

Sustainable Finance

SUSTAINABLE FINANCE

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Recommended citation: Humphrey, J., Rekker, S., Gilbert, A., Henry, E. & Scott, A. (2024). *Sustainable Finance*. University of Queensland. <https://oercollective.caul.edu.au/sustainable-finance>.

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First published in 2024 by The University of Queensland

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DOI: 10.14264/b2ba0a3

eISBN: 978-1-74272-410-2

Please cite as: Humphrey, J., Rekker, S., Gilbert, A., Henry, E. & Scott, A. (2024). *Sustainable Finance*.

University of Queensland. <https://oercollective.caul.edu.au/sustainable-finance>.

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ACKNOWLEDGEMENTS

We would like to thank the Council of Australian University Librarians for providing funding for this textbook through their Open Textbook Grants 2023 and the UQ library for funding via the Open Textbooks@UQ grant program. We could not have produced this book without the support of two of UQ's amazing Librarians – thank you Marianne Sato and Thomas Palmer for making the textbook look good, checking copyright and keeping us on track. We also would like to thank James van de Graaf for making some of the graphics and helping us with some background research.

ABOUT THE AUTHORS

Jacquelyn Humphrey is an Associate Professor in finance at the University of Queensland and is the Finance Discipline Convenor (Head of Department). She is one of Australia's leading experts on sustainable finance, with a sustainable finance publication in a peer-reviewed journal in 2006 making her one of the first Australian researchers in the area. Since that time she has published extensively in sustainable finance, and she also has an active cross-disciplinary research agenda in sustainable business more broadly. She regularly works with industry partners and has led a number of contract research projects for the finance industry and written practitioner-focussed articles on sustainable finance. As a lecturer, Jacquelyn embeds sustainability into the finance and research courses she teaches, and also assists other finance colleagues to do so in their courses. Jacquelyn has extensive supervision experience, with PhD, MPhil and honours students who have written theses on topics related to sustainable finance.

Saphira Rekker is a Senior Lecturer in finance at the University of Queensland and has been a pioneer in the area of Climate Finance and Decarbonisation. She has published in the field-leading high-impact journals *Nature Climate Change* and *Nature Communications*, with her most recent work focusing on science-based Paris alignment pathways for companies and investors. Her work is of high practical relevance and she has been working with numerous industry and government organisations on assessing companies' alignment with the Paris Agreement, including Norges Bank Investment Management, the European Union Sustainable Finance workstream, the Science Based Targets initiative, and the Australian Sustainable Finance Initiative's Taxonomy team. Saphira also co-developed Australia's first Carbon Literacy short course which has been recognised with multiple awards and is now used by universities across Australia.

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Ayesha Scott is a Senior Lecturer in Finance at Auckland University of Technology. Ayesha pioneered the development of New Zealand's first Social Impact for Finance course, a compulsory component of AUT Business School's finance major, to explore the various ways in which financial market participants can help to address social problems, including socially responsible investing and financial inclusion. An interdisciplinary researcher, Ayesha's research agenda spans banking ethics, consumer vulnerability, economic harm (economic and financial abuse), empirical finance, personal finance, and financial econometrics. Ayesha supervises post-graduate research students on a wide range of topics such as Iwi investment frameworks, consumer vulnerability in banking settings, socially responsible investment fund performance, healthy financial relationships, fraud and scams, and the readability of company disclosure. She is regularly asked to speak on these topics and her work has generated media interest within New Zealand and Australia.

PART I

INTRODUCTION

1.

INTRODUCTION

Jacquelyn Humphrey

Traditionally, finance theory has taught that investors consider only two dimensions when making decisions: risk and return. Therefore (financial) managers should manage a corporation with one goal in mind – maximise shareholder wealth – because this is what shareholders want. Similarly, fund investors want fund managers to maximise alpha (or “beat the market”) because they want the highest return from their investment given the portfolio’s level of risk.

This proposition has several advantages. First, the (financial) manager’s task is simplified into just one goal: choose those projects or investments that will maximise shareholder wealth. Second, optimisation across only two criteria, return and risk, allows for elegant mathematical models of how the (financial) world works.

However, even casual observation shows that this view of investor decision-making does not reflect the reality of the complex world in which we live. For many investors, the decision-making process is far more nuanced, and will often include a multitude of factors. Many investors care about what use their money is put to by the corporations in which they invest, in the same way as they would care about the activities they participate in, or the purchases that they make.

“Capitalism has this strange ability to kind of paralyse the altruistic part of humans. So at the weekends, they’re altruistic, they love their grandchildren. Then during the week they take on the character of the corporation whose only job description, says Milton Friedman, is to maximize short term profits. If a human being does nothing except maximize their self interest, they’re a sociopath. That’s how it’s defined. So during the week you behave like a sociopath and as if you have no grandchildren-or as if you hate the ones you have. And then at the weekend you become a loving grandfather again. That is apparently what capitalism does to us, based on the evidence.” (Billionaire Jeremy Grantham¹)

Only caring about return and risk has implications for how investment portfolios are designed and how

1. Steverman, B. (2020, February 6). 'Everything is accelerating': Billionaire investor on a climate change crusade. *The Sydney Morning Herald*. <https://www.smh.com.au/business/markets/everything-is-accelerating-billionaire-investor-sends-a-climate-change-warning-20200206-p53y62.html>

companies are run. In this book, we will investigate how sustainability – largely in terms of environmental, social and governance (ESG) issues – can interact with making financial decisions.

ESG Issues

So what are the ESG issues that investors care about? Two recent surveys by the Responsible Investment Association of Australasia asked investors in Australia and New Zealand this question. Their answers are shown in the figure below. You can see slight differences in the answers from the two countries. You can also see that there are different ways ESG issues can be combined with financial decisions. The top part of the figure shows ESG issues that are important to investors when thinking about making investments. The bottom part of the figure shows the types of activities companies could be involved in that investors *don't* want to put their money in. Both of these are important when looking at sustainable finance. (We will delve into the different ways of implementing ESG in Chapter 4.)

The Environmental and Social Themes Australian and New Zealander Investors Care About

Top 10 themes investors care about

Australia	New Zealand
1 Renewable energy and energy efficiency	Healthcare and public health and medical products
2 Healthcare and public health	Healthy rivers and ocean ecosystems
3 Sustainable water management	Sustainable water management
4 Healthy rivers and oceans	Renewable energy and energy efficiency
5 Zero waste and circular economy	Biodiversity
6 Sustainable land and agriculture	Sustainable land management
7 Employment and local business	Social and community infrastructure
8 Biodiversity	Zero waste and circular economy
9 Sustainable transport	Education and vocational training
10 Green, social and community infrastructure	Sustainable transport

Top 10 issues investors do not want

	Australia	New Zealand
1	Animal cruelty	Human rights abuses
2	Human rights abuses	Labour rights abuses
3	Animal testing for non-medical purposes	Environmental damage
4	Pornography	Violation of indigenous peoples' rights
5	Environmental damage	Company tax avoidance
6	Company tax avoidance	Animal testing for non-medical purposes
7	Gambling	Social media companies that breach privacy standards
8	Tobacco	Intensive livestock management using cages and crates
9	Weapons and firearms	Weapons and firearms
10	Violation of indigenous peoples' rights	Genetic engineering and toxic agri-chemicals

Sources: [RIAA From Values to Riches 2022: Charting consumer demand for responsible investing in Australia \(PDF, 1.58MB\)](#) and [RIAA Voices of Aotearoa: Demand for Ethical Investment in New Zealand 2023 \(PDF, 3.2MB\)](#)

In 2022, the top expectation that Australians had of their financial advisors is that they were knowledgeable about ESG investment options, and for New Zealanders this was the second most important issue.² Further, most Australians and New Zealanders (83% and 74%) expect their superannuation and their bank to invest ethically and responsibly.³ Clearly, investors care about more than just return and risk!

Market Size

In the West, sustainable finance started out as a small, niche market dominated by religious investors who wanted their investments to reflect their religious values. However, sustainable finance is now seen as having become almost mainstream. Indeed, the sustainable finance market has experienced phenomenal growth, particularly in recent years, across all asset classes and across all regions of the world.

According to the United Nations Conference on Trade and Development (UNCTAD), in 2022 the

2. Responsible Investment Association Australasia. (2022). *From values to riches 2022: Charting consumer demand for responsible investing in Australia*. https://responsibleinvestment.org/wp-content/uploads/2022/03/From-Values-to-Riches-2022_RIAA.pdf; Responsible Investment Association Australasia. (2023). *Voices of Aotearoa: Demand for ethical investment in New Zealand 2023*. https://responsibleinvestment.org/wp-content/uploads/2023/05/Voices-of-Aotearoa_-Consumer-Demand-2023-Report.pdf

3. Ibid.

value of the sustainable finance market was US\$5.8 trillion – an increase of 18% from the year before.⁴ UNCTAD measures the sustainable finance market as comprising funds, bonds and voluntary carbon markets. The number of sustainability funds grew from 189 funds in 2012 to 7,012 in 2022.⁵ Europe by far dominates the sustainable funds market (83% of sustainable funds under management are European). Voluntary carbon markets quadrupled in size over the 2012-2021 period. The sustainable bonds market, which is a newer market, grew 500% over the period 2017-2022.⁶ We will learn more about sustainable financial instruments in Chapter 4.

Australia and New Zealand

As with the rest of the world, ESG is becoming increasingly important in Australia and New Zealand. In 2022, in Australia, there was over \$1.3 trillion in sustainable assets under management (AUM), or 36% of the fund market.⁷ Compared to 2019, where Responsible Investment AUM was approximately \$980m. Similarly, in New Zealand ESG AUM was \$183 billion in 2022.⁸ This represented over 52% of New Zealand's total funds under management. Sustainable bonds markets are small in these two countries.

4. United Nations Conference on Trade and Development. (2023). *World investment report 2023: Chapter III Capital markets and sustainable finance*. https://unctad.org/system/files/official-document/wir2023_ch03_en.pdf

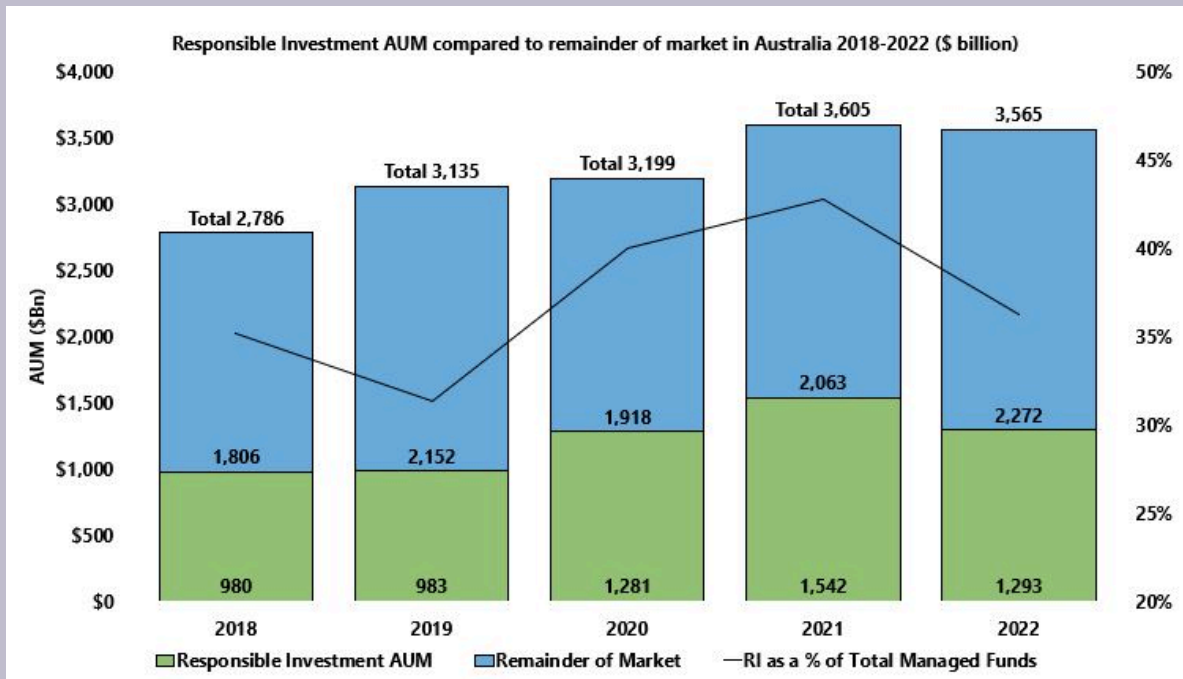
5. Ibid.

6. Note that ESG markets did experience a decrease in size in 2022, but this trend appears to be reverting to the "normal" increase in 2022.

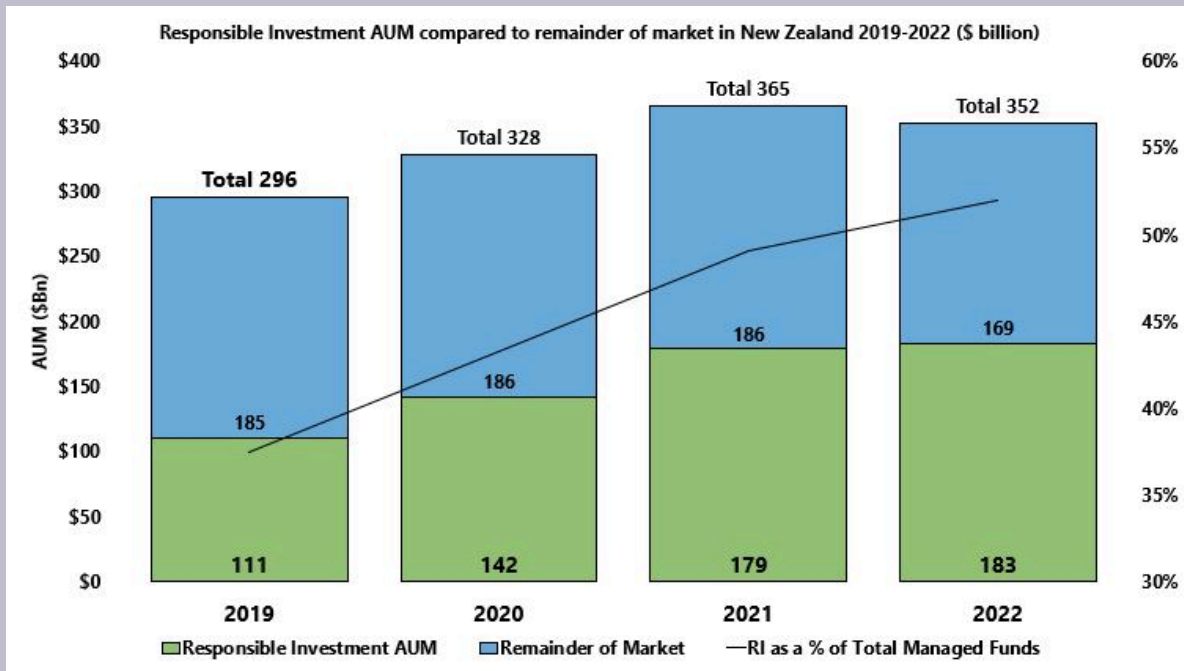
7. Responsible Investment Association Australasia. (2023). *Responsible investment benchmark report Australia 2023*. <https://responsibleinvestment.org/resources/benchmark-report/>

8. Ibid.

Size of the Responsible Investment Market in Australia and New Zealand: 2018 to 2022



Source: Data from RIAA



Source: Data from RIAA

A Note on Terminology

The terminology in this area is somewhat slippery and has also changed over time. You may have heard the following terms:

- Socially responsible finance
- Ethical finance
- SEE (Social, Environmental and Economic)

These terms are slightly outdated. Today we would typically use the broad umbrella terms **ESG**, **sustainable** or **responsible**, and these are the terms we will use throughout this book.

You may also come across the term Corporate Social Responsibility, or for investment that specifically focuses on environmental issues, “green finance” or “climate finance.”

About This book

In the remainder of this textbook, we cover a range of topics in the area of sustainable finance.

Chapter 2 looks at ESG from the perspective of the organisation. Here, we will draw on your existing

corporate finance knowledge and extend it to help you to think about how organisations can function in ways that better align with ESG.

Chapter 3 outlines some of the important sustainable finance initiatives and look at how ESG is measured.

Chapter 4 views ESG from the perspective of investors. We will look closely at what type of ESG products are available in mutual fund and bond markets, and talk about how ESG strategies are implemented.

In the second part of the book, we will take a “deep dive” into two pressing contemporary issues: corporate transition to net zero emissions, and indigenous views of sustainable finance.

Chapter 5 explains the planetary boundaries framework and zooms into climate change which is arguably the greatest challenge humanity is facing, including how it relates to our economy, society and business. This is important to be able to understand Chapter 6.

Chapter 6 looks at how corporations need to transition to net zero emissions, including pathways to getting there and how to measure their progress.

Chapter 7 provides insight into one indigenous, specifically Māori, “worldview” and shows what implications this worldview has for financial decision-making.

Please remember this book is an introduction to sustainable finance. Each of the topics we cover could have its own textbook. It is however ideal for those who are looking for an introduction and overview on the topic and we hope you enjoy this book and learn a lot.

PART II

PART 1: AN OVERVIEW OF SUSTAINABLE FINANCE

2.

CHALLENGES TO SHAREHOLDER PRIMACY

Saphira Rekker

Chapter Overview

At the end of this chapter you will be able to:

- Identify the differences in the basic legal forms of business organisation and the implications for business purpose.
- Evaluate various business purpose theories.
- Apply the different business purpose theories to a case.

Introduction

In your own life, you will most likely spend money on things that you value. However, in a business, this can be a little bit different, as you will have to consider what others value. In this chapter, we will explore the common business structures that are in Australia, and discuss different views of what the role of the company is in society. You will also learn how to apply different business purpose theories to a case.

Basic Legal Forms of Business

In Australia, there are four main legal forms of business:

- Sole trader (called sole proprietorship in the US)
- Partnership
- Corporation
- Trust.

The differences between these business forms are mostly surrounding their tax liabilities, asset protection, and ongoing administrative costs. Businesses may change their business structure over time. Many companies start as sole traders and progress to other structures as the business grows. The Australian Tax Office (ATO) has a video on [choosing your business structure](#) that explains the different structures in more detail.

Note that there are many different types of organisations, with different objectives, including not-for-profits and charities. Such organisations exist to achieve a social or environmental mission, but of course it is important for them to manage their finances effectively to maximise impact, and much of your traditional finance knowledge will be useful for these organisations. In the remainder of this chapter, we assume for-profit corporations when we talk about companies and corporations.

Sole Trader

Let's imagine that you would like to open a coffee shop. We will use this example throughout this chapter.

For a small coffee shop that you started with your own money, a sole trader may be the best option for your business. A business as a sole trader is extremely **easy to set up**; it takes you about an hour to apply online on the ATO website for an Australian Business Number (ABN) (note that you do need a separate bank account for the business!). It is also the **least regulated**, saving you a lot of paperwork, time and money compared to other business structures that are more regulated.

Whilst you get to keep all the profits if the firm makes money, you are subjected to **unlimited liability**. As the sole equity holder, this means that you are fully personally liable for any of the firm's debts, so if you go bankrupt and are unable to pay the debts, you may owe your creditors money until it is paid off in full or creditors may be able to seize your personal assets. Note that banks may be reluctant to lend you money in the first place and will often decide how much to lend based on how many personal assets you own.

Partnership

A partnership is a business that is **owned by two or more people** and is still relatively easy to start. A partnership has the advantage of having **more capital available** than a single person, but it may still be limited in raising any external capital. A general partnership consists of general partners only who all face **unlimited liability** just like a sole trader. However, in a **limited partnership**, there are still one or more general partners that have unlimited liability, but there are also one or more limited partners, who do not actively participate in the business and whose liability only extends to the amount they have put into the business.

Corporation

A corporation is a very unique business structure. It is an "incorporated" organisation, a separate legal entity, that is governed by law. It can sue and be sued, it can own assets and be in debt, very similar to a

legal person, but born only on paper. A corporation is also the most complex business structure, requiring substantial paperwork and compliance costs over its life. In return, it gives many advantages and has become a much-preferred business structure in the last century.

A corporation enjoys the ability to **raise capital more easily** than other business structures because it is able to issue shares to the financial market (privately if a private company or publicly if it is a public company). Especially when publicly traded, **transfer of membership** is easy given that shares can be bought and sold on the stock exchange (or privately). It is attractive to invest in for members (shareholders) as they enjoy **limited liability**; the only money members can lose is the money they paid for the shares, as they are not liable for the firm's debts in case of bankruptcy (and thus no-one can go after the member's personal assets!). This limited liability of members also extends to any fraudulent, negligent or reckless acts that any directors or employees engage in. However, directors and employees are personally liable for any of those acts. Further benefits include that the life of a business is not bound to that of any of the members; its life does not have a limit.

Apart from increased costs, there are some disadvantages of incorporating a business. If you move from a sole trader or partnership to a corporation, and you are not the majority shareholder, then you may lose control of what will happen with the business. We will discuss the implications of this later in the chapter.

Test Your Knowledge

Joe and Annie have recently decided to start a business together. They have not formally registered their business structure, and they are currently operating as co-owners. Joe primarily manages the day-to-day operations of the business, while Annie provides financial support. They are unsure about the legal and financial implications of their business structure and are seeking clarification on which form of business organisation they are using by default.



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<https://oercollective.caul.edu.au/sustainable-finance/?p=71#h5p-4>

Concept Check

What are the advantages and disadvantages of each of these possible business forms for StudyApp? (drag and drop each grey box to a relevant column).



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Summary

We have learned the basics of three commonly occurring business structures – sole trader, partnership and corporation. In the next section, we are going to discuss different theories of business purpose.

Theories of Business Purpose

We have talked a little about how a firm can be structured, but what is the purpose of a firm in society? What should a business value?

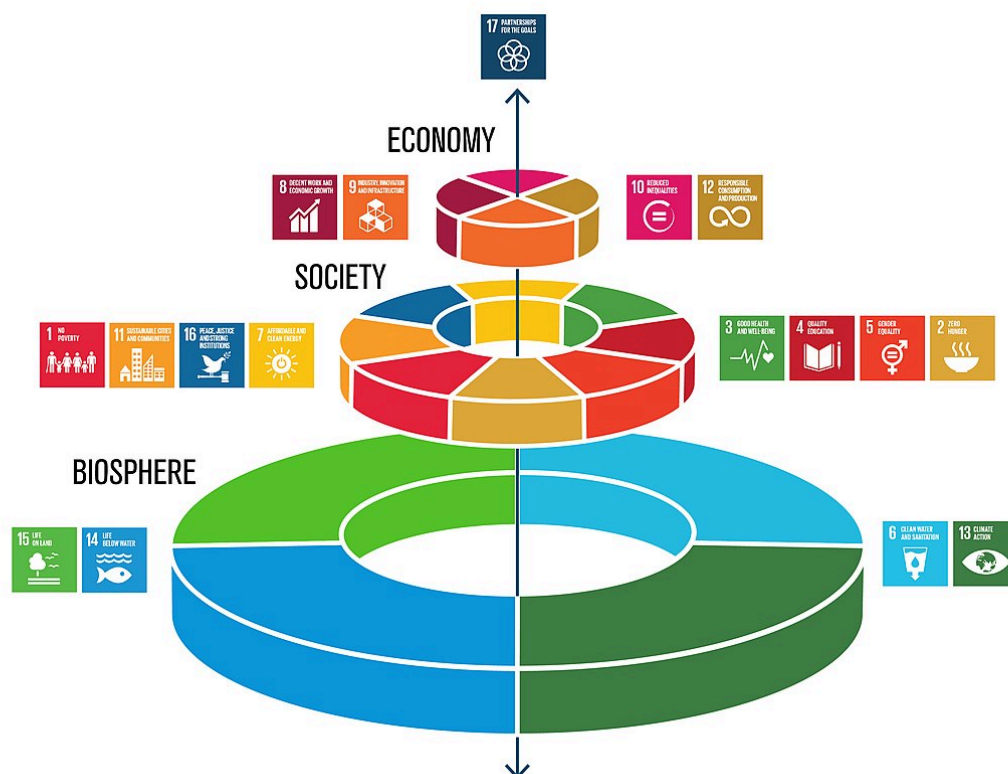
First, let's have a look at what you value yourself, using the Sustainable Development Goals (SDGs). The SDGs are a set of 17 goals, with 169 targets, that are ***“a blueprint to achieve a better and more sustainable future for all”***.¹ All 193 of the world's countries have committed to these goals, that are to be achieved by 2030. Below are the 17 goals:

1. United Nations. (n.d.). *Sustainable Development Goals*. <https://sdgs.un.org/goals>



Sustainable Development Goals by the [United Nations](#), Public domain.

To simplify the goals, we can divide them into environmental (biosphere), social (society) and economic.



Graphics by Jerker Lohantzi/Azote

The SDGs wedding cake by [Azote for Stockholm Resilience Centre, Stockholm University](#), CC BY-ND 3.0.

For societies and economies to thrive long term and be sustainable, we need a highly functioning natural environment and healthy, equitable social systems to support them.

Polls

Poll 1



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Poll 2



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Sole Traders and Partnerships

As a sole trader, you own the business all by yourself. As a partnership, you own the company with your partners. In both those cases, **you have direct control** over what happens in the company and the consequences are yours as well. You make the decisions by yourself or with your partners. For example, you can choose how you treat your employees, and you'll probably realise that you have to create some value for them if you want to retain them. Do you give them part of the profits when you have had a good month? Or do you keep it to yourself?

Let's consider your coffee shop. You can decide whether you give a discount on takeaway cups, if you sell fair-trade coffee only, etc. Let's say the cost of a "common" discount is \$0.50 for customers using a takeaway cup, but a disposable cup only costs you \$0.05. Should you offer the "common" discount? From a purely financial perspective, you may say no, but the reality is that most coffee places now offer this discount. Some may argue that considering the environment (through reducing the billions of coffee cups ending up in landfill) is either "good business", as you enhance your reputation, remain competitive and your customers might be more loyal, whereas others do it simply because it is "the right thing to do".

The Corporation

To what extent should companies consider the social and environmental impacts of their business? How should these be balanced against financial impacts? These questions have been long debated, some of the answers are set in law and regulation, others in culture, and can differ across and within countries.

The 20th century gave something unique, which was the rise of **the corporation**, a separate entity from both its owners and management, which for the first time allowed companies to **have dispersed equity ownership**.

Before companies started raising capital from the public, companies were closely controlled by those who owned them. However, when the industrial revolution started and production ramped up, owners of companies had to increasingly hire managers to help manage the company's operations. And in the 20th century, when companies went to the public for finance more and more often, there started to be an **increased separation between those that are shareholders of the company and those who manage the company**.

Managers are often seen as employees ("agents") of the company that are hired by the shareholders ("principals"). To make sure that the agents act in the best interest of principals, and not for example in their own self-interest, the shareholders elect a board of directors to oversee the company. Moreover, shareholders often receive voting rights with their shares, where they can vote on the board of directors and other important matters at the annual general meeting.

In most textbooks, you will often see the following argument: shareholders "own" the company (residual claimants of the firm) → management and directors have to do what the shareholders want → shareholders want maximum wealth (as a measure of value) = maximum share price; *thus the role of the financial manager is to maximize the value of the shares (share price)*. This argument was mostly instigated by Milton Friedman (1970), the father of **shareholder theory**. His idea was further enhanced by Jensen and Meckling (1976) in their work the "Theory of the Firm"², one of the most cited and influential works in finance literature, which discusses **the main challenge that needs to be addressed in corporate governance is that the managers and directors act to maximize shareholders' wealth**. This view is discussed in more detail next.

2. Jensen, M. C., & Meckling, W. H. (1976). Theory of the firm: Managerial behavior, agency costs and ownership structure. *Journal of Financial Economics*, 3(4), 305-360. [https://doi.org/https://doi.org/10.1016/0304-405X\(76\)90026-X](https://doi.org/10.1016/0304-405X(76)90026-X)

Shareholder Theory (Friedman, 1970)

Milton Friedman, a Nobel prize-winning economist, wrote an article in *the New York Times* in 1970 entitled “The Social Responsibility of Business”.³ In this article, he writes about the notion that businesses may have a responsibility beyond just making a profit – a responsibility to achieve some “social goals”. He strongly disagrees with this and quotes from his book *Capitalism and freedom* (1962) in which he argues:

“There is one and only one social responsibility of business – to use its resources and engage in activities designed to increase its profit as long as it stays within the rules of the game, which is to say, engages in open and free competition without deception or fraud.”⁴

And

“In a free-enterprise, private-property system, a corporate executive is an employee of the owners of the business. He has direct responsibility to his employers. That responsibility is to conduct the business in accordance with their desires, which generally will be to make as much money as possible while conforming to their basic rules of the society, both those embodied in law and those embodied in ethical custom.”⁵

Thus, Friedman concludes that the one and only responsibility of a business is to increase profits for shareholders. Note, however, that **he does not believe that this should occur at all costs**; the actions to achieve these profits have to be **legal and conform to ethical custom**. His main concern about a business manager pursuing anything other than profits is that the manager is spending someone else’s money:

“In each of these cases, the corporate executive would be spending someone else’s money for general social interest. Insofar as his actions in accord with his “social responsibility” reduce returns to stockholders, he is spending their money. Insofar as his actions raise the price to customers, he is spending the customers’ money. Insofar as his actions lower the

3. Friedman, M. (1970, September 13). The social responsibility of business is to increase its profits. *The New York Times*. SM12.

