



***EU-CHINA***

Energy Cooperation Platform

中国 - 欧盟能源合作平台

# **Accelerating the incubation and commercialisation of innovative energy solutions in the EU and China**

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# EXECUTIVE SUMMARY

The EU's pledge to achieve climate neutrality by 2050 and China's target to achieve carbon neutrality by 2060 require a rapid and radical transformation of their energy sectors and entire economies.

Innovative European and Chinese companies, large corporations and small and medium-sized enterprises (SMEs) have already developed market-ready low-carbon technologies and services: from cutting-edge renewable energy and hydrogen technologies to energy storage and digitalisation services, developers are following the political and economic signals and contributing to meeting these goals. However, companies face considerable challenges when bringing these innovative energy solutions to the European and Chinese markets.

This report has twin objectives. It aims to (i) identify barriers to the diffusion of innovative energy technologies in the EU and China; and (ii) highlight best practices that support the acceleration of incubation and commercialisation of innovative solutions. SMEs make up the largest part of the economy in the EU and China and, as innovators, are making an important contribution to the energy transition, and therefore this report focuses specifically on this business sector.

Based on an extensive series of formal and informal interviews with industry experts, business representatives from the EU and China, and representatives of associations, as well as publicly available reports and academic articles, material published in the EU-China Energy Magazine, and the results of various workshops, the key findings of this report include the following points:

- The incubation and commercialisation of innovative solutions is evaluated in four stages: initial idea generation, product development, local commercialisation and global commercial development. Each stage requires specific skills and resources to enable the company to grow smoothly and faster.
- The challenges faced by large companies when developing overseas business are distinct from those confronting SMEs. Large companies tend to have better market integration and are well placed to benefit from existing public support. They also tend to share and communicate best practices for success.
- By contrast, SMEs take a short-term, flexible approach to development, making the most of their limited development resources. Even if successful, this trial-and-error approach can hinder their commercialisation or expose their business to greater risk.
- European and Chinese SMEs face the following difficulties in particular:
  - Lack of market knowledge.
  - Lack of cultural knowledge to do business efficiently.
  - Difficulty navigating local regulations.
  - Limited funding opportunities.
  - Difficulty in staffing.
  - Uncertainty about how to deal with intellectual property.

- Limited business network.
  - Rapid technological change.
  - Language barriers.
  - Higher burden of proof for global commercialisation compared to local companies.
  - Management time.
  - Difficulties in accessing available public support.
- The EU, its Member States, and China have already adopted a variety of measures to help large and small companies to market their innovative solutions. These range from administrative arrangements and policies that create a favourable business environment for companies, to dedicated business accelerators, investment funds and cooperation institutions such as the chambers of commerce.
- A variety of bilateral innovation funds, as well as promotional activities such as the Dutch showcase website Business France's work to support French companies in China, and the German Accelerator Program, represent some of the best practice examples of how EU Member States are promoting a global distribution of European clean energy technologies.<sup>1</sup>
- Following analysis of the challenges and best practices, this report advocates adoption of the following key measures that governments can adopt in order to help SMEs to accelerate the commercialisation of their innovative solutions:
- Develop accurate material for public distribution, including sectoral development forecasts and up-to-date manuals detailing relevant regulations, available funding and the management of intellectual property: this will facilitate access to reliable and transparent information about the market and business procedures;
  - Establish dedicated digital portals that will enable access to available resources and provide tailored information to facilitate business recruitment and address staffing issues. In addition, a list of local businesses willing to participate in pilot/demonstration projects will accelerate cooperation opportunities;
  - Disseminate information through a variety of information channels (newsletter, WeChat, LinkedIn, website) and share information about business activities so they can reach a wider audience;
  - Introduce grants to subsidise the cost of management and travel time;
  - Organise dedicated marketing and networking events through the EU-China Energy Cooperation Platform, in partnership with the European Union Chamber of Commerce in China and the China Chamber of Commerce to the EU, to support business cooperation between European and Chinese companies.

<sup>1</sup> Examples for the bilateral promotional activities:

Netherlands Showcase Website: <https://netp.technologycatalogue.com/china>

Business France: <https://www.ccifc.org/services/business-support.html>

German Accelerator: <https://www.germanaccelerator.com/our-programs/china-essentials/>

# INTRODUCTION

On 9 April 2019, at the 21st EU-China summit in Brussels, representatives of the EU and China signed the *Joint Statement on the Implementation of EU-China Cooperation on Energy*.<sup>2</sup> According to this statement, a common objective of the EU and China is to further the clean energy transition, while responding to the associated challenges. This report, *Accelerating the incubation and commercialisation of innovative technology in the EU and China* forms one part of the supportive measures introduced to improve the commercial availability of low-carbon technologies.

In the spirit of the Paris Agreement, the EU and China have ramped up their climate pledges in 2020: China now aims for carbon neutrality by 2060 and the EU for climate neutrality by 2050. The EU Commission's 'Fit for 55' proposal published in July 2021, and China's '30/60' targets, are supporting strategies to ensure that Europe and China are on track for mid-century net neutrality by 2030 and that they will already have drastically reduced their greenhouse gas emissions by then.<sup>3</sup>

Both the EU and China have released policies that impact the development of buildings, transport and energy, innovative solutions in electrification, energy efficient solutions, low-carbon energy production technologies, smart grids, energy storage and carbon capture solutions.

European and Chinese companies are standing ready to answer the call of policy makers and make a success out of those policies, in sectors including offshore wind, ocean energy and renewable hydrogen. Small or big, self-effacing or well-known, newly funded or pivoting, these are the creators of the energy transition and the new climate champions.

However, despite the quality of their solutions and bold vision, European and Chinese companies face considerable challenges when bringing these innovative energy solutions to market. Historical case studies show that it has taken between 20 and 70 years to achieve the widespread commercialisation of energy supply and demand-side technologies.<sup>4</sup>

This report therefore aims to identify and describe the challenges currently faced by companies in Europe and China, and to pinpoint ways to accelerate the commercialisation of innovative energy solutions. The OECD and European

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2 Joint Statement on the Implementation of the EU-China Cooperation on Energy | Energy [Internet]. [cited 2021 Sep 23].

Available from: [https://ec.europa.eu/energy/content/joint-statement-implementation-eu-china-cooperation-energy\\_en](https://ec.europa.eu/energy/content/joint-statement-implementation-eu-china-cooperation-energy_en)

3 Delivering the European Green Deal | European Commission [Internet]. [cited 2021 Sep 23]. Available from:

[https://ec.europa.eu/info/strategy/priorities-2019-2024/european-green-deal/delivering-european-green-deal\\_en](https://ec.europa.eu/info/strategy/priorities-2019-2024/european-green-deal/delivering-european-green-deal_en)

Statement by H.E. Xi Jinping President of the People's Republic of China At the General Debate of the 75th Session of The United Nations General Assembly [Internet]. [cited 2021 Sep 23]. Available from: [https://www.fmprc.gov.cn/mfa\\_eng/zxxx\\_662805/t1817098.shtml](https://www.fmprc.gov.cn/mfa_eng/zxxx_662805/t1817098.shtml)

4 Gross R, Hanna R, Gambhir A, Heptonstall P, Speirs J. How long does innovation and commercialisation in the energy sectors take?

Historical case studies of the timescale from invention to widespread commercialisation in energy supply and end use technology. Energy Policy [Internet]. 2018; 123(March):682–699. Available from: <https://doi.org/10.1016/j.enpol.2018.08.061>

Commission<sup>5</sup> define business incubators as '(...) support structures that support entrepreneurs in business creation and development', including a wide range of services such as consultancy, training, access to networks and legal advice. The commercialisation of innovative solutions is defined as the process of transforming innovative ideas, knowledge and inventions into businesses.

This report seeks to identify best practices and possible solutions to speed up the lengthy market introduction process and the distribution of innovative energy solutions.

It is based on an extensive series of formal and informal interviews conducted between March and July 2021 with industry experts, business representatives from the EU and China, and representatives of associations<sup>6</sup>. It also draws on publicly available reports and scientific articles, material published in the EU-China Energy Magazine and the results of various workshops. Two workshops in particular are worth mentioning: the *Carbon Neutral by 2060 Series – Workshop 1: Innovation* that was co-hosted by ECECP and EnergyPost in December 2020; and *Promoting Innovation in Energy Technologies - Opportunities for Cooperation Between EU and China: Challenges in introducing innovative energy technologies in EU and China*, which was held in January 2021. Workshop transcripts and recordings are available on the ECECP website.<sup>7</sup>

The report first briefly introduces the topics of incubation and commercialisation and gives an overview of the skills and supporting factors needed to successfully commercialise innovations in the energy sector locally and globally. The second chapter presents the challenges of commercialisation, with a focus on SMEs. The third chapter outlines a selection of best practices, initiatives by governments, business associations and proactive organisations, in which the incubation and commercialisation of energy companies between the EU and China works very well. The fourth chapter proposes practical solutions to help overcome the challenges identified. The individual chapters are supplemented with case studies to highlight the specific experiences of companies in the EU and China.

