertainty around that estimate has narrowed. The chapter also looks at **energy budget** – a calculation of how much energy is flowing into the earth system from the sun. Put together, these metrics paint a picture of the human contribution to observed warming.

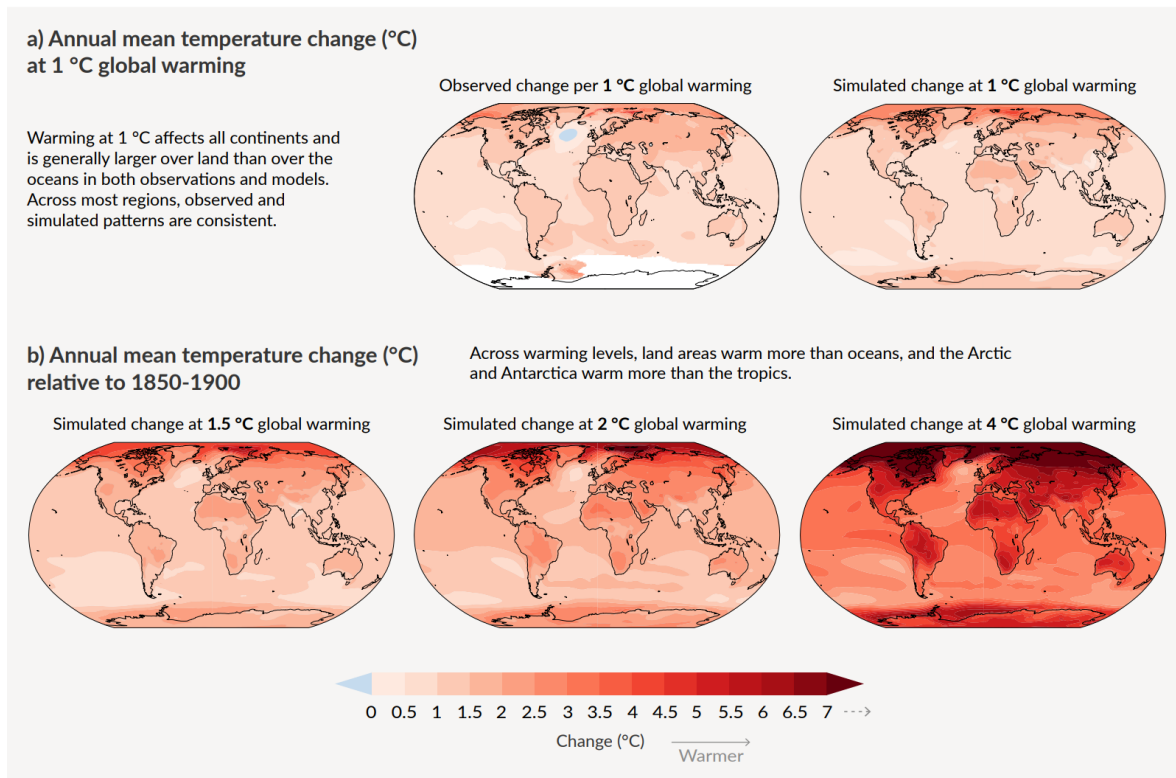
Chapter Eight catalogues **what happens to water** in a warming world. Although instances of drought are expected to become more common and more severe, **wet parts of the world will get wetter** as the warmer atmosphere is able to carry more water. Total net precipitation will increase and within any one location, the difference in precipitation between the driest and wettest month will likely increase. But rainstorms are complex phenomenon and typically happen at a scale that is smaller than the resolution of most climate models, so specific local predictions about monsoon patterns remains an area of relatively high uncertainty.

Chapter Nine considers the **ocean, cryosphere, and sea level change**. Most of the heat trapped by greenhouse gases is absorbed by the oceans. Warmer water expands, contributing significantly to **sea level rise**, and the slow, deep circulation of ocean water is a key reason why global temperatures don't adjust quickly to atmospheric CO₂. Marine animals are feeling this heat, as scientists have documented that the frequency of marine heatwaves has doubled since the 1980s. Meanwhile, glaciers, polar sea ice, the Greenland ice sheet, and global permafrost are all melting. Overall sea levels have risen about 20 centimetres since 1900, and the rate of sea level rise is increasing. Human influence is likely the driver of the global retreat of glaciers since the 1990s. Continued ice loss over the 21st century is virtually certain for the Greenland Ice Sheet and likely for the Antarctic Ice Sheet.