4. Friedman, M. (1962). *Capitalism and freedom*. University of Chicago Press.

5. Ibid.

wages of some employees, he is spending their money.”⁶

Friedman was not against giving money to a charitable organisation or helping out friends, he just believed that if **anyone wanted to give money to charity or anyone that this should be with their own money**. A manager sponsoring the local ballet, soccer club or the Red Cross with corporate funds may be something the shareholders do not want to spend money on. Shareholders may want to spend the proceeds of the businesses’ money on other pursuits. Both shareholders and managers themselves are of course free to give money to charity as well, but their own money. Friedman also argued that if managers spent money on charitable organisations or any other “social” goal, **the managers would be acting as a regulator, as they are effectively imposing a tax and deciding where the proceeds of the tax would go to**, and this should be determined through a democratic process, not a corporate executive.

Concept Check

In September 2019 there were so-called “climate strikes” across the world to demand regulatory action on climate change. There were a large number of businesses that expressed their support and encouraged their employees to take the afternoon off (paid) to join the [strike](#).



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Let’s go back to your coffee shop for a little bit.

While running the business, you will be both impacted by, and impact, a number of entities in society. Your customers impact whether or not you can stay in business, and at the same time, your service and the quality of your coffee have an impact on the wellbeing of the customers. Your suppliers have an impact on the quality and availability of your coffee, whilst you also impact their ability to be in business. Entities that

6. Ibid.

affect the firm, and/or are affected by the firm, are what we call **stakeholders**. In reality, stakeholders have an impact on the success of a business.

Shareholder theory does not deny this but rather proposes that stakeholders are a means to an end (maximising wealth for the shareholders, also called shareholder primacy). So for example, if wages can be cut to generate a profit, they should be cut. If dumping waste in a river is cheaper than treating it, the waste should be dumped in the river. If paying liability suits for a defective product is cheaper than making the product safe, then it is best to make the defective product and pay for the lawsuit. The following video shows a debate between Friedman and a student at Cornell University in 1978.

[Milton Friedman on Self-Interest and the Profit Motive \(YouTube, 6m56s\)](#):



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Friedman proposes that perhaps the car company should have put a disclaimer on the product saying “this product is \$13 cheaper and therefore has an increased chance of x% of exploding under y situation”. Do you think companies should do this? Do you think they do? **Do you think people are really “free” if they do not have information on the possible impacts of products on individuals/society when buying a product?** Who should be responsible for providing this information?

Enlightened Friedmanite

There is much criticism of Friedman’s view (shareholder primacy), particularly as it is often [used to justify focusing on short-term company valuations](#). If managers are to focus on maximising shareholder wealth in the next year, does that mean they are maximising their wealth over the next 5 years? 10 years? 50 years? Is higher current wealth necessarily in the best interest of shareholders who may hold their investment for years or decades? “Enlightened” Friedmanites take a longer-term perspective. Is it in the best interests of shareholders to clear-cut a forest and maximise current production, without replanting it? Or to sustainably manage the forest resource so that it provides a moderate level of output for decades to come? This long-term perspective can lead to the same result as managing for stakeholders (discussed next), but there is a difference in motive.

Stakeholder Theory (Freeman, 1984)

One of the leading alternatives to shareholder theory is [stakeholder theory](#), proposed by Edward Freeman

in 1984.⁷ Stakeholder theory asserts that a manager's goal should not be to maximise shareholder wealth as a primary purpose, but rather to create value for all stakeholders. Freeman intentionally used the word “value” instead of “wealth,” as value includes (but is also broader than) financial outcomes. It includes human well-being, benefits from collaboration, etc.

One of stakeholder theory's premises is the “responsibility principle,” which says that people want to and should consider how their actions impact others. Applying this principle to corporations means that a manager needs to consider how the firm's actions can impact others, and manage the firm accordingly. Stakeholder theory sees business as a set of relationships between groups that have a stake in a firm's activities, and the manager's job is therefore to manage, and create value for, these relationships. Freeman defines a stakeholder as “any group or individual that can affect or be affected by the realization of an organization's purpose”.⁸ Practically, some stakeholders will have a stronger claim on the firm than others.

Freeman⁹ classifies five primary (most important) stakeholders and their stakes are as follows:

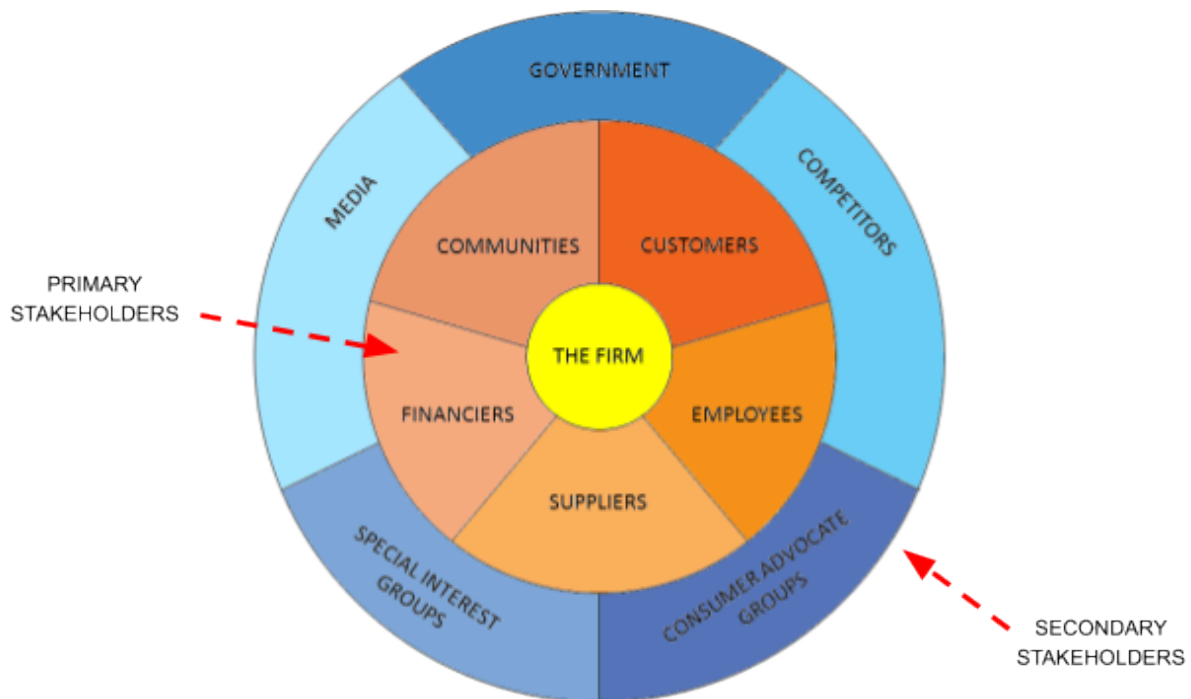
- Financiers (shareholders and debtholders) have a financial stake in the firm and expect a financial return from the firm
- Employees provide human capital to the firm and are impacted by the firm in terms of working conditions. Employees may also be decision-makers in the firm (e.g. if they are managers), or they can also be financiers (e.g. via employee stock options)
- Suppliers and customers have a stake in the firm in terms of exchanging products and services for resources (money)
- Communities grant firms the “right to operate” and can be impacted by the firm's operations e.g. provision of local services or dumping hazardous waste.

There can also be secondary stakeholders, as shown in the diagram below:

7. Freeman, R. E. (1984). *Strategic management: A stakeholder approach*. Pitman.

8. Ibid.

9. Ibid.



Source: Adapted from R. Edward Freeman, Jeffrey Harrison, and Andrew Wicks, *Managing for Stakeholders* (New Haven: Yale University Press, 2007)

There may be conflicting interests between groups of stakeholders and the manager's job is not to trade-off these conflicts, **but to work out a way to create value for all parties**. Stakeholder theorists, therefore, argue that managing for stakeholders is simply good business practice. If all stakeholders are managed well this will result in a profitable, well-run firm.

Concept Check: What is happening in the real world?

The Business Roundtable is an organisation that consists of Chief Executive Officers (CEOs) of more than 181 major companies in the United States. The organisation has been issuing statements on the Purpose of the Corporation since 1978, and since 1987 it has defined the purpose of the corporation to be to serve shareholders first and foremost.

In August 2019, “the Business Roundtable”¹⁰ changed its statement to:

We commit to:

- *Delivering value to our customers. We will further the tradition of American companies leading the way in meeting or exceeding customer expectations.*
- *Dealing fairly and ethically with our suppliers. We are dedicated to serving as good partners to the other*

10. Business Roundtable. (2019, August 19). *Business roundtable redefines the purpose of a corporation to promote 'an economy that serves all Americans'*. <https://www.businessroundtable.org/business-roundtable-redefines-the-purpose-of-a-corporation-to-promote-an-economy-that-serves-all-americans>

companies, large and small, that help us meet our missions.

- *Supporting the communities in which we work. We respect the people in our communities and protect the environment by embracing sustainable practices across our businesses.*
- *Generating long-term value for shareholders, who provide the capital that allows companies to invest, grow and innovate. We are committed to transparency and effective engagement with shareholders.*
- *Each of our stakeholders is essential. We commit to delivering value to all of them, for the future success of our companies, our communities and our country.*

Concept Check



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The example above demonstrates that there is a change in business sentiment. CEOs are increasingly realising that creating long-term value for shareholders requires creating value for its stakeholders. Through innovative thinking many co-benefits can be created. In some regions like Europe, there is also increasing regulation on companies' social and environmental impacts, so there is **more information and transparency for people to make informed decisions**.

Shareholder Value Myth (Stout, 2012)

Cornell Professor of Corporate Law, Lynn Stout wrote a book entitled *The shareholder value myth*¹¹ in which she discusses the history of the role of companies in society and several inaccuracies about shareholder theory. Watch the video below (for more info here is an [article](#) too).

[The shareholder value myth | Lynn Stout, Cornell University \(YouTube, 12m43s\):](#)

11. Stout, L. A. (2012). *The shareholder value myth*. Berrett-Koehler Publishers. <https://scholarship.law.cornell.edu/cgi/viewcontent.cgi?article=2311&context=facpub>



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Concept Check



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Shareholder Welfare not Wealth (Hart, 2017)

Lynn Stout's last point regarding shareholders having pro-social concerns is very similar to Oliver Hart's thesis below.

In the video below, Oliver Hart (winner of the 2016 Nobel Prize in economics) discusses shareholder theory and provides a new perspective on what the goal of the firm should be. In his paper, "Shareholders Should Maximize Shareholder Welfare not Market Value"¹², he argues that firms should maximise the welfare of shareholders, which is much broader than wealth. Shareholders are all participants in society and have a range of social and environmental preferences. When a company engages in actions that maximize profits but create externalities that go against a shareholders' ethical preferences, it is suboptimal to engage in these actions and then let the shareholders "mitigate" the externalities with their own money. Firms should therefore actively seek shareholders' preferences and values, and act consistently with those. Watch the video below

[Shareholders care about more than just profits \(YouTube, 4m12s\)](#)

12. Hart, O., & Zingales, L. (2017). Shareholders should maximize shareholder welfare not market value. *Journal of Law, Finance, and Accounting*, 2, 247 -274. https://scholar.harvard.edu/files/hart/files/108.00000022-hart-vol2no2-jlfa-0022_002.pdf



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Case Study: Gun Control

Oliver Hart uses the example of Dick's Sporting Goods, which changed its policy on gun control.

Dick's Sporting Goods could generate money by selling assault rifles. Friedman would have argued that, if it is a profitable strategy to sell high-powered guns, then the company should do so, pay shareholders the extra dividend, and then the shareholders could decide individually to support gun control organisations. However, shareholders spending their own money to “reverse” the actions of the company would be very inefficient and suboptimal for the shareholders.

Hart argues that it is more efficient for the company to refrain from selling guns in the first place. Shareholders are humans, who have pro-social concerns, and it is assumed that if someone is not only interested in the bottom line, they would prefer to invest in companies that are also interested in issues beyond the bottom line. Hart argues that if a CEO and managers want to show loyalty to their shareholders, their individual concerns should be taken into consideration.

In other words, instead of making money at the expense of all, the pro-social concerns of shareholders should be accounted for when building a strategy.

Exercise: Child Labour

Many companies in the fashion industry operate in developing countries, where labour is cheap and regulations on working conditions and education possibilities are poor. Whilst most of these countries do not legally allow child labour, regulations are not often enforced, as the low wages make it difficult for parents to miss out on the extra income their children can bring in. The CEO of “M&H”, a company known for its cheap apparel, says “Our duty is to maximize value for shareholders, this means we have to minimize our costs, and after all, our consumers want the cheapest products.” He further says that “without us, our employees would not have any income at all.” He does say that he cares about education a lot, and that he personally donates 5% of his income to education initiatives in developing countries. He argues that it would be wrong to donate money with the companies' funds, reasoning that this is the money that belongs to shareholders, who if they wanted to, could donate this themselves.



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<https://oercollective.caul.edu.au/sustainable-finance/?p=71#h5p-11>

Discussion: Short Case Study – Merck

[Merck & co will pay \\$4.85 billion to end thousands of lawsuits over its painkiller Vioxx \(YouTube, 2m7s\):](#)



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Exercise

Assume you were Merck's CEO and you were aware that Vioxx had possible dangerous side effects:

Lawsuits for dangerous side effect and deaths = \$ -5 billion

Net revenue from selling Vioxx = \$ 10 billion



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<https://oercollective.caul.edu.au/sustainable-finance/?p=71#h5p-12>

This chapter is adapted from “What is Financial Management” in *Introduction to financial management: A contemporary approach* by Saphira Rekker (forthcoming) under a [Creative Commons Attribution-NonCommercial 4.0 International License](#), except where otherwise noted.

3.

FRAMEWORKS FOR SUSTAINABLE INVESTMENT

Jacquelyn Humphrey and Saphira Rekker

Chapter Overview

At the end of this chapter you will be able to:

- Understand the importance of collective action and the main initiatives to which organisations can pledge commitment to sustainability
- Understand how sustainability is measured
- Evaluate different sustainability ratings schemes

Collective Action/Pledges and Commitments

As we have seen in prior chapters, sustainability is becoming increasingly important to our society. However, how can organisations become more sustainable? Many initiatives have come into existence which provide a network and support for organisations that want to operate more sustainably. In this section we will review some of the larger initiatives.

One criticism of these initiatives is that they are voluntary. This can mean that signatories can decide not to take their commitments seriously, and also the commitments cannot be enforced (other than potentially delisting the organisation from the initiative). This in turn can lead to criticisms of greenwashing. Greenwashing is a commonly used term to describe misleading, or dishonest, information provided by an entity to make it appear more sustainable than it is.

Greenwashing

Greenwashing occurs in many different forms, and regulatory bodies are increasingly focused on ensuring that accurate information is provided – particularly in relation to climate change (see Chapters 5 and 6). For example:

The EU has developed several different requirements on what can be labelled as a sustainable or “Paris-aligned” activity or investment product.

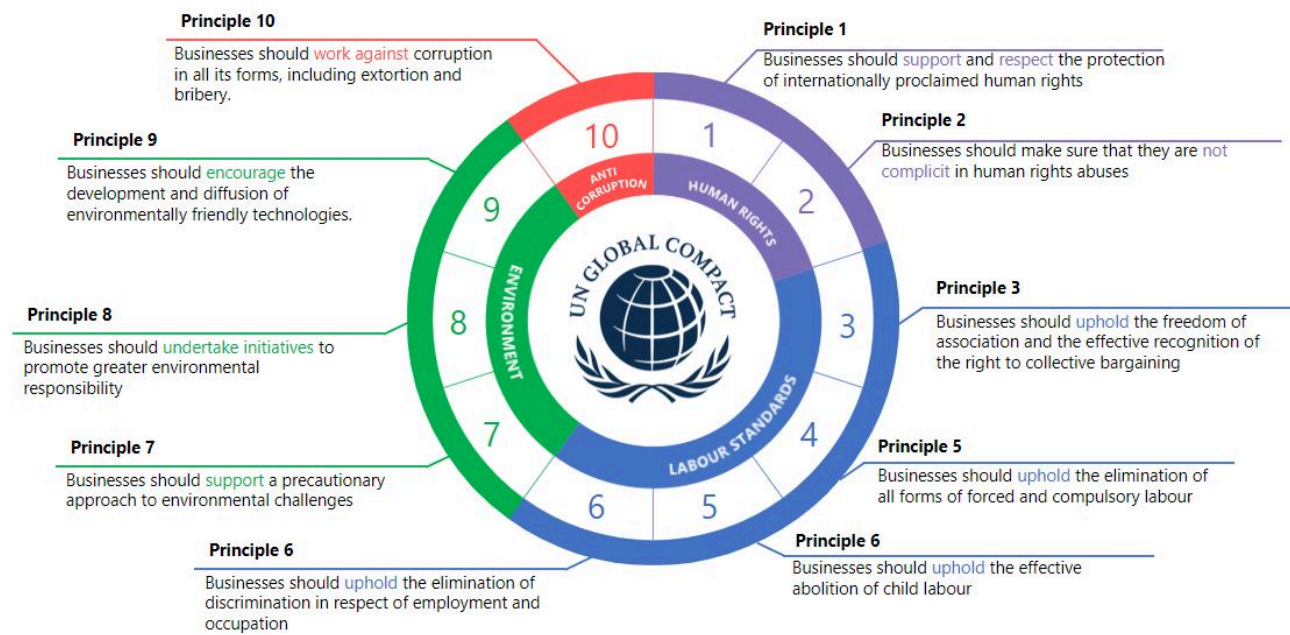
In June 2022, the Australian Securities and Investment Commission (ASIC) released guidelines on avoiding greenwashing in sustainability products, and has made action against greenwashing one of its enforcement priorities for 2023 and 2024. In 2023, ASIC sued several financial institutions for greenwashing, for example [Vanguard](#) and [Active Super](#).

In addition, international guidelines to prevent greenwashing in climate reporting have been provided by the UN Integrity matters report, which was focal during COP27.

United Nations Global Compact

In Chapter 2 we introduced the Sustainable Development Goals. Organisations, including companies, have a part to play in meeting the SDGs, and the United Nations Global Compact (UNGC) was launched in 2000 to assist them to do this. The UNGC is the largest global corporate sustainability initiative and has over 23,000 signatories from 166 countries. Well-known Australian and New Zealand UNGC signatories include Bunnings Group, Coles Group, and Air New Zealand.

UNGC signatories commit to responsibility in their everyday operations, strategies and culture across four areas: human rights, labour, environment and anti-corruption. UNGC signatories are required to implement ten principles, shown in the graphic below, and communicate how they are implementing these principles in their annual or sustainability report. The UNGC also provides education and training to its signatories on how they can more effectively embed the SDGs into their businesses.



UNGC ten Principles. Source: Adapted from [The Ten Principles of the UN Global Compact](#) by the United Nations Global Compact. The logo is a trademark of the United Nations Global Compact.

[Uniting business for a better world: 20 years of the UN Global Compact \(YouTube, 1m 32s\):](#)



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Principles for Responsible Investment

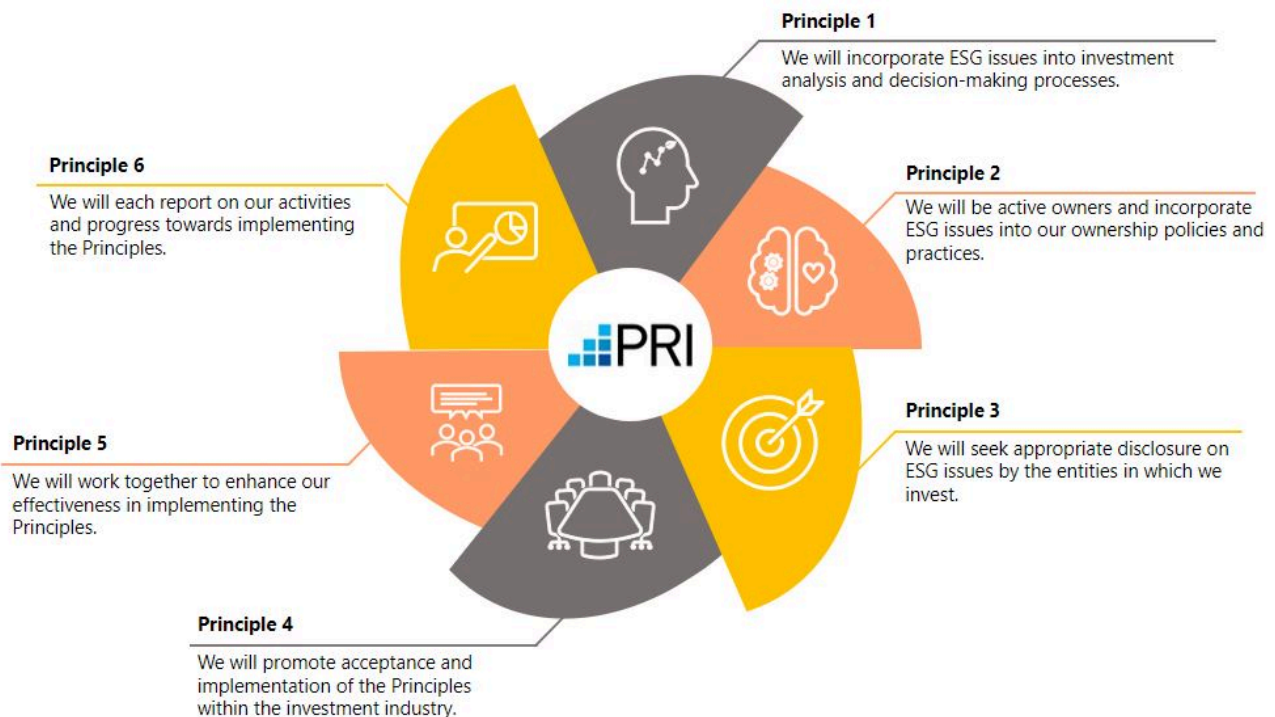
The United Nations-supported Principles for Responsible Investment (PRI) is another important large global sustainability initiative. The PRI was designed to help the finance industry – asset owners, investment managers and service providers – to become more sustainable by integrating ESG into investment and operating decisions.

The PRI was launched in 2006 with 46 signatories, including two from Australia and New Zealand. The number of signatories has grown astronomically since its launch and today there are over 5,300 global signatories. More than 260 signatories are from Australia and New Zealand – including BP Funds Management (NZ) Ltd, City of Brisbane Investment Corporation and New Zealand Superannuation Fund.¹

PRI signatories commit to six Principles on how they will operate and invest. The list of Principles can

1. Principles for Responsible Investment. (n.d.). *About the PRI*. <https://www.unpri.org/about-us/about-the-pri>

be seen in the figure below. Signatories are also required to report annually to the PRI on their progress on ESG issues. Signatories that fail to report for two years are delisted.



The six Principles for Responsible Investment. Source: Adapted from [What are the Principles for Responsible Investment?](#) The PRI logo is a trademark of Principles for Responsible Investment.

The PRI also provides education and investor tools for its signatories to help them to become more sustainable. PRI conferences and workshops provide an opportunity for signatories, and academics working in ESG, to share knowledge and information, and network.

In addition, the PRI facilitates collective action on ESG issues e.g., writing joint letters to companies, engaging or voting collectively on ESG issues. A recent example of a collective action coordinated by the PRI is when signatories could sign a letter addressed to Nike for reparations because their largest supplier had not paid wages to 4,500 garment workers in Cambodia and Thailand.

Other Sustainability Initiatives

Recent years have seen a proliferation of voluntary sustainability initiatives, many of which focus on one particular issue. The table provides information on some of the larger initiatives.

Sustainability initiatives

Initiative name	Summary	Number and type of signatories
Climate Action 100+	Investor-led initiative to engage with companies on how they are taking climate-related action. Launched in 2017.	Over 700 investors
Net Zero asset owner alliance	Convened by the UN. Investor-led initiative of institutional investors who commit to transitioning their portfolios to net zero emissions by 2050. Launched in September 2019.	86 asset owners, with combined worth of US\$11 trillion
Net Zero asset managers	Convened by the UN. Asset managers who support and commit to investment aligned with achieving net zero emissions by 2050. Launched in December 2020.	Over 315 signatories with US\$59 trillion in AUM
Net Zero banking alliance	Convened by the UN. Leading global banks who commit to financing climate action to meet net zero emissions by 2050. Launched in April 2021.	133 banks worth US\$74 trillion (41% of banking assets globally)
Investor group on climate change	Australian and New Zealand Institutional investors. Commit to accelerating progress on climate change. Established in 2005.	103 members
New Plastics Economy	Launched by Ellen MacArthur foundation and UN Environment Programme. Targets the production, use and reuse of plastics, and work towards a circular economy for plastics. Launched in 2018	Over 500 signatories, including corporations and governments
High ambition coalition to end plastic pollution	Intergovernmental group to end plastic use 2040. Launched in March 2022.	60 countries
Valuing water finance initiative	Investor-led group facilitated by Ceres, a sustainability NGO. Designed to engage with companies that use and pollute a large amount of water on water management and protecting global fresh water resources. Launched in August 2022.	85 investor signatories with approximately US\$14 trillion in assets under management.
High ambition coalition for nature and people	Intergovernmental group to conserve and manage at least 30% of global land and oceans by 2030. Launched in January 2021.	115 countries
Investors Against Slavery and Trafficking Asia Pacific	Investor-led group along with the Australian Council of Superannuation Investors, Walk Free and the Finance Against Slavery and Trafficking initiative. Targets slavery and human trafficking in companies in the Asia Pacific. Launched in 2020.	45 investors with approximately AUD11.9 trillion in assets under management.

Measuring Sustainability

The next question is how organisations can measure, report on and communicate their sustainability to their stakeholders. Without compulsory reporting standards, there is a huge diversity in how this

information could be reported. Consequently, several frameworks have been developed which are designed to assist organisations to report this information in a standardised, informative way.

Global Reporting Initiative

The Global Reporting Initiative (GRI) was one of the earliest initiatives to provide a sustainability reporting framework. GRI was launched in 1997 and now is the most widely used sustainable reporting standard, with more than 10,000 organisations in 100 countries reporting using GRI standards. GRI is governed by the Global Sustainability Standards Board. The Standards are reviewed regularly to ensure they reflect global best practice.

GRI standards are a “modular” system of three series of standards:

- GRI universal standards, which provide disclosure and guidance on topics that are likely to be material for all organisations.
- GRI sector standards, which are tailored for specific sectors and (will) cover 40 sectors e.g. Oil and gas; Textiles and Apparel.
- GRI topic standards, which relate to a specific sustainability issue e.g. human rights, waste.

Carbon Disclosure Project

The Carbon Disclosure Project (CDP), also a not-for-profit organisation, focuses specifically on enabling companies to disclose their greenhouse gas emissions and other climate-related information, as well as water usage. The CDP has become the leading global organisation through which companies and cities report their greenhouse gas emissions data. CDP data is widely used by investors, data providers, academics and governments for decision-making, product offerings and research.

There are now companies, cities, states and regions from over 90 countries disclosing through CDP on an annual basis. This includes over 23,000 companies worth more than half of global market value.

For an idea of what companies are asked to disclose, have a look at [CDP's questionnaires](#).

In 2021, the CDP launched a new strategy that aims to expand to cover all planetary boundaries, including other areas such as biodiversity, plastics and oceans, and recognises the interconnectedness of nature and earth's systems (see Chapter 5).

Since the Paris Agreement in 2015 there has been a large increase in reporting frameworks and guidelines. Initially, the CDP provided an overview of how its reporting aligned with and differed from the GRI. Now, the CDP has aligned its reporting standards with the recommendations by the Task Force on Climate-related Financial Disclosures (TCFD), which is discussed next.