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5 European Commission / OECD. Policy Brief on Incubators and Accelerators that Support Inclusive Entrepreneurship. OECD SME Entrep Pap [Internet]. 2019; No. 13:1–20. Available from: <https://www.oecd-ilibrary.org/docserver/d7d81c23-en.pdf?expires=1563972944&id=id&accname=guest&checksum=B884FFE8C96821511B52C986CD53B8F2>

6 Further details on the interviews can be found in the appendix. The names of the interview partners, companies and institutions have been anonymised in the interest of objectivity and neutrality of the report. All examples mentioning a specific company, entity or European Member State are for the sake of the argumentation only.

7 ECECP. Promoting innovation in energy technologies: opportunities for cooperation between EU and China | EU-China Energy Cooperation Platform [Internet]. [cited 2021 Sep 15]. Available from: <http://www.eccep.eu/en/workshop-videos/workshop-videos-promoting-innovation-in-energy-technologies-opportunities-for-cooperation-between-eu-and-china/>  
ECECP. Webinar videos – Carbon Neutral by 2060 Series– Workshop1: Innovation | EU-China Energy Cooperation Platform [Internet]. [cited 2021 Sep 19]. Available from: <http://www.eccep.eu/en/videos-of-webinar-china-carbon-neutral-by-2060-the-business-opportunities-for-eu-energy-solutions-providers-innovation/>

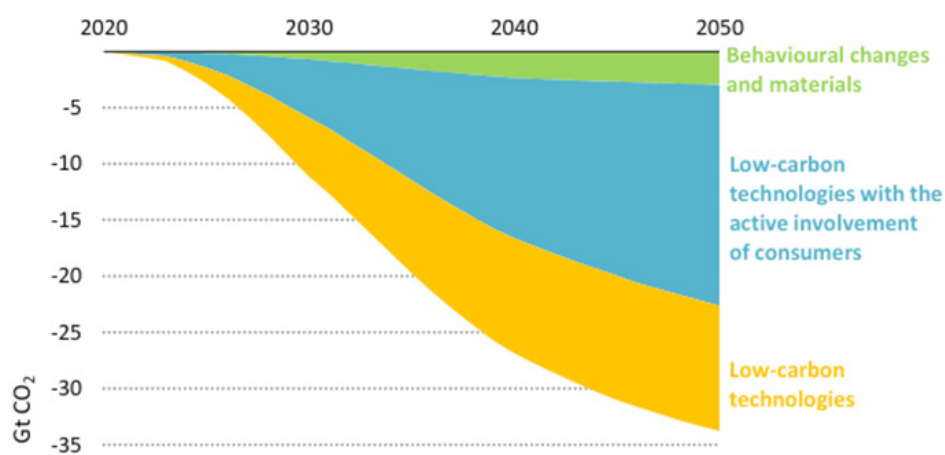


# 1. COMMERCIALISATION OF INNOVATIVE SOLUTIONS TO MARKET – LIFE CYCLE

The need for a change in the development paradigm has never been more urgent. The Climate Action Tracker, an independent scientific analysis that tracks governments' climate actions and measures them against the globally agreed targets of the Paris Agreement, grades the EU 'insufficient' and China 'highly insufficient'.<sup>8</sup> This means that given today's policies and the current pace of development, the climate targets of 'keeping warming well below 2°C, and pursuing efforts to limit warming to 1.5°C' will be missed.

A far-reaching transformation of the energy sector is therefore needed to reduce GHG worldwide. While technological progress and innovation are generally seen as drivers of economic growth, commercially viable innovation plays a vital role in a successful energy transition.<sup>9</sup> The International Energy Agency (IEA) forecasts that the diffusion of low-carbon technologies combined with behavioural changes could lead to the reduction of more than 32 Gt of CO<sub>2</sub> emissions before 2050.<sup>10</sup>

Figure 1: Role of technology and behavioural changes in the emissions reduction in IEA's Net Zero Scenario.



IEA. All rights reserved.

Source: IEA (2021): Net Zero by 2050.

<sup>8</sup> Climate Action Tracker. China | Climate Action Tracker [Internet]. 2021 [cited 2021 Sep 24]. Available from: <https://climateactiontracker.org/countries/china/>

<sup>9</sup> Schumpeter JA. The Theory of Economic Development [Internet]. Harvard Economic Studies; 1934. Available from: 9780674879904

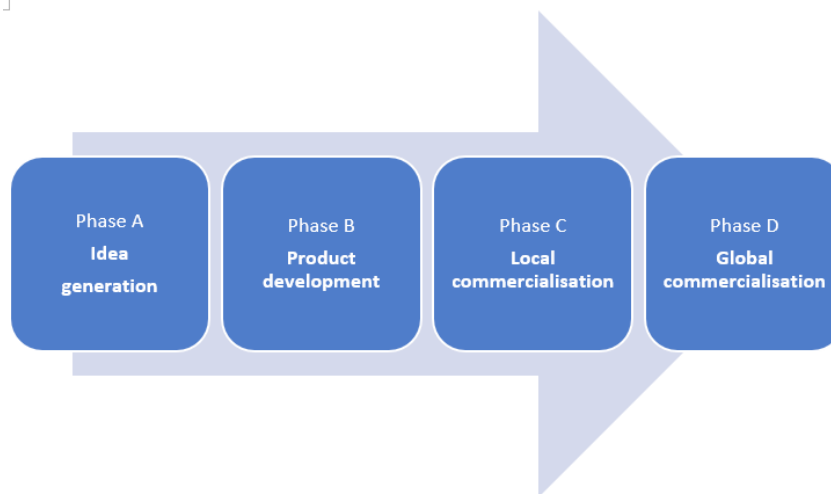
<sup>10</sup> IEA. Net Zero by 2050 – A Roadmap for the Global Energy Sector [Internet]. 2020 [cited 2021 Sep 24]. Available from: <https://www.iea.org/reports/net-zero-by-2050>

But how to quickly achieve mass market commercialisation of an innovative energy product?

Bringing an innovative solution to market can be depicted as four-step process, from the initial idea (A) to product development (B) and then from local (a first market) (C) to global (several markets) commercialisation (D), with each step of business growth requiring particular attention in order to achieve commercial success, as depicted in Figure 2.

Studies have shown that in the energy sector this process has historically taken between 20 to 70 years to complete<sup>11</sup>. The aim of this report is therefore to shorten the steps of the technology incubation and commercialisation process, particularly from phase B to C (product development to an initial market) and phase C to D (from local to global commercialisation) to help the rapid transformation of the energy sector. This chapter aims to identify the key factors that help to foster a successful commercialisation, and frictions that may hinder such success.

Figure 2: From idea generation to global commercialisation: the four critical steps of technology diffusion.



## 1.1 Skills needed in idea generation and product development

At the start of the entrepreneurial journey is an idea, a vision of a new product or a service that could solve a specific problem. Because of the complexity of the task and the time and investment needed to move on from the idea generation phase (A), and the product development phase (B), the entrepreneur needs dedicated support, however experienced he or she may be in his or her field.

This support can come from dedicated structures, such as business incubators, which specialise in transforming an idea into a commercially viable product. The support they give consists primarily in providing entrepreneurs with facilities, training and networking opportunities. Training in management, marketing, sales and finance is especially useful for entrepreneurs, who do not always possess such skills.

<sup>11</sup> See footnote 4.

Table 1 shows the sectors in which energy entrepreneurs are to be found:<sup>12</sup>

**Table 1: Non-exhaustive list of innovative solutions that would disrupt the energy sector. Adapted from interviews and energy reports by IEA (2020).**

|                    | Sustainable urbanisation and smart city  | Industry  |
|--------------------|--|---|
| Renewable energies | <ul style="list-style-type: none"> <li>• Solar and wind power for buildings</li> <li>• Floating wind power</li> <li>• Biomass energy</li> </ul>  | <ul style="list-style-type: none"> <li>• Sustainable renewable energy components</li> <li>• Recycling solutions</li> </ul>  |
| Hydrogen           | <ul style="list-style-type: none"> <li>• Hydrogen refuelling stations</li> <li>• Distributed hydrogen fuel cells</li> </ul>  | <ul style="list-style-type: none"> <li>• Direct-reduction steelmaking</li> <li>• Green hydrogen (ammonia) chemicals</li> <li>• Hydrogen (ammonia) ships</li> <li>• Hydrogen-powered vehicles</li> <li>• Hydrogen motors</li> <li>• Commercially viable electrolysis production</li> </ul> |
| Storage            | <ul style="list-style-type: none"> <li>• Storage and charging integrated station</li> <li>• Battery recycling</li> <li>• VGI</li> <li>• Cloud</li> <li>• Heating</li> <li>• Power station replacement</li> </ul>   | <ul style="list-style-type: none"> <li>• Large-scale energy storage station</li> <li>• High temperature storage</li> <li>• Emergency power supply</li> <li>• Heating</li> <li>• Charging Ships</li> </ul>   |
| Digitalisation     | <ul style="list-style-type: none"> <li>• Energy efficiency management for buildings</li> <li>• Cooperative vehicle system to charging infrastructure (V2I) and to network(V2N)</li> <li>• Big data</li> <li>• Carbon emission management</li> <li>• Decentralised trading</li> <li>• Digital currency</li> <li>• Digital grid</li> </ul> | <ul style="list-style-type: none"> <li>• Industrial energy efficiency management</li> <li>• Energy trading</li> <li>• Digital power plant</li> <li>• Digital water environment</li> </ul>   |
| Semiconductor      | <ul style="list-style-type: none"> <li>• DC building</li> <li>• DC fast charging</li> <li>• DC distribution network</li> <li>• DC IDC</li> </ul>   | <ul style="list-style-type: none"> <li>• High-reliability DC power supply</li> <li>• DC shore power for port</li> </ul>   |
| Fintech            | <ul style="list-style-type: none"> <li>• Green bonds, low-carbon financing, supply chain finance</li> </ul>  |   |
| CCUS               | <ul style="list-style-type: none"> <li>• Carbon capture utilisation and storage</li> </ul>   |   |

<sup>12</sup> See footnote 8.

