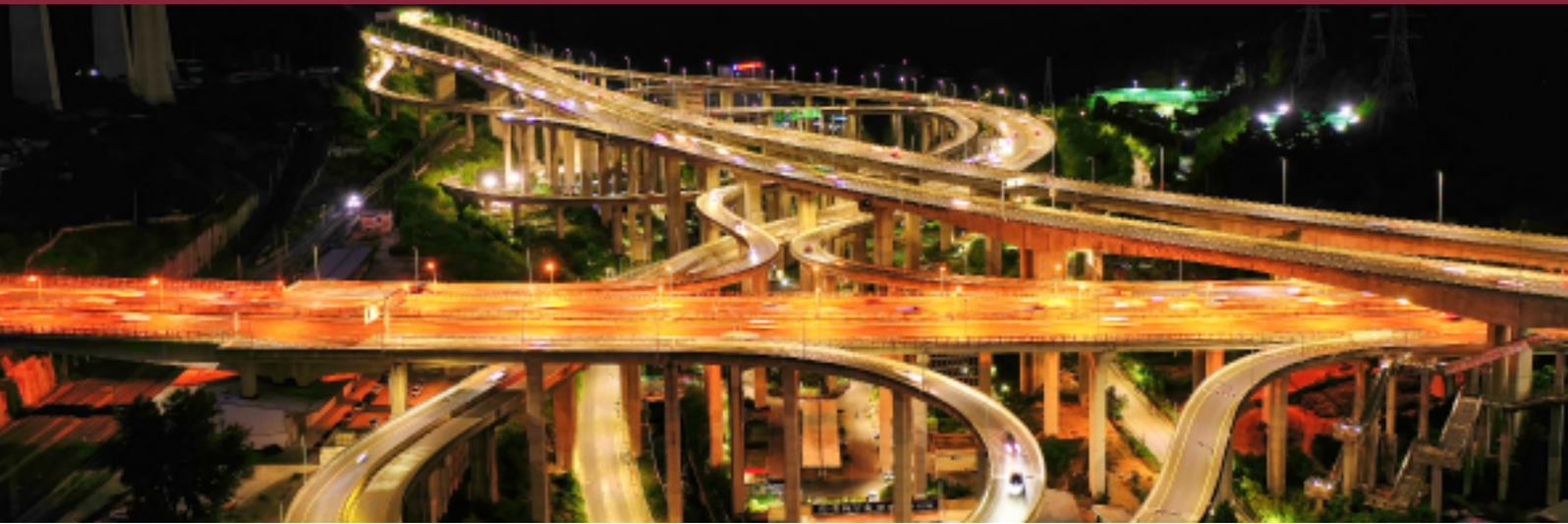


Searching for Growth Engines Via Innovation



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Exports as China's Sole Growth Engine Threatens its Trade Relations

The latest official Chinese figures on the economy confirm two simultaneous truths.

One: deflation, lower demand for durable goods and lower imports persist, even if there is some consumption rebound.¹ New fiscal stimulus and a strong push for local government bonds to rescue the real estate sector have not had an impact on new borrowing and investor trust. Moody's downgrading warning can well justify **Xi Jinping's reported remark that the Chinese economy is still "at a critical stage (经济恢复仍处在关键阶段)"** – and vice-versa.²

Two: there remains policy space to boost the economy. Even officially, China's currency reserves have risen again, while the true extent of holdings in foreign denominated assets is generally underestimated. Official policy has consistently refused monetary expansion, on grounds of financial security and because the interest gap with other major currencies has narrowed or disappeared, suggesting

there is a risk of hot money outflow. But **Xi now talks of an "effective (有效)" if stable monetary policy.** And exports, after five years of boom, are holding up, even as the Chinese government cites weak international demand as a factor weighing on a sluggish domestic economy.

The consequences for China's economic partners are quite clear. **Exports have become the mainstay of growth. They are spearheaded by China's breakthrough in key industries of the future and in core consumer sectors,** themselves fueled by past and present investment and subsidies. After solar panels, and batteries, China's nuclear industry looks ready for exports. Among many nuclear developments, China has just connected to its electricity grid the world's first gas high-temperature small modular reactor (SMR) – and is well on the way to put into production a low cost pressurized SMR. This is also the path to achieve more green hydrogen production, another potential breakthrough for the auto industry.

¹ "今年前11个月我国进出口持平11月份同比增长1.2% (My country's imports and exports were flat in the first 11 months of this year, with a year-on-year growth of 1.2% in November)," General Administration of Customs of the People's Republic of China, December 7, 2023, <http://www.customs.gov.cn/customs/xwfb34/302425/5548876/index.html>

² "征求对经济工作的意见和建议 中共中央召开党外人士座谈会 习近平主持并发表重要讲话 (To solicit opinions and suggestions on economic work, the Central Committee of the Communist Party of China held a symposium for non-party persons. Xi Jinping presided over and delivered an important speech)," Government of the People's Republic of China, December 8, 2023, https://www.gov.cn/yaowen/liebiao/202312/content_6919158.htm

Let's not focus purely on foundational or critical technologies: in the auto industry, for instance, exports of thermal vehicles increase just as rapidly as that of electric vehicles (EVs). Even if national subsidies have now been stopped, provincial competition has created production capacities of 40 to 50 million cars per year.³ Chinese solar panels are currently selling at a heavy discount in Europe. In spite of the chip export denials that impede Huawei, China still makes two-thirds of the world's mobile phones.

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The drive for new export niches will not stop. In the measures announced to boost the economy, the accent is now put on innovation, including immaterial infrastructures. **Support for "infrastructures (基础设施)," long a mainstay of China's economic policies, is now tilted towards greening or digital infrastructures, as well as education.** China's government is taking measures to unify the standards of domestic products with those prevailing internationally. In the past, this would have been interpreted as a gesture of opening up the market to imports. Today, it is much more likely to result in more exports from overcapacities in domestic production. Raising industry standards also means that public policy is now anticipating new international criteria for emis-

sions and sustainability. It is a response to the requirements for sustainability that Chinese officials call protectionism in disguise.

Overall, **deflation and a fairly managed currency guarantee continued international competitiveness for Chinese products.** In fact, were the real estate, local debt and finance crises to worsen, it would still be possible to sell foreign assets in order to restore confidence about the ability to extinguish debt, or alternatively to let the renminbi slide with a truly expansionary monetary policy – and therefore even more competitive exports.

From inside China, it is only a political or societal crisis that could challenge the present course. Unemployed youths are candidates, as are poorly compensated migrant and gig workers. So are indebted home buyers, who in China have no available debt resolution and must repay their loans to the last penny: in the words of one proud investment adviser extolling China's economic strength, they "*cannot flee from the temple.*"⁴ Such events as a political upheaval, not to mention factional strife at the top, are basically unpredictable.

It is therefore China's partners who now face a dilemma. The news about the death of the Chinese economy has been greatly exaggerated. According to reports, Xi Jinping may have expressed this dilemma crudely to the EU leaders at their recent meeting in Beijing: Europe cannot achieve its greening transition without Chinese exports, given the higher cost of all alternatives. At the end of the day, after everything has been said about the unequal playing field,

³ "2023年10月汽车工业产销情况 (Production and sales of the automobile industry in October 2023)," China Association of Automobile Manufacturers, November 14, 2023, http://www.caam.org.cn/chn/4/cate_32/con_5236270.html

⁴ Shan Weijian, "中国能否持续增长? (Can China continue to grow?)," WeChat, November 17, 2023, <https://mp.weixin.qq.com/s/hxuJcGaWHkiurhq9vEHANw>

subsidies and dumping, it remains that **imports from China are a hedge against producer inflation, even more so in the sectors where innovation has been most strongly supported by decades of government intervention and funding.** Where tariffs are a problem, Chinese goods transit through third countries, or are assembled there.

This is exactly the goal that Xi Jinping has explicitly pursued in the last decade – to **make China's partners more dependent on China than it is relatively to those same partners.** And to a large extent, he is still succeeding, in part because political democracies are also consumer societies with a low threshold for economically unsatisfactory options. Decoupling is a no-no, even though a pioneering study is claiming lower costs for Germany than for China.⁵ Under the CCP's guidance and control, it is possible to keep the share of household income at 45 % of the GDP, where in the United States (and France) it reaches 70 %. China's political system enables it to "save" – read, make available for investment through a largely public financial system – the equivalent of 40 to 45 % of aggregated household and company income. This allows for many inefficiencies, including long shot bets on innovation, added costs from import substitution, overemphasis on infrastructures and the like.

Western hopes that China will change its economic model have floundered on unavoidable realities in the past two decades. Rebalancing the economy towards household income, consumption and a service economy with increasingly powerful private companies and individuals would challenge Party power, and in fact its own income base. That is precisely the reason why this generation of political leaders will not let this happen. **China has the management capacity to steer extraordinary indus-**

trial, urban, energy and transport development. It does not have the checks and balances necessary to create an independent central bank, liberalize capital markets or become a significant international borrower – which would signal the true emergence of the renminbi as a reserve currency.

