FARMING FOR THE FUTURE

A report prepared for
Farming for the Future

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Measuring for Success

Priming Australia for the next golden age of agriculture

pwc

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The views set out in this paper do not necessarily represent those of the stakeholders consulted.

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Preface

Farming for the Future is a unique, interdisciplinary research and change program initiated by the Macdoch Foundation that brings together farm economics and natural capital measurement as a once-in-a-generation, world-first research project to focus on optimising farm performance. It is working side by side with Australian producers and their trusted advisors to provide a way for the agricultural industry to make the most of natural capital: as a portfolio of productive assets generating financial and other benefits for farmers.

Farming for the Future supplements the research program with an activation program seeking to engage and enable farm advice experts and 'partners of farmers' (retailers, brands, food companies, banks, insurers and policymakers) to support farmers to optimise natural capital. This project is the first of its kind for its scale and depth and is vital to ensure agriculture can continue to produce essential commodities and healthy rural and regional communities whilst being part of emerging climate and nature-positive solutions.

Find out more at *farmingforthefuture.org.au*

Purpose of this report

PwC has prepared this report for the Macdoch Foundation and the ***Farming for the Future*** program. It builds on a 2021 discussion paper prepared for the Macdoch Foundation, the National Farmers Federation and *Farming for the Future,* that outlined the opportunity for Australia's agriculture industry and food, fibre and beverage supply chains in supporting producers to be more financially prosperous, enhance natural capital and become more climate-resilient.[1]

For Australian producers to be more financially prosperous, climate-resilient and environmentally positive, they will inevitably need to generate farm-scale data to measure and manage their natural capital. Farm-scale data will be critical for producers to realise the economic gains from demonstrating the provenance and sustainability of their produce.

Fostering a supportive industry and policy environment will prepare Australia for a future premium in international food and fibre markets.

In this paper, we highlight the critical role that policymakers, the private sector and industry bodies (i.e. representative bodies and research development corporations) have in enabling this.

What do we mean by 'natural capital'?

Farming for the Future defines natural capital in agriculture as the natural resources that producers manage for the benefit of their businesses, their families and for society. Agricultural natural capital includes soil, water, pasturelands and croplands, riparian areas, remnant native vegetation, agroforestry and environmental plantings and animals.[2] These natural capital resources have both private benefits to producers (for example increased carbon in soils mean improved pastures) and public benefits to broader society (increasing carbon levels in soils also helps to meet emission reduction goals). In economic terms, a change to the health of on-farm natural capital generates externalities that impacts third parties. Hence while *Farming for the Future* is focused on the benefits of natural capital's role for on-farm benefits, in this paper, we extend the use of the term to include benefits of natural capital management beyond the farmgate.

What do we mean by sustainable farming?

For simplicity and consistency with other government reports (e.g. the NSW Sustainable Farming Program),[3] we use the term 'sustainable farming' in this paper. The United Nations Food and Agriculture Organization (FAO) defines sustainable farming as relating to economic, environmental and social aspects.[4] In this paper, our focus is on the natural capital management element of environmental and economic sustainability, including potentially regenerating degraded natural capital assets.

Why is this relevant when the world is dealing with bigger food and fibre issues?

At the time of this paper's development, markets for food and fibre products are being disturbed by war in Europe, supply chain disruptions and increasing inflation around the world. Many of the underlying drivers of change, such as climate change, environmental health and growing global population are longer-term trends that will outlast short and medium-term disturbances. As the world becomes increasingly developed, concern for the environment will increase.[5] Therefore this paper intentionally looks at these longer-term drivers when considering the role of government and industry in helping producers transition to become more financially prosperous, climate-resilient and environmentally-positive.

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Priming Australia for the next golden age of agriculture

Australian agriculture continues to go from strength to strength

- Putting food on tables
- Supporting rural communities
- Paychecks in pockets

Farmgate output on track to hit **$100b by 2030**

Change continues apace as local and global markets respond to challenges

Environmental
Climate change is causing increasingly frequent and severe weather events.

Social
ESG expectations are shaping the demands of agribusiness corporations.

Economic
Producers are trying to maintain sustainable and profitable businesses.

Consumer
Increasing quality, social and environmental awareness and demands.

We need to be more able to demonstrate our sustainability to meet expectations of consumers, processors and international governments.

Australian beef, pork, poultry, dairy and lamb exports to Japan, the US and the EU are worth **$6.3b**

Consumers believe these food types have the most negative impact on the environment.

Meeting these expectations is an opportunity for Australia

To put ourselves at the forefront of the sustainable producer curve

Secure increased levels of market share for Australian produce and products.

Secure higher prices and profits for Australian producers who are able to meet consumer demand for sustainable food and fibre products.

To meet our strategic goals

Position Australia as a leader in measuring, managing and investing in natural capital.

Lead the world in showcasing the role of agriculture in climate change mitigation.

Develop resilient, transparent and responsible supply chains.

Long-term benefits without a short-term catalyst

For Australia to be able to access premium markets into the future, we must respond to the regulatory and consumer trends that demand greater traceability and transparency today.

This requires all aspects of the agriculture supply chain to support producers in the:

- Consistent collection of data
- Measurement of data
- Reporting of data

This is not happening today, but this is understandable…

Measurement is difficult and expensive ▶ Lack of fit-for-purpose standards ▶ So far, markets remain relatively open

The broader supply chain, including producers, will benefit from a clear roadmap that lays out how natural capital measurement can be used to drive profitability and lead to success.

Moving now, to win tomorrow

Other jurisdictions and many large corporations are starting to take action to resolve these challenges. By taking action now, Australian agriculture can realise the benefits of being an early mover.

Action requires:

Leadership from governments
To work collaboratively with our trading partners and review policy settings.

Technological innovation
To improve the accessibility, accuracy and effectiveness of measurement tools.

Support for producers
To adopt and implement changes in their operations.

Taking the steps to drive whole-of-system change

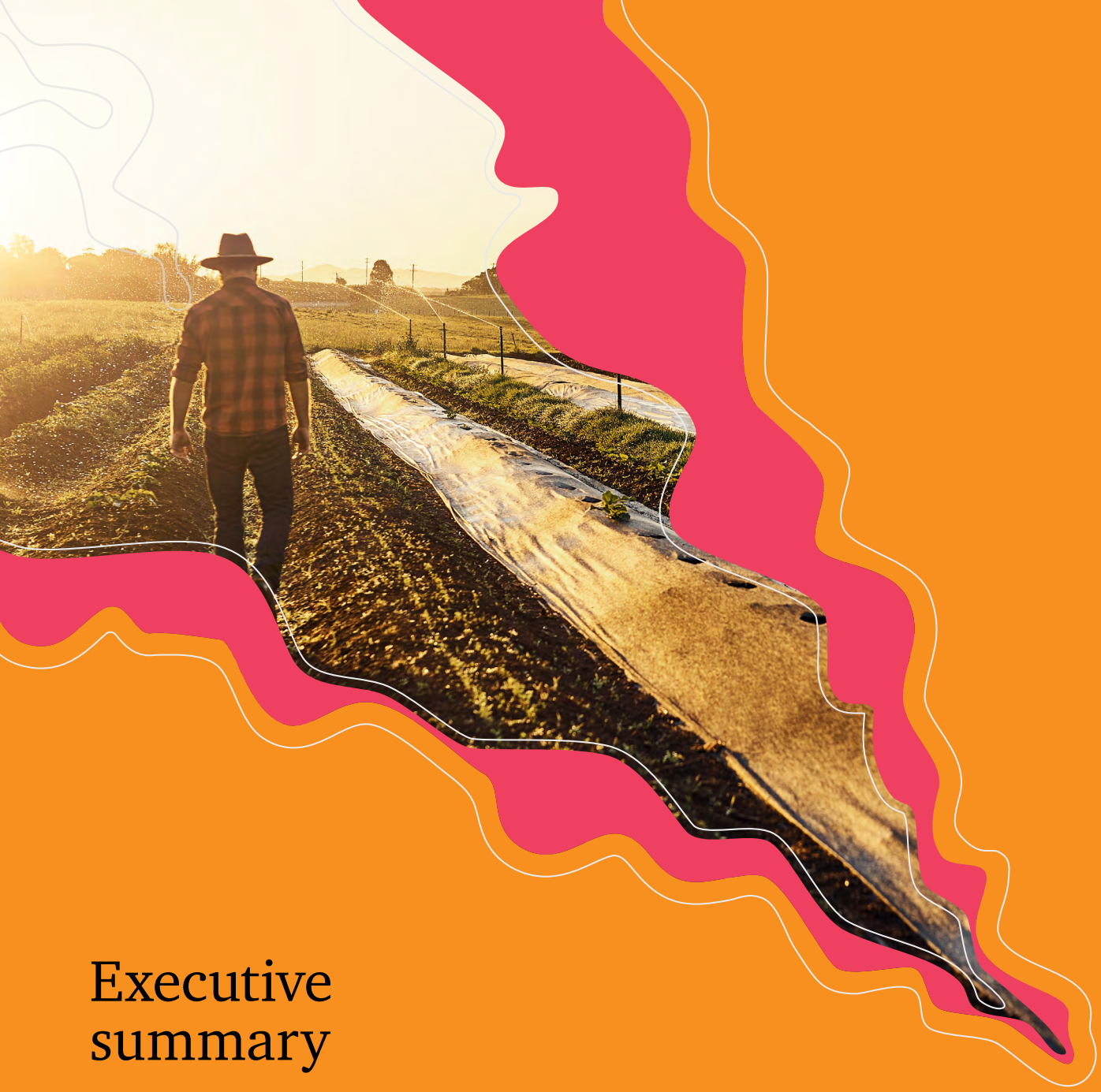
Policy makers, agricultural representative bodies and research and development corporations have a critical role to play in…

1 **Improving the efficiency of existing rules**
Review and iterate existing rules to ensure they are fit-for-purpose and complementary.

2 **Setting the rules of the game**
Putting in place the right standards and guardrails to guide stakeholders and ensure all are working in unison, towards key outcomes.

3 **Stimulating the market**
Creating an environment that provides a clear business case, and catalyses and enables Australian agriculture to become an early mover.

Farming for the Future can play a leading role in helping each of these groups achieve their goals.



Executive summary

Challenge and opportunity for one of the cornerstones of the Australian economy

Amidst global turbulence, Australian agriculture continues to go from strength to strength in putting food on tables and paychecks in pockets, and supporting vibrant rural communities. Farmgate output is well on track to hit $100 billion by 2030, powered by global demand for Australia's high-quality food and fibre.

But change continues apace in local and global markets, as jurisdictions respond to environmental, economic, social and consumer-related challenges. Climate change and environmental degradation due to agriculture in many countries are in the spotlights of regulators and consumers alike. Expectations about transparency in relation to traceability and production and supply chain footprints continue to grow. A clean, premium image must now be sustainable.

Growing the value of Australian agriculture solely through increased production is unsustainable – we must also lift the profitability of our agricultural products. Doing so requires either reducing input costs by adopting new production methods, or increasing income by maximising access to markets around the world, so that Australian products that leave our shores can realise the most lucrative price premiums wherever they may be. Improving natural capital, and treating it as a factor of production, provides one such opportunity to increase productivity sustainably by reducing cost and variability.

Long-term benefits without a short-term catalyst

For Australia to be able to access premium markets into the future, we must respond to the regulatory and consumer trends demanding greater traceability and transparency. The response requires all aspects of the agriculture supply chain to support producers in the consistent collection, measurement and reporting of data relevant to the production of their food and fibre.

This is not happening today, but this is understandable because:

- Measurement is difficult and expensive.
- There is a lack of fit-for-purpose standards and consensus on what we should view as best-practice principles to guide the Australian agriculture sector.
- Markets at this point remain relatively open, although the European Union (EU) is leading a number of other jurisdictions in defining conditions of market access in accordance with their specific view of what constitutes 'sustainable'.

Progress towards resolving these challenges in Australia continues to be slow, partly because there is a lack of immediate incentive for producers to change well entrenched practices. The broader supply chain, including producers, will benefit from a clear roadmap that lays out how natural capital measurement can be used to drive profitability and lead to success. As an example, while producers know that a relationship between natural capital on their farms and their profitability exists, that relationship has never been properly quantified, limiting the rationale for them to measure their natural capital.

Moving now, to win tomorrow

Other jurisdictions (e.g. the EU, UK, Japan and Singapore) and many large corporations (e.g. Heineken, Cargill and adidas) are starting to take action to resolve these challenges. In doing so, they are expecting their international suppliers, including from Australia, to meet the same requirements being placed on their local producers. By taking action now to closely follow these change leaders, Australian agriculture can realise the benefits of being an early mover. Doing so would still give Australia a seat at the table to help shape the standards and access requirements, and be in-market early enough to realise the price premiums of meeting those standards and requirements. We can then build a greater market share and realise price premiums earlier than if Australia was to be a late follower.

Taking the required action to be that early mover doesn't rest solely with producers – it requires:

- Leadership from federal and state and territory governments to connect and work with our trading partners.
- Technological innovation to improve the accessibility, accuracy and effectiveness of measurement tools.
- Support for producers to adopt and implement the required practices into their operations.

Taking the steps to drive whole-of-system change

Every business, organisation, government and agency with an interest in Australian agriculture has a role to play in ensuring we seize this opportunity.

This report concludes with a set of 21 recommendations, that can broadly be categorised into three groups:

Improving the efficiency of existing rules

Review and iterate existing rules to ensure they are fit-for-purpose and complementary.

Setting the rules of the game

Putting in place the right standards and guardrails to guide stakeholders and ensure all are working in unison towards key outcomes.

Stimulating the market

Creating an environment that provides a clear business case, and catalyses and enables Australian agriculture to become an early mover.

Improving the efficiency of existing rules

6 Ensure greater collaboration and interoperability of state and territory government policies.

9 Advocate for acceptance by international markets, international policy-makers and international finance markets.

10 Monitor impacts on producers of imbalances in market competition.

12 Simplify certification processes.

13 Ensure cost recovery considers the public good.

Setting rules of the game

2 Accelerate the emergence of widely agreed and open access methods of measuring natural capital.

3 Develop a natural capital accounting standard.

5 Develop a national natural capital strategy.

7 Develop an outcomes-focussed approach to assessing the sustainability of agricultural landscapes that meets the needs for environmentally-conscious markets whilst maximising the adaptive capacity of farm operations and enabling innovation in production methods.

8 Develop a cost-effective, national verification regime for sustainable agriculture.

Stimulating the market

1 Prove the case for investing in natural capital and the economic, social and environmental benefits it could generate.

4 Support benchmarking service providers to include natural capital in their analysis of farmperformance.

11 Independent assessment of industry's sustainability performance.

14 Build the capability of producers and advisors on investments in and measurement and management of on-farm natural capital.