## 1.2 Towards a successful local commercialisation

Access to procurement information and knowledge of local conditions, business networks and local market information are all necessary for commercialisation at a local level.

The term 'local' is interpreted very broadly here and includes both companies that operate at the level of a municipality and companies that market products throughout the EU. On the Chinese side, the latter is comparable to companies operating between provinces.

According to the results of a study by Fiedler & Welpé<sup>13</sup>, economic success in knowledge-intensive services often depends on social interaction, awareness of local (often unwritten) rules, and business networks. The authors point out that local clusters and networks around a particular business sector can serve as catalysts and accelerators for the commercialisation of technology innovations.

The following two case studies offer two examples of how companies in the EU and China are being helped at the local level to commercialise their innovations.

### Case Study: European Regional and Development Fund

Coaching local businesses in the organisational, legal and commercial skills required to scale up their business efforts.

Through the European Regional and Development Fund (ERDF), the EU has set up several support measures to help foster SME business development in Europe, providing dedicated coaching and mentoring programmes for companies. These programmes are devised and managed by local organisations (industry federations, specialist associations, etc.). They offer company executives several days' training over several months to teach them new management, business, marketing and human resources skills. This transfer of knowledge to key figures in companies is an efficient way to spread knowledge of innovative practices and ways to implement associated services or products. Through internal audits and diagnosis, these programmes help executives understand their current companies' flaws, suggest new practices to correct these issues, and give staff the know-how to incorporate new technologies into their operations, develop new strategies, and even target new markets: all this contributes to the efficient commercialisation of innovation.

In one example, local governments in France have used these tools to help SMEs create more sustainable growth models, from the industry to the construction sector. If companies need to find additional funds to transform the production process, the EU and its Member States offer dedicated grants for this purpose. These mentoring programmes, coupled with access to additional finance, can be a great lever for commercialisation of new innovations and can also improve companies' economic performance.<sup>14</sup>

<sup>13</sup> Fiedler M, Welpé IM. Commercialisation of technology innovations: An empirical study on the influence of clusters and innovation networks. *International Journal of Technology Management*. 2011; 54(4) : 410–437.

<sup>14</sup> French national agency for the cohesion of territories. [Note d'interprétation] sur le financement des actions collectives et/ou des actions individualisées en faveur d'entreprises | L'Europe s'engage en France, le portail des Fonds européens [Internet]. 2017 [cited 2021 Sep 24]. Available from: <https://www.europe-en-france.gouv.fr/fr/ressources/note-dinterpretation-sur-le-financement-des-actions-collectives-etou-des>

China is very effective when it comes to coordinating different policies to provide market access and mobilise funding. While strategic guidelines for the promotion of clean technologies are set at the national level, e.g. in the Five-Year Plans and their sectoral versions, provincial and municipal governments are responsible for implementation in their respective local or sector-specific development plans. For example, following publication of a central government guideline urging the development of new energy sources, the 13th Energy Sector Five-Year Plan of the Beijing municipality announced pilot zones to accelerate the development of renewable and smart energy systems, especially in areas where the Winter Olympics 2022 are taking place, and in the economic zone around the new airport.<sup>15</sup> Market access and fund mobilisation are then supported by state banks to accelerate the commercialisation of innovative energy technologies at the local level. The following example describes how the authorities of Taiyuan used public procurement to support the commercialisation of innovation in the electric vehicle industry.

### **Case study: The Transport Sector in Taiyuan**

#### Greening the transport sector in Taiyuan.

The city of Taiyuan in Shanxi province (a city of 4.2 million, with a GDP ranking 58th in China) has used a wide range of policy measures to boost take-up of electric vehicles. National regulations state that taxis should be scrapped after eight years of use. At the end of 2015, taxis in six districts of Taiyuan City reached this milestone in quick succession, thus creating an opportunity for innovation. Shanxi provincial government issued a policy requiring accelerated development of the electric vehicle industry.

Taxi drivers who refuse to drive EVs automatically lose their business accreditation, while EV taxi drivers get their licences from the government free of charge. Taiyuan city government has invested more than CNY 900 million (USD 141.7 million) in subsidies to support this new policy.

State-owned enterprises have built more than 5 000 charging stations in public parking lots such as Taiyuan South Station and in the Changfeng business district, enabling convenient charging for end-users. Taiyuan has also built ancillary services that offer car washing and maintenance alongside the charging stations.

Private stakeholders show a healthy appetite for a role in the charging stations roll out. For example, at the north passenger station of Baoli taxi company, there are three charging stations 500 metres away, all built by private investors. As the number of charging stations has risen, so has competition on price. The charging fee of state-owned enterprises is based on a TOU (time of use) tariff. After adding a service fee of CNY 0.45 yuan/kWh, the total charging price is CNY 1.21/kWh in peak load period, CNY 0.98/kWh in off-peak period and CNY 0.76/kWh in valley period respectively. Private providers charge CNY 0.80/kWh during the day and CNY 0.70/kWh at night.

It is estimated that carbon emissions of taxis are 10 times higher than those of private cars.<sup>16</sup> Taiyuan's decision to replace its 8 292 taxis with EVs has the potential to reduce CO<sub>2</sub> emissions by 200 000 tons, carbon monoxide by 21 176 tons, hydrocarbons by 2 451 tons and nitrogen oxides by 3 478 tons every year.

<sup>15</sup> Beijing Investment Promotion Service Center. Notice on Beijing's Energy Development Plan for the 13th Five-Year Plan [Internet]. [cited 2022 Jan 26]. Available from: [http://invest.beijing.gov.cn/xxpt/fzgh/bjsggh/201912/t20191206\\_907989.html](http://invest.beijing.gov.cn/xxpt/fzgh/bjsggh/201912/t20191206_907989.html)

<sup>16</sup> People's Daily (over Sohu). All Taiyuan taxis are converted to pure electric vehicles! (太原出租车全部改为纯电动汽车!) [Internet]. [cited 2022 Feb 28]. Available from: [https://www.sohu.com/a/150291543\\_770838](https://www.sohu.com/a/150291543_770838)

Both China and the EU have adopted measures to promote the commercialisation of clean technologies. Providers of innovative energy solutions should be made aware of and take advantage of this support, regardless of company ownership or manufacturing location.

### 1.3 Towards a successful global commercialisation

Once a firm has established its first local market, it aims to find new markets, both locally or abroad. The development of Chinese and European companies aiming to export to or invest in both China and Europe represents a new area of business. It requires specific means, a specific strategy, adequate human resources, financial capabilities, extra management time, improved internal organisation and access to advice and support that will match the companies' ambitions and overcome market barriers to entry.

We will examine the generic issues faced by all companies attempting to commercialise their products outside their local market.

**Letting potential users know about your product:** This requires a website and marketing material in the language of the target market. This is not a trivial step and requires cross cultural knowledge. Sometimes companies fail to recognise that the language and terminology used on the shop floor is just as important as the academic and technical vocabulary. This is particularly true of energy technology solutions. Written materials need to be targeted at the end user - invariably the engineers and technicians who will install and operate the new technology.

**Show that it works in local conditions:** This may require a demonstration / pilot project, to prove that the technology solution will work under the operating conditions at the potential user's site. This in turn gives rise to numerous questions: Who will finance the pilot? Will the potential user commit to a contract subject to a certain benchmark being reached? How to handle disagreements about the pilot results? What are the local standards? Who will pay the import duties and value added tax? How can the equipment be returned abroad, if necessary, and how can the company reclaim value added tax and import duties? It is clear that localised operation manuals will be vital.

**How to support a new market:** How can suppliers provide ongoing maintenance to their end-users? A comprehensive after sales service provision will need to support the new user, dealer and sales engineering team, particularly if the technology solution is innovative and therefore unfamiliar.

