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NAVIGATING CLIMATE CHALLENGES

From understanding risk to increasing resilience

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Marsh McLennan

The world's leading professional services firm in risk, strategy and people

Staff: 85,000

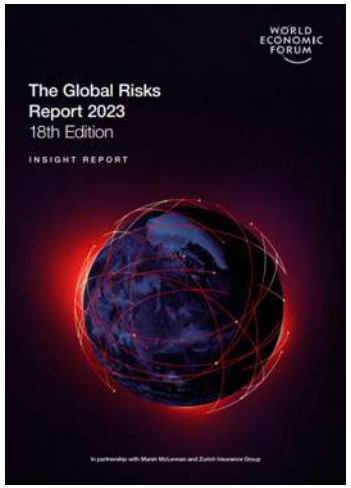
Clients: >130 countries

Annualized revenues: US$ 20.7 BN (2022)

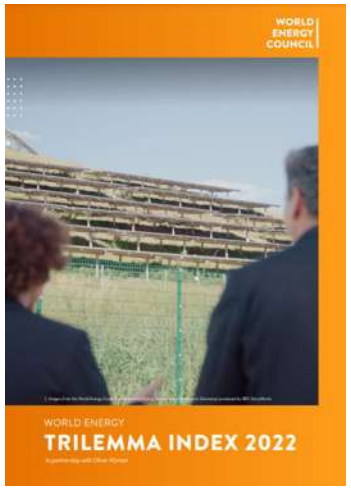
New York Stock Exchange: MMC

Age: 150 years

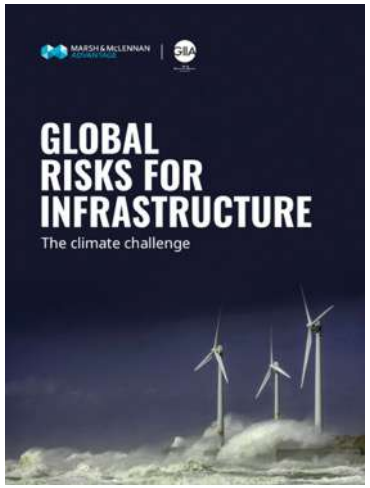
Marsh McLennan Energy and Climate Research



Global Risks Report 2023
In partnership with the World Economic Forum

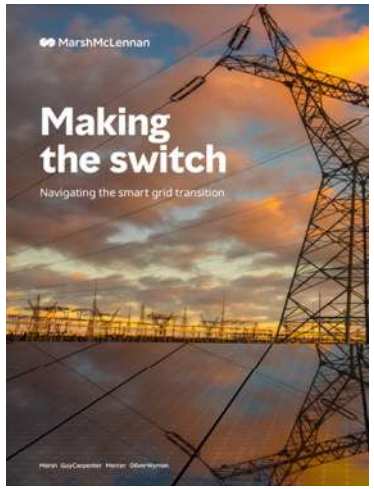


World Energy Trilemma 2022
In partnership with the World Energy Council

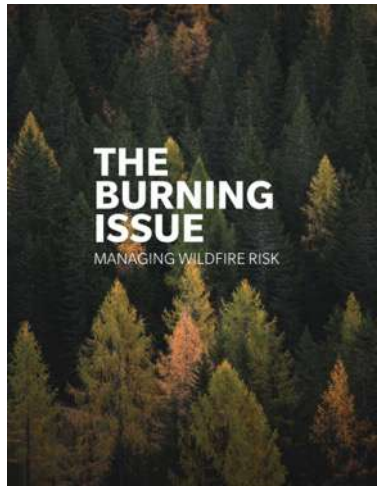


Global Risks for Infrastructure: The Climate Challenge
In partnership with the Global Infrastructure Investors Association

