

SINO-DANISH TECHNOLOGY COLLABORATION

an introduction to the context, potential,
forms of collaboration and risk management

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This report is the result of the China Tech project, which the Danish Academy of Technical Sciences coordinated alongside a working group consisting of the Danish-Chinese Business Forum, Sense China (Danish Confederation of Industries), and the Sino-Danish Center for Education and Research.

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Photo: Colourbox

Preface

In 2018, the Danish Academy of Technical Sciences (ATV) organized a delegation visit to Shanghai and Hangzhou. The participants in the delegation were Fellows of the academy and key external stakeholders. At that time, tensions between China and the US were already strained due to the trade war and the concerns about a looming tech war that could disrupt supply chains and put pressure on existing business models based on a free global market economy which consequently would also challenge collaboration around technology. Four years later, these concerns have proven justified, and we are witnessing great power competition between the US and China, which bears a resemblance to the Cold War. Uncertainties are reinforced by differences in handling the covid pandemic and, most recently, by attitudes toward the war in Ukraine.

Danish companies – multinationals as well as small and medium-sized enterprises – are already experiencing the effects of the situation and are planning accordingly. Some companies are investing in making their supply chain more robust, and some are, at the same time, seeking to regionalize their supply chains (a China+1 or China+2 strategy). Some companies are reshoring production. Others are seeking a foothold in the new markets in China, which are developing as China is decoupling its dependencies from international manufacturers. No matter the response, the situation is impacting Sino-Danish technology collaboration. Therefore, this report introduces the context, potential, forms of collaboration, and ways to manage the risks associated with technology collaboration. The report is prepared specifically with small and medium-sized Danish technology companies in mind and aims to help them work more confidently with existing or potential China-based partners.

China and Denmark have a long tradition of collaboration in science and technology. Many Danish companies have established subsidiaries in China. These initiatives are affected by the recent geopolitical developments—some more than others. At the same time, China is continuing its investments in science and technology, thus increasing its capacity, innovation, and ambitions in areas such as renewable energy, e-mobility, artificial intelligence, and many others. Against this background, it is only natural that small and medium-sized enterprises (SMEs) in Denmark are considering exploring the possibilities in the Chinese market – or, at a minimum, keeping updated on technology trends and developments in China.

Considering the abovementioned situation, the Chinese market has never been easy to access for SMEs. It is fair to argue that access has not become easier. Therefore, the Danish Academy of Technical Sciences (ATV) and our partners – the Danish Chinese Business Forum, Sense China, and the Sino-Danish Center for Education and Research – decided to jointly organize the China Tech initiative,

which consisted of a series of meetings that took stock of the situation and discussed possibilities as well as challenges.

The meetings themselves were a key component of China Tech. The guiding principle of the meetings was to engage in a dialogue that addressed the potential and risks to allow informed individuals to come together to establish new networks and discuss difficult questions, thus uncovering nuances and challenging assumptions.

The discussion concerning Denmark's relationship with China often focuses on the need to collaborate on climate change and global pandemics OR the new risks associated with trade and collaboration. We believe that a strategic approach to technology collaboration with China requires balancing opportunities against risks. The meetings showed that this balancing, while difficult, is possible. We advocate that Danish companies continue to be curious about the developments in China and the possibilities in the Chinese market – this lever will be important for staying competitive internationally. At the same time, everyone must keep in mind that recent geopolitical



Photo: Bigstock

developments, not least the war in Ukraine, have meant that business and politics are no longer separate entities (if they ever were) and that this introduces new complexities which companies operating globally need to learn how to handle.

Another important outcome of China Tech is the report you are reading – "Sino-Danish technology collaboration." The guide summarizes what we have learned from the meetings:

Indisputable possibilities and technological capabilities are available in China

– viewed only from the perspective of market size and technology capacity Danish SMEs can benefit from collaborating with Chinese partners. The knowledge and competence levels of Chinese partners continue to progress; also, the hypercompetitive Chinese market provides an outstanding learning ground.

The Danish academic community has outstanding networks in China

– over the past two decades, researchers at Danish universities have developed wide and deep collaborations with Chinese partners. These long-established partnerships could provide Danish SMEs (and large companies) a shortcut to the Chinese knowledge base.

Dominating focus on risk in the Danish ecosystem

– in the 2000s and 2010s, many technology-developing SMEs explored the Chinese market. Some were very successful, while many found the market or the partnerships futile. In recent years, the potential of China-entry into Danish technology has been overshadowed by the risks. In this situation, companies that could benefit from a China entry may shy away from exploring the possibilities and utilize the existing ones to mitigate the risks.

Risk of over implementation – there are good reasons for paying attention to the risks, but a one-sided focus on risks can lead to missed opportunities for Danish SMEs. Any risk analysis should also include an analysis of the potential, but the tools to provide this more nuanced analysis are limited.

Few success cases of Danish/European SMEs – so far, there are only a few cases of technology-driven collaboration between Danish SMEs and Chinese partners. The successful cases seem to be the exception rather than the rule. That is different from Danish SMEs not having success in the Chinese market. They do. However, there are few examples of them developing essential technology in collaboration with Chinese partners.

Denmark does not have instruments suitable for helping SMEs to access the Chinese knowledge base

– when Chinese universities and companies are drivers of state-of-the-art technology, it can become a problem if Danish SMEs are unable to access this knowledge base. There is a need to develop instruments and/or support functions that enable SMEs to protect their interests and manage the risks while also accessing competences and know-how in China.

For the time being, technological collaboration with Chinese partners is for strong-hearted trailblazers – in the face of the findings outlined above and the global tension, it is clear that technological collaboration with Chinese partners is, for the time being, mainly for strong-hearted trailblazers.

This report provides a starting point for technology-driven SMEs that already work or are considering working in China or with Chinese partners. However, it is not meant and does not seek to cover all relevant aspects. It cannot replace thorough consideration, preparation, and analysis. Therefore, the report also includes references to organizations that can assist Danish SMEs to determine their preparedness for entering China.

We are grateful to the Laurits Andersen Foundation for supporting the China Tech initiative. Their support was instrumental in enabling the meeting series and the report. Finally, we would also like to thank the many experts who have contributed to the China Tech initiative – their input has been highly appreciated.



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WHY COLLABORATE WITH CHINA ON TECHNOLOGY

China is now spending more on R&D as a percentage of GDP than the European Union and has repeatedly reaffirmed its ambitions to become a technological superpower. China sees science and technology as the key enabler to drive the country's continuous development and is working hard to become the leader of the fourth industrialisation, with strong technology development in areas such as big data, 5G, artificial intelligence, quantum computing, Internet of Things, and industrial robotics. China is already world-leading in number of patent applications, accounting for nearly 40 percent of the world's total. It is a massive talent pool for engineering and high-tech. Its STEM (Science, Technology, Engineering, and Mathematics) PhD-growth is rapidly overtaking the US. Government-led plans and initiatives such as the *14th Five-Year Plan*, and the industrial policy plan *Made in China 2025*, are designed to support China's technology ambitions and gradually reduce the country's dependency on technology imports from Western countries.

While China has accelerated its technology advancements, the country still faces challenges concerning a range of key technology areas, including some of the most value-adding products in the global value chains. The most obvious example is semiconductors, where China has not yet been able to reach the same level of performance as the market leaders in the US, South Korea, and Taiwan. Similar patterns can be identified in, e.g., clean tech, life science, pharmaceuticals, etc., where the market demand still makes it necessary for China to import technology and collaborate with partners internationally.

The Chinese government recognizes this situation and encourages international collaboration that support their domestic technology agenda. Encouragements usually come in the form of financial support, help to identify commercial partners, and/or market access. One challenge for companies thus lies in clarifying how their technologies and business models can benefit from technology priorities or flagship projects outlined by the Chinese government within, e.g., renewable technologies, industrial robotics, aviation technologies, circular bioeconomy, etc.

While it is within government sponsored and prioritized areas that important opportunities exist, it is also where collaboration should be carefully scrutinized. Companies that engage in technology-driven collaboration with Chinese partners will operate in a patchwork of intertwined and mutually reinforcing policies and plans that, on the one hand, supports collaboration and, on the other hand, may challenge the same agenda and affect collaboration negatively. Regulatory changes are common and often affect the operational space of technology companies. Therefore, collaboration with China remains a complex endeavour, and one that requires thorough assessment and due diligence prior to any collaboration.



Photo: ATV

Technology collaboration

IN A CHINESE POLITICAL CONTEXT

Business and politics have historically been inseparable in China. This is still the case, and the Chinese Communist Party does not refrain from playing an active role in steering the market and supporting industrial sectors of strategic interest. Similarly, restricted or prohibited business areas that do not follow the strategic direction of the government will find it hard to secure funding or get access to favourable programmes or subsidies, while encouraged business receive substantial support from the government.

Companies operating in China are, needless to say, expected to comply with formal regulations. But there is also evidence that companies are increasingly required to keep an eye on the Party's broader ideological agenda. In recent years, particular internet companies but also companies providing AI-based online learning platforms have been targeted by the Chinese government's so-called 'tech crackdown' aimed at limiting their influence in Chinese society and direct resources to politically supported

sectors. In the same period, more science-based industries have not been included in the crackdown. For instance, semiconductors, renewable energy and generally all the companies working in industries under the 'Made in China 2025' has experienced increased political support.

This is also clear from the newly enacted Science and Technology Progress Law, which further underscores China's need to boost its science and technology sectors.

Considering the increased politicisation of technology and the intertwined nature of business and politics in China, technology collaboration is becoming increasingly delicate. Economic and commercial interests may intersect with greater strategic (and military) aims of the party-state, and often these are not immediately clear. Foreign knowledge and technology are a high-stake commodity and very important to the further development of the Chinese society, but sometimes also for the military capabilities and ambitions of the nation. For many years, joint ventures have been the core way in which China

