MARSH & McLENNAN ADVANTAGE
INSIGHTS

GIIA

GLOBAL RISKS FOR INFRASTRUCTURE

The climate challenge

Author Name
Author Name

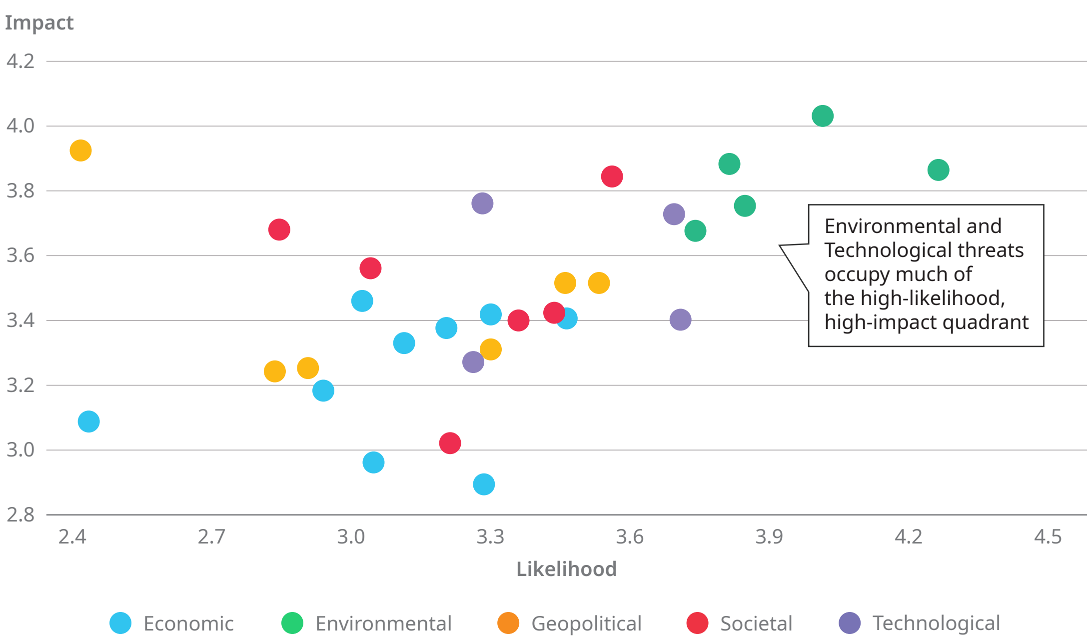
CONTENTS

INTRODUCTION

According to the World Economic Forum's 2020 Global Risks Report, *failure to mitigate climate change impacts* will be one of the business world's highest-likelihood and most-impactful risk types. A world that recognizes the exigencies of climate change will need to be approached with caution and cognizance of the risks — but also with active acknowledgment of the potential opportunities. Sustainability considerations must increasingly serve as a guide for not just risk mitigation, but for strategy development — and the infrastructure sector is no exception.

The long-term and stable returns ensured by the infrastructure asset class will come under pressure as the global economy adapts to changes in the earth's climate and undergoes the transition to low-carbon energy. Entities across the infrastructure investment universe — from equity investors in unlisted assets (often armed with significant influence on project development and management) to equity investors investing in listed assets (with a relatively passive relationship with infrastructure assets) — will all need to take note of these dynamics. They will need to ensure that climate resilience is part and

Exhibit 1. Global risks landscape



Note: Global Risks Perceptions Survey (718 responses worldwide): Respondents were asked to rate each risk based on its likelihood and impact on a scale from 1 to 5

Source: World Economic Forum, Global Risks Report 2020 parcel of both their firms' portfolio and of asset-specific risk mitigation strategies, and ultimately embed climate awareness into their strategy development.

This report is the second in a three-part analysis of the "global risks" facing infrastructure investors, as enumerated in the 2020 Global Risks Report. In our first instalment of this series, we illustrated the overall risk landscape for infrastructure using the 2020 Global Risks for Infrastructure Map interactive online tool. The following instalments take a closer look at two key high-impact and high-likelihood risk categories highlighted by the Global Risks Report: environmental risks, and technological risks (see Exhibit 1, page 5). This second instalment in this series serves as a focused overview of the environmental risks the sector faces. The third and final report will zoom into technological risks: the impact of transformative and disruptive technological innovations on the infrastructure sector.

The Global Risks for Infrastructure: The Climate Challenge report outlines the risks to infrastructure investors under each of the key climate change risks outlined by the Task Force on Climate-related Financial Disclosures (TCFD): an international working group of financial professionals providing recommendations on best practises in climate-related financial disclosure. The TCFD has outlined that the key risks arising from climate change include physical risks, comprising chronic and acute physical risks, as well as transition risks: market, reputational, technological, and policy and legal risks (see Page 7). This report will discuss the implications of these risks for investors, and take a closer look at two key dynamics that will arise as a result of their interconnections: the rise of stranded infrastructure assets, and the changing landscape of government support for renewable energy infrastructure. We will present key questions and case studies infrastructure investors will need to consider in order to prepare for and protect against the oncoming climate challenge.

Note: Throughout this report, frequent references to "energy infrastructure" have been made. We would like to note that "energy infrastructure", in the context of this report, refers to all energy infrastructure excluding oil & gas exploration and production (often referred to as E&P).

TASK FORCE ON CLIMATE-RELATED FINANCIAL DISCLOSURES (TCFD) RISK FRAMEWORK

Physical risks

Acute risk	Risks deiven by discrete extreme weather events such as hurricanes, floods, or heatwaves • E.g. in January 2019, Ausralia's hottest month on record, the state of New South Wales saw widespread driver disruptions as roads began to melt under an unprecedented 48°C heatwave
Chronic risk	Risks driven by longer-term shifts in climate patterns, such as temperature and sea levels rises • E.g. low-lying coastal airport operators are constructing new elevated terminals and perimeter protection walks to protect against rising sea levels going in 2100

Transition risks

Market risk	Unpredictable shifts in the inputs for infrastructure development (financial and non-financial) and changes in the quatity and nature of infrastructure demanded governments and users • E.g. investment bank USB estimates predict that passenger air traffic groowth could reduce by up to 1.75 percentage point between 2019 and 2025 due to "flight-shaming"
Policy risk	Policy or financial programs from governments relating to ebabling or reacting to the energy transition that will affect the competitiveness of infrastructure assets or longevity of their returns • E.g. subsidy policy shifts to renewable energy contributed to at least five solar-sector bankruptcies in China and Taiwan in 2019
Legal risk	Risks from climate-related litigation such as injury claims from physical loss events, failure to disclose climate risks, or unjust enrichment from or impairement of public trust resources • E.g. US$11 billion in settlements from 2018 North Bay and Camp Wildfires lawsuits and insurance claims led a major American utilities firm to bankruptcy in early 2019
Technology risk	New climate-related technologies could threaten to directly replace existing assets, indirectly endanger esership/revenue, or create opportunity costs in efficiency or new markets left un-accessed • E.g. the world's largest advanced indirect potable water reuse system in California, USA, serves as a new and potentially disruptive form of water infrastructure
Reputation risk	Risks from shareholders, government, consumers, or the public (e.g. through social organizations or grassroots movements) challenging corporations' or investor' social license to operate • E.g. over 100 banks and insurance companies worlwide have announced restrictions on or a complete exit from thermal coal financing, in part due to reputational risks

Source: Marsh & McLennan Advantage Insights, TCFD

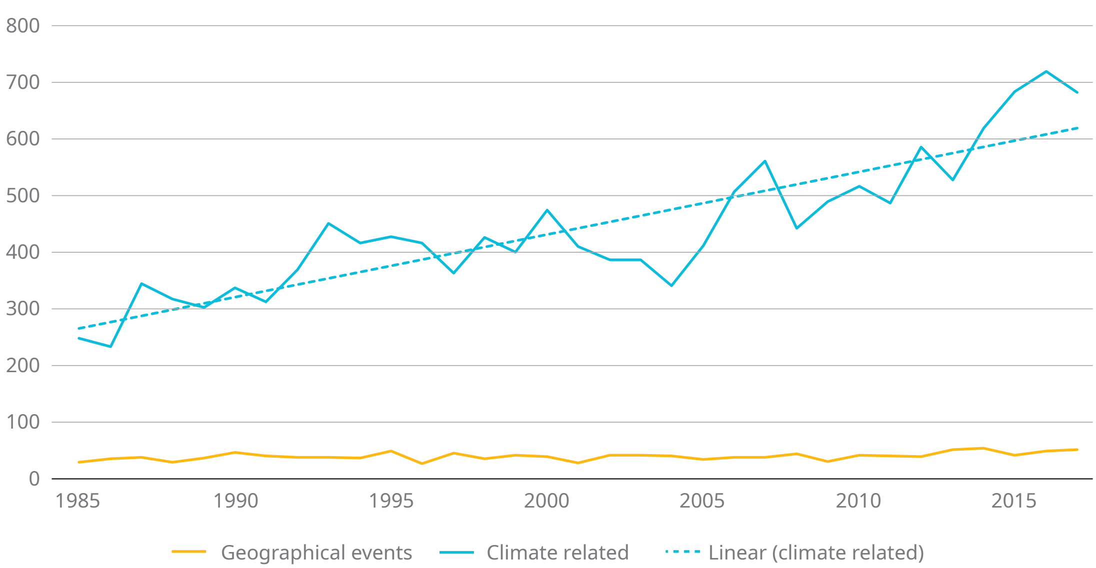
THE PHYSICAL RISKS

An analysis of global natural catastrophe losses over the last 30 years shows a dramatic rise in climate-related loss events, while geophysical natural catastrophe events have broadly remained within a consistent and limited range (see Exhibit 2). Studies have attributed the rising incidence of these events in part to rising global Greenhouse Gas (GHG) emissions, prompting business leaders to reevaluate both their contributions to climate change and their protections against it.

The economic damage wrought by these climate-related events is also severe and increasing. These losses are influenced in part by rising GHG emissions, as well as by rising urbanization rates heightening the concentration of populations and assets in high-risk areas (such as coastlines). In three decades, between 1980 and 2018, global damages from climate-related events increased by over 15 times (see Exhibit 3). Standard & Poor's estimates that 60% of entities represented in the S&P 500 Index hold assets that are at high risk of at least one type of climate-change physical risk.

The impacts of these risks could extend beyond individual assets and could have crippling effects on exposed corporations.