Task Force on Climate-Related Financial Disclosures (TCFD)

Following the Paris Agreement in 2015 an important international financial body – the Financial Stability Board – set up a Task Force to develop guidelines on climate risk disclosures. It was tasked to identify the financial risks and opportunities associated with climate change, and to provide global guidelines on how to report on these. These guidelines were published in 2017 and have formed the groundwork for other guidelines and initiatives on climate, including from regulatory bodies across the world.

[Explained | Task Force on Climate-Related Financial Disclosures \(TCFD\) \(YouTube, 2m 19s\):](#)



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The significance of the TCFD as a milestone in climate reporting cannot be understated. The TCFD has been so influential because it was a document written by a globally significant *financial* body, led by well-known leaders in the financial sector. The Task Force was led by Michael Bloomberg, founder of Bloomberg, a world-leading financial information provider, and presented to the Financial Stability Board's Chair, Mark Carney, former governor of the Bank of England.

The TCFD is focused on increasing transparency to make “markets more efficient and economies more stable and resilient”.² It streamlines climate reporting and classifies its disclosures according to four categories (see the figure below). At the core of the TCFD are metrics and targets, as a fundamental for what is needed to start managing climate risks, setting a strategy, and consequently governing the organisation.

2. Task Force On Climate-Related Financial Disclosures [TCFD]. (2017). *Metrics and targets*. <https://www.tcfddhub.org/metrics-and-targets/>, p. 3

Core Elements of Recommended Climate-Related Financial Disclosures



Governance

The organization's governance around climate-related risks and opportunities

Strategy

The actual and potential impacts of climate-related risks and opportunities on the organization's businesses, strategy, and financial planning

Risk Management

The processes used by the organization to identify, assess, and manage climate-related risks

Metrics and Targets

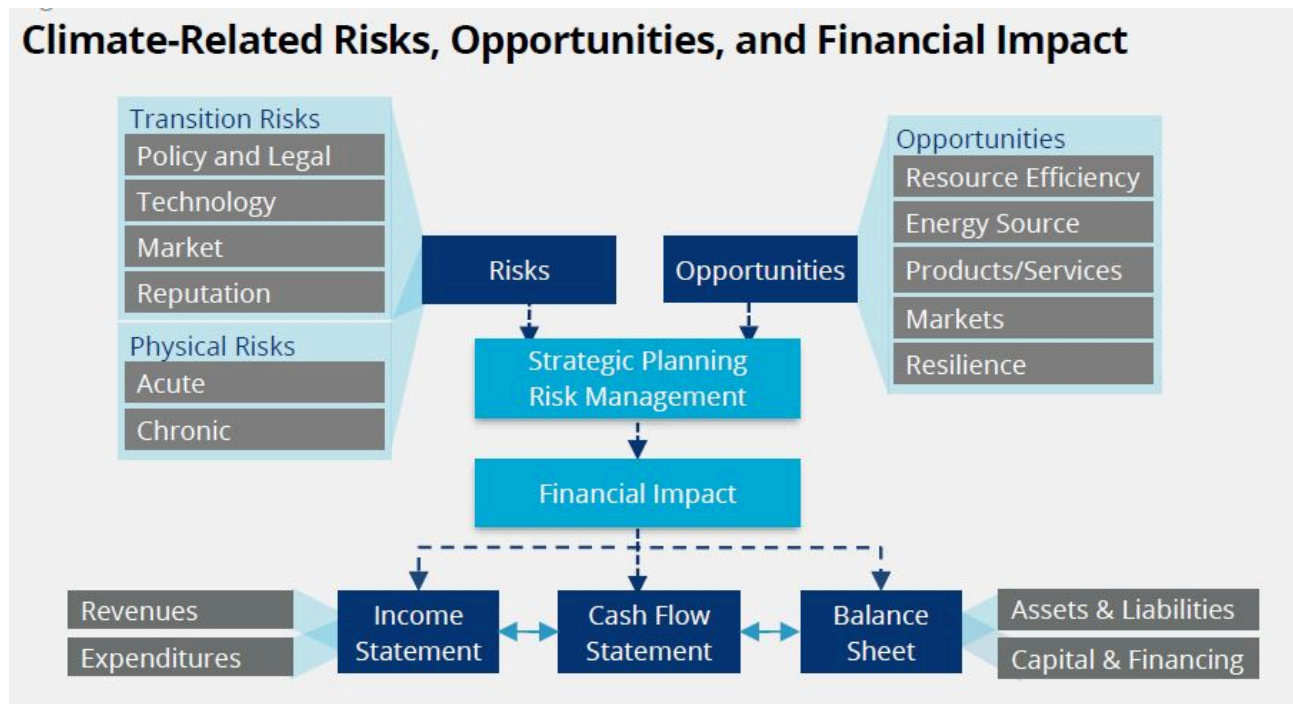
The metrics and targets used to assess and manage relevant climate-related risks and opportunities

[Core elements of the recommended Climate-Related Financial Disclosures](#) by the [Task Force on Climate-Related Financial Disclosures \(TCFD\)](#), 2017. Used with permission.

Each category has several recommended disclosures, including explanations of what should be included in the disclosure. For example, for metrics and targets, one of the recommended disclosures (disclosure c) is “Describe the targets used by the organization to manage climate-related risks and opportunities and performance against targets”³ and then there is a description of what should be disclosed, including several elements on the type of target, time frame, base year from which progress is measured, and key performance indicators used to assess progress against targets. There are disclosure guidelines that apply to all sectors, but the TCFD has also increasingly published sector-specific guidelines.

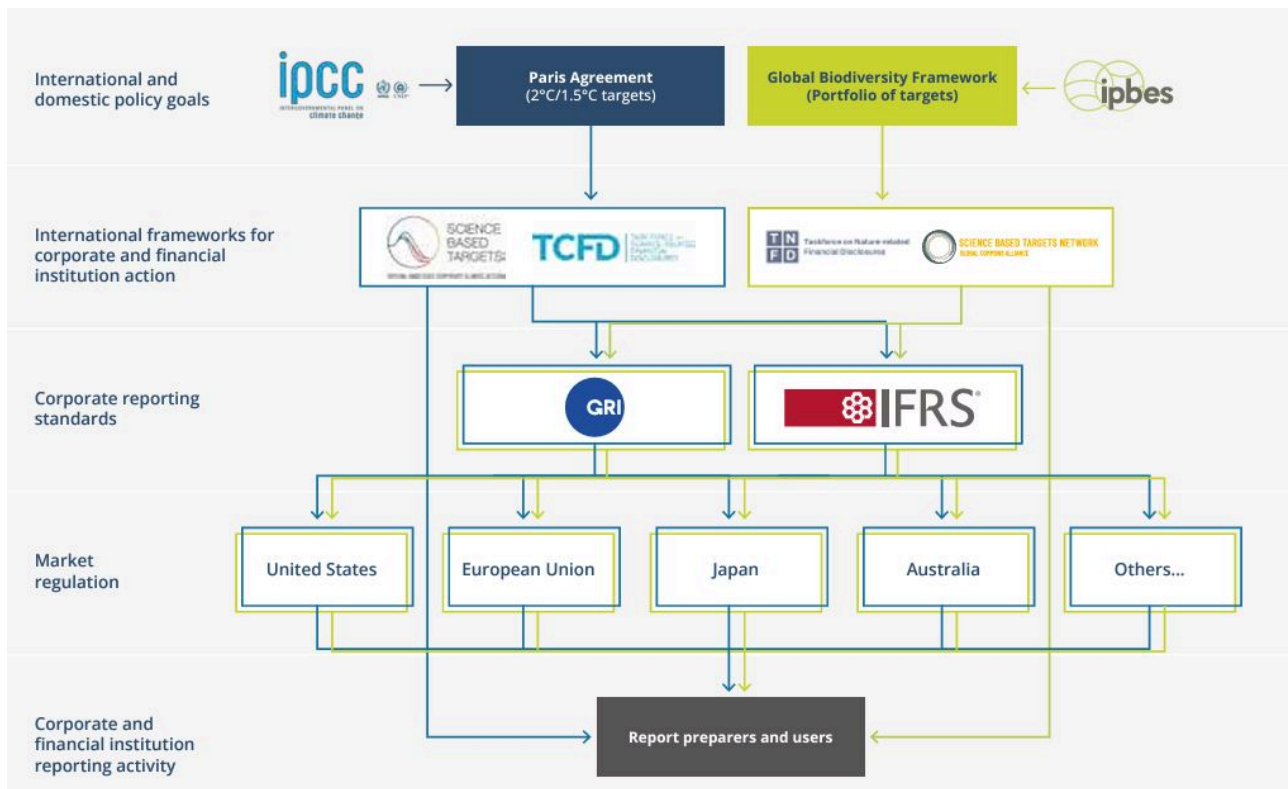
Climate-related risks and opportunities and their impact on the financials of an entity can also be divided into different categories (see the figure below). Broadly speaking there are two types of climate-related risks: transition risk and physical risk. Transition risk refers to the risks associated with the world transitioning to a lower carbon, and ultimately fully decarbonised, economy. These risks include policy and legal (increased regulation and litigation), technology (innovations), market (supply and demand) and reputation (stakeholder perceptions) risk. The more rapidly economies transition, the greater the transition risk. Physical risk, however, increases the more rapidly the climate changes. Physical risks are the risks associated with a warming planet. Some risks are acute, such as extreme weather events. Others are chronic, such as sea level rise and water scarcity. Fortunately climate change does not only come with risks, it also comes with opportunities. Addressing climate change provides opportunities in using resources more efficiently and changing sources of energy (potentially saving costs!), innovating to provide new products and services, entering new markets, and ultimately make organisations more resilient to climate-change-related risks.

3. Task Force On Climate-Related Financial Disclosures. (2017). *Metrics and targets*. <https://www.tcfddhub.org/metrics-and-targets/>



[Climate-Related Risks, Opportunities and Financial Impact](#) by the [Task Force on Climate-Related Financial Disclosures \(TCFD\)](#), 2017. Used with permission.

Following the TCFD, a similar task force was established but for a broader purpose; nature-related disclosures: Taskforce on Nature-Related Financial Disclosures (TNFD). The TNFD follows a similar structure to the TCFD in terms of the elements covered (governance, strategy, risk management, and metrics and targets). It recognises other natural systems that are important to maintain for financial stability, covering biodiversity and other planetary systems (using the planetary boundaries concept we cover in Chapter 5). The figure below demonstrates how the TCFD and TNFD are informed by international policy goals, and are currently being worked into corporate reporting standards, including the IFRS which we discuss next.



Where TNFD fits in the emerging reporting architecture in [Taskforce on Nature-related Financial Disclosures \(TNFD\) Recommendations by TNFD, CC BY 4.0](#).

International Financial Reporting Standards (S1, S2)

You are probably familiar with the International Financial Reporting Standards (IFRS), which are issued by the International Accounting Standards Board. The IFRS are international standards for how to report on financial data, making statements comparable across international boundaries. In 2021, the IFRS Foundation established the International Sustainability Standards Board in response to demand for global sustainability reporting guidelines. In 2022 the first two drafts of IFRS S1 (General Requirements for Disclosure of Sustainability-related Financial Information) and IFRS S2 (Climate-related Disclosures) were issued, with the latter built on the recommendations by the TCFD and sector-specific guidelines from the Sustainability Accounting Standards Board. In June 2023, the IFRS S1 and S2 were officially issued.

Many countries are in the process of integrating the IFRS S1 and S2 into their national reporting requirements.

Taxonomies and Other Sustainable Finance Frameworks

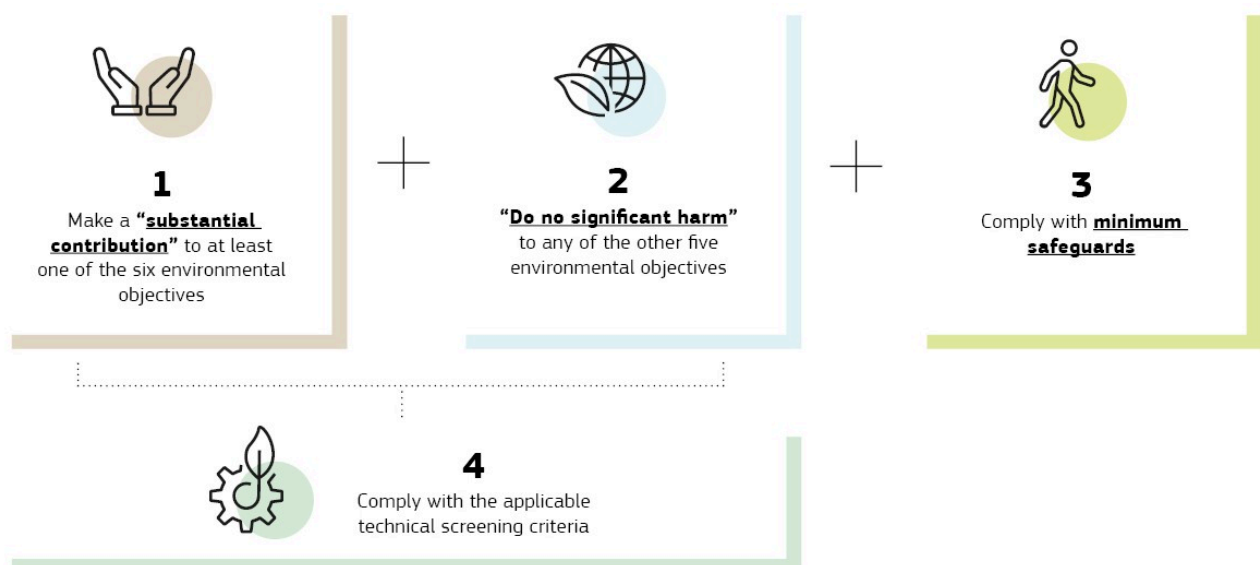
The EU has been a leader in the area of sustainable finance frameworks and standards. The aim is to facilitate sustainable investment and increase capital flows to support the EU's green deal and achieve the EU's sustainability objectives.

In 2018 it set up a Technical Expert Group to assist with developing items as listed in their legislative proposals:

- an [EU taxonomy](#): a classification system that specifies whether an economic activity can be regarded as environmentally sustainable
- an [EU Green Bond Standard](#): which we briefly discussed in Chapter 3
- a methodology for [EU climate benchmarks and disclosure for ESG benchmarks](#).

The EU's taxonomy came into force in July 2020. For an activity to be classified as sustainable, it must:

- (1) make a “substantial contribution” to at least one of six environmental objectives – climate change mitigation, climate change adaptation, sustainable use and protection of water and marine resources, transition to a circular economy, pollution prevention and control, and protection and restoration of biodiversity and ecosystems. Then, it needs to also make sure it does
- (2) “no significant harm” to any of the other five environmental objectives and
- (3) comply with minimum safeguards (social standards) and
- (4) comply with the applicable screening criteria of (1) and (2).



[The Taxonomy Regulation's 4 overarching conditions](#) by the [European Union](#), CC BY 4.0

Australian Sustainable Finance Taxonomy Development

In 2022 there were over 15 taxonomies globally, as outlined in the Australian Sustainable Finance Institute

(ASFI) Taxonomy Project’s analysis of international taxonomies and considerations for Australia.⁴ ASFI is in the process of developing [a taxonomy for Australia](#). Such a classification system will standardise what encompasses a sustainable activity and make it easier for capital to flow to sustainable activities.

EU Climate Benchmarks

In 2020 the EU had officially adopted regulation on the minimum standards for a benchmark to be classified as “Climate Transition” or “Paris-aligned”. This is aimed at reducing the risk of greenwashing, and increases the transparency and comparability of information on different benchmarks. Benchmarks are important in the financial industry, as funds often are required to compare themselves against benchmarks, or directly invest in index funds that replicate a certain index. Many index funds label themselves as “green”, “low carbon”, etc, but this regulation ensures that only funds that meet certain requirements can have a certified EU label of being a “Climate Transition Benchmark” or a “Paris-aligned Benchmark”. The requirements are for the funds to “(a) for equity securities admitted to a public market in the Union or in another jurisdiction, at least 7% reduction of GHG intensity on average per annum; (b) for debt securities other than those issued by a sovereign issuer, where the issuer of those debt securities has equity securities admitted to a public market in the Union or in another jurisdiction, at least 7% reduction of GHG intensity on average per annum or at least 7% reduction of absolute GHG emissions on average per annum; (c) for debt securities other than those issued by a sovereign issuer, where the issuer of those debt securities does not have equity securities admitted to a public market in the Union or in another jurisdiction, at least 7% reduction of absolute GHG emissions on average per annum.”⁵

Did You Know?

One of the authors of this chapter made a key contribution to the climate benchmarking regulation by assisting with the modelling of the 7% reduction. This 7% was derived from the IPCC Special Report on 1.5°C, based on scenarios that had “no or limited overshoot”.

The IPCC’s report in 2018 provided six categories of emission pathways – four categories that meet the 1.5°C and two categories that meet the 2°C goals by 2100, where differences depend on the allowance of an “overshoot” and different probabilities of meeting the temperature goal. If a pathway allows for a temporary overshoot of the temperature, it

4. Australian Sustainable Finance Institute. (2022). *Analysis of international taxonomies and considerations for Australia*. <https://www.asfi.org.au/publications/international-scoping-paper>

5. *Commission Delegated Regulation (EU) 2020/1818*. (2020). http://data.europa.eu/eli/reg_del/2020/1818/oj

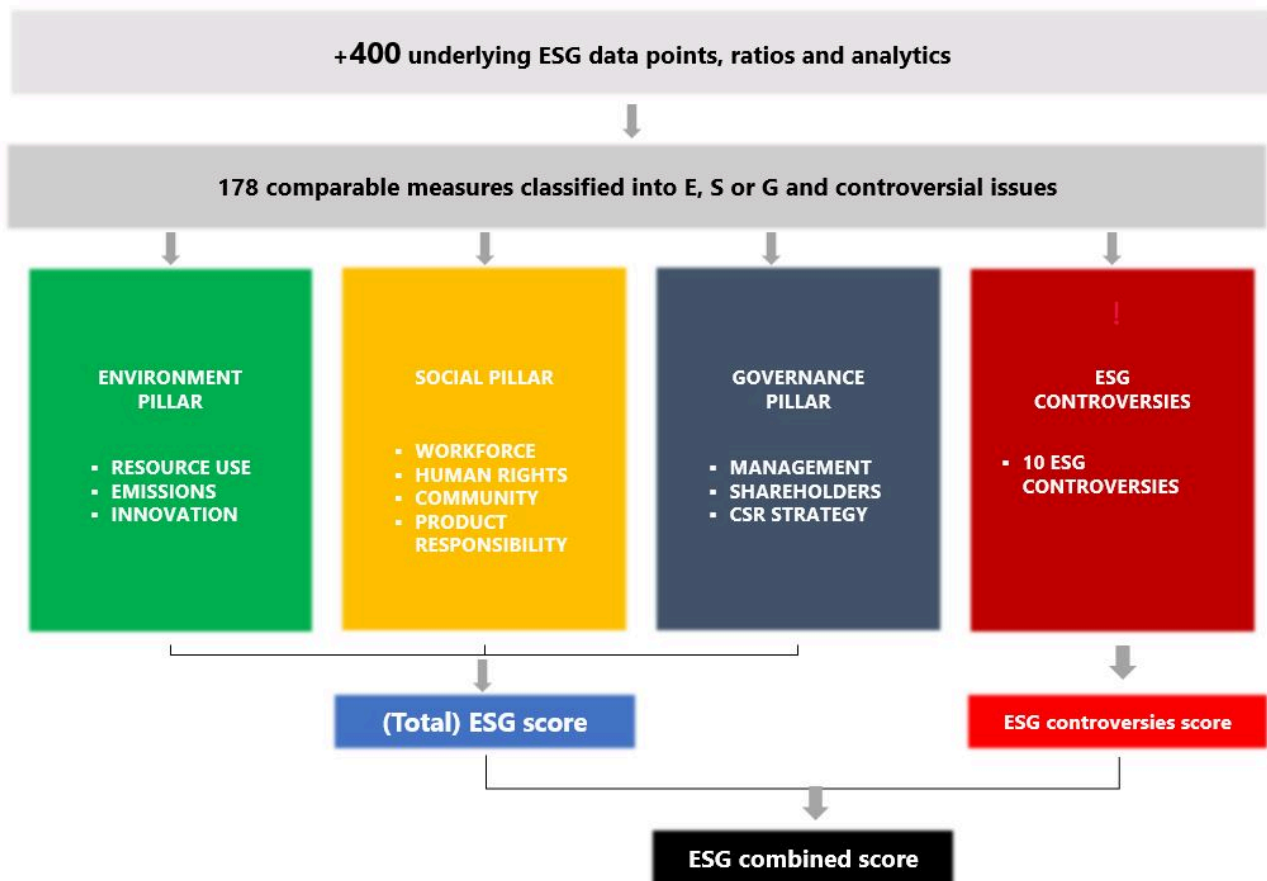
means it relies on large-scale deployment of carbon dioxide removal (CDR) measures, which are uncertain and entail clear risks (Rogelj et al, 2018).⁶ Based on the Precautionary Principle (UN, 1992, Principle 15)⁷ therefore, we proposed the use of the scenarios that had “no or limited overshoot”.

Sustainability Ratings Agencies

Ratings agencies are independent organisations that rate other organisations. The most well-known are probably credit ratings agencies – the largest of which are Standard and Poor’s, Moody’s and Fitch – which assign companies and governments scores on how likely they are to be able to repay their debts.

Similarly, there are sustainability ratings agencies, which are independent organisations that assess and then provide ratings on how sustainable companies are. The ratings are usually based on publicly available information (such as from companies’ sustainability reports), but can also include interviews with company management, or information from the media. The ratings usually start by assessing very granular-level information, and then are aggregated up to give an overall sustainability or ESG rating. An example of such a rating scheme is in the figure below.

-
6. Rogelj, J., Shindell, D., Jiang, K., Fifita, S., Forster, P., Ginzburg, V., Handa, C., Kheshgi, H., Kobayashi, S., Kriegler, E., Mundaca, L., Séférián, R., & Vilarinho, M. V. (2018). Mitigation pathways compatible with 1.5°C in the context of sustainable development. In P. Z. V. Masson-Delmotte, H. O. Pörtner, D. Roberts, J. Skea, P. R. Shukla, A. Pirani, W. Moufouma-Okia, C. Péan, R. Pidcock, S. Connors, J. B. R. Matthews, Y. Chen, X. Zhou, M. I. Gomis, E. Lonnoy, T. Maycock, M. Tignor, T. Waterfield (Eds.), *Global warming of 1.5°C. An IPCC Special Report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty*. In Press. https://www.ipcc.ch/site/assets/uploads/sites/2/2019/02/SR15_Chapter2_Low_Res.pdf
7. United Nations. (1992). *Rio declaration on environment and development*. https://www.un.org/en/development/desa/population/migration/generalassembly/docs/globalcompact/A_CONF.151_26_Vol.I_Declaration.pdf



ESG Metrics is adapted from Pellegrini, L. (2022). SRI, ESG and Value of Sustainability. In: Bellavite Pellegrini, C., Pellegrini, L., Catizone, M. (eds) *Climate Change Adaptation, Governance and New Issues of Value*. Palgrave Studies in Impact Finance. Palgrave Macmillan, Cham. https://doi.org/10.1007/978-3-030-90115-8_4

Recent years have seen a huge increase in the number of sustainability ratings agencies. Unfortunately, each ratings agency uses its own methodology and criteria for rating companies. This has led to criticisms, because the sustainability ratings of a particular company are not consistent across the ratings agencies.

Measuring Climate Performance

Given the (long-term) financial success of sustainable investment funds, and demand from clients, many funds now offer sustainable and responsible investment options (see e.g. [Morgan Stanley](#)). However, how responsible or sustainable are these investments?

[Research by Rekker, Humphrey and O'Brien \(2019\)](#) found that sustainability ratings often used by investors to make sustainable investment decisions do not measure how consistently a company is operating with e.g. meeting global climate goals (so how can we

create climate-safe investment portfolios?). The role of sustainability rating agencies is to analyse company data and provide independent assessments on their sustainability. The landscape is quickly changing, however. Over the past few years there have been major developments in the required disclosure and action of companies on climate change as we have seen in this chapter.

Whilst more science-based approaches to measuring companies targets and the progress against these targets have been developed, e.g. the [Science-based Targets initiative](#) and the [Transition Pathway Initiative](#), they still exhibit some shortcomings. To measure climate performance using a strict science-based approach, Rekker et al. (2022) propose several conditions and requirements in order to develop a “Paris Compliant Pathway”. This will be further discussed in Chapter 6.

4.

SUSTAINABLE FINANCIAL INSTRUMENTS

Jacquelyn Humphrey

Chapter Overview

At the end of this chapter you will be able to:

- Understand the different ways responsible investment portfolios can be formed
- Analyse the difference between “voice” and “exit”
- Apply your existing knowledge about bond instruments to sustainable investments

Sustainability in Portfolios and Managed Funds

Investors will usually invest in multiple assets i.e. a portfolio. Investors can select their own assets and create their portfolios, but many investors choose to invest via a managed fund, rather than assets directly. As you will recall, a fund (also known as a mutual fund, a managed fund or a unit trust), pools investors’ money and invests in a portfolio of assets. The clip below provides a quick reminder of how funds work.

[What is a Fund? \(YouTube, 1m 18s\):](#)



One or more interactive elements has been excluded from this version of the text. You can view them online here: <https://oercollective.caul.edu.au/sustainable-finance/?p=60#oembed-1>

Sustainable funds are probably the easiest way for individuals to access sustainable financial products, due to the low initial investment requirements. There is a wide range of ways in which sustainable funds can be formed, and the available strategies have also developed over time. In this chapter we look at different strategies that can be used to form sustainable portfolios. Investors could use these strategies themselves, or they can be used by fund managers to form sustainable fund products.

Early Strategies

In the West, the earliest challenges to traditional finance strategies (i.e. just focus on maximising return and minimising risk) were made by groups of Christian investors who did not want their money to be invested in activities that violated their religious values. In particular they did not want to invest in what have come to be known as sin stocks: companies in tobacco, alcohol, gambling, pornography, or weapons manufacture. These investors asked their investment managers to design products for them that excluded stocks in these industries. Thus was born **negative screening**. Negative screening was also later (through the 1970s to the 1990s) extended to excluding stocks from repressive regimes, specifically South Africa during the apartheid era, and later Sudan. Today some investments will screen out, for example, Russian investments after the invasion of Ukraine.

Negative screening is not as simple as it may first appear. A company may indirectly be involved in an activity, although it is not its primary business. For example, if a negative screen for alcohol were to be applied, this would not only affect companies that directly manufacture or sell alcohol, but also exclude restaurants, hotels and even grocery stores (e.g., Woolworths and Coles sell alcohol in some Australian states). In this case, a revenue threshold is often applied where any company that derives x% of its revenue from alcohol is excluded.

From here, investors started to say that they did not only want to exclude undesirable stocks, but also invest more in (overweight) companies that have a positive influence on society. **Positive screening** is where a company is included in a portfolio because of its performance in a desirable social or environment area. Example of positive screens are companies that treat their employees well (good labour relations) or invest in clean technology.

Best in class investment also arose, which can be thought of as a type of positive screening. Under this approach, companies with the best ESG (environmental, social and governance) performance, usually relative to other companies in the same industry, are included in the portfolio. For example, a portfolio could include the top 30% highest ESG-rated companies in each industry. The advantage of best in class investment is that whole industries are not excluded from the portfolio or overweighted in the portfolio. In other words, a diversified portfolio can be achieved through this approach.

Current Landscape

Today, investment products that use positive and negative screens are still widely available. However, other approaches to investment have also developed.

As awareness of and concern about climate change has grown, environmental issues have also been included into the list of issues investors wish to be considered. Furthermore, many “mainstream” financial institutions have now started to offer products that consider a wider range of issues than just risk and return. ESG investment has now become somewhat mainstream. Mainstream investors typically see ESG issues as risks, and therefore considering ESG factors in decision-making has to some extent been added to

the traditional risk-management strategy. These investors want the best of both worlds – they want both good ESG practices and good returns. This approach is usually referred to as **ESG integration**.

Impact investment has also developed. Similar to ESG investment, impact investments provide capital specifically to address social and/or environmental issues. However, in general, the ESG impact is more important than the financial return for impact investors. However, these investors do still expect some return from these investments – even if it is below a risk-adjusted market rate.

Finally, **philanthropy** is where money is given to a “good cause” e.g. a charity, the arts, or sports. You are probably aware of individual philanthropists, but corporations can also engage in philanthropy. This can mean corporations give money to a cause, but can also include, for example, employees volunteering their time to the community. Philanthropy done well is not easy – the firm’s philanthropic activities need to be integrated into the firm’s strategy and activities.