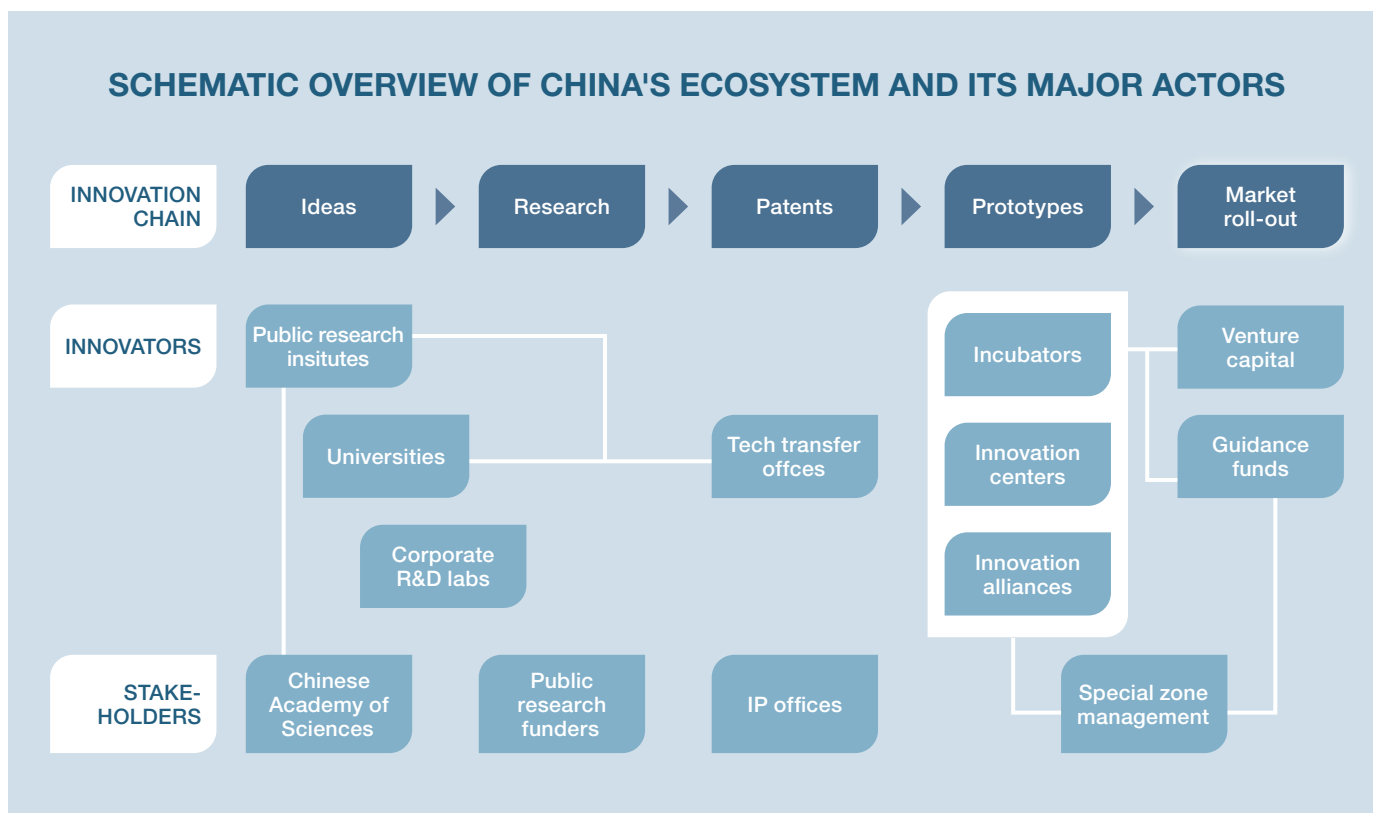
has accessed desired technologies, but now both passively absorbing and actively acquiring new technologies are on China's strategic agenda. It is therefore important that SMEs make a thorough assessment of their potential partners and the benefits as well as the risks of potential China-focused initiatives. Hopefully, this guide forms a starting point for this assessment and can help direct Danish SMEs towards value adding collaboration with Chinese partners. As such, the aim of the guide is not to argue against collaboration. On the contrary, the guide aims to address, head on, relevant questions that are key to evaluating and preparing technology collaboration in a time of geopolitical tension which includes identifying possibilities and mitigating risks.

INTRODUCING KEY INSTITUTIONS IN THE CHINESE INNOVATION SYSTEM

China has rapidly become one of the largest contributors of science, technology, and innovation in the world, leading the world in most cited academic papers and patent applications, and trailing only the US in R&D expenditure. Beijing welcomes foreign firms into China's vast and expanding innovation ecosystem and set up R&D facilities in the country. Denmark has considerable strengths in renewables, biopharma and other advanced

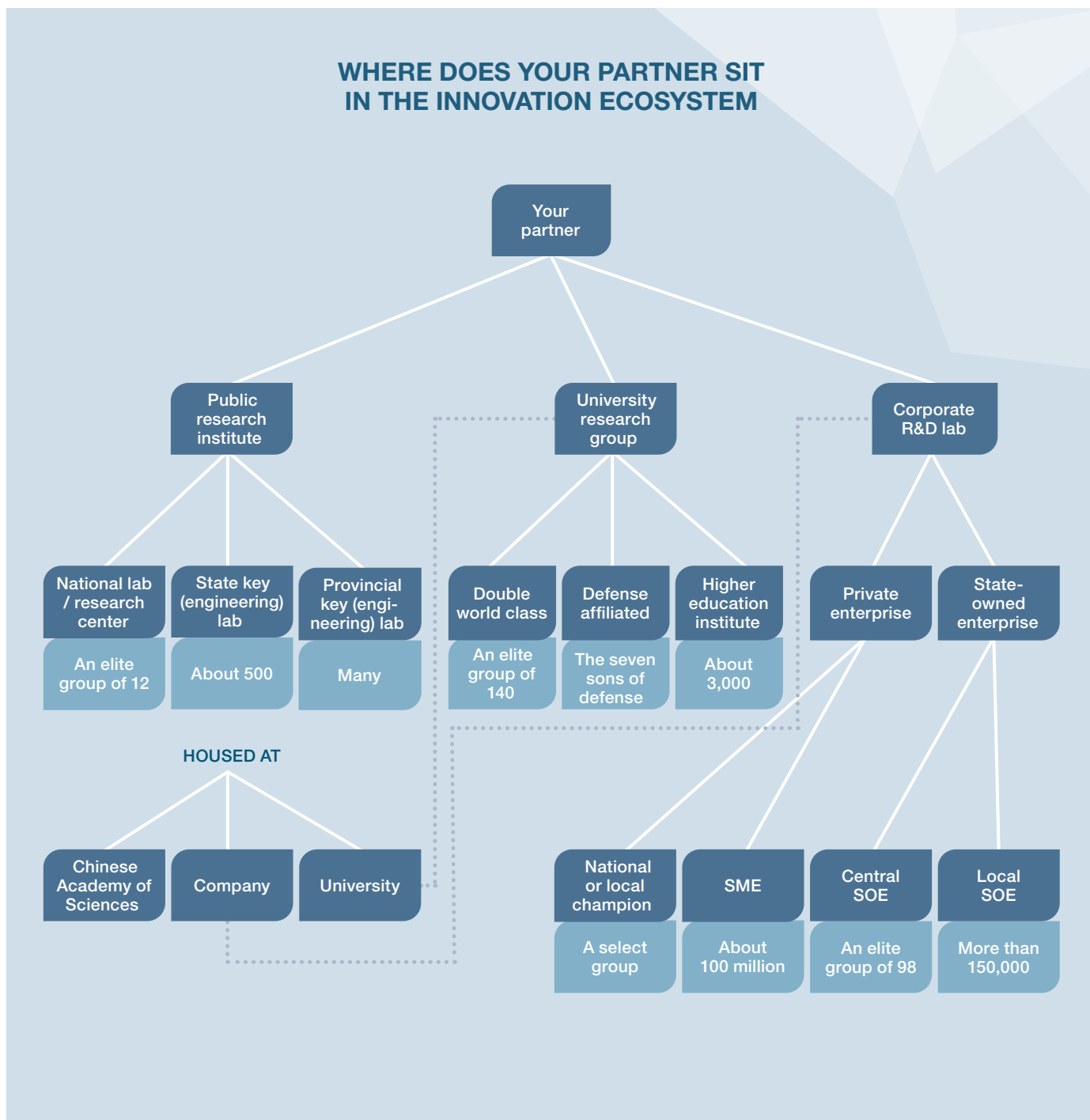
sectors. This section introduces the main institutions in science, technology and innovation that Danish SMEs may come across as they explore technology collaboration with and in China.

Decoupling risks, tech competition and self-reliance have become international focal points that also drive China's latest round of reforms to its innovation ecosystem. Science has no borders, said President Xi Jinping in 2020, but scientists have a motherland. Eagerness to break 'foreign technology strangleholds' in areas like semi-conductors, robotics and biotechnology has prompted Beijing to extend its industrial policy to earlier stages of the innovation chain (see graph below), and to adopt a more entrepreneurial and mission-driven approach. This 'all of state' approach requires government, industry, university and research institutes to work together, to which end a wide variety of platforms and investment mechanism have been set up. Not all of these initiatives are equally open to foreign participation. Although forced technology transfer is officially banned, the risk for foreign firms of technology leakage is high, not least in the areas where China welcomes foreign participation most, such as machinery, chemicals, and ICT.



By following innovations from embryonic idea to market launch, this section shows how different actors are involved in different phases of innovation, and how their activities and the related government policies add up to a larger, more or less coherent vision. Of course, innovation and international collaboration are rarely as neat as presented here. Still, this is not an entirely unrealistic scenario—European companies have indicated in interviews

that upon seeing interesting presentations at industry conferences, they would contact Chinese researchers for joint research projects. Occasionally these would lead to the researchers launching a university spinoff and joining the European firms' global supply chain. Beigene, which in 2019 became the first Chinese firm to sell an anti-cancer drug in the US, was set up by a Chinese-American scientist and an American entrepreneur.



R&D PARTNERS: RECOGNIZING HIGH-POTENTIAL

European high-tech firms, universities and research organizations are regularly approached by Chinese entities with proposals for collaboration. Danish firms may also initiate contact, especially if they are actively scouting for new technologies. A first step towards assessing a research partner is to understand whether they are affiliated with a public research institute, a university or a company, as each has its own interests, government incentives and regulations (see graph above).

Secondly, China's governance system can help assess research partners further. Official designations, rankings, and (talent) awards matter more than in Europe. Beijing has improved these indicators of excellence by standardizing criteria, promoting transparency and open competition, and banning poorly organized awards and rankings. After a warning period, underperforming public research institutes (PRI) can now be demoted. Similarly, Double World Class, launched in 2015 to create world-class universities and disciplines, makes merit the sole criterion based on regular performance reviews. Previous designations also considered politics and regional planning and were less dynamic, as universities fought tooth and nail against demotion. As a side-effect, the shift towards more open competition has exacerbated the brain drain from inland regions to prestigious institutes in Beijing and Shanghai. Beyond these trends, indicators of success are specific to each of the three types of possible R&D partners:

- **Public research institutes** typically start their lives as a municipal or provincial key lab, to become a state key lab (SKL) upon approval by the Ministry of Science and Technology (MoST). The highest level is dominated by experimental physics institutes set up in the 1980s. This may change as reforms are to align the whole pyramid with strategic priorities. These reforms will also affect the Chinese Academy of Sciences (CAS), which oversees most labs and institutes, traces back to the Soviet era, and bestows the title of

'academician' on top researchers. Affiliation with CAS is a sign of prestige and quality for a PRI.

- **Universities** now produce the bulk of China's research output, overtaking CAS. Their growth is reflected in their rise in global university rankings. The most authoritative Chinese ranking is the Academic Ranking of World Universities (ARWU), compiled by Shanghai Jiao Tong University.
- **Corporate R&D labs** are being encouraged to apply for public research funding. However, absent a national register, official evaluation criteria or categorizations, funding agencies struggle to assess the quality of corporate labs. Obtaining SKL status, employing academicians and winning public research grants are indicators. Additionally, section three below mentions several different types of firms, in the context of research commercialization.

Most of the abovementioned entities welcome international partnerships, and many have dedicated outreach departments. On the other hand, quite a few PRIs, universities and firms have ties with the People's Liberation Army (PLA) or participate in military-civil fusion programs. Consulting the China Defense University Tracker is a minimal but not sufficient step in any due diligence process,¹ as military researchers are known to share false or less conspicuous sounding affiliations. A more robust screening process would involve external China expertise. The EU and European national governments (including Denmark)² have issued guidelines to aid firms and knowledge institutes in this taxing process. More online tools are forthcoming.

1 <https://unitracker.aspi.org.au/>

2 <https://ufm.dk/publikationer/2022/afrapportering-udvalg-om-retningslinjer-for-internationalt-forsknings-og-innovationsamarbejde>; for a larger overview see <https://www.kooperation-international.de/dokumente/berichte-und-studien/detail/info/annotated-collection-of-guidance-for-secure-and-successful-international-ri-cooperation>

RESEARCH GRANTS: FROM IDEA TO PROTOTYPE

Applying for a research grant is a logical next step for a joint project. Europe and China agreed to promote joint projects and open up research programs for each other's scientists when they signed the Science and Technology Cooperation Agreement in 1998, which was silently renewed in 2018. However, in practice Europe's programs, such as Horizon, are much more open to foreign participation than their Chinese equivalents. Although foreigners can submit proposals, across six years and thousands of bids, they never won Chinese funding. This lack of reciprocity is the main reason for the new Roadmap for EU-China Science and Technology Cooperation to be delayed.

