

3.4

CLIMATE-RELATED PHYSICAL RISKS

Risk transmission across international value chains

Important notice

This unit is part of a package of learning materials designed to support understanding of foundational concepts relating to climate-related financial disclosures. These learning materials do not constitute application or regulatory guidance for the preparation of climate-related financial disclosures and are not intended to represent legal or professional advice. We encourage you to seek your own professional advice to find out how the *Corporations Act 2001* (Corporations Act) and other relevant laws may apply to you and your circumstances, as it is your responsibility to determine your obligations and comply with them.



Key topics

- › Acute and chronic risks in the global context
- › Global risk transmission
- › International value chains and impacts

Relevance for climate-related disclosures

Understanding climate-related risks, including climate-related physical risks, will help entities in their climate-related disclosures. Climate-related risks include climate-related physical risks and climate-related transition risks. Climate-related physical risks may directly impact an entity or have indirect impacts, such as through the value chain.

Value chain refers to the full range of interactions, resources and relationships related to a reporting entity's business model and the environment in which it operates.

In this unit, we return to the topic of acute and chronic physical risks, examine how these are playing out on the global scale, and explore the potential for Australian entities to be impacted by climate impacts and risks beyond our shores. Understanding these broader risks is important for understanding climate-related risks and opportunities.

Overview

We live in a highly interconnected world. Many Australian entities are part of international value chains – sourcing materials from overseas, selling products abroad, or often both. As a result, Australian entities and the broader economy are continually impacted by global events, particularly the conditions affecting our major trading partners. This may include acute and chronic physical risks.

Risk transmission describes how climate-related risks in one part of the world may indirectly affect entities elsewhere. This may stem from impacts on production in supplier countries, damage to transport infrastructure, or a combination of risks and impacts.

What is a value chain?

An entity's value chain encompasses the interactions, resources and relationships an entity uses and depends on to create its products or services from conception to delivery, consumption and end-of-life, including:

- › interactions, resources and relationships in the entity's operations, such as human resources



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- › those along its supply, marketing and distribution channels, such as materials and service sourcing, product and service sale and delivery, and
- › the financing, geographical, geopolitical and regulatory environments in which the entity operates.

How global impacts can have local risks

Climate change, including more frequent and intense extreme weather events, is causing widespread and intensifying disruptions around the world.

Rising temperatures, shifting rainfall patterns, and increasingly severe and frequent extreme weather events are undermining agricultural productivity in many countries, increasing volatility in global food markets. Transportation networks are increasingly vulnerable to climate-related physical risks, which can lead to reduced reliability, delayed shipments, and greater transport costs. These and other cross-border impacts pose systemic and cascading risks to global trade and international value chains.

Weather and climate extremes are causing economic and societal impacts across national boundaries through supply-chains, markets, and natural resource flows, with increasing transboundary risks projected across the water, energy and food sectors (high confidence).

- Intergovernmental Panel on Climate Change (IPCC) (2022)¹

What is risk transmission?

Risk transmission describes how a climate-related risk in one part of the world can ripple through international value chains and impact entities elsewhere, even if those entities are not directly exposed to the original climate hazard. For example:

- › production in supplier countries is disrupted by acute or chronic physical risks
- › damaged infrastructure causes delays in shipping
- › suppliers' costs rise due to resource scarcity, higher insurance premiums or other climate-related risks.

To explore this further, we will return to the concepts of acute and chronic physical risks introduced in Module 3, Unit 2 and look at some of the main ways these risks are manifesting globally and the potential for risk transmission.

Table 1 presents the main categories of acute and chronic physical risks, the local impacts that may result when these risks are realised, and some hypothetical examples of how climate-related physical risks may be transmitted through international value chains. This table can be used to start thinking about risks that could affect your entity.

Table 1: Categories of acute and chronic physical risks, their local impacts, and potential for risk transmission

Risk category	Impacts	Examples of risk transmission from global impacts to entity risks
Acute physical risks		
Extreme heat	<ul style="list-style-type: none"> • worker health and safety • energy demand • productivity 	Prolonged heatwaves in southern China reduce factory output due to mandatory rest periods and increased cooling costs delaying the supply to Australian fashion outlets.
Bushfires	<ul style="list-style-type: none"> • asset loss • air quality • business interruption 	Bushfires in Europe may increase demand for Australian agricultural products if European supply is impacted by bushfires.
Extreme rainfall leading to flooding	<ul style="list-style-type: none"> • asset loss • business interruption • disruption of transport networks 	Flooding in industrial areas of Thailand causes a temporary halt in the manufacture of electronic components, delaying the supply to distributors in Australia.
Tropical cyclones	<ul style="list-style-type: none"> • infrastructure damage • business interruption 	Increased cyclone intensity in the Pacific disrupts supply chains and damages coastal infrastructure, delaying operations for Australian logistics and retail businesses.

Drought	<ul style="list-style-type: none"> • water shortages affecting agriculture and hydropower • food insecurity • economic stress 	Droughts in major grain producing regions of Europe and North America cause greater volatility in global markets for these staple crops, demand in Australia increases.
Chronic physical risks		
Rising average temperatures	<ul style="list-style-type: none"> • reduced agricultural yields • stress on energy systems 	Global temperature rise intensifies heatwaves in Australia, increasing cooling costs and straining energy infrastructure for agribusiness and retail operations.
Changing precipitation patterns	<ul style="list-style-type: none"> • water shortages • reduced agricultural yields 	Shifting rainfall patterns in Brazil affect coffee bean yields, causing prices to rise in Australia.
Sea level rise	<ul style="list-style-type: none"> • inundation of coastal areas, threatening freshwater supplies, agricultural land, infrastructure • loss of habitable land 	Melting polar ice raises sea levels, increasing flood risks near Australian coastal facilities, disrupting logistics and operations for businesses in transport and agriculture.
Ocean acidification	<ul style="list-style-type: none"> • damage to marine ecosystems and fisheries • biodiversity loss 	Marine heatwaves in Southeast Asia damage fisheries, affecting seafood imports to Australia.
Ecosystem shifts and biodiversity loss	<ul style="list-style-type: none"> • migration or loss of species and ecosystems 	Coral reef degradation in Southeast Asia due to warming ocean temperatures reduces fish stocks, disrupting seafood supply chains and raising prices in Australia.
Expansion of disease vectors	<ul style="list-style-type: none"> • impacts on agriculture • impacts on human health 	Mosquito-borne diseases spreading in Southeast Asia increase biosecurity risks, prompting tighter controls and health alerts in northern Australia.

While climate change affects all regions and countries of the world, some places face greater impacts due to their exposure to climate hazards and limited adaptive capacity (see Module 2, Unit 4 for more information on adaptive capacity).

As the impacts of climate change grow, there is also greater risk of significant events occurring in multiple regions of the world at the same time, amplifying global supply chain vulnerabilities.

Key takeaways

- › Climate-related physical risks (both acute and chronic) can disrupt international value chains, affecting Australian entities even when the original impact occurs overseas.
- › Australian entities will need to consider these cross-border impacts in identifying climate-related risks and opportunities.

Sources and explanatory notes

¹ Intergovernmental Panel on Climate Change (2022): *Climate Change 2022: Impacts, Adaptation, and Vulnerability*. Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [H.-O. Pörtner, D.C. Roberts, M. Tignor, E.S. Poloczanska, K. Mintenbeck, A. Alegría, M. Craig, S. Langsdorf, S. Löschke, V. Möller, A. Okem, B. Rama (eds.)]. Cambridge University Press, Cambridge, UK and New York, NY, USA.



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