**How to protect the intellectual property:** Company owners may wish to apply for formal intellectual property protection via patent application.

All the above points were identified by our interviewees as particularly challenging for SMEs.

### 1.3.1 Opportunities for global commercialisation in the energy sector

The outlook for EU-China cooperation on clean energy is very promising. In the move away from coal, business opportunities arise not only from the offer of alternative energies, but also from the dismantling of existing coal-fired power plants. One initiative in which the EU and China are working together is *Mission Innovation (MI)*, a global initiative set up at COP21 in Paris which pledges to double funding for clean energy research and innovation. MI has identified clean hydrogen, zero-emission shipping and green electricity as areas for cooperation.<sup>17</sup> Further collaboration was agreed at the COP26 in Glasgow (November 2021). During the ECECP workshop *Carbon Neutral by 2060 Series – Workshop 1: Innovation*, the panellists identified the following three opportunities for global commercialisation of innovative low-carbon solutions<sup>18</sup>:

- *Digitalisation offers huge potential for new business models, such as for aggregators and virtual power plants.*
- *Sustainable urbanisation - More than 55% of the world's population live in cities, and that figure is rising all the time. Today, cities are responsible for an estimated 75% of global CO2 emissions.*<sup>19</sup>
- *Low carbon industry - The industrial sector accounts for around two thirds of China's total energy consumption.*

### 1.3.2 Skills needed for a successful global commercialisation

Scaling the commercialisation from local to global, and from small scale to large scale, is a complex process for European and Chinese companies.

Most successful European and Chinese companies establishing themselves in the energy sector tend to share the same features:

**Business strategy:** the most successful EU companies have dedicated resources to the development of a carefully considered strategy in China, looking for long-term development of their Chinese market and not a one-shot export sale. In Europe, most innovative Chinese companies share the same approach.

**Local footprint, local partner and legal structure:** opening local offices and facilities is a prerequisite for successful commercialisation, whether in the EU or China. The choice of the city is often driven by market potential, the advice of an investor, the personal knowledge of the entrepreneur or even an existing commercial partnership. In China, the larger companies have often established themselves with local partners through Joint-Ventures (one for each activity they want to develop). This enables them to operate in China: legal requirements restrict wholly-owned foreign investment in several sectors. An added benefit is that they can share the investment cost and risk

<sup>17</sup> Mission Innovation [Internet]. [cited 2021 Sep 19]. Available from: <http://mission-innovation.net/>

<sup>18</sup> See footnote 7.

<sup>19</sup> REN21. New Report: Cities are Trailblazers in the Race to Renewables- REN21 [Internet]. 2021 [cited 2021 Sep 23]. Available from: <https://www.ren21.net/report-renewables-in-cities-2021/>



with a partner. Their consequent deep understanding of local legislation is useful when scaling up projects, can enrich the business strategy, and can increase the company's flexibility and response time to new market developments.

**Management, marketing and human resources:** Both Chinese and European companies tend to set up new units when expanding abroad. Their executive managers have an in-depth understanding of the local business culture and language. They are also able to identify the key stakeholders to make their projects a success. Thanks to this hybrid culture, companies can deliver successful marketing campaigns targeting local clients and provide a relevant commercial offering.

## 1.4 An ecosystem that supports the commercialisation of innovation

An ecosystem that supports the commercialisation of innovation needs a well-functioning market and a competition policy that allows innovators to bring their products to market on an equal footing with existing players.<sup>20</sup> It is generally accepted that a level playing field and an open market accelerates the diffusion of innovation and creates a healthier economic environment.

In the EU and China, public institutions have restructured their investment policies that take into account sustainability targets, more commonly called 'Environmental and Social and Corporate Governance' (ESG) guidelines. This section of the report aims to review key financial initiatives and frameworks that are guiding energy sector development in both markets, as well as the intellectual property aspects of global commercialisation.

At EU level, a variety of measures support the commercialisation of innovative technologies for the energy transition. Among them, three funds aim to reduce economic and social disparities in the Union and promote sustainable development at a local level:

- the Cohesion Fund,
- the Just Transition Mechanism, and
- the Regional Development Fund (ERDF)

These funds are supplemented by others, such as the Connecting Europe Facility and the Innovation Fund, which promote cutting-edge connectivity and low-carbon demonstration projects. Apart from economic instruments, European Member States have their own investment plans and financing tools, which incorporate sustainable development objectives, and all of which are helping to accelerate the decarbonisation of the economy at a local level.

China's economic instruments to foster innovation commercialisation in the energy sector are equally numerous. However, their organisation and management differ from the EU, in that they are split between several planning and investment programmes, at

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<sup>20</sup> European Commission. Accelerating Clean Energy Innovation- Clean energy for all Europeans [Internet]. Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee, the Committee of the Regions, and the European Investment Bank. 2016. Available from: <https://op.europa.eu/en/publication-detail/-/publication/4916965d-e9dd-11e6-ad7c-01aa75ed71a1>



a national level (each government ministry has dedicated budget and financing tools) but also at a provincial and district level. Among these programmes, the national 'New Infrastructure Development Plan', launched in March 2020, is a EUR 130 billion investment plan that aims to boost deployment of new and connected infrastructure in China. It includes several clauses that relate to the digitalisation and electrification of society (for example EV charging stations and UHV lines), demonstrating a drive towards adoption of innovative systemic solutions.

#### **1.4.1 Environmental, Social, and Corporate Governance (ESG)**

To help mobilise the private capital required to achieve the Paris Agreement goals, the People's Bank of China (PBoC) issued its 'Guidelines for Establishing the Green Financial System' in 2016.<sup>21</sup> The document highlights the importance of climate mitigation and low-carbon development. According to China's Green Finance Development Report (2018), issued by People's Bank of China, green bonds in China helped channel CNY 280 billion (EUR 39.5 billion) into renewable energy and low-carbon projects in 2018.

As awareness of ESG issues rises across the globe, both public and private investors are under pressure to be socially and environmentally responsible. ESG is an evolving framework that encourages investors to consider the impact of their investments, ranging from the environment and social impact to non-binding regulatory concerns and corporate governance. It helps investors evaluate their investment decisions against a much broader spectrum of considerations compared to traditional financial analysis. ESG could play an active role in the acceleration of commercialisation of innovative energy solutions in the EU and China.

Since 2016, China has seen a rapid development of investor participation in this field. Various actors in the financial market, ranging from regulators, exchange houses, rating agencies and NGOs to institutional and influential individual investors are all taking up increasingly active roles. According to public data, the percentage of CSI 300 Index companies disclosing their annual ESG reports rose from 54% in 2013 to 85% in 2019. In 2020, ESG investment received a further boost with the announcement of the Chinese government's ambitious plan to achieve carbon neutrality by 2060. Currently, there are 19 ESG-based index investing products, more than half of which were launched in 2020. The total assets managed by ESG fund portfolios in 2020 saw a growth of 36% compared to 2019. However, the lack of necessary ESG-related data in the market has been a significant handicap to further development of ESG investment in China. According to research by CITIC Securities, the coverage of ESG reports in the Chinese stock market was merely 40%. The research has also found significant inconsistencies in ESG data.

However, investor demand for ESG disclosure is increasing and governments are following suit. In 2021, the EU issued the 'Non-Financial Reporting Directive',<sup>22</sup> which requires ESG disclosure from all companies with more than 500 employees doing

<sup>21</sup> The People's Bank of China issued the "Guidelines for Establishing the Green Financial System" | PAGE [Internet]. [cited 2021 Sep 23]. Available from: [https://www.un-page.org/people's-bank-china-issued-"guidelines-establishing-green-financial-system"](https://www.un-page.org/people's-bank-china-issued-)

<sup>22</sup> European Commission. Corporate Sustainability Reporting. 2021 [Internet]. [cited 2022 Jan 26]. Available from: [https://ec.europa.eu/info/law/better-regulation/have-your-say/initiatives/12129-Corporate-Sustainability-Reporting\\_en](https://ec.europa.eu/info/law/better-regulation/have-your-say/initiatives/12129-Corporate-Sustainability-Reporting_en)

business in the EU.

Globally, according to the OECD (2020), professional financial portfolios are managing more than EUR 14.8 trillion where key ESG components are integrated into their daily investing decisions. ESG-related investment products available to institutional and individual investors has exceeded EUR 1 trillion in recent years. A unified ESG standardisation system could facilitate reporting by internationally operating companies and promote investment in sustainable technologies.

#### **1.4.2 Technology Transfer and Intellectual Property**

'Innovative energy solutions' will always relate to new inventions. Only fair intellectual property rights provide any incentive for the creation of new products and their introduction to global markets. Companies need to protect their R&D investments and intellectual property. Technology owners are always keenly aware of IP protection because their entire business depends on it.

