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The Quad's role in shifting to resilient technology supply chains and energy security

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Key points

- The Quad countries are working collaboratively to create new technology supply chains that are resilient and immune to Chinese coercion.
- A cooperative approach to creating new supply chains among like-minded nations is necessary to making them sustainable over time, even as the United States takes targeted, unilateral steps to restrict Chinese access to technology.
- The levels of development and areas of focus for each Quad member's critical and emerging technologies industries vary substantially; they should play to their individual strengths.

Policy recommendations

Quad countries should:

- Incentivise private sector investment in the production of critical technologies and minerals by employing economic policy tools such as loan guarantees and direct equity investments that will facilitate the creation of new and resilient supply chains.
- Explore the feasibility of joint strategic investments in critical mineral projects in partner countries.
- Combine research and development efforts to improve battery technologies and manufacturing in ways that reduce dependence on cobalt and nickel.

Introduction

Supply chain disruptions during the Covid-19 pandemic, combined with intensifying US-China technology competition, have placed the development of secure and resilient technology supply chains at the top of the Quad agenda. Quad nations have experienced the negative results of China's aggressive industrial policies aimed at establishing Beijing's economic and technological dominance in the Indo-Pacific and coercing other nations to support Chinese security and foreign policy objectives.

The vulnerability of global supply chains that run through China became evident during the Covid-19 pandemic when China sought to coerce nations that were dependent on Chinese medical equipment, medication, and pharmaceutical ingredients.[1] Japan had experienced Chinese economic coercion long before the pandemic, particularly in 2010, when Beijing suspended exports of rare earths to Tokyo over a maritime dispute.[2] In 2020, China reduced imports of coal, barley, wine, and other products from Australia after Canberra called for an independent investigation into the origins of Covid-19.

Based on China's behaviour, the Quad countries are working collaboratively to create new supply chains that are resilient and immune to coercion. To maintain its technological edge, the US – under both the Trump and Biden administrations – has taken targeted unilateral steps to

restrict Chinese access to technology. However, due to the globalised nature of technology supply chains, Washington must also focus on cooperating with like-minded nations to create new technology supply chains that are sustainable over the long-term.

Prioritising semiconductors

Semiconductor technology has become a focal point in the US-China technology race. The rapid increase in demand for semiconductors during the pandemic and disruptions to the supply chain that impacted the automotive industry highlighted the challenges. US chip manufacturing has plummeted from 37 per cent of global manufacturing in 1990 to 12 per cent by 2021, and there is now a major push to reverse the tide.[3]

The US has begun to transform investment and industrial policies to maintain its technological edge vis-à-vis China. In August of last year, the US Congress passed the ***CHIPS and Science Act***, which includes US$52 billion in funding for the US semiconductor industry. The legislation aims to increase domestic manufacturing of high-end semiconductors, catalyse research in the semiconductor sector, and create American jobs.[4] To receive the funding, US companies must agree to avoid expanding the manufacture of semiconductors in China or pursuing joint research or technology licensing with China or other countries of concern for 10 years. It was the Trump administration that took the initial steps in 2018 to limit China's access to semiconductor technology to check advances by China's heavily subsidised telecommunications giant Huawei in the global 5G market. The Biden administration upped the ante on 7 October 2022, when it announced sweeping restrictions on selling advanced semiconductors and chip manufacturing equipment to China.[5]

Washington is also shoring up multilateral diplomacy and collaboration with partners and allies to address tightening technology competition with China. It has established the US-European Union Trade and Technology Dialogue and the Chip 4 Alliance with South Korea, Japan, and Taiwan and has made securing supply chains a major pillar of the Indo-Pacific Economic Framework. Another critical forum for coordinating new semiconductor supply chains is within the Quad, which in September 2021 launched the Semiconductor Supply Chain Initiative to 'map capacity, identify vulnerabilities, and bolster supply chain security'.[6] To catalyse private sector involvement, the Quad Investors Network was launched in May 2023, bringing together public, private, and philanthropic stakeholders to foster cooperation and co-investment in critical technologies and supply chain resilience initiatives. The Network has established five working groups in semiconductors, quantum information sciences, clean energy and critical minerals, artificial intelligence, and mobile networks.[7]