The Chinese research partners of European entities are much better positioned to secure public research funding in China. Danish SMEs stand the most chance to benefit as partners in a conglomerate or by exploring the provincial level, where grants can still be substantial. After reforms in 2016, both the central and local levels follow a tripartite structure of

- **Megaprojects:** the top 16 projects for a 15-year period, such as aircraft engines, satellite navigation, semiconductor equipment and anti-cancer drugs. Funding is completely untransparent, and in some cases allocated directly to central state-owned enterprises (SOEs).
- **National Key R&D Projects (NKP):** combining several pre-existing categories, this scheme focuses on applied research, with open tenders and lists of winners across about 80 different technology areas. MoST oversees the process, announcing calls for proposals at a public website.³
- **National Natural Science Foundation of China (NSFC):** tracing back to the 1980s, NSFC is for basic and 'original research'. It is organized in nine disciplinary departments and is supervised by MoST since 2018; its processes have gradually become more transparent; funding rounds take place once a year.

Research grants lead to pilot projects

In 2016, Danmarks Tekniske Universitet (DTU) launched a four-year project titled EPIMES with several Chinese partners on integrating wind power into local grids, using heat and hydrogen to store excess power. The Danish Innovationsfonden provided a grant of 6.3 million Danish Kroner, while Chinese partners were introduced by the China National Renewable Energy Centre (CNREC), itself the result of Sino-Danish collaboration under China's top planning agency, the National Development and Reform Commission (NDRC).

As part of the project, equipment prototypes were tested in Denmark and Beijing. State Grid, which participated through its Beijing branch, developed these further. The Zhejiang branch of the massive SOE received a three-year Chinese research grant (NKP) in 2018 for developing off-grid networks that combined wind and solar power with hydrogen batteries. This led to the launch of four pilot projects in Zhejiang province in August 2021 under the rubrics of 'hydrogen meets electricity'.

Media reports at this stage note NDRC calls for new types of energy storage, but no longer mention Danish involvement.

³ https://service.most.gov.cn/kjih_tztg_all/

Finally, Beijing has indicated that it wants more of this funding to go to companies, rather than PRIs, who often struggle with turning research results in marketable technologies.

TECHNOLOGY TRANSFER: FROM LAB TO MARKET

Bringing together research and industry, like CNREC did in the example above, is becoming a focus of Chinese policy, as China's rapid growth in research output has not been matched by equal growth in industrial, economic and military power. To improve this and realize its innovation missions, Beijing is adjusting incentives for researchers, de-regulating patent ownership, setting up a range of platforms and pressuring firms to step up. Engaging with this evolving ecosystem is a necessary step in the development of a Sino-Danish partnership from initial idea to market launch.

If the Chinese partner is employed at a PRI or university, setting up a spinoff is a logical next step, following the examples of Lenovo (out of CAS), iFlytek (CAS), BGI (CAS), Founder (Peking University) and Tsinghua Unigroup (Tsinghua University). However, the demise of the latter exposed risks at Tsinghua University⁴ and added pressure on universities to curb investment activities. At the same time, Beijing encourages inventors to launch spinoffs by moving the right to approve the commercialization and licensing of patents down to universities and

research institutes (from the State-owned Assets Supervision and Administration). For Danish SMEs, the main takeaway is that their Chinese research partners may not have full ownership over their inventions. Typically, launching a spinoff involves negotiations over investments and benefit sharing between researchers and their public employers.

Beijing's keen interest in research commercialization has also caused universities and PRIs to set up technology transfer offices, which link up with industry through an emerging national market for patents and technologies. Involvement in these platforms can be beneficial for new companies. The industry also impacts research agendas through the following:

- Eleven **national innovation centers**, which have been set up in industries like batteries, smart sensors or new materials between 2016 and 2021 as part of the Made in China 2025 blueprint for industrial upgrading; each is led by major enterprise and involves SMEs, PRIs and other stakeholders. For instance, industry leader TCL hosts the National Center of Technology Innovation for Display⁵ through at its subsidiary Juhua Printing; iFlytek leads the National Center for Intelligent Voice Recognition through its subsidiary Nivic.⁶
- **Innovation alliances** set up by localities to target a single technology; they are typically led by a local champion, with several universities and PRIs involved in R&D and testing.

Schneider Electric's EcoStruxure

To commemorate the Communist Party of China's centenary in 2021, the China Industry-University-Research Institute Collaboration Association published a book with 100 model tech transfer cases. The only foreign firm mentioned is the French firm Schneider Electric, for promoting digital transformation and low-carbon, sustainable development. Its partnership with Shanghai Jiao Tong University includes a joint lab, while partnerships in Chengdu, Xian, Nanjing, Taiyuan and Shenyang seem to be focused on vocational education. These collaborations feed into and promote Schneider's industrial Internet of Things platform EcoStruxure, which is also open to co-innovation with end-users in various industries.

4 <https://www.reuters.com/article/tsinghua-unigroup-strategy-idCNL4N2JT2BK>

5 <https://www.nctid.com/>

6 <https://www.nivic.cn/>

Beijing seeks to nudge both private and state-owned firms into taking on a larger role in developing the technologies it identifies as crucial to China's long-term development through these platforms, various tax incentives, SOE reforms and the so-called 'tech crackdown' of major digital platforms. Several official designations exist for high-tech and innovative firms that are linked to tax and other incentives. These designations require firms to invest in research and generate patents and can be helpful shorthand for Danish SMEs to gauge the R&D commitment of their corporate partners. However, despite these incentives, officials complain that firms rely too much on the state for early-stage R&D.

As Beijing is searching for local success cases to replicate and expand nationally, its attention has shifted from national behemoths to a group of more specialized high-tech firms called 'little giants',⁷ inspired by notions like 'hidden champions' and 'Mittelstand' in Europe. For instance, Leaderdrive,⁸ which specializes in harmonic reducers, listed on the Shanghai Stock Exchange in 2020, a year after being recognized as a little giant. The Ministry of Industry and Information Technology has officially recognized 8,997 such firms since 2018. Adopting this language may help Danish SMEs, for instance in negotiations with local officials over support packages for building research facilities in their jurisdictions.

SCALING UP: CROSSING OVER INTO INDUSTRIAL POLICY

Developing a Sino-Danish partnership may involve setting up research and production facilities in China. This is where the innovation chain blends into industrial policy. Industrial zones, investment catalogues and capital markets increasingly shape the trajectory of innovations.

Many of the institutes, firms and platforms mentioned in previous sections are located in special development zones. As a result, zone management and local district officials are important stakeholders for building a company around an innovation. These officials compete for

FDI and will offer support packages, including subsidized rent, utility and construction cost, and help with talent attraction, training, IP protection and so on. What a zone can offer is defined by its type, with the pilot free trade zones the most advanced type. For other zones, recognition at the national level is a marker of quality and access to national policy support.

The types of investments that are welcomed in these zones and China more generally are governed by various lists and catalogues, which are updated every couple of years. An official negative list restricts FDI, opening up all other areas for foreign involvement. By contrast, catalogues like that of the strategic emerging industries identify sectors for active support. This support is then expressed through local policies and government guidance funds.

7 <https://www.bnnbloomberg.ca/china-s-little-giants-are-its-latest-weapon-in-the-u-s-tech-war-1.1712026>

8 <https://www.leaderdrive.com/>

Swiss Pharma Giant Roche Accelerating in China

Roche launched an accelerator in Shanghai in 2021 with a 300 million RMB investment. The facility aims to attract “entrepreneurs in the areas of pharmaceuticals, diagnostics and personalised health-care including artificial intelligence and digital solutions,” according to the official website. Through its location in Zhangjiang, one of China’s top innovation zones, and links with Roche’s own research facilities in Shanghai, the accelerator is well placed to “contribute to the local innovation ecosystem in China.” Although construction is ongoing, the accelerator picked five firms in 2021 out of 150 applicants, exploring R&D partnerships.

Roche cited investments in China as a driver behind a 14 percent increase in its global pharma R&D budget in 2021. The firm extended its global lead in pharma R&D expenditure with a \$16 billion outlay. China interest is also fuelled by a deal that Roche signed with Innovent Biologics in 2020, which could end up being worth \$2 billion. It allows the Chinese firm to use Roche’s research labs (for a fee) while it gives Roche the right to market (outside of China) the anti-cancer drug that Innovent is developing, for a potentially much larger fee.

Guidance funds emerged around 2014 as an alternative to direct subsidies. Mimicking venture capital, including by employing professional fund managers rather than officials, would make government support more effective. It also helped shape a domestic trajectory for tech startups (like our hypothetical Sino-Danish collaboration) towards IPO, together with incubators and accelerators, and stock market reforms around tech boards in Shanghai (STAR), Shenzhen (ChiNext) and Beijing (NEEQ).

The National Integrated Circuits Industrial Investment Fund, the most famous guidance fund, typically sets up sub funds with local government, which would make investments in local facilities, often tied to zones. China’s many guidance funds altogether raised about 4.76 trillion RMB by 2020. Unlike the stated intentions, this enormous sum creates significant (stock) market distortions, and tech startups only receive a portion of investments.

DESTINATIONS

This section has outlined a possible trajectory of a Sino-Danish technology partnership from idea to IPO. More often, collaborations will not follow the entire innovation chain and instead focus on segment, as each has its own dynamics and actors, and hence also different forms of partnerships. Especially at the later stages, where the innovation chain intersects with industrial policy, opportunities are limited for Danish entities to remain an equal partner and benefit fully from all support and synergies in the Chinese innovation ecology. Still, this outline should provide a good overview of how China’s innovation ecosystem is set up. Building on this, the next section returns more squarely to the perspective of Danish SMEs, outlining in more detail how technology-focused collaboration may be forged.



Different ways of

FORGING TECHNOLOGY COLLABORATION

There are numerous ways to engage in technology collaboration with Chinese partners and there is no one-size-fits-all guide to the most effective model; each model presents its own advantages and disadvantages, requires different levels of commitment and resources, and presents different risks. Therefore, before considering specific ways to enter the Chinese market, it is fundamental that Danish tech SMEs carefully assess what they are hoping to achieve in China based on their strategy and resources available.

This section illustrates five main engagement approaches that could be pursued. These will be treated individually, although they are not mutually exclusive; in practice, Danish tech SMEs may use a combination of two or more engagement approaches to cooperate with Chinese partners.

INVESTING IN CHINA: ESTABLISHMENT OF A LEGAL REPRESENTATION

Investing in China is the most direct way to enter the Chinese market. It requires the establishment of a legal entity which is the basis for operating a certain minimum representation in the country – a representation that can later be expanded as activities develop. In general, a legal entity is ideal for businesses that require payments to be made and received in China without paying intermediary fees.

Foreign direct investment in China is governed by the Foreign Investment Law adopted by the National People's Congress on March 15, 2019, and came into effect on January 1, 2020. This law replaces the three former laws on foreign direct investment, namely the EVJ Law⁹, CJV Law¹⁰, and the WFOE Law¹¹. While immediately effective for companies entering China, a five-year transition period to the Foreign Investment Law (2020-2024) is given to companies already operating in China.

The Foreign Investment Law outlines the general intentions and principles rather than a detailed set of enforceable rules and functions as a general framework law. The law consists of six chapters and 42 articles that establish the basic rules for promoting, protecting, and managing foreign investment in China.

It covers greenfield investments, M&A, and project investments. With the introduction of the new Foreign Investment Law, China has set a new course that aims to give foreign investors more transparency and clarity based on the principle of national treatment and protection. Joerg Wuttke, president of the European Union Chamber of Commerce in China, said the Law puts a “strong emphasis on preventing Chinese entities from forcing foreign companies to transfer valuable technology” as a requirement to do business in China while at the same time also improving the protection of trade secrets.