It must therefore accumulate, invest – and depend on the rest of the world to absorb its productive surpluses. Short of international crisis scenarios, this is where China's true dependence lies.

The instinctive emphasis on limited de-risking as opposed to broader decoupling seems mistaken, particularly for Europe. Not only, as is often pointed out, because China literally invented one-sided decoupling. But also because Europe, thanks to its adherence to multilateral trade and institutions such as the WTO, has a larger dilemma than most. The United States and India have closed their doors to Chinese solar panels. They, with Japan and more recently Turkey, are essentially banning Chinese EVs from their roads. **The result is that China's overproduction in these key sectors is, by default perhaps, directly aimed at the European market.**

This is in fact what the EU tried to get through to China's leaders at their recent Beijing meeting. **In a trade world where WTO no longer serves for conflict resolution, barriers are going up for various reasons – national security, economic security or plain and simple retaliation for China's own policies.** So far, Europe has remained more open to Chinese exports than other major economies. It could indeed delay greening and emission curbs, which would gain a respite from China's export drive in those sectors. It could also accelerate and increase taxation at the border on sustainable and ethical concerns, using

⁵ "Cost of decoupling from China for German economy severe but not devastating," Kiel Institute for the World Economy, December 14, 2023, <https://www.ifw-kiel.de/publications/news/cost-of-decoupling-from-china-for-german-economy-severe-but-not-devastating/>

the proceeds for its own greening transition. As European Commission President von der Leyen is known to have told Mr. Xi: China's export drive is politically unsustainable in Europe. If China does not curb its financing and export policies, it will soon lose the last open partner in many sectors.

If China does not curb its financing and export policies, it will soon lose the last open partner in many sectors.

This is not Europe's preferred course of action. The Single Market itself was built on multilateral rules. Free marketeers rightly point out that targeted protectionist measures shift China's export through third markets. They also point out our own higher costs due to increased import prices or reduced competition. **Adversaries of de-risking, whether it is conducted for reasons of national security or for broader economic security purposes, emphasize that this may also reduce our access to Chinese innovation** (truly present in many logistical processes such as 5G, port control or auto production processes), and stimulate even more support in China for self-sufficiency in science and technology. All very true, but less consequential than letting a command economy abuse its "*developing economy*" status gained a quarter of a century ago, when its GDP per capita was circa 1000 dollars. Of course, the strategic competition and "*struggle*" initiated in the Xi era add a political dimension, as hopes for change and convergence are put off to a future generation.

There is currently no real self-correcting mechanism in China's political economy. The imbalances have been there for a very long time, and **it is naive to expect that a leadership so devoted to struggle and strategic competition will commit itself to fair trade and updated multilateral rules.** Indeed, our defensive measures will in some cases create added costs for our societies – and Xi is right when he refers to these costs. We may have to delay some greening to avoid over-dependence on China or face popular revolts if doing without China indeed proves very costly. The EU is particularly vulnerable, as it has the most ambitious plans combined with a relatively small carbon footprint in all but some energy production sectors.

De-risking implies costly research, procurement and industry costs, best shared on a wider scale with suitable partners, whether these are like-minded or have similar interests. If the United States has the energy resources, the capital depth and protectionist legislation to manage economic policy almost on its own, Europe does not have the same resources, and has taken more of a stand against protectionism. From these weaknesses, China has deduced more willingness to compromise, and there are Europeans who would oblige.

Let's tell them that it is only the advent of European trade defenses and other new tools under development, and a new firmness in refusing empty talk from Beijing, that may bring China to the table.

Pierre Pinhas



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Pierre Pinhas joined Institut Montaigne in 2023, where he is notably in charge of China Trends. Whether on economic, environmental, or geopolitical issues, his work also consists of enriching the various publications of the Asia Program with Chinese sources.

The Real State of Infrastructure Investment

"A relatively stable growth rate (相对平的增长状态)" is how Liu Aihua, Chief Economist and Director of the National Economic Comprehensive Statistics Department of the National Bureau of Statistics, described the recent infrastructure investment figures.¹ A vague assessment, not exclusive to infrastructure investment, and indeed reflecting the growth challenge of various sectors of the economy. Even if that growth is largely public-funded, it is still there in official statistics, whether one looks at annual (9.4% increase in 2022 year-on-year) or monthly numbers (5.8% increase in November year-on-year).^{2,3}

The economic potential from infrastructure investment has come under the spotlight, following the October 23 announcement of 1 trillion yuan (129 billion euros at the October 2023 exchange rate) in special treasury bonds to help provinces in their post-natural disasters recovery and reconstruction – a use of funds towards affected provinces that was re-emphasized by Xi Jinping on November 10.⁴ One week later, Premier Li Qiang further insisted that these funds would support rural infrastructures – namely water conservancy, irrigation and "high-standard farmland construction" – and boost rural employment.⁵

¹"国务院新闻办发布会介绍2023年10月国民经济运行情况 (Briefing by the State Council Information Office on the operation of the national economy in October 2023)," Government of the People's Republic of China, November 15, 2023, https://www.gov.cn/lianbo/fabu/202311/content_6915332.htm

²According to the National Bureau of Statistics, infrastructure investments grew year-on-year by 3.8% in 2018, 3.8% in 2019, 0.9% in 2020, 0.4% in 2021 and 9.4% in 2022, with the last year's percentage important due to a low base in 2021.

³This figure excludes electricity, heat, gas and water production and supply industries. Among the other infrastructure investments, investment in the railway transportation industry increased by 21.5%, investment in the water conservancy management industry increased by 5.2%, investment in the road transportation industry decreased by 0.2%, and investment in the public facilities management industry decreased by 2.5%. See "2023年1—11月份全国固定资产投资增长2.9% (National fixed asset investment increased by 2.9% from January to November 2023)," National Bureau of Statistics, December 15, 2023, https://www.stats.gov.cn/sj/zxfb/202312/t20231215_1945573.html

⁴"习近平在北京河北考察灾后恢复重建工作 (Xi Jinping inspects post-disaster recovery and reconstruction work in Beijing and Hebei)," Government of the People's Republic of China, November 10, 2023, https://www.gov.cn/yaowen/liebiao/202311/content_6914766.htm

⁵"李强对推进农田水利和高标准农田建设作出重要批示强调: 大力推进农田水利和高标准农田建设为保障 国家粮食安全奠定坚实基础 (Li Qiang gave important instructions on promoting farmland water conservancy and high-standard farmland construction, emphasizing that vigorously promoting farmland water conservancy and high-standard farmland construction will lay a solid foundation for ensuring national food security)," Government of the People's Republic of China, November 17, 2023, https://www.gov.cn/yaowen/liebiao/202311/content_6915871.htm

To some extent, this financial measure appears as a remedy to address the needs of massively indebted local governments while not having the name tag of a stimulus plan.

But what should we understand to be infrastructures? In the general sense, infrastructures are **"the common material basis for the production, operation, work and life of all enterprises, units and residents."**⁶ And concretely, these facilities and systems include transportation, post and telecommunications, water and power supply, commercial services, scientific research and technical services, landscaping and environmental protection, culture and education. Liu Feng and Nie Weixin, two economists from the Central University of Finance and Economics, further present them as *"material engineering facilities that provide public services for social production and residents' lives,"* a definition that takes into account infrastructures' positive externalities and encompasses new societal concerns.⁷

This paper focuses on domestic infrastructure and therefore does not cover BRI-related infrastructures. From this, do Chinese experts assess that infrastructure investment can generate economic growth, alongside other engines of growth such as booming manufacturing industries (automobile, batteries etc.) and as real es-

tate is running dry? And what explains the expansion of the definition of *"infrastructures"* by some experts?

Investments in infrastructures, an unavoidable remedy for economic stimulus?

Real estate is no longer the *"forefront sector driving China's economy"* as explained by Xu Hongcai, Deputy Director of the Economic Policy Commission of the China Association of Policy Science.⁸ While real estate investment accounted for about one-third of the country's fixed asset investment of China's GDP growth until recently, this is not the case anymore.⁹ China's real estate sector has in fact been a negative contributor to China's overall economic growth since 2022.¹⁰ Calls have been made for a renewed approach to enliven the property market, through government-funded construction of affordable housing or urban renovation for instance. But this approach is slow to materialize and cannot be the only solution.

In contrast, especially in the secondary sector, infrastructure investment still appears as a growth driver. Yet, diverging voices exist among Chinese researchers. Zhang Jun, Dean of Fudan University's School of Economics, criticizes the risks of a stimulus through investments.¹¹ In his opinion, more infrastructures could prove

⁶ This definition, available on Baidu (*"基础设施建设"* <https://baike.baidu.com/item/%E5%9F%BA%E7%A1%80%E8%AE%BE%E6%96%BD%E5%BB%BA%E8%AE%BE/5031234>) and with reference to the journal *Urban Planning Newsletter* (*城市规划通讯*), is often re-used by the Chinese press when discussing infrastructure topics and news.