Time to Recharge: Accelerating the rollout of EV charging infrastructure



Making the Switch: Navigating the smart grid transition



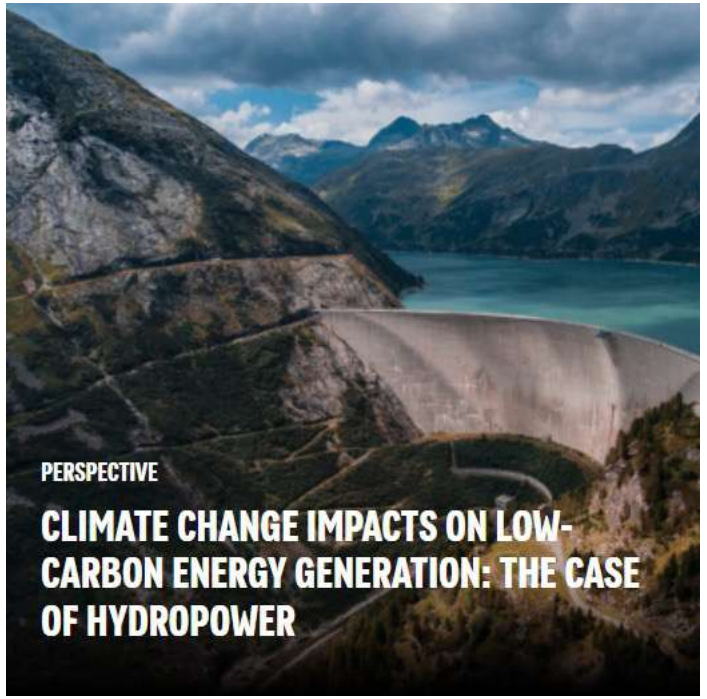
The Burning Issue: Managing Wildfire Risk

Impact of climate change on hydropower

61% of hydropower dams worldwide will be in river basins with high to extreme risk of water scarcity, floods or both by 2050

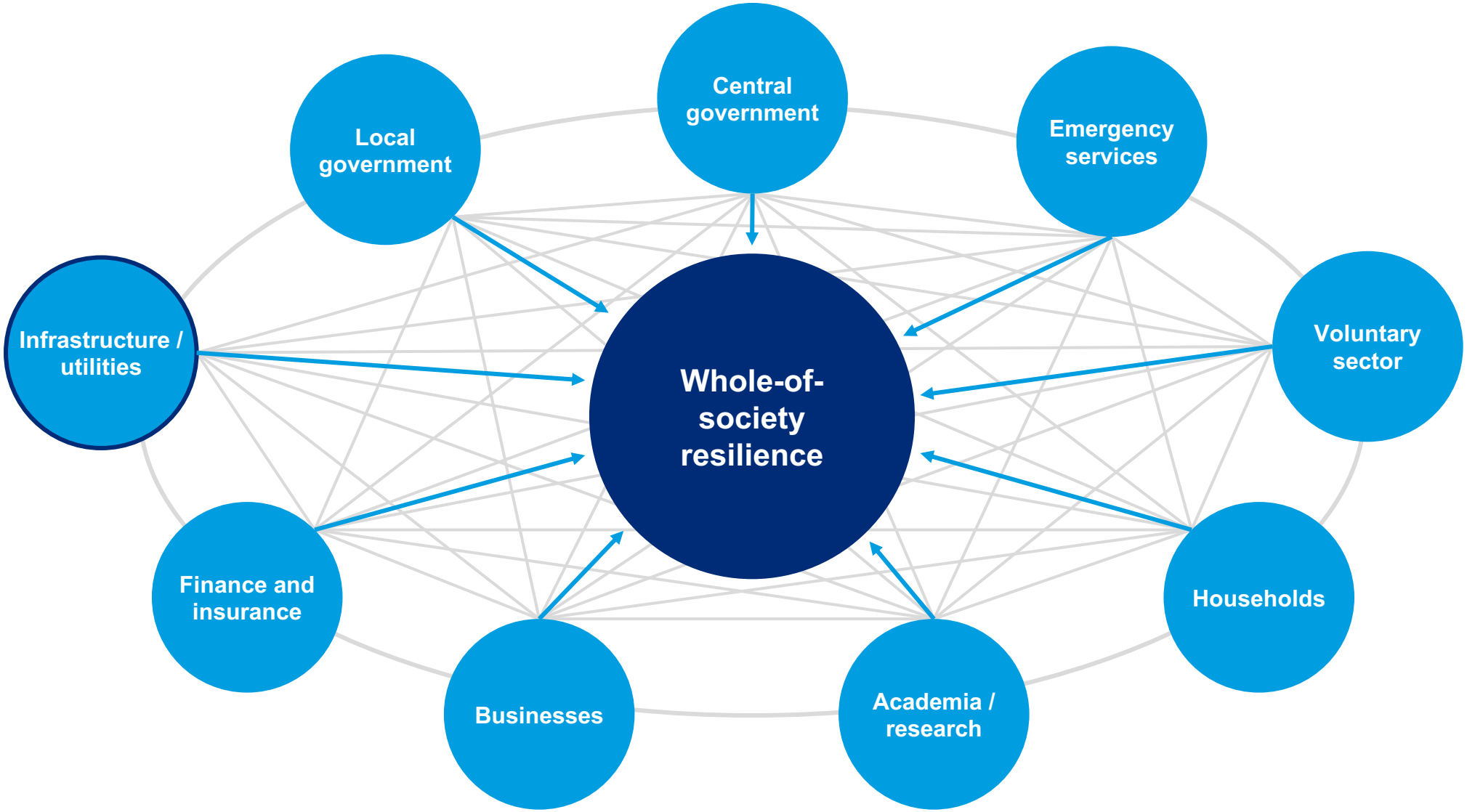
Global hydropower exposed	Floods	Water Scarcity
2050	57%	32%