15 Address gaps in the agriculture education and training infrastructure.

16 Support for market-based incentives to encourage investment in natural capital.

17 Support the market to reduce the cost of measuring natural capital.

18 Implement assessment of natural capital on government-owned assets.

19 Use government procurement to stimulate supply of natural capital-positive food and fibre.

20 Incorporate sustainability into product traceability.

21 Educate consumers on sustainable agriculture.

Note: Recommendations are numbered in an indication of the chronological order in which they may be implemented

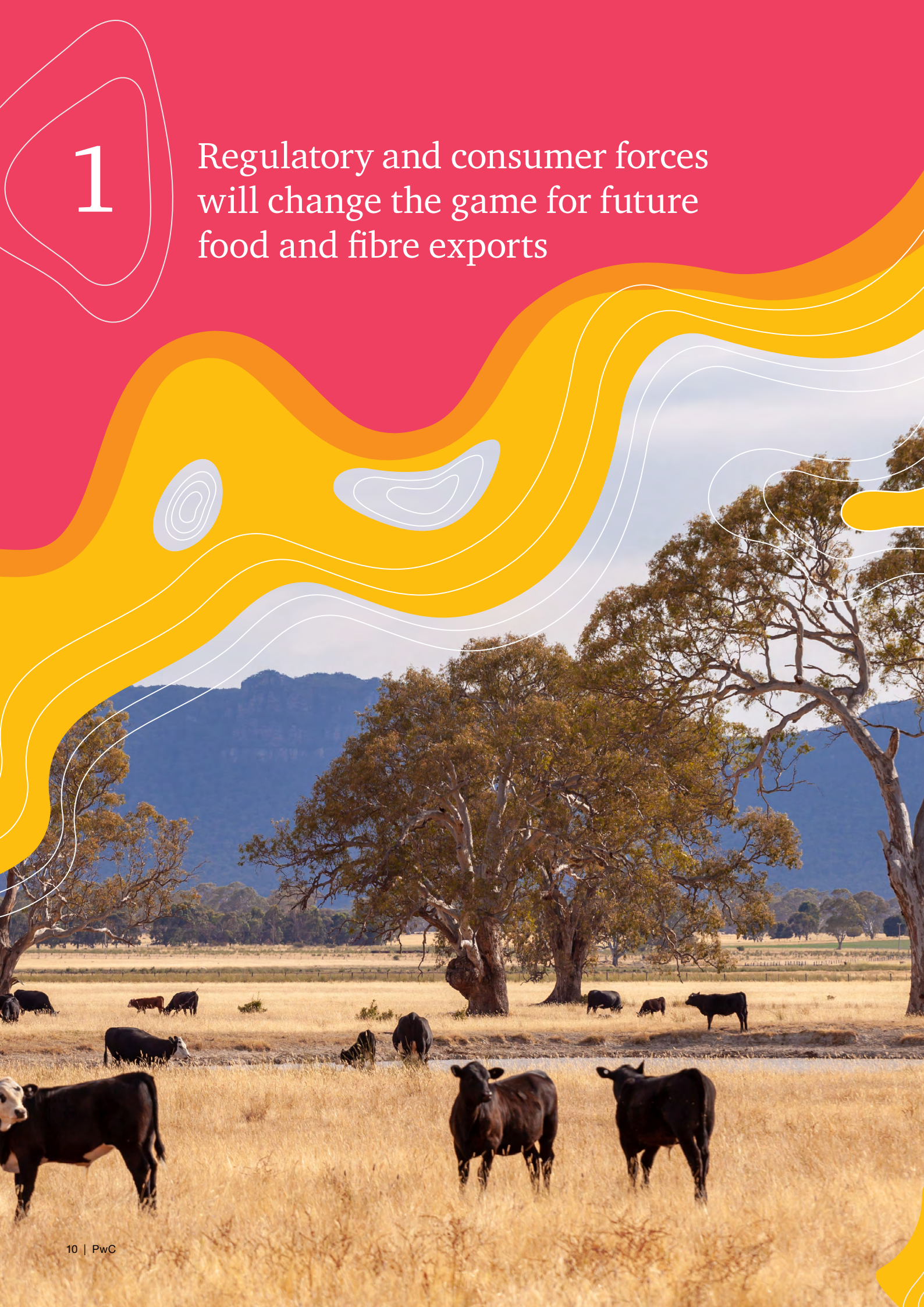
With its focus on building the business case for farmers to improve natural capital in productive landscapes, *Farming for the Future* is one vehicle that can play an important role in this journey. It aims to provide, as a public good, the evidence base, tools and resources for the agricultural sector to understand the relationship between differences in natural capital and differences in benefits to farmers.

By considering natural capital as a factor of agricultural productivity and profitability, economic benefits to producers and better environmental performance of agricultural markets and supply chains can co-exist. This will support Australia's agricultural sector in becoming more financially prosperous, climate-resilient, and environmentally positive.

Farming for the Future is helping realise this by building the evidence base and practical support that producers need to incorporate natural capital as part of the foundation of their farming businesses, and to activate the supply chain to encourage and reward that shift.

The opportunity is there for the taking. Not taking it could see Australian agriculture not realise its full value – to the detriment of local producers, businesses and communities. If we get this right, it could lay the foundation for the next golden age of Australian agriculture. Now, that's something worth investing in.

1 Regulatory and consumer forces will change the game for future food and fibre exports



1.1 More is needed if we are to grow our agriculture market beyond $100b

Australia has a diverse agricultural sector that produces a range of food and fibre products, and accounts for more than half of the country's land use. More than 70 per cent of Australia's total agricultural produce is exported to international markets,[6] a significantly higher proportion compared to other developed countries such as the United States (US) and European Union (EU) (which export around 20 per cent[7] and 32 per cent[8] of their agricultural produce). Over the past decade, Australian agriculture production has grown significantly, with revenue increasing from $61 billion in 2010-11 to $75 billion in 2020- 21.[9] This growth was in part driven by the adoption of new technologies and management practices backed by innovative research and development, and a strong brand synonymous with clean and green products.[10] These factors have enabled Australia to expand access to international markets.

It was anticipated that farm-gate returns were likely to exceed $80 billion by 2030.[11] Recognising an opportunity to boost growth, in 2018 the National Farmers' Federation (NFF) released the 2030 Roadmap with a bold and ambitious target to increase annual farm-gate output beyond that to $100 billion by 2030.[12]

Over the next eight years, substantial sector-wide efforts will be required to realise and surpass the $100 billion target. Stakeholders must also be looking beyond 2030, to ensure that productivity and profitability gains are sustainable. To achieve this, a multilateral approach to drive long-term increases in demand, maintain and expand market access, and respond to the challenges of climate change through improving the resilience of Australian agriculture and improving its environmental outcomes is required. Further to this, there is an opportunity to drive profitability and productivity by enhancing investment in natural capital and reducing reliance on other inputs. Reducing reliance on inputs will help counter the profitability pressures producers are currently facing as input costs surge. The approach to managing and measuring natural capital must be nimble, continually adapting and responding to complexities in the global market.

Collaboration between industry and government on productivity-enhancing initiatives will be fundamental to achieving the $100 billion agricultural output target and sustaining that growth and prosperity in the decades that follow.

1.2 Sustainability demands on food and fibre products are increasing globally

By 2050, the global population is projected to have reached close to 10 billion people, up from 8 billion people today.[13] The United Nations (UN) Food and Agriculture Organisation (FAO) notes that this population increase as well as higher incomes, increased urbanisation and dietary preference changes toward more resource-intensive foods will all serve to drive up the global food demand. This is expected to see gross agricultural outputs increase by 25 per cent between 2022 and 2050.[14]

Yet climate change and the increasing demand for food and fibre production that can demonstrate clean, sustainable and ethical practices[15] means we will need to produce more, from less. This is highlighted through initiatives led by the UN including the development of Sustainable Development Goals, which look at ensuring sustainable food production systems that can survive climate change and extreme weather.[16] FAO analysis shows that the arable land requirements to meet the global population's food demands in 2050, may exceed the available suitable area due to urbanisation, degradation and climate change – even under a 'towards sustainability' scenario.[17] To meet all of these challenges, the FAO says bold changes to improve agricultural ecological efficiency will be required.

Regulatory pressures

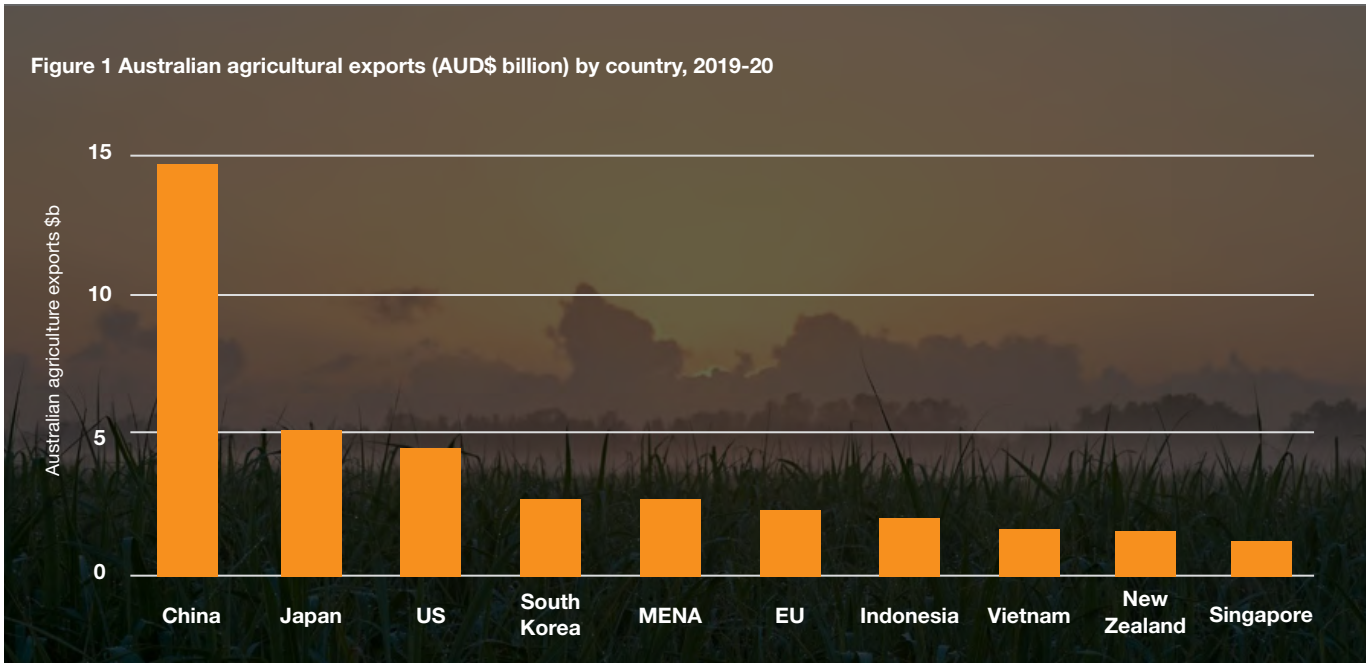
As the world looks to meet the collective challenge to feed the planet while mitigating climate change, enhancing biodiversity and reducing degradation, agricultural produce will be subject to more rigorous sustainability requirements. If unaddressed, this could pose significant cost implications and restrict market access for agricultural exporting nations that fail to keep pace.

The challenge of more rigorous sustainability requirements is quickly appearing on the horizon. Australia's trading partners are increasingly considering climate change, their net zero commitments and nature loss by introducing initiatives that set out sustainability requirements for all participants in the food and fibre supply chain. Below we highlight pressures in five of our top 10 export markets, which Figure 1 shows comprise more than $39 billion in exports and 79 per cent of our agriculture exports. While not the largest export market for Australian agricultural produce, the EU is a focus here because of how advanced it is in its sustainability policy development and because there is a perception that the EU's efforts and clout may result in European policies becoming the globally accepted approach. There is also movement in Australia's other priority trade regions. Across Asia, governments are setting strategies that will impact exports bound for those markets and we highlight these below too.

The European Union

The EU is significantly advanced in implementing policies and strategies that seek to transform agriculture in Europe by 2030. Considerations for sustainable, ethical and traceable agricultural products are already shaping discussions around trade agreements, as the EU looks to apply similar levels of standards to domestic and international producers. Below sets out a raft of developments within the EU that demonstrate these developments.

Figure 1 Australian agricultural exports (AUD$ billion) by country, 2019-20



Note: Includes cattle, crop, sheep, wine, horticulture, dairy, wool, seafood and cotton exports. MENA = Middle East and North Africa.

Source: Rural Bank 2019-20 Australian Agricultural Trade

The European Green Deal and the subsequent Farm to Fork Strategy (2020-23) outline ambitious goals for a comprehensive sustainability framework for food production and distribution, which could result in tariff and non-tariff barriers to trade. Some examples of requirements set by the EU which create barriers for Australian exports include:

- Australian canola exports have had to adjust their use of the chemical omethoate to meet standards in the EU, the biggest importer of Australian canola.[18]
- The EU is also planning to follow Vietnam[19] and phase out the use of glyphosate, which is a herbicide used to control weeds and grass and has been linked to negative human health and environmental impacts. However, a ban on glyphosate, could result in losses of up to 57 per cent per year for producers due to weed control costs and decreases in crop yield.[20]

Further to these requirements, the EU Corporate Sustainability Reporting Directive and the related European Sustainability Reporting Standards, oblige companies (including the subsidiaries and branches of non-EU entities) to provide detailed sustainability disclosures including on biodiversity aspects (often along the upstream value chain) alongside their financial reports. There is also the Corporate Due Diligence Directive, which obliges companies to assess and manage environmental and human rights risks in their value chains. Australian agricultural producers may be affected by these frameworks if they are part of EU value chains and will be asked by their EU buyers to provide detailed information so that their EU customers can fulfil their reporting obligations.

The EU is also encouraging market participants to go beyond the minimum requirements specified in regulation. Established in 2021, the EU's voluntary Code of Conduct for Responsible Food Business and Marketing Practices commits organisations to improve their operations' sustainability. More than 78 organisations, including food processors and retailers such as Nestle and Coca-Cola Europe have signed up to the code.[21]

Sustainability demands for agriculture are likely to continue increasing. While agriculture is currently exempt from the EU's Emissions Trading System and therefore the Carbon Border Adjustment Mechanism, Australian producers view there being a risk that in the future it will be included.

Finally, in a move to help meet the above climate, energy and sustainability goals, the EU is creating the EU Taxonomy classification system to establish a list of environmentally sustainable economic activities.[22] This aims to provide a clear definition of what is 'sustainable' and will encourage, for example, financial institutions to include businesses that are 'Taxonomy-aligned' in sustainable or ESG-marketed investment products. In March 2022, a draft definition of what constitutes 'sustainable' was put forward for the EU's consideration, including for agriculture.[23]

The implication is these sustainability definitions could affect which Australian farms receive finance, particularly where that involves European financial institutional funds, given that Australian agricultural producers are part of a globalised finance system. This could become increasingly the case in the longer term if the EU Taxonomy is adopted more broadly across the global financial system.

The United Kingdom

In negotiating the recent Australia-UK Free Trade Agreement (FTA), public concerns were raised in the UK about Australia's animal welfare conditions and Australia's use of deforested land for agriculture.[24] As a result, under the FTA, Australian agricultural exports into the UK can be restricted if they do not meet UK standards on animal welfare and environmental protection. The UK and Australia have obligations under their FTA to uphold their statutory obligations, which provide for high levels of environmental protections and ensure a level playing field between domestic and international producers.[25]

Singapore

In 2021, Singapore, released its comprehensive national plan for sustainable development – *Green Plan 2030*. The plan recognises Singapore's reliance on imported food products and sets an aim of meeting 30 per cent of its food needs through locally produced food by 2030.[26] The plan aims to do so in a sustainable manner and has invested over US$23 million in research and development (R&D) in sustainable urban food production. Singapore's renewed focus on meeting its growing food demand through sustainable, local farming will impact Australia's agricultural market share.

Japan

Japan in 2021 introduced its *Green Food System Strategy* (the Strategy).[27] The Strategy – driven by the private sector – reflects the demand for more transparency into the sustainability credentials of food products. The Strategy aims to achieve net-zero emissions in agriculture by 2050 and encourages imports of sustainably and ethically produced ingredients. Since its introduction, more Japanese investors and importers are integrating the Strategy into their investment and purchasing decisions.[28]

The United States

In the US, sustainability requirements are largely being driven by targets set by large companies and retailers, (a more detailed discussion on this is included later in this chapter), rather than by governments. The US government is looking to create policy environment for change, as highlighted with a recently released draft national strategy for a US National Capital Accounting System.[29]

Buyer expectations

Beyond governments, large companies and retailers around the world have put in place their own sustainability commitments, with consequent changes going beyond the individual organisation to across the entire supply chain to meet input traceability reporting requirements. Examples of such initiatives include the below, all of whom buy Australian food and fibre.

- Heineken has committed to decarbonising its production by 2030 and its full value chain by 2040.[30] It has also committed to restoring water balance and reducing water usage for breweries in water-stressed areas by 2030.[31]
- Unilever has introduced a Regenerative Agriculture Code for all suppliers, that builds on the company's Sustainable Agriculture Code and incorporates farming practices aimed at rebuilding critical resources,[32] improving soil health, biodiversity, carbon sequestration, and water and air quality.[33]
- Cargill has made several commitments to improving natural capital focused on protecting forests, promoting sustainable agriculture and reducing their environmental impact. As part of Cargill's pledge to end deforestation across their supply chain, they have committed to halving deforestation by 2020 and end deforestation by 2030.[34]
- PepsiCo is undertaking a Positive Agriculture initiative that focuses on creating more sustainable agriculture systems through three major goals – sustainably sourcing, regenerative agriculture and improved livelihoods. By 2030, PepsiCo aims to ensure that all of its key ingredients are sustainably-sourced, and to spread the adoption of regenerative farming practices to all land used globally to grow key crops and ingredients used in Pepsi products.[35] The company is also supporting regenerative agricultural practices aimed at improving soil health, carbon sequestration, watershed health and biodiversity.[36]
- McCain has pledged to use only sustainably-farmed potatoes by 2030[37] and has committed to farming practices that promote soil health and quality, naturally prevent plant diseases and improve crop resilience to climate variability.[38]
- Adidas targets include 90 per cent of its articles being sustainable (defined as showing environmental benefits over conventional articles) and reducing greenhouse gas (GHG) emissions by 15 per cent by 2025, and being climate-neutral across its entire value chain by 2050.[39]

To grow as an industry, it is important for producers to keep pace with evolving consumer demands around demonstrating provenance and sustainability of their produce. This is even more pertinent due to the public perception that products like beef, pork, poultry, dairy and lamb, which make up a significant proportion of Australian agricultural exports, have the most negative impact on the environment.[40]

Currently, provenance and environmental credentials may seem largely limited to the EU market, but there is an important role for governments and industry to play in preparing and supporting producers as consumers around the world become increasingly aware of the impact of food production on climate change. There is an opportunity for producers to better capture the full value of traceability. Many Australian producers are already meeting and exceeding importer requirements, however this can be supported by improved coordination and consistent requirements across the supply chain,[41] as well as increased financing to help producers effectively and efficiently demonstrate their biosecurity and production credentials.[42] Better cohesion and cross-sectoral understanding across the supply chain – including through improved system interoperability – will ensure all are able to realise benefits.[43] Ireland's Origin Green program[44] (see Case study 1 for more detail) demonstrates the benefits of a national food sustainability program that takes a whole-of-supply chain view to improving food production and exports. Origin Green enables producers to understand changes in farm performance over time through regular audits, which then enables them to reap the benefits of adopting natural capital-positive practices.