⁷ Liu Feng and Nie Weixin *"基础设施红利或将成为未来中国经济高质量发展的重要依托 (Infrastructure dividend may become an important basis for high-quality development of China's economy in the future)"*, DRCnet, November 11, 2023 <https://d.drcnet.com.cn/eDRCnet.common.web/DocDetail.aspx?chnid=6801&leafid=27019&docid=7227171&uid=01&version=integrated>

⁸ Xu Hongcai, *"Greater certainty of China's economic growth,"* China-US Focus, November 10, 2023, <https://www.chinausfocus.com/finance-economy/greater-certainty-of-chinas-economic-growth>

⁹ Chen Bo, Niu Mujiangqu, Liu Ran, Huo Kan and Han Wei, *"Cover Story: Rethinking China's PropertyMarket Meltdown,"* Caixin Global, November 20, 2023, <https://www.caixinglobal.com/2023-11-20/cover-story-rethinking-chinas-property-market-meltdown-102137443.html>

¹⁰ Henry H. McVey and Francis Lim, *"Thoughts from the road - Asia,"* KKR, October 2023, <https://www.kkr.com/content/dam/kkr/insights/pdf/thoughts-from-the-road-asia-october.pdf>

¹¹ Zhang Jun, *"中国经济承压时，为何总是呼吁基建刺激? (Why does China always call for infrastructurestimulus when its economy is under pressure?)"*, Aisixiang, January 28, 2023, <https://www.aisixiang.com/data/140349.html>

useless to stimulate economic growth as there is already a relatively high level of infrastructure stock. However, **a majority of expert voices seems to advocate for infrastructure investment as a viable remedy.**

Throughout 2023, Yu Yongding, an economist from the Chinese Academy of Social Sciences (CASS) and the President of the China World Economics Association, has continuously made the case for infrastructure investment. As a governmental prerogative, he considers it as an option if there were to be a recession. This is still not China's economic reality, but a period of doubt has undeniably opened up.¹² This stand is shared by several in-house government think tanks. For instance, Zhang Liqun, from the State Council's Development Research Center, agrees that infrastructure investments are important to boost the demand side of the economy, as well as to support companies and the well-being of individuals.¹³

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More recently, Guo Liyan, a researcher from the China Academy of Macroeconomics (CAM), linked to the National Development and Reform Commission, under-

lined the benefits expected from large infrastructure investments.¹⁴ Her results insist on infrastructure's role in increasing internal demand and growth in the short run, while also promoting coordinated regional development, particularly in rural areas, in the medium and long run. Yet, she does not ignore **possible challenges in terms of funding, especially from private players, since infrastructure investment does remain the *pré carré* of public money.**

Infrastructure investment does remain the *pré carré* of public money.

From a geographical point of view, Liu Xiangdong, a member of the China Center for International Economic Exchanges (CCIEE), insists that geographically comprehensive infrastructure investment is crucial, as much in urban as in rural areas.¹⁵ This position is qualitatively supported by an analysis from Long Haiming and Wu Zhilin, both from Hunan University's School of Finance and Statistics, that shows how **infrastructure investments in China have overall allowed to raise income levels and to reduce the income gap between urban and rural areas. Nevertheless, diverging effects remain in terms of employment and productivity depending on the area.**¹⁶

¹² Yu Yongding, "对2023年中国经济的八个判断 (Eight judgments on China's economy in 2023)," January 19, 2023, <https://finance.sina.cn/zl/2023-01-19/zl-imyasppt4642324.d.html>; Yu Yongding, "关于当前中国宏观经济形势和政策的几点思考 (Some thoughts on China's current macroeconomic situation and policies)," Economists 50 Forum, October 30, 2023, <http://www.50forum.org.cn/home/article/detail/id/10650.html>

¹³ Zhang Liqun, "抓住恢复窗口期 扩内需多举措密集而至 (Seize the recovery window period and take multiple measures to expand domestic demand)," China Center for International Economic Exchanges, March 30, 2023, <https://www.cciee.org.cn/Detail.aspx?newsId=20454&TId=684>

¹⁴ Guo Liyan, "发挥有效投资带动作用 (Give full play to the role of effective investment as a driver)," Chinese Academy of Social Sciences, October 26, 2023, https://www.cssn.cn/zkzq/202310/t20231026_5692954.shtml

¹⁵ Liu Xiangdong, "把握信心作为扩大内需的'本手棋' (Use boosting confidence as a 'special move' to expand domestic demand)," China Development Observation, October 18, 2023, <https://cdo.developress.com/?p=14683>

¹⁶ Long Haiming et Wu Zhilin, "基础设施投资能促进共同富裕吗? (Can infrastructure investment promote common prosperity?)," Finance and Economy, No.4 (2023), <https://chn.oversea.cnki.net/KCMS/detail/detail.aspx?dbcode=CJFD&dbname=CJFDLAST2023&filename=JTJJ202304008&uniplatform=OVERSEA&v=YAiMeQDGXqGORL3aJl-Y-fUpaRqNS8RLusYryQUwdDu8jLHIH1xpzCqbAk65Hw29>

Transportation, the equilibrium between over-capacity and rural marginalization

Indeed, with the question of infrastructure comes the idea of bridging the gap between urban and rural areas, especially visible in the case of transportation. As studied by the Transportation Research Institute of the National Development and Research Commission (NDRC), in "*special type of areas (特殊类型地区)*,"¹⁷ areas it defines as restricted by geographical conditions, natural environment, development foundation and capital investment, there are both opportunities and challenges in terms of transportation investment.¹⁸

Past infrastructure strategy came with drawbacks and over-crowding effects, effects that could persist should demand be insufficient or not targeted geographically. Wang Yongli, Bank of China's former Vice-President, acknowledges with lucidity that the overproduction in certain sectors, steel for instance, for certain areas, the most developed provinces notably, is now impacting the Chinese economy as global demand falls.¹⁹ In the same vein, Zheng Yongnian, now a professor at

the Chinese University of Hong Kong, considers that a country without large-scale infrastructures cannot successfully carry out its industrialization, urbanization and modernization. But he also depicts a country that is partly reaching saturation, in Southeastern coastal areas and the central provinces especially.²⁰

Yet, transportation remains "a basic, leading and strategic industry for the economy (交通运输是国民经济中基础性、先导性、战略性产业)."²¹ In light of regional gaps and even with the risks of over-capacity, recent governmental guidelines and official figures therefore underline the importance of transportation investments. In the first three quarters of 2023, China's railways reached fixed asset investment of 508.9 billion yuan (66.2 billion euros at the October 2023 exchange rate), a year-on-year increase of 7.1%, but with priority clusters in Beijing-Tianjin-Hebei, the Yangtze River Delta, the Guangdong-Hong Kong-Macao Greater Bay Area, and the Chengdu-Chongqing.²² The Five-Year Action Plan to accelerate the construction of a strong transportation state (2023-2027) offers a more comprehensive view of the subject. Its ambitions to

¹⁷ Their list includes old revolutionary base, ethnic minority, border, out of poverty, resource depleted, in-decline industrially, or severely ecologically degraded areas.

¹⁸ National Development and Reform Commission, "加快补齐特殊类型地区交通基础设施发展短板 (Accelerate the completion of shortcomings in the development of transportation infrastructure in special types of areas)," DRCnet, September 8, 2023, <http://d.drcnet.com.cn/eDRCnet.common.web/DocDetail.aspx?chnid=6801&leafid=27019&docid=7159839&uid=01&version=integrated>

¹⁹ Wang Yongli, "如何看待近期中美经济增长超预期大反差 (How to view the recent sharp contrast in economic growth between China and the United States that exceeds expectations?)," Chongyang Institute for Financial Studies, October 10, 2023, <http://rdcy.ruc.edu.cn/zw/jszy/rdcy/grzLrdcy/b0a48397340d4dba9bf9d9e73e4749a4.htm>

²⁰ Zheng Yongnian, "大变局下的中国式现代化 (Chinese-style modernization under great changes)," Institute for International Affairs, May 19, 2023, <https://www.qiia.org/en/node/942>

²¹ "加快建设交通强国五年行动计划(2023—2027年) 解读 (Explainer of the Five-Year Action Plan to accelerate the construction of a strong transportation state (2023-2027))," Government of the People's Republic of China, April 23, 2023, https://www.gov.cn/zhengce/2023-04/23/content_5752770.htm

²² "前三季度全国铁路完成固定资产投资5089亿元 (In the first three quarters, national railways completed fixed asset investment of 508.9 billion yuan)," Government of the People's Republic of China, October 20, 2023, https://www.gov.cn/yaowen/liebiao/202310/content_6910443.htm Republic of China, April 23, 2023, https://www.gov.cn/zhengce/2023-04/23/content_5752770.htm

balance the layout of the transportation network, to have more stable supply chains and to replace foreign producers in core technology chokepoints.²³

New infrastructure opportunities, the case of urban modernization

While keeping in mind the goal of modernizing the country – a hallmark of Xi's discourses on the economy – the government is trying to explore new investment openings. **Urban modernization appears as a more sustainable and viable path than transportation.** In July, the China Macroeconomy Forum's (CMF) monthly report focused on breakthroughs for China's recovery and explained how an increase in public investment could be efficient and profitable, including for investments in urban infrastructure, as part of the urbanization process.²⁴

Urban modernization appears as a more sustainable and viable path than transportation.

