FIIA BRIEFING PAPER

NOVEMBER 2024 /398

SECURITY OF SUPPLY IN AN ERA OF ENVIRONMENTAL CRISES

EXPLORING THE POTENTIAL OF FINNISH COMPREHENSIVE PREPAREDNESS

Emma Hakala & Helmi Räisänen

FINNISH INSTITUTE OF INTERNATIONAL AFFAIRS

SECURITY OF SUPPLY IN AN ERA OF ENVIRONMENTAL CRISES

EXPLORING THE POTENTIAL OF FINNISH COMPREHENSIVE PREPAREDNESS

- Climate change will increase the probability of crises affecting society and security of supply: for example, extreme weather events might disrupt manufacturing and logistics across sectors.
- Energy transition relies on several raw material supply chains to develop new energy sources. However, growing demand threatens to outstrip supply for some raw materials in the near future, creating a potential bottleneck in the transition.
- The Finnish model of security of supply, which emphasises comprehensive preparedness, is a feasible framework for addressing climate-related risks, but so far these have not been systematically taken into account.
- An understanding of climate-related risks needs to be integrated into the shared situational awareness of everyone involved in security of supply operations.
- Reliance on unsustainable activities might not be possible in a world that is largely moving away from fossil fuels. For example, the procurement of equipment for the Defence Forces must take into account the availability of fuel for decades to come.

EMMA HAKALA

Leading Researcher

Global Security and Governance

FIIA

HELMI RÄISÄNEN

Postdoctoral Fellow

Global Security and Governance

FIIA

ISBN 978-951-769-811-5

ISSN 1795-8059

Language editing: Lynn Nikkanen

Cover photo: Jose Jordan, AFP/Lehtikuva

This Briefing Paper is part of a research project titled 'Climate change and Finland's security of supply', funded by the National Emergency Supply Agency.

FINNISH INSTITUTE OF INTERNATIONAL AFFAIRS

Arkadiankatu 23 b

POB 425 / 00101 Helsinki

Telephone +358 (0)9 432 7000

Fax +358 (0)9 432 7799

www.fiia.fi

SECURITY OF SUPPLY IN AN ERA OF ENVIRONMENTAL CRISES

EXPLORING THE POTENTIAL OF FINNISH COMPREHENSIVE PREPAREDNESS

INTRODUCTION

Climate change and environmental crises threaten the stability and security of societies all over the world. According to the Intergovernmental Panel on Climate Change (IPCC), a changing climate imperils livelihoods, intensifies forced migration and, along with other vulnerability-inducing factors, may exacerbate conflicts.

Climate risks are varied and cut across different sectors of society. Changing weather conditions may imperil global transportation chokepoints, such as in the summer of 2024 when traffic through the Panama Canal had to be reduced due to an extended drought. Critical infrastructure, including roads, harbours and energy facilities, will be increasingly threatened by events such as the widespread flooding in Eastern Europe in September 2024.

Rapid and effective action to mitigate climate change is needed to avoid the worst impacts, but such action may also pose risks in itself if it is poorly planned or inconsistent. Climate change should not be addressed in ways that accelerate other environmental crises, such as species loss, pollution or soil erosion. Climate and environmental risks are intertwined with several simultaneous emerging or potential crises, such as rising geopolitical tensions or new pandemics. Their complex nature makes them difficult to anticipate and prepare for.

In Finland, the need for comprehensive, cross-sectoral thinking about security was already recognised during the Cold War, resulting in the cooperation model of Finnish preparedness. This was recently reaffirmed by the Covid-19 pandemic as well as the Russian war of aggression in Ukraine. Societal cohesion and resilience are seen as crucial for security and defence capability. Finland has particularly emphasised the concept of *security of supply*, which is used to refer to the preparation for potential crises and disruptions by safeguarding critical functions of society.

This Briefing Paper argues that while climate change mitigation remains a priority, some climate-related risks will inevitably occur, and it is necessary to prepare for them. The Finnish model of security of supply is a feasible framework for addressing climate-related risks, but it needs to adopt new foresight capabilities and practices to do so. The paper first outlines the Finnish security of supply system and points out the aspects that coincide with climate preparedness efforts. It then presents concrete examples of climate-related risks to security of supply, focusing on energy transition. Finally, the Briefing Paper proposes ways to strengthen preparedness for climate-related risks concerning security of supply.