Technology transfer is a major topic in the process developed by the United Nations Framework Convention on Climate Change (UNFCCC). In 2018, the UNFCCC participants adopted the Technology Framework which plays a strategic role in improving the effectiveness and efficiency of the work of the Technology Mechanism by addressing the transformational changes envisioned in the Paris Agreement and the long-term vision for technology transfer.<sup>23</sup>

According to the '*Strategic Emerging Industry Classification and International Patent Classification (2021) (Trial)*' released by the National Intellectual Property Office, over the past 20 years China has applied 3 751 energy patents in the EU, while the EU has applied 13 870 patents in China.<sup>24</sup>

Although patent application is now a booming trend in both markets, it has brought to light a number of issues including the mismatch between patents and industry needs, abuse and copy of patents, and the naive management of patent trading and exchange: this last point may need to be addressed by dedicated communication campaigns to support and reassure innovative companies.

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<sup>23</sup> Technology framework under Article 10, paragraph 4, of the Paris Agreement | UNFCCC [Internet]. [cited 2021 Sep 23]. Available from: <https://unfccc.int/documents/187562>

<sup>24</sup> China National Intellectual Property Administration [Internet]. [cited 2021 Sep 23]. Available from: <https://english.cnipa.gov.cn/>

## 2. MAIN CHALLENGES FACED BY SMES ON THE EUROPEAN AND CHINESE MARKETS

SMEs are drivers of the economy in both the EU and China. They create the vast majority of employment and contribute between 50% and 60% of gross domestic product (GDP) and tax revenue in the two markets. Meijer et al.<sup>25</sup> describe SMEs as often overlooked cradles for the commercialisation of technologies in the renewable energy market, as they are able to commercialise sustainable technologies by developing new products and creating new organisational forms and business models. In particular, the authors identify external financial investment, strong entrepreneurial abilities, early-stage prototyping and piloting, and the existence of legitimising sources, such as an official 'stamp' for product quality, as key drivers for commercialisation of SME solutions.

However, SMEs face significant challenges to market entry and diffusion of their products.

### 2.1 SMEs in the EU and in China

SMEs make up the overwhelming majority of enterprises in China and are key to the country's economic development, accounting for 99.6 % of Chinese enterprises. They account for over 80% of jobs and own more than 70% of patents. They also account for more than 60% of GDP and contribute over 50% of taxes. The definition of an SME in China depends on the industry in which the company operates. The definition of SMEs differs in the EU and China, as illustrated in Table 2. It is evident that SMEs in all categories (medium-sized, small, micro) have a much higher staff count in China, whereas the balance sheet total is larger in all categories in the EU.

Table 2: Definition of SMEs in the EU and in China.

| Company category | EU              |                             | China           |                              |
|------------------|-----------------|-----------------------------|-----------------|------------------------------|
|                  | Staff headcount | Balance sheet total         | Staff headcount | Balance sheet total          |
| Medium-sized     | < 250           | ≤ EUR 50 m<br>(≤ CNY 381 m) | ≤ 1000          | ≥ EUR 2.6 m<br>(≥ CNY 20 m)  |
| Small            | < 50            | ≤ EUR 10 m<br>(≤ CNY 76 m)  | ≤ 300           | ≥ EUR 394.000<br>(≥ CNY 3 m) |
| Micro            | < 10            | ≤ EUR 2 m<br>(≤ CNY 15.2 m) | ≤ 20            | < EUR 394.000<br>(< CNY 3 m) |

Sources: European Commission and China State Council.

<sup>25</sup> Meijer LLJ, Huijben JCCM, van Boxstael A, Romme AGL. Barriers and drivers for technology commercialization by SMEs in the Dutch sustainable energy sector. *Renewable and Sustainable Energy Review* [Internet]. 2019;112(June 2018):114-126. Available from: <https://doi.org/10.1016/j.rser.2019.05.050>

According to Eurostat,<sup>26</sup> the network energy supply sector employed 1.3 million people in the EU in 2018. Of the energy sector players (electricity, gas, steam and air conditioning supply) 99.7% are small and medium sized companies while 0.3% are large enterprises. However, the 0.3% large enterprises employ 70% of the total workforce and create around 70% of the total gross value added.

## 2.2 Challenges faced by SMEs on the European and Chinese markets

Since not only the market situations are completely different, but also the definitions of SMEs, the challenges that companies face when entering the EU or China also differ. Meijer et al.<sup>27</sup> highlight key challenges that SMEs face when bringing their energy products to market:

- complexity of the technology and a lack of technological know-how.
- lack of financial resources.
- shortage of qualified personnel.
- lack of knowledge and experience in marketing and communication.
- difficulties with registering patents, secrecy requirements and IP-related competition.

In interviews with a number of European companies operating in China, Chinese companies operating in the EU, as well as commercialisation experts, we have not only confirmed the reality of the challenges listed above, but have also identified a list of additional hurdles faced by SMEs when entering new markets.

### Experiences on the Ground in China

#### Key findings from a European SME targeting China

Finding the right development strategy for the Chinese market requires careful planning by European SME executives. This case study is based on an interview with a European energy SME, which is a leader in the heat-to-electricity sector. Since its creation around ten years ago, the company has grown to around 50 employees and its products are sold in more than 20 countries. Naturally, the Chinese market has been targeted as a priority for the company in the commercialisation of its innovation. After a few export sales, in 2019 the company decided to set up a joint venture in China. This strategy did not eventually lead to the commercial success it expected, but rather wasted time and brought financial losses. Based on this experience, we list here the following key tensions and time-consuming obstacles encountered by their managers.

- ◆ *Difficulty identifying the key public stakeholders for a successful business development*

<sup>26</sup> European Commission. Business Sector Profile [Internet]. [cited 2021 Sep 16]. Available from: <https://ec.europa.eu/eurostat/cache/scoreboards/BSP/>

<sup>27</sup> See footnote 25.

The mapping of public agencies involved in the energy sector - local governments, national agencies, industry federations, associations, embassies, chambers of commerce – is a difficult task for SMEs. The work to decipher each stakeholder’s activities and learn about the potential support they could provide is time consuming, particularly since this information might not be available in the entrepreneur’s mother tongue. Meeting stakeholders is also a cumbersome process for the entrepreneurs, involving long and draining business trips.

◆ *Difficulty targeting the right networks and finding market information*

The pre-commercialisation step is a difficult one for established companies (which do not tend to benefit from being incubated). Without the help of a dedicated consulting firm that specialises in exports, the SMEs are at risk of isolation and limited interactions with experienced peers. They are not integrated in the networks of the targeted country and therefore are unaware of all the publicly available market and legal information, online events and other initiatives that could help them in the commercialisation process.

◆ *Difficulty finding the correct partner and the right business approach*

With limited time and resources, the SME struggled on its own to find the right approach to commercialising its innovation in China. It had difficulty persuading local clients to import its solution because of the lack of previous clients in China who could vouch for its efficacy. Eventually, it set up a joint venture with a Chinese partner to produce solutions locally. However, the joint venture failed to achieve its sales objectives, and the company was dissolved. Undaunted, the SME has established a licensing process, which has proved to be the optimum solution and generates the best cost/profit ratio for the company, given its current development state...

Overall, SMEs tend to face the following challenges (see Table 3).

**Table 3: Overview of the global commercialisation challenges for SMEs.**

| Challenges |                                  | Definition   |
|------------|----------------------------------|--|
| C1         | Lack of market knowledge         | Lack of knowledge about customer needs and specifications of foreign markets.                                |
| C2         | Lack of cultural knowledge       | Lack of knowledge and understanding about the culture, language and business etiquette of the new market.    |
| C3         | Regulatory barriers              | Lack of knowledge of legislation; slow and costly administrative procedures and restrictive regulations.     |
| C4         | Financing                        | Difficulties in accessing external finance, higher financing costs.  |
| C5         | Recruitment                      | High costs for recruiting new professionals; different recruitment channels in the new market.               |
| C6         | Intellectual property management | Uncertainty as to whether patents are necessary; costs and time required for patent applications.            |
| C7         | Absence of network               | Absence of a local network of customers, partners, investors, policy makers and employees in the new market. |

|     |                                 |   |
|-----|---------------------------------|---|
| C8  | Rapid technological change      | Challenges in adapting to rapid technological change and high technological demands.  |
| C9  | Language barrier                | Difficulties communicating with public administration, employees, customers and business partners. Translation time and costs.              |
| C10 | Higher burden of proof          | Showcases and pilot projects are needed in the new market to build trust and information among potential customers, partners and employees. |
| C11 | Management time                 | Additional administrative time, i.e., for travel and coordination.  |
| C12 | Communication of public support | Lack of familiarity with public programmes and difficulties applying for public funding; lack of access to public contracts.                |

**C1. Lack of market knowledge.** If a company is already successful in the European market, this does not mean that the transition to China will be easy. SMEs tend to be less informed about customer needs in foreign markets, and this hinders marketing and internationalisation of their activities.

**C2. Lack of cultural knowledge.** One factor that should not be underestimated is the business culture of the target market. Differences in the way business is done (formal vs. informal), as well as variations in the manner and speed of business communication, represent major hurdles for many companies, above and beyond the language barrier.