Urban infrastructures also appear in the China Academy of Macroeconomics' spring publication. It details how **the investment structure has gradually shifted towards water conservancy, environment and**

public facilities management industry.²⁵ Hereafter, the government's efforts appear to confirm this trend. In the case of water conservancy for instance, 860.1 billion yuan (111.8 billion euros at the October 2023 exchange rate) had been invested since January 2023, a number greatly on the rise, and 24,900 water conservancy projects were launched since the beginning of the year.²⁶

To solidify this momentum, CMF's Renmin University analysts also offer some suggestions on how to make infrastructure investment more attractive: for example, **supporting the construction industry through accelerated equipment investment or by working on the insufficient supply of qualified labor force.** Regarding the choice of projects, Mei Xinyu, a researcher at the Ministry of Commerce's Research Institute, recommends that the October treasury bonds be focused on investments in water conservancy and irrigation, with project planning and arrangements taking into account climate change trends and their impacts.²⁷

Expanding the notion of "infrastructure"

It still transpires from the above mentioned sources that traditional infrastructures per se cannot be an eternal growth driver. In recent years, the definition

²³ "加快建设交通强国五年行动计划(2023—2027年) 解读 (Explainer of the Five-Year Action Plan to accelerate the construction of a strong transportation state (2023-2027))," Government of the People's Republic of China, April 23, 2023, https://www.gov.cn/zhengce/2023-04/23/content_5752770.htm

²⁴ China Macroeconomy Forum, "寻找复苏突破口的中国宏观经济 (Looking for China's macroeconomics that recovers breakthroughs)," CMF Macroeconomic Monthly Data Analysis Report, No.65, July 2023, <http://ier.ruc.edu.cn/docs/2023-07/1be9fa853f604aff83b7de7ce1a7f78e.pdf>

²⁵ "我国基础设施投资: 现状、问题与对策 (Infrastructure investment in my country: current situation, problems and countermeasures)," Sohu, May 15, 2023, https://www.sohu.com/a/675754280_121687424

²⁶ "China sees record water conservancy investment in January-September," Ministry of Water Resources, October 10, 2023, http://www.mwr.gov.cn/english/Medianews/202310/t20231030_1688321.html

²⁷ Mei Xinyu, "增发万亿国债, 投资水利领域实属必要 (Increasing trillion national debt, it is necessary to invest in the field of water conservancy)," Yicai, November, 13, 2023, <https://www.yicai.com/news/101902712.html>

of "infrastructure" has therefore been broadened to include "soft" or immaterial infrastructures. An economist like Yu Yongding lists various infrastructure needs, including sewage or pipeline-like networks, but he also advocates for expanding the scope of "infrastructure". Indeed, he often pushes the idea of "new infrastructures (新基建)," by considering that public investment should fund social infrastructures, notably to cover education and health costs.²⁸

This expanded definition of "infrastructure" is also shared by two economists from the Central University of Finance and Economics, Liu Feng and Liu Yiwei, who qualify these infrastructures of "soft infrastructure (软性基础设施)" for "people's livelihood projects (民生工程)".²⁹ Whereas "hard infrastructures" broadly refer to transportation, energy or communications, "soft infrastructures" represent projects such as social security, medical care, elderly care and education. These social infrastructures, which Liu and Liu currently deem insufficient, would restore both consumers' and investors' confidence if they are properly funded.

From a historical perspective, Yang Sihan, Tong Menghua and, Ai Yongfang, three economists from universities specialized in economy in Shanghai and Dalian, together underlined how investment in new

infrastructures had a major impact compared to traditional infrastructures. Thereafter, their research, covering 31 provinces and the 1997-2020 period, demonstrates how new infrastructures very much benefited the center and east of China in the short run.³⁰ Their definition of "new infrastructures," englobing all the new technologies and applications that support the traditional infrastructures' transformation, echoes very much that of the NDRC, which offered the following typology: "information infrastructure (信息基础设施)," "integrated infrastructure (融合基础设施)," where new technologies support traditional infrastructures, and "innovation infrastructure (创新基础设施)".³¹

Though challenged as a driver of growth, infrastructure investment therefore still brings hope in terms of economic growth. This optimism exists due to new investment opportunities in urban areas notably, and because the word "infrastructure" itself has kept expanding to new realms. More recently, this expansion has been towards digital infrastructures, a full-fledged branch of the digital economy. However, the question remains of the funding of these future infrastructures and their appropriate location. Where local governments could be viewed as relevant to identify the needs on the ground, in practice, they still lack the financial capacity to do so.

²⁸ Yu Yongding, "中国宏观经济当前形势和政策 (The current situation and policy of China's macroeconomic economy)," *China Finance 40 Forum*, July 21, 2023, http://www.cf40.org.cn/news_detail/13415.html

²⁹ Liu Feng et Liu Yiwei, "加大'民生工程'等软性基础设施建设力度, 才是恢复投资者与消费者信心与预期的关 (Strengthening the construction of soft infrastructure such as 'people's livelihood projects' is the key to restoring investors and consumer confidence and expectations)," *DRCnet*, November 1, 2023, <https://d.drcnet.com.cn/eDRCnet.common.web.DocDetail.aspx?chnid=6801&leafid=27019&docid=7204752&uid=01&version=integrated>

³⁰ Yang Sihan, Tong Menghua and Ai Yongfang, "传统与新型基础设施投资如何推动经济增长 (How to promote economic growth in traditional and new infrastructure investment)," *Contemporary Economic Management*, No.9 (2023), https://chn.oversea.cnki.net/KCMS/detail/detail.aspx?dbcode=CAPJ&dbname=CAPJLAST&filename=DJGL20230908002&uniplatform=OVERSEA&v=cYkL0Pohxxid46WvooJL5feQS9Hm_7r3oskB8dlj41t1RZNF-l3FpmJjF13sNxTP

³¹ "国家发改委召开新闻发布会表示: 经济运行正有序恢复 (The National Development and Reform Commission held a press conference and stated: Economic operations are recovering in an orderly manner)," *Government of the People's Republic of China*, April 21, 2020, https://www.gov.cn/xinwen/2020-04/21/content_5504561.htm



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China's Plans for Nuclear Energy: Taking the Lead

As of June 2023, China had 55 nuclear reactors with a total installed capacity of 57 GWs, and a total electricity production of 417 TWh.¹ It ranked second in the world behind the United States in terms of actual production, and third behind the United States and France for installed nuclear capacity. Nuclear energy has become a central piece in China's strategy to achieve its decarbonization objectives, guarantee its energy security and allow it to support its economic growth model. Chinese debates regarding nuclear energy focus on the level of ambition of the world's largest construction program, and the effective means to reach targets.

A strong momentum, slowed down by post-Fukushima doubts

China's progress has been fast, considering its first nuclear plant was connected to the grid in 1991 and

that, in the province of Shandong, it just achieved the stint of putting into commercial operation the first generation IV reactor ever.² China basically became self-sufficient in reactor design and construction by leveraging on American and French technologies. The Hualong-type reactor (the first generation III type produced by China) is free of foreign patents or intellectual property, and China has started to export it – namely to Pakistan.³

The status of the nuclear sector, as a key tool for promoting economic development, energy security, decarbonization and high value-added exports, is now well enshrined in China's medium and long term plans. The 14th Five-Year Plan indeed calls for China's capacity to reach 70 GW by 2025. 28 reactors are currently under construction, according to Chinese specialists.⁴ This is the largest program in the world, and, in the next five years, the number of new

¹ "People's Republic of China," *International Atomic Energy Agency's Power Reactor Information System*, Last updated on December 6, 2023, <https://pris.iaea.org/PRIS/CountryStatistics/CountryDetails.aspx?current=CN>; "全国核电运行情况 (2023年1-9月) (National nuclear power operation status (January-September 2023))," *China Nuclear Energy Association*, November 3, 2023, <https://www.china-nea.cn/site/content/44010.html>

² "全球首座第四代核电站商运投产 (The world's first fourth-generation nuclear power plant is put into commercial operation)," *Xinhua*, December 6, 2023, http://www.news.cn/tech/2023-12/06/c_1130011034.htm

³ The Hualong reactor is jointly developed by the China General Nuclear Power Group (CGN) and the China National Nuclear Corporation (CNNC).

⁴ Dai Jingjing, "最北端核电站开工, 中国在建机组增至28台 (Construction of the northernmost nuclear power plant has started, and the number of units under construction in China has increased to 28)," *Jiemian*, November 16, 2023, <https://m.jiemian.com/article/10398302.html>

nuclear power units approved each year is expected to reach between 6 to 8 units.⁵ Besides, "actively developing nuclear power through a safe and orderly approach (积极安全有序发展核电)" is listed as a key task in China's high-level action plan to achieve a carbon dioxide emissions peak in 2030.⁶

There is not much room today for openly anti-nuclear or even nuclear-skeptic public voices in China. **Debates are more centered on whether current plans are ambitious enough, and the challenges that need to be overcome in order to achieve them.** But this has not always been the case, and there was a sense of unease regarding the nuclear industry, after the Fukushima accident in 2011, leading to a temporary pause in the approval of new projects and a detailed review of security processes at existing plans.