CLIMATE CHANGE CHALLENGES THE SECURITY OF SUPPLY APPROACH

As a small country with an open economy, Finland is particularly dependent on trade, cross-border connections and peaceful international relations. This also makes Finland vulnerable to external risks and crises. The Finnish approach to security of supply aims to address external threats by ensuring that the economic activities and technical systems that are vital for the population, economy and defence of the country can be maintained during severe crises and emergencies. Security of supply thus encompasses critical sectors like energy, logistics, water and food supply, waste management, digital networks and healthcare.

Finland relies on a model of comprehensive security, which is based on cross-sectoral cooperation between authorities, the private sector, and civil society. The idea is that by doing so, it is possible to prepare for various kinds of threats and crises. In practice, the comprehensive security work consists, among other things, of sharing and analysing security information, preparing joint plans, and organising joint training.

A considerable proportion of security of supply activities is carried out in cooperation between the public and the private sectors. This work is coordinated by the National Emergency Supply Agency (NESA) and carried out through the National Emergency Supply Organisation, which engages the participation of companies, authorities and organisations. This large pool of contributors is seen as beneficial for overall preparedness and continuity management. Among other things, NESA also obtains crucial foresight information from the members of the National Emergency Supply Organisation.

The security of supply framework has changed over time to reflect new geopolitical realities. Since the end of the Cold War and the onset of rapid globalisation, security of supply has moved from stockpiling critical resources like oil and grain towards ensuring the continuity of supply chains, trade relations and critical infrastructure. As noted, Finland is increasingly dependent on complex and often international infrastructure, including transboundary banking systems and digital networks. These cannot be fully controlled from a national point of view, but it is possible to monitor and contribute to their crisis resilience. Therefore, Finland's approach to security of supply seems justified in the face of heightened geopolitical tensions, economic competition and advancing digitalisation, all of which are exerting pressure on supply chains and critical infrastructure.

The operating environment has changed further in recent years in the wake of the Covid-19 pandemic and the Russian war of aggression in Ukraine. The supply chain disruptions during the pandemic and the vulnerabilities exposed due to dependence on Russian oil and gas have led the EU to seek to strengthen its material self-sufficiency and reduce its reliance on external sources, especially concerning unstable or potentially antagonistic countries. This is one element in the policy of *strategic autonomy*, which aims to solidify the EU's capacity to act autonomously in strategically important areas. Strategic autonomy also aims to reinforce the EU's control over critical raw materials by securing supply chains and promoting European production. While strategic autonomy does not replace or reconstruct Finland's national security of supply, the policies associated with it will shape the Finnish operating environment.

The risks caused by climate change have only recently been acknowledged in the planning of Finnish security of supply, and have not yet prompted concrete policy measures to address them.[1] Finland has a National Climate Change Adaptation Plan, which includes targets such as climate risk awareness in the industrial

1 Räisänen, H. et al. (2021). Comprehensive security: The opportunities and challenges of incorporating environmental threats in security policy. *Politics and Governance*, 9(4), 91–101.

Wind turbines in Kemi, Northern Finland.
Source: Lasse Hendriks/Lehtikuva

sector and enhancing preparedness for climate change overall. However, the adaptation plan also spells out the need to address climate risks as part of security of supply activities, as it calls for their integration into the comprehensive security model and the security of supply objectives by 2026.

While security of supply has the potential to counter complex risks due to its comprehensive and participatory character, climate change and the green transition pose new challenges. The essential focus of security of supply is to *maintain and preserve* vital societal functions to ensure their continuity during crises. Meanwhile, the green transition – which is the only chance to pre-empt the worst environmental crises – requires *rapid changes* in the structures and interactions underlying the vital functions. In other words, accustomed practices for short-term security of supply may at times be at odds with efforts to ensure it in the longer term.