Case Study 1

Origin Green - the world's first national food sustainability program

For Ireland's Origin Green[58] program, consumer demand for traceability was catalytic to its development. While built on individual industry frameworks, the Irish beef industry's experience provides insight into how the Origin Green Sustainable Assurance Schemes' developed. In 2001, the foot and mouth disease outbreak in the UK created great demand for imported beef. Being a neighbouring country, Ireland was an ideal candidate. However UK retailers, such as Tesco and Sainsbury's, demanded quality assurance of Irish beef products and required information on animal health and welfare. By using its beef traceability and quality assurance scheme, Ireland was able to meet buyers' demands and saw a resulting surge in beef exports to the UK (sales almost trebled between 2001 and 2006). Over time retailers' requirements evolved with the largest buyers of Irish beef, McDonalds and Tesco, setting robust quality assurance schemes that suppliers need to comply with.[59] Ireland's reliance on exports and increasing demands from retailers and wholesalers subsequently led to the development of a national beef sustainability framework. Over time, this evolved into the beef industry's input into what is now known as the Origin Green program.

Today, the Origin Green program operates across the entire food production supply chain to help the industry set and achieve measurable sustainability targets. Origin Green's Sustainable Assurance Schemes enables on-farm audits and provides verification for food manufacturers and retailers. While not all producers participate in the program, there are over 55,000 farm-level members of the Sustainable Assurance Schemes across agricultural industries with very high levels of producer participation including beef and lamb farmers (92%), dairy farmers (95%), horticulture (70%) and eggs (95%). Schemes are also being developed for poultry and pig products.[60] Verified Origin Green members account for 90% of Irish food and drink exports and over 70% of the domestic retail market.

Origin Green has evolved to introduce programs that use on-farm audit data to provide support and guidance to producers. In 2019, the program started using audit data to generate producer feedback reports which include on-farm analysis of:

- general farm performance
- carbon footprint
- greenhouse gases
- nutrient management
- grassland management
- farm health and safety.

Audits take place every 18 months and the producer feedback reports detail how farm performance has changed since the last audit, and provide advice and feedback on how to improve against these metrics. Over 100 Origin Green auditors undertake 650 weekly on-farm assessments where they measure performance against sustainability criteria, including greenhouse gas emissions, biodiversity, water use, energy efficiency, soil management and socio-economic factors. Origin Green auditors gather data during the audit process to assess the environmental performance of quality-assured farms via a carbon footprint calculation.

At the farm level, Origin Green provides accreditation to ISO: 17065, which ensures the competence of an accreditation body in providing verification for the quality of products, processes and services[61], and Carbon Trust (PAS 2050), which is the internationally-recognised environmental standard to measure lifecycle GHG emissions.[62]

In addition to growing and maintaining the competitiveness of its agriculture sector, the success of the program is demonstrated through improvement in sustainability metrics for farms participating in Sustainable Assurance Schemes, for example in 2014:

- cattle farms saw an average of five per cent reduction in CO2 per unit of beef produced
- dairy farms saw an average of nine per cent reduction in CO2 per unit of milk produced.[63]

The Origin Green program continues to evolve and improve, but as the world's only national food sustainability program it provides a useful reference point as more of the world looks to emulate such frameworks.

Investor pressure

The global landscape on environmental, social and governance (ESG) performance and ambitions to address climate change is further accelerating this movement. Investors are demanding urgent action from company leaders to lay out long-term plans on ESG goals and the journey to net zero. The formation of the Glasgow Financial Alliance for Net Zero — a group of 450 financial firms across 45 countries responsible for assets of over US$130 trillion — in 2021 highlights the momentum for decarbonisation.[45] Investor demand is being fuelled not just by the need to do the right thing socially but also by the beneficial commercial outcomes, which include lower costs of capital.[46] It is not enough for companies to simply articulate a comprehensive strategy. They have to show progress in meeting aggressive goals and provide transparent and comprehensive reporting. Investors are increasingly expecting to see non-financial ESG metrics fully integrated into financial reports (in some jurisdictions, such as the EU, this is no longer a voluntary choice, but a regulated obligation). This sentiment was reiterated in a recent PwC survey of asset managers and investors, in which 80 per cent of the respondents said ESG was an important factor in their investment decision-making and almost 70 per cent thought ESG factors should figure into executive compensation targets.[47]

The development of global frameworks highlights the pace at which the ESG and climate change reporting landscape is evolving and maturing. Examples include:

- **The Taskforce on Climate-Related Financial Disclosures (TCFD),** created in 2015 by the Financial Stability Board, aims to move climate-related disclosures into mainstream reporting and away from standalone sustainability reports, thereby elevating such disclosures to require the same rigorous governance processes as financial reporting. The TCFD framework is based on four pillars: governance, strategy, risk management, and metrics and targets. The 2021 Status Report shows that disclosure of climate-related financial information aligned with the TCFD recommendations has been increasing year on year, growing nine per cent between 2019 and 2020.[48] In 2021, TCFD supporters increased to approximately 89 countries and jurisdictions and included most sectors of the economy, with a combined market capitalisation of more than US$25.1 trillion – a 99 per cent increase since 2020[49] – demonstrating the global momentum around climate-related reporting.
- **The Taskforce on Nature-Related Financial Disclosures (TNFD),** launched in 2021, use the same four pillars as the TCFD, but aims to deliver a risk management and disclosure framework for organisations to report and act on nature-related risks and opportunities, with the ultimate aim of supporting a shift in global financial flows toward nature-positive outcomes. The UN Environment Programme Finance Initiative, the UN Development Programme, the World Wildlife Fund and Global Canopy are founding partners of the TNFD.
- **The International Sustainability Standards Board (ISSB),** created in 2021 under the International Financial Reporting Standards, provides a comprehensive global baseline of high-quality sustainability disclosure standards to meet investors' information needs. In March, two of the most prominent ESG reporting frameworks, the IFRS Foundation and the Global Reporting Initiative (GRI), agreed to align their capital market standards for sustainability disclosure. The ISSB has indicated plans to build on the Sustainability Accounting Standards Board's (SASB) industry-based approach to developing standards.[50] The SASB identifies the most relevant ESG risks for individual industries including agricultural products. SASB standards for agricultural products aim to manage sustainability risks across the entire supply chain to help companies meet their disclosure requirements.[51]

Given the reliance of the Australian agriculture sector on exports, current and prospective developments in Australia's key export markets will undoubtedly shape the future of Australian agriculture. Focus on ESG performance and addressing climate change and nature loss is expected to increase and ultimately become integral to decision-making in international trade. The Australian agricultural sector needs to be agile and adaptable to better adjust to changes in the market and demonstrate resilience in an increasingly complex trade landscape.

1.3 The risk of inaction is significant

Australia is well-positioned within growing global markets and is considered one of the leading producers and exporters of agricultural products.[52] This advantageous position is, in part, a result of the agriculture sector's past investments in responding to emerging issues. One example of this is the Australian red meat industry. To pre-empt current and future market expectations related to environmental credentials, the red meat industry in Australia has taken action to reduce greenhouse gas emissions – targeting carbon neutrality by 2030. These and other actions have seen the agricultural sector make significant contributions to reducing greenhouse gas emissions, more than any other sector in the Australian economy.[53]

Australia's strong position is reinforced through established trade channels and FTAs. The Australian brand is built on high-quality and safe agricultural produce – however, as highlighted earlier in this section, there are challenges that threaten Australia's reputation as concerns around food production evolve from food safety to sustainability in the developed world.

To address these concerns and potentially even emphasise a competitive advantage, more robust and standardised quantification of the sustainability of Australian agriculture is needed. Among other sustainability aspects of farming, its relationship with biodiversity and natural capital more broadly are key aspects. Nature-positive farming practices present a significant opportunity for sustaining productivity and demonstrating sustainability credentials to better position Australian produce in global markets.

However, Australian producers currently have no way of quantifying natural capital – something that goes to the heart of sustainable production – on their farms. By quantifying a farm's natural capital, each farm can have information about whether they are consuming their natural capital and are therefore unsustainable. They can then take steps to avoid or reverse this. Therefore, governments and industry need to do more to empower producers to measure their natural capital and work out whether there is a business case to broaden the implementation of natural capital-positive practices into their businesses.

Australian producers are well placed to support retailers and corporations in achieving their sustainability commitments and reporting obligations. However, to help justify producers taking a more strategic view of their natural capital to enable this, they must be given greater clarity of the costs and benefits of doing so. The responsibility of doing this does not rest solely with producers. Government, industry and other players along the value chain have a critical role to play in establishing this link to profitability and value capture for producers.

In the absence of action to address such challenges, Australian producers are likely to face significant reputational and compliance risk that could present potential barriers to overseas markets. Failure to meet and contribute to the international evolution of sustainability requirements could ultimately lead to loss of some market access – not only for direct agricultural exports, but also those industries that use agricultural products as inputs in their production.

This is especially concerning given the reliance of Australian agriculture on its key export markets, and could have significant financial repercussions for our producers, regional communities and downstream value chains.

To understand the potential scale of what is at risk, consider that Australian beef, pork, poultry, dairy and lamb exports to Japan, the US and the EU are worth $6.3 billion.[54] Consumers believe these food types have the most negative impact on the environment.[55] If we assume large corporates with sustainability and ESG-driven goals take 30 per cent[56] of these exports, then ~$1.8 billion of exports are at risk if no action is taken to meet these customers expectations. If this assumption was expanded and whole markets were to enforce sustainability reporting requirements, around 80 per cent of these export markets could be threatened resulting in a loss of up to $5.0 billion per year. This translates to a potential loss of up to 10 per cent of Australia's total agricultural exports.[57] These exports would need to find new markets, and with increased volumes going to those markets, this may mean lower returns for Australian exporters.

2 There are barriers that we need to overcome

2.1 Sustainability reporting requirements

As an export-driven industry, Australia's agricultural products are vulnerable to shifts in overseas policy and market regulations. The advancement of sustainability requirements in the global trade landscape will set a higher bar for Australian food and fibre exports to clear. To maintain competitiveness and market access, the Australian agricultural industry will need to continue to adapt to policy and market fluctuations and ensure compliance with relevant requirements overseas. The challenge for Australian producers is that the sustainability reporting requirements are not always aligned with Australian ecosystems. The requirements can be complex and inconsistent across jurisdictions, and present significant cost implications.

The challenges of meeting some market access requirements

Australia's export markets such as the EU and the UK have developed their discrete sustainability requirements to meet their domestic sustainability and net zero commitments, but these requirements have wider repercussions for Australian exports.

As Australia's export partners ramp up sustainable agriculture expectations and sustainability reporting requirements, they are likely to hold their international trade partners to the same level of sustainability standards as domestic producers.

This is evident in international requirements which, at times, have been highly prescriptive on agricultural production methods including in relation to:

- Chemical use and residue, such as the toxic herbicides – glyphosate and paraquat, which is banned in 32 countries worldwide including China and the EU.[64]
- Live animal export ban in a growing list of countries including New Zealand (NZ)[65] and China amidst increasing animal welfare requirements.
- Environmental protection, land use and deforestation considerations as demonstrated by new EU law promoting the consumption of deforestation-free products.[66]

The risk in mandating such requirements is that, at times, they will not have the desired outcomes in the Australian climate and geography. Producers will be presented with the challenge of meeting overseas requirements to maintain access to overseas markets while ensuring their farming practices don't have a detrimental impact on their farms. For example, the EU introduced Product Environmental Footprint (PEF) labels, which categorise products based on their environmental impact and take into account factors such as water and land use.[67] The labelling is intended to guide consumers towards choosing the most sustainable products. The methodology used for PEF labels consider life cycle assessments, which focuses on measuring the harmful impacts of a product but makes no attempt to account for positive impacts.

The methodology has faced criticism for being misleading, particularly in the context of the agri-food system. For example, the PEF methodology favours more intensive farming methods over extensive agricultural practices, scoring organic and free-range eggs lower than eggs from caged hens.[68] Similarly, PEF can be counterintuitive in relation to wool and other natural fibre products, which can present challenges for Australia's wool industry.[69] Under PEF, Australian wool producers are penalised for water and land use, but are not rewarded for the fact that wool is renewable, fully biodegradable and releases its nutrients back into the soil. As a result, wool is graded lower than synthetic fibres derived from fossil fuels as the current PEF methodology overlooks some of the negative impacts of microplastics associated with synthetic fibres.[70] A blanket application of PEF requirements in Australia presents a risk of greenwashing as it would deter wool production and disregard the positive agricultural practices employed by wool producers, favouring synthetic products which have an undesirable outcome on the environment.

Sustainability requirements are complex and inconsistent

What is considered sustainable varies in its definition, understanding and application across countries (although a key definition has been established by the FAO[71] and as discussed in Section 1.2, the EU Taxonomy seeks to define sustainable activities).

Requirements for certifications and accreditations of sustainability can be complex and vary across countries depending on the policy and market regimes. Similarly, ESG reporting targets and sustainability commitments often vary across companies (as discussed above) as there is no standardised approach for companies to develop their sustainable sourcing strategies for inputs (although some jurisdictions such as the UK and NZ are beginning to mandate common sustainability reporting standards).

Producers who produce multiple products or supply to various buyers need to understand and address extensive and varied criteria. The lack of harmonisation across continually evolving sustainability requirements can create confusion and present challenges for the food and fibre sector, particularly producers who often have to contend with practical implications of these requirements. This is particularly an issue for smaller-scale producers who may not be familiar with overseas or international sustainability requirements and do not have pre-existing relationships with certified value chains, which can help them navigate accreditation and certifications.[72] Our consultations with producers (see Case Study 2) who have transitioned their farms to a more environmentally sustainable system state that having a standardised set of rules and certification would help them navigate inconsistent rules and support in the realisation of market premiums.

Case Study 2

Farmer Allen*

Allen runs a family owned and operated mixed livestock and crop farm which was severely impacted during periods of drought. Allen realised he needed to adjust his farming practices to make his farm and family more resilient to the impacts of climate change. Allen aspires to prioritise producing nutritious food over yield, to be financially viable and stable, to leave the land in a better state than he found it, and to feel more connected to family and friends in the local community.

In Allen's experience, the initial transition phase was the most difficult and emphasised the need to have a transition plan in place. He noted that the transition for livestock farming was more straightforward than cropping, as the process of improving soil health is more involved and gradual.

Some of the challenges and barriers noted by Allen include:

- Profitability is a significant motivating factor for most farmers – farmers can be reluctant to take on the costs and risks associated with adopting unfamiliar practices.
- The initial transitioning process can be daunting and difficult for farmers. More research on natural capital measurement and practical case examples of other farmers integrating natural-capital positive practices into farming can support this transitioning process.
- Having a standardised set of rules would help. Some kind of certification for a farm that is adopting more sustainable farming approaches would be beneficial, especially as consumers might pay a higher premium for products that are working to a more sustainable future and increasing their focus on natural capital.

Note: *Producer case study is based on 2021 interviews with Australian producers and has been de-identified.

Meeting international sustainability requirements can be costly

Australia has a reputation for producing high-quality exports, however, this comes with a considerable cost associated with meeting food standards and regulations in both domestic and international markets. In some industries, this cost is considerably higher compared to other countries. For instance, compared to other beef exporting countries such as the US, Brazil and Argentina, the Australian beef industry has the highest operating cost due to government regulatory costs associated with overseas certification requirements.[73]

Australia is also one of the few countries where full cost recovery is charged to the processor[74] and presumably passed on to the producer. In the case of beef products, certification costs more than $7 per head for Australian beef processors, compared to under $1.50 per head in the US and less than $0.50 per head in Brazil.