Exhibit 2. Natural catastrophe loss events worldwide



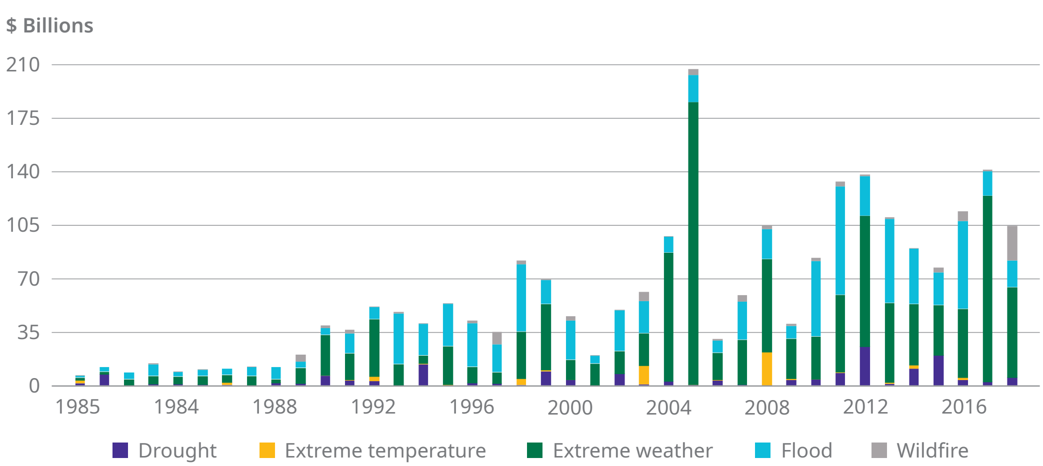
Source: Munich Re

This became abundantly clear at the beginning of 2019, when the American utility company PG&E filed for world's "first climate change bankruptcy" after being impacted by wildfires. Made worse by inadequate infrastructure, development in the wildland-urban interface and rising global temperatures, wildfires in California between 2017 and 2018 resulted in over US$30 billion in potential liabilities for PG&E and many deaths[1]. The rising prominence of these risks is prompting business leaders to reevaluate both their contributions to climate change and their protections against it.

Key to protecting against the physical risks of climate change is developing an understanding of the different physical risk types that can affect infrastructure assets. The TCFD's risk framework splits physical climate risks into two key risk categories: **acute** and **chronic**. Acute physical risks refer to those that are event-driven, i.e. caused by discrete incidents such as cyclones, hurricanes, floods, wildfires, or other extreme weather events. Conversely, chronic physical risks refer to longer-term shifts in climate patterns, such as sustained higher temperatures or sea level rises. In addition to the costs associated to their direct consequences, chronic physical risks have the potential to exacerbate the impacts of acute risks: sea level rise, as an example, is expected to amplify the losses caused by storm surges.

These risks can generate a wide variety of loss types to infrastructure owners and operators. Key among these loss types are: an asset being rendered unusable (temporarily or permanently) due to physical damage, reduced efficiency or output, and increased costs of maintenance. A sample (non-exhaustive) of key physical climate change risks and their direct impacts on a selection of infrastructure types is listed below (see Exhibit 4).

Exhibit 3. Economic losses from physical climate change risks



Source: EMDAT (2019): OFDA/CRED International Disaster Database, Université catholique de Louvain, Brussels, Belgium

1 For more information on wildfire risk and climate change see The Burning Issue: Managing Wildfire Risk

Exhibit 4. Selected risks and their direct impacts on infrastructure assets

	Chronic Risks*		Acute Risks			
	Sea level rise	Temperature rise	Drought**/ Heatwave	Storm/Flood		Wildfire
Energy	● Inundation of assets	● Coolant losses ● Hydropower output reduction ● Trans, & distr. efficiency loss ● Distr. network failure		● Network outages ● or failure	● Damage to assets	● Network outages ● or failure
Telecoms		● Coolant losses		● Network outages ● or failure		● Network outages ● or failure
Transport		● Melting/ buckling of roads/rail	● Melting/ buckling of roads/rail ● Water-based traffic disruptions	● Traffic disruptions		● Traffic disruptions
Water	● Inundation of assets ● Salinisation ● Increased water storage requirements	● Increased need for treatment ● Water source shortage		● Increased need for treatment ● Liabilities or fines for overflows		● Increased need for treatment ● Water source shortage

Impacts:

- ● Physical damage
- ● Efficiency/output loss
- ● Maintenance cost increase

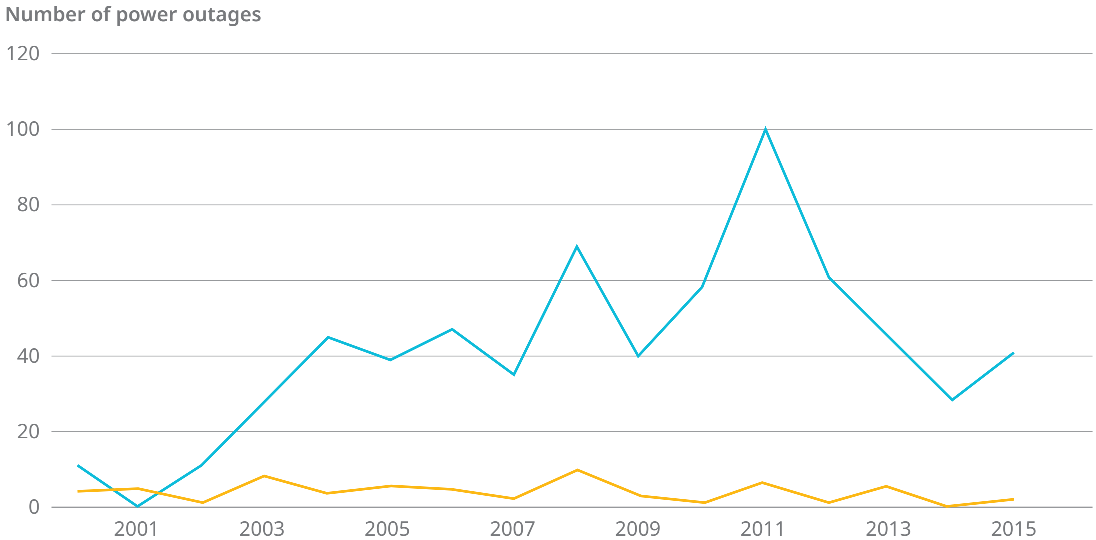
* In this table we focus on the direct impacts of each risk type, and therefore do not include the indirect effects chronic risks can have on acute risks

** Note that a drought can manifest as a chronic risk in the form of a multiple-season or multiple-year drought or a permanent change in water availability

Source: OECD, IFC, World Bank, Marsh & McLennan Advantage Insights

While the economic consequences of the trends in acute climate risks are already apparent, the impacts of chronic risks are progressively emerging and will become prominent in the medium to long term. Increasingly frequent and intense chronic weather events in the US such as extreme precipitation, hurricanes, excessive heat and others, have for example steadily increased the number of major power outages felt across the USA in recent years (see Exhibit 5).

Exhibit 5. Major power outages in the United States



Source: Purdue University, Major Power Outage Risk in the US
Note: Major power outages in USA refer to those with >50,000 customers affected

Because chronic risks often involve structural, creeping damages caused slowly over time, their damages are likely to undermine the underlying resale value of an asset altogether. Crucially, difficulties around chronic climate risk modelling mean that these risks often go underpriced or unmeasured at the point of their development — meaning that the potential losses from physical climate risk often go unincorporated into an infrastructure asset's initial contract.

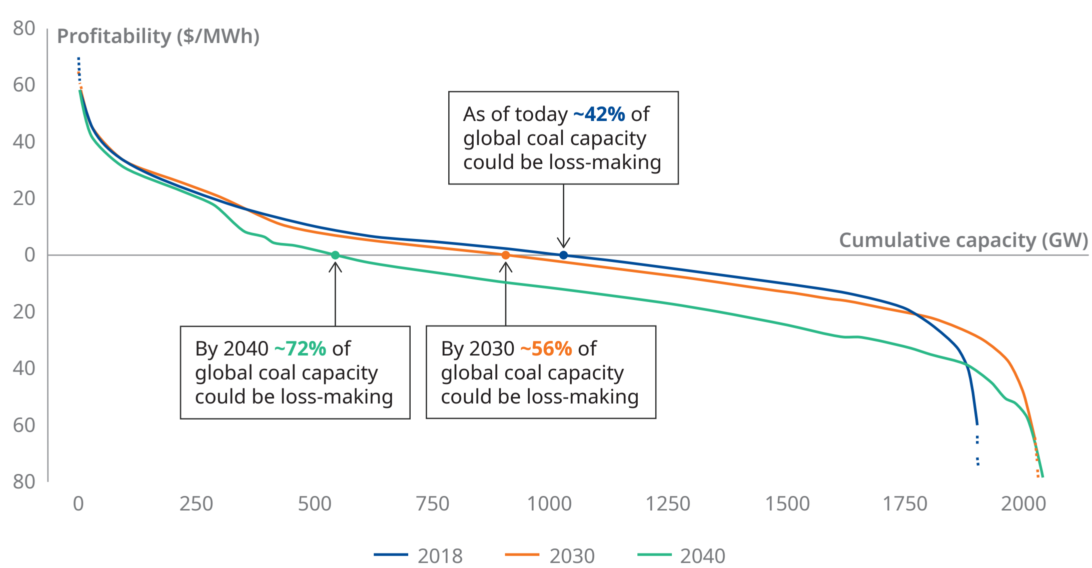
For example, when a major credit ratings agency wrote a sobering note in August 2019 on Miami's Rickenbacker Causeway, it warned that the asset was "exposed to extreme weather events in relation to rising sea levels and vulnerable to traffic and revenue disruptions." This warning came from the results of the agency's new environmental risk scoring system, which highlighted the high exposure of the asset to sea level rise. The overall debt rating for the causeway, however, remained unchanged. For now, this chronic long-term risk hasn't affected the asset's final risk rating — but was duly noted in the qualitative assessment of its risk exposures as a key concern.

A conscientious investor with an eye on the future may need to scratch below the surface of an asset's high-level debt rating to uncover long-term physical risks arising from climate change. Ultimately, incorporating long-term chronic risk exposure quantitatively into an asset's risk outlook and valuation will be crucial for mitigating physical climate change risks to investors.

THE TRANSITION RISKS

With physical risk losses continuing to mount pressures on society and corporations to embrace the low-carbon economy are rising. The world economy has begun to shift away from fossil fuel-based energy generation as a result, marking a historic transition toward energy sustainability. An ever-growing list of over 220 companies has committed to sourcing 100% of their energy from renewables through the RE100 initiative, and the European Union (EU)'s European Green Deal aims for member nations to reach net-zero greenhouse gas emissions by 2050. Carbon Tracker, a think tank, estimates that 42% of today's global coal capacity could already be loss-making, and projects that by 2040 this number could rise to 72% (see Exhibit 6). The low-carbon imperative has implications beyond the energy sector as well: in February 2020, plans for a third runway at London's Heathrow airport were ruled illegal on the basis of the Paris Agreement — the world's first major Paris Agreement-based ruling. The business case for low-carbon business and operations is growing rapidly, giving rise to new shifts and risks for investors across the infrastructure sector.