Chapter Ten outlines the **link between global and regional climate change**. Since 1950, scientists have detected clearly how greenhouse gas emissions from human activity have changed regional temperatures. Climate models can predict regional climate impacts. Where data are limited, statistical methods help identify local impacts (especially in challenging terrain such as mountains). Cities, in particular, will warm faster as a result of urbanisation. Global warming extremes in urban areas will be even more pronounced, especially during heatwaves. Although global models largely agree, it is more difficult to consistently predict regional climate impacts across models.

Chapter Eleven examines **weather and climate extreme events in a changing climate**. Better data collection and modelling means scientists are more confident than ever in understanding the role of rising greenhouse gas concentration in climate extremes. We are confident humans are behind observed temperature extremes. Human activity is more making extreme weather and temperatures more intense and frequent, especially rain, droughts, and tropical cyclones. While even 1.5°C of warming will make events more severe, the intensity of extreme events is expected to at least double with 2°C of global warming compared today's conditions, and quadruple with 3°C of warming.

With every increment of global warming, changes get larger in regional mean temperature, precipitation and soil moisture



Chapter Twelve notes that **climate models** are getting better, more precise, and more accurate at predicting regional impacts. Our climate is already different compared to the early or mid-20th century and we're seeing **major changes to mean temperatures, growing season, extreme heat, ocean acidification, and deoxygenation, and Arctic sea ice loss**. More changes by mid-century: more rain in the northern hemisphere, less rain in a few regions (the Mediterranean and South Africa), as well as sea-level rise along all coasts. Overall, there is high confidence that mean and extreme temperatures will rise over land and sea. Major widespread damage is expected, but also benefits are possible in some places.

So what?

The findings from the latest IPCC report will underpin discussion at the COP26 UN climate talks in Glasgow. While parties will be under pressure to commit to deep reductions in greenhouse gas emissions, there should also be a focus on the importance of moving beyond declaratory commitments to cut emissions and towards the technology required to enable the rules and transparency that the global reporting system will need to ensure real reductions are being achieved. The IPCC report makes clear that without immediate, rapid and large-scale reductions, the goal of limiting warming to 1.5°C - 2°C will be beyond reach. And even with such deep reductions in place, the IPCC report shows it could take 20-30 years before global temperatures stabilise.

The IPCC report confirms that climate change is already affecting every region on earth. We will continue to see disruptions to food, water and energy systems. Prosperity and stability will continue to be undermined in many countries. Climate change must be considered an ongoing investment priority across all sectors. See the [Climate Change Action Strategy](#) and contact the Climate Sustainability Division for further advice.



How should DFAT prepare and respond to the global trends that will shape the next 20 years?

A major new report by CSIRO, [‘Our Future World’](#), identifies seven megatrends that will shape the globe out to 2042. The trends cover: the changing climate, innovation in pursuit of sustainability; preventative and precision health; geopolitics affecting science, technology, and trade; digitisation and data technology; Artificial Intelligence (AI); and a social push for greater transparency.

The timing of this update to the 2012 report – with many of the trends at tipping points or junctures – is critical. As CSIRO Chief Executive Dr Larry Marshall put it when introducing the report, ‘Australia is at a pivotal point. There is a tidal wave of disruption on the way and it’s critical we take steps now to get ahead of it’. DFAT will be most effective at prosecuting Australia’s national interests and values if we can proactively identify, respond to and leverage these trends in both our external engagement and our internal organisational planning.

These trends have the power to transform the world. And while CSIRO do not try to chart a clear trajectory or predict the future, overall, the projections are sobering. They convey a world that will become riskier but will also bring significant opportunities. Harnessing their potential benefits will be a challenge, but failure to do so bodes ill for Australia. Moving decisively and with focus will set us on the path to maximise the benefits.

