Climate Risks and Opportunities for Maritime Shipping and UK Trade

PRIORITY POLICY QUESTIONS: SUMMARY OF KEY FINDINGS

Environment and National Security: Exploring the Risk Pathways

July 2026

About

This document is one of a series of reports from the Agile Initiative's Environment and National Security: Exploring the Risk Pathways project. The Priority Policy Questions: Summary of Key Findings reports respond to questions emerging from discussions with policymakers. Designed to be concise and accessible, each provides a list of key findings, a synthesis of available scientific evidence, a graphic illustrating the pathways between environmental pressures and national security, an explanation of the implications for UK national security, a list of priority policy recommendations, and description of relevant uncertainties and evidence gaps.

The Priority Policy Questions Series

- The role of critical natural infrastructure in supporting national security
- Managing demand: energy security, food security and UK national security
- Climate risks and opportunities for maritime shipping and UK trade
- Environment-driven mobilities and UK national security
- Weaponisation of nature
- Environment and social resilience

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Policy Questions

Q1

What are the main climate-related risks to global shipping and maritime supply chains that matter to the national security of the UK?

Q2

Why should the government care about these risks now, especially in the context of UK national security and economic resilience?

Q3

What can be done in the next 1–5 years to reduce risk, improve resilience, and avoid new vulnerabilities?

Summary

- Shipping plays a key role in UK national security by maintaining our supply of essential goods including food, fertilisers, industrial inputs and defence supplies. Shipping equates to 98% of UK-international trade by value and 78% by volume.[1] However, shipping is becoming more exposed to climate hazards and energy transition challenges, which will affect shipping routes, infrastructure and workers. Moreover, climate change and Arctic melting are creating new challenges and opportunities for maritime trade. This summary identifies the most important vulnerabilities and cascading risks for UK supply chains and recommends interventions to enhance resilience.

Policy priority recommendations

Map UK dependence on climate-vulnerable ports, routes, and partner-country rerouting.

Stress-test compound maritime disruptions, including port closures, chokepoint restrictions and rerouting bottlenecks.

Prioritise adaptation at critical ports (in the UK and abroad), including drainage, flood protection, power resilience, and hinterland access. This should also include greater use of robotic and autonomous systems where these reduce risk to personnel from hazardous weather and extreme temperatures.[2]

Monitor Arctic route development and treat it as a strategic uncertainty rather than a substitute for existing routes.

Align shipping decarbonisation with resilience planning so that new fuel systems and bunkering hubs do not create new chokepoints.

Uncertainties

How much UK trade would reroute through Arctic passages under different future price scenarios for fuel, vessel prices, and insurance premiums.

Which geographical trends will dominate future global trading patterns, particularly in relation to trade with China and in fossil fuels (coal, oil and gas).

How quickly and in what ways firms, insurers, and ports would adapt their behaviour after a major shock.

Where the least-cost green fuel supply chain will sit and how concentrated it may become.

Key Findings

UK maritime dependence is very high and concentrated through a small number of routes and ports. The most important climate-sensitive chokepoint is Panama, which is highly vulnerable to drought. Suez, Bab el-Mandeb and Malacca are vulnerable to maritime accidents, conflict, piracy, congestion and geopolitical tension. (HIGH CONFIDENCE)

Ports are exposed to compounding climate hazards from storms, floods, wave overtopping and heat, which can damage infrastructure, disrupt operations and make conditions unsafe for workers. (HIGH CONFIDENCE).

Arctic routes are unlikely to become commercially viable for the UK as an alternative to routes through the Panama Canal and the Red Sea. The commercial and strategic value of Arctic shipping routes remain uncertain. (MODERATE CONFIDENCE)

Shipping decarbonisation may create new fuel and import dependencies, especially for green ammonia, which will probably be imported from Northern Africa. (MODERATE CONFIDENCE)

Evidence Synthesis

Ports: climate risk is operational as well as physical

Ports (civilian and military) are exposed to compound climate hazards, especially storms, flooding, intense rainfall, wave overtopping and heat. These hazards can damage physical infrastructure and assets but can also disrupt operations by making conditions unsafe for workers and interrupting normal port activity, causing trade disruptions.[3]

The most immediate issues are often river and surface water flooding affecting low-lying storage areas, access roads, power supply, drainage and workforce access. In the longer term, sea-level rise will also become a disruptive pressure.