Exhibit 6. Global gross profitability curve of coal capacity existing and under



Source: Carbon Tracker analysis

Another — and more fundamental — implication of the low-carbon transition for the infrastructure sector is the pressure for economies to become "circular". Experts note that enabling a low-carbon transition will need to take place in concert with a transition to a "circular economy": the elimination of waste by the constant re-use and/or up-using of resources for as long as possible. According to the Global Circularity Gap Report, urban infrastructure consumes 40% of global resources annually, yet only 9% of global resources are recycled. As the low-carbon transition takes hold, pressure from governments and users on infrastructure providers' use of resources will rise across a project's life cycle — all the way from construction to maintenance. In the coming decades, infrastructure providers will likely find that circular business models will likely help keep maintenance costs low and guard against growing transition risks.

As a result, the TCFD has outlined that adapting to a lower-carbon economy will require corporations to build resilience against extensive transition risks, including: **policy, legal, technology, reputational and market** risks (see page 7 in introduction for descriptions of each risk), in tandem with preparing for physical risks. The European Green Deal, for example, introduces new policy and regulatory shifts relevant for infrastructure investors (such as emission limits, decarbonization goals, and a commitment to transitioning to a "circular economy"). The Deal also includes new funding sources and targets that could produce new market and technological risks for incumbent infrastructure players (see A Closer Look I). Infrastructure investors will need to be cognizant of the transition risks on the horizon that programs like the European Green Deal and other market forces could pose worldwide to remain future-ready.

A Closer Look

THE EUROPEAN GREEN DEAL

At the end of 2019, the European Union released a roadmap for a sustainable green transition for all member nations in the form of the European Green Deal. A progressive deal for its time, this deal could be seen as a benchmark for other governing bodies looking to legislate in favour of climate action.

The deal aims not only to achieve an ambitious target of net-zero greenhouse gas emissions by 2050, but to also invest in new research and technologies. Key infrastructure-relevant goals from the EU's Green Deal, and the Deal's planned funding sources includex*:

Goals	Government financing/support
• 90% reduction in transport emissions needed by 2050 to reach climate neutrality • 75% of inland freight carried by road will need to shift to rail and inland waterways • In 2021 a zero pollution action plan will be adopted for air, water and soil • Decarbonizing steel, chemicals and cement industries • Broad commitment to transitioning to a "circular economy" and significantly reducing waste	• Trans-European Energy Networks (TEN-E) regulation to be reviewed and used to deploy innovative green infra (e.g. smart grids, hydrogen networks) • European Investment Bank and European Union budget-supported loan facility to public sector for green investment projects • Horizon Europe programme to contribute funds, particularly to batteries and clean hydrogen

* For more on green investment in Europe, see Marsh & McLennan and the Climate Disclosure Project's Doubling Down — Europe's Low-Carbon Investment Opportunity

IMPACTS AND IMPLICATIONS

As physical climate risks and risks related to the low-carbon economy transition continue to evolve, they will ultimately exert two key pressures on the infrastructure sector: uncertainty and accountability (see Exhibit 7).

Uncertainty. Although infrastructure assets will remain long-term investments relatively insulated from the volatility of the business cycle and structured to adapt to trends in inflation, both physical and transition risks arising from climate change — such as new contracting models arising from the energy transition, or the increasing unpredictability and volatility around natural disasters — will introduce new uncertainties to the traditionally stable and reliable returns of the infrastructure asset class. These uncertainties could raise the cost of capital for new infrastructure projects and endanger long-term returns for existing assets.

Accountability. Consumers, employees and shareholders are also beginning to impose new pressures on infrastructure assets with high carbon footprints by reducing their usage or demanding supply-side shifts from investors and developers. Meanwhile, government

Exhibit 7. Examples of climate change pressures on the infrastructure sector

Source: Marsh & McLennan Advantage Insights regulation and policy are becoming increasingly climate-change conscious, creating new risk management and disclosure pressures. These risks could delay projects (e.g. by using Environmental Impact Assessments as grounds for contract renegotiation) or raise operating costs (e.g. by imposing higher-cost procurement requirements for developers).

These pressures are creating several key shifts in expectations across the primary stakeholders comprising the infrastructure sector: users, investors, and governments. Below is an overview of how these expectations are likely to evolve as the energy transition take takes hold (see Exhibit 8).

Exhibit 8. Traditional and evolving stakeholder expectations in the infrastructure sector

	Users	Investors	Government
Traditional	Infrastructure considered a government-provided public good Expectations anchored around price and quality	Long-term stable returns sought in immovable, large-scale and durable infrastructure assets Preferences tending toward brownfield assets Procurement contracts structured to focus on product acquisition and replacement Laser-focus on profit maximization with expectations of a profit-sustainability trade-off	Regulation focused on pricing and reigning in monopoly power Large portion of the funding burden shouldered by national governments
Evolving	Infrastructure also considered to include private contracting directly with infrastructure providers (e.g. through corporate PPAs) to enable green project development Infrastructure also considered to include prosumerism, increasingly bypassing governments and investors altogether Stronger climate-related data transparency expected from investors and governments Quality expectations increasingly anchored around minimizing environmental damage/emissions, and physical climate risk resilience	Long-term stable returns also sought in smaller scale, movable and durable infrastructure assets Preference shift toward greenfield renewables Procurement contracts structured to accommodate circular economy principles (e.g. service rental; upcycling and re-use) Expectation of profit-sustainability synergies Easier access to knowledge-, information- and network-sharing platforms from governments	Regulation increasingly focused on climate change mitigation and adaptation Greater support from the private sector, shift towards public-private partnerships (PPP) in green projects Subnational governments (particularly at themunicipal level) rising in importance in green infrastructure commissioning and planning Compliance with tightened disclosure and reporting standards Compliance with heightened requirements for Environmental Impact Assessments (EIAs)

Source: Marsh & McLennan Advantage Insights

Each of the physical and transition risks outlined by the TCFD are likely to impact some infrastructure sectors to a greater extent than others. Below is Marsh & McLennan's expert assessment of the extent to which certain sectors are exposed to key climate-change risks as identified by the TCFD (see Exhibit 9[1]).

This analysis shows clearly that the energy sector will by far be the most exposed to climate change-driven risks. We will therefore scrutinize this sector in more detail. In particular, we see two key dynamics that will emerge as a result of physical and transition risks in the **energy sector**: the emergence of stranded assets, and the rise of policy shifts in public-sector support mechanisms for renewables. In the sections below, we take a closer look at these two dynamics and the interconnected impacts they will have on investors.

Exhibit 9. The infrastructure sector's climate risk exposure

	Physical Risks		Transition Risks				
	Acute	Chronic	Policy	Legal	Technology	Market	Reputational
Energy (excl. renewables)	High	High	High	High	High	High	High
Renewable Energy	High	High	Medium	Medium	Low	Medium	Low
Water	High	Medium	High	High	Medium	Low	High
Transport	High	High	High	Low	Low	High	Low
Telecom	Medium	High	Medium	Low	Low	Medium	Low

High exposure · Medium exposure · Low exposure

Source: Marsh & McLennan Companies' Expert Contributions

1 Note: this table is based on the example of assets based in United States of America; the risk levels represented by each colour reflect risk levels relative to each other and reflect *exposure levels* rather scenario projections

THE INTERCONNECTIVITY OF CLIMATE CHANGE RISKS

Two key examples

ENERGY RISKS I. THE CHANGING LANDSCAPE OF GOVERNMENT SUPPORT FOR RENEWABLE ENERGY

The renewable energy sector has experienced rapid and steady growth for almost two decades. Renewable energy capacity expanded by 40% between 2000 and 2008, and even more rapidly between 2008 and 2016 at 90%. The International Energy Agency (IEA) has had to revise its solar PV and wind capacity projections upward every year since 2006 after repeatedly underestimating the sector's growth, and today, approximately 20% of the world's total final energy consumption (TFEC) comes from renewable energy sources. The prices of solar, wind, and bioenergy have also fallen precipitously, and in many major energy markets have managed to compete with fossil fuel prices over certain periods. Carbon Tracker estimates that all of today's coal capacity in the US, EU, Japan, China and India (those currently operating and those under construction) will have higher long-run operating costs than renewables by 2030.

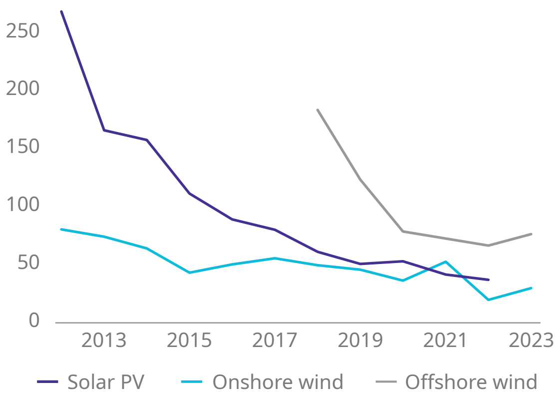
However, a major enabler of these strides in renewable energy is now entering a period of uncertainty: public-sector financial support (often referred to more broadly as "subsidies"). Government support for renewable energy takes a variety of forms around the world, from tax breaks, to Feed-in-Tariffs (FiTs), to certificate programs (such as the Renewable Portfolio Standards program in the US, or the Contracts for Difference program in the UK). These programs offer financial relief and risk protection to renewable energy developers and investors seeking reliable returns in a new and unpredictable industry. Many of these programs have the potential to expire, be reduced or phased out altogether in time in mature renewable energy markets (see Exhibit 10[1], page 18).

This major **policy risk** has its roots in key **technology** and **market risks**. Technological innovations such as the conversion efficiency of solar PV, improvements in wind turbine sizes and lithium-ion batteries for energy storage, as well as the unexpected rush of new projects and competition in recent years, have resulted in major shifts in the dynamics of the renewable energy market: renewable energy prices have plummeted and governments around the world have underestimated their subsidy obligations. With the "market price" of renewable energy being driven down

1 Note that "set competitively" denotes that prices are set without Feed-in-Tariffs or other government support mechanisms

Exhibit 10. The changing landscape of public-sector financial support for renewable energy

Average global auction prices across sectors
USD/MWh, by project commission date[1], 2012–2023



2012–17

21%
of renewables capacity emuneration set competitively

2018–23

59%
will be set competitively

Support mechanism trends in selected markets
70% of global installed renewables capacity (2018)

EUROPEAN UNION

UK. Solar PV and onshore wind projects rendered ineligible for the Contracts-for-Difference scheme between 2015-2020

Germany. Feed-in-Tariff (FiT) program expected to begin expiring in 2021

USA

Several grants under the post-GFC American Recovery and Reinvestment Act (ARRA) of 2009 have expired since 2016

Investment Tax Credit (ITC) to be reduced steadily until 2022; Production Tax Credit (PTC) to be phased out starting in 2021

China

Government subsidies for renewable energy will be cut by 30% in 2020

Subsidies for utility-scale solar, new offshore wind power and new concentrated solar power (CSP) will be eliminated by 2021

Japan

Japan's Ministry of Economy, Trade and Industry (METI) has already initiated move away from FiTs toward competitive auctions

India

FiTs for wind power terminated in 2017

Auctions increasingly favoured over FiTs for wind and solar energy

1. Future-dated prices denote that auctions have taken place for capacity to be commissioned in these future years. Note that auction prices sometimes track below global average LCOEs, due to auction prices omitting some costs, developers bidding aggressively to gain market share, and auctions to date occurring in places with exceptional resources and low financing costs

Source: Marsh & McLennan Advantage Insights, IEA

the gap between this price and the level of government support has widened, rendering some government support mechanisms overburdened, seemingly obsolete, or both.