To improve climate-related preparedness in terms of security of supply, it is first necessary to analyse the types of risks that are emerging. Only on the basis of this analysis is it possible to propose policies or practices for climate-proofing security of supply. The following section presents examples of the kinds of climate-related risks to security of supply that are particularly relevant to energy transition.

ENERGY TRANSITION RELIES ON A GROWING SUPPLY OF CRITICAL RAW MATERIALS

To mitigate climate change, countries around the world are committed to decreasing their carbon emissions. In practice, this must result in the transformation of the current energy systems, food production, industries, logistics, and so forth.

Energy transition refers to the global shift from traditional carbon-based energy sources to zero-emitting sources. It relies on resource-intensive supply chains, such as steel and other metals. It is important to note that extreme weather events and the changing climate can also cause abrupt disruptions to and deterioration of infrastructure in the minerals, manufacturing and logistics sectors. The actions to promote energy transition are being taken in the context of both a worsening environmental crisis and rising geopolitical tensions, which expose it to risks.[2]

First, energy transition requires an unprecedented amount of minerals. Mineral demand will double by 2030 based on today's policy settings, and triple by 2030 in a net-zero emissions scenario. For example, electrification of the transport sector in particular requires lithium for electric car batteries. In a high-demand scenario, lithium demand in the EU is expected to grow 12-fold by 2030 and 21-fold by 2050. Globally, a high-demand scenario would see an 18-fold growth in lithium demand by 2030 and a 90-fold growth by 2050. Additionally, renewable energy deployment requires an expansion of transmission and distribution networks made of copper and aluminium. In order to achieve national goals, over 80 million km of grids should be added or refurbished by 2040.[3] While there may be enough minerals in the Earth's crust to meet growing demand in the long term, the adequacy of supply in the near future appears to be a potential bottleneck in the necessarily tight schedule of energy transition. Mineral exploration and scaling up mining and refining capacities take time: it takes ten to fifteen years to open a new mine in Finland, for example. Setting up refineries requires expertise and skills that are already in short supply due to a long history of outsourcing, for example to China.

Second, material risk pertains to the social acceptability of mining and local environmental damage. Not all known mineral reserves are therefore exploitable. The lack of a social licence to operate can slow down or even block mining projects and affect the development of mineral value chains. In Serbia, for example, 30,000 people recently demonstrated against the construction of a lithium mine in the lithium-rich Jadar region. If public concern is not addressed, for example through adequate guarantees of environmental protection, the security of supply of critical minerals will be further challenged.

MINING AND LOGISTICS IMPERILLED BY A CHANGED CLIMATE

Sectors such as mining and logistics will be affected by increasing droughts, floods and temperatures. In addition, mining and refining raw materials is a highly energy- and water- intensive process. In September 2024, Hurricane Helene halted the production and transport of high-purity quartz needed in semiconductors and solar panels in Spruce Pine, North Carolina – one of the few places in the world where such quartz is produced.[4]

2 The following analysis is partly based on document analysis and expert interviews conducted for the FIIA research project "Climate change and Finland's security of supply", funded by the National Emergency Supply Agency.

3 Carrara, S. et al. (2023). Supply chain analysis and material demand forecast in strategic technologies and sectors in the EU – A foresight study. Publications Office of the European Union. https://doi.org/10.2760/386650.

4 Brumfiel, G. et al. (2024). A tiny town just got slammed by Helene. It could massively disrupt the tech industry. *NPR*. https://www.npr.org/2024/09/30/nx-s1-5133462/hurricane-helene-quartz-microchips-solar-panels-spruce-pine.

It has been estimated that even with substantial emission reductions, over 70% of cobalt and lithium production could face significant, high or extreme drought risk by 2050. Between 2015 and 2017, South Africa experienced a severe drought that led to mine closures and economic losses. Furthermore, mines are not only geographically concentrated in certain countries, but also in specific regions within those countries. For instance, more than half of the world's cobalt comes from just five mines in the Democratic Republic of Congo. The four largest mines are located along the same road, over a distance of 100 km.[5] Such concentration increases the risk of production disruptions, not only due to extreme weather events but also for other reasons, such as conflicts.