The imperative for DFAT is to understand how these trends will affect foreign policy and the department and consider what we can do about them. Thinking about DFAT's future should include two parallel lines of effort. Firstly, looking outwards to examine our strategic context and policy settings. And secondly, looking inwards to decide how we can build our capability and effectiveness.

Megatrend 1: Adapting to a changing climate

CSIRO Headline Projections: The increasing intensity and frequency of natural disasters will impose higher economic, health and environmental costs. Water scarcity and mass migration will increase. Critical infrastructure will degrade, and ocean dynamics are changing for the worse.

DFAT implications: Climate-related demands on our aid program will likely grow. We will need to help developing countries to build better healthcare capabilities, including public health, and construct infrastructure resistant to extreme weather events, rising sea levels, and a hotter world. We will need to focus on supplying infrastructure that produces or conserves clean water or improves quality and storage. Some preparedness will be needed to mitigate – or assist – climate-driven mass migration. This will be especially important for island countries at risk of becoming uninhabitable. Declining fish stocks, brought on by warming oceans, will reduce national budgets, needing increased financial aid or development to broaden economic activities.

Climate change diplomacy will become more important. And we will need to focus more on disaster preparedness in the Indo-Pacific. The Consular and Crisis Response functions of the department may rise in importance, requiring increasing resourcing and relevant training. Our decision-making processes will need to adapt, devolving more authority and logistical support to lower levels to enable rapid and more frequent responses.

Megatrend 2: Leaner, cleaner, and greener

CSIRO Headline Projections: The world will demand more food, with Asia in particular seeking more protein. Synthetic biology will increasingly provide solutions. The world will also need more minerals, driven by urbanisation and the transition to a zero-emissions technologies. Biodiversity will decline and the need for recycling increase. More renewable energy will be needed to electrify transport and industry to reach net zero. Hydrogen demand will grow.

DFAT implications: Enhancing our trade arrangements to promote the supply of new proteins should include helping Australian alternative (plant-based) protein companies into receptive markets. Our burgeoning hydrogen and critical minerals industry will benefit from international policy harmonisation around norms and standards, and supporting

agreements on energy security, country of origin, and decarbonisation. We will need to find the balance between simultaneously securing these minerals and energy resources for our own needs, as well as meeting the needs of our allies and partners.

We should continue to support Australian research institutions to form partnerships with suitable partners in the region. Focal research areas will be biofuels, vaccines, mineral extractive technologies, zero-emission and clean energy technologies, recycling, and biomaterials. As international research collaboration continues to engage more with geopolitical sensitivities, developing and advocating for ethical and safety frameworks that align with our values and interests will be essential. In some countries in our region, poor environmental management will increase the need to advocate on the Convention on International Trade in Endangered Species (CITES), ecosystem conservation, and against illegal export of hazardous goods and logging.

Megatrend 3: The escalating health imperative

CSIRO Headline Projections: Populations will age, adding to a growing health burden driven by an increase in infectious (and antimicrobial resistant) diseases, social expectations, and persistent chronic health trends. Preventative health measures will increase in importance, particularly for mental health and social connection. Technology holds promise for bespoke detection and interventions.

DFAT implications: The rising risk of infectious diseases will increase the need to build and sustainably supply medical and health related aid, particularly vaccines and public health capability. It will also become more important to build monitoring, reporting and response capabilities to detect and react to outbreaks overseas early. Facilitating the establishment or enhancement of research partnerships for vaccines and medicines would support these initiatives.

Like Australia, other countries in our region will face growing health burdens from non-communicable diseases, such as obesity and mental health. There will be opportunities to share experiences and best practices in how to set up or improve the delivery of precision health services, particularly e-health. This will require the establishment of effective norms and standards as well as the construction of next-generation digital health infrastructure. Our aging population will need a sustained and increased migration program to support our standard of living. DFAT will need to support immigration agencies to find and build pathways for migrant workers, particularly from countries with younger populations and/or expertise in industries that will be most economically valuable in the future.

Megatrend 4: Geopolitical shifts

CSIRO Headline Projections: Countries are spending more on defence and emerging technologies and this is altering the strategic defence environment. Trade relationships are changing, especially to reduce supply chain disruption, and sea lines of communication will be more important. Cybersecurity threats are increasing and changing. Research and development collaboration is bifurcating, but international collaboration on scientific research is declining in both real and relative terms.