Under the Australian Government's *Cost Recovery Guidelines*, regulatory charging is considered appropriate as the export regulatory activity is provided to a distinct group of individuals and organisations that participate in the agriculture, food and fibre export supply chain.[75]

Australian agricultural export producers directly bear the fees and charges associated with export certification services. In the absence of financial support mechanisms or changes to the way such charges are shared across the community, producers are likely to incur additional compliance costs to meet overseas sustainability requirements set by their trading partners. Along with high processing costs, this threatens to place Australia at a competitive price disadvantage against its competitors.

2.2 Collection, measurement and reporting of data

Robust and reliable data is imperative to effectively monitor and report on sustainability outcomes and track the productivity and profitability of farms over time. It is not enough to make databases public – the value of data needs to flow down to producers by ensuring that data is suitable for producers' use to enable better decision making. Data is also crucial in enabling enhanced traceability captured through provenance information, in accessing finance based on sustainable practices, and in establishing benchmarks for natural capital. Despite the significance of agricultural supply chain data, there is no universally agreed set of data standards or infrastructure used to communicate across the supply chain or across commodities.[76]

Customers are demanding greater traceability across the agricultural supply chain

Heightened environmental and social awareness among consumers is driving the demand for sustainable and traceable products. Increasingly, consumers want to know more about the food they eat and how it is produced, and are willing to pay extra for greater visibility of the end-to-end process of food products they consume. This is demonstrated by the growth of Europe's organic food market, which has doubled over the last decade. Studies have found that more than 70 per cent of consumers place increasing importance on information about how food and ingredients are manufactured, prepared and handled.[77] In markets such as the US, certified 'grass-fed beef' gains an additional $1 per kilogram, while in China consumers are willing to pay a premium of more than 20 per cent for beef if it has been digitally traced and certified. The CBH Group exports sustainable malting barley to Vietnam, attracting a $5 premium per tonne for barley growers accredited through the International Sustainability and Carbon Certification scheme.[78]

Retailers are responding to this evolving demand by evaluating their supply chain practices, implementing digital strategies to improve traceability, and pursuing branding strategies to communicate product provenance information. However, the benefit of higher wholesale prices received by processors or premium prices paid by consumers often do not flow back to the producers (see section 2.4).[79]

As demand for information on the production and distribution of agri-product grows, producers will increasingly rely on traceability to enhance visibility of their practices and validate the footprint of their products where possible. However, implementing these practices are inevitably expensive and logistically difficult.

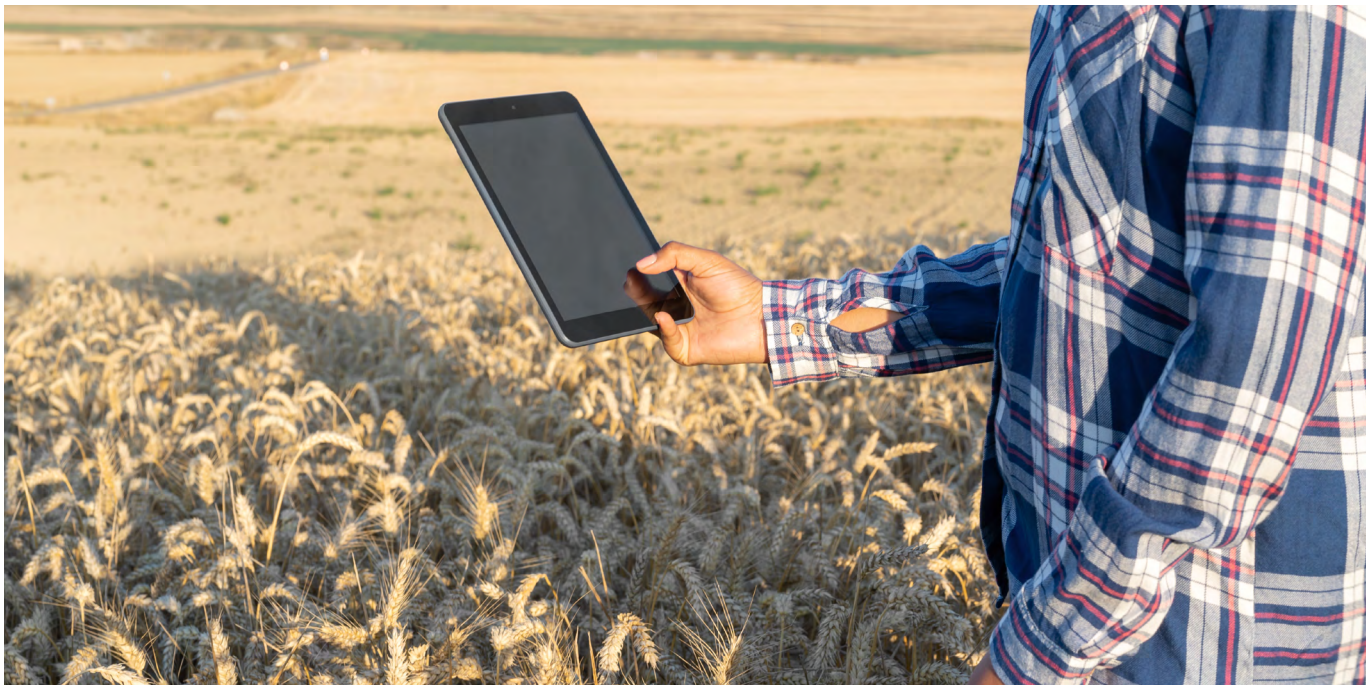
An emphasis on traceability comes with inherent challenges, and products such as grains, for example, have additional challenges when it comes to traceability as they are a bulk commodity. Grain producers might have oversight of their product at the farm level, but there are challenges associated with grains from different farms and regions being stored and exported in bulk.

Agricultural traceability is reliant on rigorous tracking of supply chain data to provide visibility, assure sustainability attributes, improve food biosafety and reduce the risk of food fraud. But while expensive and complicated, it is possible. The National Livestock Identification System (NLIS) is a successful example of traceability in beef products. The NLIS identifies and traces on-farm cattle, sheep and goats, and provides assurance on biosecurity and food safety of Australian meat. As sustainability gains further importance in international trade, traceability will be vital to validate performance against ESG and other sustainability measures. In addition to traceability, the NLIS provides real-time data that can help manage on-farm livestock.[80] Thanks to the investment into new technologies, MLA is continually improving on traceability through R&D. An example of this is a pilot that uses trace elements and isotopes to track the origin of red meat products. This will scientifically distinguish beef and lamb produced in Australia from meat produced in other countries.[81]

Producers are at a disadvantage due to a lack of long-term data. Although many Australian producers implement sustainable practices, data that demonstrates this is often not captured or, if captured, not well structured or tracked over time. There is a need for better cohesion and cross-sectoral understanding across the supply chain – including through improved system interoperability – to ensure all are able to realise benefits. There is an opportunity to increase trust and transparency by reimagining how data is collected across the supply chain. Meeting the demand for improved traceability and realising its associated benefits requires government and industry to transform existing information sharing arrangements to achieve better cross-visibility of business-to-business and business-to-government data flows.[82]

Access to cost-effective finance may become more dependent on demonstrating sustainable practices

ESG reporting has gained significant traction and has become the way in which organisations disclose performance against key sustainability metrics. Increasingly, investors are placing more importance on the demonstration of ESG performance as a key consideration for and attractiveness of investments. Internationally recognised tools and frameworks such as the TCFD and TNFD (see section 1.2) have been established to support organisations and investors navigate the growing and changing sustainability landscape. By employing these factors in decision-making, investors and financiers can assess and determine the risks and growth opportunities within a sustainability context.[83]



As a standard course of business, rural bank managers currently assess the riskiness of their loans based on their customers' practices. While not widespread, there are examples of businesses that are able to access cheaper finance as they demonstrate sustainability. This was recently echoed by the Australian Banking Association which noted that Australian agriculture businesses demonstrating sustainability outcomes are accessing cheaper finance.[84] This is important as outcome measures are more effective and preferable for producers and financiers compared to a focus on practices which could inhibit producer autonomy and stifle innovation.

Availability of timely data that demonstrates sustainable outcomes will be vital to producers' ability to access lower-cost financing to enable this transition. Data is also needed for the development of robust insurance markets that tackle uncertainties about future climate. This is highlighted in studies that outline the importance of developing drought insurance markets to manage producers' exposure to drought risk. Drought insurance markets are yet to achieve commercial viability and require improvements in data to support new approaches including parametric or 'index-based' insurance.[85]

Benchmarking data on natural capital is underdeveloped

Producers need long-term data to understand their natural capital and undertake benchmarking exercises to determine farm productivity and profitability over time, support informed operational decision-making and gauge performance against industry benchmarks. Benchmarking can be either indirect — where producers calculate their own performance indicators and compare them against published industry benchmarks — or direct — where producers contribute their farm information into a service that generates the benchmarks for comparison with other producers.[86]

Farms, like any other business, need relevant and practical facts and statistics to understand what practices generate the maximum value for them. The importance of data for benchmarking was echoed during consultations with producers (see Case Study 3). Producer consultations highlighted that benchmarking, in conjunction with new tools and technologies, allows producers to understand their relative performance.

Benchmarking requires continuous measurement of practices to understand the costs and benefits of new technologies over time and allow comparison with best-practice farms. This is particularly important for smaller farms as benchmarking and performance data enables them to borrow good ideas from the 'best in the business'.

While benchmarking services have matured over the years, there is currently a gap in using these services to assess natural capital as a factor of production.

Case Study 3

Farmer Barry*

Barry and his wife own and operate a livestock farm in the Southern Tablelands region of NSW. They have lived on the farm for more than 30 years, which has been passed down through generations. They mostly farm merino sheep and angora goats. They are mindful of chemicals used and animal welfare on farms.

Barry and his wife have integrated more sustainable farming practices focused on grazing management, which has improved the soil health on their farm. They emphasised the need for diverse pastures to increase resilience to the impacts of climate variability. In their transition to more natural capital-positive practices, these are some of the challenges and barriers Barry noted:

- Generating baseline data is essential but requires significant investment by farmers.
- Benchmarking data is lacking but is important for farmers to understand their relative performance.
- Technology and tools to measure and track farm performance are perceived as costly but are becoming more affordable and will allow farmers to better assess their performance.
- A lot of the work involved with improving natural capital sits with farmers. More support for farmers is required to enable better management of natural capital.

Note: *Producer case study is based on 2021 interviews with Australian producers and has been de-identified.

There is an opportunity to improve both the availability and knowledge of natural capital measurement in mainstream benchmarking services. Making natural capital measurement benchmarks available in free, easy-to-access datasets is key, but on its own this is not enough. As the measures are based on specialised science and analysis, farm managers and their advisors will need to be upskilled in its interpretation and implications. Together these changes could address the maturity gap and empower more producers to undertake on-farm benchmarking.

2.3 Incorporating positive natural capital practices into mainstream farming

Our understanding of the role of natural capital in farming continues to develop. The pathway to incorporating positive natural capital practices into mainstream farming is complex and requires clarity and cohesion. Some of the key barriers producers face when trying to integrate natural capital-positive practices are the lack of clarity around benefits to them, the real and perceived costs and risks associated with adopting new practices and technologies, and the information asymmetry that impede producers' understanding and uptake of these practices.

There is a lack of clarity on benefits for producers

There is growing evidence that producers who invest in and implement natural capital-positive practices could see improved profits, increased resilience to climate change, greater market access and improved producer well-being.[87,88] However, the link to profitability for producers isn't always clear. A producer survey conducted by the World Economic Forum (WEF survey) highlighted that four out of five producers surveyed viewed sustainability as a necessity and the future of farming, but only two out of five viewed it as a driver of profitability. The WEF survey highlighted that poor understanding of the benefits associated with sustainable farming practices is likely to deter adoption – practices with positive economic perception scores of more than seven out of 10 were adopted by 60 per cent of the producers on average, compared to just six per cent adoption of practices with scores lower than five.[89] Analysis has shown that for every 10 per cent increase in producers' perception of economic benefits, the adoption of that practice increased by 16 per cent.[90]

More work is required to prove the case for investing in natural capital and to better demonstrate the economic benefits it could generate. Developing this evidence-base is critical to demonstrate and validate the economic value of natural capital-positive practices.

There are costs and risks involved with adopting unfamiliar practices and new technologies

There are costs and risks, both perceived and real, to producers associated with changing to unfamiliar practices and adoption of new technologies. In addition to the compliance costs associated with increased reporting and verification discussed above, the financial impact of changing deeply entrenched farming practices acts as a deterrent to change. Risks and costs are further exacerbated for small-scale producers with lower farm revenues. As highlighted during producer consultations, the transition process is challenging as it can require significant upfront costs while the investment returns are realised in the longer term (see Case Study 2 and 3). Support in the form of research and sharing of best practices is needed to help producers through the transition. The time lag between initial investment and payback in sustainable agriculture can vary depending on several of factors including the type of farming, the existing ecological condition of the land, and the historical management and input use.[91] During the first couple of years of the transition period, it is not uncommon for producers to experience lower yields and reduced profits.

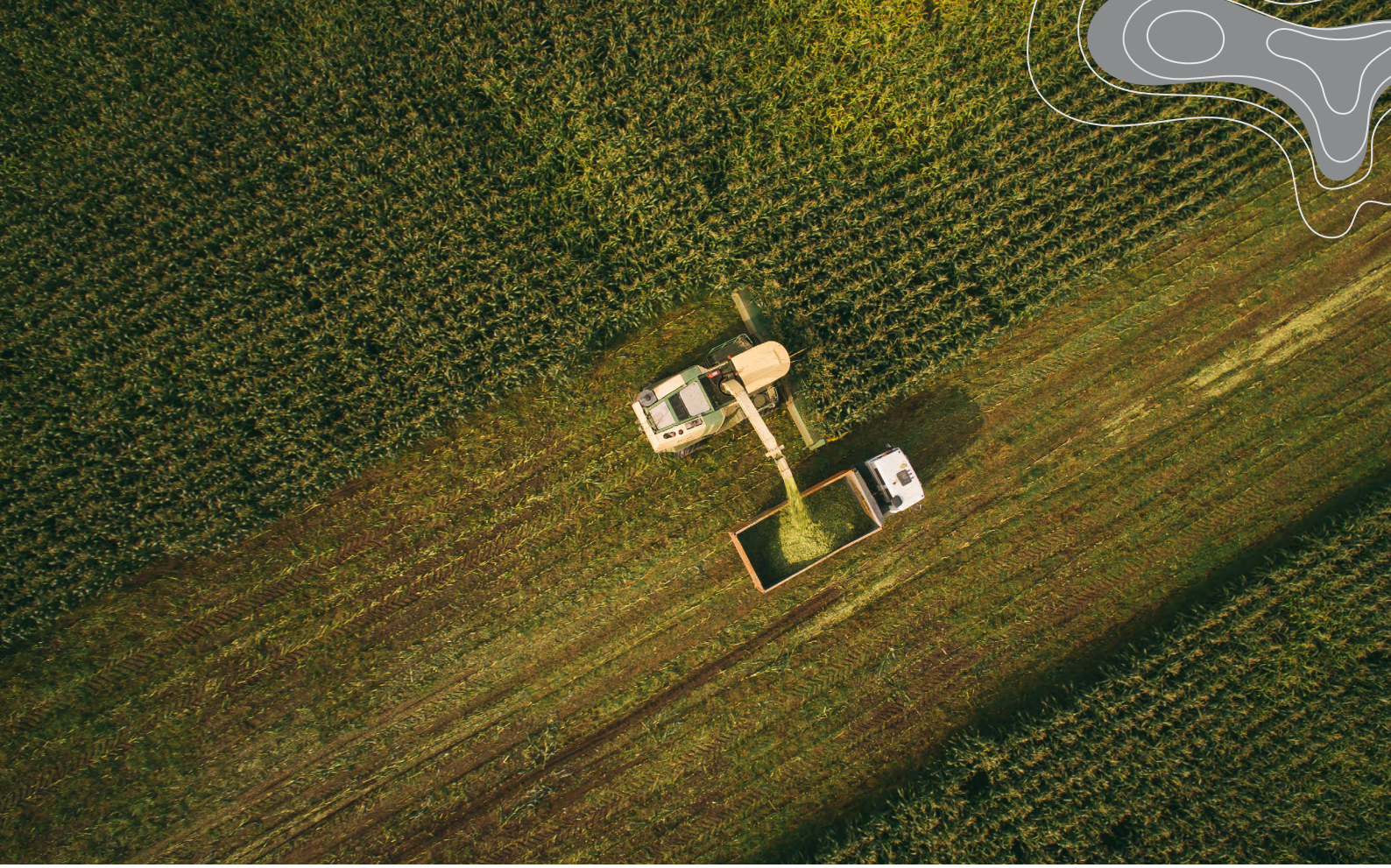
The cost, lack of compatibility between devices and challenges with transforming data into accessible information deter producers from adopting sustainable farming practices.[92] The use of new and emerging technologies has the potential to transform the agricultural industry. However, this relies on the ability of producers to not only afford but utilise these technologies available to them. To address this gap, training and access to relevant information will be key in supporting improved adoption.