Policy implications

Port resilience needs to go beyond protection of infrastructure such as quay walls and cranes. It should address drainage, power resilience, road and rail access, digital systems, backup procedures, recovery planning and worker conditions. Because port ownership and adjacent infrastructure are often fragmented, the government also needs clearer coordination and standards.

Chokepoints: direct dependence, indirect spillovers and climate case studies

The UK has high dependence on maritime trade. The UK imports 40% of our food, 60% of fertiliser, 40% of energy and 5% of defence materials, plus industrial inputs and clean-energy technologies, and most of this arrives by sea.[4]

However, the UK is highly exposed to a few maritime chokepoints, especially Suez, Bab el-Mandeb and Malacca - over 20% of UK trade passes through each of these maritime passages.[5] These are not primarily climate-sensitive; their main risks are maritime accidents, conflict, piracy, congestion and geopolitical tension.

Panama is the most climate-sensitive chokepoint because drought can directly reduce capacity and create spillovers through rerouting and cost increases, with widespread impacts on trade with the Western Hemisphere.[6] While disruptions in the Panama Canal have minimal direct impacts on the UK, the UK has an important trade relationship with the USA whose economy is more sensitive to the Panama Canal.

Policy implications

UK resilience depends not only on direct exposure to maritime chokepoints, but also on spillover from the dependence of our trade partners on vulnerable ports and maritime routes, and on rerouting through the wider shipping network.

Arctic routes: a future option, not a present substitute

Melting of Arctic sea-ice may create new routing options. The Arctic may become an alternative to routes though the Red Sea and the Panama Canal by the end of the century, but this will remain constrained by weather, ice, vessel suitability, infrastructure, emergency response capacity, insurance, environmental sensitivity and geopolitics, which are all highly uncertain. A cost-optimisation analysis undertaken for this project, which includes insurance pard risk but excludes geopolitical risk, suggests that up to 80% of future Arctic trade by value could be routed via the Northern Sea Route north of Russia. The key question is not only whether the Arctic is opening, but whether it becomes a useful option for certain cargoes, under which conditions, and at what cost and possible increase of risk. Russian control, sanctions and limited support infrastructure mean it is not a realistic near-term UK contingency route.[7]

Arctic sea routes may expand in the future but are unlikely to replace established routes at scale in the near term. Around 3.8% of global trade and 1.7% of UK trade passing through the Suez Canal and Bab el-Mandeb could be re-routed via the Arctic by 2100, potentially reducing global economic risk (a combined measure of trade value passing a maritime chokepoint and risk at that chokepoint) by around **US$227 million** (MODERATE CONFIDENCE).

Policy implications

It will be important to monitor Arctic development, but such routes should not be relied upon as a substitute for existing routes or for adaptation in ports and chokepoints.