DFAT implications: DFAT has a leading role to play in proactively advocating for positive responses to geopolitical shifts through diplomacy that clearly communicates our interests and views. Developing a clear strategic narrative to articulate our national interests and project modern Australia has a new urgency as a balance to the exercise of hard power and revisionism.

Our future economic security will require us to shore up existing trusted trade relationships, develop new types of trade agreements, and promote secure and trusted supply chains. Our work will be particularly relevant – and challenging – in the face of growing cybersecurity threats, proliferating disinformation challenges, democratic backsliding, academic research risks, and contested standards for digital infrastructure and data protection. Building open communication architecture to support supply chains, information and financial flows, and peer-to-peer links will also enable us to better show who we are and what we stand for.

Megatrend 5: Diving into digital

CSIRO Headline Projections: Innovative technologies, especially AI and robotics, will fundamentally transform industry. E-commerce will continue to grow, and data will drive organisations. More people will work from home. Cities and city structures will decline in relative importance to regions, except in Africa and Asia – which will see the rise of new megacities. Digital health services will become normalised. Digital economies will increase the prominence or importance of digital skills, cryptocurrency, and distributed ledgers (especially for transparency). And we might harm our physical and mental health by spending too much time online.

DFAT implications: Global competition in the areas of AI and robotics will drive the fourth industrial revolution. Questions of who we work with and what critical technologies we work on will drive our diplomacy on critical technologies partnerships. Additionally, the expanding digital environment opens prospects to support countries building digital health and education systems. We'll also need to support Australian-based digital health and education firms expand globally.

Departmentally, we will need to adjust to the accelerating digital environment. This will require us to develop the right internal data ecosystem, including collection and analytical tools, to support better strategic decision making in DFAT. To support a decentralised workforce, we should continue efforts to build a secure digital and communications environment, both to enable work-from-home arrangements, but also to increase connectivity in hostile or adverse situations. Our training and HR policies will need to improve digital literacy and address the potential impact on staff well-being from increased online work.

Megatrend 6: Increasingly autonomous

CSIRO Headline Projections: Increased use and reliance on AI and quantum computing will accelerate trends in autonomous technology. Global competition in research and development will increase and will be critical to keep a national competitive edge. Technology development will occur in episodes, punctuated by lulls. Ethical principles underpinning technology's development and use will be contested.

DFAT implications: Along with supporting the establishment or expansion of research and development partnerships, we need to continue advocating for norms and standards that enshrine ethical uses of quantum computing and AI. This will be especially important in autonomous weapons systems and weapons of mass effect. We should also leverage our alliances and technology partnerships to secure and lead AI and quantum technologies, both to reduce the risk of misuse and to give ourselves a strategic advantage.

The department should also consider the potential benefits of increased computational power and AI in our decision making, situational monitoring and public diplomacy. Making use of new tools to understand and respond to changing geo-strategic trends will increase our awareness as well as the timeliness and accuracy of our responses. Our IT infrastructure will require further investment to cope with the increased computational needs and support open-source policy research at scale.

Megatrend 7: Unlocking the human dimension

CSIRO Headline Projections: Australians will trust in institutions less but feel more connected to each other. False and misleading information will proliferate, especially around science and its complexities. Global poverty, wealth distribution and income inequality will take longer to address, if at all, with some countries becoming much more internally unequal. Environmental, social, and corporate governance will rise in importance. Globally, the application of indigenous knowledge in land management will increase. Multigenerational workforces will evolve. Improvements in gender participation in the Australian workforce will remain patchy.

DFAT implications: Along with projecting modern Australia, we should build trust in our institutions in Australia and international organisations, showing the benefits of our governmental, regulatory, and socio-cultural environments. This includes effectively responding to dis/misinformation as effectively as possible. While advocating for the needs of disadvantaged communities and indigenous peoples, we should continue and expand programs that address the drivers of poverty, wealth distribution and income inequality. Further, we should lift our support for global initiatives that promote the highest standards of environmental, social, and corporate governance, particularly on matters relating to trade, security, and global challenges.

And finally...