It is noteworthy that China's *Foreign Investment Negative List*¹² stipulates that, in some sectors, foreign investors will only be allowed to establish Joint Ventures with Chinese partners, according to certain equity gaps.¹³ At the same time, there is also a *Positive List* (see info box), which indicates sectors are particularly open and welcoming for foreign investment nationwide and in Chinese central and western regions. Foreign investors in these sectors will receive much stronger support from local administrations regarding incentives, preferential policies, access to administrative services, etc.

9 Law of the People's Republic of China on Sino-Foreign Equity Joint Ventures

10 Law of the People's Republic of China on Sino-Foreign Cooperative Joint Ventures

11 Law of the People's Republic of China on Wholly-Foreign Owned Enterprises

12 The last edition was published at the end of 2020:
https://www.ndrc.gov.cn/xxgk/zcfb/fzggwl/202012/t20201228_1260594.html?code=&state=123.

13 Foreign investment in China is regulated by the Foreign Investment Law, and by a series of ad hoc regulations mostly reflected in three Foreign Investment Negative Lists: (i) one list applies nation-wide, indicating 31 industries in which foreign investment is restricted or prohibited – mostly within the energy sector, ICT, scientific research and creative industries; (ii) one applying only to China's 22 Free Trade Zones, removing restrictions on all manufacturing sectors and reducing restrictions for foreign investors in value-added telecommunication services, publishing, and education; and (iii) one applying only to Hainan Free Trade Port, with less restrictions in value-added telecommunication services, education, automotive manufacturing, and legal affairs.



Photo: Bigstock

LiTHIUM BALANCE's attempts to establish a JV in China in the Electric Vehicle sector

LiTHIUM BALANCE was founded in 2006 as an ambitious start-up at the Danish Technological Institute. It was one of the very first pioneers of battery-based electrification technology, by developing, manufacturing and selling Battery Management Systems (BMS) for lithium-ion battery technologies.

Since the very beginning, LiTHIUM BALANCE was looking to expand internationally. Back then, China was a natural option as the country was investing heavily in the EV industry. The company originally only sought to sell products to Chinese clients, however it encountered significant challenges to find any as the latter preferred to cooperate through the establishment of a JV, rather than purchase of products. This was the result of the strong push of the Chinese government to attract foreign investment projects in China in the EV sector; indeed, until 2018, foreign investors in China in the EV sector were only permitted to establish JVs with local partners. The company was

willing to invest in a JV as it could represent a solution for developing business and sales networks in China, otherwise difficult to build alone. However, it soon realised the preference of Chinese companies to work with large-sized companies as JV partners.

In 2016, the company found a Chinese client who also invested for 25% of its shares, for the development of a leading automotive BMS platform – with co-owned IP rights – which would lead, if successful, to the establishment of a JV in China for sales. It is noteworthy that the core R&D personnel was kept in Denmark, thus reducing potential risks of employees leaving to work for other Chinese competitors. The partnership, however, did not turn out as expected: In 2021, the shares of LiTHIUM BALANCE were acquired by Sensata Technologies, and the plans for a sales JV in China abandoned – although an IP and licensing agreement was kept with the Chinese investor.

China's 'Foreign Investment Positive List'

The 'Positive List' includes more than 1,000 sectors in line with China's development priorities and strategies, mostly in advanced manufacturing industries (e.g., ICT, medical, new materials, etc.) as well as production-oriented service industries (e.g., 5G, design of recycling facilities, blockchain, etc.).



CHINESE INVESTOR IN DENMARK

Over the last decade, Chinese' outbound foreign direct investment (FDI) has grown significantly thanks to the central government's "go global" push. There is a wide range of subsidies, tax rebates and other incentives to stimulate Chinese domestic entities to invest abroad, through mergers and acquisitions (M&As) or the establishment of R&D facilities. Europe has been a key destination of Chinese FDI.¹⁴

Chinese investment may look attractive to a number of Danish SMEs looking to access the Chinese market thanks to the resources and networks of the Chinese partner, or simply looking for new capital. In practice, these are the two major benefits brought by Chinese investors to the invested company, as demonstrated by Accelink Denmark A/S (see case study in the next page); while technological spillovers and increased research capabilities tend to be of secondary importance.

However, significant risks are associated with this form of engagement with China, especially when the investor has

state-owned ownership and aims to acquire the majority of shares. For instance:

- Unintended transfer of technology and know-how from the invested company to China, either by establishing new subsidiaries in the country or other channels. One must always remember that outbound FDI through the acquisition of overseas companies in technology fields is an active policy of the Chinese central government aimed at "digesting, absorbing and re-innovating" imported foreign technologies in China.¹⁵
- The above process might be speeded up in case the Chinese investment leads to a significant company restructuring, with new members of the board of directors, supervisors or managers introduced to follow the interests of the Chinese investor. There is extensive literature showing how at the beginning Chinese investment did not result in immediate changes in the company structure, but only over the medium to long term.

¹⁴ However, the trend is slowing. Available data shows that in 2020 Chinese FDI was the lowest in 13 years, after peaking in 2016. See thereport from Rhodium Group and MERICS: <https://rhg.com/research/china-europe-2020/>. The percentage of private Chinese investment has increased over the past two years, but Chinese state presence remains substantially behind the concluded transactions. Significantly, the absolute majority of Chinese FDI in Europe occurs through M&As, rather than greenfield.

¹⁵ Several case studies of unintended technological transfer from Europe to China after company acquisition by Chinese investors is available on the website of Dutch consulting firm Datenna. See e.g. a recent case of the Swedish Stjernberg Automation AB: <https://www.datenna.com/eac-stjernberg/>.

Accelink's benefits and challenges from working with a Chinese investor

Accelink Denmark A/S produces optical chips for the telecom industry based on wafer processing. Its origins can be traced back to 1992 as a research collaboration project between NKT and MIC.DTU. Throughout the years, the company was owned by different European and American investors and operated under different names until it was finally acquired in 2013 by the Chinese Accelink Technologies Co., Ltd. – one of the largest suppliers of optical components for telecom globally and actively working with China's biggest firms.

The acquisition was the result of a trustful and complementary partnership initiated already in 2005: a mature technology platform, design know how and stability were complemented by the investor's strong manufacturing capacities, cost-efficiency and complete product portfolio. The Chinese investor granted the company access to its sales channels and clients; the company also gained substantial visibility and credibility and got in a stronger position to obtain market and regulatory insights and to understand in more depth the specific needs of its Chinese consumers.

At the same time, the presence of a Chinese investor also poses a series of challenges, particularly in terms of company culture, which tends to be oriented towards China's industrial policies and a tendency to overemphasize the importance of quantitative KPIs.

Therefore, this form of engagement is recommended when one or more of the following conditions apply: (i) when the Chinese investor is a long-term, trusted and complementary partner; (ii) when the Chinese investor brings not only access to the Chinese market, but also technological improvements and know-how to the invested company; (iii) when the investment involves a limited amount of shares so that there is no substantial impact on the composition of the invested company's governance and operations; (iv) when the investor has a

clear company structure and no State-owned shareholders; and (v) when it is a greenfield investment, rather than an acquisition.

Lastly, please note that in the past few years, awareness of the risks of Chinese FDI in Europe has grown significantly in the EU and the individual Member States. The Investment Screening Act also adopted FDI screening mechanisms in Denmark in 2021.¹⁶

	Pros	Cons
Chinese investment in the Danish company	<ul style="list-style-type: none"> • Access to the Chinese market and network of investor • New capital injected • Potential access to new know-how and technologies (only in limited cases) 	<ul style="list-style-type: none"> • Transfer of know-how from Denmark to China • Company restructuring, impact on governance and operations • Loss of company/bankruptcy

¹⁶ More information: <https://businessindenmark.virk.dk/guidance/erst-activities-covered-by-the-investment-screening-act/Authorisation-or-notification-of-foreign-investment/>.

PARTICIPATION IN PROJECT-BASED R&D COOPERATION

Despite China's rising influence on the global research and innovation scene and annual R&D expenditure ranking second worldwide, project-based R&D cooperation remains a relatively uncommon way for foreign SMEs to collaborate with Chinese partners. Local administrations in China¹⁷ provide significant support, mostly through grants, for international cooperation projects between:

- A Chinese entity, i.e., universities or research institutes, or less frequently, other companies;
- A foreign partner is not necessarily legally represented in China. Therefore, we include Danish companies in Denmark or other countries.¹⁸

Such grants are made available by most municipalities and provinces in China, particularly – but not only – the larger ones such as Shanghai, Jiangsu, Zhejiang, Guangdong, and Beijing. They follow annual calls published on the websites of local S&T departments, specifying the fields and topics to be funded in that year; the Chinese partner then submits the application. Danish tech SMEs may join freely unless the grant only supports projects with specific countries or universities.

COLLABORATION WITH CHINESE PUBLIC AUTHORITIES: PPP AND PROCUREMENT

In the past few years and since 2014, China's has witnessed a rapid growth of Public-Private Partnership (PPP) projects, as they are seen as an effective way to reduce the burden on government finances, increase the supply and quality of public products, improve overall performance, ultimately contributing to China's efforts of implementing supply-side reforms.¹⁹

Chinese municipalities and districts not only have significant resources to invest for projects, but also maintain a certain degree of decision-making authority in experimenting new technologies and in approving demonstration projects. However, they generally lag behind in terms of sustainability, planning, and efficiency, i.e. areas where Danish actors have rich experience to share. Several examples of foreign companies, including Danish ones, already cooperating with Chinese municipalities and districts can be found.²⁰ PPP projects are attractive as they generally do not involve sharing of IP rights; upfront investment is not particularly high as this is usually covered by the Chinese side; finally, success in one pilot project can easily evolve into deeper cooperation partnerships, as demonstrated by Danish SME Ejlskov. The challenges of the PPP approach mainly relate to the still developing legal and policy environment in China, excessive red tape, the different engagement, and power of the government compared to Denmark, and the tendency of the Chinese side to achieve tangible results in short time.

When it comes to government procurement, it must be stressed that China has not yet accessed the WTO Government Procurement Agreement. In fact, although in recent years efforts have been made to increase fairness and the participation of SMEs, China's government procurement and its accessibility for foreign companies has long been a key issue advocated by the EU.²¹ Specifically, there still is a strong "buy China" bias – that is for products produced in China (including from foreign companies). This issue is particularly evident in the medical devices sector, where in 2021, a series of policies were issued explicitly encouraging local entities to buy domestically produced products.²²

17 There used to be a Co-Funding Mechanism (CFM) at the EU level, supporting Chinese entities to participate in H2020 projects. It is not yet sure if the CFM will be renewed for the Horizon Europe Framework Programme.

18 The China-based subsidiaries of Danish companies cannot be included as foreign partners as they are Chinese legal entities; only their Danish headquarters can. Nonetheless, a very common practice is to include the headquarters as official members of the project ('foreign partners'), then delegating the daily operations and implementation activities to their China-based subsidiaries.

19 By December 2021, China had implemented 10,157 PPP projects with a total investment of 15.9 trillion CNY, mainly in transportation, energy, water management, urban-rural environmental remediation, and healthcare; the majority of PPP projects follow the Build-Operate-Transfer (BOT) model. Source: Ministry of Finance's China Public Private Partnerships Centre: <https://www.cpppc.org:8082/inforpublic/homepage.html#/projectPublic>.

20 For instance, Danish sustainable urban planning firm NORDIQ Group actively takes part in PPP projects with Chinese municipalities and districts, see: <https://nordiq-group.cn/cases/>.

21 The European Union Chamber of Commerce in China's Position Paper provides examples of several challenges reported by European companies, see: https://www.europeanchamber.com.cn/en/publications-archive/964/European_Business_in_China_Position_Paper_2021_2022.