As a result, after years of government support mechanisms like Feed-in-Tariffs setting the remuneration rate for renewable power, many governments are now turning to competitive auctions to take advantage of the rush of new projects. Between 2018-2023, the IEA projects that almost 60% of renewable energy project remuneration will be set competitively (see Exhibit 9). Auction-based pricing has eroded pricing power for investors and developers, driving down market prices as new players continue to enter the market.

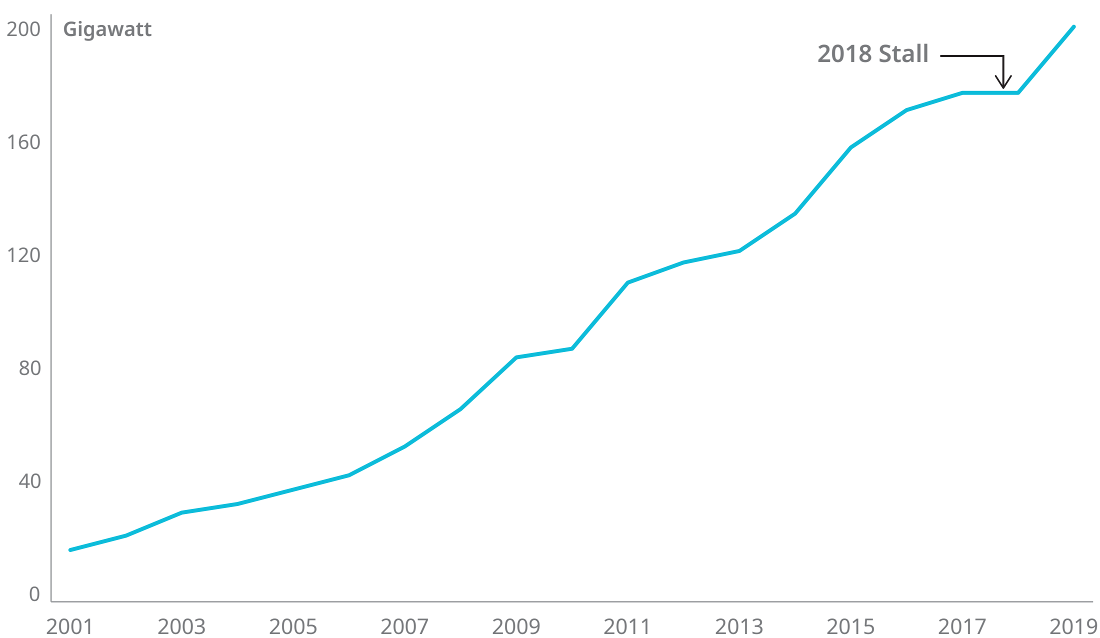
These shifts in the policy landscape around renewables contributed to the recent bull run in renewables capacity growth — an otherwise steady trend for the last 18 years — stalling in 2018 (see Exhibit 11). This occurred in large part because subsidy regimes around the world help shield renewable energy providers from the significant risks associated with the "intermittency" of renewable energy generation: the variability in the power produced from renewable energy infrastructure due to the ever-changing nature of their sources (e.g. because of shifting cloud cover or wind flows).

With shifts in renewable energy subsidy policy transferring intermittency risks from governments to renewable energy providers, investors became jittery about signing onto new renewable energy projects in 2018.

Many of these jitters subsided in 2019. When the market responded badly to sudden financial support removals, several governments introduced alternative measures to support renewable infrastructure development, calming investors. For example, by 2016, large-scale solar and onshore wind projects were officially blocked from the UK's Renewables Obligation (RO) program and the Contracts for Difference (CfD) program. This severely limited government support for key green technologies, and slowed growth in the UK's renewables capacity. By 2018, the country was seeing its lowest renewables capacity growth since 2002. In a dramatic policy shift, in early 2020 the UK government announced that utility-scale solar, onshore wind and some offshore wind projects would likely have a path to being included once again in the CfD program by 2021 — opening up the industry once again to this crucial form of financial support from the government. In the EU, the European Green Deal also promises to support green infrastructure with substantial grants and start-up funding, as well as targeted loan facilities and investments from the European Investment Bank. In the United States, a Production Tax Credit (sometimes referred to as the "Wind PTC") that was expected to expire in 2020 was also renewed for an additional year.

However, renewed financial support mechanisms may not perfectly resemble their predecessors, and are unlikely to remain unchanged in perpetuity. As renewable energy becomes increasingly affordable and supported by new innovations, governments could return to seeking subsidy-free renewables in the long term. Investors therefore will still need to be alert to two key project-stalling implications that could arise in the post-subsidy market for renewables in the future: the rise of unfavourable contracting terms, and price cannibalization.

Exhibit 11. Global renewable net capacity additions, 2001-2019

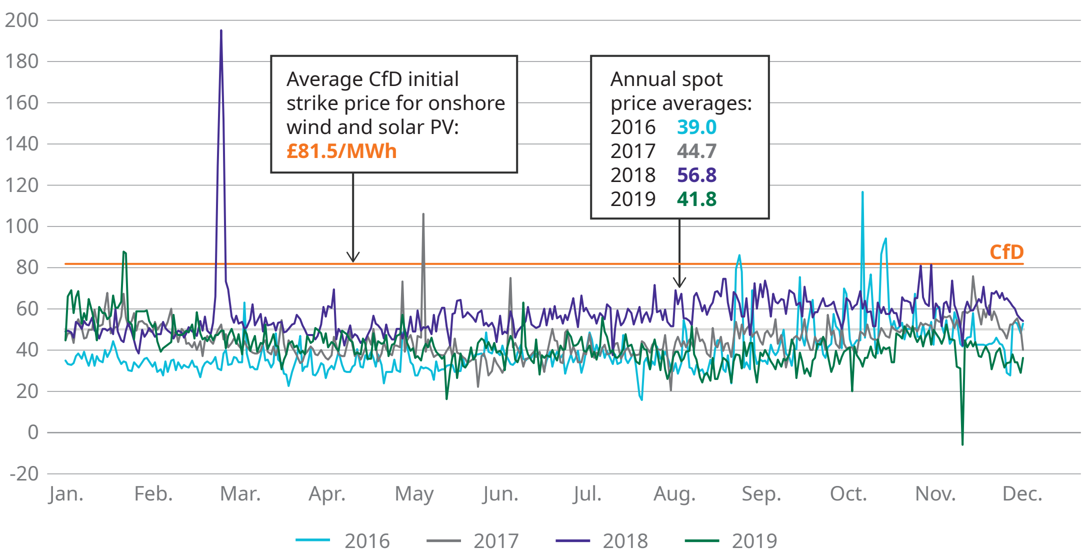


Source: International Energy Agency (IEA)

Contracting. In the absence of financial guarantees from the public sector, intermittency issues and the lack of contracting standardization in the nascent renewable energy industry leaves investors and developers particularly susceptible to being forced to accept unfavourable contracting terms from their buyers. As mentioned earlier in this report, by 2016 the UK government was blocking new onshore wind and solar PV projects from benefiting from the Contracts for Difference (CfD) program: a program allowing project developers to benefit from a fixed CfD strike price[2]. Without the CfD program acting as a price stabilizer for the market, new project developers found themselves being forced to accept shorter duration Power Purchase Agreements (PPAs) — and often with a discount on the market spot price. Buyers were able to demand this discount in exchange for providing generators with a fixed price, and on the basis of the intermittency and unpredictability of the renewable energy output. Wind and solar PPAs in 2019 saw discounts of over 10% against the 2019 average spot price in some cases (see Exhibit 12), and developers typically found it difficult to secure contracts for longer than 3 years. Project bankability was therefore endangered due to a lack of buyers offering attractive structures or prices without sufficient public sector protection, resulting in a serious slowdown in the UK's renewable energy capacity growth.

Exhibit 12. Daily average spot price vs. CfD strike price in the United Kingdom

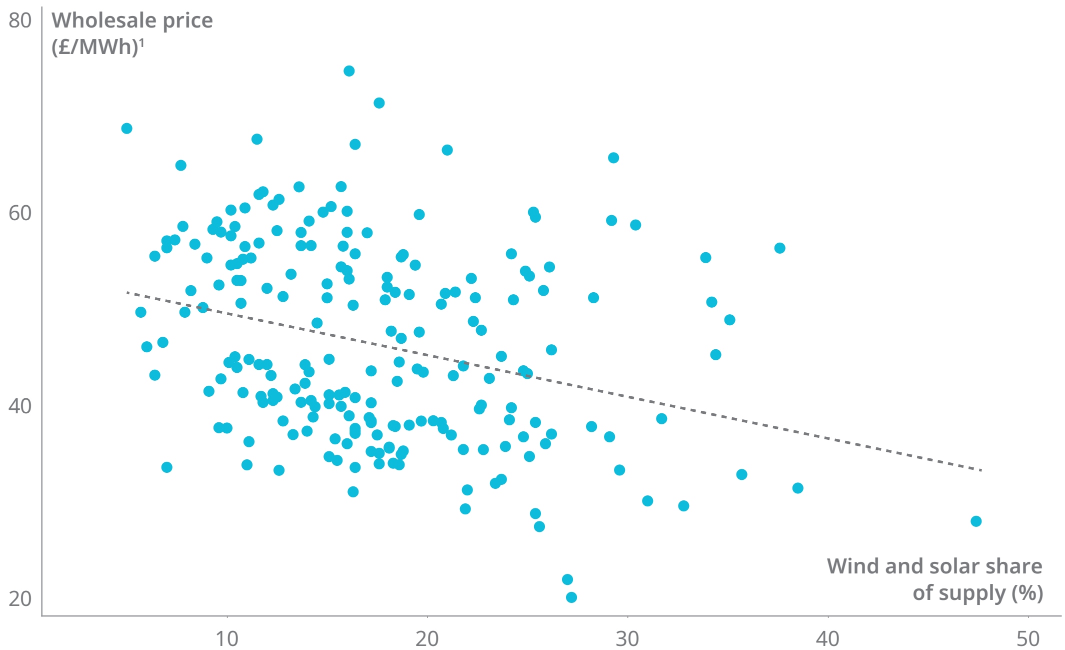
2016–19, £/MWh1



1 Daily average of APX reference spot price vs average initial CfD strike price for live onshore wind/solar PV projects (18 sites, ~700 MW capacity)
Source: Bloomberg/APX; BEIS; Expert interviews; Smartest Energy; Oliver Wyman analysis