**C3. Regulatory barriers.** Lack of understanding of legislation, as well as slow and costly administrative procedures and restrictive laws or regulations can hinder SMEs, particularly in strategically important sectors.<sup>28</sup>

**C4. Financing.** SMEs (especially start-ups and micro-enterprises) can face problems when seeking access to external finance. They can also experience higher financing costs and therefore greater economic risk. EU companies are disadvantaged by the 'lowest cost' criterion, as they often offer products that are cheaper overall in terms of total life-cycle costs, but that initially appear more expensive. Reliability and investment returns do not always feature as project selection criteria.

**C5. Recruitment.** SMEs tend to have few or no skilled workers in their new country of operation, and face proportionately higher costs because they need to recruit or train new workers. In a foreign market, it can be difficult to find and identify skilled staff.

**C6. Intellectual property management.** There appears to be a lot of uncertainty about IPP. While one technology supplier company told us that they had not applied for patents in China for years in order not to create a 'copycat guide', for other companies the issue was at the top of their agenda when entering the market in China or a European Member State. Patent registration requires specialist lawyers, search time and money.

<sup>28</sup> Liu et al. China's New Negative List for Foreign Direct Investment. 2022. [Internet]. [cited 2022 Jan 26].

<https://www.idsupra.com/legalnews/china-s-new-negative-list-for-foreign-6608812/>

Simmons & Simmons. EU investment restrictions for investing in strategic companies. 2020. [Internet]. [cited 2022 Jan 26]. <https://www.simmons-simmons.com/en/publications/ckaqvpi7pru820943s7lc64aq/eu-investment-restrictions-for-investing-in-strategic-companies>



**C7. Absence of network.** SMEs usually have a smaller network of partners or lack access to industry experts with specialist knowledge (regulations, R&D, standards).

**C8. Rapid technological change.** SMEs may face greater challenges adjusting to new technological trends such as digitalisation and/or find it harder to exploit new developments.

**C9. Language barrier.** Difficulties in administrative procedures (visas, registration, etc.), communication with staff, clients and business partners. Translation costs must be factored in as an additional expense. In addition, it is difficult to find specialist translators or interpreters who are aware of the necessary technical vocabulary.

**C10. Higher burden of proof.** When entering a new market, there is no basis of trust for customers and investors because the company is unknown locally. Showcases and pilot projects in the country are necessary to convince people of the company's capabilities and products. In addition, if there is no comparable product to demonstrate to potential customers, the SME is left with the task of persuading people to accept an entirely new concept.

**C11. Management time.** Global commercialisation requires additional management time, such as for travelling and coordination between the different locations. A lot of time is spent finding potential local partners, clients and employees. In addition, time has to be spent on administrative procedures for registration and applying for residence permits. Moreover, due to the time difference at the different locations, additional working hours have to be put in outside the times of the official working day.

**C12. Communication of public support.** A number of the companies interviewed had very limited knowledge about public programmes to support the commercialisation of their innovations. SMEs lack the capacity to search extensively for public programmes and apply for projects. In addition, some EU companies have advised that as foreign companies they do not have the same access as their Chinese competitors to opportunities and government procurement information when applying for public tenders.

According to the Chinese companies interviewed, the market fragmentation of the EU poses a challenge, e.g. within the Single Market, regulations are enforced differently in individual Member States. Chinese companies also note the challenges posed by the EU's 24 official languages.

EU companies entering China often find a discrepancy between expectations and reality. For example, the initial experiences of the German Accelerator China Market Discovery Programme have shown that participating companies are sometimes overconfident in their own technology, and take an oversimplified approach to the Chinese market. On the other hand, the speed of development and level of competition in China is often underestimated, while in some cases there is too little commitment to market expansion.<sup>29</sup>

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<sup>29</sup> German Accelerator. China | German Accelerator [Internet]. [cited 2021 Sep 15]. Available from: <https://www.germanaccelerator.com/our-markets/asia/china/>

Experience shows that SMEs face very different challenges compared to multinationals:

SMEs are often newcomers to the global market, while multinationals already have historical and cultural knowledge. While most multinational companies no longer consider IP issues a major problem and stress that the Chinese systems in this area have improved in recent years, IP protection still presents a major challenge to small and medium-sized enterprises.

SMEs do have competitive advantages, such as agility, their focus on one specialist product, and flexibility (tailor-made solutions). Moreover, they are often able to develop tailor-made solutions for a specific customer. However, they find access to finance more difficult than multinational companies, and the cost of money is much higher.



## 3. ACCELERATING INNOVATIVE ENERGY SOLUTIONS TO MARKET IN EU AND CHINA

Both public and private European and Chinese players have launched a series of initiatives in response to the challenges of commercialisation of innovative energy solutions. Here, we describe a selection of useful measures that support the incubation and commercialisation of innovative energy solutions.

### 3.1 Bilateral initiatives

#### 3.1.1 Bilateral innovation funds

Several European Member States have set up bilateral innovation funds in cooperation with Chinese institutions. In the main, these funds target clean and renewable energy SMEs in China and in Europe, among other sectors, thus helping to scale up the development of innovative companies. Such initiatives, which offer additional coordination and are orientated specifically towards the energy sector, have the potential to offer even more support to the commercial development of innovative companies in either of the two markets.

Table 4: Selected bilateral innovation funds with a focus on energy development.

| Fund name  | European partner                              | Chinese partner                    | Characteristics/<br>Scope of activity                            |
|--|---|------------------------------------|--|
| Sino-French Fund   | French Public Bank of Investment (BPI France) | China Development Bank             | Innovation fund, mid-cap, SMEs investment in China and in Europe |
| Sino-German High-Tech Fund   | KfW   | China Development Bank             | Internet of things, Industry 4.0, clean technologies, healthcare |
| Sino-Italian Investment Fund                                       | Cassa Depositi e Prestiti (CDP)               | China Development Bank             | SMEs, industry, green energy, biotechnology, etc.                |
| Sino-Denmark research and innovation cooperation: Green Transition | Innovation Fund Denmark                       | Ministry of Science and Technology | Investment in 4-5 joint research and development programmes      |

### 3.1.2 Bilateral promotion initiatives

At Member State level, the embassies, chambers of commerce and business promotion agencies have launched a series of initiatives in the energy field to foster business cooperation in China. This section focuses on a few selected initiatives that are helping to grow business visibility, networking or competitiveness.

#### *3.1.2.1 Netherlands: Showcase website*

The Netherlands Energy Technology Platform is a website showcasing the innovative technologies of Dutch companies in the energy sector, categorised by sector. It helps end users to search for technology and gives useful information about its deployment (comparisons, specific details). Supported by leading Dutch players in the energy sector, development agencies, accelerators, associations and the Dutch diplomatic network, the platform is an excellent marketing and networking tool for Dutch technology suppliers and a powerful search tool for prospects.<sup>30</sup>

#### *3.1.2.2 Business France / French Tech*

To help French SMEs enter the Chinese market, Business France, the French state-sponsored business agency, has put in place a complete range of offers: consultancy services, networking events, newsletters, conferences and international recruitment. Among these, the 'French Tech Tour' is a programme allowing selected French companies that are members of its accelerator scheme to visit China and meet relevant stakeholders and counterparts, the aim being to accelerate their development in China. Such a programme is highly appreciated by entrepreneurs who see great networking opportunities, not only with Chinese partners but also with other French entrepreneurs who share the same goals and business development challenges.<sup>31</sup>

Business France also helps companies to hire industry professionals to develop their international footprint. Companies can apply for a *Volontariat international en entreprise* (VIE) to receive financing help and recruitment facilities, in order to recruit a person in charge of developing a new market who will be based in the targeted country.

#### *3.1.2.3 German Energy Solutions Initiative and the German Accelerator*

SMEs based in Germany that offer energy solutions in the fields of renewable energies, energy efficiency, smart grids and storage technologies are supported to develop new markets abroad by the Federal Ministry for Economic Affairs and Energy (BMWi). The multi-year funding strategy for individual target regions, such as China, consists of a phased market preparation, market development and market securing; the German Energy Solutions Initiative offers support services for each phase.<sup>32</sup>

In addition, the 'German Accelerator' program was launched in 2021 to support start-ups in particular as they enter global markets. German Accelerator is operated by German Entrepreneurship GmbH and funded by the BMWi. The organisation enables

<sup>30</sup> NETP [Internet]. [cited 2021 Sep 23]. Available from: <https://netp.technologycatalogue.com/>

<sup>31</sup> French Tech Tour China 2020- Phase 2 en 2021- Business France [Internet]. [cited 2021 Sep 23]. Available from: <https://www.businessfrance.fr/french-tech-tour-china-2020-phase-2-en-2021>

<sup>32</sup> BMWi- Federal Ministry for Economic Affairs and Energy- German Energy Solutions Initiative [Internet]. [cited 2021 Sep 23]. Available from: <https://www.bmwi.de/Redaktion/EN/Artikel/Foreign-Trade/german-energy-solutions-initiative.html>

domestic German start-ups to access international markets and achieve rapid success. Currently it is active in the USA, Southeast Asia, Japan, India, South Korea and China.