Despite the cost imposition, some Australian producers have proactively adopted and implemented sustainability practices. It is vital that benefits such as lower-cost financing and price premiums enabled by traceability flow through the entire supply chain and are shared with producers. Producers need to be incentivised and supported through grants schemes that enable them to take on the costs and risk associated with adapting to more sustainable farm practices. This topic is covered in section 2.4.

Information complexity and transaction costs can deter change

The difficulty in accessing and understanding information on ecosystem service markets (such as markets for carbon credits) is a barrier to entry and has high transaction costs that in turn deters producers' from being able to generate additional income from meeting market demands. Within the sustainability landscape, policies and practices are evolving at a rapid pace and have significant implications for how producers manage their on-the-ground operations. In addition to implementing different practices, producers are also tasked with understanding the financial, legislative and scientific elements of these practices. Larger farm businesses with experience in adopting climate-smart practices may be at an advantage, while new and small farm businesses are less likely to find the time to comprehend what is required or to have the funds available to implement the changes.[93]

Without wide-reaching communication and distribution of information, there is a growing risk that producers will be deterred from partaking in the transition to a more sustainable farming future. This is evident through findings of the WEF survey, which reported that although producer interest in carbon sequestration is high, 76 per cent of the respondents cited the lack of information on how to participate in soil carbon programs.[94] Improving information dissemination and reducing the barriers to entry for smaller farm businesses through the administration of data, metrics and standards will be key to enabling widespread participation and adoption of sustainable and natural capital-positive practices.



2.4 Prices paid to producers have not always reflected costs of production

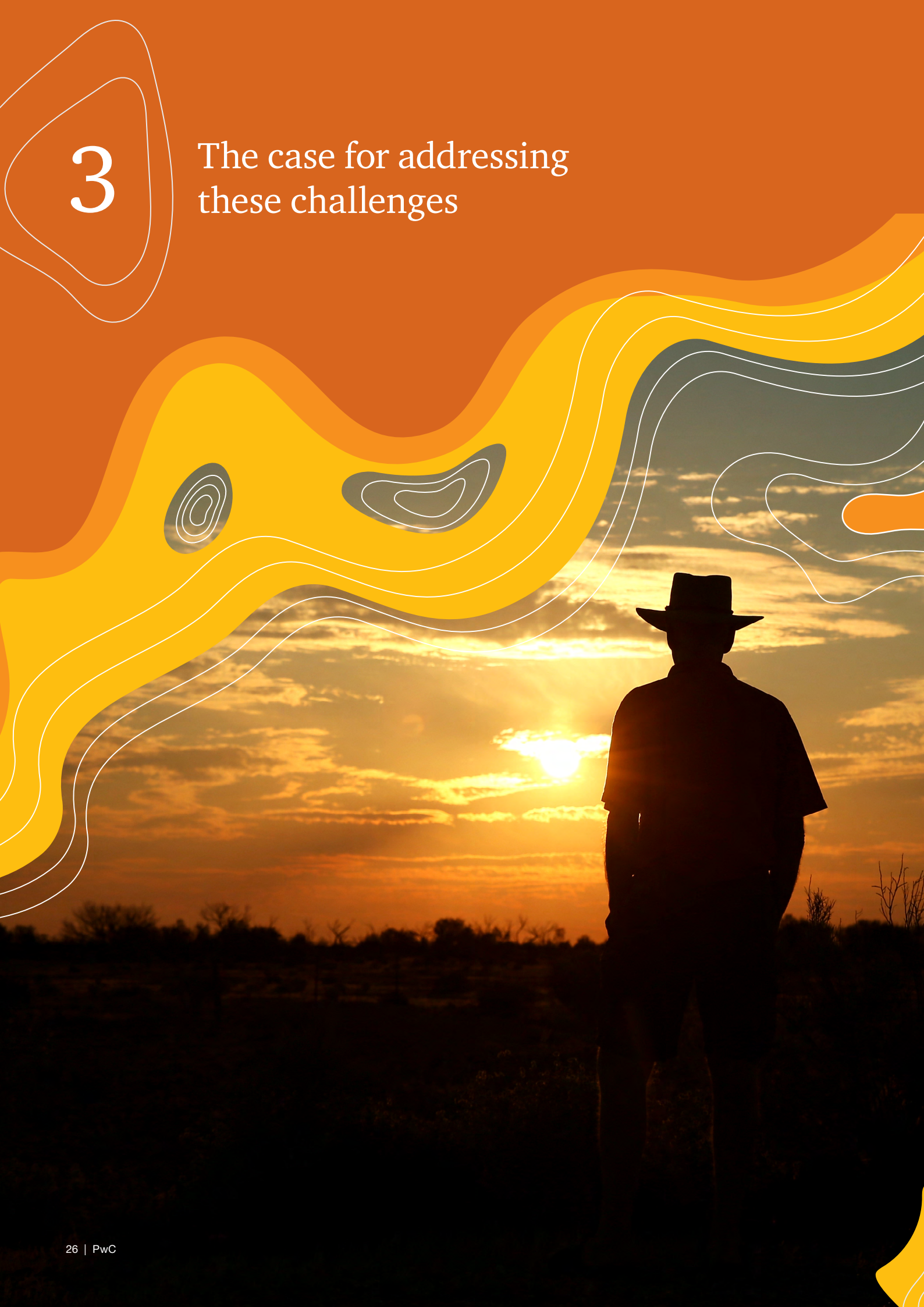
For producers to make the decision to invest in their natural capital, they need to be able to realise the returns. While enhanced natural capital improves environmental performance, which in turn can increase profitability,[95] there is also an opportunity for producers to achieve higher prices by meeting consumers' increased demands for sustainably-produced food and fibre. However just because consumers might be willing to pay a price premium, this does not necessarily mean the producer fairly shares in that price premium with all other parties in the supply chain. Due to the nature of some sections of the input supplier, processor and retailer markets of the agricultural supply chain (where scale is important to be competitive), there exists heightened levels of market concentration along the supply chain. The existence of market power has commonly given rise to an unequal distribution of returns to producers.

In Australia, a recent example of the dynamics of market power was seen in the dairy industry. Significant deregulation occurred in 2000, allowing dairy farmers and the broader industry to operate in an open market environment with little government intervention.[96] Throughout the 2010s, increasing competition amongst retailers saw consumer milk prices decline, placing increasing pressure on milk processors.

By 2015-16, retrospective reductions in milk prices by Australia's then two largest milk processors had significant, wide-ranging and detrimental effects on farm businesses.[97] The Australian Competition and Consumer Commission (ACCC) conducted an inquiry in 2016, finding market failure resulting from the strong bargaining power imbalance between processors and dairy farmers.[98] The ACCC made recommendations to improve transparency and the allocation of risk in the commercial relationship between dairy processors and farmers. Foremost amongst the recommendations was the introduction of a mandatory Code of Conduct to regulate the commercial relationships and improve the transparency of trading arrangements between farmers and milk processors.[99]

By supporting producers to change their production systems to take advantage of the potential market premiums and have access to more markets in general, it will give them more optionality to find a farm-gate price point that is fair recognition of the value they add and sustainable for their businesses. Nevertheless, bargaining power must continue to be monitored and action taken where required to ensure that returns are fairly shared.

3 The case for addressing these challenges



3.1 There are economic benefits to being an early mover

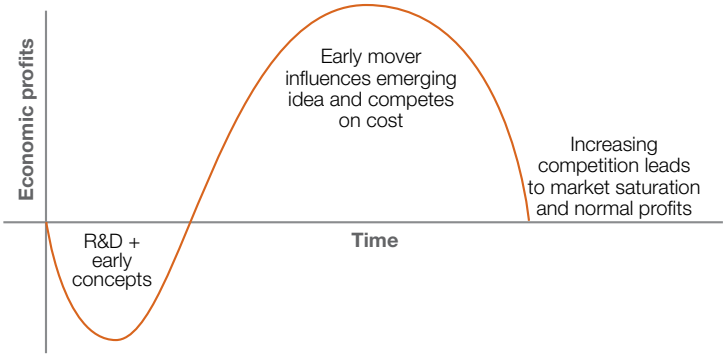
The interest in sustainable agriculture is gathering pace across the world, presenting Australia with the opportunity to work with its export partners to define the market for high-quality, sustainably-produced, natural capital-positive food and fibre.

In defining food and fibre sustainability standards, the EU has made significant progress in implementing policies and initiatives. Through policies such as the Farm to Fork Strategy and the EU Taxonomy, the EU is seeking to establish the definitions, rules and requirements for sustainable agriculture.[100] As countries beyond the EU begin to finesse what agricultural sustainability means for them, Australia should leverage its longstanding reputation as a reliable, high-quality agricultural exporter to become an early mover and take a leadership role in international forums and partnerships. There is an opportunity for early movers to consider the dominant design or emerging idea and then move in to help shape the idea before it is fully established.

An early mover has the advantage of influencing the design of an idea in a market that is well set up to grow in the future.[101]

Consider for example how, before the Codex Alimentarius (see Case Study 4), safely-produced food was not a market requirement. Before such an agreement was in place, products that could demonstrate and brand themselves as being safer would have attracted higher demand and higher prices.

Figure 2 Early mover advantages



Case Study 4

How the world developed an international food standard – Codex Alimentarius

Prior to the 1960s, no internationally-accepted food standard existed. Discrete food safety standards across countries began to be developed as food trade, including long-distance food transportation of frozen meat from Australia to the UK, picked up pace in the late 1800s. Countries acted independently and there was little, if any, consultation among them with a view to harmonisation. These gave rise to trade barriers.[102] Trade associations lobbied governments to harmonise minimum food safety standards and quality assurance. This led to a plethora of industry bodies emerging with rules specific to their own sector.[103]

Meanwhile consumer awareness of food quality and health hazards increased in the 1940s, as rapid progress in food science and technology was made and studies assessing the health impact of additives and chemicals used in food were released. Heightened concerns from food regulators, traders and consumers catalysed the need for international collaboration on establishing food safety standards and addressing knowledge gaps aimed at ensuring consumer safety.[104] In 1953, the World Health Assembly recommended that the FAO and World Health Organization (WHO) conduct further investigations to address the public health risks associated with the widening use of chemicals in food.

In 1961, the FAO passed a resolution to set up the Codex Alimentarius Commission (CAC).

The CAC is now the internationally-recognised food standards-setting body. The international food standards, known as Codex Alimentarius,[105] are aimed at:

- Protecting the health of consumers.
- Ensuring fair international food trade.
- Developing standards based on sound scientific principles.

Codex Alimentarius is not a substitute for national regulation or legislation, but guides and promotes the establishment of definitions and requirements for foods to assist in their harmonisation. In doing so, it facilitates international trade. CAC coordinates input from 188 countries and the EU and is recognised by the World Trade Organization.[106]

Codex Alimentarius was established in the span of a few years but it has continued to evolve. Today, the principles and guidance provided in Codex Alimentarius are embedded in national legislations and regulations. Since its formation, member nations have continued to contribute through scientific studies that improve health and safety issues and address export requirements. As outlined during the 2021 UN Food Summit, Codex Alimentarius *'represents global agreement and a scientific base about what is important, how to measure it, and how countries can comply with global export requirements.'*[107]

With the introduction of an agreement on what constitutes safe in food production systems, that threshold requirement means brands and products no longer have a competitive edge based on of food safety alone.[108] However, as consumers demonstrate brand loyalty, the early movers may maintain a greater market share than would otherwise be the case.

Using this food safety analogy, we can suppose that sustainably-produced food and fibre could follow such a trend. As previously highlighted, consumer awareness, investor demands and governmental expectations are increasingly backing sustainable products. The early movers in this market are the likes of organic foods, which tend to sell for 1.5 to two times the price of conventionally-grown produce.[109] Many fine-dining restaurants market their 'pasture-fed', farm-to-fork, or regeneratively-farmed ingredients to attract customers. While there is currently a premium, conceivably it could be the case that this becomes a standard to which all products must meet in the future (as shown in Figure 2).

Ireland's Origin Green scheme (see Case Study 1) show how being an early mover in sustainable assurance has benefitted its food and fibre exporters.

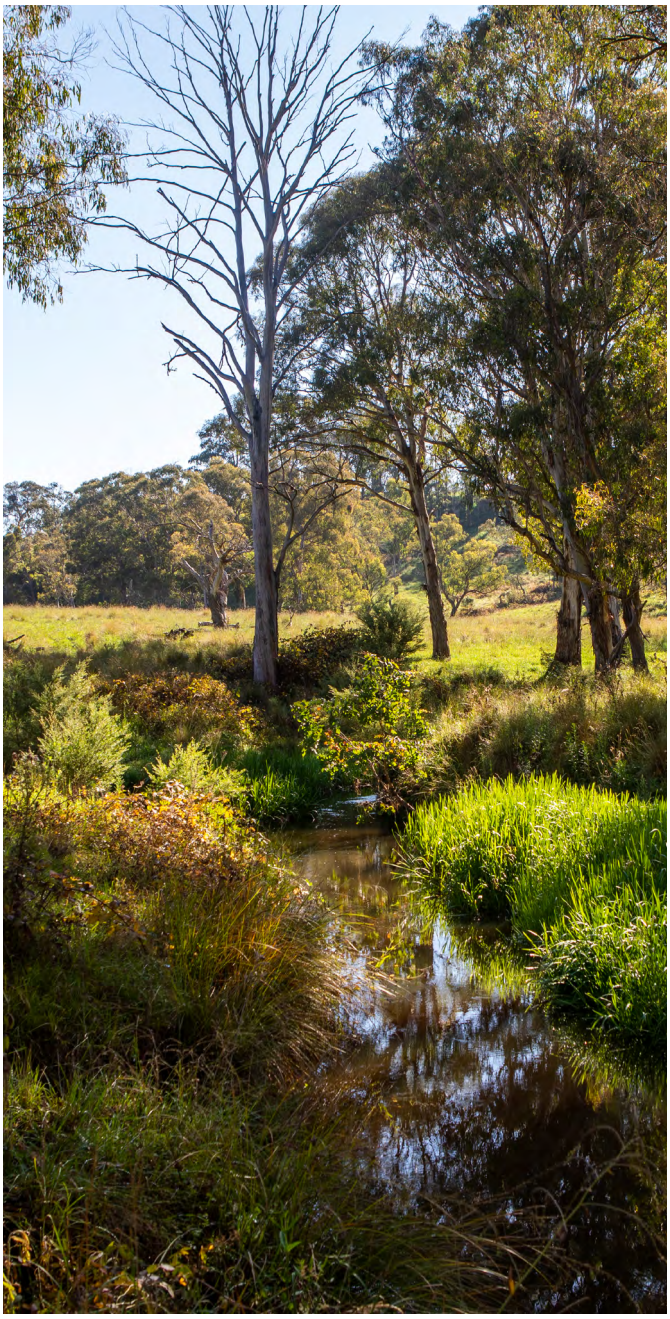
The case for demonstrating sustainability in the future of food and fibre exports is clear. The establishment and evolution of the TCFD and TNFD has set the framework for companies to disclose their climate and nature-related risks. As an early mover, Australia has the opportunity to act swiftly and help define the market for high-quality, sustainably-produced, natural capital-positive food and fibre.

Acting as an early mover, Australia could:

- Secure increased levels of market share for Australian produce and products.
- Secure higher prices and profits for Australian producers who are able to meet consumer demand for sustainable food and fibre products.

Even as an early mover, Australia's reputation as a clean and green exporter of food places it in a position to play a leadership role in demonstrating what sustainable farming practices look like in the Australian geography and climate, rather than responding to the requirements set by other countries.