Philanthropic giving by companies is often seen as where ESG in corporations began. However, while philanthropy can form part of a company’s ESG strategy, for a company to be seen as an ESG leader, it is not enough to just give some money away. In fact, some argue philanthropy directs money away from implementing effective ESG strategies and can be considered greenwashing if donating money is used to distract attention from the company’s poor ESG practices. Another argument against company philanthropy is that if shareholders wanted to donate money, they could do so themselves privately, and further, it is unlikely that corporations would choose to donate to the same organisations or causes that investors would choose themselves.

Poll



One or more interactive elements has been excluded from this version of the text. You can view them online here: <https://oercollective.caul.edu.au/sustainable-finance/?p=60>

Divestment Versus Engagement: Which Strategy is Better?

What happens when investors are not happy with the ESG performance of companies in which they are invested? There are a number of strategies that can be used. **Corporate engagement** and **shareholder activism** are where shareholders engage with these companies and try to push them to do better on ESG issues. Engagement can take many forms, such as writing letters to companies’ management, meeting with

management to discuss ESG issues or by bringing resolutions to be voted upon at companies' annual general meetings. These methods have also been called using "voice".

If the investors hold shares in the companies directly, they can use voice. Alternatively, if they choose to invest in funds, they can choose funds which commit to exercising voice (in this case, it is the fund that holds the shares in the company directly, not the investor). However, one difficulty is that most shareholders have relatively small holdings in their portfolio companies, and therefore do not have enough voting rights to push for change on their own. This is why collective engagement – which we discussed in Chapter 3 – can be very important if these ESG engagements are to be successful.

Of course, the other option for if investors are not happy with a company's ESG performance is they can simply sell their shares in that company. This is called divestment, or "**exit**". The problem with exit, however, is that investors are then no longer owners of the company and have no way to influence the company for the better.

Engagement versus divestment (voice versus exit) is quite a complex balancing act and has been the topic of much recent discussion. Watch the video below to learn more about divestment versus engagement.

[Engagement vs Divestment \(YouTube, 3m, 47s\)](#):



One or more interactive elements has been excluded from this version of the text. You can view them online here: <https://oercollective.caul.edu.au/sustainable-finance/?p=60#oembed-2>

Implementing the Strategies

How do investment managers implement these strategies? Some use third-party data providers which rate companies on ESG criteria. Others have their own in-house ESG investment teams which do their own research. Some use a combination of third-party providers and their own ESG investment team for particular issues.

Example

Australian Ethical (AE) was Australia's first fund manager to offer funds that incorporated ESG issues. AE offers managed funds (including exchange traded funds) as well as superannuation and retirement products. AE has an in-house team that does the research on ESG issues. AE uses absolute negative screening for some issues e.g., animal testing, human rights abuses,

tobacco, coal mining and nuclear weapons. Revenue thresholds are applied for other negative screens such as alcohol and components to make weapons. AE also does not invest in government bonds issued by authoritarian regimes – in 2022 this meant the Russian, Belarussian, Myanmar and Chinese governments. Several positive screens are applied e.g. preservation of endangered ecosystems, poverty alleviation and sustainable land use and food production.

AE also actively engages with the companies in their portfolios through corporate engagement and shareholder activism. For example in 2022, AE voted on 4,755 items, of which 803 were a vote against company management. These “against” votes included voting on a lack of diversity of the companies’ boards, compensation, human rights, climate and employee welfare issues.

AE has a foundation through which it donates 10% of its profits to charities, currently with a strong emphasis on donating to non-profit organisations that combat climate change.

Find out more about [Australian Ethical](#).

A Spectrum of Investments and Investment Returns

As we have seen from the discussion so far, there is substantial variation in what investors want in terms of ESG versus financial returns. The figure below summarises different types of investment approaches. As we move from left (traditional investment) to right (philanthropy), the requirement for competitive financial returns becomes less important and the ESG issues and impact become more important.

RIAA's responsible investment spectrum								
APPROACH	TRADITIONAL INVESTMENT	RESPONSIBLE & ETHICAL INVESTMENT						PHILANTHROPY
		ESG Integration	Exclusionary/ negative screening	Norms-based screening	Corporate engagement and shareholder action	Positive / best-in-class screening	Sustainability-themed investing	Impact investing
METHOD	Providing limited or no regard for environmental, social, governance and ethical factors in investment decision making	Explicitly including ESG risks and opportunities into financial analysis and investment decisions based on a systematic process and appropriate research sources	Excluding certain sectors, companies, countries or issuers based on activities considered not investable due principally to unacceptable downside risk or values mis-alignment	Screening of companies and issuers that do not meet minimum standards of business practice based on international norms and conventions; can include screening for involvement in controversies	Executing shareholder rights and fulfilling fiduciary duties to signal desired corporate behaviours - includes corporate engagement and filing or co-filing shareholder proposals, and proxy voting guided by comprehensive ESG guidelines	Intentionally tilting a proportion of a portfolio towards solutions; or targeting companies or industries assessed to have better ESG performance relative to benchmarks or peers	Specifically targeting investment themes e.g. sustainable agriculture, green property, "low carbon", Paris or SDG-aligned	Investing to achieve positive social and environmental impacts - requires measuring and reporting against these, demonstrating the intentionality of investor and underlying asset/ investee and (ideally) the investor contribution
INTENTION	Avoids harm							
	Benefits stakeholders							
	Contributes to solutions							
FEATURES AND OUTCOMES	Delivers competitive financial returns							
	Manages ESG risks							
	Contributes to better system stability and economic sustainability							
	Pursues opportunities and creates real-economy outcomes							

* This spectrum has been adapted from frameworks developed by Bridges Fund Management, Sonen Capital and the Impact Management Project

The RIAA's [Responsible and Ethical Investment Spectrum](#) maps out the various approaches to responsible investing, their similarities, differences and areas of focus. © Responsible Investment Association Australasia (RIAA). Used with permission.

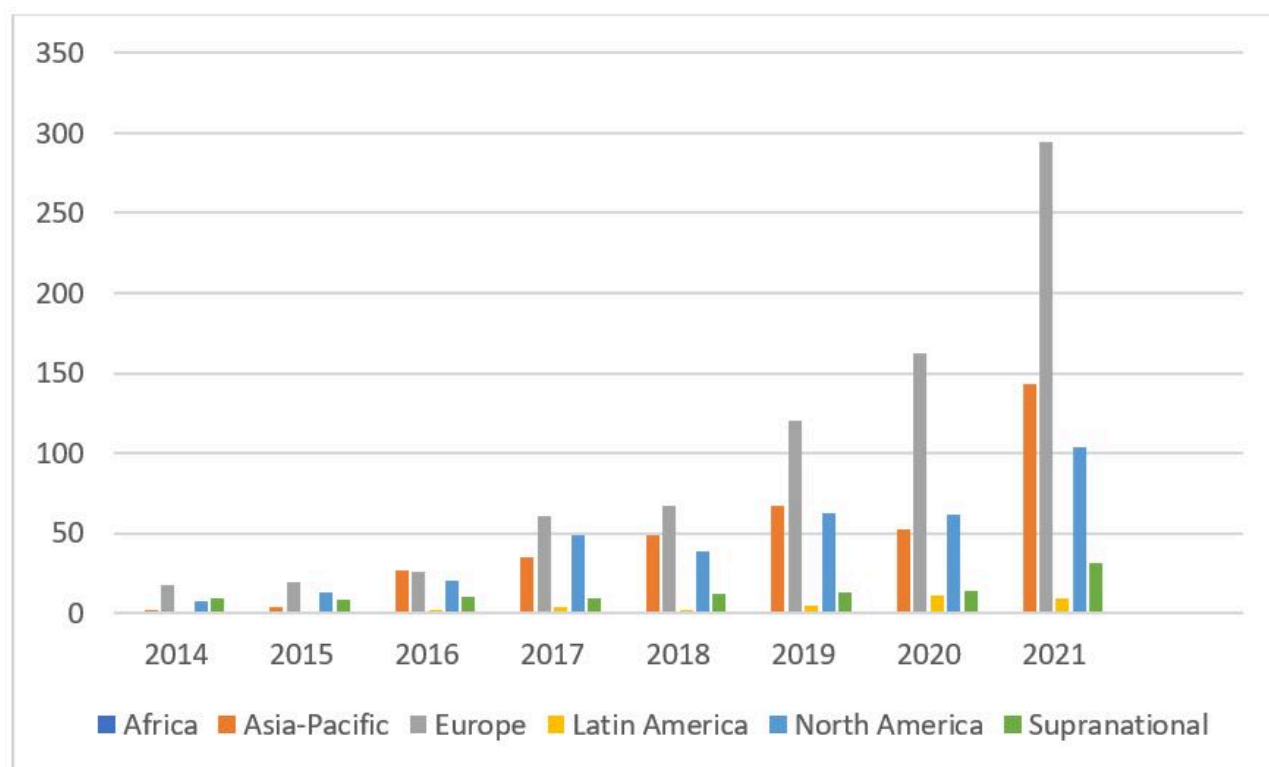
Sustainability in Bond Markets

Bonds are debt instruments i.e. provide a way for companies or other organisations to borrow from the financial markets. Unlike shareholders, bondholders are not owners of the companies and therefore do not have voting rights. Bonds are becoming a popular way for organisations to finance sustainable projects. We will look at five different types of bonds in this section: green bonds, social bonds, social impact bonds, sustainability bonds and sustainability-linked bonds.

Green Bonds

Green bonds are bonds whose proceeds must be used to finance projects that specifically address climate issues. The Climate Bonds Initiative estimates that to date there has been USD 2.2 trillion issued in green

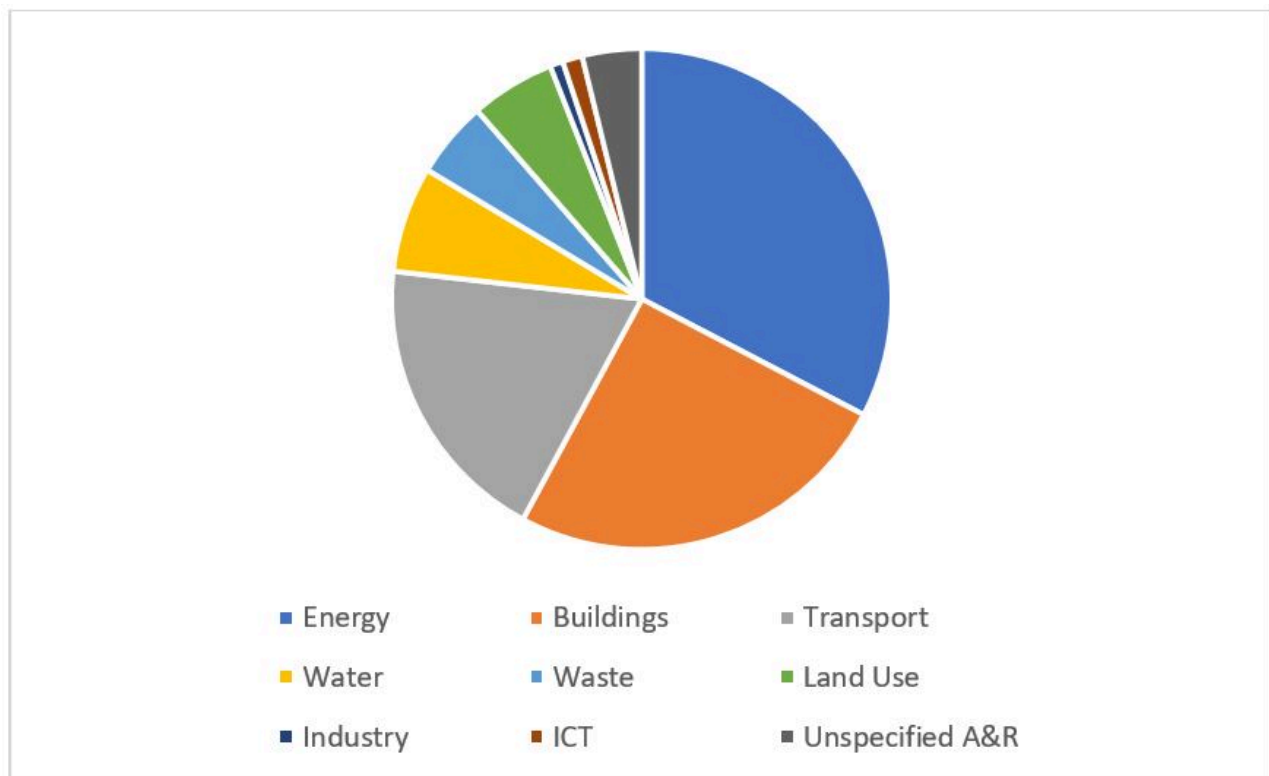
bonds globally.¹ Most bonds (just under 60%) are issued by corporations. Europe is by far the largest issuer of green bonds, but as you can see from the figure below, the green bond market has been increasing rapidly over the last decade in every part of the globe.



Dollar amounts invested in green bonds (based on data from the [Climate Bonds Initiative](https://www.climatebonds.net/files/reports/cbi_sotm_2022_03e.pdf)).

The chart below shows the types of climate issues that green bonds have been used to fund. These figures were from 2022 and show that green bonds have mainly been issued to fund projects relating to energy, buildings and transportation.

1. Climate Bonds Initiative. (2022). *Sustainable debt global state of the market 2022*. https://www.climatebonds.net/files/reports/cbi_sotm_2022_03e.pdf



Use of green bond proceeds – 2022 (based on data from the [Climate Bonds Initiative](#)).

Social Bonds

Similar to green bonds, social bonds are used to raise capital to fund specific social issues such as affordable housing, health or unemployment. The social bonds market is significantly smaller than the green bond market, with the Climate Bonds Initiative estimating that there has been a total of USD 653 billion raised by social bonds to date.² The issues are also substantially smaller than green bonds – in 2022, the average social bond issue size was USD 55 million compared with USD 140 million for green bonds.

Unlike green bonds which are mainly issued by corporations, most social bonds are issued by governments or development banks. According to the Climate Bonds Initiative, since 2014, 57% of social bonds were issued by government, government-backed entities or development banks.³

Social Impact Bonds

Note that there is another type of bonds called Social Impact Bonds (SIBs) or Social Benefit Bonds. These are not the same as social bonds. SIBs are complex financial instruments which are designed to use private sector capital to address social issues that are usually paid for by governments.

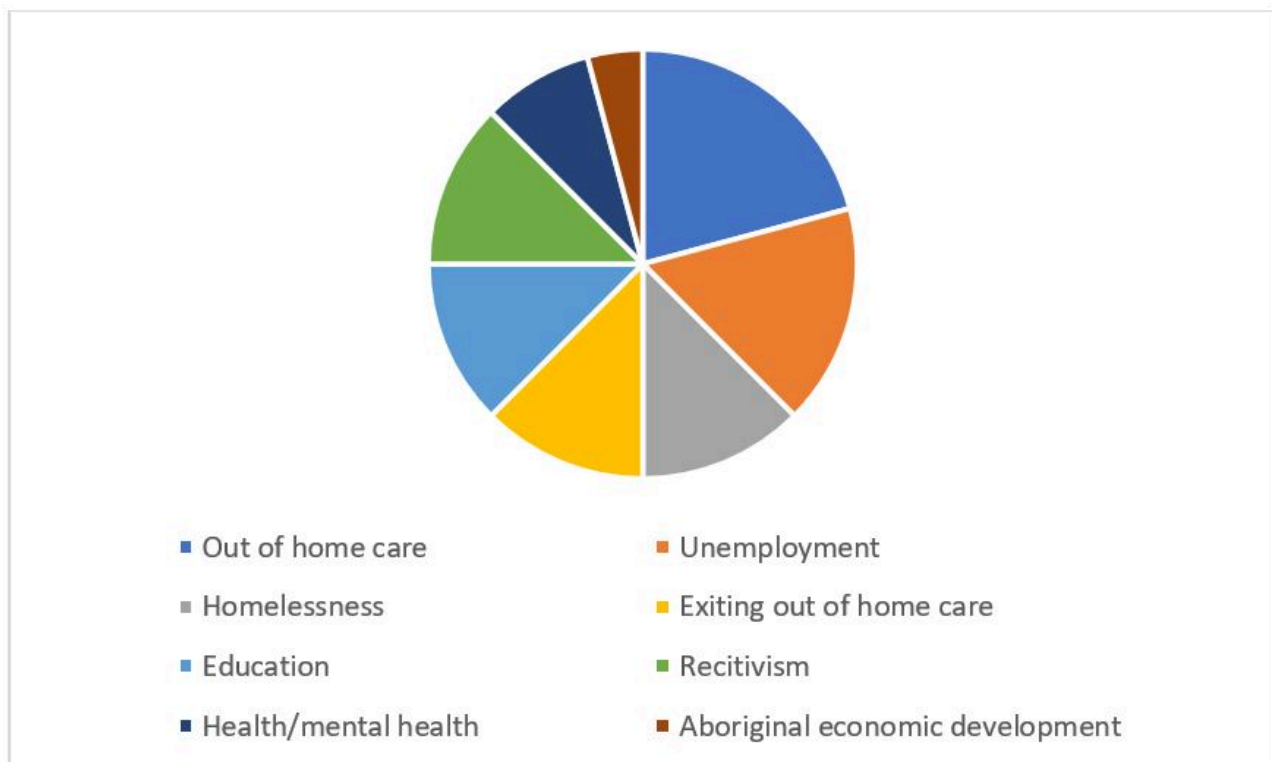
2. Ibid.

3. Ibid.

In a SIB, the government will engage a service provider to provide a service to the affected population to address a particular social issue. The service provider is paid by money raised via the SIB i.e. from investors buying the SIB. Investors only receive their money back (sometimes with an additional return, but sometimes not) if a particular pre-specified outcome is achieved.

As an example, the first SIB was launched in the UK in March 2010 by the Ministry of Justice and the Big Lottery Fund, and was used to fund a program at Peterborough Prison to reduce reoffending rates. The service provider would work with offenders for up to twelve months after they were released. The program was offered to three groups of prisoners. The terms of the SIB were that investors would receive a return if and only if there was a 10% lower reoffending rate in any of the three groups, or a 7.5% reduction across the three groups receiving the program versus the control group (those that did not participate in the program).

The SIBs market is still small. By October 2022, only 218 SIBs had been launched globally.⁴ In Australia, SIBs have tended to be issued by state governments: the NSW, Queensland, South Australia and Victoria governments have all issued at least one SIB. The issues funded by Australian SIBs are shown in the diagram below.⁵ In New Zealand, SIBs have been used to address mental health, youth reoffending and social housing.



Issues funded by Australian Social Impact Bonds.

4. Brookings. (2022). *Global Impact Bonds database snapshot October 1, 2022*. https://www.brookings.edu/wp-content/uploads/2019/01/Impact-Bonds-Snapshot_October-2022.pdf

5. Social Ventures Australia. (2022, December 9). *A guide to outcomes contracting and social impact bonds*. <https://www.socialventures.com.au/sva-quarterly/a-guide-to-outcomes-contracting-and-social-impact-bonds/>

Sustainability Bonds

Sustainability bonds finance projects which aim to achieve both environmental and social goals. The Climate Bonds Institute estimates that by the end of 2022 there had been 3679 sustainability bonds issued globally.⁶ The majority of sustainability bonds have been issued in the USA (2059) followed by South Korea (320), and most are issued by local governments. There have been 20 sustainability bonds issued in Australia and 8 in New Zealand.

Sustainability-linked Bonds

Sustainability-linked bonds are slightly different in that the capital raised is not tied to funding a specific environmental or social project. Instead, the bond is linked to the organisation achieving particular ESG targets. If the targets are not met, the issuer is penalised by having to pay a higher rate (coupon) to investors. Sustainability-linked bonds are a relatively new instrument, with the first issued by an Italian energy company, ENEL in late 2019. The box below provides more information on the first ENEL bond.

The World's First Sustainability-linked Bond

Issuer: Enel Finance International NV

Launch date: 10 September 2019

Maturity: 10 October 2024

Issue amount: USD 1.5 billion

Target: by 31 December 2021, 55% of ENEL Group's total consolidated installed energy capacity was to be from renewable generation (as of 30 June 2019, this was 45.9% i.e. they needed to increase renewable capacity by just over 9%)

Penalty: If the target was not achieved, coupons would increase by 25 basis points for the remainder of the bond's life

Bond Certification

A major concern in sustainable investment is whether the investment is actually delivering the ESG

6. Climate Bonds Initiative. (2022). *Use of proceeds*. <https://www.climatebonds.net/market/data/#use-of-proceeds-charts>

outcomes that it promises. One way for bond issuers to signal that the funds will genuinely be used for the purported purpose is to have them independently certified by a third party. Research shows that investors view sustainable bonds that have been certified by independent third parties more favourably than bonds that do not have such certification.⁷

Two leading global certification agencies are the Climate Bond Initiative and the International Capital Market Association. The European Green Bond Standards and ASEAN Green Bond Standards have also been developed for their respective markets. These organisations also provide frameworks for companies to be able to demonstrate that their bonds meet the requirements for certification.⁸

7. Flammer, C. (2021). Corporate green bonds. *Journal of Financial Economics*, 142(2), 499-516. <https://doi.org/https://doi.org/10.1016/j.jfineco.2021.01.010>

8. International Capital Market Association. (2021). *Green bond principles*. <https://www.icmagroup.org/assets/documents/Sustainable-finance/2022-updates/Green-Bond-Principles-June-2022-060623.pdf>

PART III

PART 2: SPOTLIGHT ON CONTEMPORARY ISSUES

5.

PLANETARY BOUNDARIES AND CLIMATE SCIENCE: BACKGROUND

Saphira Rekker

Chapter Overview

At the end of this chapter you will be able to:

- Evaluate the implications of the “challenges of the century” for business and finance
- Understand the Planetary Boundaries Framework
- Evaluate the implications of social and environmental systems for human development
- Apply your knowledge of climate science

Challenges of the Century

In this first section of the chapter, we provide a brief history and overview of developments in different environmental and social systems and how they are connected. In particular we look at:

- Socio-economic trends
- Earth system trends

In this background section we draw information from other sciences, such as earth system and environmental science. Before continuing, here are a few questions to think about:

What are some of the challenges of the century?

What are some of the issues humanity has to deal with or has to face in the next century?

Socio-economic Trends

Since the Industrial Revolution, humans have invented machinery to replace manual tasks, and discovered new chemical processes and power sources (e.g. coal). Whilst these inventions led to an increase in human and economic development, in the 1950s, development started to increase at an unprecedented rate. The figure below demonstrates these unprecedented and exponential increases in our social and economic (socio-economic) systems starting in the 1950s.

The [Anthropocene website](#) contains more information on the major changes that have occurred in key trends since 1950.

Exercise

Go to the Anthropocene website and click on “The Great Acceleration”¹. What are some of the great accelerations we have seen in socio-economic systems? In our earth system?

Answer:

Socio-economic system:

- world population
- real GDP
- foreign direct investment
- urban population
- primary energy use
- fertiliser consumption
- large dams
- water use

1. *Welcome to the Anthropocene: Great acceleration*. (n.d). <https://web.archive.org/web/20240216202953/https://www.anthropocene.info/great-acceleration.php>

- paper production
- transportation
- telecommunication
- international tourism

Earth system:

- carbon dioxide
- nitrous oxide
- methane
- stratospheric ozone
- surface temperature
- ocean acidification
- marine fish capture
- shrimp aquaculture
- coastal nitrogen
- tropical forest loss
- domesticated land
- terrestrial biosphere degradation

Of course these are just examples, and there are many more!

One of the most obvious challenges is related to the exponential increase of population. This is because people now live longer and on average have more than 2 children. The human population has more than tripled in the past 70 years, from 2.5 billion to over 8 billion, resulting in humans exerting even more dominance over other species. However, it is expected that increased education and opportunities for women will result in a stabilisation of the global population in the future.

Economic growth (GDP) has also reached unprecedented levels since the 1950s, leading to substantially more wealth and higher levels of welfare. However, these increases are mostly concentrated in OECD countries. Economic systems have become global, where a country's wealth is linked to the wealth of other countries. We have collectively moved to cities, and many people have access to primary energy such as electricity and transport, allowing further economic development. We need to produce unprecedented levels of food, which has led to the increased use of fertilisers and water. We travel more and have more electronic devices than ever before (increasing amount of electronic storage. Only 20 years ago, Nokia phones had a limit of 20 messages – with 150 characters!).

The [Anthropocene website](#) has more information on socio-economic development.



[Nokia 3310 mobile phone](#) by [Multicherry](#), [CC BY-SA 4.0](#), via Wikimedia Commons. The Nokia was released in the year 2000.

Example: Mobile phones and telecommunications

In the 1950s, most people were not using mobile phones – they only became part of our daily lives around the 2000s. This explains for example why telecommunications have risen significantly in the past 20 years. The same holds for tablets, laptops, and smart watches. These devices require energy to be produced, charged, and recycled, and have led to increased data use and storage (costing energy again). These devices are just one example of many aspects of our lifestyles that require large amounts of energy and resources. The way we currently produce, use and dispose of these products has resulted in exponential changes in our

environment. A great challenge is to decouple our social and economic growth from negatively impacting the life-support systems our planet is fortunate to have.

Earth System Trends

Our *explosive* socio-economic developments have led to large changes in our natural environment. That humans impact the natural environment is nothing new and has been documented since humans have wandered the earth. However, it used to be that human activities only impacted a localised area, and with a lower population and less resourced population, the earth systems were usually able to recover. Now, however, human effects are happening at a much larger scale and are impacting some important life-supporting systems on regional, national and global scales.

The Great Acceleration figure above demonstrates **the effect human activities have had on various key environmental indicators**. Atmospheric concentrations of greenhouse gasses (carbon dioxide, nitrous oxide and methane) have exponentially increased, caused by, among other things, fossil fuel combustion for energy (carbon dioxide emission), increased deforestation (reducing the earth's uptake of carbon dioxide), agricultural processes including livestock (carbon dioxide, nitrous oxide and methane emissions), and other industrial processes. Increased greenhouse gas emissions has led to several problems, including ocean acidification. Our human activities have also led to increased over-fishing, tropical forest loss, and loss of species. This has dire ramifications not only for us personally and other species living on this planet, but in the short term also for those companies and small businesses that rely on the environment for the running of their business, for example agriculture and tourism. Our society and economy, including its businesses, will increasingly be negatively impacted as our environment degrades, given we rely on a stable environment. For example, this [New Scientist article](#)² describes how climate change is already affecting the tourism sector around the Great Barrier Reef.

The Great Acceleration

When Did Humans Begin to Affect the Earth's Systems?

As we have seen, humans have moved from impacting the environment on a local scale to now becoming a geological force that is affecting the way the whole planet operates. Scientists are saying we have moved into a new geological epoch, the “Anthropocene” – an epoch where humans are the driving force of changes

2. Greenpeace Australia Pacific. (2020). How climate change impacts the Great Barrier Reef tourism industry. *New Scientist*.
<https://www.newscientist.com/article/2256873-how-climate-change-impacts-the-great-barrier-reef-tourism-industry/>

in the environment. In other words, humans are the primary cause of *permanent* planetary change. This epoch is characterised by the fact that planet is now outside of its natural limits. From being solely participants, humans became the dominant creatures on the earth, having an influence on the oceans, landscape, agriculture and animals. Human activities have caused fundamental changes in the way the earth is behaving, and it could be a full-scale catastrophic change.

You can watch a [TED talk on the “Anthropocene” \(YouTube, 18m15s\)](#) by renowned earth system scientist Professor Will Steffen for more information.

Some propose that this era started centuries ago, when we started smelting metals, traces of which we see in the Greenland ice core. Others argue that this started with the industrial revolution, as we dramatically increased our use of fossil fuels. Exponential growth in social and environmental changes has been evident since the industrial revolution. As we saw in the previous graphs, however, a massive expansion of the human enterprise has occurred since the 1950s, and this phenomenon is what scientists call **the great acceleration**. It refers to the era in which human activities are changing environmental systems at unprecedented scales and levels.