The ban on approvals was lifted in 2012, but too few new projects were approved in the eight following years, which led to the 2020 target of 57 GW for installed capacity in the 13th Five-Year Plan to be missed.

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The main concern was security, especially considering that the vast majority of Chinese nuclear facilities are located along the sea, which was also the case of the Fukushima Daiichi reactor.⁷ At least two projects were canceled during this period due to public protests (one in Guangdong, one in Jiangsu).⁸ **This concern for security is apparently still present in the minds of Chinese citizens, and taken very seriously by the government.** In March 2023, Lu Tiezhong, Secretary of the Party Committee and Chairman of China National Nuclear Power, declared in an interview with local journalists that "the development of nuclear power is facing the challenge of public acceptance (核电发展面临公众接受度挑战)".⁹

Virtually every official statement about the nuclear industry has a section dealing with China's safety track record, emphasizing that "China has established a nuclear safety regulatory system and regulatory standards in line with international specifications,"¹⁰ that it reports all in-

⁵ Wang Yuqing, "预计未来5年每年6至8台核电机组核准开工中国竞逐核能利用技术制高点 (It is expected that 6 to 8 nuclear power units will be approved to start construction every year in the next five years. China competes for the commanding heights of nuclear energy utilization technology)," *Shanghai Securities News*, November 5, 2023, <https://news.cnstock.com/industry,rjji-202211-4976271.htm>

⁶ "国务院关于印发2030年前碳达峰行动方案的通知 (Notice of the State Council on issuing the Action plan for carbon dioxide peaking before 2030)," Government of the People's Republic of China, October 26, 2021, https://www.gov.cn/zhengce/content/2021-10/26/content_5644984.htm

⁷ See for instance a rare case dating from this period of open criticism of China's security practices in this field: "China warned over 'insane' plans for new nuclear power plants," *The Guardian*, May 25, 2015, <https://www.theguardian.com/world/2015/may/25/china-nuclear-power-plants-expansion-he-zuoxiu>

⁸ Chen Aizhu and Qi Ding, "China cancels \$6 billion uranium plant after protest," *Reuters*, July 13, 2013, <https://www.reuters.com/article/us-china-uranium-idUKBRE96C02G20130713/>; Chris Buckley, "Chinese City Backs Down on Proposed Nuclear Fuel Plant After Protests," *The New York Times*, August 10, 2016, <https://www.nytimes.com/2016/08/11/world/asia/china-nuclear-fuel-lianyungang.html>

⁹ Lu Tiezhong, "开足马力推进核能综合利用 (Fully promote the comprehensive utilization of nuclear energy)," *People's Daily*, March 13, 2023, http://paper.people.com.cn/zqnyb/html/2023-03/13/content_25971182.htm

¹⁰ Yang Zhiyi, Li Fengchen and Chai Guohan, "Status and perspective of China's nuclear safety philosophy and requirements in the post-Fukushima era," *Frontiers in Energy Research*, No.9 (2021), <https://www.frontiersin.org/articles/10.3389/fenrg.2021.819634/full>

idents affecting nuclear facilities to the International Energy Agency and that it never reported any incident ranking higher than 1 on the INES scale.¹¹

Public protests in China are even rarer in 2023 than they were ten years ago, but it is unlikely that the topic will completely disappear from public consciousness. Ironically, Chinese authorities may have been adding fuel to the fire of their citizens' anxieties, by playing up so loudly in their propaganda the issue of the potential impact of the used waters to be released into the sea, from the Fukushima plant.

A new era, and a new sense of urgency

The period of doubts seems to be over, and in recent years, top officials in the nuclear ecosystem have been advocating for a very ambitious approach to the development of nuclear energy. Lu himself stated the case very clearly in the same interview: "Nuclear power is stable, reliable and, has a long material exchange cycle (核电运行定,可靠, 换料周期长). It is suitable for the basic load of the power grid and necessary load tracking. It is the only base charge power supply that can replace fossil energy on a large scale at present and even in the future [...] The higher the proportion of nuclear power in China's energy structure, the more conducive it is to the safety of the entire power grid system [...] The intensification of international energy competition and geopolitical games has further exacerbated the shock of the international market and the global energy supply has fallen

into crisis. The advantages of nuclear energy as a reliable, low-carbon, efficient and stable energy source are more prominent. In this context, governments have begun to re-examine their energy security strategies."

Lu does not, in this article, discuss in detail all the issues which make it impossible for China to rely exclusively on renewables, such as the geographical mismatch between demand and supply, the high curtailment rate, or the difficulties for the national grid to cope with their unpredictability.¹²

However, he does make it clear where he thinks the main concern lies, by stressing the "stable (稳定)" character of nuclear and the "intermittent (间歇性)" character of electricity from renewables. This specific issue is particularly sensitive at this point in time in China. In 2022, hydroelectricity production dropped substantially due to an abnormally long patch of dry weather in some parts of the country.¹³ Some factories in the south of China had to close temporarily or reduce their activity, as it was impossible to increase at will the production from other renewables or to dispatch energy from other regions to make up for the shortfall. It turned out that the only way to limit the damage was to increase production from standard coal-fired plants, thus leading to more coal being burnt and more CO₂, while also raising the question of the need for even more coal-fired plants as back-ups.¹⁴

Lu's core argument is therefore that **the more you use renewables, the more you also need to have**

¹¹ This scale, going from 0 to 7, ranked Fukushima as a 7.

¹² For a discussion of these topics, see Zhao Fuquan, Bai Fanlong, Liu Xinglong and Liu Zongwei, "A review on renewable energy transition under China's carbon neutrality target," *Sustainability*, No.14 (2022), <https://www.mdpi.com/2071-1050/14/22/15006>

¹³ Dennis Wong and Han Huang, "China's record heatwave, worst drought in decades," *South China Morning Post*, August 31, 2022, <https://multimedia.scmp.com/infographics/news/china/article/3190803/china-drought/index.html>

¹⁴ John Kemp, "China's rainfall is in the wrong place for hydropower," *Reuters*, August 23, 2023, <https://www.reuters.com/business/energy/chinas-rain-fall-is-wrong-place-hydropower-kemp-2023-08-22/>

access to stable sources of energy in order to cope with the unpredictable variations in the production from renewables, and that **nuclear is the best answer to this challenge**.

The announcement in 2020 of China's twin carbon targets (CO₂ emissions peak by 2030, zero net CO₂ by 2060), helped to put in perspective the enormity of the task at hand if nuclear energy is to play the kind of role envisaged by Lu and many others: the **starting point in China's current energy mix is very high for carbonated energy and very low for nuclear energy**. In spite of China's substantial investment and technological achievements in the nuclear field, nuclear still only accounts for less than 3% of installed capacity and 5% of electricity production – much lower than the 9% world average.

Nuclear still only accounts for less than 3% of installed capacity and 5% of electricity production – much lower than the 9% world average.

The large number of plants already approved or under construction makes it likely that the objective of 70 GW of installed capacity in 2025 mentioned in the 14th Five-Year Plan will be reached, and that China will soon have the largest installed nuclear capacity in the world. This may however not be enough to be consistent with the 2060 decarbonation target, ac-

ording to experts from the Nuclear Power Institute of China (NPIC), who estimate that "by 2035, China's nuclear power installed capacity will need to reach 150 GW, accounting for about 10% of power generation; by 2050, China's nuclear power installed capacity will need to reach 350 GW, accounting for about 15% to 20% of power generation. The room for nuclear power development is huge."¹⁵ These long-term targets are not yet part of a high-level official action plan, but keep being mentioned in many other domestic publications from the nuclear bureaucracies.¹⁶

Technological challenges a plenty, nuclear fusion a source of anxiety

Meeting these targets will require overcoming many technological challenges. A roadmap to this effect is described by the same experts from the NPIC: "**a development strategy and a path for advanced nuclear energy technologies have been put forward, including: intelligent operation management of in-service nuclear power plants; batch deployment of third-generation nuclear power plants; research and development of inherently safe fast reactor technology; active research and development of ultra-high temperature gas-cooled reactors for high-efficiency hydrogen production; active exploration of small modular reactors for industrial heating and platform power supply; and domestic and international cooperation in developing critical advanced nuclear energy technologies.**"

The first point refers to the need to optimize the operations of current plants for instance, by reducing the

¹⁴ John Kemp, "China's rainfall is in the wrong place for hydropower," Reuters, August 23, 2023, <https://www.reuters.com/business/energy/chinas-rain-fall-is-wrong-place-hydropower-kemp-2023-08-22/>

¹⁵ Wang Conglin, Chai Xiaoming, Yang Bo and Li Zhongchun, "Development and Prospect of Advanced Nuclear Energy Technology," Nuclear Power Engineering, No.44 (2023), pp. 1-5, <http://hdlgc.xml-journal.net/cn/article/doi/10.13832/j.jnpe.2023.05.0001>

¹⁶ Wang Binghua, "到2035年我国核发电量占比有望达到10%左右 (My country's nuclear power generation is expected to account for about 10% of the total by 2035)," Chinese Nuclear Energy Association, September 26, 2023, <https://www.china-nea.cn/site/content/43838.html>

period of time they need to be shut down for maintenance or repairs. The second one refers to the importance of mastering the full industrial and logistical chains so that the construction of plants can be smoothly scaled up. The other points basically constitute a catalog of all the major new technological avenues currently being explored by most nuclear nations, revealing that China does not want to bet on one particular technology. The last point shows that **even though China considers itself as a leader in the field, it still values foreign partnerships for certain forms of know-how that it does not fully master yet**, hence the on-going discussions with Russia or France.^{17 18}

Even though China considers itself as a leader in the field, it still values foreign partnerships for certain forms of know-how that it does not fully master yet.