Australia also has the opportunity to position itself as a world leader in other areas such as improving soil health and natural capital measurement. Australia has a well-known track record for innovation in agriculture.[110] Innovative Australian producers who have been receptive to new technologies have improved on-farm productivity, even in challenging climate conditions. For instance, producers in Australia have managed to grow drought-resistant crops through practices such as soil probing and no-till farming.[111]



The Australian agriculture sector is supported by robust R&D. Twenty-four Australian universities are rated as world class or higher in agriculture research and development,[112] and over 300 agtech and food tech enterprises including producers, industry groups and research organisations drive innovation.[113] *Farming for the Future* is one such program contributing to Australian agriculture by helping producers understand how natural capital can contribute to on-farm productivity. Australia can leverage its resources to advocate for a collaborative approach in defining sustainability of food and fibre on an international scale.

3.2 This helps achieve broader strategic goals, too

The benefits of collaborating with export partners and demonstrating Australia's leadership in food and fibre sustainability will help achieve strategic goals inside the farmgate and broader strategic goals beyond the farmgate for governments and industry.

Inside the farmgate

Improved natural capital conditions on productive landscapes

Supporting producers in measuring and managing their natural capital has the potential to increase resilience to drought and to climate change in several ways, including improved soil health, increased soil-water retention, reduced erosion, reduced air and waterway pollution, and improved animal welfare.

Less variability and increased on-farm profitability

There is a growing body of evidence that suggests that farming for natural capital outcomes and profitability are compatible.[114] Initial research has found that for participating farms that enhanced natural capital, their average annual net income increased by anywhere between 40 per cent and 83 per cent. This research is based on small sample sizes and therefore is not representative of all Australian farming, but the research presents a promising opportunity for the agricultural sector.[115] Analysis has found that producers implementing just three climate-smart practices such as no-till, cover crops and diversified crop rotations could increase their profit by more than 11 per cent and reduce the cost per hectare by 37 per cent.[116]

A just transition for rural and regional producers

Producers who are supported in understanding sustainability requirements and applying them to their local climate and geography are better equipped to transition to more climate-smart practices and technologies.

Access to finance at a lower cost

Lower financing costs as a result of improving natural capital is a win-win for producers and banks alike, with banks reducing their exposure to risky debts and having greater protection against the cyclical nature of agriculture, whilst producers are able to reduce their interest repayment costs. A reduction in finance costs of 0.1 percentage points would reduce the agricultural sector's interest costs by $920 million by 2040.[117]

Beyond the farmgate

Position Australia as a leader in measuring, managing and investing in natural capital

There is an opportunity for Australia to develop a world class agricultural innovation system that draws on robust data, digital strategies and agtech.

The Digital Foundations for Agriculture Strategy released by the Australian Government in 2022 recognises that investment in digital agriculture is key to improving market access. The combination of Australia's research expertise, agricultural innovations, digital entrepreneurs and venture capital markets can sow the seeds for a world leading agtech and sustainable agriculture sector.

Supports government in meeting environmental and other strategic goals

In addition to achieving the goal of $100 billion in Australian agricultural output by 2030, enabling adoption of natural capital-positive practices and demonstrating Australia's progress on a global scale will help secure Australia's growth beyond 2030 as well. This is in line with the recently elected federal government's renewed focus on accelerating the transition to net zero. In May 2022, the Australian Government announced a new target of reducing emissions by 43 per cent by 2030 to put Australia on track to reaching net zero emissions by 2050.[118]

Australia can lead the world in showing the role of agriculture in mitigating climate change

The climate is changing and there is a need to engage in collaborative and cohesive initiatives aimed at building resilience to climate change. As the Intergovernmental Panel on Climate Change states, improved and sustainable crop and livestock management and carbon sequestration has a large role to play in reducing agricultural CO2 emissions.[119] Developing a natural capital-focussed agriculture system is therefore one of Australia's great opportunities to lead the world and effectively respond to climate change while proactively demonstrating the role that farming can have as a nature-based solution to climate change.

Support industry in meeting environmental and other strategic goals

Industry will also play an integral role in meeting the $100 billion in agricultural output by 2030 and contribute to achieving sustainability commitments. This includes net zero targets set by Australia agriculture industry such as the NFF's aspirational economy-wide target of net carbon zero by 2050[120] and the MLA's target to be carbon neutral by 2030.[121]

Resilient, transparent and responsible supply chain

With large buyers wanting to reduce emissions resulting from activities in their supply chain, producers who can better demonstrate improvement in their natural capital will be better positioned to remain competitive and maintain their market access.

4 Changes we can make to realise these opportunities

4.1 A whole-of-supply-chain view of the changes is required from industry and government

Sustainability is driving change across all groups along the supply chain, including producers, processors manufacturers, distributors, retailers and consumers. As discussed in Chapter 1, there are multiple megatrends accelerating this change, including:

- Increased pressure for sustainability reporting set in international markets by governments, retailers, corporate buyers and investors.
- Increased consumer awareness of and demand for supply chain transparency, sustainability commitments and evidence of living up to those commitments (with an aversion towards and high scrutiny of greenwashing).
- Financial institutions' and companies' response to climate change and nature-related risks through reporting frameworks under TCFD and TNFD.
- The need for improved resilience to climate change and other external shocks to maintain or improve productivity and profitability.
- Increased competitiveness among producers, processors and retailers to get more from less.

Supply chain participants have had to change the way they produce and share information about their production processes in response to shifting market demand. As demonstrated in Figure 3, the key drivers of change for these individual groups are evolving and often vary, which means a broad range of operational changes must be made to empower the future supply chain. In addition, understanding the individual drivers also assist in meeting the growing need for traceability requirements along the supply chain.

Figure 3 Changes required across the supply chain

	Inputs	Production	Processing	Distribution	Retail	Consumer
Example players in supply chain	**Seeds, fertilisers & livestock feed; Agbiotech; farm equipment & infrastructure; financiers/insurers**	**Farmers & Farm Advisors**	**Aggregators Processors Manufacturers**	**Distributors Importers Exporters**	**Retailers Supermarkets Restaurants**	**Consumers**
What are the key drivers of change?	• Private and capital market ESG expectations • Increasing environmental regulations • Future TCFD/TNFD requirements	• Maintaining a sustainable and profitable business • Enhance climate resilience of business • Leave farm environment healthy for next generation • Increasing environmental regulations	• Private and capital market ESG expectations • Improve and differentiate product in consumer market • Reduce operational and compliance costs	• Private and capital market ESG expectations • To improve visibility of product volumes, origin and destination • Reduce operational and compliance costs	• Private and capital market ESG expectations • To meet changing consumer demands • To maintain certainty of supply, profit margin and market share	• Increasing quality, social and environmental awareness and demands
What operational changes are required?	• Measure ESG performance • Measure sustainability practices of downstream producers (eg by banks) • Measure up- & down-stream (Scope 3) emissions • Adjust products and services for policy and market needs	• Sustainable practice change • Gather farm-scale natural capital data • Prepare natural capital accounting and use data management systems • Use of natural capital benchmarking tools	• Measure ESG performance • Measure up- & down-stream (Scope 3) emissions • Monitor inputs to assure meeting of industry and certification standards	• Measure ESG performance • Measure up- & down-stream (Scope 3) emissions • Gather data to report compliance with industry and certification standards	• Measure ESG performance • Measure up- & down-stream (Scope 3) emissions • Demonstrate standards, certifications and assurance measures • Monitor consumer preferences and trends	• Product information that consumers can trust • Transparency at point of product purchase
	Traceability - transparency - exchange / sharing - interoperability					
What policy and industry support will enable these changes?	• Agreed sustainable farming standard (eg for banks & insurers to measure against) that is internationally accepted • Support the market to reduce cost of measuring natural capital • Support market-based incentives to encourage natural capital investment • Training support for agtech users	• At-scale research linking natural capital to financial performance • Agreed method to measure natural capital • Agreed method to prepare natural capital accounts • Include natural capital data in benchmarking tools • Proactive engagement to ensure producers share of value chain is equitable • Education and training to improve producer and advisor awareness and build capacity	• Simplified certification and accreditation methods for 'credence attributes' (organic, sustainable, etc) of food / fibre products • International acceptance of these certification and accreditation methods • Cost effective assurance regime • Product and document nesting (tracking product to certificates of origin and compliance)	• International acceptance of certification and accreditation methods to reduce complexity	• Product provenance information (eg QR codes for source tracing) • Certification and accreditation methods for 'credence attributes' (organic, sustainable, etc) of food / fibre products	• Standards, certification and assurance schemes/ programs that consumer scan trust • Education campaigns on benefits of sustainably made food and fibre products

An example of an Australian agriculture supply chain changing due to increasing consumer awareness is the production of merino wool in Australia. Australia is the world's largest producer and exporter of wool, and most Australian wool is high-quality fine and superfine merino. Australian wool exports trade at a premium price due to its unique and high-quality characteristics.[122] In recent years, the production of merino wool has been subject to scrutiny, particularly due to the practice of mulesing.[123]

Organisations such as People for the Ethical Treatment of Animals (PETA) and Four Paws Australia have long advocated for a ban on mulesing, and international brands including Adidas and Kathmandu have responded by committing to end their use of mulesed wool by 2030.[124] Figure 4 illustrates the changes that have been implemented along the entire merino wool supply chain in response to support the phasing out of mulesing.

Figure 4 Changes required across the supply chain – phase-out of mulesing in Merino wool example

	Inputs	Production	Processing	Distribution	Retail	Consumer
Example players in supply chain	**Seeds, fertilisers & livestock feed; Agbiotech; farm equipment & infrastructure; financiers/insurers**	**Farmers & Farm Advisors**	**Aggregators Processors Manufacturers**	**Distributors Importers Exporters**	**Retailers Supermarkets Restaurants**	**Consumers**
What are the key drivers of change?	• Evolution of input demands for wool growers to meet up stream practice change	• Maintaining a sustainable and profitable business • Premium for non-mulesed merino wool	• Improve and differentiate product in consumer market	• Service demand for new product sectors	• Desire to meet changing consumer demands	• Increasing awareness of practice of mulesing through animal welfare campaigns
What operational changes are required?	• Development and provision of new analgesics and anaesthetics products and methods	• Training of staff on new non-mulesed animal husbandry methods • Submission of information for certification of non-mulesed methods	• Collection and assessment of information on non-mulesed wool growers • Separation of product in processes	• Collection and check of compliance with industry and certification standards	• Marketing of product as non-mulesed	• Transparency at point of product purchase

Merino wool producers responded to changing market demands by:[125]

- Undertaking research to prevent flystrike, ensuring the lifetime welfare of individual sheep, whilst reducing reliance on mulesing.
- Using analgesics and anaesthetics to alleviate the pain associated with mulesing.[126]
- Breeding sheep that do not need mulesing.[127]

Over the period from 2014 to 2019, the proportion of producers who mules their sheep fell from 83 per cent to 69 per cent and the proportion of producers who used anaesthetics for their wether lambs increased from 64 per cent to more than 90 per cent.[128]

Transitioning away from a well-entrenched traditional farming practice bears financial and non-financial costs. Producers who moved to non-mulesed wool indicated that it took years of planning to successfully transition and indicated that it cost them an extra 50 cents per kilo to change their husbandry practices.[129]

There is limited measurement of the financial benefits of moving to non-mulesed enterprises as producers who do so are focused on future requirements signalled by the market. However early insights from the Australian Wool Exchange (AWEX) suggest a premium of 25 cents per kilo of wool that is mulesed with analgesics and anaesthetics, and a premium that ranges from 10-20 cents per kilo to 100-200 cents per kilo for non-mulesed wool.[130]

This is just one example demonstrating the interconnectedness of the players along the supply chain, and the importance of understanding the impact of any industry or government-led initiative from a whole-of-supply-chain perspective. A collaborative effort by government and industry is required to understand the changes across the supply chain as well as the impact of any policy interventions on all participants involved. In the absence of a coordinated response with a holistic perspective of the supply chain, there is a missed opportunity to capture the full economic value for the Australian agriculture sector.

4.2 The tools available to industry and government

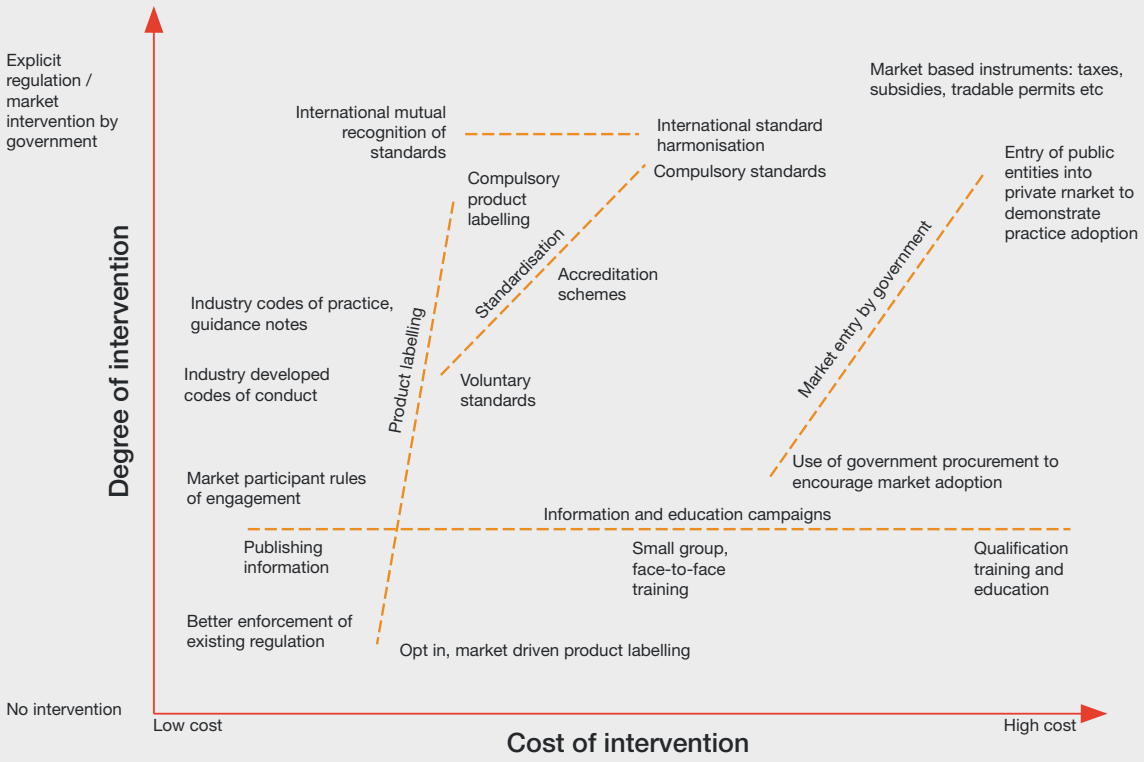
In the case of increased sustainability requirements for the agriculture supply chain, market failure can arise from several challenges. Some of the examples of market failures in the context of the barriers outlined in Chapter 2 are:

- Public goods: elements of natural capital benefit the private sector but are also public goods (e.g. shelter belts, biodiversity or soil health, which benefits both producers and the environment).
- Lack of information / information asymmetries: for example, awareness by consumers, suppliers, processors and retailers of producers' practices affects a product's market value. They also exist for producers' awareness of the costs and benefits of farming in a nature-positive way.
- Market power: for example, retailers and processors are more concentrated markets and have greater power when negotiating with producers.
- Externalities impacting third parties: for example, encouraging producers to consider, measure and report on the sustainability impacts of their production helps inform consumers, in turn stimulating the market mechanism for producers to farm sustainably. This internalises the previously external impacts on the environment.
- Transaction costs: for example, the costs of demonstration of meeting multiple countries' definitions of sustainable practices. Also, the costs to producers of participating in ecosystem service markets and in the costs of demonstrating processes are nature-positive.

The risk of not addressing these factors is the inability to achieve the benefits set out in Chapter 3.

Government and industry have a range of mechanisms available for them to influence change and guide action in response to the challenges identified. It is important that policymakers consider the full suite of levers available to them when implementing changes, and aim any kind of intervention at correcting market failure. The tools available to government and industry vary based on their 'degree of intervention' and the 'cost of the intervention'. In Figure 5, we provide an illustrative view of the relativities of different interventions as they relate to the challenges highlighted above. The 'degree of intervention' indicates how prescriptive an intervention can be and extends from 'no intervention' and 'light-touch regulations' to 'explicit regulations'. The 'cost of the intervention' is represented on a scale of low-cost to high-cost.

Figure 5 Illustrative degree and cost of intervention by government and industry



Source: PwC adaptation of Australian Government guide to regulatory impact analysis, 2020.

Note: This does not differentiate the benefits of different interventions. It is likely that the benefits are not distributed proportionally to the costs, and so a more efficient intervention may be a more costly one as its benefits are disproportionately higher than its costs.