In China, the German Accelerator focuses on smart manufacturing, health technology, clean technology and agricultural technology. The program helps companies to explore the Chinese market, and evaluates their business model for entry into the target market.<sup>33</sup>

## 3.2 Initiatives by private companies and associations

### 3.2.1 EUCCC business company dialogue

Since its establishment in 2000, the European Chamber of Commerce in China (EUCCC) has actively promoted business cooperation between European and Chinese players, and it is now recognised by the European Commission and the Chinese authorities as the official voice of European business in China.

From its original 51 founding members, the Chamber has grown to more than 1 700 members. It is present in nine Chinese cities and manages 26 working groups that each address a particular issue. Through its working groups, such as the Energy working group, the EUCCC regularly organises business meetings, conferences and networking events to energise the business community, introduce the latest policy and regulation developments, share knowledge, and gather feedback on business needs. It compiles all the information gathered into an annual report, the Position Paper.<sup>34</sup> This paper 'details how persistent issues, such as limited market access and a complex regulatory environment, prevent European businesses from contributing fully to China's sustainable development'. The EUCCC actively promotes business cooperation in the energy field both through its dedicated working group and through updates in the Position Paper.

### 3.2.2 EU SME Centre

The EU SME Centre is an EU initiative that provides hands-on support services to European SMEs who wish to do business in China, in business development, legal, standards and compliance, and human resources. The advice and support provided by the EU SME Centre is based in four areas:<sup>35</sup>

- *Knowledge Centre*: a website with nearly 200 comprehensive market reports, guidelines and case studies available for download.
- *Advice Centre*: advising SMEs on their entry into the Chinese market.
- *Training Centre*: offering training programmes to fill the knowledge and skills gaps of SMEs entering the Chinese market.
- *SME Advocacy Platform*: a coherent, consistent and consolidated voice for European small businesses.

<sup>33</sup> See footnote 26.

<sup>34</sup> EUCCC. European Business in China- Position Paper 2021/2022 [Internet]. 2021. Available from: <https://www.europeanchamber.com.cn/en/publications-position-paper>

<sup>35</sup> About the Centre | EU SME Centre: China Market Research, Training, Advice [Internet]. [cited 2021 Sep 23]. Available from: <https://www.eusmecentre.org.cn/about-centre>

### 3.2.3 EXCEL Accelerator

EXCEL Accelerator is a prestigious accelerator programme run by the Energy Internet Innovation and Entrepreneurship Center (EIIEC). The EIIEC is a cooperative venture based in Chengdu which was established in 2019 by Tianfu New Area, Energy Internet Research Institute, Tsinghua University and New Energy Nexus with support from the California Energy Commission and the National Energy Administration of China. The accelerator programme recruits international growth-stage start-ups in the climate and energy sectors, with a focus on heavy industry and utilities. It supports the start-ups to expand their business opportunities in China by facilitating market exchanges and connecting leaders in academia and industry with international partners. Companies are supported to set up pilot projects and run deep-dive workshops. The Accelerator also offers face to face mentoring sessions and cohort meetings. In 2020, 20 start-ups were selected for the Accelerator, focusing on hydrogen, storage, AI, blockchain, energy efficiency, mobility and solar. Success stories include a business contract with a heavy industry company, obtaining next-round funding for five start-ups, and industry events in Shanghai, Chengdu, Beijing and Shenzhen.

### 3.2.4 Working together with design institutes

Chinese design institutes are state-owned companies that are responsible for plant design and industry technology research. There are more than 1 000 design institutes in China, with between 500 and 2 000 high skilled employees. Design institutes exist in almost every sector, including the energy sector. Linde plc, one of the world's leading industrial gas and engineering companies that produces, among other things, hydrogen for clean fuels, reports that design institutes are key to success in developing and introducing new technologies to China. At the ECECP workshop on *Promoting Innovation in Energy Technologies – Opportunities for Cooperation Between EU and China: Challenges in introducing innovative energy technologies in EU and China*<sup>36</sup> in January 2021, Linde plc noted many advantages to working with design institutes, e.g. the design institutes know the industry and regulations. The company stresses that it is important to have a clear agreement on intellectual property rights and a joint development agreement that clearly defines the roles for innovation and commercialisation.<sup>37</sup>

Table 5: Examples of design institutes in different sectors.

| Sector | Example   |
|--------|---|
| Power  | CEEC Jiangsu Power Design Institute             |
| Steel  | Capital Engineering & Research Incorporation    |
| Copper | Nanchang Design Institute of Non-ferrous Metals |
| Glass  | Nanjing Fiberglass Research & Design Institute  |

<sup>36</sup> See footnote 7.

<sup>37</sup> Scheele J von. Working with Design Institutes. In: Promoting Innovation in Energy Technologies- Opportunities for Cooperation Between EU and China: Challenges in introducing innovative energy technologies in EU and China [Internet]. Beijing: ECECP; 2021. Available from: <http://www.ececp.eu/en/workshop-videos/workshop-videos-promoting-innovation-in-energy-technologies-opportunities-for-cooperation-between-eu-and-china/>

### 3.2.5 Energy Performance Contracting

SMEs in energy efficiency highlight in particular the lack of information on existing technologies, scarcity of skilled workers, the opacity of a clear return on investment, and intense competition with tight margins as significant barriers hampering widespread take-up of innovative solutions. This challenge is particularly daunting in the area of building energy efficiency technologies, given the high up-front costs.

In project tenders, often only the acquisition costs (CAPEX) are taken into account, while operational expenditure (OPEX) is frequently disregarded. The acquisition costs for European technology often initially appear higher, which means it can miss out when it comes to project selection. However, if life-cycle costs, effectiveness, return on investment, reliability (i.e., labour costs) and water and waste disposal are taken into account, the project costs often look quite different.

This is where Energy Performance Contracting (EPC) comes in. EPC is a market mechanism whereby an energy service company (ESCO) provides energy retrofit services for an energy user and is paid for the projected energy savings. A Chinese ESCO, Warmland, is using EPC to finance energy saving technologies and to ensure that they are affordable for Chinese costumers.

The projects usually range in size from CNY 300 000 to CNY 5 000 000 (EUR 42 570 to EUR 709 500) with a static payback period of 3-5 years. As end-users often do not have the necessary expertise in energy efficiency management, EPC is a useful tool: end-users pay in accordance with the actual energy saving effect, which is a more reliable and measurable payment system. The idea with EPC is to use contracts to solidify the relationship between customers and the ESCO. The ESCO invests in construction or upgrading of the energy efficiency systems, and then provides customers with long-term operating services.<sup>38</sup>

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<sup>38</sup> Yang B. EMC- The Key of Integrating EU Solutions in China Building Energy Efficiency Market. EU-China Energy Magazine [Internet]. :2021 Spring Double Issue35–40. Available from: <http://www.ececp.eu/en/eu-china-energy-magazine-2021-spring-double-issue-new/>

## 4. RECOMMENDATIONS – TARGETED SUPPORT FOR SMES WHO ARE ENERGY SOLUTIONS PROVIDERS

Having discussed the challenges and best practices around innovative products, the question now is how the various policy makers can help EU and Chinese companies bring their innovations to market faster. How can we make even more effective use of the institutions and resources that already exist? Building on best practices, Table 6 provides an overview of proposed solutions to the challenges listed above.

Table 6: Overview of proposed solutions.

| Proposed solution |  | Details  | Who?   |
|-------------------|--|--|--|
| C1                | Improve market knowledge                   | Develop market outlook and business opportunities in China and Europe for different sectors and make available via national chambers of commerce   | ECECP / EUSME / EUCCC for China market reports |
| C2                | Strengthen intercultural knowledge         | Attend training in inter-cultural communication between the EU and China   | ECECP / EUSME / EUCCC                          |
| C3                | Reduce regulatory barriers                 | Develop and maintain up-to-date handbooks on regulatory issues related to commercialisation of energy technologies in the EU and China   | ECECP / EUSME / EUCCC for China issues         |
| C4                | Financing                                  | Organise seminars with local banks, financing intermediaries, and energy management companies, and include financing options in a handbook on regulatory issues  | ECECP / EUSME / EUCCC for China                |
| C5                | Recruitment                                | Portal to provide information on HR needs  | ECECP / EUSME / EUCCC                          |
| C6                | Intellectual property management           | Include information on IP management in the handbook and provide a registry of patent attorneys / consultants  | EUSME / EUCCC                                  |
| C7                | Networking                                 | Networking events; create a match system / buddy system for companies  | ECECP / EUSME / EUCCC                          |
| C8                | Support adaptation to technological change | Provide an HR portal to help recruit the best talent with knowledge of the latest technology; offer information on training on the latest developments to support early adoption of technological advances | ECECP / EUSME / EUCCC                          |
| C9                | Reduce the language barrier                | Provide a roster of interns / professional interpreters  | EUSME / EUCCC                                  |
| C10               | Enhance trustworthiness                    | Provide a list of local companies willing to partner in pilots / demonstrations  | ECECP  |
| C11               | Decrease management time                   | Grants to support the cost of management time, travel and associated costs   | National export agencies                       |
| C12               | Communication of public support            | Disseminate information on a variety of information channels (newsletter, WeChat, LinkedIn, website); share information on partner services  | ECECP / EUSME / EUCCC                          |

## **C1. Improve market knowledge**

- Develop information materials on the market outlook and business opportunities in China and Europe for different sectors and make them available via national chambers of commerce.
- Identify and develop recommendations on approaches and tools for the assessment of the technologies that are ready for commercialisation.
- Create an EU-China accelerator programme, in partnership with Member States development agencies, to help a selection of European SMEs in China and of Chinese SMEs in Europe, serving as an experimental batch of companies that are working to achieve the Net Zero pledges.
- Continue to publicise market development trends, market reforms, and market cooperation opportunities to attract new companies into either of the two markets.

