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What Xi Jinping's third term means for science

At the Chinese Communist Party's 20th congress, Xi laid out his vision for science and innovation to drive the country's growth.

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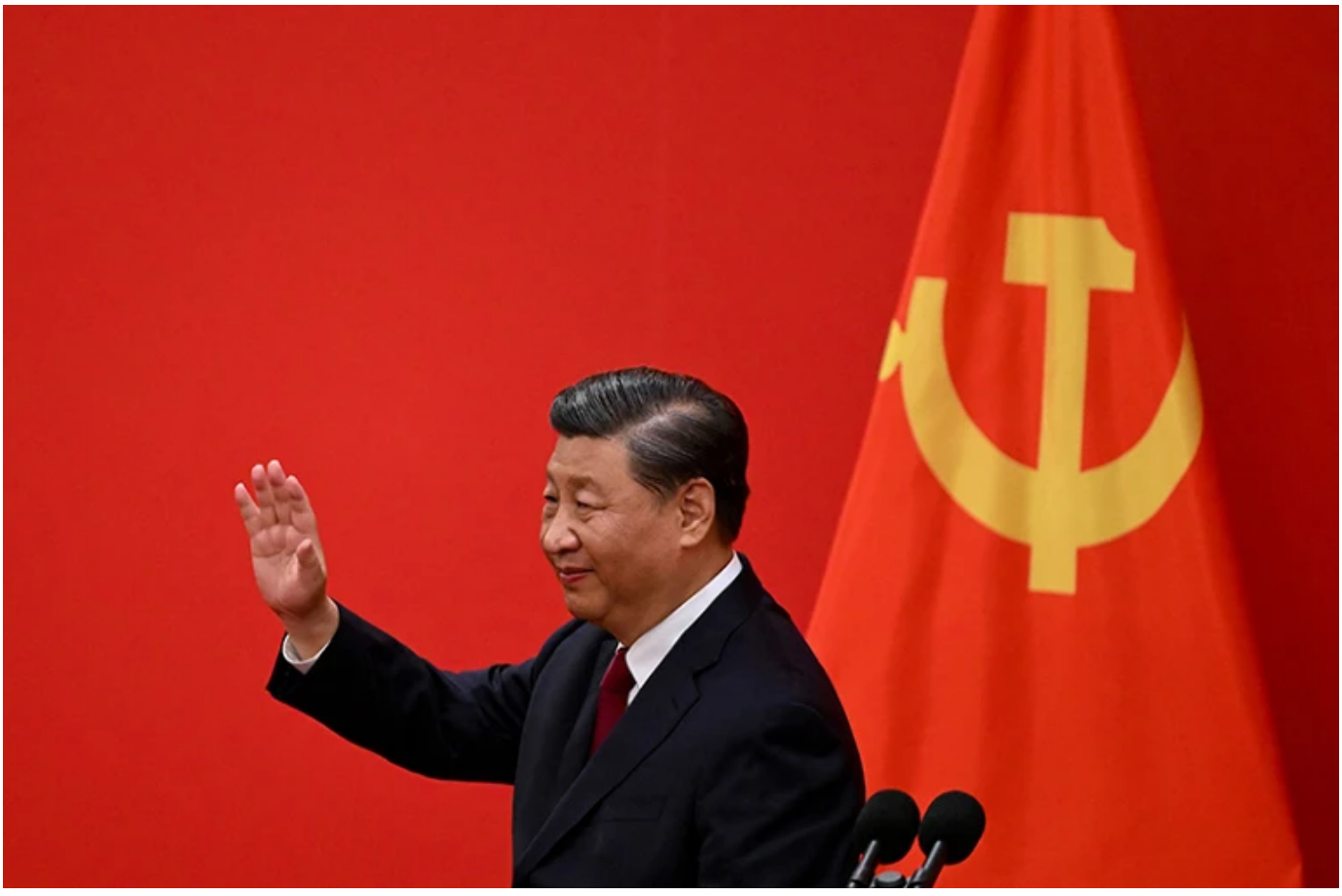

President Xi Jinping's speech at the opening of China's 20th Communist Party congress emphasized self-reliance in science and technology. Credit: Noel Celis/AFP via Getty

China's ambitions and reliance on science and technology were front and centre at the Communist Party's all-important 20th congress in Beijing, which ended on Sunday.

President Xi Jinping said at the opening of the meeting, held every five years, that the country must "regard science and technology as our primary productive force, talent as our primary resource and innovation as our primary driver of growth".

On Sunday, he was reinstated as general secretary of the party for a third term, breaking a convention established four decades ago, and there was a major reshuffle of the party's senior leadership. The decision-making body called the Politburo gained several members with qualifications or experience working in science or technology: 6 out of 25 members now have a science background, compared to just one member in the previous Politburo.

Nature spoke to science-policy analysts about Xi's opening address, a shortened version of a written report that sets the agenda for the party to 2027 and beyond.

Science funding

Analysts say that China's epic investment in science is likely to continue.