While CSIRO's report names global megatrends, they are not fixed. And although the global challenges presented by CSIRO are many and complex, the future policy problems we face are not insurmountable. Gaining an insight into the future is the first step towards developing a better response. The onus is now on us to design strategies that can head off the worst potential outcomes and build our capability to nudge events towards the best.

Contact: [s22\(1\)\(a\)\(ii\)](#)

Snapshots draw attention to analysis relevant to DFAT's policy agenda. They summarise the author's views and highlight possible policy implications for Australia. Article selections do not indicate an endorsement of the content.



A comprehensive roadmap for the energy sector to reach net-zero emissions by 2050 identifies steep challenges – and opportunities.

Net Zero by 2050: A Roadmap for the Global Energy Sector: International Energy Agency (May 2021)¹

The International Energy Agency (IEA) has laid out a Roadmap to transform the world’s energy systems to reach net zero global carbon dioxide (CO₂) emissions by 2050 in order to limit the rise of temperatures to 1.5°C. The Roadmap focuses on the pathway to net zero the IEA considers most feasible, cost-effective and socially acceptable (see Box 1), without using non-energy offsets and while assuming low reliance on negative emissions technologies. It includes more than 400 milestones spanning all sectors and technologies. The Roadmap involves **vast levels of investment, innovation, skilful policy, technology deployment, infrastructure, and international cooperation**, along with an immediate and massive deployment of all available clean and efficient energy technologies. The pathway claims to be ‘narrow but achievable,’ and promises ‘major benefits’ for prosperity and well-being.

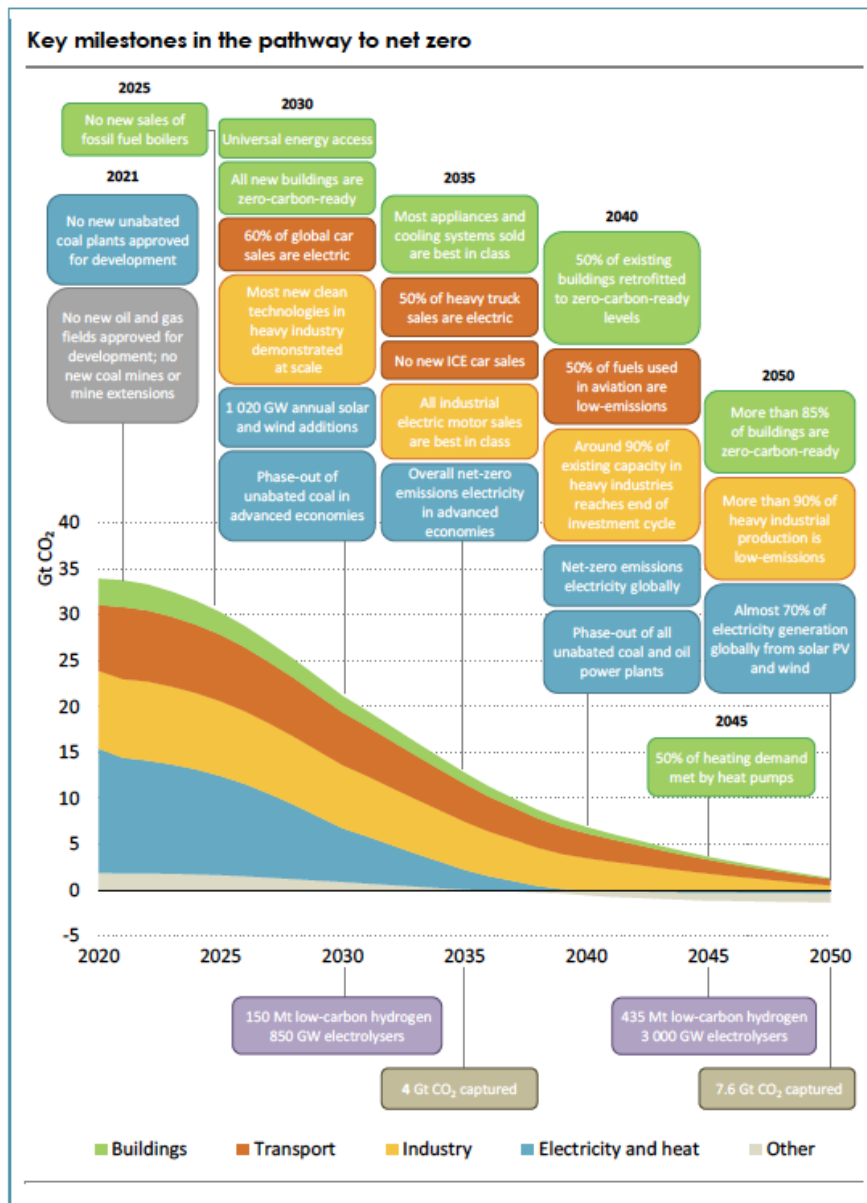
Despite the steep challenges, the transformation of the energy sector presents a **huge economic opportunity through new jobs and growth**, including as part of a post-COVID economic recovery; by 2030, 0.4 percent could be added a year to global GDP growth if annual energy investment surges to USD 5 trillion. Meanwhile, improvements in air quality would mean 2 million fewer premature deaths from air pollution in 2030 than today. The Roadmap emphasises an **inclusive transition**, especially to ensure developing economies can meet their energy needs, including bringing electricity to around 785 million people, and for workers transitioning out of the fossil fuel industry. Citizen participation will be needed to support the pathway, and to make direct impacts through consumer demand and behavioural changes.