One of the main inventions that have allowed us to “unleash” the human enterprise was the invention of “fossilised energy”, also known as fossil fuels. These fossils that have been built up underneath the earth for millions of years, provide a cheap, powerful, reliable, and convenient energy when combusted. This energy source allowed humans to undertake economic activities more efficiently, such as:

- Converting and plowing land (globally, [85% of land has been impacted by humans in more than one way!](#))
- Manufacturing and transporting of products, many consuming energy themselves (e.g. cars, phones, laptops.)
- Construction
- Cutting down trees at a faster rate (for example, [50% of Australian forests have been cut down](#) since European settlement)
- Building enormous fishing boats (also trawling the seas with huge nets and systems)
- Reforming the coastal zones
- Changing the delta systems of rivers
- Travelling large distances

Think about the following example regarding oil

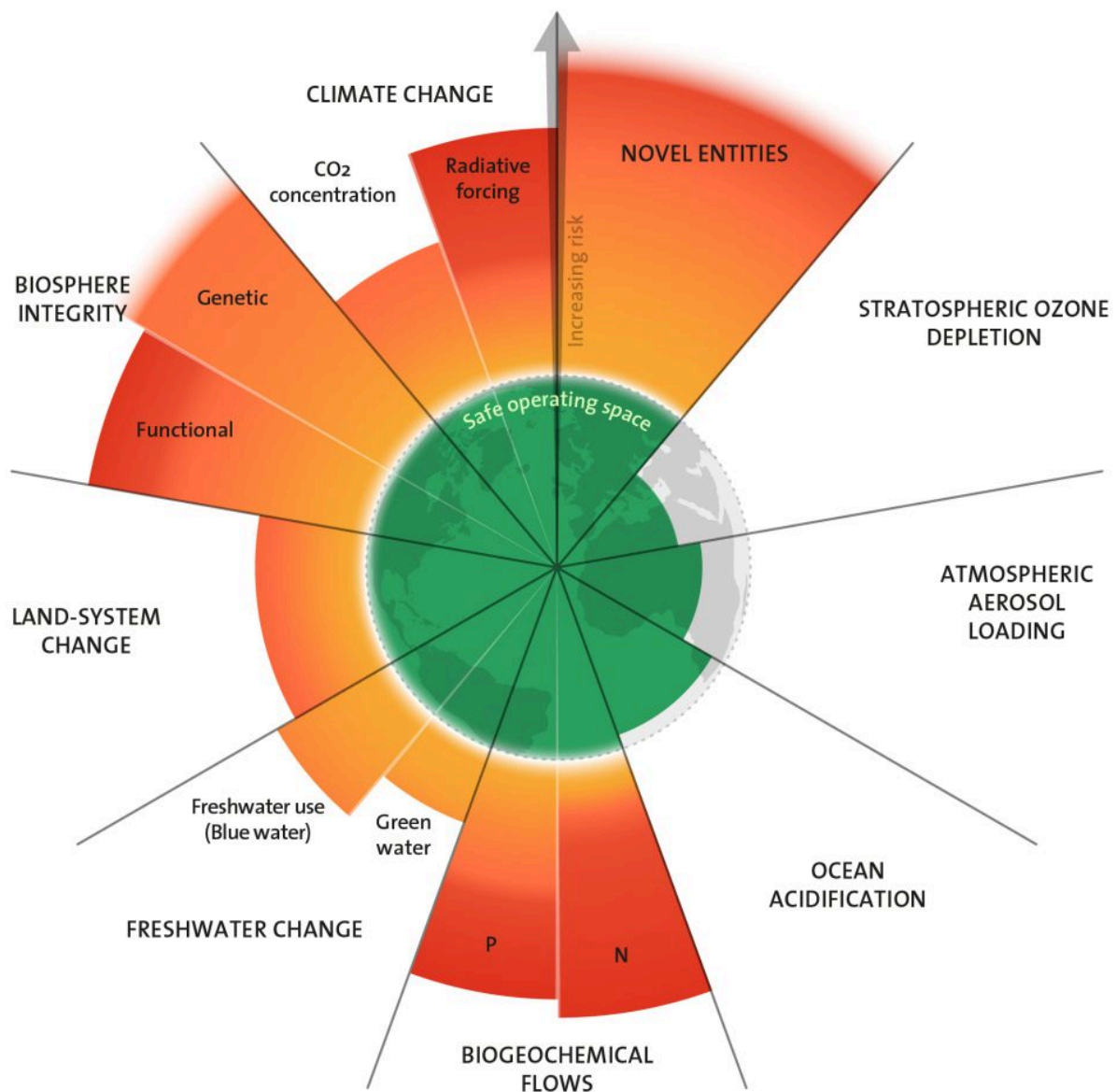
What can 1 litre of oil provide to you? It allows you to drive for around 10-11km carrying the weight of your car and propelling it forward, even on steep hills. What would happen if you were to try and push the car yourself for 10-11 km? It would be beyond difficult. This highlights the power of only 1 litre of oil. It is enormously condensed energy and one that has powered our development, including our business and prosperity, for decades.

Unfortunately, there is a side effect. During the process of fossil fuel combustion, carbon dioxide (CO₂) is produced. CO₂ is a greenhouse gas, which traps heat in the atmosphere. Why is this a problem? There is a natural level of greenhouse gas emissions in the atmosphere that keeps the earth warm, at exactly the right climate for humans to live and develop in. If humans are releasing CO₂ and other greenhouse gas emissions into the atmosphere every year, the concentration of greenhouse gases in the atmosphere increases, making the planet warmer. However, is a warmer planet bad for us?

A key question is – how bad is changing the natural environment for us? Which systems are important for our survival and how much can they be changed until the earth becomes unsafe for humans to live on?

Planetary Boundaries

For humans it is important to know three elements: 1) which of earth's processes are humans are impacting/affecting by their activities – which do we control, and 2) which natural systems are important for providing living the conditions we need – what scientists call a “safe operating space for humanity”; and 3) by how much we can change the systems before the earth becomes an unsafe place for humans to live and develop in. The planetary boundaries framework aims to answer these questions based on the **most sophisticated scientific knowledge and evidence to date** (for example work that has been published in prestigious journals such as [Nature](#) and [Science](#)).



[The 2023 update to the Planetary Boundaries Framework](#) by Azote for Stockholm Resilience Centre, Stockholm University, [CC BY-NC-ND 3.0](#). Orange sections indicate “overshoot” of boundaries, green sections indicate a “safe” state within the boundaries (data for September 2023).

The framework identifies nine interlinked, but different, systems: climate change, novel entities, stratospheric ozone depletion, atmospheric aerosol loading, ocean acidification, biochemical flows, freshwater change, land-system change and biogeochemical flows (see above figure). **Humans are dependent on these systems and humans impact these systems at the same time.**

The framework concerns itself with the level of anthropogenic (human caused) changes that can occur so that the risk of destabilisation of the earth is likely to remain low. Generally, it is an indication of what a safe operating space is for global societal development. This is shown by the green “zones” in the diagram. The framework identifies the scientific limits to important planetary systems, which if transgressed, would pose a high risk of irreversible change in the earth’s stability, tipping it out of the safe Holocene state. The system limit is shown by the white border in the diagram. As an example, the planetary boundary

for CO₂ concentration in the atmosphere should not exceed 350 parts per million by volume. In 2022 we reached 418.56 parts per million.

Crossing the identified limits is considered high risk because:

- Changes can be **extreme, rapid and irreversible** when tipping points are reached
- It is **costly** for humans to adapt
- There are **limits** to how much change humans can **adapt** to.

Whilst all planetary boundaries are important, the two **core planetary boundaries are climate change and biosphere integrity**. The reason for this is that these two systems could tip the earth into a new (unsafe) state and also have a significant impact on the other boundaries.

The two most important systems are biosphere integrity and climate change.

These systems are also referred to as “core” planetary boundaries, because if limits are transgressed, the earth could move into a different state (out of the safe Holocene state), which would induce irreversible and unsafe changes to our life-supporting earth system.

Case Study: Biosphere integrity

Biosphere integrity refers to the quantity and quality of biodiversity. It is very similar to the concept of diversification that you have come across in your prior finance studies. The more plant and animal species that inhabit the planet, and the better the quality (“function”) of these species, the more resilient and better the health of our ecosystems is. Currently we are facing extinction rates that are 100-1000 higher than usual. We have thus exceeded the planetary boundary of limiting extinction rates to 10 extinctions per million species per years (=10 times the usual rate). However, when making difficult choices about which species are most important to concentrate our efforts on conserving, we need to look at the function of species in our ecosystems.



[Bee perched on pink petaled flower](#) by [Robert Thiemann](#) on Unsplash.

For example, bees should definitely be on our priority list! Bees pollinate about **70 percent of the world's food**. Although very small in size, bees are doing very important services for us (for free!), and are highly functional. This means that if bees go extinct, unprecedented problems would occur. The functional diversity of species are different. This means that some species provide greater “function” to the ecosystem than others. Perhaps losing some types of mosquitoes might not be that bad?

The World Economic Forum

So far we have focused on socio-economic and environmental developments. This has provided you with an introduction of how **systems are vastly interrelated**. To understand and help solve challenges it is important to take a systems perspective that acknowledges complexity and interrelatedness, so as not to “shift” challenges by solving one problem but creating a new one by doing so.

A useful demonstration of how challenges are related across different systems, and how to prioritise these challenges, can be found in the yearly Global Risks Reports by The World Economic Forum. These reports show the interrelatedness of risks, referring to economic, environmental, geopolitical, societal and technological risks. The reports detail the number and strength of connections of risks as well as the trends. Environmental risks dominate global risks in terms of both impact and likelihood.

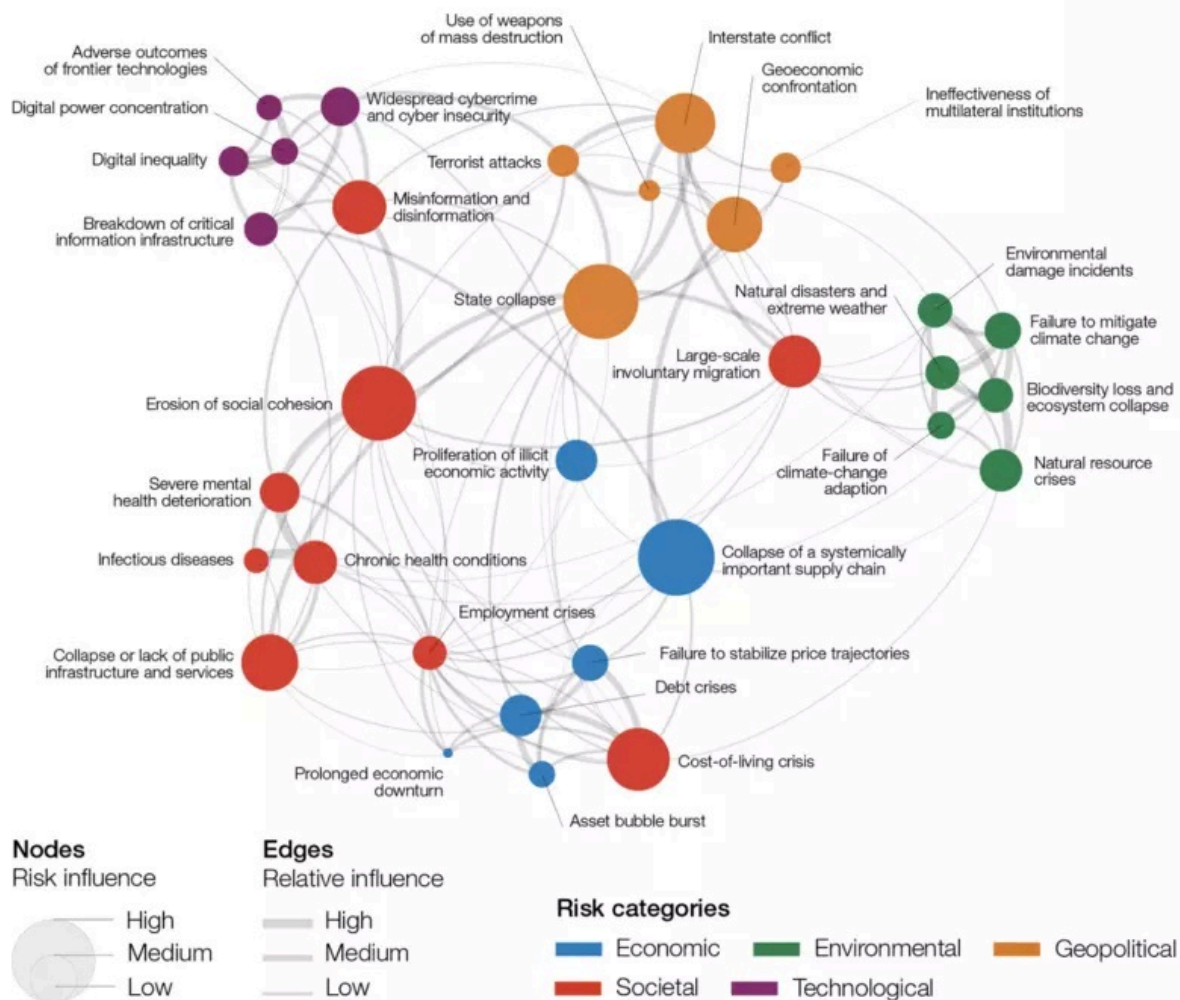
The figure below demonstrates the linkages between the different types of risks, and how one problem

is connected to other problems. Consistent with the planetary boundaries framework, climate change is identified as a strong driver of increased environmental and social risks.

Global Risks Report 2023



Global risks landscape: an interconnections map



Source: World Economic Forum, Global Risks Perception Survey 2022-2023

[Global risks landscape: an interconnections map](#) by the [World Economic Forum](#), Global Risks Perception Survey 2022-2023, [CC BY-NC-ND 4.0](#)

Global Risks Report 2023



Top 10 Risks

“Please estimate the likely impact (severity) of the following risks over a 2-year and 10-year period”

2 years

1	Cost of living crisis
2	Natural disasters and extreme weather events
3	Geoeconomic confrontation
4	Failure to mitigate climate change
5	Erosion of social cohesion and societal polarization
6	Large-scale environmental damage incidents
7	Failure of climate-change adaption
8	Widespread cybercrime and cyber insecurity
9	Natural resource crises
10	Large-scale involuntary migration

10 years

1	Failure to mitigate climate change
2	Failure of climate-change adaption
3	Natural disasters and extreme weather events
4	Biodiversity loss and ecosystem collapse
5	Large-scale involuntary migration
6	Natural resource crises
7	Erosion of social cohesion and societal polarization
8	Widespread cybercrime and cyber insecurity
9	Geoeconomic confrontation
10	Large-scale environmental damage incidents

Risk categories

■ Economic
 ■ Environmental
 ■ Geopolitical
 ■ Societal
 ■ Technological

Source: World Economic Forum, Global Risks Perception Survey 2022-2023

[Top 10 Risks](#) by the [World Economic Forum](#), Global Risks Perception Survey 2022-2023, [CC BY-NC-ND 4.0](#)

While climate change has had an impact on several other environmental issues, such as biodiversity loss and natural disasters (extreme weather events), it will increasingly lead to social issues such as food or water crises, and large-scale migration. It will also dramatically alter our economies and businesses, regardless of whether we rise to meet the challenge or not. **Thus, ultimately climate change is a long-term socio-economic issue that, if is not tackled, will have catastrophic implications for socio-economic systems.**

Challenges of the Century – Summary

In this section, we have covered how recent rapid developments in socio-economic systems have led to unprecedented changes in important life-supporting earth processes. This presents us with unique challenges for humanity in this century. One challenge is to decouple our socio-economic activities from negatively impacting planetary systems on which long-term human development depends. At the same time, there are social challenges such as poverty and income equality that are important to be considered. In the next section we focus in on the challenge of climate change in more detail.

Climate Change

Introduction

In this section we focus on the challenge of climate change. Climate change has increasingly been pushed up the agenda internationally given the urgency of the issue. As we learned in the previous section, climate change is one of the key earth systems that can, on its own, push the earth into an undesirable state for humans. If climate change is not tackled, it could even lead to humans becoming extinct. Tackling the challenge will require many changes in the way we see and do business and finance. Mark Carney, prior governor of the Bank of England, said at the 26th Conference of Parties (2020, p. 2)³ meeting on climate change:

“The objective for the private finance work for Cop26 is simple: to make sure that every private finance decision takes climate change into account. [...] Achieving net zero emissions will require a whole economy transition – every company, every bank, every insurer and investor will have to adjust their business models”.

If we act now, Mark Carney says it *“could turn an existential risk into the greatest commercial opportunity of our time”*.⁴ Note that what Mark Carney stated can be applied to any challenge: challenges can also be considered as opportunities, it depends on one’s perspective as to how we approach them. What he is suggesting here is that if companies increase their investment in research and development that helps us transfer to a low carbon economy, they will most likely be rewarded with healthy bottom lines in the not-too-distant future.

Climate Change: Science

In this [TEDxNASA \(YouTube, 17m 21s\)](#) video, Bruce Wielicki gives an overview of some of the key facts

3. Carney, M. (2020). *The road to Glasgow*. Bank of England. <https://www.bankofengland.co.uk/-/media/boe/files/speech/2020/the-road-to-glasgow-speech-by-mark-carney.pdf>

4. Ibid.

and impacts of climate change. If you are really keen to learn more, you may like to look at the IPCC reports – they contain all the scientific knowledge we have to date on climate change.

How Does the Climate System Work?

The way the climate system works can be associated with simple budgeting. There is income and expenses, and the balance of the two.

In the climate system, there is sunlight, which is the incoming resource or energy that keeps heating up the planet. This energy leaves the system through infrared radiation – this is something that you do not see with your eyes, but it feels similar to fire, if you are close to it. At the same time, there are greenhouse gases (often expressed as a CO₂-equivalent) blocking the heat from escaping, giving us a nicely habitable earth.

Thus, there is energy coming in, and energy leaving the system, which has a balance, and this is the energy budget of the planet. This determines the climate on the planet. Before the industrial revolution, the concentration of CO₂ in the atmosphere was 280 parts per million (ppm), but through our anthropogenic activities we kept adding greenhouse gases every year, increasing the amount of heat retained, and resulting in a concentration of [419ppm](#) in October 2023.

Exercise

You can find historical carbon dioxide – and other greenhouse gas – levels on the [NASA website](#).

What was the concentration of carbon dioxide in 1960?

Answer:

Around 320ppm.

Has the concentration of carbon dioxide changed since we wrote this book?

Answer:

Yes. When checking again in January 2024 it had risen to 420ppm, so when you are checking now it will likely be higher.

The more carbon dioxide there is in the atmosphere, the more heat is trapped and the warmer the planet gets. The main sources of anthropogenic CO₂ emissions are fossil fuel combustion, cement production and flaring.

Exercise

Here we are going to do our first exercise of looking up information provided by the IPCC (more in the next chapter). To make it easy we will give you the direct link to where you can see all the figures contained in the [AR5 2014 synthesis report](#). Click on “graphics”, and open Figure 1.5.

What is the other category of global anthropogenic CO₂ emissions?

Answer:

Forestry and other land use

Between 1750 and 1970, approximately how many GtCO₂ were emitted cumulatively for the two categories of anthropogenic CO₂ emissions?

Answer:

Forestry and other land use: around 500GtCO₂

Fossil fuel combustion, cement production and flaring: around 400GtCO₂

And between 1750 and 2011?

Answer:

Forestry and other land use: around 700GtCO₂

Fossil fuel combustion, cement production and flaring: around 1300GtCO₂

What is a Cloud Feedback?

Scientists have been interested in the way climate change impacted the earth systems for decades – the earliest climate models were built in the 1970s.

One of the many variables impacting the climate are clouds. There are models that have analysed cloud feedback for decades, to see the impact of change in temperature. For example, if the global cloud cover is changed by 1 percent, it triggers dramatic changes in the sensitivity of the climate system (Note: Bruce Wielicki has been studying cloud feedback for the last 30 years!).

For a more accurate representation of this change, and comparison of data, satellite data was analysed,

in different wavelengths (or colour of light). This allowed scientists to compare the amount of green vegetation, the brown deserts, the snow, the ice and the clouds, and the thermal emission that is infrared up to space. This method contributed to a better understanding of the climate system and facilitated the prediction of future trends. There are many examples like this for the studying of oceans and other planetary systems.

As you saw in the video, **there is a lot of mis-information and many conspiracies in the public domain**. Academics and philosophers sometimes refers to this as “post-truth”, which is a recent phenomenon where the common standard for “facts” is no longer seen as needed to be obtained through scientific methods and enquiry. To find accurate information about topics **always look at the source of information**.

Some of the reliable sources for reliable information about climate change are:

- American Association for the Advancement of Science (AAAS) – established in 1848, gathering scientists around the world, spending hundreds of years on climate system questions.
- American Geophysical Union (AGU) – established in 1919, with 50,000 members in 137 countries.
- American Meteorological Society (AMS) – established in 1919, with 14,000 members.
- **Intergovernmental Panel on Climate Change (IPCC)** – consists of thousands of scientists around the world, who are working to analyse how the climate system is changing and what the risks and occurring issues are.
- skepticalscience.com – common questions about climate change answered referencing peer-reviewed literature

Note: in academia, peer-reviewed articles are considered legitimate sources. Peer-reviewed articles have undergone significant criticism and questioning by other academics in the field, and are only published when all criticisms and concerns have been addressed to the highest standard.

Climate Change: Impacts

What are the Impacts of Climate Change?

Human activities are estimated to have caused 1.2C of global warming since pre-industrial levels. The impacts of climate change are already being felt around the world, we are already experiencing species extinction (flora and fauna slowly disappearing) and more extreme weather events (more frequent and more intense), just to name a few.

Exercises

The IPCC report summarises the concerning impacts of climate change in their 5 reasons for concern. Particularly in the 2018 IPCC special report on 1.5C it outlines the differences in impacts of 1.5°C vs 2°C warming. We do not expect you to remember these impacts – this is merely to show you how a changing climate causes risks for socio-economic systems. Every country will be exposed to a different extent to these risks (More information on [the impacts on Australia](#)).

As we further encourage in the next chapter, it is very useful to be able to find information in IPCC reports.

1. Go to ipcc.ch
2. Click on Reports, then click on “Global Warming of 1.5°C”
3. In the section “summary for policy makers” click on “explore graphics”
4. Click on “Figure SPM.2.”

What are the Five Reasons for Concern? Do the levels of impacts and risks associated with these reasons change from 1.5°C vs 2°C warming?

Answer:

- RFC1: Unique and threatened systems
- RFC2: Extreme weather events
- RFC3: Distribution of impacts
- RFC4: Global aggregate impacts
- RFC5: Large-scale singular events

Yes, the risk levels increase for all of these impacts.

The bottom bars of the figure show the level of impacts and risks to various natural, managed and human systems. List them and identify those most at risk at 1.5°C.

Answer:

- warm water corals
- mangroves
- small-scale low-latitude fisheries
- Arctic region
- terrestrial ecosystems
- coastal flooding
- fluvial flooding
- crop yields
- tourism
- heat-related morbidity and mortality

Risks are highest at 1.5°C for warm-water corals, small-scale low-latitude fisheries , Arctic region and coastal flooding.

What Can be Done to Stop the Temperature Increase?

The Paris Agreement

Based on the overwhelming scientific evidence on climate change, most nations around the world have signed the “Paris Agreement”, which is a commitment to keep temperatures **well-below 2°C warming compared to pre-industrial levels**. Crossing 1.5°C-2°C will substantially increase the risk of setting off feedbacks that will lead to irreversible and catastrophic changes to our planet. For example, crossing 2°C would substantially increase the risk of melting the icecaps in Greenland, which would release huge amounts of methane (a strong greenhouse gas). The suddenly increased level of greenhouses gases would then accelerate climate change. There are many such feedbacks, as the earth is one big complex interconnected system.

Even though the Paris Agreement has been signed by most nations, **current commitments to reduce greenhouse gas emissions are not sufficient to stay below the 2°C threshold**. In fact, current

commitments will lead to warming of at least 2.6-3.1°C (Rogelj et al., 2016).⁵ Find out how on [track your country](#).

Reducing Emissions

To have a more than 50% chance of staying below 1.5°C, cumulative emissions need to be kept within 480 GtCO₂ from 2018, which is also referred to as the “remaining carbon budget”. Currently, we emit around 41 GtCO₂ globally every year. This means that if we keep emissions at 2018 levels, we would **exceed the budget before 2030**. To ensure that we stay within the carbon budget and meet the temperature limits set out in the Paris Agreement, all stakeholders in society have a role to play, which we discuss in more detail in the next chapter.

This chapter is adapted from “What is Financial Management” in *Introduction to Financial Management: A Contemporary Approach* by Saphira Rekker (forthcoming) under a [Creative Commons Attribution-NonCommercial 4.0 International License](#), except where otherwise noted.

5. Rogelj, J., den Elzen, M., Höhne, N., Fransen, T., Fekete, H., Winkler, H., Schaeffer, R., Sha, F., Riahi, K., & Meinshausen, M. (2016). Paris Agreement climate proposals need a boost to keep warming well below 2 °C. *Nature*, 534(7609), 631-639. <https://doi.org/10.1038/nature18307>

6.

CORPORATE TRANSITION TO NET ZERO

Saphira Rekker

Chapter Overview

At the end of this chapter you will be able to:

- Explain the concept of net zero and how it relates to the Paris Agreement
- Explain different global emissions reduction pathways, and their trade-offs, to meeting the goals of the Paris Agreement
- Discuss trends and challenges in relation to human development and climate change
- Explain how greenhouse gas emissions are measured on a corporate level.

You have probably heard the term “net zero”, perhaps from countries or companies aiming to achieve net-zero emissions by a certain date, commonly by 2050. In this chapter we will have a close look where the concept of “net zero” comes from, what it means, and how it relates to the goals of the Paris Agreement. We will dive deeper into carbon budgets, pathways to stay within those budgets, and how to assess the impact of businesses on climate. In this chapter we will encourage you to become familiar with important resources on climate change so you know where to find information in the future. In particular, we extensively draw upon the International Panel on Climate Change (IPCC), which collates the knowledge and science on climate change to date and consists of three working groups: Working Group I focuses on the physical science basis, Working Group II on climate impacts and adaptation, and Working Group III on climate change mitigation.

Net Zero and the Paris Agreement

As we covered in the prior chapter, the Paris Agreement is a globally significant agreement to limit global warming. It is important to go to the source itself to understand what the Paris Agreement states. Here is the link to the [Paris Agreement \(PDF, 4.33MB\)](#).

Here are some of the key elements of what the Paris Agreement states (2015, p. 2):

*“Acknowledging that climate change is a common concern of humankind”.*¹

In other words, tackling climate change has nothing to do with the planet, the planet will still be here if humans are not! It is about maintaining life-supporting systems for humans, their activities and development – humans and other species are vulnerable and dependent on the functioning and state of our natural systems, specifically our climate.

“Article 2:

1. *This Agreement [...] aims to strengthen the global response to the threat of climate change, in the context of sustainable development and efforts to eradicate poverty, including by:*
 - (a) Holding the increase in the global average temperature **to well below 2°C above pre-industrial levels and pursuing efforts to limit the temperature increase to 1.5°C above pre-industrial levels**, recognizing that this would significantly reduce the risks and impacts of climate change;*
 - (b) Increasing the ability to adapt to the adverse impacts of climate change and foster climate resilience and low greenhouse gas emissions development, in a manner that does not threaten food production; and*
 - (c) **Making finance flows consistent** with a pathway towards low greenhouse gas emissions and climate-resilient development.*
2. *This Agreement will be implemented to reflect **equity and the principle of common but differentiated responsibilities** and respective capabilities, in the light of different national circumstances.”*²

This is a key paragraph in the Paris Agreement. It highlights the temperature limit agreed upon, that development should integrate both adaptation and be low carbon, and that rich nations have a greater responsibility to address climate change. This last point reflects that rich countries have more capability to address climate change, but also recognises that these nations’ economic development resulted by them producing the majority of global emissions to date (we will discuss this further later in the chapter). This is what the climate negotiations at the Conference of Parties (COP) every year are about, nations coming together to discuss progress, commitments and responsibilities.

*“Article 4: 1. In order to achieve the long-term temperature goal set out in Article 2, Parties aim to reach global peaking of greenhouse gas emissions as soon as possible, recognizing that peaking will take longer for developing country Parties, and to undertake **rapid reductions** thereafter **in accordance with best available science**, so as to achieve a **balance between anthropogenic emissions by sources and removals by sinks of greenhouse gases in the second half of this century**, on the basis of equity, and in the context of sustainable development and efforts to eradicate poverty.”*³

This paragraph actually refers to net zero – the balancing of carbon sources with sinks. However, note

1. United Nations. (2015). *Paris Agreement*. https://unfccc.int/sites/default/files/english_paris_agreement.pdf

2. Ibid, p.3

3. Ibid, p.4

that it is in the context of article 2, and needs to be paired with rapid reductions. It is not possible, at this point, to create enough carbon sinks to absorb our emissions. The pathways to net zero (how we will get to net zero) matters greatly, and is what we will discuss further in this chapter.