Extreme weather events are increasingly affecting transport, industry and energy production. Heatwaves, for example, warp tracks and melt asphalt. Disruptions at logistical hubs can be particularly damaging. Most major shipping chokepoints have faced closure or disruptions in transit over the last two decades.[6] Furthermore, almost a third of the world's ports are located in areas with tropical storms, which will be further exacerbated by climate change.[7]

Rising sea levels will in turn make it more difficult for ports and shipping companies to operate. At the same time, maritime transport is facing sustainability challenges, to which the sector is responding, for example, through the use of biofuels. However, the production volume and potential of biofuels is limited, with marine, road and air transport competing for the same fuel. The advance of climate change will also impact the production of bioenergy crops by changing the area of land suitable for their cultivation.[8]

GEOPOLITICS AND ENERGY TRANSITION ARE INTERLINKED

The intensifying strategic competition between major powers is affecting the supply chains of critical energy transition materials and components. All the major geopolitical powers have drawn up lists of strategically critical raw materials for which they want to ensure security of supply. While these materials are indispensable for renewable energy technologies, there is additional competition for them because they are also used in digitalisation and the aerospace and defence sectors. Supply chain resilience and strategic autonomy have gained importance among policymakers, and discussions on 're-shoring' or 'friend-shoring' production are ongoing. Re-shoring and friend-shoring refer to bringing offshore production back to its country of origin or to countries considered "friendly".

As a part of the heightened competition, the US imposed export controls on semiconductor products to China in 2022. In response, China – dominant in processing several transition minerals and in manufacturing components and technologies – imposed export controls on gallium, germanium and graphite. The materials are needed, for example, in solar panels and lithium-ion batteries. In addition to the major powers, Chile, Zimbabwe, the Philippines and Indonesia have also taken, or are considering taking, a more protectionist stance in relation to their material resources.[9]

To some extent, climate policy has been reframed as strategic economic policy.[10] For example, China's Made in China 2025 Roadmap, the Inflation Reduction Act in the United States, and the EU's Green Deal Industrial Plan are examples of policies that support domestic production of clean-energy technologies. Regions and countries compete with each other for green technology investments and take measures such as tax breaks and subsidies in order to boost the competitiveness of their economy. Tariffs are also imposed: in 2024, fearing overcapacity due to the Chinese government's support for its electric vehicle industry, the EU, US and Canada announced tariffs on Chinese electric vehicles. In response to EU trade tariffs, China is considering similar measures for European food and drink products.[11]

The emphasis on economic and technological competition and raw material self-sufficiency in high-consumption regions such as the US and Europe might risk slowing down the uptake of these technologies in the shorter term. If Western import customs or Chinese export restrictions prevent these countries from using less expensive Chinese solar cells or electric cars, they will

5 PwC (2024). Climate risks to nine key commodities: Protecting people and prosperity. https://www.pwc.com/gx/en/issues/esg/people-and-prosperity-at-risk.pdf.

6 Bailey, R., & Wellesley, L. (2017). Chokepoints and Vulnerabilities in Global Food Trade. The Royal Institute of International Affairs; Chatham House Report. https://www.chathamhouse.org/2017/06/chokepoints-and-vulnerabilities-global-food-trade.

7 Becker, A. et al. (2018). Implications of climate change for shipping: Ports and supply chains. WIREs Climate Change, 9(2), e508.

8 European Environment Agency. (2019). Adaptation challenges and opportunities for the European energy system: Building a climate-resilient low-carbon energy system. Luxembourg: Publications Office of the European Union; EEA Report No 01/2019. https://www.eea.europa.eu/publications/adaptation-in-energy-system.

9 Cohen, J., et al. (2023). *Resource realism: The geopolitics of critical mineral supply chains*. Goldman Sachs. https://www.goldmansachs.com/insights/articles/resource-realism-the-geopolitics-of-critical-mineral-supply-chains.

10 Lewis, Joanna I. 2024. The Climate Risk of Green Industrial Policy. Current History 123 (849): 14–19. https://doi.org/10.1525/curh.2024.123.849.14.