While global in scope, the Roadmap makes it clear that **individual countries will need to**

¹ **Snapshots** draw attention to analysis relevant to DFAT’s policy agenda. They summarise the author’s views and — in the concluding ‘So what?’ section — highlight possible policy implications for Australia. Article selections do not indicate an endorsement of the content.

design their own strategies, considering specific circumstances, with advanced economies expected to lead the way on transition. National net zero roadmaps will require governments to break down silos and integrate energy across their policies.

Box 1:



The scale of transformation

The report calls for net zero by 2050 pledges, now covering 70 percent of global emissions, to be underpinned by near-term policies and measures. **Even if fulfilled, pledges to date would leave around 22 billion tonnes of CO2 emissions in 2050, consistent with a temperature rise in 2100 of around 2.1 °C.** Without reversing that trend, net zero by 2050 will be out of reach.

The pathway involves a **major push to increase energy efficiency, and rapidly scale up solar and wind.** Solar photovoltaics, for example, would reach a level by 2030 equivalent to installing the world’s current largest solar park roughly every day. **Hydropower and nuclear would provide an essential foundation for transitions, and electrification emerges as a crucial economy-wide tool** for reducing emissions, including in vehicles, with electricity accounting for 50 percent of total energy consumption in 2050. Two-thirds of energy supply by 2050 would come from wind, solar, bioenergy, geothermal and hydro energy, with solar alone accounting for one-fifth of energy supplies. Fossil fuels fall from almost four-fifths of total energy supply today to slightly over one-fifth by 2050.

While most of the global reductions in CO2 emissions through 2030 would come from technologies readily available today, the report calls for **major innovation over this decade to also bring new technologies to market**. By 2050, almost half the reductions come from technologies currently at the demonstration or prototype phase. Advanced batteries, hydrogen electrolyzers, and direct air capture and storage will make vital contributions to the reductions in CO2 emissions between 2030 and 2050 in the pathway outlined. Innovation over the next ten years must be accompanied by **large-scale infrastructure investments**, including new pipelines to transport captured CO2 emissions and systems to move hydrogen.

The Roadmap envisions **no additional new final investment decisions be taken for new unabated coal plants**, the least efficient coal plants are phased out by 2030, and remaining coal plants still in use by 2040 are retrofitted. Unabated coal demand declines by 90 percent to 1 percent of total energy use in 2050. In the pathway, **there are no new oil and gas fields approved for development beyond those already committed as of 2021**. However, oil and natural gas industry expertise helps drive technologies such as hydrogen, carbon capture, utilisation and storage (CCUS) and offshore wind. Oil and gas producers switch their focus to output – and emissions reductions – from existing assets. By 2050, gas demand declines by 55 percent and oil declines by 75 percent. While emissions from industry, transport and buildings take longer to reduce, the Roadmap includes large-scale investments in innovation and industrial capacity, and policies to **end sales of new internal combustion engine cars by 2035**.