In 2021, China spent 2.8 trillion yuan (US$386 billion) on research and development (R&D), accounting for 2.4% of its gross domestic product (GDP), a measure known as R&D intensity. The country's most recent five-year plan aims for an increase of more than 7% every year from 2020 to 2025. If that continues until 2035, China's R&D intensity could reach parity with the average for countries in the Organisation for Economic Co-operation and Development, which has reached close to 2.7%, says Marina Zhang, who studies innovation in China at the University of Technology Sydney in Australia. However, China's below-target GDP growth this year could mean businesses will find it harder to increase their investment in R&D, she says.

There is little doubt that China will strengthen its R&D investment despite the economic situation, says Futao Huang, a researcher in higher education at Hiroshima

University in Japan. The importance of science and technology is reflected in how often the term appears in the written congress report — 44 times, compared with 17 times in the 2017 report, 16 times in 2012 and 15 times in 2007, according an analysis by Jing Qian, who heads the Asia Society Policy Institute's Center for China Analysis in New York City.

Qian's analysis also found that some 42 officials with formal degrees and work experience in science have been selected for the Central Committee, a political body that comprises the party's top leadership, including the Politburo. These members typically go on to head government bodies, including science-related ministries and research-funding agencies.

Semiconductors and self-reliance

Earlier this month, the United States introduced new restrictions on exports of advanced semiconductor technology, along with manufacturing equipment and know-how, to China. The controls are the latest in a long line of US-imposed barriers to the trade on which China would have relied to build its innovation economy. Xi's speech stressed the importance of self-reliance in science and technology; researchers say this priority could translate to increased investment in strategically important industries such as semiconductor manufacturing, the digital economy, quantum computing and biomedicine. "If you can't buy it, you've got to make it," says Denis Simon, who studies Chinese science and innovation at Duke University in Durham, North Carolina.

But researchers will be watching how China plans to allocate funds. Zhang says more of the money will need to go to fundamental research, and companies will need to shoulder more of that investment, which so far has come mostly from the government.

The report's nod to the business sector's major role in allocating R&D investment is encouraging, says Zhang. "Innovation requires diversity, innovation requires autonomy and innovation needs to tolerate failures," she says. But Qian says the central government has increasingly been intervening in market dynamics, and this is

likely to continue. In such an environment, the bulk of the money will probably continue to flow to researchers at state-owned enterprises, leading technology firms and top universities, and less will go to those at smaller companies and universities. Qian says China's scientific community does not seem very optimistic about the research environment, owing to policies that impinge on academic freedom.

China is also expected to prioritize research in aerospace — including space science — defence, climate change, clean energy and agriculture, among other areas, says Qian.

Talent drive

Xi's speech noted that China already has "the largest cohort of research and development personnel in the world". He said that to boost innovation, investments in the country's skilled workforce will continue.

Studies have shown that despite huge efforts to train China's researchers in some areas such as artificial intelligence, "there is still a quality gap", says Jacob Feldgoise, who studies science and technology in China at the Center for Security and Emerging Technology at Georgetown University in Washington DC. For example, Chinese researchers produce more artificial-intelligence publications than do researchers in the United States, but US papers garner double the share of global citations.

To boost the workforce, China could try to recruit international researchers and entice back Chinese scholars based overseas, alongside training local scientists, say researchers. But hiring foreign talent is a sensitive topic, Simon says, so local efforts "will be given high priority and the overseas recruitment will be more quietly done, without fanfare". In recent years, scientists in the United States have come under scrutiny for not declaring financial ties to talent-recruitment programmes in China.

Some analysts suggest that political tensions between the United States and China have spilled over into science. In the past few years, fewer researchers have been declaring dual US–China affiliations in their publications, and there has been a decline in the number of publications co-authored by scientists in the two countries. In the short to medium term, US and Chinese researchers will probably continue to

engage, but at nowhere near the levels observed "during the heyday of bilateral cooperation", in the 1990s through to the mid-2010s, says Simon. China's increased emphasis on fostering home-grown talent could come with more pressure to show results, he adds. "It is no longer simply desirable for China to improve its innovation performance; it is now a national imperative."

Even so, China intends to "expand science and technology exchanges and cooperation with other countries", says the congress report. This could see China shifting away from working with the United States to focus on other regions, such as Europe, Australia or Canada, and even expanding its scientific ties with countries involved in its global infrastructure plan, the Belt and Road Initiative, says Simon.

Zero COVID

Researchers in China say travel restrictions under the country's stringent zero-COVID policy have made it difficult for them to develop and maintain relationships with peers abroad. Limited availability of flights, high ticket costs and extensive quarantines mean that it is almost impossible to travel abroad or for foreign scientists to enter China, says Cong Cao, a science-policy researcher at the University of Nottingham Ningbo China, who is eager to meet face-to-face with overseas colleagues and attend international conferences again.

Before the congress, analysts presented conflicting views on whether restrictions could ease soon. Xi mentioned zero-COVID only once during his speech — to point out its merits. Qian says this might be because zero-COVID is an established policy, so Xi saw no need to elaborate on it. Or it could indicate that Xi wants to maintain flexibility and is open to change, says Qian.

Some researchers say it is possible that China will try lifting some restrictions after the party congress, but others say it won't budge until the country's legislative body, the National People's Congress, meets early next year.

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