11 Song, W. et al. (2024, August 28). Q&A: The global 'trade war' over China's booming EV industry. Carbon Brief. https://www.carbonbrief.org/qa-the-global-trade-war-over-chinas-booming-ev-industry/.

need to subsidise their own production. Consequently, the prices of these technologies could rise and their uptake might slow down. Diversifying production chains and reducing their geographical concentration in China is helpful in reducing supply chain disruptions and in decreasing dependence on China. It may also increase the legitimacy of domestic climate policy by revealing its benefits in the form of employment and revenue. However, this will be extremely difficult to realise without major efforts to set up local production and foster partnerships with offshore producers elsewhere.

To enhance its strategic autonomy, the EU has set ambitious targets related to strategic raw materials in the Critical Raw Materials Act: by 2030, 10% of the EU's annual material consumption should be extracted within the EU; 40% should be processed within the EU; 25% should come from recycled materials; and no more than 65% of the annual consumption of each strategic material should come from a single third country. However, considering the previously discussed bottlenecks, the targets appear to be unreachable within the given timeframe. To diversify and secure its supply of critical raw materials, the EU has started investing in so-called raw materials diplomacy with non-EU countries such as Australia, Rwanda and Zambia.

It could be much easier to strengthen strategic autonomy by reducing the consumption of energy and especially natural resources, both in Finland and in the EU. In other words, demand reduction could be a stronger part of the efforts to increase material self-sufficiency. Recycling, technological innovation and material substitution, in addition to behavioural changes leading to reduced consumption, are all needed. This saving and reduction is also relevant for policymaking, such as the national mineral strategy and the industrial policy strategy that Finland is currently compiling. In order for these strategies to also be effective in building stronger security of supply, they should contribute to Finland's emission reduction targets and the need to address overconsumption of natural resources.

CONCLUSIONS

Comprehensive approaches, such as security of supply in Finland, are essential for addressing the kind of cross-sectoral impacts that climate change and its mitigation generate. Yet Finnish security of supply does not currently integrate climate change in a systematic way. By integrating climate and environmental risk awareness more closely into preparedness work, Finland could improve its resilience to multiple crises – as well as provide an internationally interesting example of climate security.

There is a need for *better foresight* on climate-related risks to security and supply. While these risks tend to be complex, it is often possible to identify the broader causal pathways underlying them. For example, the risks related to energy transition presented in this paper can be linked to material access, geopolitical competition, and climate impacts. Once these causal pathways are known, they could be traced and monitored effectively.

The monitoring and foresight data should also be used to complement situational awareness and *shared within the comprehensive security community*. The Finnish participatory model has the advantage of involving a diverse group of actors, making it possible to prepare for sector-specific implications of climate-related risks. For example, the severity of impacts caused by a major shortage of cobalt as a result of long-lasting droughts in Africa is likely to be different in different sectors, as are the options for alternative supply chains. However, through shared situational awareness, it is possible to coordinate responses and pool resources.

Building upon a shared situational awareness and the existing cooperation within the National Emergency Supply Organisation, it is also possible to develop *common preparedness measures* for climate-related risks to security of supply. This would require close integration of climate-related foresight data into joint exercises, risk analysis and scenario building. At best, such activities could yield mutually recognised contingency measures that can be applied when a given vital function is threatened. For instance, stockpiling should be reconsidered to also take into account those critical raw materials and components that are considered the most essential for a range of societal functions.

The ongoing energy transition also calls for a deeper re-thinking of the objectives of security of supply at the policy level. Traditionally, Finnish security of supply has been about preparing for sudden, short-term crises, and in a world of chronic environmental emergency, such thinking may fall short. While resilience in the face of fast-burning crises remains important, it is also essential to ensure that maintaining vital functions at present does not end up threatening the ability to safeguard them in the long run. Instead of trying to artificially support fossil-intensive fuel production in the name of security of supply, the aim should be to ensure that security of supply measures are also sustainable in terms of energy transition. For example, the procurement of equipment for the Defence Forces must take into account the availability of fuel for decades to come.

At best, the approach to security of supply can yield foresight and practices that will simultaneously benefit crisis preparedness, societal security and the mitigation of climate change. To remain relevant in the present, security of supply should seek to ensure an energy transition to a less crisis-prone world. /