2 The CfD guarantees the generator that it will receive the CfD "strike price" for its power output. If the CfD "reference price" is lower than the CfD strike price, the generator receives a top-up payment equal to the difference between the strike price and the reference price. If the reference price is higher than the strike price, the generator pays the difference to the CfD counterparty for each unit of output

Exhibit 13. Summer relationship between price and renewables output in the United Kingdom (2017, 2018, 2019)



1 Daily average of EPEX SPOT half-hourly reference price and wind/solar share of output for June, July and August in 2017/18 and June 2019
Source: Bloomberg/EPEX SPOT, Exelon/Gridwatch, Oliver Wyman analysis

Price cannibalization. Intermittency issues also exacerbate the risk of price "cannibalization", where surges in output cause wholesale electricity prices to fall dramatically into ultra-low or even negative price ranges. This dynamic is likely to give rise to a longer-term trend: the intermittency of these technologies means that as more renewable energies come online, the combined effect of their intermittency could bring down the wholesale price of electricity overall (Exhibit 13). This trend has already been observed across several major renewable energy markets in Europe: in the UK power market, for example, during the summer period (a period of historically lower demand) the wholesale price of electricity fell significantly overall during periods where high volumes of wind and solar power supply came online. Without subsidy protection, renewable energy projects will have to bear the full costs of these price declines and future projects could be rendered unbankable[3].

Although these obstacles are widely expected to be addressed by the development of new technologies — particularly lithium-ion battery and hydrogen fuel cell technologies that can store renewable energy output and mitigate intermittency, as well as smart or digitized grid systems that can control renewable energy's entry into the grid — these technologies have yet to reach market-scale maturity (see Case Boxes 2 and 5 below for more information on these new innovations and their benefits). The renewable energy industry will therefore still need to lean on financial support mechanisms from governments in the interim.

3 The removal of subsidies could mitigate the risk of price cannibalization as well (as subsidy collectors will no longer be incentivized to continue producing renewable energy during low or negative pricing periods), but only to a limited extent

Case Study I

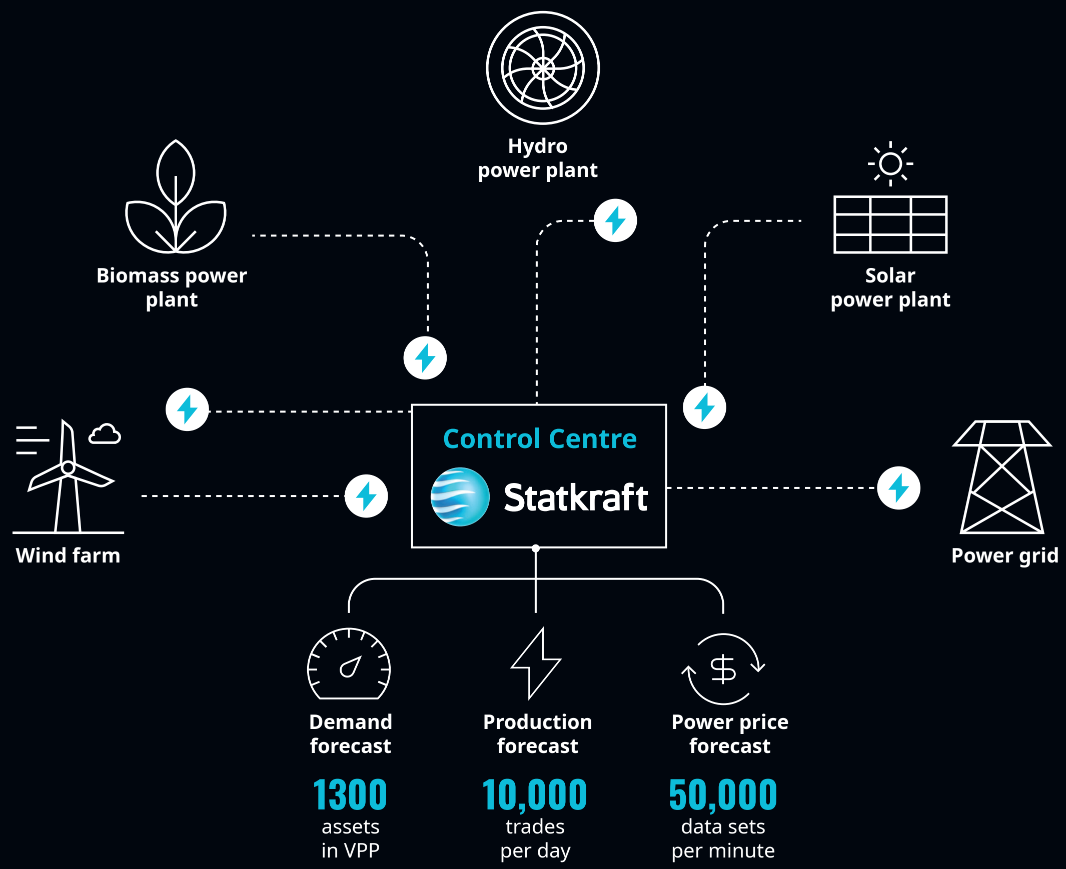
PPAS AND VIRTUAL POWER PLANTS

The flexibility offered by direct corporate PPAs could open renewable energy investors up to unfavorable contracting terms, including discounted rates and short contract lengths, due to the intermittency of renewable energy output and prices. However, innovative uses of PPAs can provide developers and investors some relief.

The Statkraft "smart-grid"-like model offers a new method of using flexibility to control renewable energy output. Statkraft's virtual power plant system is inter-networked with a diverse array of virtual renewable energy stations, which all receive a steady stream of three key data points from the Statkraft central control centre: a generation forecast, current electricity production, and market prices. When there is excess supply of electricity, generation units can throttle production accordingly. Having multiple and flexible renewable energy assets operating in unison allows the generation units networked into the Statkraft system to adjust their output in accordance with market dynamics to optimize power trading and provision.

By signing onto a PPA with Statkraft, renewable energy providers can therefore introduce a crucial middleman between them and their buyers, mitigating the pricing risks associated with the intermittency of their output. For example, faced with the transition from feed-in-tariffs to direct marketing in the renewable energy market in France, a French renewables developer decided to sign two three-year PPAs with Statkraft in late 2018. Under the terms of the agreement, new wind farms will be developed and operated by the developer, while Statkraft will integrate these installations into its balancing group and control them remotely to ensure the automatic downregulation of production during periods of negative pricing.

Exhibit 14. Stratkat's virtual power plant system



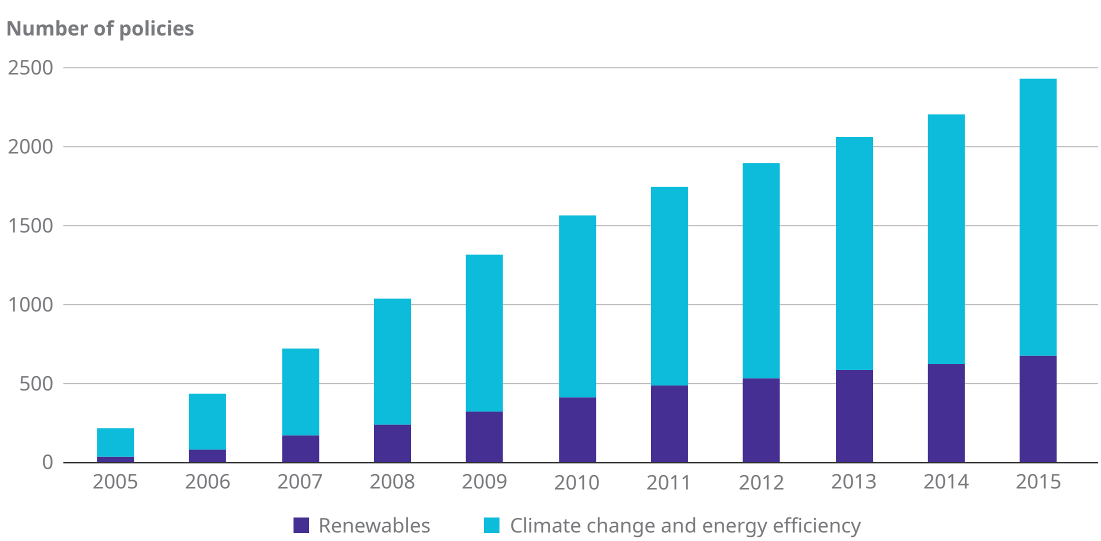
ENERGY RISKS II. THE PROSPECT OF WIDESPREAD STRANDED ASSETS

The transition to a global low-carbon economy poses serious "stranded assets" risks to infrastructure investors: the possibility that a portion of existing assets tied to long-term financial agreements may lose economic value well ahead of their anticipated useful lives. Major infrastructure assets with exposure to this risk will include fossil fuel and gas plants or pipelines, as well as transport infrastructure for fossil fuels or for gas (such as import terminals or railways).

Stranded assets represent a major **market risk**, one that has been exacerbated by a confluence of key government **policy** initiatives, **technological** innovations and **reputational** risks. In 2015, almost 1,800 climate change and energy efficiency policies were implemented globally — 10 times that of 2005 (see Exhibit 15). These policy drives have intensified stranded asset risks by supporting renewable energy innovation and helping the technology become price-competitive against traditional energy sources. The rise of climate-consciousness has also raised the specter of reputational risks for companies with exposure to high-emissions infrastructure. Reputational damage erodes at companies' social license to operate, quickening the obsolescence of their assets as governments, consumers and shareholders either drive up their costs or shut their wallets in response.

According to the International Renewable Energy Agency (IRENA), the value of stranded assets globally could amount to up to US$19.5 trillion by 2050 (approximately 22% of global GDP in 2020) if crucial policy action is delayed. These costs could halve to US$11.8 trillion if policy action is taken today, accelerating renewable and energy efficiency deployment promptly between 2016 and 2050 (which IRENA refers to as the "REmap" scenario).