Ejlskov's demonstration project with Jiangsu government

Ejlskov is a Danish SME providing sustainable environmental protection and remediation solutions, actively working on demonstration projects with Danish universities and public institutes.

When looking to expand to China, Ejlskov first analysed China's Five-year Plans and other development plans to identify priorities matching with Ejlskov's expertise; it then identified potential regions in China where such priorities were more urgent, i.e. Shandong, Jiangsu and Heilongjiang; it then approached and gradually built relationships with the local government authorities, highlighting the win-win and problem-solving nature of the solutions proposed by Ejlskov. During this process, the company invited the Chinese authorities to visit its sites in Denmark, which contributed to building trust.

This led to the launch of a demonstration project with the Jiangsu Provincial Academy of Environmental Protection on groundwater remediation and soil renovation. Soon after it was launched, the project became profitable thanks to effective planning and implementation. This, in turn, opened the door to new projects for Ejlskov in Heilongjiang province, and now the company works closely with one of China's biggest SOEs – PetroChina. To facilitate operations, Ejlskov set up a subsidiary in Qingdao, Shandong province. Furthermore, Ejlskov has established a JV with a state-owned Chinese company and has sent its experts within environment, hydrology and geology to work on projects around China.

China still has extensive environmental problems with soil and groundwater pollution that needs to be solved but has too few experts with know-how at a sufficiently high level to ensure the quality of the environmental projects and to ensure that the technology is adapted to local conditions. Here, Ejlskov can make a valuable contribution.

The key to success for Ejlskov was its Chinese-style approach in engaging and building relationships with Chinese authorities, instead of spending resources e.g. to participate in trade exhibitions. Specifically:

- Identify Chinese priorities matching the company's expertise
- Gradually build relationship and trust with the Chinese authorities
- Work together on a pilot, demonstration project, aiming for longer-term, deeper cooperation

It is noteworthy that, throughout this process, Ejlskov fully leveraged on the role of one of its employees, a Chinese native of Jiangsu province with previous experience working with the local authorities.

22 For instance, in October 2021 the Ministry of Finance and the Ministry of Industry and Information Technology published the 2021 revised Standards for the Evaluation of Imported Products for Government Procurement, which require that for 137 types of medical devices, 100% domestic products must be purchased; while for 12, 24 and 5 other types of medical devices, respectively up to 75%, 50% and 25% of domestic products must be purchased. See: <https://m.innomd.org/article/61653f4523ce965474c3dd75>. Following this list, several provinces such as Guangdong, Sichuan and Zhejiang have issued explicit policies restricting the procurement of imported medical devices to a few dozens. See the following article for a Western media commentary: <https://www.reuters.com/business/aerospace-defense/china-quietly-sets-new-buy-chinese-targets-state-companies-us-sources-2021-08-02/>. This point also suggests that China is increasingly using access to its procurement market as a way to incentivise foreign companies to transfer their production in mainland China; indeed, there are reports of foreign medical device producers asked by their Chinese distributors to consider moving production in China in order to be able to compete in China's public procurement market

This trend is expected to intensify further in the near future: the 14th Five-year Plan (2021-2025) emphasizes increasing domestic production capacities while facilitating import procedures of high-tech/innovative medical devices “facing urgent clinical needs” or “not having similar alternatives in China”; for all the other products, there is no need to rely on imports. Therefore,

the opportunities offered by China’s government procurement channel are very limited. At the same time, for medical devices and drugs, the volume-based centralized procurement strongly pushed by the Chinese central government makes the procurement channel profitable only in case of excessively large volumes of sales, which tech SMEs can hardly meet.

	Pros	Cons
Public-Private Partnership projects	<ul style="list-style-type: none"> • High demand for demonstration projects; • Significant resources available at all administrative levels; • The relatively easier entry point for foreign tech SMEs; • The upfront investment is low. 	<ul style="list-style-type: none"> • Uncertainties and risks from the legal environment; • Excessive red tape; • The different, more present role of the Chinese government.
Chinese government procurement	<ul style="list-style-type: none"> • High demand from various regions 	<ul style="list-style-type: none"> • Strong “buy China” biases • Tool for speeding high-tech transfer to China • The high amount of time needed to prepare bids • Profits only with large volumes

LICENSING OF TECHNOLOGY, SUBCONTRACTING OF RESEARCH

Licensing patents (including designs and software) to China-based entities is a common approach adopted by foreign companies, not only large multinational corporations but also tech SMEs. It represents a cost-effective way to leverage the partner’s resources to tap into the Chinese

market while bringing a stable source of income (through royalties and/or lump sum payment), including potential new IP generated from further development. It also allows the licensor to focus resources on its core activities. However, licensing IP rights may come with many risks,

as the licensor – though keeping the ownership of IP rights – might not be able to fully control the activities of the licensee(s), including possible theft; sometimes, the licensee might prove not capable to deliver its promises.²³ The parent company in Denmark can also license IP rights to its subsidiary in China (WFOE or JV), making it eligible to obtain ‘technology transfer subsidies’ offered by local administrations in China. However, there might be future limitations if the subsidiary wants to transfer back to the parent company in Denmark, the IP rights further developed from the licensing.²⁴

Another common approach could be to subcontract R&D activities to China-based entities, especially in those sectors (e.g., life sciences) that require products to meet specific China-tailored requirements or to conduct trials within mainland China. However, moving R&D activities to China entails exposure to extensive IP risks, which must be carefully considered.²⁵ In addition, it might be difficult to patent research results overseas. For some projects involving genetic resources or marine scientific research, joint filing and ownership between the Chinese and the foreign team are mandatory by law.

This section has provided five examples of the most common ways to establish technological collaboration. The following section zooms in on the challenges and barriers associated with different modes of collaboration.

	Pros	Cons
Licensing of technology	<ul style="list-style-type: none"> • Cost-effective market entry; • Stable source of income; • More resources to focus on the most important IP rights; Access to tech transfer subsidies 	<ul style="list-style-type: none"> • Possible data and IP transfer limitations; • Difficult control on the licensee.
Moving / subcontracting R&D to China	<ul style="list-style-type: none"> • Access to a wide pool of scientists/engineers; • Required for specific sectors (life sciences) 	<ul style="list-style-type: none"> • Exposure to IP rights; • Possible data and IP transfer limitations

23 For more details on technology transfer and on the clauses of licensing agreements in China, see a dedicated guide produced by the EU-funded China IP SME Helpdesk: <https://op.europa.eu/en/publication-detail/-/publication/65d0ab00-a0b9-11eb-b85c-01aa75ed71a1>.

24 More information in the ‘Intellectual Property Rights’ section (2.2) of this report.

25 A common and effective approach adopted by foreign companies to minimise IP risks, is to work with more than one subcontractor, assigning them different components of the research. Danish companies are also advised to include clauses in the subcontracting agreement, explicitly mentioning that they will retain the ownership of IP rights generated from the subcontracted research – even though adequate compensations based on profits must be paid to subcontractors. Specific questions on this regard can be submitted through the EU-funded China IP SME Helpdesk project: https://intellectual-property-helpdesk.ec.europa.eu/regional-helpdesks/china-ipr-sme-helpdesk_en.



Photo: Colourbox

Technology-driven collaboration:

CHALLENGES AND BARRIERS

When engaging in technology collaboration with Chinese partners, Danish technology-developing SMEs will also need to deal with a series of challenges and barriers that apply in addition to the intrinsic characteristics of the engagement approach chosen. These are cross-cutting, applying more or less equally to companies from any country and to tech SMEs and multinational corporations (MNCs). However, while MNCs may have more resources and capacities to navigate through and deal with these challenges, tech SMEs with their limited resources, are naturally in a more vulnerable position; it is, therefore, vital for them to be well aware and prepared in advance.

THE INCREASED POLITICIZATION OF BUSINESS (AND TECHNOLOGY)

In recent years, the political relationship and dialogue between China and Europe significantly deteriorated. On the one hand, China has become increasingly assertive on the diplomatic scene, often leveraging on the nationalistic sentiment and public opinion of Chinese citizens to launch boycotts of foreign companies and products; on the other hand, the EU has become increasingly vocal about what it perceives to be serious human rights

violations in China. Notably, over 41% of companies that responded to the European Union Chamber of Commerce in China's 2021 Business Confidence Survey reported that business in China became more politicized compared to 2020.²⁶

For foreign companies operating in China, it is important to have continuous dialogue with the authorities to protect themselves against and respond to regulations stemming from the politicization of the business environment. This phenomenon is not new. Historically, the Chinese state has dominated in regulating and steering the market and industrial sectors of specific interest. In addition, the legal framework and the enforcement of regulations have been non-transparent. Despite China's massive – and largely successful – efforts to improve its statutory system, regulatory framework, and law enforcement, many legal provisions in China still lack clarity and detailed implementation procedures, remain vague and sometimes inconsistent, with many grey areas. This point provides the authorities and law enforcement agencies with a very broad margin of discretion for the practical implementation of laws and regulations, which ultimately could hinder the non-discriminatory treatment of foreign companies.

26 See: <https://www.europeanchamber.com.cn/en/publications-business-confidence-survey>.

VIOLATION OF INTELLECTUAL PROPERTY RIGHTS

China has improved its legislative and judicial system to protect and enforce intellectual property rights. The *Foreign Investment Law* explicitly bans forced technology transfer. There are several dedicated IP courts across the country, including one Intellectual Property Court within the Supreme People's Court of China. Despite continuous improvements, however, foreign businesses operating in/with China still encounter many challenges, especially in terms of:

- Lack of clarity of legal provisions may provide the authorities with an unpredictable broad margin of discretion for law enforcement.
- Although forced technology transfer is banned, China still pursues a policy of “digesting, absorbing and re-innovating” foreign technologies in China.²⁷ This goal is achieved through overseas M&As and induced technology transfer – namely, transfer/localization of technology as a precondition for accessing the market or obtaining business permits.
- The EU Chamber of Commerce in China still reports wide concerns about the unnecessary disclosure of trade secrets and confidential information during licensing, testing, and certification procedures in China, especially in the ICT and the medical sector.
- China has formulated ad hoc catalogs restricting or prohibiting the import and export of certain technologies. Subsidiaries of Danish tech SMEs in China that want to transfer their IP rights to headquarters in Denmark in fields listed in the catalog need to go through an opaque review process that could be used to protect strategic technologies.²⁸

In addition, there are other sector-specific challenges. For instance, in the pharmaceutical sector, there is a surprisingly high rate of innovative patents registered by foreign companies in China successfully invalidated by domestic generic drug makers. The issue is in part due to China's strict rules for using post-filing data to defend against invalidity challenges, in contrast to international practice; it is exploited by an increasing number of small domestic firms to have their generic drugs introduced in the market, a phenomenon that is called ‘reverse patent trolls.’²⁹

The EU is funding a dedicated project – the China IP SME Helpdesk – to help EU SMEs to protect and enforce their IP rights in China through ad hoc training, case studies, guides, and free-of-charge business consultations.³⁰ The EU also has an active dialogue on IP with China, providing information on China's IP policy development.³¹

UNEQUAL ACCESS TO FUNDING AND FINANCING

China has long emphasized that it equally supports foreign companies participating in its public funding system and programs. However, despite de jure openness, foreign participation remains limited to smaller local programs, minor participation roles that require co-financing, and companies that have established subsidiaries in China.³²

Even though Chinese public funding programs have a high degree of standardization and transparency of information (new calls are pre-announced through public calls for comments on draft calls; lists of evaluators and awardees are published online), the project selection process remains opaque. There are unwritten rules that often prevail over formal rules for participation. There is evidence collected through EU-funded initiatives in China of European companies and individual researchers

27 This is one of the key objectives of China's development and industrial policies, and is explicitly stipulated in Art. 41 of the Law on Progress of Science and Technology – which was last revised in December 2021 (“the State encourages enterprises to digest, absorb and re-innovate imported technologies”), see: <http://www.npc.gov.cn/npc/c30834/202112/1f4abe22e8ba49198acdf239889f822c.shtml>. This fundamental approach is also implicitly at the heart of the Made in China 2025 and ‘dual circulation’ strategy.