Since the level of development and areas of focus of the semiconductor industries in each Quad country varies substantially, their collaborative efforts will be most effective if they each play to their individual strengths. The US excels in the design and manufacture of specialised equipment, while Japan is a leader in memory products and accounts for 35 per cent of semiconductor manufacturing equipment and half of global semiconductor materials supply.[8] Australia lacks large semiconductor design, manufacturing, or testing facilities, but does have large critical mineral deposits and mining capabilities that are integral to the broader microelectronics industry.[9] India has a large supply of skilled workers with strong potential to contribute to the testing and packaging parts of the semiconductor production process. During Indian Prime Minister Narendra Modi's visit to Washington in June 2023, US semiconductor company Micron announced it was investing US$825 million in a new semiconductor assembly and testing facility in Gujarat, India.[10]

The critical minerals link to technology supply chains

Critical minerals are foundational to the digital economy, as well as the transition to renewable sources of energy. At the most recent Quad leaders' summit in Hiroshima, Japan in May 2023, the Quad announced a Clean Energy Supply Chain Initiative to enhance collective energy security and support the global energy transition. Although not stated publicly, one of the initiative's key aims is to reduce reliance on Chinese-produced critical materials and technologies needed for renewable energy alternatives, as well as microelectronic devices such as smartphones, computers, and laptops, and some military technologies.

In March 2022, US senators introduced ***The Quad Critical Minerals Partnership Act*** to address the national security threat posed by China's control of two-thirds of the global supply of critical minerals. In addition to accounting for most global production of critical minerals, China is also responsible for around 80 per cent of global processing of minerals including copper, lithium, nickel, cobalt, and rare earth elements, and controls 77 per cent of the world's electric vehicle manufacturing capacity. Beijing already is starting to exercise its leverage over global mineral supplies, as demonstrated by its recent decision to control the export of gallium and germanium.

Within the Quad, Australia and India are pursuing cooperation in critical minerals, especially rare earth elements (REE). Australia is the fourth-largest REE producer, while India's demand for REE is driven by its need for magnets used in defence and environmental technology.[11] The two countries signed a Memorandum of Understanding (MOU) on critical minerals in 2020, and further deepened their cooperation during Australian Prime Minister Anthony Albanese's March 2023 visit to India, where cooperation in critical minerals was a major theme of discussions. The two sides have identified five potential projects in lithium and cobalt production, and Indian company Khanij Bidesh India Limited (KABIL) is preparing for a major investment in Australia's rare earth sector. Australia's Minister for Resources and Northern Australia, Madeleine King, recently said, 'India's goals to lower carbon emissions and boost electric vehicle production presents great opportunities and prospects for Australia's critical minerals sector, for renewable exports and for building stronger supply chains.'[12]

Supply chain security for the future

The Quad nations are rightly focusing on building resilient and secure technology supply chains, but unless they build links between the private and public sectors and incentivise major shifts in investment and production of critical technologies and minerals, thoughtful joint statements and well-intentioned government working groups will not amount to much. Given the capital-intensive investments required to develop new sources of critical minerals, the Quad should exchange ideas on deploying government resources and tools to the task and explore the feasibility of joint strategic government investments in critical mineral projects in partner countries. The Quad should also combine research and development efforts to improve battery technologies and manufacturing in ways that reduce dependence on cobalt and nickel, two critical minerals that are highly susceptible to supply chain disruptions.

While the US will likely continue taking unilateral steps that seek to restrict China's access to advanced chips, it cannot meet the challenge of creating trusted and reliable technology supply chains on its own. Washington needs to consult and collaborate closely with its partners and allies as it takes new restrictive measures on technology trade with China and to create the new supply chains necessary for maintaining a stable, secure, and increasingly climate-friendly global economy.

Notes

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[3] Scharre, ***Four Battlegrounds***, page 179.

[4] Emily Benson, Japhet Quitzon, and William Alan Reinsch, "Securing Semiconductor Supply Chains in the Indo-Pacific Economic Framework for Prosperity: Squaring the Circle on Deeper Cooperation," ***CSIS.org,*** 30 May 2023, accessed 24 October 2023, https://www.csis.org/analysis/securing-semiconductor-supply-chains-indo-pacific-economic-framework-prosperity.

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About the Quad Tech Network

The Quad Tech Network (QTN) is an initiative of the NSC, delivered with support from the Australian Government. It aims to establish and deepen academic and official networks linking the Quad nations – Australia, India, Japan, and the United States – in relation to the most pressing technology issues affecting the future security and prosperity of the Indo-Pacific.

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