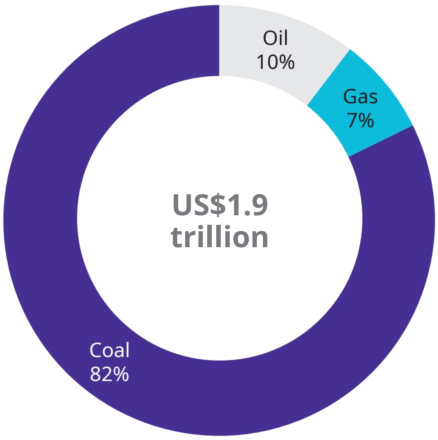
Exhibit 15. Growth in global green policies



Source: International Energy Agency (IEA)

Coal-fired power generation. Central to the problem of stranded assets risk is the exposure of power generation assets. IRENA estimates that under its "Remap" scenario, approximately US$700 billion in power asset value will be lost by 2050 to stranding — 82% of which will be in coal assets (see Exhibit 16). The business community has already begun to respond to this threat in much of the developed world: the US has not built a single major coal-fired plant since 2015 and has begun to see widespread closures of existing plants, resulting in a dramatic 20% decline in the nation's coal capacity in the last decade[4]. Similar trends in the EU have also seen the region's coal capacity decline by approximately 20% in the same period. The Institute for Energy Economics and Financial Analysis (IEEFA) has pointed out that although coal capacity is increasing at a global level, it grew at its slowest rate since 2000 in the year 2018 and utilization rates of existing capacity are steadily declining. Continued investments in coal-fired power generation will be at high risk of early closures and obsolescence in the coming decades.

Exhibit 16. Stranded power generation assets by fuel type



Source: International Renewable Energy Agency (IRENA)

4 Note that in April 2019, a small 17MW plant opened to supply power to the University of Alaska Fairbanks campus

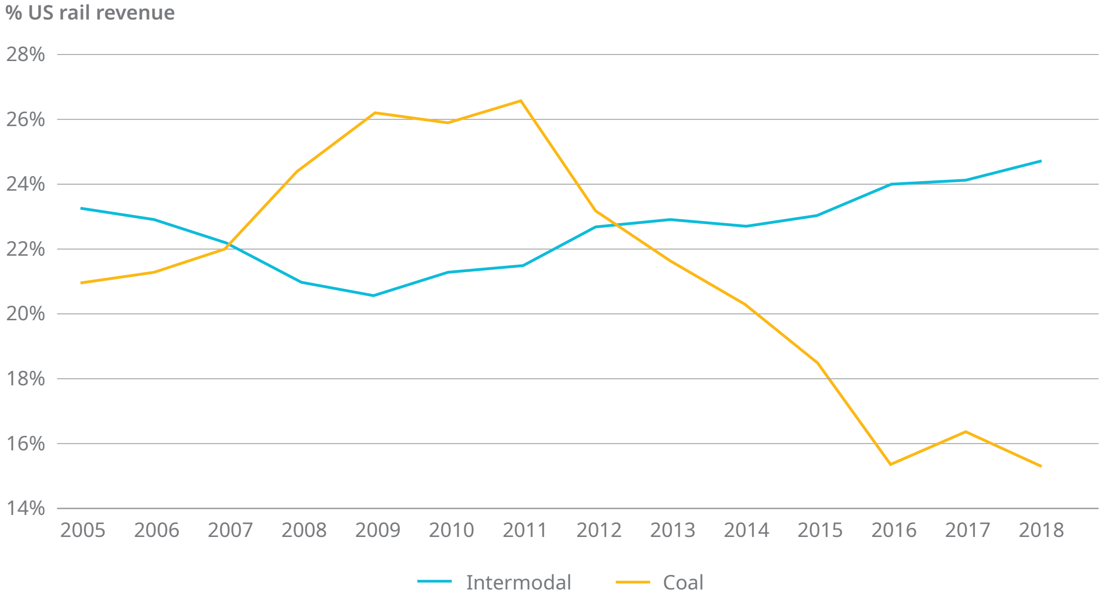
A Closer Look

TRANSITIONING AWAY FROM COAL

PacifiCorp, a major six-state-wide utility company in the United States, released a plan in late 2019 announcing its pivot away from coal-fired energy generation toward renewable energy. The corporation plans to close 20 of its 24 coal units by 2038, five of which will close between 4-14 years ahead of schedule. Despite being faced with political pressure to sell rather than retire some of its plants, PacifiCorp insisted that the economic case for keeping coal-fired power units simply wasn't there. The company has indicated that it would be unlikely that any buyer would be able to profitably take the assets over.

Fossil fuel transport infrastructure. A key corollary to the stranding of power generation assets is that transportation infrastructure for traditional fuels, such as railways or import terminals dedicated to coal or oil, also stands to be stranded. As the consumption of coal has declined in the US, coal — once the primary driver of railroad revenues — has now shrunk dramatically as a percentage of total US rail revenue (see Exhibit 17). A 2019 report from Moody's warns that American railroads could face US$5 billion in losses over the next decade due to the decline in the coal sector. Ensuring revenue buffers from other goods (such as intermodal freight), as well as including protective clauses against stranded asset risk in new project contracts will be crucial for the coming decades as the energy transition continues to charge ahead

Exhibit 17. Coal vs. intermodal as a percentage of United States rail revenue



Source: The Association of American Railroads
Note: "Intermodal" refers to containers and trailers loaded with a wide variety of different products being carried by more than one mode of carrier (e.g. trains and trucks), excluding coal

A Closer Look

STRANDED TRANSPORT ASSETS IN AUSTRALIA

As Australia and its trading partners transition away from fossil fuels to green energy, owners of thermal coal transportation infrastructure — particularly rail lines and ports — stand to lose billions in revenue or write-downs as demand for thermal coal transportation dwindles. In response, these firms are already trying to get ahead of the stranded asset risks they face in Australia through public sector compensation. Some of the country's largest rail freight and port managers have submitted claims to Australian state governments explicitly requesting compensation for "stranded assets" risks (for example, through pricing re-evaluations).

Case Study II

USING GREEN HYDROGEN FUEL TO COMBAT INTERMITTENCY AND STRANDED ASSET RISK

Hydrogen offers the energy industry a potentially game-changing form of energy storage. Electricity produced from renewable energy can be used to produce hydrogen through electrolysis (the splitting of water into hydrogen and oxygen using electricity). The resulting hydrogen can act as a store of electricity, and eventually be re-electrolyzed for later use through a fuel cell. Hydrogen fuel cells are a (currently nascent) zero-emissions[5] source of energy that can undergo an electrochemical process (instead of a combustion process), to produce electricity with only heat and water as by-products.

Combating intermittency risks. This has important implications for intermittency risks. Boasting the largest energy content of any fuel, hydrogen can serve as a powerful form of energy storage for renewable energy infrastructure. Energy storage for renewables can provide wholesalers with desperately-needed control over the contributions renewable energy makes to the grid, and can mitigate the industry's intermittency problems.

Hydrogen as a storage solution has already made modest inroads in parts of Europe. In Germany, hydrogen produced using wind power was injected into the country's natural gas grid for the first time on an industrial scale in 2013. The initiative was led by private energy companies, and culminated in a Power-to-Gas (P2G) facility in Falkenhagen in eastern Germany with a capacity of 2 MW. In 2019, Germany announced Westküste 100: an ambitious project with nine corporate partners and close to €100m of government funding. The project aims to build a 700MW green hydrogen plant powered by a dedicated offshore wind farm, first to produce carbon neutral aviation fuel by 2030, and to subsequently provide energy to the grid. This project has been lauded for creating an opportunity for German wind farms to use their excess energy — 40% of which was wasted in 2018 due to intermittency and grid constraints.

Combating stranded asset risks. The commercialization of hydrogen gas could also offer a solution to the stranded asset risks facing natural gas infrastructure. The rising uptake of hydrogen as a fuel source means that transportation networks and infrastructure will be required, including the development of pipelines. Experts have noted that some natural gas pipelines could in fact be converted to carry either a blend of natural gas and hydrogen, or hydrogen exclusively.

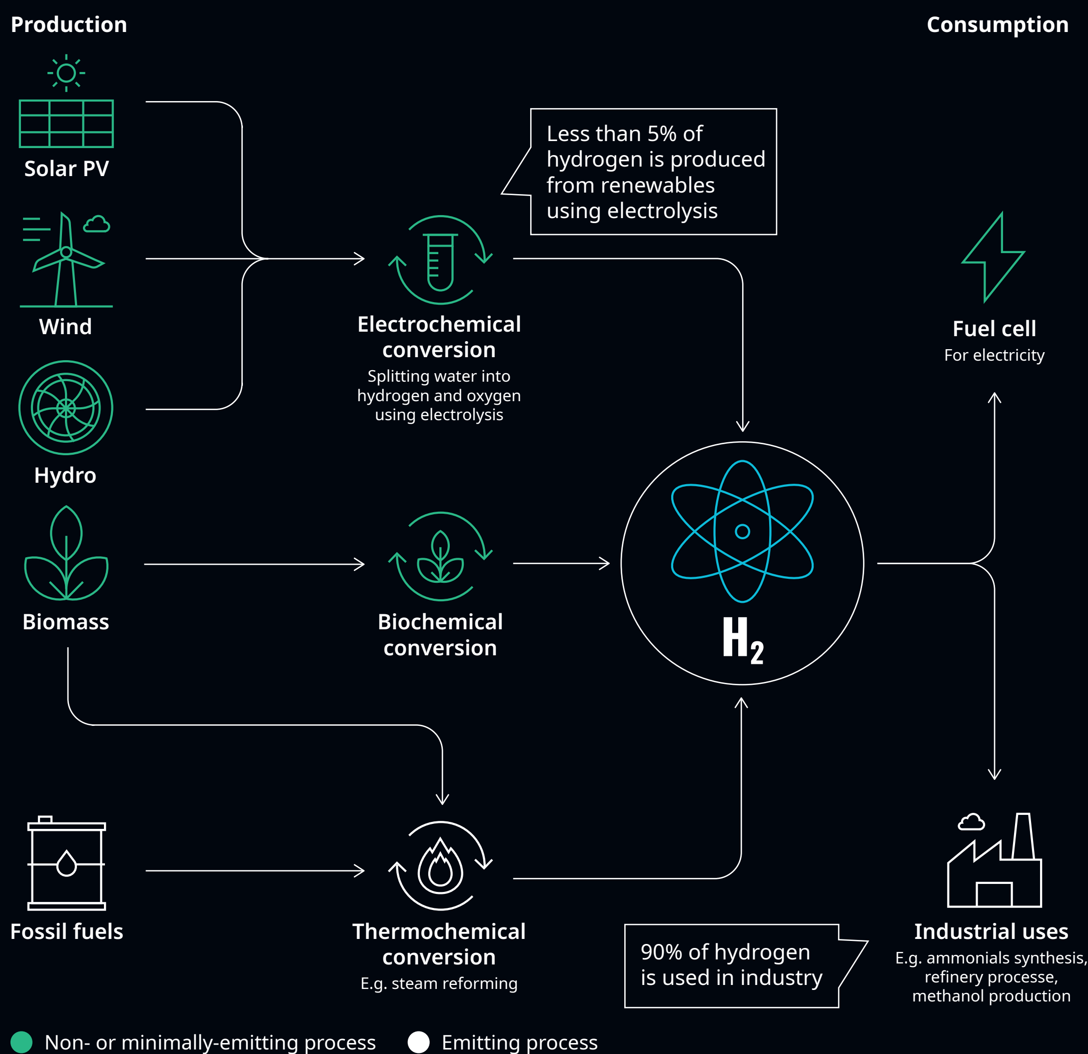
The H21 program in the UK, for example, is working with £9 million in funding from Ofgem (Great Britain's regulator for gas and energy markets) to research and develop solutions for repurposing natural gas infrastructure for hydrogen fuel. The "H21 North of England" subsection of the H21 project aims to convert 3.7 million UK homes and businesses from natural gas to hydrogen, making it one of the world's largest clean energy project. In 2018 they released a report confirming the concept's feasibility, and further tests are currently underway. This kind of program could be instrumental in addressing the prospect of the "pipeline bubble" facing the natural gas infrastructure industry.