28 The Catalogue was last revised in 2019. It is available, in Chinese, at: <http://fms.mofcom.gov.cn/article/a/ae/201911/20191102909472.shtml>.

29 Several case studies can be found online. This is also reflected regularly in the top patent invalidation cases published every year by China's National IP Administration, see e.g.: <https://www.chinalawinsight.com/2020/09/articles/intellectual-property/introduction-to-2019-top-ten-patent-reexamination-invalidated-cases-pharmaceutical-chemical/>.

30 For more information, see: https://intellectual-property-helpdesk.ec.europa.eu/regional-helpdesks/china-ipr-sme-helpdesk_en

31 For more information, see the IP Key China project: <https://ipkey.eu/en/china>.

32 For a detailed overview of Chinese funding opportunities at the local level for tech SMEs, see a report issued in October 2021 by the EU SME Centre: <https://www.eusmecentre.org.cn/report/incentives-subsidies-and-funding-tech-smes-china>.



Photo: Bigstock



Photo: ATV

being explicitly required to partner up with a Chinese project coordinator / Principal Investigator. Indeed, the fact that, in most cases, a significant proportion of evaluation committees are represented by experts affiliated with State or military organs can easily lead to biases and discrimination against foreign companies. Therefore, the issue is not as prominent for Sino-foreign joint ventures, thanks to the presence of the Chinese partner, which is assessed more favorably.

At the same time, SMEs are in a disadvantaged position compared to large companies, as most of the eligibility requirements of Chinese funding programs favor background experience and solid hardware conditions – such as the number of R&D personnel, the value of R&D assets, and the R&D/revenue ratio.

Similar challenges are encountered by foreign companies when borrowing from Chinese banks, despite China's continuous efforts to eliminate bottlenecks and encourage its banks to grant loans to SMEs also through innovative financing schemes.³³ For instance, a loan from a Chinese bank must be obtained against guarantees from banks outside China, thus requiring further risk assessments; loans in foreign currency are affected by a debt-equity borrowing gap and thus cannot exceed certain amounts.

There is evidence of many tech SMEs overcoming these issues, but it remains a challenging and lengthy process.

UNFAVORABLE STATE-CENTRIC TECHNICAL STANDARDIZATION AND CONFORMITY ASSESSMENT

China initiated significant reforms to its standardization system in late 2017, aiming to increase the role of the market and private companies in formulating standards. While significant results have been achieved, China's approach to technical standardization remains State-centric, i.e., closely following the country's industrial policies and strategies – and it will continue to be so in the near future. See more in the subsequent section.

STRICT RULES FOR DATA PROTECTION AND CROSS-BORDER TRANSFER

China has strengthened its cybersecurity and data protection regime in the past years, especially since 2017, creating a solid and comprehensive governance framework formed by the *Cybersecurity Law*, the *Data Security Law*, and the *Personal Information Protection Law*. In practice, these put significant limits on collecting, processing, and transferring data generated in China.

³³ According to the European Union Chamber of Commerce in China's 2020 Business Confidence Survey, 40% of European companies in China report that insufficient (if any) access to financing in China. Among these, SMEs suffer the most from financing challenges: only 36% of SME respondents received government subsidies in 2019.

Essentially, personal information and “important data” generated in China must be stored in mainland China and cannot be transferred overseas for business reasons unless a security review is conducted.³⁴ The challenge is that “important data” currently remains only broadly defined as data closely linked with issues concerning national security, economic development, and public interests; ad hoc catalogs must be defined by relevant government departments in their competence areas. These points pose significant challenges for foreign companies based in China that need to transfer data on research activities to their headquarters, contributing to skyrocketing compliance costs.³⁵ Even more notably, these laws provide Chinese state authorities with the ultimate right to adopt export control measures and retaliatory measures against infringers – leaving room for the politicized use of this tool to retaliate directly against foreign companies as a result of political disputes.

At the same time, it must be noted that there are additional limitations in specific sectors. For instance, international scientists and entities working with human genetic resources in China are required to work with a Chinese partner to share the data generated through the partnership with the local partner, not to share data with other entities – in China or abroad, and not to publish data in international journals without prior approval. This point also applies to Sino-foreign joint collaborative projects. Similar provisions are in place in the field of marine scientific research.

The result is that an increasing number of companies operating in mainland China are obliged to localize their entire R&D in mainland China, facing potential challenges and high costs to transfer results back to their overseas headquarters – which is an essential element of research and innovation today. While MNCs may afford to decouple their R&D operations in China from their global ones, thus to “do R&D in China, for China,” this approach is rarely feasible for tech SMEs.

RESTRICTIONS ON THE MOVEMENT OF MATERIALS AND EQUIPMENT ACROSS BORDERS

The movement of scientific materials, instruments, and equipment, as well as spare parts, components, and accessories, is a key need of companies with operations in different countries. This situation is especially the case for tech SMEs which often have limited resources and require to move their equipment between headquarters and subsidiaries in China.

China has issued a preferential policy for the 14th Five-year Plan (2021-2025) that exempts local entities from import duties and import VAT on imported research equipment and instruments. However, the policy only applies to equipment and instruments that domestic suppliers cannot produce or meet the performance requirements – thus representing a bias in favor of domestic production. At the same time, scientific equipment and instruments which have been used at least once are not only excluded from the policy; they are also subject to a completely different importation process, which requires an official inspection by certified bodies of the equipment to be exported directly in the country of origin. Only afterward, the import approval may be granted. This point results in increased costs and delays for R&D activities in China, especially for SMEs, which often have to move equipment across borders as they cannot afford to buy a new one.

In addition, in line with China’s REACH regulation, new chemical substances not included in a dedicated inventory cannot be imported into China unless they have been previously filed or registered – a process that requires lengthy paperwork and may take up to several months. There are also reports of certain chemical compounds or biological samples that, when imported from Europe to China for laboratory research, face unpredictable delays at Chinese customs.³⁶

34 Draft Measures on the Security Assessment of the Cross-border Transfer of Data were issued in October 2021 by the Cyberspace Administration of China: http://www.cac.gov.cn/2021-10/29/c_1637102874600858.htm.

35 According to a report published in November 2021 by the British Chamber of Commerce in China, there are instances of companies that are cancelling planned R&D projects in China due to uncertainty and fears of compliance issues. See: <https://www.britishchamber.cn/wp-content/uploads/2021/11/BritCham-China-Cross-Border-Data-and-Innovation-Report.pdf>. It is also noteworthy that, at the end of 2021, LinkedIn closed its social media functions in mainland China for unsustainable data compliance costs.

36 Examples include acetone, animal brain samples, faecal samples, microbiota samples, and doping compounds. Source: direct interviews with European researchers based in China conducted between 2020 and 2021.

RESTRICTIONS ON HUMAN RESOURCES AND MOBILITY

Compared with the issues and challenges outlined in the previous section of this report, human resources and personnel mobility tend to be underestimated. However, Danish tech SMEs should be fully aware of relevant challenges in this area as they might as well have a significant impact on business and research operations.

Firstly, even though China has the world's largest pool of STEM graduates, hiring the right engineers and scientists in the country remains challenging: the Chinese education system focuses on hard skills over soft skills such as management; labor-related costs are extremely high, with high salaries and substantial fringe benefits needed to attract and retain capable talent. In addition, Chinese engineers and scientists might prove not easily adaptable to international work environments or practices and may decide to leave to work for domestic competitors.

The above leads to another key issue that Danish tech SMEs must always keep firmly in mind: the majority of trade secrets theft is generally done by former employees who work for competitors. Considering China's high turnover rate, a consistent company-wide approach and system must be strictly enforced on employees, stipulating non-disclosure agreements and ad hoc confidentiality clauses in contracts (with a duration extending for a defined amount of time after the end of the working relationship) as well as regular monitoring.

Lastly, the COVID-19 pandemic has had a profoundly negative impact on the mobility of foreign workers to China. China currently adopts very strict entry and quarantine measures for foreign citizens entering China,³⁷ which discourages or makes it impossible for many to return, and at the same time, leads many to leave China to reunite with their families abroad. Even in the most optimistic scenario, China is not set to begin easing such restrictions before the end of 2022. This situation is a cause of concern for tech SMEs which often rely on specialized foreign technicians and engineers to come to China for projects or training.³⁸ At the same time, this also has serious implications on the other way around: Chinese engineers and scientists who find it impossible to go overseas for further training.

However, it must be noted that the issue of mobility and the foreign workforce, exacerbated by the COVID-19 pandemic, began before it. China's 2020 census showed a significant decline in foreign population in key major cities such as Shanghai and Beijing. In addition, limitations were already in place for foreign R&D companies to obtain visas for foreign engineers or interns for short-term projects in China. Therefore, this appears to continue in the coming years, which Danish tech SMEs must fully consider when planning their activities in China.

37 An overview of China's strict entry and quarantine requirement for international visitors is regularly updated by the EU Chamber of Commerce in China: <https://www.europeanchamber.com.cn/en/national-news/3356>.

38 According to the EU Chamber of Commerce in China's annual business confidence survey, in 2021, 73% of companies interviewed confirmed that COVID-related travel restrictions have had a negative impact on them. See: <https://www.europeanchamber.com.cn/en/publications-business-confidence-survey>.





Photo: ATV

The role of standards in TECHNOLOGY COLLABORATION WITH CHINA

This section introduces the Chinese standardization system and outlines how China engages in the international standardization system (ISO and IEC). It identifies possible ways to influence or obtain information about standards in China.³⁹

Complying with technical standards is a requirement to obtain market access to a market in any given country. Thus, it is paramount to know different standardization regimes if a company wants to develop and market products and technologies globally. Similarly, for companies interested in ensuring the best competitive environment for their product and services, it is also paramount to seek to influence global standards.

China has significantly increased its strategic engagement and investment in setting international standards in the last ten years. For instance, by taking the lead in the governance of international standardization organizations and in the technical work associated with writing the standards. On the one hand, this is good news because it decreases technical trade barriers. On the other hand, it also means increased competition for European companies, who will have to step up to keep on top of international standardization – including a potential politicization of technology standards.

³⁹ Written by Pouline Terpager, Chief Consultant, Danish Standards.

What is a technical standard, and what do standards do?

International technical standards produced by recognized bodies like ISO and IEC constitute a technical lingua franca, which is used worldwide and helps us understand things similarly.

Standards can, for instance, set requirements for the performance of a product or describe technical terms in a given area. Standards can also indicate methods for, e.g., testing a product's durability. This point means that we can be sure that what we collaborate on or buy from each other matches expectations – whether this is between businesses, authorities, or consumers.

Standards are used worldwide, so a customer in Bahrain or Brazil can easily get an overview of the quality and characteristics of a product by using standards. Similarly, Danish companies can safely buy products produced abroad.

Standards are written by experts who join the work through the national standardization body in their country. Companies based in Denmark can thus contribute to the development of international standards through Danish Standards.

Standards can decrease technical barriers to trade

The significance of technical trade barriers has increased considerably in past years as tariffs steadily decline and governments worldwide introduce more and more regulatory requirements to address inter alia health, safety, or environmental concerns.

The WTO TBT Agreement is an important tool to tackle such technical barriers to trade. The EU has consistently promoted greater harmonization through the more widespread use of international standards.

Standardization organizations

The main standard-developing organizations are: The international standards organization (ISO), the International Organization for Electrotechnical Standardization (IEC), and International Telecommunication Union (ITU).