‘No intervention’ to ‘light-touch regulation’ describes interventions that are applicable at the user’s discretion. Generally, these interventions are not obligatory and therefore simpler to implement. An example of a light-touch intervention with ranging costs is the use of information and education campaigns, which can include published information, face-to-face training for a small group, and qualification training and education initiatives ranging from low to high in cost.

‘Self-regulation’ considers interventions aimed at better informing all participants and encouraging adoption of common principles. The Australian Agriculture Sustainability Framework (AASF) is an example of collaboration between government and industry to establish a framework that acts as a translation layer between producers and the rest of the supply chain. The AASF aims to create alignment across existing and emerging programs at a national level and to reduce duplication of industry-specific schemes.

‘Explicit regulations’ represent interventions that are relatively more stringent and enforceable. These include the compulsory application of national and international standards. Standards are an effective tool as they enable alignment and consistency in industry requirements.

Food producers are familiar with the idea of standards such as Codex Alimentarius, the international food safety code which is well-entrenched in countries’ practices (see Case Study 4).

There are clear parallels between the context that led to Codex Alimentarius and the sustainability issues in international trade of food and fibre products today. Codex Alimentarius was established to tackle differences in standards across countries that created trade barriers, address growing consumer demand and guarantee quality of the end product.

The food and fibre sustainability landscape is facing similar challenges of customer demand, the threat of trade barriers and the need to address collective concerns on climate change. It can be argued that developing food safety standards were a much bigger task than developing standards on food and fibre sustainability today and Codex Alimentarius provides us with a case study for how we can tap into established international forums, scientific research and digital technologies that enable coordination and information-sharing.

There are lessons to be learnt from the development and application of industry standards such as those for dairy in relation to waterways in New Zealand (NZ) (see Case Study 5). NZ is well-progressed down a path where levels of natural capital are being set by explicit regulation. Producers need to shift their management, plan how they use their natural capital and manage their on-farm practices so the externalities off-farm are within regulated limits. Industry has tried to self-regulate but the combination of a lack of incentive to comply, a lack of clarity on definitions and that the implications became a potent political issue meant that explicit regulation was the result.

Case Study 5

The regulation of New Zealand's dairy industry's waterway impacts

NZ has successfully marketed its exports off the back of a clean, green image, and its dairy exports are no exception. To meet increased global demand, the NZ dairy sector's cost-competitive, pasture-based production system has grown significantly in recent years. Dairy products now account for around 20 per cent of NZ's exports and around three per cent of GDP.[138]

As the NZ dairy industry grew, so, too, did the dairy cattle population and the use of fertilisers – by 82 per cent and 700 per cent between 1990 and 2019.[139] This brought greater attention to its environmental impacts. Chief among these concerns is the increased nitrogen levels in waterways, as a result of animal effluent and fertiliser leaching through soils into watercourses. By the mid-2010s, 60 per cent of NZ rivers and lakes were unswimmable, drinking water became increasingly polluted leading to new levels of illness and 95 per cent of rivers in pastoral land had nutrient levels exceeding guideline values.[140] This harmed not just the environment but also: the community, who weren't able to enjoy waterways; NZ's clean, green image; and the industry's social licence to operate.

In response, the dairy industry developed a self-regulatory framework. At first, the 2003 *Dairy and Clean Streams Accord* (CSA) was launched in an effort to avoid regulation. But by 2012, it was being criticised as 'toothless', with only one in five of its targets having been achieved.[141] In 2013, this evolved into the *Sustainable Dairy: Water Accord*, a voluntary commitment from dairy farmers, the levy-funded industry organisation DairyNZ and dairy processors to improve waterways. Producers committed to fence off waterways, install bridges and culverts at stock crossing points and prepare annual nutrient budgets that plan nutrient applications and manage nutrient losses.[142] To enact this, a number of notable actions were undertaken:[143]

- Producers would report information to dairy companies through agreed protocols and consistent data collection systems.
- A nutrient management adviser and certification program was developed through which fertiliser companies' advisers needed to be certified.
- Each dairy company would inspect farms to check compliance.
- Reviews were subsequently audited and industry results were published online.[144]
- Training institutes would educate producers and new people joining the industry.

While progress towards these actions was made, again a final audit found most targets were not achieved.

Then, in 2017, the Labour Government took office with a policy to make 90 per cent of rivers swimmable and reduce fresh water degradation.[145] Regulation and legislation was introduced in 2020, which:[146]

- Required mandatory and enforceable farm environment plans be prepared.
- Required dairy producers to report annually the quantity of nitrogen applied per hectare as synthetic fertiliser.
- Invested over $700 million to support sediment removal, riparian planting, and to help producers with stock exclusion and developing farm plans.

While currently in draft, a 2021 guideline shows the regulated outcomes may include catchment level values; ecosystem health; and farm practices.[147] This could include regulating the maximum nutrient levels and farm discharges limits, and that the condition and structure of soils are maintained or improved. Each farm would need to prepare a 'freshwater farm plan'. This would be assessed by a certifier who signs off that it meets the legal requirements. In addition, an auditor would then report to councils on whether the farm achieves compliance with the certified freshwater farm plan.[148]

When launching the plan in 2020, the Ministers for Environment and Agriculture said:

- *'Cleaning our waterways will secure the future of our meat, dairy and other primary exports and ensure they continue to earn higher prices overseas. It makes both economic and environmental sense.'*
- *'Our high-value overseas consumers want greater assurances that the food and fibre they buy is produced in a sustainable way. Clean water and sustainable farming is entwined with the economic success of the sector, it isn't one or the other.'*[149]

Despite their benefits, mandating industry standards can be costly to implement and comply with. Standards on food and fibre sustainability are difficult to introduce in the absence of publicly-available data and long-term research that tracks natural capital performance. There are less-onerous and effective mechanisms to achieve harmonisation across industry practices through collaboration and information-sharing. This is evident through the development of well-aligned frameworks across the sheep and cattle industries that guide producers on sustainable farming. Regulatory tools also include market-based instruments such as taxes, subsidies and tradable permits. These sit on the high-end of the scale – being more explicit and having a high implementation cost.

The policy levers discussed above are already being considered in a number of government and industry-led initiatives across Australia. Governments in their capacity as an authority, investor and enabler incorporate these tools into policy instruments, plans and strategies, to enable them to influence and guide the continually-evolving sustainability landscape. Similarly, industry organisations, peak bodies, and Research and Development Corporations (RDCs) embed tools into their industry-wide and/or industry-specific frameworks to help report on ESG performance, provide evidence of sustainable production practices and better meet customer expectations.

Some examples of government strategies and industry frameworks that use a number of these tools include:

At the national level:

- National Soil Strategy (2021)
- Natural capital: unlocking private sector investment (2021)
- National Landcare Program (2014)
- Agriculture Biodiversity Stewardship Package (2019)

At the state level:

- New South Wales's Natural Capital Statement of Intent 2022 and the Sustainable Farming Program
- Victoria's Protecting Victoria's Environment – Biodiversity 2037 (2017)
- Western Australia's Primary Industries Plan 2020-24
- Queensland's Land Restoration Fund

At the industry level:

- Australian Beef Sustainability Framework
- Sheep Sustainability Framework
- Australian Dairy Sustainability Framework
- Behind Australian Grain (Australian grains industry sustainability framework)
- Australian Agriculture Sustainability Framework.

Some of these are further detailed in the Appendix.

4.3 The opportunities for government and industry to address to enable change

The initiatives outlined in the previous section are an important step towards achieving greater sustainability across the agriculture supply chain. There are additional opportunities that will require a collaborative effort between government, industry and other participants across the supply chain, to enable change and meet the evolving sustainability needs of the agriculture sector.

These opportunities require a balanced consideration of the ease and value of implementation. Figure 6 provides a list of proposed opportunities against a matrix of the ease and value of implementing them.

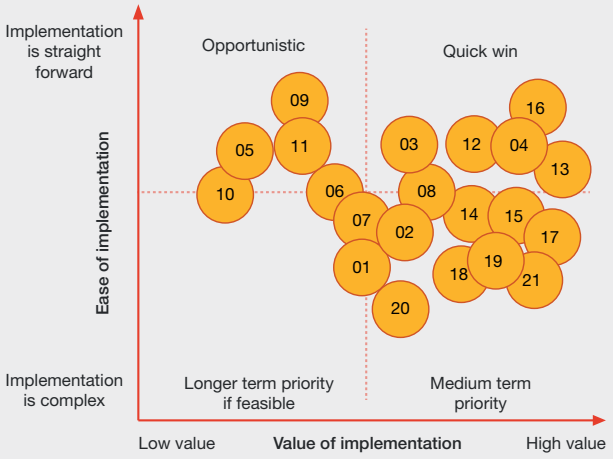
Some of these are easier than others. For instance, a new national natural capital strategy (recommendation 5) could be an easy way to address the perception in overseas markets that the Australian government has not been leading but instead following industry. On the other hand, initiatives that prove the case for implementing natural capital-positive practices and draw out the link to profitability and productivity for all participants (recommendation 1) are likely to be highly valuable but more complex to implement. Such initiatives directly support producers in capturing the economic benefits of evolving practices and align with the changes occurring along the supply chain as sustainability requirements accelerate. More detail on potential opportunities for government, industry and other supply chain participants is included below.

The below recommendations are numbered in an indication of the chronological order in which they may be implemented.

1. **Demonstrate the case for investing in natural capital and the economic, social and environmental benefits it could generate.** This is key to validate and demonstrate the economic value of natural capital-positive practices and will enable better value capture for all participants.

   Type of intervention – Information and education campaigns.

Figure 6 Ease and value of implementing government and industry led initiatives



01. Demonstrate the case for investing in natural capital and the economic, social and environmental benefits it could generate
02. Accelerate the emergence of widely agreed and open access methods of measuring natural capital
03. Develop a natural capital accounting standard
04. Support benchmarking service providers to include natural capital in their analysis of farm performance
05. Develop a national natural capital strategy
06. Ensure greater collaboration and interoperability of state and territory government policies
07. Develop an outcomes-focussed approach to assessing the sustainability of agricultural landscapes that meets the needs for environmentally-conscious markets whilst maximising the adaptive capacity of farm operations and enabling innovation in production methods.
08. Develop a cost-effective, national verification regime for sustainable agriculture
09. Advocate for acceptance by international markets, international policy-makers and international finance markets
10. Monitor impacts on producers of imbalances in market competition
11. Independent assessment of industry's sustainability performance
12. Simplify certification processes
13. Ensure cost recovery considers the public good
14. Build the capability of producers and advisors on investments in and measurement and management of on-farm natural capital
15. Address gaps in the agriculture education and training infrastructure
16. Support for market-based incentives to encourage investment in natural capital
17. Support the market to reduce the cost of measuring natural capital
18. Implement assessment of natural capital on government-owned assets
19. Use government procurement to stimulate supply of natural capital-positive food and fibre
20. Incorporate sustainability into product traceability
21. Educate consumers on sustainable agriculture

2. **Accelerate the emergence of and open access to widely agreed methods of measuring natural capital.** Developing accepted methodologies to measure natural capital will facilitate a nationally consistent approach and correct information inconsistencies. Methods should be developed with practical, cost-effective measurements in mind so they are accessible to both small and large operators. This would help to ensure equal treatment of all market participants and comparability of the outputs of the natural capital assessments. Stakeholders across the supply chain such as banks, the agtech sector, producers and retailers would be better informed and less confused while upstream and downstream users will be more trusting and confident in the information provided on the sustainability credentials of farm products.

   Type of intervention – Voluntary Standards.

3. **Develop a natural capital accounting standard.** Formal accounting standards on the preparation of natural capital accounts will be required for producers, accountants, valuers and financiers to prepare and 'bank' on natural capital measures. Accounting standards will help farm accountants to make the value that natural capital brings to the farm business more visible to the farm manager and other stakeholders such as lenders and investors.

   Type of intervention – Voluntary or compulsory standards.

4. **Support benchmarking service providers to include natural capital in their analysis of farm performance.** Currently benchmarking surveys provide financial data for average farms but not for natural capital. Including natural capital measures would allow producers, industry providers and consumers to understand the industry's performance, understand an average farm's performance, and enable free access. This could incentivise a race to the top and as a consequence increase the sustainability credentials of Australian producers and by extension their positioning in international markets.

   Type of intervention – Publishing information and Education.

5. **Develop a national natural capital strategy.** This should set out a vision to improve natural capital management and measurement in Australia, implemented through targeted goals and initiatives. While acknowledging that much work has already been done on this at the national and state levels, there is an opportunity to broaden, deepen and elevate the national strategy with consideration of many of the types of recommendations and practical implementation steps contained in this report. Elevating the profile of this national strategy could help demonstrate to overseas markets that Australia and the Australian Government is providing leadership in this area. It could consider many of the types of recommendations contained here and the practical steps for government and industry to implement them.

The US National Strategy to Develop Statistics for Environmental-Economic Decisions[131] is an example of a national initiative that seeks to measure the economic value that natural resources provide to society. The strategy aims to expand national statistics to take stock of natural assets, how those assets are being enhanced or depleted over time and the impact that has on the country's economic strength.

Type of intervention – Various interventions and accreditation schemes.

6. **Ensure greater collaboration and interoperability of state and territory government policies.** Encourage states and territories to align policies on natural capital and sustainability to improve consistency and to not disadvantage producers. Some states are forging ahead with state-specific programs that will leave producers outside their states behind. NSW's Sustainable Farming Program, for example, will pay producers incentives to get verification for their natural capital investments. This gives NSW producers a government-backed verification of their sustainable farming practices,[132] which has been likened to Heart Foundation 'Red Tick' or the Forestry Stewardship Council certification. One way of achieving alignment could be to have national programs. As an example, this was the case state renewable energy targets that were later replaced with a national renewable energy target. A national equivalent of the Sustainable Farming Program would treat producers across Australia more equitably and consistently.

   Type of intervention – Voluntary standards.

7. **Develop an outcomes-focussed approach to assessing the sustainability of agricultural landscapes that meets the needs for environmentally-conscious markets whilst maximising the adaptive capacity of farm operations and enabling innovation in production methods.** This approach should be designed to meet the needs of environmentally-conscious markets whilst maximising the adaptive capacity of farm operations and enabling innovation in production methods. It should aim to achieve positive environmental outcomes that are appropriate to the Australian context and to accommodate Australia's natural landscape and climate variability.

   It should avoid standards being based on practices as these are imperfect proxies for actual outcomes and the ability to monitor environmental metrics is becoming increasingly cost-effective as new forms of sensors, algorithms and connected devices appear on the market.[133] If the approach is also aligned with the needs of banks' and insurers' climate risk assessment frameworks and with taxonomies of what is considered sustainable by an ESG investor perspective, it will avoid inconsistencies and simplify matters for all involved.

   The EU and NZ taxonomies on sustainable agriculture[134] are examples to consider while the work being done by the Australian Sustainable Finance Initiative and the NFF's AASF can assist in scale-appropriate approaches to minimise or eliminate unfair cost burdens on individual farmers.

   Type of intervention – Voluntary standards.

8. **Develop a cost-effective, national verification regime for sustainable agriculture.** The required outcomes would not be mandated, but the methods used for verification of outcomes claims should be. This would demonstrate the good work being done by farmers who choose to adopt outcomes-based measures. A verification regime should provide assurance that producers who choose to use a nationally developed outcomes-focussed approach in communicating the sustainability of their food and fibre production are able to assure the quality of statements and information being reported to their supply chains. To be cost-effective, this service should be open to competition to allow for innovation in ways in which verification is completed. This should also learn from the existing and emerging regimes, such as NSW's Sustainable Farming Program or NZ's Freshwater Farm Plan.

   Type of intervention – Accreditation schemes.

9. **Advocate for acceptance by international markets, international policy-makers and international finance markets.** Australian definitions and practices of sustainable agriculture should be recognised in international markets to minimise the costs on industry. Government agencies such as DAFF and DFAT have an important role to play in this by advocating internationally for scientifically-proven practices that align with the Australian ecosystem. This will inevitably involve negotiation of what standards are acceptable in international markets while also reflecting on what is sustainable in Australia given our environmental factors.

   Type of intervention – International mutual recognition of standards.

10. **Monitor impacts on producers of imbalances in market competition.** As producers, processors and retailers work together to meet the consumer demand for more sustainably produced food and fibre, equitable distribution of market returns should not be overlooked. The entire system needs to share the risk and reward of this transition more equitably. Businesses should be able to recover their costs of the transition and share in this opportunity. Competition regulators should monitor the imbalances between larger and smaller businesses and intervene where warranted.

    Type of intervention – Industry developed code of conduct.

11. **Independent assessment of industry's sustainability performance.** To be more reputable to local and overseas consumers, the assessment of industry performance should be undertaken by a mutually agreed third-party that is independent of industry.