China is moreover at the forefront in the development of small modular reactors (SMR), and has recently announced the installation of the core module of an SMR in Hainan.¹⁹ Only China and Russia have so far reached this stage, but it remains unclear to what extent China

actually relies on this technology in order to meet its goals.

Curiously the previously mentioned list does not refer to nuclear fusion, even if China is known to be actively involved in research in this area. China is a member of the ITER international program, and has its own research in Chengdu, at the Southwestern Institute of Physics (SWIP). Fusion is also mentioned by Lu Tiezhong as a potentially very important development for the future: *"the realization of controlled nuclear fusion in the future is more likely to become the ultimate solution to human energy problems."*

An article by **Zhang Jun of the Fudan Development Institute also provides some fascinating insights regarding China's views on nuclear fusion research in the United States, and perhaps inadvertently, on China's own anxieties.**²⁰ In this paper, he analyzes an experiment conducted in a Californian research laboratory, in December 2022, where, for the first time, a nuclear fusion reaction that yielded more energy than what was put into it was achieved, through laser ignition.²¹ Zhang admits that it is indeed a significant *"first"* in scientific terms, but that the experience was extremely costly and the quantity of energy produced very small, so that it does not amount to a major

¹⁷ "中华人民共和国和俄罗斯联邦关于深化新时代全面战略协作伙伴关系的联合声明 (Joint statement between the People's Republic of China and the Russian Federation on deepening the comprehensive strategic partnership of coordination in the New Era)," Ministry of Foreign Affairs of the People's Republic of China, March 22, 2023, https://www.fmprc.gov.cn/zyxw/202303/t20230322_11046188.shtml

¹⁸ See point 23 after Macron's April visit in China: "中华人民共和国和法兰西共和国联合声明 (Joint statement by the French Republic and the People's Republic of China)," Ministry of Foreign Affairs of the People's Republic of China, April 7, 2023, https://www.fmprc.gov.cn/zyxw/202304/t20230407_11056239.shtml

¹⁹ "玲龙一号'全球首堆核心模块安装成功 (The world's first core module of 'Linglong No.1' was successfully installed)," Xinhua, August 11, 2023, <http://www.news.cn/science/20230811/0daf76f6ceb5414497eea31972b1d1d5/c.html>

²⁰ "美国核聚变点火'成功'对中国能源产业的战略启示 (The strategic implications of the 'successful' US nuclear fusion ignition for China's energy industry)," Fudan Development Institute, April 23, 2023, <https://fdi.fudan.edu.cn/77/54/c21253a489300/page.htm>

²¹ Margaret Osborne, "Scientists repeat nuclear fusion breakthrough in a step toward more clean energy," Smithsonian Magazine, August 9, 2023, <https://www.smithsonianmag.com/smart-news/scientists-repeat-nuclear-fusion-breakthrough-in-a-step-toward-more-clean-energy-180982683/>

progress in terms of the economic and commercial feasibility of this technology.

The scholar then suggests that the so-called civilian experiments may be intended to provide cover for military ones: "At this time, laser ignition just provides the United States with a technical opportunity to walk on the edge of nuclear morality." He further argues that "another purpose of the United States to promote nuclear fusion ignition technology is to maintain its technological advantages over China," and that **"in terms of nuclear fusion development strategy, the United States has always regarded China as its imaginary opponent (假想对手)."**

Such an approach is of course bound to fail, as it amounts to "wishful fantasy (一厢情愿的幻想)," and "the United States does not have the ability to stop China's independent progress of nuclear fusion." Finally, his main point is that the announcement has to be understood in the context of US domestic politics: there is no political consensus in the Congress on the funding of this research or of other giant programs, and the **Biden administration desperately needed a success story in order to have some of its research spending bills approved.**

The Fudan professor goes on to discuss, with a certain realism, the Chinese environment for nuclear fusion: "objectively speaking, **although China has continuously made technological breakthroughs in the field of nuclear fusion, China's fusion reactor is also in the early stage of research and is still a long way away from commercial power generation.**" Zhang then comments on some specific issues of inte-

rest: the excitement caused worldwide by the United States' announcement may cause private investors to invest more in the field of fusion, including in China.²²

This is not necessarily a bad thing, but this trend needs to be tightly controlled so as to avoid a misallocation of capital: "if China does not strengthen the guidance of investment in the nuclear fusion industry, the disorderly expansion of social capital will also pose a major investment risk, which will eventually drag down the development of China's nuclear fusion industrialization." He lists some potential sources of inefficiency resulting from this situation: **the best research teams are today to be found among SOEs or among army labs**, but they are not as good as private firms to raise funds from the capital markets; and **there is currently more interest in funding research in fusion than in fast reactors**, although both technologies may be equally important for the future. Zhang concludes by stressing that what China needs is an overall plan, not a free for all.

Securing the supply of uranium: a strategic challenge

China will need to secure its sources of uranium in order to achieve its nuclear ambitions. It has stated its intention to become self-sufficient in nuclear fuel, but is still far from reaching its targets. Official sources and figures are scarce due to the sensitivity of the issue: current requirements are estimated at around 10,000 tons, and production at 1,700 tons.²³ **Domestic production will increase, as several discoveries have been reported and new mines are being developed, but so will demand, as the number of reactors in operation rises.**

²² As an example of this trend, the electric vehicle manufacturer Nio announced in March 2023 an investment of more than 1 billion yuan in a nuclear fusion startup: "Chinese EV maker Nio invests in nuclear fusion startup," Reuters, May 19, 2023, <https://www.reuters.com/business/energy/chinese-ev-maker-nio-invests-nuclear-fusion-startup-2023-05-1>

²³ "China's Nuclear Fuel Cycle," World Nuclear Association, Last updated in November 2023, <https://world-nuclear.org/information-library/country-profiles/countries-a-f/china-nuclear-fuel-cycle.aspx>

In addition, China has adopted a multi-pronged strategy in order to cope with this challenge by: intensifying exploration efforts and increasing domestic supply; taking measures and promoting research in areas which may reduce the need for primary uranium, such as recycling and enrichment (China as a legitimate nuclear power already has several enrichment facilities in operation);²⁴ directly acquiring stakes in mines when feasible (mostly in Kazakhstan, Namibia and Niger so far) and securing long term supply contracts with countries such as Kazakhstan,²⁵ China's largest supplier, or more recently with Russia.²⁶ China is also exploring the potential of non-conventional resources such as uranium from seawater.²⁷ Finally, the news agency Reuters reported in early 2022 that China, as part of its strategic reserves, had stockpiled 120,000 tonnes of uranium, enough to meet its nuclear demand for the next 10 years at the time, a figure not confirmed by China.²⁸

Chinese customs' data corroborate these supply efforts though. Indeed, between 2022 and 2023, **imports of uranium and uranium-derived products increased by 15.4% in value** (from 1.36 billion dollars to 1.57 billion dollars) **and by 36.7% in volume** (from 9.35 billion kilos to 12.78 billion kilos) over the January-September period.²⁹

Public support for China's ambitious plans is not to be taken for granted, and technological breakthroughs are needed but they can be fickle and elusive in China as much as elsewhere.

China has therefore now solidly established itself among the leading countries in the field of civil nuclear, both in terms of its development program's scale and technological sophistication. It will likely remain there for the foreseeable future, but this in itself does not guarantee that it will meet its own ambitious targets. Nuclear is expected to play an important role on the road toward zero carbon, but the road will be long and tortuous. **Public support for China's ambitious plans is not to be taken for granted, and technological breakthroughs are needed but they can be fickle and elusive in China as much as elsewhere.** As for national security, it is difficult, based on what we know today, to assess if and when China can achieve its goal of self-sufficiency for nuclear fuel.