Carbon Budgets

Cumulative greenhouse gas emissions determine the concentration of carbon in the atmosphere, and in turn global temperatures. There are six main greenhouse gases emitted by human activities: carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF₆). These different greenhouse gases have different warming strengths, and different life spans. The most dominant and prevalent greenhouse gas emitted by human activities is carbon dioxide, which is also a very long-lived gas (there is no single estimate, but it is likely centuries, up to even 1000 years). Other gases, like methane, have a very high potency (up to 83 times stronger than CO₂), but are relatively short lived (around 12 years). Greenhouse gases are often expressed as a carbon dioxide equivalent (CO₂-e) to be able to understand their warming potentials.

Exercise

As part of its work on the physical science of climate change, Working Group I of the IPCC includes the latest estimates on the remaining carbon budget in its reports. The Remaining Carbon Budget is the amount of carbon that can be emitted, starting from a specified year, to remain within a certain temperature increase, from that year. This budget is an estimate and has a high uncertainty – it could be much higher or much lower. This is because of various factors; non-CO₂ scenario variations; non-CO₂ forcing and response uncertainty; historical temperature uncertainty and recent emissions uncertainty. For example, we don't know at exactly what temperature the ice caps melt, and although we know there are large quantities of methane stored underneath that will be released, we only have an estimate. Given that some changes will be irreversible, it is important to take a precautionary approach and not take the risk that the budgets are larger than expected, but rather that they are smaller.

Here is your first practice to look up information in IPCC reports.

1. Go to [ipcc.ch](https://www.ipcc.ch). Click on Working Groups -> Working Group I -> AR6 Synthesis Report: Climate Change 2023
2. If you can't find it, go to [AR6 Synthesis Report: Climate Change 2023 Technical Summary](#)

(PDF, 30.9MB) ⁴

3. Use Ctrl+F to search for “remaining carbon budget”.

Open Question: how many “hits” are there from searching for this term?

Answer:

29

4. Find “Table TS.3 | Estimates of remaining carbon budgets and their uncertainties”.

- a. What is the estimated carbon budget from 2020 to have an at least 33%/50%/67% chance to keep global surface temperature change below 1.5°C/1.7°C/2.0°C since pre-industrial levels? And what are the variations based on non-CO₂ and other uncertainties? Complete the table below:

Global surface temperature change since 1850-1900	Estimated RCB from 01/01/2020 (subject to variations)			Scenario variation	Geophysical uncertainties			
°C	Percentile GtCO ₂			non-CO ₂ scenario variations	non-CO ₂ forcing and response uncertainty	Historical temperature uncertainty	Zero CO ₂ emissions commitment uncertainty	Recent emissions uncertainty
	33%	50%	67%	GtCO ₂	GtCO ₂	GtCO ₂	GtCO ₂	GtCO ₂
1.5								
1.7								
2.0								

Answer:

4. Intergovernmental Panel on Climate Change. (2023). *AR6 synthesis report: Climate change 2023: Technical summary*. https://www.ipcc.ch/report/ar6/wg1/downloads/report/IPCC_AR6_WGI_TS.pdf

Global surface temperature change since 1850-1900	Estimated RCB from 01/01/2020 (subject to variations)			Scenario variation	Geophysical uncertainties			
°C	Percentile GtCO ₂			non-CO ₂ scenario variations	non-CO ₂ forcing and response uncertainty	Historical temperature uncertainty	Zero CO ₂ emissions commitment uncertainty	Recent emissions uncertainty
	33%	50%	67%	GtCO ₂	GtCO ₂	GtCO ₂	GtCO ₂	GtCO ₂
1.5	650	500	400	+- 220	+- 220	+-550	+- 420	+-20
1.7	1050	850	550					
2.0	1700	1350	1150					

b. If we are looking to have a 67% chance to keep temperature limits to 1.5°C compared to pre-industrial levels, what is the remaining carbon budget from 01/01/2020?

Answer:

400 GtCO₂

5. Now we are going to retrieve information from another IPCC report. Go to [ipcc.ch](https://www.ipcc.ch). Click on Working Groups -> Working Group III -> Reports -> Summary for Policymakers
6. If you can't locate it, go to [IPCC Climate Change 2022 – Mitigation of Climate Change – Summary for Policymakers \(PDF, 1.11MB\)](#)⁵

a. What were the global net GHG emissions in 2019? (Hint: see item B.1.1)

Answer:

59+- 6.6 GtCO₂-e

b. What were the net CO₂ emissions from fossil fuel combustion and industrial processes (CO₂ FFI) in 2019? (Hint: see figure SPM.1)

5. Intergovernmental Panel on Climate Change. (2022). *Climate Change 2022: Mitigation of climate change: Summary for policymakers*. https://www.ipcc.ch/report/ar6/wg3/downloads/report/IPCC_AR6_WGIII_SummaryForPolicymakers.pdf

Answer:

38+/- 3 GtCO₂

c. What were the net CO₂ emissions from land use, land-use change and forestry (CO₂ LULUCF) in 2019? (Hint: see figure SPM.1)

Answer:

6.6 +/- 4.6 GtCO₂

d. If you compare the sum of net CO₂ (not CO₂-e, so the sum of CO₂ FFI and CO₂ LULUCF) against the carbon budget we calculated previously (400 GtCO₂ to have a 67% chance to remain within 1.5°C)⁶, and if emissions were not reduced, in what year would we would reach 1.5°C?

Answer:

2029 (remember the carbon budget is from 2020). The answer is calculated by $400 / (38 + 6.6) = 8.97 + 2020$, so in the 9th year after 2020.

Hopefully the prior exercise has given you a good overview of carbon budgets and the challenge ahead.

Carbon Dioxide Emissions Pathways

As we saw before, to have a more than 50% chance of staying below 1.5°C, cumulative emissions need to be kept within 500 GtCO₂ from 2020, which is also referred to as the “remaining carbon budget”. Currently, we emit around 40-45 GtCO₂ globally every year. As you calculated in the exercise above, this means that if we do not reduce emissions, we could exceed the budget before 2030. The IPCC outlines different pathways to reduce emissions society can follow, all resulting in net zero CO₂ emissions around 2050.

6. The reason we use CO₂ only is because the other gases have shorter life spans and therefore also other mitigation pathways, so these non CO₂ gases were included in the uncertainty estimates you completed in the prior exercise.

Exercise

We are going to open some IPCC reports again. First, we are going to have a look at the special 1.5°C report that was published in 2018, specifically the Summary for Policymakers. Try finding it yourself on [ipcc.ch](https://www.ipcc.ch). If you can't find it, go to [IPCC Summary for Policymakers \(PDF, 799KB\)](#).⁷

On page 14 you can find four illustrative pathways to limit global warming to 1.5°C. Have a look at the indicators that are paired with each pathway.

All scenarios require a fundamental shift in the energy sector away from fossil fuels, requiring large investments in renewable energy and storage solutions and a loss of value of existing fossil fuel assets. The scenarios also all rely on AFOLU (Agriculture, Forestry and Other Land Use) emissions, such as afforestation (e.g. planting trees), to go to zero and turning negative using Carbon Dioxide Removal technologies, that remove carbon from the atmosphere. Three of the four scenarios also include removal of carbon through Bioenergy with Carbon Capture and Storage (BECCS). **These technologies however have many limitations, one of which is a high cost.**

The first scenario (P1), assumes low population growth, with reduced energy demand and rapid decarbonisation, which is depicted by the rapid decrease of fossil fuels. In contrast, the last scenario (P4) depicts high population growth and high consumption patterns, where population remains reliant on fossil fuels. Although there is a reduction in the amount of fossil fuels (grey area), it still remains largely present for the next few decades. This scenario will need to rely heavily on technologies such as carbon capture and storage (CCS).

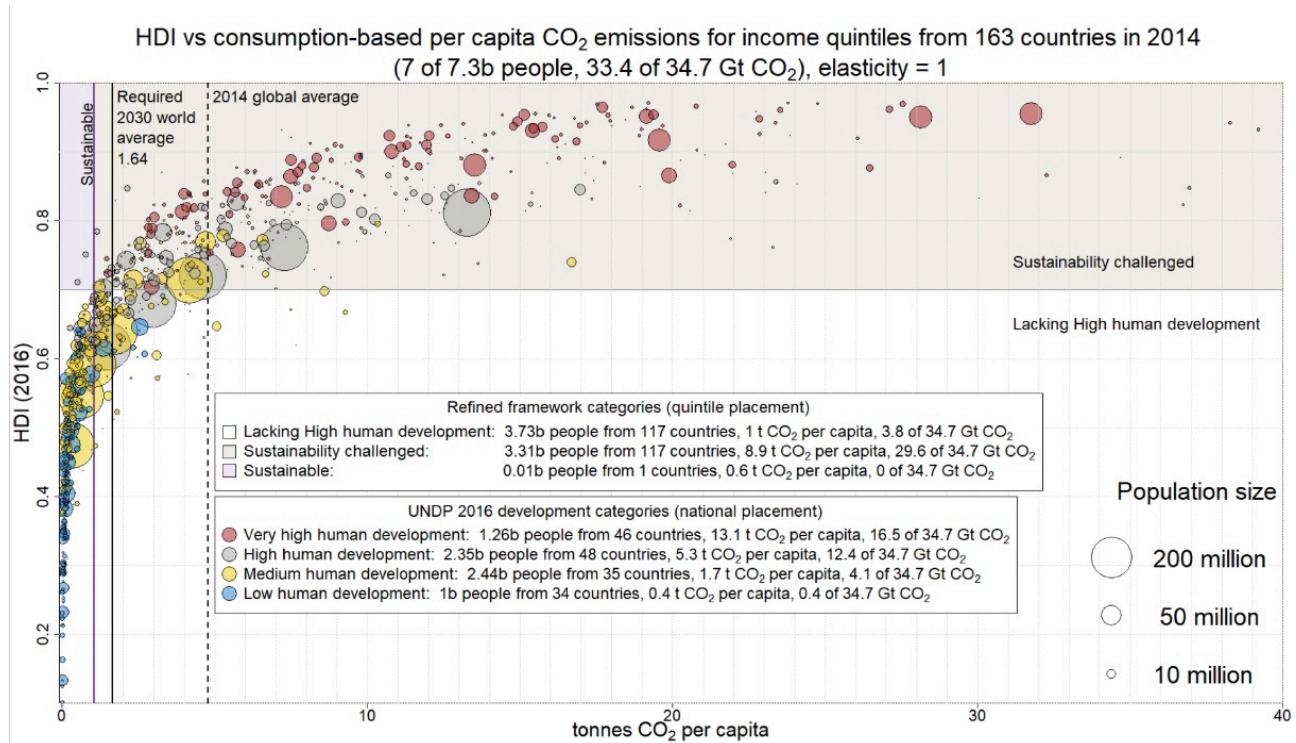
In the most recent report in 2023, more Illustrative Mitigation Pathways (IMP) were added in addition to the Shared Socio-economic Pathways in the 2018 report. You can view these IMPs in Figure SPM.5 on page 26-27 of the report – [IPCC Climate Change 2022 – Mitigation of Climate Change – Summary for Policymakers \(PDF, 1.11MB\)](#).

Panel E shows the different carbon sources and sinks associated with each pathway at the time of net zero.

7. Intergovernmental Panel on Climate Change. (2018). *Summary for policymakers*. https://www.ipcc.ch/report/ar6/wg3/downloads/report/IPCC_AR6_WGIII_SummaryForPolicymakers.pdf

Human Development Index

The climate challenge can also be seen as a “dual-challenge”. The figure below looks at the correlation between HDI (Human Development Index) and consumption-based per capita CO₂ emissions, considering different income quintiles.



Source: Pascal, A., et al, 2020. Used with permission.

From the graph you can see a clear trend: the higher the development, the higher the carbon emissions per capita. For example, if you live in Australia on an (relatively low) income of around A\$25,000 per year, then your carbon footprint is estimated to be around 13 tonnes of CO₂. This amount can vary depending on a couple of factors, including one’s travelling habits (e.g. international flights), as well as diet (e.g. vegetarian or meat-based diet).

If everyone in the world was given an “equal” carbon budget, how much would this be? In order to stay within a 2°C consistent carbon budget, everyone in the world would have 1.64 tonnes of CO₂ allocated per person to emit in 2030. Compare this to the 13 tonnes of CO₂ emitted by someone in Australia earning A\$25,000 per year. **The challenge for developed countries is therefore to maintain a high HDI, but decrease the emissions per capita.** For developing or underdeveloped countries the challenge is quite different, as they currently have very low CO₂ levels per capita. Their challenge is to **increase their HDI without increasing their emissions**. As we saw at the beginning of the chapter, an important element of the Paris Agreement is that there are “**common but differentiated responsibilities**”. This means that because developed countries have emitted by far the largest portion of emissions, and have benefited from this greatly, they have a greater responsibility in mitigating climate change, which also included providing Climate Finance to poorer countries.

Carbon Intensity Pathways of Sectors: How Can We Decarbonise Different Sectors?

In order to contribute to the CO₂ reduction process, industries have to adopt significant transformations. Have a look at Table 2 of this [Nature Climate Change article](#)⁸, which provides a summary of the unit reduction certain industries have to achieve in order to achieve the sustainability targets.

For example, in the case of power generation, the global average was 591 g CO₂ per kWh 2011 and to stay within a global carbon budget consistent with staying below 2°C, this amount should be reduced to 28.7 by 2050. Power generation currently predominantly relies on the use of fossil fuels. Ways to decarbonise power generation can be achieved with renewable energy or nuclear power. However, both options carry certain risks or drawbacks. An increase in renewables has to be paired with investment in energy storage and smart systems. There is some exciting research ongoing by UQ researcher [Dr Jake Whitehead](#) on using electric vehicles as portable energy storage systems, i.e. “battery-on-wheels”.

Climate Change as a Tragedy of the Commons

Climate change can be seen as a classic example of a “tragedy of the commons”. This occurs where a common pool of resources is overexploited. Globally, individual entities (each country, each company, and each individual) have a self-interest to consume or produce more than their “fair share” of greenhouse gas emissions, which has led to a suboptimal state of our common climate. Think “why should *I* fly less when all my colleagues or friends don’t? Why should *I* consume less energy when everyone else doesn’t?” (for more information on the tragedy of the commons, please have a look at [The Tragedy of the Commons published in Science](#)).

Solving this issue requires collective action, and it is essential to recognise the importance of governance, ethical dimensions, equity, value judgments, economic assessments and diverse perceptions and responses to risk and uncertainty. Hardin (1968)⁹ argues that there is no technical solution to the tragedy of the commons. It requires **education**, recognising the necessity to give up a little bit of freedom by regulating the commons and reducing the production of greenhouse gases, because only then can people be “free”; *“But what does “freedom” mean? When men mutually agreed to pass laws against robbing, mankind became more free, not less so. Individuals locked into the logic of the commons are free only to bring on universal ruin; once they see the necessity of mutual coercion, they become free to pursue other goals.”*¹⁰

Nobel Prize winner in economics, Elinor Ostrom¹¹, however, argued that Hardin’s (somewhat

8. Krabbe, O., Linthorst, G., Blok, K., Crijns-Graus, W., van Vuuren, Detlef P., Höhne, N., Faria, P., Aden, N., & Pineda, Alberto C. (2015). Aligning corporate greenhouse-gas emissions targets with climate goals. *Nature Climate Change*, 5(12), 1057-1060. <https://doi.org/10.1038/nclimate2770>

9. Hardin, G. (1968). The tragedy of the commons. *Science*, 162(3859), 1243-1248. <http://www.jstor.org/stable/1724745>

10. Ibid.

11. Janssen, M. A. (2012). Elinor Ostrom (1933–2012). *Nature*, 487(7406), 172-172. <https://doi.org/10.1038/487172a>

depressing) view did not line up with how we observe humans behave. Her work argues that in reality, the tragedy of the commons can be overcome by cooperation and self-regulation i.e. by groups coming up with agreed ways to divide up a resource. You can see a direct link between her ideas and some of the collaborative initiatives we discussed in Chapter 3 as well as the Paris Agreement. You can read more about Elinor Ostrom in [the article published in *Nature*](#).

Climate change was first addressed internationally as a major issue in the 1970s, in an IPCC report. Since then, there have been numerous international negotiations on how to solve it, mainly evolving around which country has to do what, which highlights this case as a collective action problem.

Did You Know?

There is an increasing area of the law that deals with the rights of people in regards to climate change.

For example, in the Netherlands, there was a lawsuit brought by citizens who sued their government for not taking enough action against climate change. They won the first case, which was appealed, and then they won again. This initiated an international breakthrough in terms of law, encouraging courts to mandate that governments take the required actions.

What do you think about the role of educators, and universities? Do you believe they have a big influence in this case?

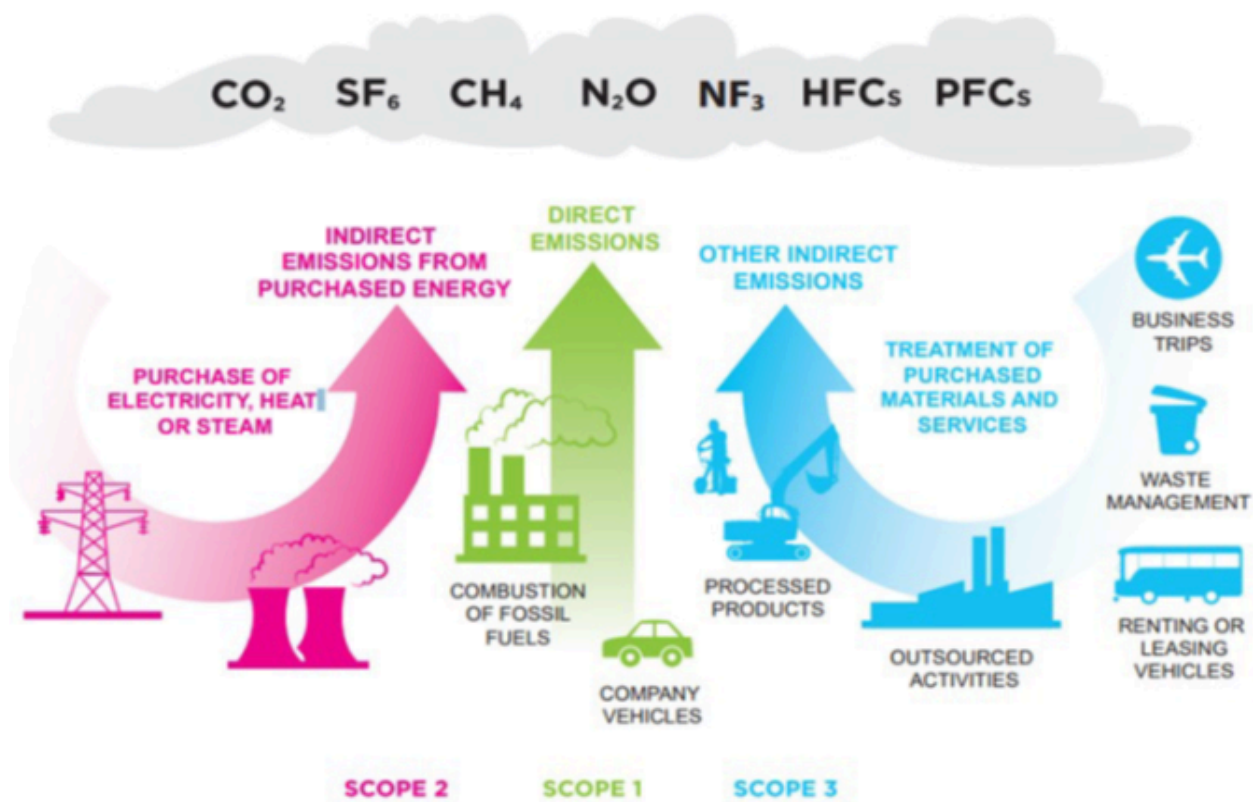
Corporate Carbon Accounting – GHG Protocol

We have covered different emission sources and global emissions accounts, but accounting for a company's emission requires a specific approach. The international guidelines on how to account for a company's emissions can be found by the Greenhouse Gas Protocol. The GHG Protocol classifies companies' greenhouse gas emissions into three types as follows:

- Scope 1 emissions: direct emissions from owned or controlled sources. Examples are fugitive emissions (e.g. gases escaping from a mine) and livestock emissions (e.g. anaerobic digestion from livestock)
- Scope 2 emissions: indirect emissions from the generation of purchased energy
- Scope 3 emissions: all indirect emissions (not included in scope 2) that occur in the value chain of the reporting company, including both upstream and downstream emissions.¹² Scope 3 covers a wide range of emissions and are divided into 15 categories:
 - Downstream:
 - purchased goods and services
 - capital goods

12. Greenhouse Gas Protocol. (n.d.). *FAQ*. https://ghgprotocol.org/sites/default/files/standards_supporting/FAQ.pdf

- fuel- and energy-related activities
- upstream transportation and distribution
- waste generated in operations
- business travel
- employee commuting
- Upstream:
 - upstream leased assets
 - processing of sold products
 - use of sold products
 - end-of-life treatment of sold products
 - downstream leased assets
 - franchises
 - investments



[Carbon Accounting Scopes](#) by [Karen Hills](#) and [Center for Sustaining Agriculture and Natural Resources](#), CC BY 4.0 Modified from World Resources Institute (WRI) Greenhouse Gas Protocol.

Let's look at a few examples to illustrate how it works.

Exercises

Question: The company Energise owns a facility that uses 10,000 tonnes of coal for the generation of electricity. How should the emissions from the coal combustion be recorded (Scope 1, 2 or 3)?

Answer:

Scope 1. The facility is owned by the company and is generating direct emissions.

Question: The University of Oceanic Views (UOV) owns a facility that produces 200 tonnes of solid waste, which was collected by the local council to go to landfill. How should UOV record the emissions associated with its landfill?

Answer:

Scope 3: Waste generated in operations. These are indirect emissions for UOV. The organisation that owns the landfill facility will have to record it as direct emissions. Note that this means there is double counting in the economy (one organisation's Scope 1 emissions become another organisation's Scope 3 emissions); however, it allows for shared responsibilities and the accounting of risks for both parties.

Question: The freight company NotElectricYet uses 25,000 kL of diesel to operate its fleet. How should the company record the fuels purchased?

Answer:

Scope 1. The company owns the vehicles it operates, and they directly emit CO₂ through the combustion of the fuels.

Question: The company BnB consumes 100,000 kWh of purchased electricity from the grid. How should this electricity be recorded?

Answer:

Scope 2. Purchased electricity falls under Scope 2.

Measuring and recording a company's emissions is only the very first step in managing a company's GHG emission and climate risk. To effectively manage a company's transition risk, increasingly companies are being asked to align with the goals of the Paris Agreement. Under its core component of transition risk, "metrics and targets", the TCFD¹³ recommends companies to disclose the following:

- whether the target is absolute or intensity based
- time frames over which the target applies
- base year from which progress is measured, and why
- key performance indicators used to assess progress against targets.

Further, in 2021 Larry Fink, the CEO of Blackrock, asked in his annual letter to CEOs to "disclose a business plan aligned with the goal of limiting global warming to well below 2°C, consistent with achieving net-zero global greenhouse gas emissions by 2050".¹⁴ Regulators across the world are increasingly requiring companies to disclose their targets, the progress against them and even to meet certain emission reduction levels.

Science Based Targets

Following the Paris Agreement, several organisations came together to develop the Science Based Targets initiative (SBTi). This initiative was to set global guidelines on aligning corporate emission reduction targets with the Paris Agreement. It was founded by the Carbon Disclosure Project, UN Global Compact, World Resources Institute and World Wide Fund for Nature.

Fast forward, in January 2024 over 7000 companies are "taking action" through the initiative. The SBTi provides several guidelines, including sector-specific methods. It requires companies to set near-term targets (between 5-10 years), and optional long-term targets. These targets are then also listed on the [SBTi's website](#).

In simple terms, there are two different methods:

- Absolute Contraction Approach (ACA). This approach requires every company to reduce their emissions by the same % every year, year on year.
- Sectoral Decarbonisation Approach (SDA). This method takes a sectoral approach to allocating the carbon budget. It takes global sectoral reduction pathways, which outline sectoral emissions as well as demand/production, and then determines a companies' required emission reductions based on its initial carbon intensity and its market share over time.

The SBTi provides tools on their website to help companies to develop targets.

13. Task Force on Climate-Related Financial Disclosures. (2017). *Metrics and targets*. <https://www.tcfhub.org/metrics-and-targets/>

14. Fink, L. (2021). *Larry Fink's 2021 letter to CEOs*. BlackRock. <https://www.blackrock.com/us/individual/2021-larry-fink-ceo-letter>

7.

INDIGENOUS VALUES SHAPING SUSTAINABLE INVESTMENT: A CASE STUDY OF MĀORI

Ella Henry, Aaron Gilbert and Ayesha Scott

TE REO MĀORI KARAKIA



One or more interactive elements has been excluded from this version of the text. You can view them online here: <https://oercollective.caul.edu.au/sustainable-finance/?p=66#audio-66-1>

The chapter's authors begin by acknowledging our ancestors and our spirit:

Kia tau iho	Let the strength
Te tauwhirotaanga	And serenity
O te wāhi ngaro	Of our ancestors
E pai ai te nohotahi	Guide us as we gather
Ā tinana, wairua hoki	In body and spirit
Werohia te manawa	With compassion
Ki te tao o aroha	And care for one another
Kia whakamaua kia tīna	Let this be realised
Hui e, tāiki e	For all of us

Chapter Overview

At the end of this chapter, you will be able to:

- Identify the commonalities and differences between Indigenous and non-Indigenous sustainability practices in an investment context
- Evaluate sustainable investment practices, acknowledging key Indigenous values including intergenerational timeframes and a broader range of (non-financial) investment objectives
- Illustrate Indigenous finance concepts using examples of Māori ¹ investment entities

How to Use This Chapter

Our aim is to introduce you to how Indigenous investors integrate the way they understand the world (their Indigenous “worldview”) with fundamental financial concepts and extend our understanding of sustainable finance. We encourage you to dip in and out of the content as you need, skipping ahead and coming back to different sections as you have questions, and to suit your interests along with your study requirements.

You’ll find “Key Takeaways” and questions to answer dotted throughout, inviting you to deepen your learning and relate the information to your own life and career.

On language: For many concepts, there is no satisfactory or direct English translation, and you will see us use Māori language to accurately convey investing in a Māori context. Our intent is to enrich your learning, beyond existing financial frameworks, and have included additional web, audio, and video resources to suit your learning style. For NZ-based students, the entire chapter provides an important basis for working in Aotearoa New Zealand.

“We need to put all our money where our values are” – Villanueva (2021, p.10)²

Indigenous cultures tend to view the world as highly interconnected and interdependent – in harmony or balance. This philosophical perspective significantly shapes Indigenous culture and values, and in a financial context, distinguishes Indigenous investment from a ‘traditional’ Western (or Eurocentric) view of investment. The advent of sustainable investment has moved mainstream finance beyond a sole focus on financial returns and increasingly in line with Indigenous investors’ values.

1. Māori are the Indigenous people of Aotearoa New Zealand.

2. Villanueva, E. (2021). *Decolonizing wealth: Indigenous wisdom to heal divides and restore balance* (2nd ed.). Barrett-Koehler Publishers.

While this move toward sustainable investing results in some alignment with Indigenous investment objectives, Indigenous perspectives continue to offer a different way of thinking about sustainability in finance and challenge current financial concepts. But how can non-Indigenous investors and finance professionals incorporate Indigenous values in managing their own investment portfolios?

Balancing multiple objectives, including harmony, sustainability, and collective benefit, lies at the heart of Indigenous investment decision-making. As finance professionals try to integrate non-financial objectives into their decision-making, the experiences of Indigenous investors offer insights for all sustainable investment managers.

This chapter covers:

- Indigenous views of finance, showcasing the values, intergenerational timeframes, and inherent sustainability practices of Indigenous investors and businesses.
- Three case studies of Māori investment entities as examples of Indigenous values informing investment practice.
- Explanations behind the broad range of (non-financial) investment objectives of Indigenous investors.
- A summary of the challenges and tensions that remain for investors.

We start by giving some background into Aotearoa New Zealand's history and politics, including the impact of colonialism on the Māori economy, as the financial ramifications of European settlement for Māori influence their investing practice today.³

Māori History and Culture

A brief introduction to the history of the Māori economy and Iwi investment:

[Renata Blair – The Māori Economy and Iwi Investment \(YouTube, 21m56\)](#)



One or more interactive elements has been excluded from this version of the text. You can view them online here: <https://oercollective.caul.edu.au/sustainable-finance/?p=66#oembed-1>

3. Mika et al. (2022) highlight that Māori, the Indigenous people of Aotearoa New Zealand, share commonalities with other Indigenous peoples around the world. However, all Indigenous peoples have their own history and culture, distinct from each other, and while we restrict our discussion to Māori, we acknowledge unique contexts as critically important. Mika, J. P., Dell, K., Newth, J., & Houkamau, C. (2022). Manahau: Toward an Indigenous Māori theory of value. *Philosophy of Management*, 21(4), 441-463. <https://doi.org/https://doi.org/10.1007/s40926-022-00195-3>

The first 12 minutes briefly describe Māori history and culture, and supplement Professor Ella Henry's slides: [Introduction to the Māori world Te Āo Māori \(PPT, 363KB\)](#).