REFORM OF THE CHINESE STANDARDIZATION SYSTEM

Standardization has been a strategic issue in China for quite a while. Since 2018, the Chinese Academy of Engineering has led the “China Standard 2035” and “National Standardization Development Strategy Research,” which aim to support implementing the country's standardization strategy.

In 2021 the current Chinese standardization strategy plan was published. This plan turns the Chinese system from a state-driven system to a system that is more open to the participation of other actors.⁴⁰ However, China's approach to technology standards remains state-centric and supports domestic strategic research and innovation agendas. In practice, this means:

40 <https://carnegieendowment.org/2021/10/28/three-takeaways-from-china-s-new-standards-strategy-pub-85678>

- China conducts feasibility and applicability analysis before converting international standards into Chinese standards, leaving room for the revision of international standards and, thus, new technical barriers to trade
- At the same time, China is actively pushing for the internationalization of its standards – particularly in key emerging areas such as 5G, AI, automation, big data, etc. – through active involvement in international standard-developing organizations
- There are cases of some Chinese national standards with a recommended implementation that are nonetheless used as the basis for mandatory certification schemes or market access regulations – thus becoming *de facto* mandatory but are not notified to the WTO.

The system comprises local industry standards, and the American and European systems have inspired regional and state standards. It is thus a hybrid that allows for some participation of foreign companies.

This system is somewhat different from the European standardization system, built on a bottom-up tradition, where experts from companies, research institutions, societal stakeholders, etc., agree that a certain standard is needed and invest their own time and expertise in

producing it. Standards are thus only produced if they are important enough for the experts and their organizations and are developed to fit the needs of those stakeholders.

The Chinese system has been based on a top-down system, where standards are requested by the state and often developed by state experts. Such standards have often been used to enhance Chinese products’ quality and competitiveness. This competitiveness is seen, for instance, in the 14th Five-Year Plan for “Developing the National Standards System Promoting “High-Quality” Development” issued by 10 Chinese ministries. In the current system, standards are still state-driven, but it includes more expertise by allowing commercial actors and even foreign countries to participate.

CHINA IS ENGAGED IN SETTING THE INTERNATIONAL STANDARDS

The strategic ambitions described above have had a noticeable impact on the international level. Regarding governance positions, Zhang Xiaogang was elected as the first Chinese President of ISO in 2013, and in 2020, Dr. Shu Yinbiao became the first Chinese president of IEC.

At the technical level China is very active in hosting the secretariats of technical committees producing the standards. Among these are some very prominent committees i.e. the Technical Committee on Ships and marine technology (ISO TC 8). The actual figures are shown below.

Hosting of TC secretariats 2022	ISO	IEC
Europe	293	92
USA	94	27
China	73	12
Denmark	4	2

Based on strategic ambitions, China is one of the most active countries in proposing new standards to be developed. Especially in areas where China has a technological advantage which greatly benefits the Chinese manufacturers and their ability to develop these technologies further.

At the same time, the Chinese standardization organization (SAC) has stressed their ambitions to adopt international standards. This can be seen as a positive signal that will further reduce technical barriers to trade, provided that the commitment is followed up with on-the-ground enforcement.

HOW CAN DANISH COMPANIES TAKE PART IN THE DEVELOPMENT OF CHINESE STANDARDS?

Although foreign companies participate actively in Chinese standardisation development (particularly in sectors such as civil engineering, construction, petrochemicals, and ICT),⁴¹ this is rarely the case for tech SMEs. Enormous resources in China, local technical expertise and deep integration with the Chinese ecosystem are necessary conditions for participation; generally, only joint ventures or SMEs working closely with Chinese partners in international standard-developing organisations might meet them. However, as technical standardisation in China and internationally is becoming increasingly political, tech SMEs cannot afford to remain completely passive: they must dedicate resources to monitor standardisation developments in China and internationally. In an article for the German Council on Foreign Relations researcher Dr. Tim Rühling investigates the experience of European companies in participating in the development of Chinese standards. Through interviews and questionnaires, he identifies a number of prerequisites for companies to influence domestic standard setting in

China, including standardization expertise; investments in local research and development (R&D); good government contacts; a sound corporate reputation; Chinese language skills; reasonable market share and company size; knowledge of the Chinese standardization system; and openness to dialogue with Chinese actors.⁴²

The European standardization organizations (CEN and CENELEC) have had a cooperation agreement with SAC, the Chinese standardization body, since 2016. In 2022, the agreement has been renewed and further commitments to increased cooperation has been made. This covers information exchange, strengthened cooperation within ISO and IEC; and under exceptional circumstances observer status and Joint Working Groups. It also sets the framework for identical adoption of national/European standards when international standards are not available. The goal is to develop standards that are aligned as much as possible and thereby reduce technical barriers to trade. Usually, international standards identically adopted is the preferred solution, but in some instances, this is not possible.⁴³

To further cooperation, the EU is funding the Seconded European Standardisation Expert in China (SESEC), which provides useful updates on China's standardization activities and directions.⁴⁴ The project also aims to raise awareness in China about the European standardization system, increase information exchange, and help companies navigate the Chinese standardization landscape.⁴⁵ The SESEC project was renewed in 2022 and will run for another four years. Companies that want to investigate which standards are in force for specific products can also use an online database established by German - Chinese cooperation.⁴⁶ It can be mandatory to conform to certain standards to make products available to the Chinese market.

41 They continue to face significant challenges, such as exclusion from a number of key technical committees (e.g. for information security and cryptography), limitation of their voting rights (only observer status granted), exclusion from technical leadership positions, information on upcoming meetings communicated on very short notice, lack of transparency, etc. More details can be found in a report by the EU Chamber of Commerce in China and the Swedish Institute of International Affairs released in December 2021: https://www.eurochamber.com.cn/en/publications-archive/966/The_Shape_of_Things_to_Come_The_Race_to_Control_Technical_Standardisation.

42 <https://dgap.org/en/research/publications/shape-things-come-race-control-technical-standardization>

43 CEN and CENELEC General Assembly 2022

44 The SESEC project provides regular updates on China's standardisation activities and directions, and also offers a free helpdesk for European companies. For more information, see: <https://sesec.eu/>.

45 <https://sesec.eu/>

46 <https://www.din.de/en/services/standards-portals/germany-china-standards-information-portal>



Photo: Bigstock

A STRATEGIC FOCUS ON STANDARDIZATION

International standards can eliminate technical barriers to trade. It is therefore positive that China has fully engaged in international standards setting and has ambitions to adopt more international standards. A scenario where China would mainly operate with Chinese standards would have slowed trade with China. At the same time, this creates increased competition in standard setting for companies from Europe, who will have to step up to keep on top of international standardization, as China is using its massive state organization to influence and develop standards that fit the Chinese market strategies.

China has a strategic focus on standardization. It is increasingly investing energy and resources into developing international standards. They lead in organizational governance and the technical work associated with writing the standards. A role that previously was taken by European and American companies through a bottom-up process driven by the market and specific industries.

One approach cannot be more correct than the other, as China rightly could say that Western industries have dominated the standards world for many years. Nevertheless, the different approaches have changed the hitherto well-known conditions and working methods of international standardization.

The European Commission has noticed the effect of a state-driven strategic approach in their standardization strategy from February 2022 and has drawn up some measures that might in the longer run turn out to have a strategic effect.⁴⁷

For individual companies it remains important to ensure that products and innovations fit to the relevant standards, by either adapting the products, using the standards in the design phase or participate in the writing of the standards to ensure that international standards fit the technology development of the company.

47 <https://www.earto.eu/ec-published-its-new-standardisation-strategy/>

Risks and

RISK MANAGEMENT

Over the years, there have been many strong opinions about the potential of foreign companies locating technology development and R&D in China. Some have argued that the speed and agility of the Chinese market, coupled with the lack of regulation, give companies an unparalleled competitive advantage. Others have focused on the lack of a well-developed IP regime and an unpredictable party-state system and argued that this disqualifies China as an attractive partner in technology development. In recent years, the fault lines have become increasingly visible as a consequence of geopolitical tensions and governments' willingness to highlight problems that only a few years ago would have been left unaddressed or addressed behind closed doors. This point was exemplified by the European Union's categorization of China as a 'systemic rival' back in March 2019⁴⁸. The Danish government's recent URIS guidelines provide guardrails for Danish universities' international collaboration. These developments have narrowed strategic options and increased the complexity of collaboration.

RISK CATEGORIES

Against this background, what are the main risks associated with Sino-Danish technology collaboration and how to manage these risks?

The risks generally fall within four categories:

- Dual-use: When collaboration supports the development of technology or knowledge that can be used for civil as well as military purposes
- Commercial: This point refers to unintended technology transfer and unfavorable competitive environments
- Ethical: Involves situations where joint research or technology from international companies are used for purposes that contradict values normally associated with liberal democracies, e.g. surveillance, ethnic screening, biometric data collection etc.
- Neglecting potential: Due to a sensitive political climate, Chinese partners might be disregarded in circumstances where collaboration would mutually benefit.

Depending on the context, individual cases can fall within one or several categories above. The risks are serious and can have considerable consequences for companies or universities, e. e.g.:

- Companies and universities that collaborate with partners in both China and the US may be required to choose one partner over the other.
- Companies and universities may face bad publicity in an environment where public opinion is increasingly turning against China and collaboration with China.
- Knowledge and/or technology generated in collaboration with Chinese partners may be used for ethically dubious purposes.
- Missed collaboration and technology development opportunities and, for companies, missed market opportunities.

48 <https://ec.europa.eu/info/sites/default/files/communication-eu-china-a-strategic-outlook.pdf>

PRINCIPALS AND TOOLS FOR RISK MITIGATION

The available tools to manage these risks are not in and of themselves complicated, however the proper and thorough application is likely to require specialized knowledge as well as, in some cases, a very specific set of competences including Chinese language. This is further complicated by the fact that information and communication is moving from publicly available channels such as webpages to more informal platforms such as WeChat, making it more difficult to gain access to necessary and relevant information. It is also important to note that risk management requirements are different from a private company to a public university. However, the following pointers do not distinguish between the two.

While the tools listed here are good starting points, there is currently no comprehensive tool that can singlehandedly be used to assess the potential or gains of collaboration. Please refer to the 'Additional Resources' section of the report for additional resources.

Investment screening

The EU Investment Screening Law offers a thoroughly vetted shortlist of technology areas that the Commission considers either as critical infrastructure or of critical importance to European competitiveness. Hence, collaboration requests from China (or any other country for that matter) involving these technology areas is likely to be met with requests for thorough due diligence and documentation from the authorities.

This is not to say that technologies that are not on the investment screening list do not merit thorough consideration but rather that the screening law is a good place to start if you wish to understand the context of the technology you are working with. In 2021, Denmark has also enacted an investment screening law based on the EU directive from 2019, that can be accessed via the link in the footnote.⁴⁹

Civil-military fusion databases

The civil-military fusion is a key policy of the Chinese government, and it aims to utilize relevant technologies developed by the private sector also for military purposes. This type of policy is not unique to China and similar initiatives can be found in Europe, the US and elsewhere. In Denmark, the NATO Quantum Center, which was announced in spring 2022, is an example.

Companies are, in principle, free to deal with partners with military contracts – unless these companies are blacklisted, e.g., by the US. In China, supplying technology to the military requires a license; often, companies will display this on their website. However, there are also examples of State-Owned Enterprises that act as conglomerates with an untransparent range of subsidiaries, some of which are dealing directly with or owned by the People's Liberation Army. Performing this type of due diligence may require expert knowledge and Chinese language competencies to assess the underlying association.