Source: WWF, Water Risk Filter



- Hydropower is the EU's second largest renewable energy source, accounting for 33% of renewable energy and 17% of all EU energy
- Dams in Spain and Bulgaria stand at some of the highest risks of water scarcity globally, while flood risks remain high for dams in Ireland
- In 2022, extreme heat and droughts reduced hydroelectricity output in France and Spain by 30% and >50% respectively
- **Way forward**: assessing the EU's hydropower exposure to climate risks, bolstering resilience efforts, and strategically diversifying renewable sources

From utility preparedness to national resilience



How do I use the resilience playbook?

What are Physical Climate Risks?

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RESILIENCE PLAYBOOK

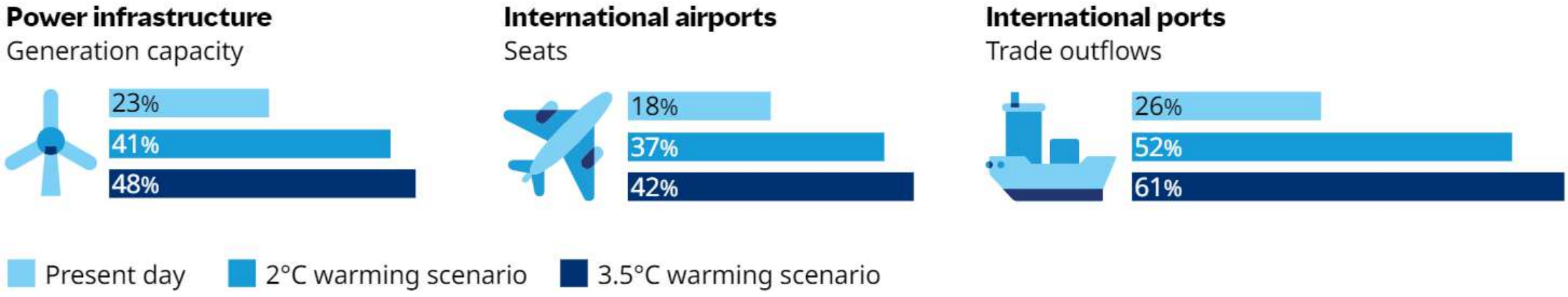
What changes do I need to make to my assets?

Definitions & Glossary

Starting point: Understanding current and future risks

- Findings from the Marsh McLennan Flood Risk Index reveal key vulnerabilities in global power infrastructure, international airports and international ports. Even under a 2°C global warming scenario, the percentages of these three infrastructure classes at risk are set to approximately double.
- Failure of critical infrastructure prolongs and exacerbates flood impacts, such as business interruptions, disruptions to supply chains, and recovery costs.