Shipping decarbonisation: transition challenges and opportunity

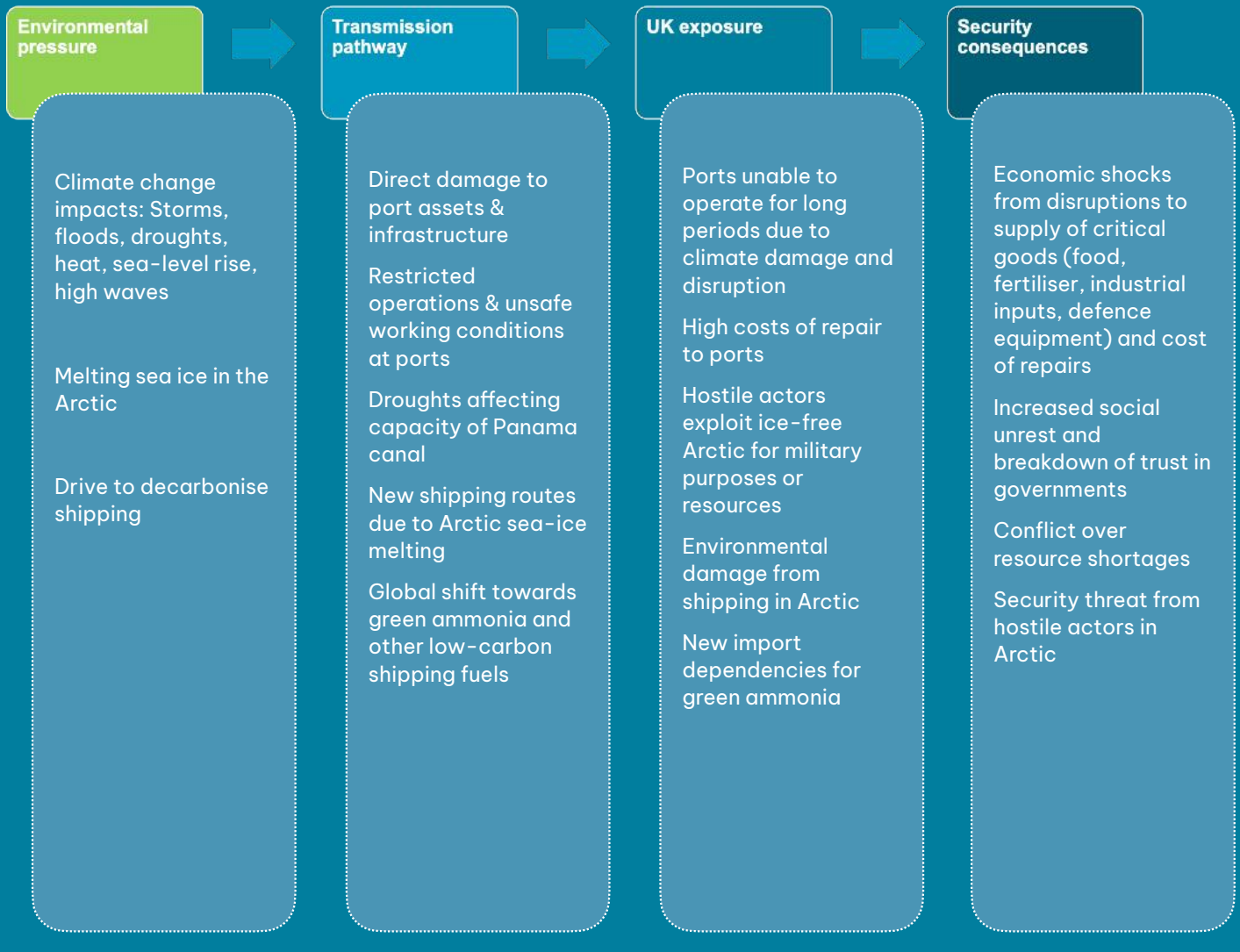
Currently, shipping has significant impacts on the environment through air and water pollution and is responsible for 3% of GHG emissions.[8] Shipping decarbonisation is essential, but it is also a supply-chain issue. The candidate fuels for low- and zero-emission shipping are biofuels (methane, methanol, fuel oils), e-fuels (hydrogen, ammonia, etc.), or alternative such as batteries or hybrid systems. These require the development of new production capacity, storage, safety procedures, bunkering infrastructure, crew training and emergency response capabilities.

Shipping decarbonisation will reshape fuel supply chains and port infrastructure. Green ammonia is the preferred solution for medium to long distances. This is likely to be cheaper to produce outside the UK in places with abundant and reliable solar energy, rather than with intermittent UK renewable energy supplies. The least-cost supply is projected to be in North and West Africa, whilst UK renewable energy is used for domestic energy security. This means decarbonisation can create new import and infrastructure dependencies. Other alternatives like biofuels and e-fuels, while less energetically favourable, can be used for drop-in, for instance in aviation, whereas batteries could be implemented in smaller vessels and for shorter routes.

Policy implications

Decarbonisation needs to be aligned with resilience. Fuel infrastructure, port adaptation and logistics planning should be designed together so that the transition reduces emissions[15] without creating new vulnerabilities. Ports have a role to play in mitigation, and port authorities can encourage this, for example, by offering reduced fees to greener ships.