²⁴ Recycling may also generate plutonium, also needed in producing nuclear weapons

²⁵ "Kazatomprom signs long-term uranium supply contract with China", *Nuclear Engineering International*, November 15, 2023, <https://www.neimagazine.com/news/newskazatomprom-signs-long-term-uranium-supply-contract-with-china-11301319>

²⁶ Echo Xie, "Russia confirms enriched uranium supplies to China," *South China Morning Post*, May 5, 2023, <https://www.scmp.com/news/china/science/article/3219424/russia-confirms-enriched-uranium-supplies-china>

²⁷ "我国最大海水提铀海试平台亮相! (My country's largest seawater uranium extraction sea trial platform unveiled!)," *Guancha*, May 18, 2023, https://www.guancha.cn/industry-science/2023_05_18_692871.shtml

²⁸ Pratima Desai, "Transport disruptions the wild card for Kazakh uranium shipments," *Reuters*, January 7, 2022, <https://www.reuters.com/markets/commodities/transport-disruptions-wild-card-kazakh-uranium-shipments-2022-01-07>

²⁹ Even if useful to underline the growth of the nuclear sector, these figures remain proxies as uranium is not exclusively for the nuclear energy sector.



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China's Digital Economy, Avoiding a Slowdown

Digital economy was elevated to a national strategy at China's 18th National Congress in 2012. Since then, China has diligently worked to pave the way for its digital economy, aiming to stimulate economic growth. This commitment is evident in strategic policies, such as "Internet Plus" and "Made in China 2025", which focus on integrating digital technologies into traditional industries. Xi Jinping's work report of the 20th National Congress emphasizes that **China "will accelerate the development of the digital economy, further integrate it with the real economy, and build internationally competitive digital industry clusters."**¹ These initiatives aim to enhance productivity, promote innovation, and ensure sustainable economic development.

The term "*digital economy*"; is frequently employed, though loosely due to its multidimensional nature, to characterize sectors of the economy impacted by digital transformation. According to the 2020 G20 Digital Economy Ministers Meeting, "*the digital economy incorporates all economic activity reliant on, or significantly enhanced by the use of digital inputs, including digital technologies, digital infrastructure, digital services, and*

data."² This overreaching policy definition by the G20 is in line with the general understanding of the digital economy. For instance, China's approach to the digital economy, which emphasizes strengthening key technologies, building infrastructure, and integrating the digital economy with the real economy, reflects this definition.

China's approach to the digital economy, which emphasizes strengthening key technologies, building infrastructure, and integrating the digital economy with the real economy.

It is not surprising that China is giving so much attention and importance to its digital economy. **Digitalization is not only the transformative opportunity of our time but also a survival imperative: no economy can afford to stay behind.** As noted by Sheng Bin, Distinguished Professor at Nankai University, the competition among countries in digital technology,

¹ "Full text of the report to the 20th National Congress of the Communist Party of China," Ministry of Foreign Affairs of the People's Republic of China, October 25, 2022, https://www.fmprc.gov.cn/mfa_eng/zxxx_662805/202210/t20221025_10791908.html

² "G20 Digital Economy Ministers Meeting – Ministerial Declaration," G20 Saudi Arabia, July 20, 2020, http://www.g20.utoronto.ca/2020/G20SS_Declaration_G20_Digital_Economy_Ministers_Meeting_EN.pdf

digital industry, digital talents and digital rules is exceptionally fierce.³ Therefore, building a digital China has a far-reaching impact on promoting Chinese-style modernization, on its modern industrial system and on constructing a new national competitive advantage. The understanding of such pertinence is also shared by the EU, which has set "A Europe fit for the digital age" as one of the European Commission's six political priorities for 2019-2024.⁴ On data, technology and, infrastructure, the focus is clear.

State of the play: keeping pace with past efforts

In recent years, China's digital economy has emerged as a powerhouse, playing a pivotal role in its rapid economic growth. **The convergence of technological advancements, strategic policies, and a burgeoning digital infrastructure has propelled China into the forefront of the digital era.** In the words of Wang Yiming, the former Deputy Director of the State Council's Development Research Center, **China's digital economy has entered a "no man's land (无人区)," where there is no one to lead, no established rules, and no one to follow.**⁵ He borrowed the term from Ren Zhongfei, founder and CEO of Huawei, who previously used it to describe his company's innovation journey.⁶

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The Research Report on the Development of China's Digital Economy (2023), released by the China Academy of Information and Communications Technology (CAICT), paints an interesting picture of China's digital economy.⁷ In 2022, faced with new economic challenges, governments and enterprises at all levels embraced the digital economy, as a crucial mean to foster new economic growth. The report highlights that the scale of China's digital economy reached 50.2 trillion yuan (6.6 trillion euros at the April 2023 exchange rate), marking a year-on-year increase of 4.68 trillion yuan (618 billion euros). Furthermore, it emphasizes the **solidification of the digital economy's position in the national economy, with its GDP contribution reaching 41.5%, equivalent to the proportion of the secondary industry** in the same period. Based on this number, it is no surprise that the digital economy has now become a driving force behind China's economic growth. However, it is worth mentioning that when highlighting China's digital economy success,

³ Zhang Jie, "打造数字时代中国式现代化发展新引擎"(Create a new engine for Chinese-style modernization development in the digital era)," Chinese Academy of Social Sciences, July 25, 2023, https://www.cssn.cn/skqz/bwyc/202307/t20230725_5670166.shtml

⁴ On March 9, 2021, the Commission proposed a path to the Digital Decade, a comprehensive framework that will guide all EU actions related to the digital realm. The aim is to strengthen European digital sovereignty, set standards, and avoid merely following those of others. See Communication from the Commission "2030 Digital Compass: the European way for the Digital Decade," <https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:52021DC0118&rid=4>

⁵ "数字经济发展的四大趋势 (Four major trends in the development of digital economy)," China Center for International Economic Exchanges, May 19, 2023, <https://www.cciee.org.cn/Detail.aspx?newsId=20509&Tid=685>

⁶ Ren Zhongfei, "在'无人区'寻找方向 (Looking for direction in 'no man's land')," China Economic Weekly, January 2017, http://paper.people.com.cn/zqjjzk/html/2017-01/02/content_1741550.htm

⁷ "中国数字经济发展研究报告(2023年) Research Report on the Development of China's Digital Economy (2023)," China Academy of Information and Communications Technology, April 2023, http://www.caict.ac.cn/kxyj/qwfb/bps/202304/t20230427_419051.htm

the CAICT report is the most commonly used source of reference, with **other statistics to support the claim seemingly missing.**

This announced achievement for China's digital economy does not imply that the efforts can be let up; quite the opposite, as there is a clear commitment to continuous improvement and advancement. As Cao Yu and Zhang Qinyue, respectively from Tsinghua University's School of Public Administration and from Beijing Institute of Technology's School of Economics and Management, remind us, in the process of China's modernization, the country must remain vigilant and avoid the emergence of a situation in which there is a "*disengagement from reality (脱实向虚)*." They also stress the need to "**avoid the distractions of unsubstantiated ideas and superficial fame (不驰于空想,不鹜于虚声)**" in order to pave the way for the digital economy to lead the high-quality development of the real economy. In addition, Hu Yongjun, from the State Information Center of China, argues that, from a long-term perspective, the development of the digital economy is akin to sailing against the current: "*if you don't advance, you will retreat, and if you proceed slowly, you also retreat (不进则退,慢进亦退)*."⁸

As often mentioned, China's success in its digital economy is owed to massive data resources, rich application scenarios and so on.⁹ Adding to it, Huang Yanghua, Professor and Director of the Department of Industrial Economics at Renmin University, asserts

that China is capable of offering both upstream and downstream support for innovating digital economy application scenarios.¹⁰ He concludes that, currently, **China is on the verge of leading the industrial revolution, marking a historical milestone.**

To further embrace the economic value generated by data, on October 25, 2023, China formally launched its new National Data Administration (NDA), an agency under the National Development and Reform Commission (NDRC). This institutional signal is strong in a country where, during the January-July period of 2023, the cloud computing and big data services sector generated 640.9 billion yuan (80.1 billion euros at the July 2023 exchange rate) of revenues, up by 16.2% year-on-year.¹¹ The NDA is responsible for coordinating the integration, sharing, development, and utilization of data resources, as well as promoting China's digital economy and the construction of Digital China. Its introduction signifies an amplification of China's data strategy and governance framework, intricately aligned with the nation's economic advancement and national security imperatives.