Infrastructure at risk under present and under 2°C and 3.5 °C warming scenarios



Source: [Marsh McLennan Flood Risk Index]

Calculating financial impacts: Physical risk affects multiple key drivers

Operational Expenses

- **Water expenses**
  - Hazards: Drought
  - Contributes to increased COGS in CCA, and will impact the unit cost driver
- **Energy expenses**
  - Hazards: Heat, freeze
  - Contributes to cost of heating and air conditioning

Productivity losses

- **Employee productivity**
  - Hazards: extreme temperatures, wildfire
  - Contributes to decreased margins in CCA, and will impact the unit cost and volume drivers
- **Business interruption**
  - Hazards: Extreme temperatures, coastal flooding, fluvial flooding, tropical cyclone, water stress, wildfire
  - Lowers revenues in CCA by impacting the volume driver

Capital Expenses

- **Cleanup and repair costs**
  - Hazards: coastal flooding, fluvial flooding, tropical cyclone, wildfire
  - Increases capital spending in the CCA capex driver
- **Repair and retrofit**
  - Hazard: flood, hurricane
  - Replacing existing with resilient materials as part of ongoing repair and maintenance
- **Building foundation damage**
  - Hazard: Drought
  - Increases capital spending in the CCA capex driver

Insurance Costs

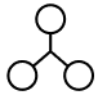
- **Increased expected losses to physical risk will increase insurance premiums/deductibles**
  - Affected by insurance company pure loss ratio and company percentage of insured assets (both to be included as user parameters)
  - Impacts the COGS line item in CCA
- **Future access to traditional insurance requiring alternative risk transfer**
  - Denial of cover and exclusions for high risk assets requiring more costly parametric cover

Identifying responses: Building climate-resilient energy systems

Energy security is still a low priority for adaptation; as of 2020, only 40% of global NDCs prioritize adaptation in the energy sector

Enhance preparedness

Mitigate the impacts of climate risks through early action, strategic reinforcements, and stakeholder engagement

	Incentivize data sharing across stakeholders to improve existing climate models, identify and prioritize high-risk areas
	Invest in green and grey climate adaptation infrastructure (including nature-based solutions)
	Reinvigorate aging grids with smart grid technology (e.g., smart meters, microgrids, energy throttling systems)

Respond with agility

Swiftly recover assets and operations by coordinating action, mobilizing stakeholders, and evaluating resilience targets

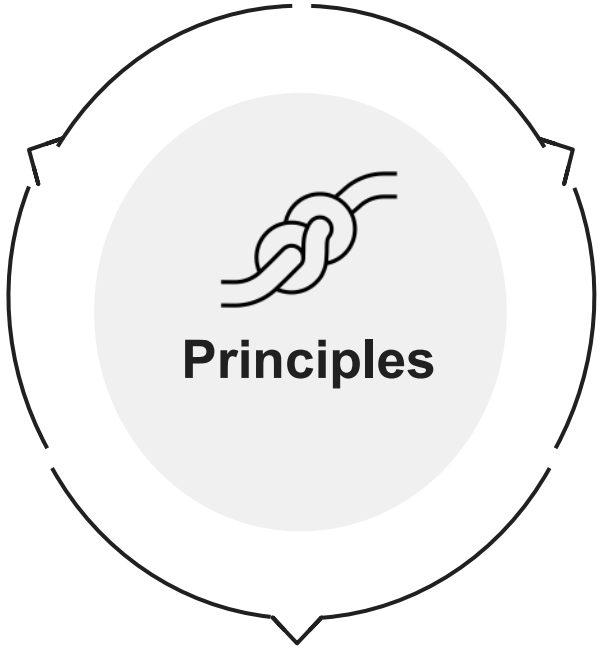
	Grant emergency powers to local stakeholders (e.g., emergency services) and afford flexibility to adapt plans and priorities
	Mobilize community-based action to reduce losses (e.g., community resilience hubs)
	Work closely with re/insurers and financiers to build financial resilience
	Develop response protocols to reduce inefficiencies in recovery

Three principles to guide adaptation strategies

1

Embrace current and forward-looking trends

Strategies need to incorporate information on climate change projections and evolving risk drivers to minimize the risk of maladaptation, blind spots, and lock-ins.



2

Coordinate the implementation of tools through new modes of collaboration

New models of participation can coordinate action and align incentives among a wide range of stakeholders, such as corporates, households, communities and governments.

3

Harness co-benefits by taking a systems-level approach to resilience

Leveraging the broad range of social, economic and environmental co-benefits can strengthen the business case for resilience and unlock investments.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