Read more about Māori history and culture by selecting the arrows:

Discovering Aotearoa (New Zealand)

Māori are one part of the Austronesian diaspora – the term for the group who first ventured into the South Pacific over three thousand years ago into what we now know as Polynesia. Archaeological, linguistic, and genetic evidence has found these travellers originated in Southeast Asia, with the strongest linguistic links to the Formosan languages. These Austronesian languages are found throughout Southeast Asia, from Taiwan to the Pacific, stretching as far as Madagascar in the Indian Ocean (Greenhill et al, 2008; Anderson, 2016).⁴

⁵ Chambers and Edinur describe the explorations as “a remarkable, but perhaps somewhat underestimated, series of human population movements lasting continuously for around 5000 years” (2015, p53).⁶

It is estimated that the people now referred to as Māori⁷ began arriving in Aotearoa New Zealand from the 13th Century, in a series of canoe (waka) voyages. While the origins of these **waka** are uncertain, a combination of Māori storytelling (the primary repository of knowledge in a culture without written texts) and archeological evidence suggests more than one departure point. The location of Hawaiki, from ancient Māori mythology, may include Rarotonga, Tahiti, and/or Tuamotu. We do know that the view “held by the indigenous people themselves, is one of islands connected to each other by storylines and cosmologies to form a single cohesive unit, built on a history of ocean voyaging and knowledge transference to new environments” (Feary & Stubbs, 2012, p202).⁸ We also know that at least one group of Polynesian peoples voyaged to South America, returning with the sweet potato, named kumara (Addis, 2008).⁹ Taken together, this evidence shows that Māori brought physical, human, and cultural resources shared by other Polynesian peoples to the country, then adapted to the new geography and climate.

-
4. Greenhill, S. J., Blust, R., & Gray, R. D. (2008). The Austronesian basic vocabulary database: From bioinformatics to lexicomics. *Evolutionary Bioinformatics*, 4, EBO.S893. <https://doi.org/10.4137/ebo.S893>
 5. Anderson, A. (2016). *The first migration: Māori origins 3000BC–AD1450* (Vol. 44). Bridget Williams Books.
 6. Chambers, G., & Edinur, H. (2015). The Austronesian diaspora: A synthetic total evidence model. *Global Journal of Anthropology Research*, 2(2), 53–65. <https://doi.org/10.15379/2410-2806.2015.02.02.06>
 7. The word Māori means ‘normal’, which was how the people described themselves when Europeans first made landing in the 18th Century. A dialect variation of the term is used across Polynesia: Māohi in Tahiti, Maoli in Hawai’i, Maori in Rarotonga.
 8. Feary, S., & Stubbs, B. J. (2012). From Kauri to Kumara: forests and people of the Pacific Islands. In *Australia’s ever-changing Forests VI: Proceedings of the eighth national conference on Australian forest history* (pp. 202-207).
 9. Addis, P. (2008). The arrival of the kumara. In *Te Ara - the Encyclopedia of New Zealand*.

History also tells us that the first arrivals in Aotearoa New Zealand were adventurous and curious, adaptable, and innovative, and with the arrival of multiple waka (canoe) over many decades created a unique new society, based on an ancient culture and values, that subsequently developed into something unique and distinctive to Aotearoa (Walker, 1990).¹⁰

Māori Society

Traditional, pre-colonial Māori society was based on collective ownership and shared use of resources by groups living in tribal communities. This kinship was linked by **whakapapa** to founding **rangatira** and/or **waka**. The smallest social unit was the whānau, or extended family, usually made up of three to four generations headed by **kaumātua**. **Rangatira** were called upon to manage resource dependencies and other social matters (Henry, 1995).¹¹

According to Mika, elders in Māori society performed important roles as keepers of tribal knowledge, sources of **mātauranga**, child-rearing, and education. (2016, p. 168).¹²

Collectives of **whānau**, living in communities close to each other, and bound by common ancestry, might form **hapū**, a slightly larger tribal entity. These **hapū** could come together for celebrations or in times of stress. Several hapū (community), tracing their lineage back to the waka and/or common ancestor, were known as **Iwi**, the largest tribal grouping (Henry, 2012).¹³

One of the earliest written documents in the Māori language was Te Wakaputanga (translated as the Declaration of Independence), first signed by a collective of chiefs in 1835. Henry and Wikaire state that this document, “articulated the aspirations of tribes to form a national polity, retain their tribal sovereignty, receive acknowledgement of their status from the British Crown, and the protection of their trading interests by the Royal Navy” (2013, p.61).¹⁴

In the Māori language version, Te Wakaputanga refers to the gathering of chiefs as “Te Wakaminenga o Nga Hapu o Nu Tirene”¹⁵ (the confederation of hapū/tribes of New Zealand). It also refers to Nga Tino Rangatira o Nga Iwi (the self-determination and

10. Walker, R. (1990). *Ka whawhai tonu matau: Struggle without end*. Penguin.

11. Henry, E. (1995). Contemporary Māori business and its legislative and institutional origins. In J. Deeks & P. Enderwick (Eds.), *Business and New Zealand Society*. Longman Paul.

12. Mika, J. P. (2016). The role of elders in Indigenous economic development: The case of Kaumātua on Māori enterprises of Aotearoa/New Zealand. In *Indigenous People and Economic Development* (pp. 151-175). Routledge.

13. Henry, E. (2012). *Te Wairua Auaha: Emancipatory Māori entrepreneurship in screen production*. Doctoral dissertation, Auckland University of Technology.

14. Henry, E., & Wikaire, M. (2013). *The Brown Book: Protocols for Working with Māori in Screen Production*. Ngā Aho Whakaari Inc. <https://www.nzfilm.co.nz/resources/brown-book>

15. Out of respect for the language written by our ancestors, we have not inserted macrons, which are a relatively recent language-revitalisation tool.

sovereignty of iwi/tribes). Thus, the terms hapū and iwi were both used to describe tribal entities. The tribes, be they **iwi** or **hapū**, were the cultural and spiritual center of life in a society that had not previously developed centralised government, or associated organisations of the state, such as those that deliver and administer military, justice, education, and health services. In the absence of a national legal code, the declaration was a symbol of nationhood, with the creation of a unified body to make laws, whilst continuing to maintain tribal independence at the community level. The use of the term “Declaration of Independence” in English mirrored the federal system in the United States and was likely an intentional choice given the number of American sealers and whalers visiting Aotearoa New Zealand at the time.

Aotearoa New Zealand was formally annexed as a colony of Britain after the Treaty of Waitangi was signed between Māori chiefs and Crown representatives on February 6th, 1840. Over ensuing months, several versions of the Treaty (in both Māori and English) traversed the country, eventually being signed by over 500 chiefs. The English version was fundamentally different and has been the cause of ongoing conflict and hostility between Māori and the Crown (Stokes, 1992; Stenson, 2012; Orange, 2015).¹⁶¹⁷¹⁸ A key dispute between the versions relates to the degree of authority Māori ceded to the British. The English-language version of the Treaty states that Māori ceded sovereignty to the Crown, while the Māori version uses the term kāwangatanga (governance) as opposed to rangatiratanga (self-determination).

Federalism (as implied by a “Declaration of Independence”) is a sophisticated political system, allowing for national polity, alongside state sovereignty. On that basis, it defies logic that the same chiefs who signed Te Wakaputanga would have abdicated their sovereignty to the British Crown less than five years later when signing Te Tiriti o Waitangi (the Treaty of Waitangi). It seems more likely that the Māori chiefs assumed deepening their relationship with Britain under the Treaty would continue to strengthen international trade and prosperity (Henry & Wikaire, 2013).

However, the colonial experience of Māori has not borne out that theory (Walker, 1990).

Te Ao Māori (the Māori Worldview)

*“Māori religion is not found in a set of sacred books or dogma, the culture **is** the religion. History points to Māori people and their religion being constantly open to evaluation and*

16. Stokes, E. (1992). The treaty of Waitangi and the Waitangi tribunal: Maori claims in New Zealand. *Applied Geography*, 12(2), 176-191. [https://doi.org/https://doi.org/10.1016/0143-6228\(92\)90006-9](https://doi.org/https://doi.org/10.1016/0143-6228(92)90006-9)

17. Stenson, M. (2012). *The Treaty: Every New Zealander's guide to the Treaty of Waitangi*. Penguin Random House New Zealand Limited.

18. Orange, C. (2015). *The Treaty of Waitangi*. Bridget Williams Books.

questioning in order to seek that which is tika, the right way. Maintaining tika is the means whereby ethics and values can be identified"

– Henare (1998, p3)¹⁹

By drawing on ancient Māori cosmological accounts, renowned Māori scholar Henare developed an analytical framework for describing traditional culture and values to better understand Māori society, given the lack of written historical records. Anderson reinforces Henare's work, noting "the specifically tribal traditions of all Polynesians were often expressed in the formulaic language and metaphor of myth and legend" (2016, p24).

Specifically, Henare (1998) created a "Koru of Māori Ethics" (see Slide 7 in Henry's slides above). Henare writes:

"like a koru on the fern, each ethic reveals an inner core as it unfurls, and they are the foundations of Māori epistemology and hermeneutics – knowledge and interpretation of oral traditions, events and history... Together they constitute a cosmic, religious worldview and its philosophy, from which can be identified an economy of affection and the utilisation of resources (that) aims to provide for the people in Māori kinship systems."

– Henare (1998, p7)

The koru is the spiral of the silver fern frond, an image that is prevalent in carving and weaving arts, representing new life. The metaphor of the koru, unfurling like the cosmos, embodies the primary beliefs of the ancient Māori. At its centre is Io, the origin of all life, from which sprang Papatūānuku, the earth mother, and Ranginui, the sky father. Their offspring, the fronds of the koru, are atua, guardians of every facet of life and the human environment. Our celestial parents bestow gifts upon us, as do all parents. Tapu is the sacred, sacrosanct centre of all things. Mana, the spiritual power and authority that can be applied to people, their words, and acts, is closely linked to tapu. Mauri is the life force, the intrinsic essence of a person or object. Hau is the vital essence embodied in a person and transmitted to others, through everything they produce and value.

The Collective Responsibility versus the Individual Right

"Environment before People; People before Profit; Responsibility over Rights."

– Temuera Hall, Portfolio Manager TAHITO

Mauss (1990) also described the intricate set of relationships surrounding kinship as an economy founded on reciprocity, where gift-giving was the glue that bound communities

19. Henare, M. (1998). *Te tangata, te taonga, te hau: Maori concepts of property*. Paper presented to the Conference on Property and the Constitution, Wellington for the Laws and Institutions in a Bicultural Society Research Project, Waikato University, 18 July.

together. According to Stewart, “Mauss’s gift theory included the Māori example of the ‘hau of the gift’ which Mauss explained as a spiritual force, seeking to return to its original owner or place of origin” (2017, p1). This “economy of affection” was one in which the political economy related to the impacts and effects people had on each other and their environments, which was in direct opposition to the capitalist “economy of exploitation” introduced with British colonisation (Henare, 1995)²⁰.

Today, collectivism is demonstrated across all levels of Māori society, including joint **Iwi** ownership of key business assets. For example, many **Iwi** hold shares in Māori-owned Moana New Zealand, a fisheries company that owns half of Sealord, one of the largest fisheries companies in the Southern Hemisphere. This inter-**Iwi** collective arises from one of the earliest negotiated settlements with the Crown, recognising customary Indigenous fishing rights by endowing equal ownership in the (then Crown-owned) Sealord company to Māori.

The Impact of Colonisation

The traditional Māori economy contrasted sharply with 19th century British culture and society. In his comparison of Māori and Eurocentric knowledge and philosophy, ethnographer Elsdon Best wrote, “In studying the religion and myths of barbaric folk such as the Māori people of these isles, it is by no means an easy task to do so in a sympathetic manner. Our own point of view differs so widely”, (1924, p. 2).²¹ He went on to note, “It is not a case of differing degrees of intelligence, for the Māori is a remarkably intelligent person; but of difference in outlook on life, on matters normal and supernormal, essentially the latter” (1924, p. 34). Views such as these, from eminent British scholars, no doubt contributed to the negative view of Māori and fostered the view that Māori should be assimilated into (British Colonial) society.

It took little time for overt (British Crown) government action to have an impact, including repressive legislation directed at appropriating Māori land, and open warfare resulting in the loss of land, language, and Indigenous culture. By 1900, Māori retained less than 10% of land in Aotearoa New Zealand, undermining the economic foundations of Māori communities. By the turn of the 20th Century, the population was so decimated by poverty and disease it was assumed the Māori would die out (Henry, 2012).

Māori did not die out, of course, but the oppression of Māori, their language and culture, has had a catastrophic impact. The result of colonisation is not only the loss of land and the loss

20. Henare, M. (1995). Human labour as a commodity – a Maori ethical response. In *Labour Employment and Work in New Zealand*. Victoria University.

21. Best, E. (1924). *The Maori as he was: a brief account of Maori life as it was in pre-European days*. (No. 4). Owen, Government Printer.

of people through disease, poverty, and despair, but the loss of language, culture, cosmology, and identity. By the mid-1950s, Māori was a dying language and Māori people suffered the very real threat of death by assimilation. Over the same period, European settlers grew in wealth and opportunity, through expropriated land and the diminishing mana of the Māori people.

A Māori Renaissance

In the aftermath of the Second World War, Māori began an unprecedented urban migration. While enabling further assimilation, the migration also introduced increasing numbers of traditionally isolated and rural Māori to the institutions, the technologies, and the opportunities of the post-war economy. Māori became educated, wealthier, and empowered to the extent that by the 1970s, the Māori Renaissance was born and fully acknowledged (Walker, 1990). The Māori struggle was founded on demands for Māori sovereignty, acknowledgement of the Treaty of Waitangi as the constitutional basis of New Zealand society, and redress demands for Treaty grievances (Awatere, 1984).²²

The Māori Land March in 1975 brought together diverse activist groups and Māori organisations to highlight the plight of Māori people. In the same year, the National government created a Tribunal to consider Treaty grievances. However, it was only in 1984 under the new Labour government that the Waitangi Tribunal was given the power to look retrospectively back to 1840 at breaches of the Treaty, and the potential to require the New Zealand government to address and produce redress for historical grievances (Henry, 2012).

Since 1985, successive New Zealand governments have devolved over 2 billion NZD to tribes (Iwi) in Treaty settlements, in partial redress for the harm caused to Māori by European settlers. These settlements have been key to enabling Māori investment and wealth creation today. Additionally, Māori have grown in political strength and unity, particularly since the 1993 introduction of proportional representation in the New Zealand political process. However, Māori still languish economically, socially, and culturally, when compared to non-Māori.

Movements such as the Te Kōhanga Reo (the Māori language early childcare system), Kura Kaupapa Māori (Māori language primary and secondary education), Te Whare Wānanga (Māori universities), Te Taura Whiri i te Reo Māori (the Māori Language Commission), Te Māngai Pāho (the Māori Broadcasting Authority), and a raft of other organisations have increased the potential for positive change (Henry, 2012).

[Billion dollar Auckland iwi sharing part of its history in new tourism venture \(YouTube, 1m51s\):](#)

22. Awatere, D. (1984). *Māori sovereignty*. Broadsheet.



One or more interactive elements has been excluded from this version of the text. You can view them online here: <https://oercollective.caul.edu.au/sustainable-finance/?p=66#oembed-2>

Jan 4, 2018 – “Ngāti Whātua Ōrākei is hoping its tech-based tour of a city icon will help diversify its assets.”

Key Takeaways

Key Takeaway 1 – Everything is connected.

Ancient Māori knowledge is founded on the profound relationship between humankind and the cosmos, and the genealogical links that bind these. Everything is connected and interwoven into a pattern of evolution from the void at the beginning of time, to the world of light in which all life exists.

Key Takeaway 2 – Knowing history helps us make sense of now.

Traditional Māori philosophy and knowledge have endured to survive colonisation, albeit through change, and ancient knowledge continues to shape, inform, and serve Māori identity and action in contemporary society.

Questions

Think about your own culture, personal values, and your background. Answer:

1. How do they influence your decisions? Choose two examples from the previous week to illustrate how you live your culture, values and/or make decisions influenced by your background.
2. What relationship do you have with the world around you (people, places, nature etc)? Has it influenced your decision to study finance, sustainable finance, or learn about investing?
3. Think about your personal investment objectives. Do you place financial returns before non-financial considerations (like sustainability)? Why/why not? How does your answer relate to your answers in (1) and (2) above?

Next, we offer Māori organisations' investment strategies as examples of how uniquely Indigenous values shape sustainable investment.

Overlap Of Māori Values and ESG Concepts

Iwi (Tribe) Asset Management

Iwi typically manage their assets via Māori Asset Holding Institutions ('MAHI', also the Māori word for 'work') within a tribal entrepreneurship framework (Mataira, 2000).²³ The commercial entities manage Iwi assets within a Māori cultural framework for the current and future benefit of the tribe and its members.

"Mō tātou, ā, mō kā uri ā muri ake nei – For us and our children after us"

– Ngāi Tahu mission statement, 2023²⁴

However, the consequences of colonisation (described in "The Impact of Colonisation") for Māori, like many Indigenous populations, means they are disproportionately represented across many negative social statistics, including life expectancy and health outcomes, educational achievement and employment, and incarceration rates. The financial returns of MAHI are an important revenue source for **Iwi**, to support "social, cultural, educational, health and environmental programmes" (Tainui Group Holdings, 2023) aiming to improve overall wellbeing for Māori. Many **Iwi**, therefore, face an investment horizon trade-off between improving social outcomes for their current generation and building their economic base to provide for the next.

"Whakatupu rawa, whakatupu taangata – Growing assets to grow our people"

– Tainui Group Holdings purpose, 2023²⁵

Example: Ngāi Tahu – Background and Investment Objectives

Based in Aotearoa New Zealand's South Island (Te Waipounamu), Ngāi Tahu's rohe (tribal lands) stretch from southeast of Blenheim, across to Kahurangi Point on the west coast, down past Bluff to also encompass Rakiura (Stewart Island). In terms of regional coverage, theirs is the largest of all **Iwi** (Te Rūnanga o Ngāi Tahu, 2021), and one of the most populous with over 75,000 registered **whānau** members (Ngāi Tahu Group, 2022).²⁶

23. Mataira, P. (2000). *Nga kai arahi tuitui Māori: Māori entrepreneurship: The articulation of leadership and the dual constituency arrangements associated with Māori enterprise in a capitalist economy*. Unpublished Doctoral Thesis, Massey University.

24. Ngāi Tahu. *Nau mai, tauti mai*. (2023). <https://ngaitahu.iwi.nz/>

25. Tainui Group Holdings. (2023). *Purpose*. <https://www.tgh.co.nz/>

26. Te Rūnanga o Ngāi Tahu Group. (2022). Annual Report 2021-2022. <https://ngaitahu.iwi.nz/assets/Documents/Te-Runanga-o-Ngai-Tahu-Annual-Report-2022.pdf>

In 1998, the Crown and Ngāi Tahu finalised their Treaty Settlement negotiations, including an apology from the Crown and \$170m (land and cash). However, the Ngāi Tahu Charitable Trust and its predecessor, the Ngāi Tahu Māori Trust Board, have been managing and distributing **Iwi** assets since the mid-40s with a strategy of growth, value creation, and reinvestment.

Ngāi Tahu Holdings Corporation (NTHC) is tasked with “[protecting] and [growing] the pūtea [fund] and [delivering] a dividend” (Ngāi Tahu Group Annual Report 2021-2022, p.2), allowing fund distribution for Ngāi Tahu Charitable Trust. The Trust supports programmes related to education (including financial literacy), health, and **whānau** wellbeing, linked to the promotion and protection of culture and language.

The approach of having an “investment arm” and a “social arm” is not uncommon for **Iwi**, indicating the pragmatic melding of dual objectives within a non-Indigenous financial framework. For example, under their mandate to deliver sustainable investment returns, in FY22 the entire Group returned 9.8% and distributed 3.7% of Net Assets to the Charitable Trust.

There are challenges in the separation; with kotahitanga (unity) listed as an explicit **Iwi** value, and the trade-off between current and future time horizons a delicate balance. CEO of NTHC, Lisa Tumahai, acknowledges this in her 2022 report (Ngāi Tahu Group Annual Report 2021-2022, p.2): “I remain hopeful that collaboration between the Office [Trust] and NTHC will continue to grow. At times we can still feel like we are two very different organisations.”

Now, in 2023, the **Iwi** manages six subsidiary companies worth approx. NZD 1.89 billion (Ngāi Tahu Group Annual Report 2021-2022) and seeks to deliver on their 10-year plan ‘Ngāi Tahu 2025’. It is arguably the formal reinvestment policy (two-thirds of income), in place since the advent of the Trust, that most clearly demonstrates the ongoing intent “to create and control [their] destiny” (Ngāi Tahu 2025, p.5).²⁷

An Overview of Māori Wealth

As noted earlier, colonisation decimated the Māori asset base via land confiscations (amongst other things), alienating Māori from their ancestral lands (rohe) which provided sustenance and economy. Māori wealth, that which was retained and has been rebuilt since, is mostly retained within **Iwi** structures, comprised of lands retained after British appropriations and confiscations, and the proceeds of Treaty settlements discussed above (see “A Māori Renaissance”). These settlements are negotiated with **Iwi** or **hapū** as restitution for historical breaches of the Treaty of Waitangi, and typically involve an apology from the Crown, the return of Crown-owned lands taken from the **Iwi** or **hapū**, and financial compensation. The value of Treaty settlements amounts to approximately NZD 2.6 billion across 85 settlements.

For eight of the ten largest **Iwi**, their largest investments are in either property or primary industries; most investments are in land and businesses that utilise land and sea (like the Sealord fisheries example in

27. Te Rūnanga o Ngāi Tahu. (n.d.). *Ngāi Tahu 2025*. <https://ngaitahu.iwi.nz/assets/Documents/NgaiTahu-20251.pdf>

“The Collective Responsibility versus the Individual Right”), unsurprising, given the historical importance of land to Māori for resources, sustenance, and culture.

As of 2021, the value of Iwi-held assets was estimated at NZD 11.7 billion although the broader Māori economy, including Māori-owned businesses, is valued closer to NZD 70 billion. The 10 largest Iwi collectively hold about 69% of all **Iwi** assets. In terms of assets under management, the three largest Iwi are Ngāi Tahu (2.2B), Waikato-Tainui (1.9B) and Ngāti Whātua Ōrākei (1.6B), see TBD Advisory (2022).

The intent of each settlement is that they are final, meaning there will unlikely be additional significant transfers from the Crown to **Iwi** as the process winds down. For **Iwi**, it is crucial that their treaty settlements are managed effectively for their people’s ongoing health and wellbeing. This highlights risk management as a significant consideration for **Iwi** investment managers; losses to the asset base of the **Iwi** cannot be easily replenished.

Key Takeaways

Key Takeaway 3 – Overall Value

The Māori economy is estimated to be worth NZD 70 billion, including tribal (Iwi) assets and Māori-owned businesses. In 2021, Iwi-held investments were valued at NZD 11.7 billion and are typically managed via holding institutions known as MAHI (Māori Asset Holding Institution).

Key Takeaway 4 – Importance of Financial Returns

Financial returns are an important revenue source to support and improve overall wellbeing. Māori, like many Indigenous populations, are disproportionately represented across many negative social statistics, including life expectancy and health outcomes, educational achievement and employment, and incarceration rates. There is an investment horizon trade-off between improving social outcomes for the current generation and building the economic base for the next.

Key Takeaway 5 – Addressing Dual Objectives

Iwi often use a two-pillar approach in a non-Indigenous financial framework to manage their now with their future, referred to as having an “investment arm” and a “social arm”.

Key Takeaway 6 – Risk Management is Key

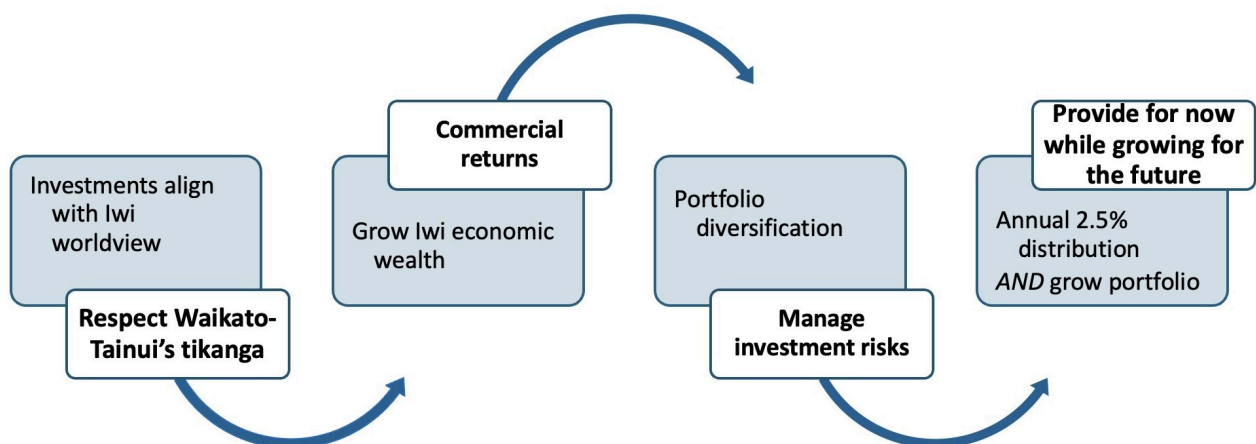
Sound risk management is crucial for Indigenous investors, like Māori, as they manage current and future needs along intergenerational time horizons.

Questions

1. List two examples of non-Indigenous investment entities that typically have long (intergenerational) time horizons. Briefly describe how they approach building their asset base while providing income streams to their investors (or similar) now.
2. What is the size of your local Indigenous economy? How does it compare to the national economy? If investment funds like MAHI exist, provide an example.
3. If needed, review what you've previously learned about ESG (Environment, Social, Governance) in business and finance.

Cultural Values Underpin Māori Business and Investment

MAHI operate within Te Ao Māori (Māori worldview). For instance, (Waikato-)Tainui Group Holdings (TGH) operates within Puna Whakatapu Tangata, a holistic framework setting out their investment portfolio objectives. The blueprint emphasises four pillars underlying the TGH's investment strategy, shown in the figure below, beginning with respect to tikanga (customs and traditional values of Waikato-Tainui). Ngāi Tahu frames a similar imperative as “respecting and contributing to the mana (prestige) of Ngāi Tahu” (Te Rūnanga o Ngāi Tahu, 2023). In both cases, the implication of beginning with **tikanga** and **mana** is that Māori values will, alongside economic returns, drive all financial decision-making.



Source: adapted from [Waikato-Tainui's Puna Whakatapu Tangata \(Investment Framework\)](#).

We noted previously the importance of mana (spiritual power and authority, applied to people, through their words and acts) and hau (the vital essence embodied by a person and transmitted to others, through everything they produce) to Māori culture. Through building and growing their economic foundations, **Iwi** aim to build and grow their **mana**.

Mana is a familiar concept to both Māori and other Polynesian peoples, with Dwayne “The Rock” Johnson offering this explanation to journalist Jacqui Brown in 2017:

Mana is a term in Polynesian culture – it’s spirit, it’s power. Everyone in New Zealand has [their] own version of mana. I feel like the most important thing about mana is it’s very grounding. It makes you recognise how grateful you should be, recognise your blessings because [life] wasn’t always like cool fun, bright lights and movies...

– Dwayne “The Rock” Johnson, 2017

A third related concept relevant to investment frameworks is taonga, which translates to ‘treasure’. **Taonga** has a very broad definition, encompassing both tangible things including land (whenua), its natural resources, scared (tapu) and significant places (like marae, the community centre of hapū) – like the Western concept of ‘assets’ – and intangible things, like te reo (language) and tikanga (Russell et al., 2012).²⁸ Māori are guardians of **taonga**, rather than owners, implying it is their responsibility to protect and enhance it for future generations’ benefit.

Kono NZ Seafood Story

These three videos introduce the story of Kono Seafood. [Part 1 \(Linkedin, 1m05s\)](#) focus on their why – why they share the best of their place and space with the world. In [Part 2 \(Linkedin, 1m08s\)](#), they share the connection between kaimoana, seafood and togetherness. In [Part 3 \(Linkedin, 1m43s\)](#) they visit the home of their Greenshell Mussels and we learn how they balance growing resources with being good ancestors.