The energy transition outlined requires **substantial quantities of critical minerals**, including for batteries, with revenues from those minerals being larger than revenues from coal well before 2030, creating substantial new opportunities for mining companies. Annual investment in transmission and distribution grids would need to expand from USD 260 billion today to USD 820 billion in 2030. The required roll-out of hydrogen and CCUS after 2030 would require laying the groundwork now: annual investment in CO2 pipelines and hydrogen-enabling infrastructure increases from USD 1 billion today to around USD 40 billion in 2030.

Priorities for action under the Roadmap

1. **Make the 2020s the decade of massive clean energy expansion.** Technologies needed to achieve deep cuts in emissions by 2030 already exist, and policies to drive their deployment are proven. The post COVID-19 recovery should be aligned with the net zero pathway, with policies to speed up the deployment of clean and efficient energy technologies. Mandates and standards drive consumer spending and industry investment into efficient technologies; targets and competitive auctions enable wind and solar to accelerate the electricity sector transition; fossil fuel subsidies are phased out alongside carbon pricing and other market reforms to ensure appropriate price signals; and there are disincentives for the use of certain fuels and technologies. Governments must lead the planning and incentivising of the massive infrastructure investment needed, including in smart transmission and distribution grids.
2. **Prepare for the next phase of the transition by boosting innovation.** Clean energy innovation must accelerate rapidly, putting R&D, demonstration and deployment at the core of energy and climate policy. Around USD 90 billion of public money will be needed for demonstration projects by 2030, against USD 25 billion currently budgeted for.
3. **Clean energy jobs will grow strongly but must be spread widely.** The energy transition must account for the social and economic impacts on individuals and communities, and it

must include people as active participants in the process. New employment opportunities will often be in different locations, skills sets and sectors than fossil fuel jobs, making it imperative for targeted policy measures to address this. These measures include retraining and locating clean energy facilities in heavily affected areas.

4. **Set near-term milestones to get on track for long-term targets.** Governments need to provide credible step-by-step plans to reach their net zero goals, building confidence among investors, industry, citizens and other countries.
5. **Drive a historic surge in clean energy investment.** Policies need to be designed to send market signals that unlock new business models and mobilise private spending, especially in emerging economies.
6. **Address emerging energy security risks now.** Ensuring uninterrupted and reliable supplies of energy and critical energy-related commodities at affordable prices will become even more important on the way to net zero. This will involve addressing vulnerabilities associated with the increased reliance on electricity, including variability of supply and cybersecurity risks, as well as the sustainable supply of critical minerals.
7. **Take international cooperation to new heights.** Governments must work together in an effective and mutually beneficial manner to implement coherent measures that cross borders. This includes carefully managing domestic job creation and local commercial advantages with the collective global need for clean energy technology deployment. Accelerating innovation, developing international standards, and coordinating to scale up clean technologies needs to be done in a way that links national markets. Cooperation must recognise differences in the stages of development of different countries and the varying situations of different parts of society. For many rich countries, achieving net-zero emissions will be more difficult and costly without international cooperation. For many developing countries, the pathway to net zero without international assistance is not clear. Technical and financial support is needed to ensure deployment of key technologies and infrastructure. Without greater international cooperation, global CO2 emissions will not fall to net zero by 2050.

So what?

The IEA's Roadmap has far-reaching implications – 'nothing short of... complete transformation' – for an energy sector which accounts for around three-quarters of global CO2 emissions. The report's timing adds to momentum leading into COP26 in November and will frame a re-energised G7's forward-leaning stance on climate change next month. While the Roadmap demonstrates the immense scale and complexity of the challenge to reach net zero, it also underlines the feasibility of doing so. This offers transformative opportunities in the energy industries of the future. For Australia, the challenges remain acute, raising the stakes on support for carbon-intensive industries and the pace of transition. Equally, there are opportunities for Australia to emerge as a global low emissions technology leader, as envisioned by the Government's Technology Investment Roadmap, building on initiatives such as Australia's Hydrogen and Critical Minerals Strategies and the Recycling and Clean Energy National Manufacturing Priority road map, and through exports from the growing energy services sector.