Causal Pathway



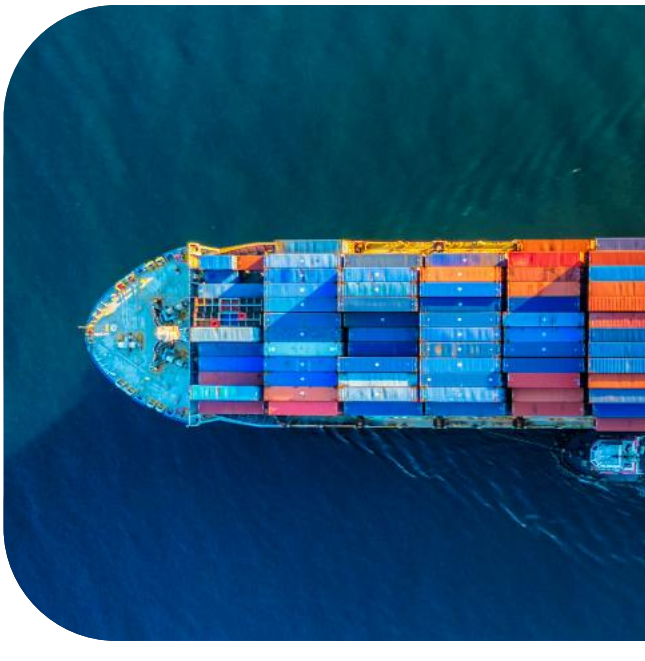
Interventions: Governance and funding for enhancing climate resilience of ports, managing transition to low-carbon shipping fuels and monitoring impacts of new Arctic routes

Implications for UK National Security

- Maritime disruption is a security issue because it can affect the availability and price of food, fuel, medicines, industrial inputs and clean-energy equipment. The risk is not only direct disruption at UK ports. Risk also comes through foreign ports, partner-country rerouting and exposure at global chokepoints. This matters especially where critical goods are time-sensitive or difficult to substitute. For example, around 62% of fresh produce imports from the EU and roughly a quarter of all UK food imports enter via Dover and the Channel Tunnel.[9]

For the UK, the main concern is resilience under climate stress. If a major port is disrupted, a chokepoint becomes unreliable or a new fuel system is not ready, the consequences can cascade through supply chains into shortages, delays, higher costs and public pressure. These effects matter for economic stability, food security, energy security, the resilience of critical services and social and political stability.

The same logic applies to defence and civil resilience. Maritime disruption can affect fuel supply, dual-use infrastructure, commercial ports used by defence, and the ability of the system to absorb shocks when the military is called to support civil authorities. The broad national security implication is that climate resilience is no longer an optional add-on to maritime policy; it is part of basic preparedness.



Policy Recommendations

Recommendation	Lead department(s) / actor(s)	Time	Evidence confidence	Complexity	Key dependencies / trade-offs
Map UK dependence on climate-vulnerable ports, routes and partner-country rerouting.	Cabinet Office, DfT, DBT, FCDO, HM Treasury	0–2 yrs	HIGH	MODERATE	Data sharing, commercial confidentiality, cross-government coordination
Stress-test compound maritime shocks, including ports, chokepoints and fuel disruption.	Cabinet Office, DfT, DBT, sector regulators, Met Office	0–2 yrs	HIGH	MODERATE	Requires scenario design and private-sector engagement
Prioritise adaptation at critical ports and supporting infrastructure.	DfT, port authorities, devolved administrations, infrastructure owners	2–5 yrs	HIGH	HIGH	Capital costs, fragmented ownership, planning and regulatory issues
Monitor Arctic routes as a strategic uncertainty rather than a substitute.	FCDO, DfT, MoD, UKHO, Met Office	5–10 yrs	MODERATE	LOW	Depends on sustained monitoring and scenario capability
Align shipping decarbonisation with resilience, especially for fuel and bunkering systems.	DfT, DESNZ, port authorities, industry	2–5 yrs	MODERATE	HIGH	Fuel geography, investment risk, international supply chains
Use the UK's influence in standards, insurance, finance and maritime diplomacy to reduce systemic risk.	DBT, FCDO, Cabinet Office, MoD	0-5 yrs	HIGH	MODERATE	Diplomacy, competing national interests

Uncertainty and Priority Evidence Gaps

What is known

UK maritime dependence is high and concentrated around a small number of ports and maritime chokepoints.

Ports, chokepoints and shipping fuels are all exposed to climate or transition risk.

Climate disruptions can cascade across supply chains and raise costs quickly.

What still needs evidence

Which foreign ports are most important to UK resilience.

Which cargoes are most exposed to chokepoint disruption.

The scale of benefit provided by Arctic rerouting compared with existing alternatives.

Which port adaptations give the greatest resilience benefit per GBP spent.

What is uncertain

The commercial scale and potential risks (maritime accidents, geopolitical) of Arctic shipping in the future.

The extent of indirect UK exposure to hazards through trade partner-country rerouting.

The likely geography of low-cost green fuel production and import routes.

What can be done despite uncertainty

Map dependencies now.

Stress-test major disruption scenarios now.

Improve port and supply-chain resilience now.

Plan decarbonisation so it does not create new chokepoints.

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