Beyond national digital economy

China's digital economy is not confined within its borders. One example is the push for digital RMB cross-border settlement services to reduce China's dependence on the existing international payment network. On October 27, the Shanghai Petroleum

⁸ Hu Yongjun, "八大视角看数字经济发展态势 (Eight perspectives on development trends of the digital economy)," Sohu, September 9, 2023, https://www.sohu.com/a/627218730_121459397

⁹ 李强主持国务院第三次专题学习 (Li Qiang presided over the third special study session of the State Council)," Government of the People's Republic of China, August 21, 2023, https://www.gov.cn/yaowen/liebiao/202308/content_6899332.htm

¹⁰ Zhang Jie, "打造数字时代中国式现代化发展新引擎 (Create a new engine for Chinese-style modernization development in the digital era)," Chinese Academy of Social Sciences, July 25, 2023, https://www.cssn.cn/skgz/bwyc/202307/t20230725_5670166.shtml

¹¹ "2023年1-7月份软件业经济运行情况 (Economic performance of the software industry from January to July 2023)," Ministry of Industry and Information Technology of the People's Republic of China, August 25, 2023, https://wap.miit.gov.cn/gxsj/tjfx/rjy/art/2023/art_369eff77e056482986cb212bc40fb4b9.html

and Gas Exchange (SHPGX) reported the compilation of China's first cross-border digital RMB transaction of crude oil. The transaction entailed the purchase of 1 million barrels by PetroChina International, totaling nearly 670 million yuan (86.4 million euros).¹² The SHPGX did not disclose the identity of the seller. However, digital RMB is just a small piece of the puzzle. Sheng states that countries have come to realize that digital technology, the digital economy, and data elements constitute the core of the current scientific and technological revolution and industrial change. **Whoever masters the dominance of digital technology and the digital economy will secure the strategic initiative in future development and international competition.**

Huang Qifan, the former Mayor of Chongqing, has pointed out that China is currently engaged in intense competition and a game to shape the rules governing the global digital economy.¹³ Among these challenges, the digital competition between China and the United States stands out as particularly fierce. This competition is evident in various aspects, such as the stock market value of leading enterprises, the number of unicorn enterprises in the digital field, the underlying core digital technology innovation ability, international digital market share, and the global discourse on digital rule-making. Despite various indicators, the **development gap in the digital economy between China and the United States has not narrowed in recent years; on the contrary, it has expanded.** For example, Huang

notes that by the end of 2019, the market value of China's top ten digital enterprises was equivalent to 24% of the market value of the top ten digital enterprises in the US. However, by the end of 2022, this ratio had fallen to 17%.

Whoever masters the dominance of digital technology and the digital economy will secure the strategic initiative in future development and international competition.

Such weakness is underlined in official documents. According to a speech published by Qiushi, Xi Jinping notes that, compared to the world's major economic powers in the digital realm, **China's digital economy is "sizable but lacks strength, quick but lacks optimization (大而不强, 快而不优)."**¹⁴ Xi goes on by emphasizing the necessity for China's active participation in international digital economy negotiations. This involves bilateral and multilateral cooperation on digital governance, maintaining and enhancing multilateral governance mechanisms, and promptly presenting China's proposals to ensure its voice is heard. Huang also points out that recently, with ChatGPT as the representative of the United States, big model technology innovation greatly accelerated the development of artificial intelligence. China is thus at least two years behind, and the gap is rapidly widening.

¹² "交通银行成功完成首单油气贸易数字人民币跨境支付业务 (Bank of Communications successfully completed the first digital RMB cross-border payment business for oil and gas trade)," *China News*, October 28, 2023, <https://www.sh.chinanews.com.cn/jt/2023-10-28/117657.shtml>

¹³ Huang Qifan, "我国面临数字经济激烈竞争,应依托自贸试验区开展综合集成改革试验 (My country is facing fierce competition in the digital economy and should rely on free trade pilot zones to carry out comprehensive and integrated reform experiments)," *Jiemian*, September 25, 2023, <https://www.jiemian.com/article/10151821.html>

¹⁴ "不断做强做优做大我国数字经济 (Continuously make my country's digital economy stronger, better and bigger)," *Qiushi*, January 15, 2022, http://www.qstheory.cn/dukan/qs/2022-01/15/c_1128261632.htm

China's digital economy is "sizable but lacks strength, quick but lacks optimization (大而不强、快而不优)."

However, there is also an optimistic view. **Hu Yongjun and Shan Zhiguang**, also from the State Information Center of China, **predict that by 2035, China will have fully entered the era of a prosperous and mature digital economy**, leading the world in the digital industry and becoming a crucial source of global digital technological innovation, industrial innovation, institutional innovation, and conceptual innovation.¹⁵ That matches the official plan published by the Central Committee and the State Council in February 2023.¹⁶

In addition, Huang Qifan stresses that **in the competition for setting the norms and standards, the United States and Europe are the main architects of global digital governance rules**. Many major developed countries and a significant number of developing countries worldwide have already aligned themselves with either the US or the EU. On the other hand, **China's digital governance has not yet fully dovetailed with international high-level digital rules and has not made significant progress in addressing key digital governance issues**.¹⁷ These include the cross-border flow of data, market opening of digital services, localized storage of data, openness of public data, protection of personal privacy data, digital security, and other critical digital governance issues.

If China cannot achieve a breakthrough in these key digital rules to align with the international standards, there is a risk of being sidelined from the main global digital market. He refers to the recent adoption of the EU-US Data Privacy Framework, as an illustration of the convergence between Europeans and Americans in the data space, with China at risk of being excluded from the world's primary digital markets. However, this framework is struggling to stand the test of time, with many in the data sphere expecting a Schrems III.

Further efforts to pursue the digitalization of the economy

Huang advocates for a renewed and comprehensive phase of reforms, suggesting that Free Trade Zones (FTZ), as a testing ground for China's deepening reforms and opening up, are well positioned and obligated to lead in conducting holistic reform experiments. This involves establishing a digital economy development demonstration zone, essentially "*carving a path forward (出一条血路)*" for the evolution of China's digital economy. Specifically, he proposes early and pilot implementations in five key areas, encompassing systematic alignment with the Digital Economy Partnership Agreement (DEPA), efficient management of cross-border data flows, exploration of offshore data processing ventures, promotion of China's digital payments and cross-border settlement services and, investigation into a mature model for data trading.

For now, **China's digital activity is primarily taking place at the consumer and business levels. The digi-**

¹⁵ "数字引领未来—数字经济重点问题与发展路径研究 (Digital leads the future—Research on key issues and development paths of digital economy)," State Information Center, October 9, 2023, http://www.sic.gov.cn/sic/93/552/644/list/index_pc.html

¹⁶ "中共中央 国务院印发《数字中国建设整体布局规划》(The Central Committee of the Communist Party of China and the State Council issued the 《Overall Layout Plan for the Construction of Digital China》)," Government of the People's Republic of China, February 27, 2023, https://www.gov.cn/zhengce/2023-02/27/content_5743484.htm

¹⁷ François Godement and Viviana Zhu, "Cross-border Data Flows: the Choices for Europe," Institut Montaigne, April 2023, <https://www.institutmontaigne.org/en/publications/cross-border-data-flows-choices-europe>

tization of the industrial economy is still in its early stages. This imbalance has not gone unnoticed. Wang Yiming, the former Deputy Director of the Development Research Center of the State Council, highlights in his analysis of China's current digital economy trends that the country's digital transformation is expanding beyond consumer-focused platforms to include the manufacturing sector.¹⁸ This integration involves advanced sensing technology, digital design, robotics, and intelligent control systems, offering opportunities to enhance productivity and international competitiveness in manufacturing.

Wang also observes the rapid evolution of China's industrial ecology based on the industrial Internet. He therefore suggests that, to enhance the digital economy's added value, innovation capacity, and competitiveness, China should focus on four key areas: accelerating the digital transformation of the manufacturing industry, overcoming challenges faced by small and medium-sized enterprises, promoting industrial Internet platforms, and achieving technological self-reliance. The renowned economist also calls for breaking through key technological barriers, fostering cross-border innovation, and ensuring a

competitive policy framework that supports a diverse and market-oriented innovation ecosystem.

Conclusion

All in all, China might have a flourishing digital economy. But given the geopolitical competition with the US, and disagreements with the EU in how to regulate the digital space, it is quite constrained in advancing beyond its border. In addition, **under China's approach, the primacy of the government's power and benefits consistently takes precedence over those of other stakeholders, creating a sense of distrust.**

There is still a long way to go. Chinese Premier Li Qiang, while discussing the importance of creating a favorable environment for the development of the digital economy, mentioned the need to **"adhere to an inclusive and prudent regulatory attitude (秉持包容审慎监管态度)."**¹⁹ Interestingly, the call for a prudent regulatory attitude seems to go against the trend of cracking down on tech companies over the past few years. This also underscores the significance that Chinese leaders place on the digital economy.

¹⁸ "数字经济发展的四大趋势 (Four major trends in the development of digital economy)," China Center for International Economic Exchanges, May 19, 2023, <https://www.cciee.org.cn/Detail.aspx?newsId=20509&TId=685>

¹⁹ "李强主持国务院第三次专题学习 (Li Qiang presided over the third special study session of the State Council)," Government of the People's Republic of China, August 21, 2023, https://www.gov.cn/yaowen/liebiao/202308/content_6899332.htm

China Trends is a quarterly publication by Institut Montaigne's Asia Program which is composed of **Joseph Dellatte**, Research Fellow for Climate, Energy and Environment ; **Mathieu Duchâtel**, Director of International Studies ; **François Godement**, Special Advisor and Resident Senior Fellow - Asia and America ; **Claire Lemoine**, Project Manager and **Pierre Pinhas**, Project Officer & Editor of China Trends.