This solution is, however, a nascent one. Currently, less than 5% of all hydrogen is "green", that is, produced from renewable energy. This is in part because green hydrogen is far more expensive to produce than "grey" or "blue" hydrogen (hydrogen produced as a by-product from fossil fuels or from carbon capture, utilization and storage, i.e. CCUS, respectively). The IEA estimates that grey hydrogen, the cheapest of the three, is priced at €1.50 per kilo while green hydrogen is estimated to be priced between €3.50 and €5 per kilo (as of January 2020). Although the conversion of blue and grey hydrogen to electricity is also non-emitting, the production of hydrogen through high-emissions processes will pose a significant obstacle to reducing global emissions. Secondly, network infrastructure is currently limited for the commercialization of hydrogen fuel. Only 1,600 miles of pipeline in the United States are fit for hydrogen use (compared to 3 million miles of natural gas pipeline).

Nevertheless, technological innovation and both government and private-funded research is underway to spur the widespread commercialization of green hydrogen. IRENA has noted that clean hydrogen is enjoying "unprecedented political and business momentum", and the IEA has predicted that hydrogen generated from wind will be cheaper than natural gas by 2030.

3 Zero Co2 is emitted in the conversion of any type of hydrogen (green, blue or grey) to electricity.

Exhibit 18. Selected modes of production and consumption of hydrogen

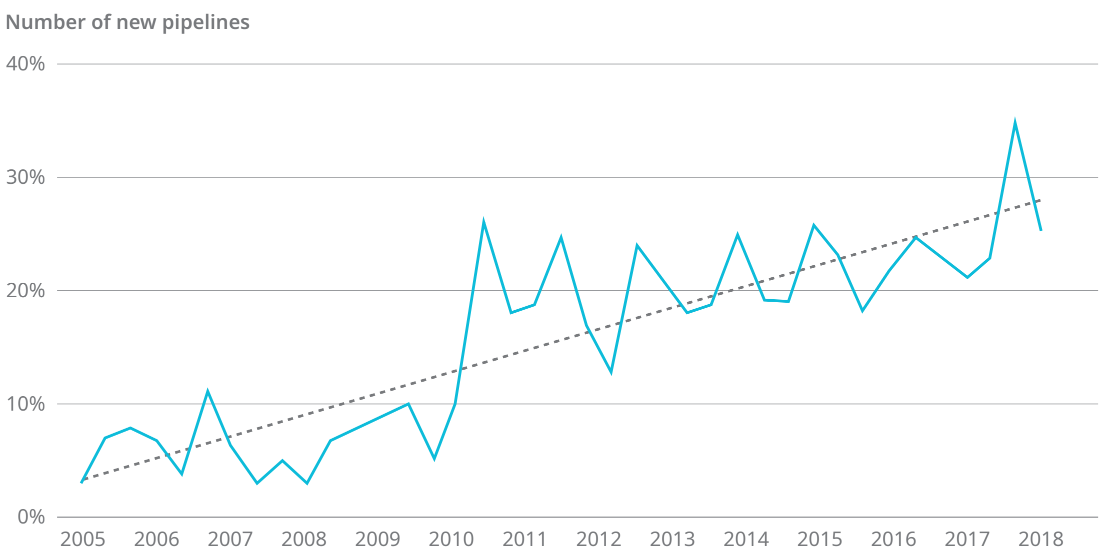


Source: Global Fossil Infrastructur4e Tracker, 2019

Natural gas networks. However, coal will not be the only sector at high risk of stranding. In the longer term, it will additionally be crucial to protect against gas-fired power plant- and gas pipeline-stranding risks. Gas has long been referred to as an important "transition-fuel" due to its low emissions factor relative to coal and oil, as well as its ease of distribution in emerging markets. Unfortunately, climate scientists have widely noted that reliance on natural gas will prevent many nations from meeting their Paris Agreement targets and will contribute to life-threatening levels of climate change. Furthermore, recent evidence of methane leakages in the gas value chain and concerns around the environmental impacts of fracking have further called into question the role of gas in the low-carbon transition.

The IPCC, an intergovernmental body of climate scientists, has called for a 43% reduction in gas use between 2020 and 2050. However, the global system added an average of 25 new pipelines a year from 2009-2018 (up from 7 a year between 1980 to 1995) — creating what some have begun to call a "pipeline bubble" (see Exhibit 19), susceptible in the future to the losses the coal sector is seeing today. The conundrum of the natural gas pipeline bubble could be addressed by the rise of green hydrogen: a new technology that could facilitate the conversion of stranded natural gas infrastructure to hydrogen gas infrastructure. This phenomenon is in its nascent stages, and investors would do well to watch it closely (see Case Study II for more).

Exhibit 19. New pipelines per year



Source: Hydrogen Europe, European Union, Marsh & McLennan Advantage Insights Analysis

KEY ACTIONS FOR MINIMIZING CLIMATE RISKS

Infrastructure investors will need to consider a range of potential strategies for addressing the physical and transition risks associated with climate change. Selecting and honing the correct strategies will require a keen understanding of each investment house's particular contexts and motivations.

To this end, this report offers a series of questions Infrastructure Investors can use to sense-check their internal thinking and processes. Asking these questions will ensure that climate risk is appropriately integrated into infrastructure investors' decision-making in a context-specific manner. This section draws from Mercer's Responsible Investment Pathway, which provides investors with a guide to designing a climate-resilient investment approach, as well as from Oliver Wyman's leading thinking on risk appetite measurement in an environment of increasing transition and physical climate risks. These questions will guide Infrastructure Investors in first rethinking their overall investment strategies based on today's climate risks, and then in redesigning their approach to infrastructure investing accordingly.

RE-EVALUATING YOUR INVESTMENT STRATEGY

As Mercer's Responsible Investment Pathway outlines, a responsible investment strategy involves four key steps: outlining your firm's beliefs, policies, processes and portfolio. Key questions as part of each step below:

Beliefs

- Is climate change a key consideration in guiding my firm's investment strategy in infrastructure?
  - Were climate change risks considered fully in the development of my mission statement?
  - Does my organization acknowledge the significance of climate change in being a determinant of investment performance or a key consideration in risk management?
  - Has my organization expressed support or become a signatory of a major climate change-related initiative (such as the Equator Principles, the TCFD, or the PRI)? Do these include at least one industry benchmarking initiative and one disclosure initiative?

Policies and Processes

- **Data collection and analysis.** Do I have a diverse and innovative array of data sources and analysis tools for processing physical and transition climate-risk data?
- **Investment policies and processes.** Do I have a standardized framework or process in place to align my investment strategy with my climate resilience policies and my risk appetite?
- **Capabilities management.** Have I targeted manager hires and strategically acquired or partnered with the necessary specialists to enhance my climate risk resilience?

Portfolio

- Is there explicit coverage of climate-related risks in the **risk appetite** statement or investment policy of my firm?
- Where reasonable and practical, have I built TCFD-based metrics and thresholds into my overall **risk appetite** statement? [see A Closer Look 5, page 32]

RESPONDING TO PHYSICAL AND TRANSITION RISKS

Risk Assessment

- What is my risk **Exposure** within each asset sector, geography, time horizon, emissions scenario and risk type?
  - What risk exposure do scenario modelling and stress testing tools tell me my portfolio/assets have to physical and transition climate risks? [see A Closer Look, page 32]
  - Could any of these risks interact to create resonance effects and strategic concentration risks (i.e. amplify risks)?
- What are the **Gaps** between my levels of risk exposure and my predefined risk appetite?
- Given the climate change risk assessment results, **do I want to invest** in infrastructure? If so, **how**?
  - Through which mechanism or asset class?
  - What should the role of my infrastructure investment play in my portfolio (e.g. growth vs. defensive vs. inflation vs. diversification)?

Risk Responses

- Am I willing and able to invest in **Hard (built infrastructure)** measures to reduce the likelihood of and build my risk-exposed assets' resilience against physical and transition risks?
  - **Public fortification (grey or green).** Invest in government relationships and lobbying capabilities to encourage city-wide, public fortification measures *(such as a city storm surge barrier)*
  - **Private grey fortification.** Invest in grey (man-made, built-up) infrastructure to fortify asset from physical risks *(such as an asset perimeter wall to protect against rising sea levels; using building materials such as stainless steel to withstand water damage or corrosion)*
  - **Private green fortification.** Invest in green (natural, ecosystem-based) infrastructure to protect and build resilience for assets *(such as mangroves)*
  - **Private early adopter investment.** Invest in new forms of infrastructure powered by innovations that address climate challenge concerns and have low exposure to transition risk *(e.g. hydrogen pipelines)*

- Am I willing and able to invest in **Soft (financial or contractual)** measures to build my risk-exposed assets' resilience against physical and transition risks?
  - **Financial resilience.** Ensure cash reserve management processes are in place to provide a financial buffer in the event of serious strategic concentration risks materializing *(e.g. maintaining higher debt service coverage ratios, larger debt service reserve accounts and maintenance reserves)*
  - **Debt structuring.** Ensure flexible debt structuring processes are in place to provide a financial buffer in the event of severe physical or transition risk events creating large prospective losses from assets *(e.g. lower leverage, shorter tenors, or higher pricing in the face of greater cash-flow variability from climate-related risks to revenues and costs)*
  - **Flexible buyer contracting.** Ensure legal protections are built into contracts with buyers (governments or corporations) to ensure that sponsors/developers/investors do not bear undue burdens from physical or transition risk events *(such as building physical and transition risks into relief, compensation or "force majeure" clauses in PPP contracts*
  - **Circular economy-minded procurement contracting.** Ensure procurement contracts across the supply chain make efforts to keep resources in use for as long as possible *(e.g. by including provisions for recycling and upcycling; by structuring contracts as service-rental instead of product-acquisition and transfering maintenance costs to suppliers)*
  - **Risk transferring.** Purchase risk transfer instruments to financialize physical and transition risks *(such as Parametric insurance or Cliff insurance* [see A Closer Look 5, page 32]