One or more interactive elements has been excluded from this version of the text. You can view them online here: <https://oercollective.caul.edu.au/sustainable-finance/?p=66>

28. Russell, C., Taonui, R., & Wild, S. (2012). The concept of taonga in Māori culture: Insights for accounting. *Accounting, Auditing & Accountability Journal*, 25(6), 1025-1047. <https://doi.org/https://doi.org/10.1108/09513571211250233>



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While this idea arguably places Māori investors alongside impact investors, and well within current understandings of ESG, by framing their purpose as both future-focused and within **tikanga**, Indigenous investors like Māori extend beyond standard (non-Indigenous) sustainable investment.

Actions consistent with **tikanga**, especially in preserving and enhancing **taonga**, enhance **mana**.

The focus on enhancing financial and non-financial **taonga** to benefit everyone involved is akin to stakeholder theory, although for MAHI, investments must especially benefit the **Iwi** and its members. For Māori investors, their financial returns must align with non-financial objectives including the support of their people today and building a better future for their people tomorrow.

Exercise – Actioning Values Guide Investment Decisions



An interactive H5P element has been excluded from this version of the text. You can view it online here:

<https://oercollective.caul.edu.au/sustainable-finance/?p=66#h5p-21>

Key Takeaways

Key Takeaway 7 – Prioritising Values

Indigenous investors, like Māori, prioritise non-financial considerations (including environmental, social, and spiritual factors) over financial performance in their investment decisions. Leading decisions with their values helps to ensure the resulting portfolio aligns with their sustainability and non-financial goals.

Key Takeaway 8 – What is an 'Asset'?

Indigenous investors, like Māori, aim to invest in both tangible assets (like land or businesses) and intangible assets (like culture and language).

Key Takeaway 9 – Above and Beyond

While similar in some ways to non-Indigenous impact investors, Indigenous investors go beyond protecting what we have now (e.g., our waterways or biodiversity via sound environmental practice) to actively improve it for tomorrow. This can include building portfolio wealth for the next generation (recall Ngāi Tahu's example above) or investing directly in businesses making the world a better place (e.g., circular economy).

Questions

1. Compare and contrast: What do Indigenous investors (like Māori) have in common with impact investors? How are they different? Use an example or examples to illustrate your answer.
2. How does stakeholder theory relate to a Māori investment or business approach? Use an example or examples to illustrate your answer.

Values: Expanded

Value	Description
Whanaungatanga (relationship and kinship)	Whanaungatanga recognises the bonds and relationships between people. Māori culture places considerable importance on familial and ancestral bonds, placing people within wider social networks. A person is therefore accountable to a wider community, resulting in a more collective view of the world. Assets belong to the collective, rather than an individual, and should benefit the collective. Whanaungatanga (relationship and kinship) also places great importance on relationships. Within a business context, these relationships create both opportunities and obligations (Haar and Delaney, 2009). Interlinked with whanaungatanga (relationship and kinship) is the concept of manaakitanga (care for all things), which arguably sits at the heart of how Māori view relationships.
Manaakitanga (care for all things)	Manaakitanga refers to caring for all people, with generosity and respect, and is commonly associated with hospitality. Manaakitanga (care for all things) is about growing the mana (spirit/power) of others, and by doing so results in mutually beneficial relationships. An investment preference for long-term, direct holdings in businesses suggests these relationships are more valuable than shorter-term indirect investments. The overarching investment goal of Māori to look after their tribal members, their hapū (community) and whānau (extended family), and support their wellbeing is practising manaakitanga (care for all things). The example provided below of Ngāi Tahu demonstrates what manaakitanga (care for all things) looks like in an investment and business context. It is perhaps most like the Social pillar of the ESG framework, with its focus on people, and in a non-Indigenous business setting can be thought of as caring for employees and consumers.
Kaitiakitanga (stewardship/guardianship)	Kaitiakitanga relates to being a guardian of taonga (treasure) and is often used to describe environmental stewardship. In this respect, it incorporates the Environmental component of the ESG framework. However, kaitiakitanga (stewardship/guardianship) goes further as it incorporates both socio-economic and cultural issues. As a result, kaitiakitanga (stewardship/guardianship) also relates to the Social aspect of ESG, looking after and caring for communities. Additionally, where the ESG framework focuses on minimising harm and maintaining our environment, kaitiakitanga (stewardship/guardianship) requires the improvement of the taonga (treasure) entrusted to a person or community. On the face of it, kaitiakitanga (stewardship/guardianship) appears to carry a stricter standard of stewardship than the current risk management focus on material ESG issues.
Wairuatanga (spirituality)	Wairuatanga relates to Māori spirituality and their understanding of their place within the universe, earth, and land (Hall et al., 1993). An important aspect of wairua (spirit) is the connection to ancestors, especially through connection to ancestral lands. The alienation of Māori from their lands via confiscation and urban migration caused considerable harm to Māori wairua (spirit). Within MAHI, wairuatanga (spirituality) can be seen in the importance placed on retaining or acquiring additional land. For example, Waikato-Tainui's whenua (land) policy requires that any divestment of land be balanced with an equivalent acquisition of whenua (land) within 18 months. Policies specifying land acquisition by MAHI recognise the hurt to Māori wairua (spirit) through its loss and clearly distinguish Indigenous investor goals from non-Indigenous investor objectives.
Kotahitanga (unity)	Kotahitanga refers to building unity between people, binding people together and encouraging consensus between parties. As a collective culture built on reciprocity and relationships, Māori business practice often refers to the waka (canoe) and joint goals. As we saw in the Ngāi Tahu example above, unity between the 'social' and 'investment' arms is key to the enduring success of the Iwi (tribe).

Example: Ngāi Tahu – Practising Values Through Investment

Along with the values above, Ngāi Tahu add **tohungatanga** (expertise) and **rangatiratanga** (leadership). Test your understanding by matching Ngāi Tahu's values to their explanation, sourced from their [Annual Report 2022](#).



An interactive H5P element has been excluded from this version of the text. You can view it online here:

<https://oercollective.caul.edu.au/sustainable-finance/?p=66#h5p-27>

Values Trade-off

The balancing of manaakitanga (looking after Iwi members) with kaitiakitanga (stewardship/guardianship) of current and future assets, is exemplified by Ngāi Tahu's decision-making during the COVID-19 pandemic and associated economic downturn that impacted aspects of their business, especially tourism. For example, they paused some regular grant funding distributions due to economic volatility over 2020-2021 and switched focus to natural disaster and pandemic-related relief for their community, like many corporate organisations with social responsibility programmes.

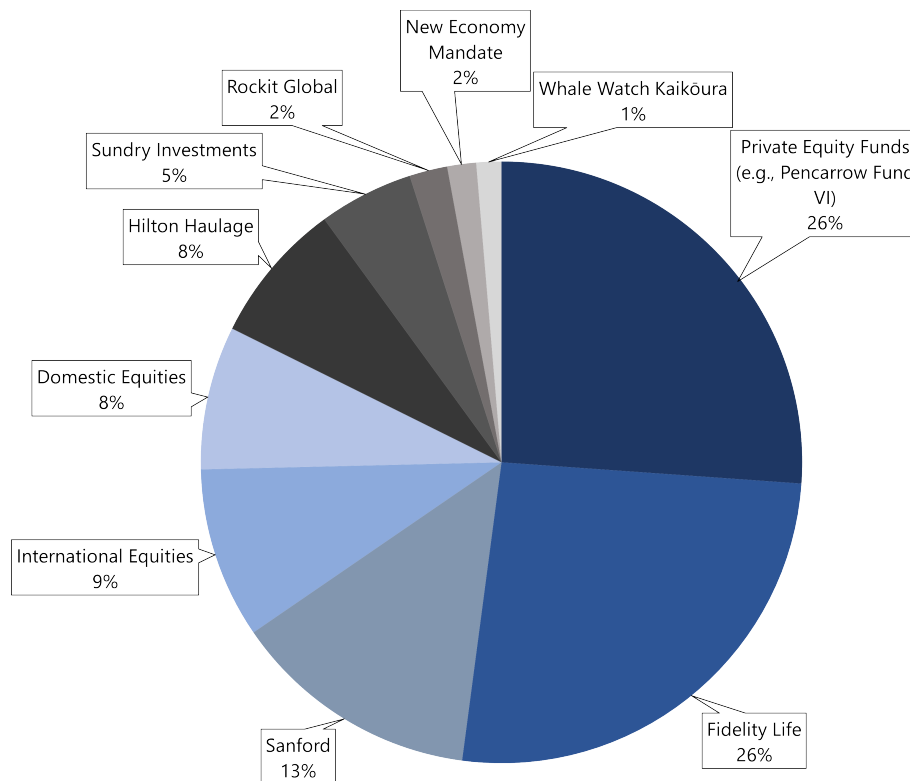
The preference for relatively large, direct holdings in companies allows the active practice of **whanaungatanga** in an investment context. These longer-term business relationships and partnerships also provide opportunities for self-determination and control important to Māori generally. However, diversification still needs to be managed to avoid over-exposure and illiquidity.

Investment in Practice – Kaitiakitanga and Tohungatanga

Ngāi Tahu Holdings Corporation (NTHC) encompasses their business arm (in seafood, property, farming, and tourism), direct investments in NZ businesses (e.g., their 24.9% stake in life insurer Fidelity Life, or 50% stake in transport company Hilton Haulage), ESG-focused indirect holdings (e.g., Pathfinder Responsible Investment Fund). While their preference is investments in NZ-based business, with a particular focus on Te Waipounamu (South Island), the portfolio includes some international holdings like equities and the Australian operations of their seafood company.

We focus here on their indirect holdings, managed by Ngāi Tahu Investments (NTI), and worth NZD

573.4 million in total assets for FY2022 (second only to the Property subsidiary, worth NZD 754.9 million). Overwhelmingly, the NTI portfolio is NZ-based with a small (unspecified) holding in Australian assets – notably, international equities are less than 10% of total assets. NTI's top holdings for the 2021-2022 financial year were:



Ngāi Tahu Investments top holdings adapted from [Ngāi Tahu Group Annual Report 2021-2022](#).

Of note is the NZD 8.9 million in their New Economy Mandate portfolio, managed by a Ngāi Tahu-affiliated boutique financial advisory firm (NTI owns a 25% stake); the thematic portfolio considers “new economy” investments like the circular economy and alternative proteins. The values evident are:

- tohungatanga (expertise) – by investing in and managing funds through an Iwi-affiliated advisor, NTI is enabling expertise to be built “in-house”
- rangatiratanga (leadership) – novel technologies such as those broadly defined as “new economy” illustrate a future focus and position the Iwi as a leader in the field
- kaitiakitanga (stewardship/guardianship) – while managing large property and agricultural businesses, investment in new technologies like alternative proteins diversifies current and future revenue streams, building economic resilience.

Almost 17% of assets under management are held in an NTI-managed portfolio of listed equities. The investment approach is ESG-focused, with exclusionary screening that targets ethical practice, climate change, and sustainability to ensure Ngāi Tahu values are upheld. The investment purpose is to allow NTI to control what they are invested in while providing a liquid means of diversification.

Integrated Reporting:

NTHC reports their Scope 1, 2, and 3 carbon emissions and is implementing year-on-year carbon footprint reduction policies across their commercial businesses. Like all sustainable investors, their largest challenge is the Scope 3 emissions they cannot control (as they are generated through the supply chain, rather than directly by NTHC-owned businesses).

A Note on Individual Savings – Manaakitanga in Practice

Along with their commercial business, Ngāi Tahu also encourages Iwi members to invest personal savings in diversified portfolios via the Whai Rawa managed fund to increase financial capability, experience, and longer-term planning (often matching those savings with charitable trust distributions; over 16 years, these contributions equate to NZD 50 million). In FY23, Whai Rawa reported NZD 132 million in net assets across 33,255 members (Whai Rawa, 2023)²⁹.

These personal savings are managed by Mercer (NZ) Ltd, with investments in socially responsible conservative, balanced and growth portfolios according to the savings goal, and with clear withdrawal criteria (tertiary education, first home purchase, retirement [55+] and other special circumstances, like financial hardship). Like NTI, Whai Rawa investments exclude “sin” stocks³⁰ and seek to include “good” companies, with the SIPO stating that a “sustainable investment approach is more likely to create and preserve long term investment capital” (Whai Rawa Unit Trust Statement of Investment Policy and Objectives 2022, p.5)³¹.

Further, and importantly, the SIPO includes a Responsible Investment Policy outlining that investments should be “consistent with Ngāi Tahu values and [...] not undermine environmental stewardship, consumer protection, human rights, or racial or gender diversity” (p.5). It also emphasises active ownership as a key guiding investment principle.

29. Whai Rawa. (2023). Pāwhiri ā-tau 2022/23. <https://www.ngatiwhatuaorakeiwhairawa.com/media/1876/j0449-nwo-whai-rawa-annual-report-2023-fa.pdf>

30. See the Whai Rawa Unit Trust Statement of Investment Policy and Objectives (dated 31 October 2022) for a full list of excluded products, services, and industries.

31. Whai Rawa Unit Trust. (2022). *Statement of investment policy and objectives*.

Key Takeaways

Key Takeaway 10 – Diverse Values and Approaches

Like all portfolio managers, each tribal (Iwi) investment fund has its own investment values, goals, and priorities. For example, Ngāi Tahu includes tohungatanga (expertise) and rangatiratanga (leadership) rather than wairuatanga (spirituality).

Key Takeaway 11 – Transparency by Design

The Statement of Investment Policy (SIPO) outlines the investment approach to responsible investment – often, these types of investment strategy documents are more explicit than responsible investment policies for non-Indigenous fund managers and portfolios. Exclusion lists tend to be more extensive than non-Indigenous investment portfolios and may be adhered to more strictly.

Questions

Recall the [Māori \(investment\) values](#) are: Whanaungatanga (relationship and kinship); Kaitiakitanga (stewardship/guardianship); Wairuatanga (spirituality); Manaakitanga (care for all things); Kotahitanga (unity).



An interactive H5P element has been excluded from this version of the text. You can view it online here:

<https://oercollective.caul.edu.au/sustainable-finance/?p=66#h5p-29>

Māori Investment in Practice

The example provided in the previous section illustrates an Iwi (Ngāi Tahu) investment approach, offering a practical overview of how non-Indigenous ESG interacts and overlaps with Māori values. Here, we

provide two additional case studies – a company, Wakatū Inc., and a managed fund provider, TAHITO – to round out the chapter.

Case Study One: Wakatū Incorporation

“Our purpose is to preserve and enhance our taonga for the benefit of current and future generations.”
– Wakatū Inc. purpose, 2020³²

Background

In contrast to Ngāi Tahu’s approach, Wakatū Inc. was established in 1977 as an alternative to a charitable trust entity, allowing its owners (shareholders) to receive dividends from the company rather than grants or distributions (“Establishment of Wakatū”, 2020). With roughly 4000 registered whānau (extended family) members across four Iwi in the Nelson-Marlborough region at the top of Te Waipounamu (NZ’s South Island), Wakatū Inc. manages the “Nelson Tenth”³³ – some 1393 hectares of land in Nelson, Motueka, and Golden Bay, originally worth NZD 11 million (unimproved land value) – through three commercial subsidiaries:

- [Whenua Ora](#) – Approx. 70% of Wakatū, with an asset base of land and waterways, managed as a diverse property portfolio of residential and commercial buildings, orchards, marine farms, and vineyards. Wakatū’s “social” programmes, including home ownership, education, and wellbeing, are also run through Whenua Ora.
- [Kono](#) – A food and beverage business, with operations covering the farm-to-table supply chain across their product lines of wine, cider, beer, apples, pears, and kiwifruit.
- [AuOra](#) – Health and wellbeing business, using active ingredients from natural resources in and around Wakatū.

Today, Wakatū Inc. has an estimated value of over NZD 350 million (Wakatū Inc., 2020).

Investment in Practice – Kaitiakitanga

“Whatungarongaro te tangata toitū te whenua – As people disappear from sight, the land remains”
– Kono (Wakatū Inc.) on **kaitiakitanga**, 2022

32. Wakatū Incorporation. (2020). *About Wakatū*. <https://www.wakatu.org/about-wakatu>

33. The “Nelson Tenth” are named for the original 1840s sale agreement between the London-based New Zealand Company and the Māori landowners, promising one-tenth of settled land to be retained for Māori. However, most of the promised land was not kept for resident Iwi, and Wakatū Inc. lead the long-running legal fight for the Crown to remedy the historical contractual breach (see, e.g., Neal 2023a; Neal 2023b). Legally, it is not a Treaty Settlement due to the nature of the arrangement with the New Zealand Company.

Sustainability through **kaitiakitanga** is Wakatū's dominant investment value and is emphasised across their mission, investment, and business philosophy (see, e.g., [Kono's Sustainability website](#) for examples). They explain the collective responsibility to protect and enhance their "precious natural resources that are [their] life force" to "achieve sustained spiritual, environmental, social and cultural well-being and economic aspirations" (Kono, 2022)³⁴.

The focus on **wairuatanga** and culture in addition to general environmental and social concerns typifies a key difference between Indigenous and non-Indigenous investors, including sustainable and impact investors.

Kaitiakitanga is also exemplified by their 500-year plan (named Te Pae Tawhiti), which "sets out our purpose as an organisation. The reason we exist and what we want to do. A long-term plan like this is fairly common for Māori, we tend to think of our grandchildren and future generations" (Kerensa Johnston, Wakatū CEO, quoted in Brown, 2018).³⁵

Placing values front and centre is evident through the Kono product range, with wine ranges named for and "inspired by" concepts like *whenua* and *manaaki* (Tohu Wines, 2021). There are parallels between Māori-owned businesses like Kono and non-Māori businesses founded with sustainability and social responsibility in mind, who often promote their philosophy strongly, too. For example, non-dairy ice cream and milk brand Little Island's homepage prominently display their organic, vegan, fairtrade, and living wage employer credentials (Little Island "Our Story", 2023).

Questions

Identify an example of a (non-Indigenous) sustainable company and answer:

1. Provide a brief overview of your chosen company. Include the company's mission and/or business philosophy and highlight the areas of sustainability and social responsibility they focus on.
2. Compare and contrast: List similarities and differences between Wakatū (or one of their subsidiary companies, e.g., Kono) and your chosen company. Provide specific examples from each company to illustrate your answers.
3. Wakatū has a 500-year business strategy. Briefly explain what Indigenous investment value or values this approach exemplifies and why.

34. Kono. (2022). *About*. <https://www.kono.co.nz/our-values>.

35. Brown, M. (2018, August 2018). *Māori company plans for the future with 500-year plan*. Stuff.co.nz. <https://www.stuff.co.nz/business/105970245/mori-company-takes-the-long-view-on-their-business-goals>

4. Think about your chosen company. Would a long-term (intergenerational) plan suit their business? Justify your answer.

Case Study Two: TAHITO

Funds manager TAHITO is “an Indigenous contribution towards a new global story of diversity, equity and sustainability”, focusing on “providing high quality ethical investment services” (TAHITO “About Us”, nd and “Investment Philosophy”, in *Statement of Investment Policy and Objectives 2023*, p.5)³⁶, guided by a Māori worldview.

They invest in NZ and Australian equities, targeting a 49%/49% split with 2% cash and cash equivalents, benchmarking to a 50-50 S&P/NZX50 and S&P/ASX200 Index (TAHITO *Statement of Investment Policy and Objectives 2023*). The fund holds Responsible Investment Association Australasia (RIAA) accreditation and in 2023 was awarded “Best Ethical Retail Investment Provider” by NZ-based Mindful Money (TAHITO *Monthly Report August 2023*). TAHITO reported NZD 21.5 million assets under management for the quarter ending June 2023 (TAHITO *Quarterly Fund Update June 2023*).

TAHITO details their strategy as one of active ownership in companies that are positively screened into the fund, after passing an initial negative screen. Their SIPO outlines a decision-making process based on ESG integration, with three investment priorities applied in this order:

1. Values-based investment: the portfolio aligns with TAHITO principles.
2. Impact investment: seek to “drive change” on social and environmental factors.
3. Risk management: use ESG integration to reduce and manage the fund’s risk profile.

The way TAHITO describes their decision-making process highlights a key difference between an Indigenous investment fund and a non-Indigenous ESG or responsible investment fund. First and foremost, Māori values and worldview underpin the fund’s investment philosophy – before standard ESG screens are applied, as would be the case for non-Indigenous funds.

Second, ethical considerations are the primary filter through which investments are analysed. Financial performance and fundamentals are a clear secondary consideration, which is unlikely to be the case for many non-Indigenous funds claiming to be “responsible” (with some notable exceptions). The growing green- and impact-washing literature attests to the wide spectrum of ethical intensity among managed funds.

36. TAHITO. (2023). *Statement of investment policy and objectives 2023*. <https://tahito.co.nz/sites/default/files/documents/TAHITO%20SIPO%2010%20August%202023.pdf>



TAHITO
Investment
Principles
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TAHITO define their approach as “a unique way of measuring companies using Indigenous knowledge combined with conventional financial analysis” (TAHITO “Indigenous Investing”, nd)³⁷. In this sense, TAHITO demonstrates the purpose of this chapter and provides a roadmap for investors wishing to apply a values-based approach to their own portfolio management.

Question

There are seven steps in TAHITO’s Investment Process, but in the figure below they are out of order. Rearrange the steps into their correct order. In each case, provide a brief justification for your choice with reference to the principles of Indigenous investment covered in the chapter and TAHITO’s Case Study.



An interactive H5P element has been excluded from this version of the text. You can view it

37. TAHITO. (n.d.). *Indigenous investing*. <https://tahito.co.nz/indigenous-investing#investment-philosophy>

online here:

<https://oercollective.caul.edu.au/sustainable-finance/?p=66#h5p-24>

Challenges for Indigenous Investors

Like their non-Indigenous counterparts, Indigenous investors face challenges in aligning their values with their investment strategy. Specifically:

- Geographical diversification
- Lack of control over indirect holdings
- Reporting non-financial performance
- Defining value

Geographical Diversification

The Iwi-level, company-level, and funds manager-level case studies all demonstrate a preference for local (to Aotearoa New Zealand) and nearby (primarily Australian) investments. Within Aotearoa, investing in businesses and property tied to their tribal lands (rohe), aligning with **whanaungatanga**, may reduce diversification further and increase a portfolio's risk profile. For example, Ngāi Tahu's large holdings in tourism and agricultural businesses leave them exposed to natural disasters, like the 2016 Kaikōura earthquake, specific to the Te Waipounamu (South Island) region. Waikato-Tainui, in the central North Island, faced record rainfall in 2022-2023 and Cyclones Hale and Gabrielle, impacting their infrastructure and agriculture businesses, as well as their people (Waikato-Tainui Annual Report 2023).

An ongoing challenge for Indigenous investors is balancing their commitment to their geographical region while pursuing opportunities outside it. Additionally, relatively large weightings in property and land-based businesses also restrict industry-level diversification opportunities; heavy investment in farming, for instance, increases portfolio exposure to food and dairy price movements, and climate risks.

A Lack of Control Over Indirect Holdings

While Indigenous investors strive to meld their worldviews with Western financial principles and earn financial returns to support other activities, limitations of ESG reporting and transparency in company supply chains mean similar challenges exist for Indigenous investors, as they do for all responsible investors. These limitations are especially felt when relying on third-party managers and low-cost index investments.

Reporting Non-Financial Performance

Poyser et al. (2021)³⁸ highlight a key tension between Indigenous and traditional (Western) investment frameworks, particularly around reporting performance. While Māori Statements of Investment Policy and Objectives (SIPO) documents barely mention financial performance metrics, instead focusing on values and tikanga (traditional customs/values), investment strategy documentation tends to be dominated by financial performance measures. Poyser et al. (2021) suggest the difference lies in the documents' purpose: a SIPO is aspirational, while a strategy is meeting disclosure expectations. However, this disconnect raises a key question for disclosure's role and documents like the annual report.

Even when integrated reporting and the quadruple bottom line build in non-financial performance, do existing measures serve the broad and diverse outcomes Indigenous investors are concerned with? This in turn raises the question of whether documents like annual reports, even with integrated values-based, spiritual, and cultural reporting, serve investors well when reporting such a broad and diverse range of outcomes. For instance, how do you report on the wairua (spirit) of the Iwi?

Defining Value

Along with performance evaluation a challenge, shared by non-Indigenous impact investors, is how value is defined. Mika et al. (2022) argue that Indigenous views of value centre on collective wellbeing and contain both spiritual and material elements. Taonga encapsulates this difficulty, as what is prized and treasured contains not only material goods that can be assessed to hold a “market value” (like land), but also intangible elements that cannot be valued easily, if at all. Mika et al. (2022) put forward a Māori theory of value, based on the joint concepts of mana (spirit/power) and hau (life essence). However, how investors can incorporate such theory into both their decision-making and performance measurement requires more work.

Summary

Despite the tensions arising when considering an Indigenous worldview and values in an investment context, non-Indigenous sustainable investors can draw inspiration from the practice of Indigenous investors. In this chapter, we provided insight into one Indigenous history and context – that of Māori in Aotearoa New Zealand – and showcased how their investment strategy and objectives align with their values.

We focused on **Iwi** investment and Māori business here, however, many public NZX-listed companies in Aotearoa New Zealand now integrate the values described above in their annual reports and company

38. Poyser, A., Scott, A., & Gilbert, A. (2021). Indigenous investments: Are they different? Lessons from Iwi. *Australian Journal of Management*, 46(2), 287-303. <https://doi.org/10.1177/0312896220935571>

mission statements. Values such as kaitiakitanga (stewardship/guardianship) and manaakitanga (care for all) are increasingly present across sustainability frameworks for all organisations, their sustainability plans, and organisational culture. The use of Māori terms like **kaitiakitanga** is also increasing within business contexts (in Aotearoa New Zealand). While it is questionable whether the concepts are entirely understood, there is evidence that businesses (and the financial sector) are moving to embrace these concepts.

The ongoing revitalisation of the Māori world is also being experienced by other Indigenous peoples. Award-winning Indigenous author Villanueva (2021), renowned Native American activist and expert on wealth and philanthropy, acknowledges money is nothing more than a human-created concept and tool for assigning value. He advocates for new strategies to use money in ways that can heal trauma and return balance, calling for people to create new “decision-making tables, rather than setting token places at the colonial tables” (p10).

Final Key Takeaway

In expanding our notion of “value” and “values” in finance beyond Western and Eurocentric theory and frameworks, we continue to expand our understanding of sustainable finance and its application.

Further Reading

If you would like to learn more about Māori culture, language, or values within a business context, below are some resources for you.

NZ-based readers will find the Māori language and culture material/apps particularly useful and applicable for working in NZ.

Video/Podcast Resources

- [NZTE Investment Fix](#) Season 3 Episode 5 [33 minutes]: Māori investment strategy with Rachel Taulelei and Jamie Tuuta, then listen on Spotify or Apple podcasts
- [Extended interview \(YouTube, 54m 38s\)](#) with lawyer and former Kono CEO Rachel Taulelei on Indigenous 100 about her career, international trade, sustainability, and business (Mahi Tahi, posted 24 October 2023),

Online Resources

- [Māori culture and values in business](#), Te Kete Ipurangi (NZ Ministry of Education),
- [Principles from Te Ao Māori \(the Māori worldview\)](#), Ministry of Business, Innovation and Employment.
- [Tikanga Māori Values](#), explained by Rangatahi Tu Rangatira with activities.

Apps (Available on Android & Apple, via Your Favourite App Stores)

Available for free:

- **Rongo**, learning to pronounce te reo Māori
- **Te Kete Māori**, NZTE introduction to Māori culture
- **Puna Ako**, NZ Treasury introduction to Tikanga Māori

Available for free via an internet browser, the full functionality app is paid:

Te Aka, Māori dictionary and other learning resources.

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GLOSSARY

hapū

community

lwi

tribe

kaitiakitanga

stewardship/guardianship

kaumātua

elders

mana

spirit/power

manaaki

blessing

mātauranga

wisdom

negative screening

Add a glossary definition

rangatira

chiefs

Taonga

treasure

tikanga

traditional customs/values

wairuatanga

spirituality

waka

canoe

whakapapa

genealogy

whānau

extended family

whanaungatanga

family; relationships

whenua

land

VERSIONING HISTORY

This page provides a record of changes made to this textbook. Each set of edits is acknowledged with a 0.01 increase in the version number. The exported files for this toolkit reflect the most recent version.

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Version	Date	Change	Details
1.01	31 January 2024	Published chapters 1-7	
1.02			