For universities, the general trend is to avoid collaboration with military universities as well as university departments, centers or individuals that receive funding from the military. There are online tools that can help identify such links, e.g. Chinese Defence Universities Tracker⁵⁰, but again it is important to dig a bit deeper and also investigate the homepages of the specific university departments or even specific research to clarify if military links are on display. If a company is considering collaborating with universities, a similar exercise is advised. In addition, the China Aerospace Studies Institute⁵¹, a think tank driven by the United States Air Force, is also a good place to investigate linkages to the military, especially within the air and space domains. Finally, the Dutch company Datenna provides various forms of intelligence tracking, e.g. the China Defence Radar⁵².

49 https://www.retsinformation.dk/eli/lta/2021/842_

50 <https://unitracker.aspi.org.au/>

51 <https://www.airuniversity.af.edu/CASI/>

52 <https://www.datenna.com/china-defence-radar>



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Communication and contracts

Going through the motions highlighted above will weed out many uncertainties but there are no guarantees that issues related to either military, commercial, or ethical violations may not arise. Hence, it is advised from the starting point to identify the red lines and write them into contracts or partnership agreements. Going back only a few years, this would have been unheard of but considering the new geopolitical climate, it is not unlikely that Chinese entities will be expected to take the same precautions.

For standard formulations that can be used in a variety of contracts, it is advised to approach industry organizations and, for universities, the legal department. As well as to keep in mind that contracts and agreements alone does not ensure compliance and that continued communication about these potentially sensitive issues is necessary.

Intellectual Property (IP)

Even with improved IP protection laws in China, the country is still the top global source of counterfeit products. Several guidelines exist on best practices for IP protection in China, the most important of which we have listed in the section “Additional Resources” in the report. The key step to protect your IP are:

- Registration: This has to be done in China, as your Danish/foreign registration does not provide any protection in China.
- Ensure strong contracts with collaboration partners: Make sure that you have strong contracts in place with anyone to whom you will reveal your IP.
- Take down infringing products on Chinese Websites: When your IP is registered in China, you should ensure that your products are not illegally circulating

and being sold on Chinese websites. Follow the takedown procedures of the online marketplaces (e.g., Alibaba, Tmall, JD.com, etc.).

- Register your IP with Chinese customs: This is important, as China Customs will block products that infringe on China IP from both entering (import) and leaving (export) China.

Avoiding ethical misconduct

Ethical and reputational risks play an increasingly larger role when working with China. Therefore, there is a strong need for a clear set of principles to guide companies’ and universities’ actions to limit ethical risks. Relevant measures to take to ensure a strong ethical profile of a potential collaboration partner could include:

- Due Diligence of local partners’ CSR and ESG profiles
- Strong enforcement of transparency throughout the organization (including third parties)
- Whistleblower schemes

Regular re-evaluations and re-screening

To ensure that a collaboration partner will remain a suitable partner over the entire course of collaboration, it is important to do ongoing re-evaluations of partners. The institutional and regulatory environment in China is constantly changing, and a complex web of partners means that public universities as well as private companies may come under new regulatory regimes or be reorganised as the collaboration progresses. Taking stock of the collaboration is thus a good idea to ensure that the collaboration develops according to the plan.



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SUMMARY

For many multinational Danish companies, China is a key market and also considerable R&D activities including registration of IP rights (see ICDK report). Similarly, most Danish universities have existing links with China also within technology areas that are on the investment screening list. These organizations are working actively to mitigate risks and balance these against obvious benefits. Danish SMEs have been less active in China but many are gathering experiences with market access as well as deeper relations involving partnerships, investments, access to technology etc. For these companies, all the usual

recommendations still stand, i.e. China is a long-term investment, find the right partner, protect your IP, work with local experts etc.

In addition, it is important to note that new framework conditions for technology collaboration between Europe and China are currently under development. The consequences of the European Commission's definition of China as a systemic rival are not yet known; therefore, vigilance and attention to policy developments are required for SMEs and universities alike.



Photo: Bigstock

Useful resources

- **China-Europe Water Platform (CEWP)** – CEWP is a joint initiative supported by the Chinese Ministry of Water Resources, the European Union, and individual EU Member States. The objective of the CEWP is to promote water policy dialogues, collaborative research, and business development based on mutual interests and joint funding. Denmark, represented by its Ministry of Environment, acts as a lead country of the CEWP from the EU side. Website: <https://cewp.eu/>
- **China IP SME Helpdesk** – Funded by the European Union, the China IP SME Helpdesk supports EU SMEs to both protect and enforce their Intellectual Property Rights (IPR) in or relating to Mainland China, Hong Kong, Macao, and Taiwan through the provision of free-of-charge information and services. These take the form of jargon-free, first-line, confidential advice on intellectual property and related issues through one-to-one consultation, training, materials, and online resources. Other EU-funded IP SME Helpdesks are available for other countries and regions, such as Southeast Asia, India, Latin America, and Africa. Website: https://intellectual-property-helpdesk.ec.europa.eu/regional-helpdesks/china-ipr-sme-helpdesk_en
- **EU SME Centre in China** – The EU SME Centre is a European Union-funded initiative that provides a comprehensive range of hands-on support services to European SMEs, getting them ready to do business in China. Specifically, a team of experts provides free-of-charge advice and support through training, webinars, and one-to-one consultations. Key focus fields include legal issues, business development, standards, and conformity, as well as technology-related issues. The EU SME Centre has also developed a set of FAQs and a Self-Diagnosis Tool to help you assess your readiness to do business with China. The EU SME Centre is currently in its third phase until March 2022. A fourth phase will follow. Website: <https://www.eusmecentre.org.cn/>
- **EURAXESS China** – EURAXESS is a worldwide project funded by the European Union. Its activities in China aim at linking researchers in China with Europe. Although the focus is on researchers in academia and research institutes, EURAXESS' activities are also open to researchers in businesses; some topics covered are also directly relevant for businesses, such as EU-China mobility of researchers and research funding. Website: <https://euraxess.ec.europa.eu/worldwide/china>



- **Innovation Centre Denmark, Shanghai** – Innovation Centre Denmark, Shanghai – Innovation Centre Denmark, Shanghai is the trusted advisor for Danish stakeholders in China's innovation, technology, digitalization, science, and higher education. Website: <https://icdk.dk/our-locations/shanghai>
- **IP Key China** – The IP Key China is a project directed by the European Commission and implemented by the European Union Intellectual Property Office (EUIPO). It aims to support and facilitate market access in China to international firms and innovators, especially considering the concerns expressed by European businesses, increasing transparency, and improving the implementation of the intellectual property and IP enforcement system. The IP Key China project provides regular updates on new IP-related policies in China and on EU-China cooperation activities in the field of IP. Other EU-funded IP Key projects are available for Southeast Asia and Latin America. Website: <https://ipkey.eu/en/china>
- **Seconded European Standardisation Expert in China (SESEC)** – SESEC project was launched in May 2006 by a consortium formed by the EU, CEN, CENELEC, ETSI, and EFTA. Its objective is to raise awareness of the European Standardization System in China and Chinese standards in Europe; promote dialogue and technical alignment of European and Chinese standards. As part of its tasks, SESEC provides free-of-charge regulatory updates on China's technical standardization activities and advice on opportunities for EU companies – through ad hoc news, monthly newsletters, webinars, and technical assistance to inquiries from EU companies. Key sectors of focus include electronic devices, ICT, medical devices, chemicals, automotive, and transport. Website: <https://sesec.eu/>
- **Sense China** – Sense China is a professional business service provider. Our objective is to offer tailor-made services that will help you to do business in China and its neighboring countries. Sense China is a unit under the Confederation of Danish Industry, the largest business association in Denmark with 19,000+ corporate members. Website: <https://www.sensechina.dk/>

Contributors & contact

The Danish Academy of Technical Sciences coordinated the China Tech initiative alongside a working group consisting of the Danish-Chinese Business Forum, Sense China (Danish Confederation of Industries), and the Sino-Danish Center for Education and Research.

The following organizations have contributed chapters to the report:

- EU SME Centre, Beijing
- Mercator Institute for China Studies (MERICS)
- Danish Standards

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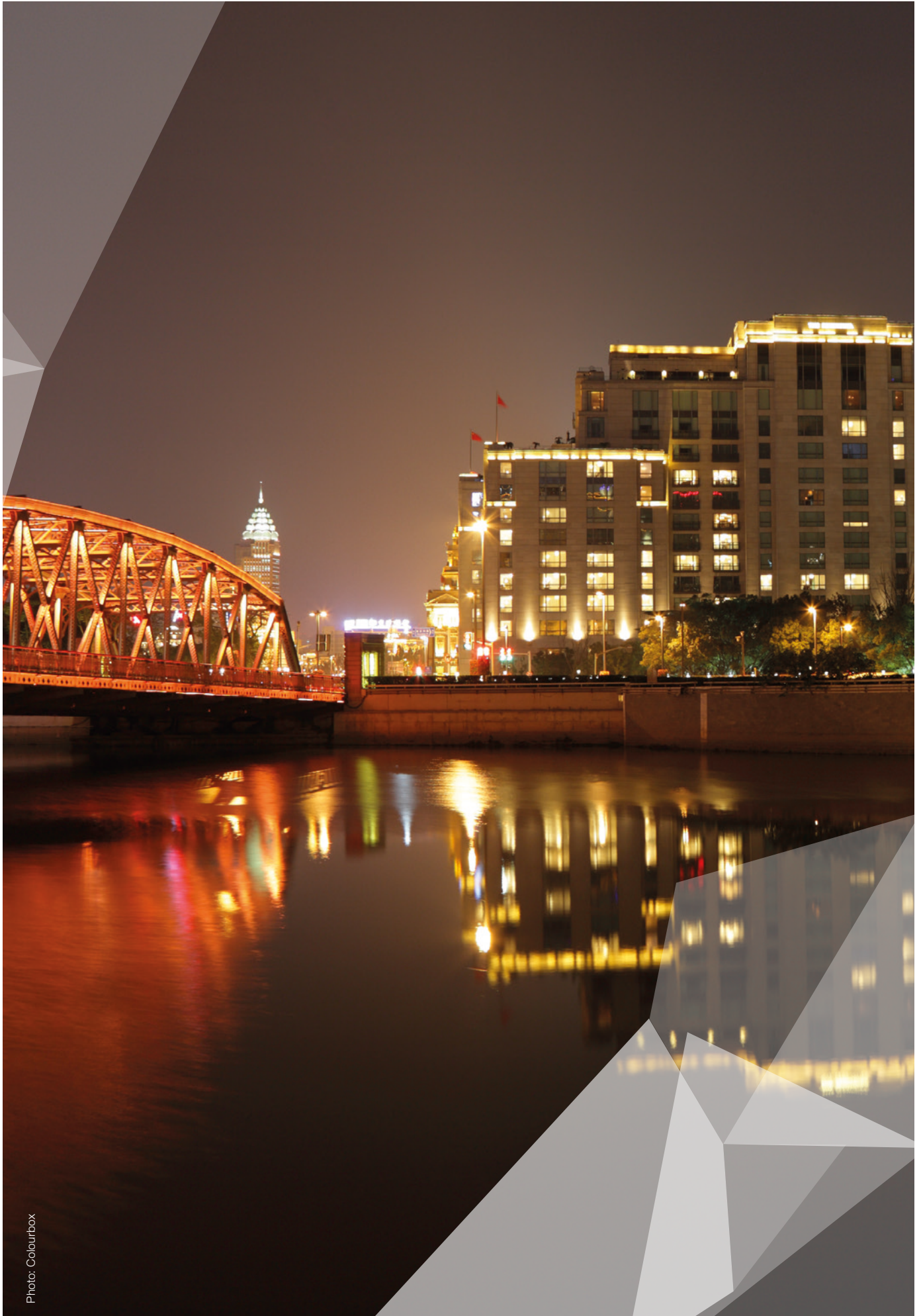


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