    Type of intervention – International mutual recognition of standards.

12. **Simplify certification processes.** Certification processes for overseas markets are confusing and costly. There is a need for streamlined processes that reduce the burden on producers. An example of this is the Sustainable Grains Australia Program which simplifies the certification process for Australian canola being exported to the EU. Growers need to register and be audited just once and can trade with multiple buyers, which reduces the paperwork and costs of certification.

    Type of intervention – Accreditation schemes.

13. **Ensure cost recovery considers the public good.** Australia is also one of the few countries where industry can be charged on a full cost recovery basis. In line with cost recovery guidelines, care should be taken to consider the public benefit of the service for which industry is being charged. If there is a positive externality from the service being provided in that it encourages investment in natural capital, then this should be factored into the calculation of charges so industry and government bear costs that are proportionate with their share of benefits.

    Type of intervention – Accreditation schemes.

14. **Build the capability of producers and advisors on investments in and measurement and management of on-farm natural capital.** Activate adoption of natural capital measurement through levy-paying industry bodies with support from government funding. While some producers will be early adopters, others will require more coaching. An example of a successful program is the AWI Lifetime Ewe Management (LTEM) training program. The program is delivered in small groups that meet six times a year on participating farms. On average, participants reported an increase in marking and weaning percentage by seven per cent and a 25 per cent reduction in ewe mortality.[135]

    Type of intervention – Information and education campaigns.

15. **Address gaps in the agriculture education and training infrastructure.** Adoption of more sustainable practices cannot occur without developing the prerequisite skills to drive change across the diverse climates and landscapes in Australia. This includes training and education for the next generation of farm labourers, apprentices, agronomists, consultants, rural bankers, agtech workers and accountants. Government and industry should map the current skills landscape and the predicted demand for skills, to determine the gaps that need to be addressed. Training and education programs aimed at addressing these skills should be prioritised with funding.

    Type of intervention – Information and education campaigns.

16. **Support for market-based incentives to encourage investment in natural capital.** The market for ecosystem services should be supported to include more buyers and sellers to improve liquidity, enable lower transaction costs and provide more transparency of prices and volumes. For example, Australian Carbon Credit Units (ACCU) seek to support carbon sequestration projects that reduce emissions but it does not recognise carbon already sequestered as it is only forward-looking, limiting its attractiveness. The 2021-22 Commonwealth Budget also provided $22.3 million over four years for a pilot stewardship program, which incentivises producers through ACCU credits, but the timeframe and eligibility of the program could be expanded. Market-based incentives rely on agreed methods of natural capital measurement (see opportunity 2) and a definition of sustainable agriculture (see opportunity 6).

    Type of intervention – Market based instruments.

17. **Support the market to reduce the cost of measuring natural capital.** Lowering the cost of measurement methods will increase accessibility and application by producers. Opportunities 1, 2, 3 and 4 will help to stimulate demand for measuring methods and thereby increase competition by providers, who will compete to reduce costs. The government could also contract to underwrite the acquisition of natural capital measuring services over several years to encourage private sector providers to make initial investments where costs are a barrier to entry. Government ownership of monopoly-type infrastructure (e.g. satellites or data registries) may also be an option. Alternatively, governments may choose to be an early market participant in natural capital measurement services, then exit when the market develops further.

    Type of intervention – Entry of public entities into private market to demonstrate adoption.

18. **Implement assessment of natural capital on government-owned assets.** State and federal governments could undertake natural capital assessment on land they own. This is in line with the NSW Natural Capital Statement of Intent, which recognises the opportunity to include natural capital in planning and development decisions on Crown land.[136] This will also help deliver opportunity 16, as the government will lead by example and, by being a market participant, can support demand for natural capital measurement and encourage competition on the market.

    Type of intervention – Entry of public entities into private market to demonstrate adoption.

19. **Use government procurement to stimulate supply of natural capital-positive food and fibre.** In addition to being a market participant and procuring natural capital measurement services on state-owned land (opportunity 17), governments can also focus their procurement of food and fibre products on providers who demonstrate their natural capital-positive credentials. Just as many corporates are demonstrating through their targets and requirements of producers to provide sustainable produce (see Chapter 1), government procurement policies can also be a mechanism through which the agriculture sector is stimulated. If a reasonable premium is paid for such products, this can also help to encourage Australian producers to accelerate the shift to practices that invest in and better manage natural capital.

    Type of intervention – Use of government procurement.

20. **Incorporate sustainability into product traceability.** Traceability needs to go beyond the 'one step forward one step back' solutions and enable end-to-end traceability across the supply chain. This requires collaboration by improving stakeholders' understanding of the benefits from collectively employing interoperable traceability systems. Government should leverage existing data reporting structures to develop national data standards. This should include access to a national database that provides timely data to supply chain participants. Such verifiable data will be invaluable to supporting claims that agricultural products are produced in a sustainable manner, and needs to be drawn and traced across the whole of the supply chain to reflect the many and varied inputs which go into agricultural production.

    Type of intervention – Publishing information.

21. **Educate consumers on sustainable agriculture.** To help stimulate demand for Australian-made, nature-positive agricultural products, consumers should be educated on the health, social, environmental and economic benefits of farming in nature-positive ways. This can also help overcome misconceptions and misunderstandings about agriculture, such as that all meat products are bad for the environment.

    Type of intervention – Information and education campaigns.

In introducing and implementing government and industry interventions, it is crucial that producers are involved and represented in the process to facilitate collective action. The following principles should apply:[137]

- Ensure that users have a say in modifying rules that affect them.
- Canvass producers early and ensure the majority of suppliers are in support to gain momentum.
- Allow for regular monitoring of resources and users.
- Enable access to low-cost dispute resolution and make provisions for graduated sanctions.

The above opportunities available to government and industry are just a sample of what has been identified so far through the targeted engagement that has been undertaken for the purpose of this paper. Deep engagement with producers, industry, policymakers and decision-makers on what is needed to accelerate the Australian agricultural system forward into a more prosperous, resilient and nature-positive future is key.

Farming for the Future aims to make a significant contribution to the evidence base linking on-farm natural capital with farm business sustainability, and provide an opportunity for positive disruption and change. Information alone will not change the system. Activation of change will require work both directly with producers and their advice networks and indirectly, through the associated ecosystem with financiers, policy makers, retailers, technology providers and others. This is where *Farming for the Future* is working with partners and collaborators across the entire Australian agriculture sector, to create a future state that rewards and incentivises producers and stakeholders across the supply chain. This will involve collaboration to identify and develop opportunities and solutions, to accelerate the proliferation of farming that enhance natural capital at scale. To achieve this, active participation is needed across the sector. Stakeholders that want to get involved can visit *Farming for the Future* www.farmingforthefuture.org.au for more information.

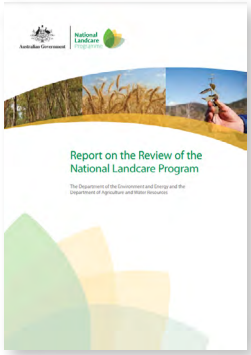
Appendix

Table 1: Selected government led initiatives

Government initiatives

National Soil Strategy (2021)

The National Soil Strategy is Australia's first national policy on soil and outlines how Australia will value, manage and improve its soil for the next 20 years.[150] The National Soil Strategy and the associated Commonwealth Interim Action Plan sits under the broader National Soil Package and supports the agriculture sector's goal of being a $100 billion industry by 2030.



National Landcare Program (2014)[151]

The National Landcare Program is a key part of the Australian Government's long-standing commitment to natural resource management, and was designed to drive sustainable practice change in the use and management of natural resources. The Program recognises the role of natural capital in contributing to productivity and profitability of agriculture, and places importance on protecting and improving natural resource management through the projects funded.

Agriculture Biodiversity Stewardship Package (2018)[152]

The Agriculture Biodiversity Stewardship Package seeks to develop market arrangements and kick start private investment in farm biodiversity and other sustainability opportunities, by demonstrating that environmental markets and other mechanisms can diversify and potentially boost farm income.

New South Wales (NSW)

Natural Capital Statement of Intent (2022)[153]

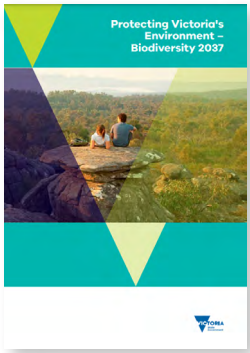
The Draft NSW Natural Capital Statement of Intent sets the ambition for an approach to manage NSW's natural capital in a sustainable manner. The Statement of Intent draws attention to the role of natural capital as integral to the State's environmental and economic prosperity and defines the role of NSW Government in implementing natural capital principles and supporting landholders to engage in natural capital markets.

Government initiatives

New South Wales (NSW)

Sustainable Farming Program[154]

The program will accredit producers who take action to improve biodiversity and reduce carbon emissions, while enhancing their productivity. Accreditation will enhance producers' access to premium financial markets and supply chain standards relating to environmental, social and governance (ESG) values. Accreditation assurance will be conducted by accredited assessors to ensure credibility and integrity, and provide confidence to producers, financiers and consumers. Producers participating in the Sustainable Farming Program are expected to gain many benefits, including receiving payments for attaining and maintaining accreditation; having lower interest rates, given increased resilience to climate change and improved biodiversity; increasing their market access, on the basis of their government-backed accreditation; and improving their land's long-term productivity.



Victoria

Protecting Victoria's Environment – Biodiversity 2037 (2017)[155]

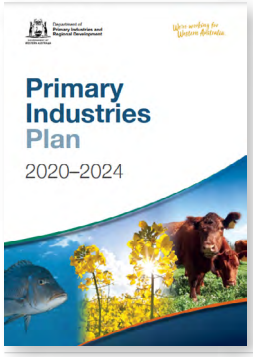
Protecting Victoria's Environment – Biodiversity 2037 is Victoria's 20-year plan to manage and enhance biodiversity by ensuring it is healthy, valued and actively cared for by all. It establishes key priorities for action, and clear targets that will support the government to align its specific priorities and investments within a broader national context and to international commitments on biodiversity and climate change.

Western Australia

Primary Industries Plan 2020-24[156]

The Primary Industries Plan underscores the role of primary industries in contributing and creating prosperity across Western Australia. The Plan aims to support and grow an increasingly sophisticated and globally competitive primary industries sector. The plan focuses on five strategic themes:

- Protect and enhance the condition of our natural resources.
- Build trust in Western Australia's primary production.
- Maintain and build competitiveness in the global marketplace.
- Differentiate, value-add, and diversify primary industries.
- Secure and grow markets through industry partnership and new market development



Queensland

Land Restoration Fund

Launched in 2017, the Land Restoration Fund is Queensland Government's flagship environmental program. The $500 million fund aims to expand carbon farming in the state by supporting land-sector projects that deliver clear environmental, social and economic co-benefits.[157] The Fund will primarily invest in projects that deliver Australian Carbon Credit Units (ACCUs) with co-benefits.

Table 2: Selected industry led initiatives

Industry initiatives	
Australian Beef Sustainability Framework[158]	Australian Beef Sustainability Framework seeks to inform practices to encourage sustainable beef production, and track how the industry is performing over a series of indicators on an annual basis. The aim of the Framework is to improve reporting on how the beef industry is meeting the changing expectations of consumers, customers, investors and stakeholders in key areas that have been identified as being important: animal welfare, economic resilience, environmental stewardship and people and the community.
Sheep Sustainability Framework[159]	Sheep Sustainability Framework is both a food and fibre framework and extends across the value chain for Australian sheep meat and wool products – from farm to fork and sheep to shelf. The Framework showcases Australia's sustainable production of sheep meat and wool to build trust and confidence in the industry and secure access to local and global markets.
Australian Dairy Sustainability Framework[160]	The goals and targets of the Australian Dairy Sustainability Framework are aligned with the UN Sustainable Development Goals and with the Sustainability Agriculture Initiative's dairy working group. The framework makes commitments to enhancing livelihoods, improving wellbeing, animal care and reducing environmental impact. Progress reports by the framework report 23.5 per cent reduction in dairy manufacturers' emissions intensity since 2010-11.
Behind Australian Grain (Australian grains industry sustainability framework)[161]	Behind Australian Grain sets out the sustainability framework for the grains industry. This includes 12 goals under three broad pillars. These include responsible stewardship, which focuses on caring for natural capital and inputs, building capacity and wellbeing of the community to make them capable and resilient, and consumer confidence, which focuses on the evolving needs of customers.
Australian Agriculture Sustainability Framework	The AASF is a voluntary framework that serves as a central hub for information about Australian agricultural sustainability and provides a translation layer between the farm sector, the private sector, government and the community. The framework maps the existing industry-level sustainability goals into sustainability principles and criteria to ensure consistency and cohesion across multiple programs across the sector in its entirety. This also enables alignment of Australian industry sustainability efforts with the global market and community expectations.

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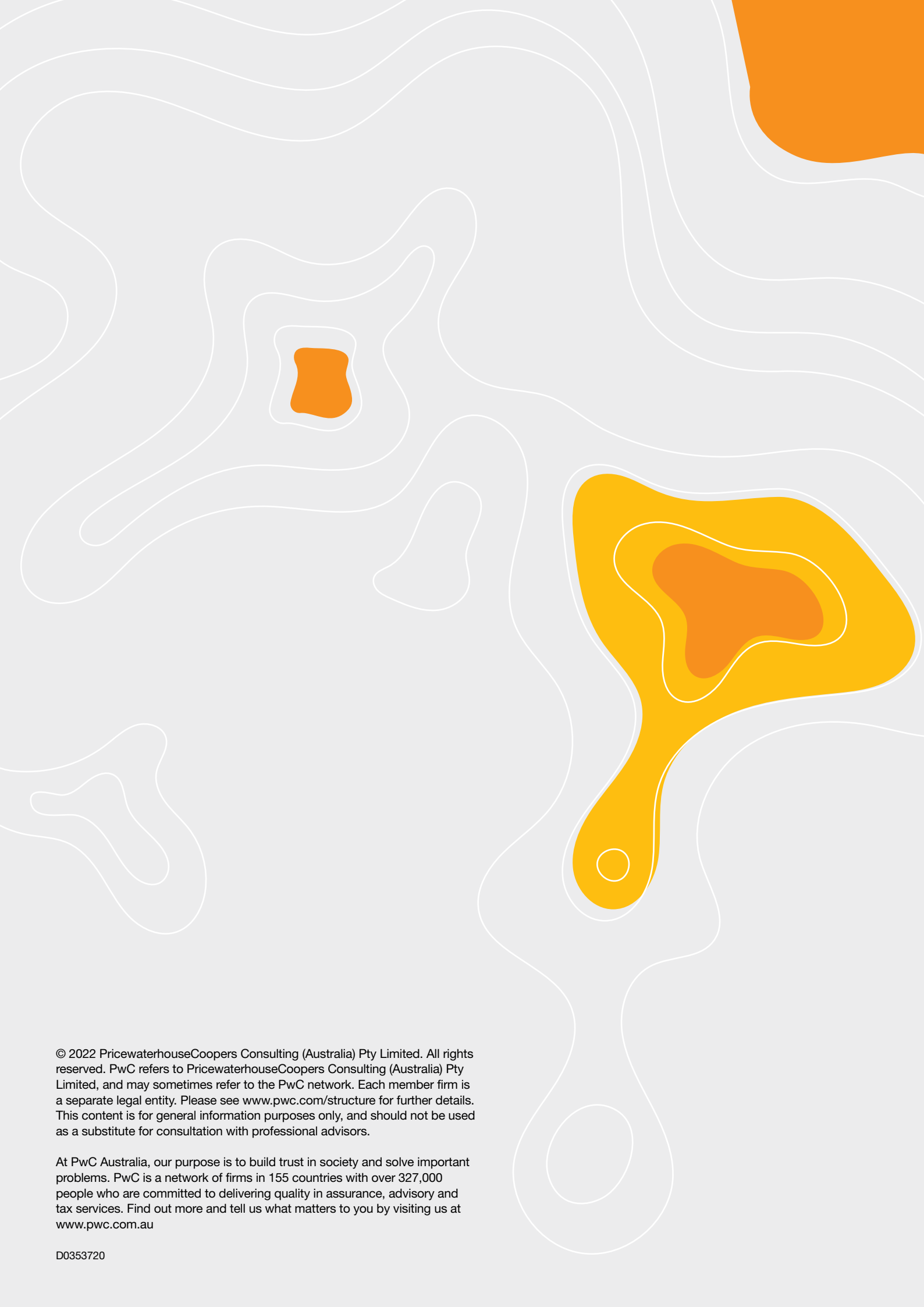

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