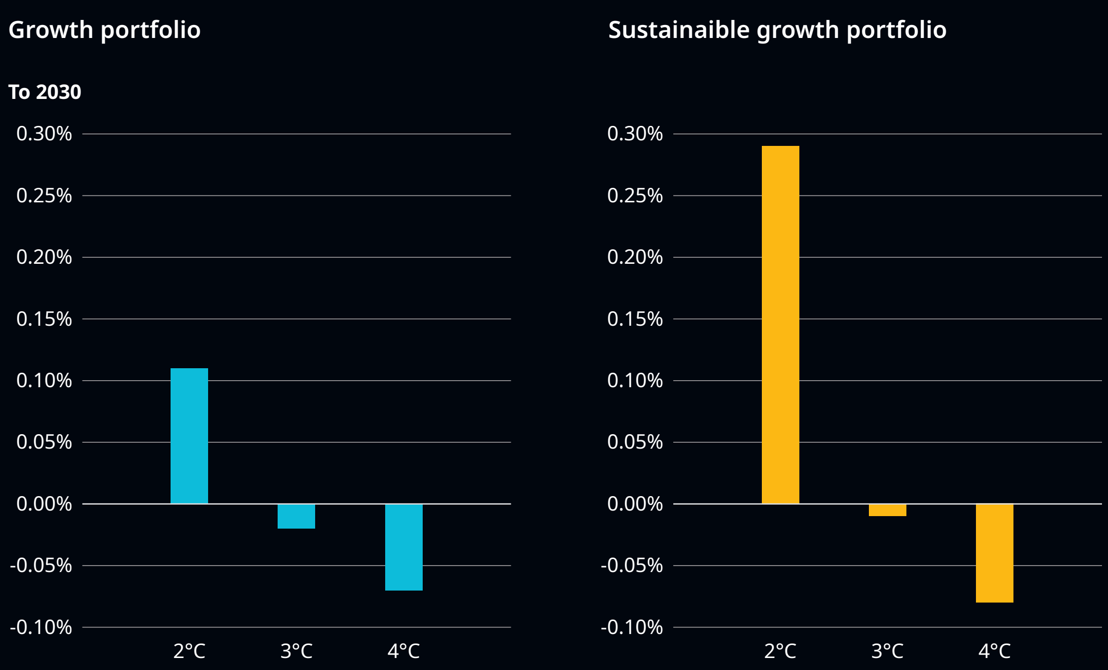
A Closer Look

SCENARIO MODELLING AND STRESS TESTING

Scenario analysis, a key element of the recommendations put forth by the TCFD for managing climate risks, can be a powerful tool in supporting investors' strategic asset allocation and portfolio construction decisions. Conducting comprehensive and data-rich scenario analysis exercises can test portfolio resilience under multiple potential future outcomes, and can be particularly impactful for infrastructure investors whose exposures can often extend into the long-term.

An example of this kind of assessment can be seen out of Mercer's Responsible Investment team, which advises institutional investors on why and how to adopt sustainable investment approaches. The team has developed a climate scenario model for assessing the effects of both climate-related physical damages (physical risks) and the transition to a low-carbon economy (transition risks) on investment return expectations across a wide variety of asset classes and sectors. The model offers three climate change scenarios, a 2°C, 3°C and 4°C average warming increase on preindustrial levels, over three timeframes — 2030, 2050 and 2100. See the hypothetical portfolio examples below.

Exhibit 20. Mercer sustainable growth portfolio model

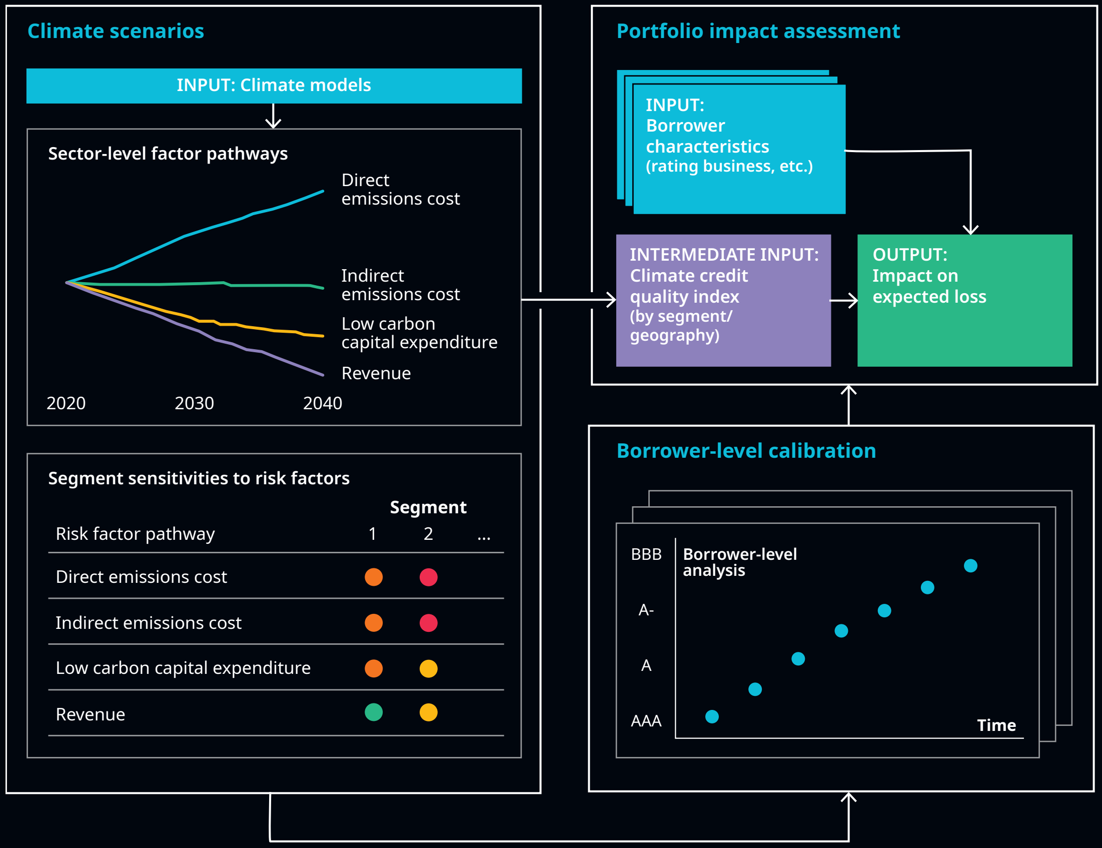


Source: Investing In A Time Of Climate Change — The Sequel, Mercer

Scenario analysis can be taken a step further to conduct an in-depth evaluation of lending institutions' exposure to climate risks as well. In 2019, Oliver Wyman and Mercer released a report synthesizing the efforts of a Working Group of sixteen international banks convened by the UN Environment Finance Initiative (UNEP FI), to develop a methodology for assessing the risks and opportunities associated with the climate transition.

The report presents a framework for assessing climate transition risk for banks, comprising of three key components: climate scenario analysis, borrow-level calibration, and portfolio impact assessments (see example below). This exercise provides an indication of heightened downgrade/default potential due to climate risk, and serves as form of sensitivity analysis to ensure financial institutions are sufficiently climate aware.

Exhibit 21. Oliver Wyman and Mercer climate scenario modelling framework for lending institutions



Source: Oliver Wyman

A Closer Look

RISK TRANSFER INSTRUMENTS

Risk transfer instruments for physical risk: Parametric Insurance

Parametric protection is a risk-transfer solution that provides index-based coverage which triggers based on a predefined event happening (as derived from historical data or from a parameter) rather than indemnifying actual loss incurred. Predetermined payouts are made should these predefined parameters be met.

This solution is gaining traction, particularly for weather-related events. When Typhoon Mangkhut fell over the Philippines, Hong Kong, Macau and other parts of China in September 2018, infrastructure owners and operators incurred significant costs in physical damage, air travel cancellations and project delays. In response, as one of the world's most exposed countries to tropical storms, the Philippines doubled its parametric natural catastrophe insurance cover in December 2018 with support from the World Bank. International re-insurer Swiss Re has pointed out that parametric insurance solutions are also increasingly being used by Chinese provincial governments to finance disaster relief and infrastructure re-building initiatives as well. Unlike traditional insurance policies, which can often require clients to wait 8-12 months before seeing their claims paid out, parametric solutions can help build financial resilience and rebuild communities far more rapidly.

Parametric protection also enables investors, contractors and project owners to optimize their bidding strategies, understand contractual ramifications and changes in risks for their projects, and receive quick settlement at time of need if adverse weather conditions arise. Governments can use the parametric payouts to fund disaster relief programs and rebuild infrastructure, while private sector stakeholders can use payouts to increase infrastructural resilience.

Risk transfer instruments for transition risk: Cliff Insurance

Insurance coverage for infrastructure traditionally targets the revenue lost during a predefined indemnity period. This, however, overlooks the risks that various project stakeholders might encounter due to the nature of the regulatory and policy environment. For many industries — particularly but not exclusively in the renewable energy infrastructure sector — the regulatory and policy environment is rigid and risky.

In 2017, Norton Rose Fulbright LLP and Marsh jointly developed a new "cliff insurance" policy that could protect developers and financiers from the risk of the loss of statutory renewable energy incentives. This was developed for a biomass-fueled combined head and power project in response to the UK Government's announcement that its Renewable Obligation Certificates scheme (a form of a government subsidy for renewable energy developers) would be phased out. It emerged that a dedicated biomass-fueled combined heat and power project (CHP) that qualifies for ROC support, but that does not commission and apply for ROC accreditation on or before the set deadline of 30 September 2018, would lose the benefit of the ROC regime. If the client project were to find itself "going over the ROC cliff", it would find itself incurring financial losses worth millions of pounds.

"Cliff insurance", therefore, served as a vital risk mitigation tool for this project. This policy was designed to pay out, on an upfront basis, the net present value of the projected revenue forgone as a result of the project's failure to achieve accreditation for ROCs by the hard deadline of 30 September 2018. This innovative solution can provide much-needed coverage in today's uncertain regulatory landscape.

About Marsh & McLennan Insights

Marsh & McLennan Insights uses the unique expertise of our firm and its networks to identify breakthrough perspectives and solutions to society's most complex challenges.

Our work draws on the resources of Marsh, Guy Carpenter, Mercer and Oliver Wyman – and independent researchers. We collaborate with industry, government, non-governmental organizations, and academia around the world to explore new approaches to problems that require shared solutions across economies and organizations.

Marsh & McLennan Insights plays a critical role in delivering the MMC Advantage – Marsh & McLennan's unique approach to harnessing the collective strength of our businesses to help clients address their greatest risk, strategy and people challenges.