## **C2. Strengthen intercultural knowledge**

- Raise awareness of distinct cultural differences without reinforcing stereotypes through close cooperation, exchange and intercultural training, i.e. in conjunction with an EU-China accelerator programme.
- Develop and/or disseminate information materials on business etiquette.

## **C3. Reduce regulatory issues**

- Develop and maintain up-to-date handbooks on regulatory issues related to commercialisation of energy technologies in EU and China.
- Allow participation by European and Chinese companies in standard-setting groups in both the EU and China to facilitate the commercialisation of innovative solutions;
- Given the future importance of data in the energy sector, we would suggest further cooperation on digital norms that would be used in the energy sector. This cooperation would prevent future risks such as cybersecurity risks but would also unlock new market potential thanks to an open-data approach. This would follow the examples of the PSD 2 regulation (open banking law) in the banking sector in the EU and the open banking law in Hong Kong which enable third parties to use data from market operators (banks).
- Pursue sectoral market reforms in the EU and China to ensure an economic relationship that provides an assurance of mutual benefit and non-discrimination.
- Ensure a frictionless trade cooperation in the energy sector, which does not put obstacles in the way of choosing imported products over domestically produced goods.



- Continue energy market reforms to reflect the true carbon cost in the EU and China.

#### **C4. Financing**

- Organise seminars with local banks, financing intermediaries, and energy management companies, and include financing options in a handbook on regulatory issues.
- Create a common investment fund between China Development Bank and the European Investment Fund in the energy sector, to invest in promising European and Chinese SMEs contributing to the energy transition.

#### **C5. Recruitment**

- Establish a portal to provide information on HR needs.
- Draft a proposal to agree on streamlining the mobility of entrepreneurs and key business players and to disseminate relevant news updates using a variety of information channels (newsletter, WeChat, LinkedIn, website); share information on the services of partner innovators. E.g., green passport.

#### **C6. Intellectual property management**

- Include information on IP management in the handbook and provide a register of patent attorneys and consultants.

#### **C7. Networking**

- Organise dedicated marketing and networking events through the EU-China Energy Cooperation Platform, in partnership with the European Union Chamber of Commerce in China and the China Chamber of Commerce in the European Union, to underpin business cooperation between European and Chinese companies. Such events could include speed-dating for companies through online or offline meetings, an online import / export forum to promote technologies that are domestically commercialised but have not yet found an international market, and events dedicated to business strategies, etc.

#### **C8. Support adaption to rapid technological change**

This challenge affects all sectors and is probably the most difficult to resolve.

- Since infrastructure in the energy sector faces an increasing trend towards digitalisation, we suggest that the EU and China should hold an information session dedicated to norms presentation under the Energy dialogue, to familiarise both sides with the standards that drive innovation in the energy sector. This session could lead to the adoption of common energy performance indicators in the building industry or in city development, facilitating a more transparent energy transition and frictionless trade.



- Portal to provide information on human resource (HR) needs.
- Provide information on training providers.

### **C9. Reducing the language barrier**

- Provide a roster of interns / professional interpreters.
- Provide language training and vocabulary lists focusing on the energy sector.

### **C10. Enhance trustworthiness**

- Provide a list of local companies willing to partner in pilots / demonstration projects.
- Promote the demonstration of engineering innovation in China-EU cooperation.
- Organise visits by business representatives, collaborate on demonstration spaces, promote accelerator science parks and mentoring programmes.

### **C11. Reduce management time**

- Grants to support the cost of management time / travel and so on.

### **C12. Communication of public support**

- Disseminate information on a variety of information channels (newsletter, WeChat, LinkedIn, website).
- Facilitate information-sharing and networking among relevant organisations and institutions to create synergies and to enable an exchange of information and expertise among relevant players regarding best practice, experience and technology transfer.
- Capitalise on the existence of the EU-China Energy Cooperation Platform which can act as a knowledge hub, and can direct companies towards the public help available for European and Chinese companies and the publicly available information that can help companies to expand their market reach.
- Continue to support the advocacy work of business communities to further improve business conditions for European and Chinese companies in the EU and China.

# CONCLUSIONS

In December 2019, the EU Commission presented the Green Deal, setting the ambitious target of becoming the first climate-neutral continent by 2050. In September 2020, China announced its objective of becoming climate-neutral by 2060. Although these targets differ in content, it is clear that new technologies and social innovations are needed to achieve the goals set by policymakers. This challenge is significant because the commercialisation of innovations in the energy sector has in the past often taken between 20 and almost 70 years.<sup>39</sup>

The aim of this report is to (i) identify barriers to the diffusion of innovative energy technologies in the EU and China and (ii) identify best practices that support the acceleration of incubation and commercialisation of innovative solutions.

Based on an extensive series of formal and informal interviews with industry experts, business representatives from the EU and China, and representatives of associations, as well as publicly available reports and academic articles, material published in the EU-China Energy Magazine, and the results of various workshops, we have identified challenges that hinder the commercialisation of energy technologies and offered realistic recommendations to address them.

Based on the challenges and best practices identified, we propose the following public measures targeting the needs of SMEs to accelerate the commercialisation of their innovative solutions:

- Develop accurate, publicly-available material, including sectoral development forecasts and up-to-date manuals on relevant regulations, available funding and the management of intellectual property, to facilitate companies' access to official and transparent market information and practical procedures.
- Establish dedicated digital portals to help businesses access available resources and provide tailored information to facilitate business recruitment and address staffing issues. In addition, a list of local businesses willing to participate in pilot / demonstration projects would be very useful to accelerate cooperation opportunities.
- Disseminate relevant information using a variety of information channels (newsletter, WeChat, LinkedIn, website) and share information about partner services to reach a wider audience.
- Offer grants to offset the cost of management and travel time.
- Organise dedicated marketing and networking events through the EU-China Energy Cooperation Platform, in partnership with the European Union

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<sup>39</sup> See footnote 4.


Chamber of Commerce in China and the China Chamber of Commerce in the European Union, to help business cooperation between European and Chinese companies.

## ANNEX


This report is based on an extensive series of formal and informal interviews with industry experts, business representatives from the EU and China, representatives of associations, as well as on the results of various workshops conducted by ECECP, in particular the *Carbon Neutral by 2060 Series – Workshop 1: Innovation* that was co-hosted by ECECP and EnergyPost in February 2021. Workshop transcripts and recordings are available on the ECECP website. Table 7 provides a list of the experts that were formally interviewed for this report.

Table 7: List of interviewed experts.

| No | Position                                | Entity type  | Experience in China/EU                    |
|----|---|--|---|
| 1  | Vice-President                          | Multinational energy company                           | Activities in China                       |
| 2  | Head of Department                      | State-sponsored promotion agency of an EU member state | EU MS-China business cooperation in China |
| 3  | Corporate Affairs Manager               | Multinational energy company                           | Activities in China                       |
| 4  | CEO                                     | Chinese Energy Start-up                                | Activities in the EU and China            |
| 5  | Head of Department                      | Global energy accelerator                              | Business mentoring in China               |
| 6  | Program Director                        | Global think tank- Energy                              | Policy analysis in China                  |
| 7  | Research Associate on the energy sector | Global think tank- Energy                              | Policy analysis in China                  |
| 8  | Business Development Manager            | European SME   | Activities in the EU and in China         |
| 9  | Head of program                         | European Technology Platform                           | Non-profit activities in the EU           |
| 10 | Wind Energy Developer                   | European Renewable Energy producer                     | Business development in the EU            |
| 11 | President of the Energy Cluster         | Regional Energy Cluster in an EU member state          | Business coordination in the EU           |
| 12 | Export Warranties Manager               | European State-backed Bank                             | Business funding in the EU and in China   |
| 13 | President                               | Chinese think tank - Law                               | Policy analysis in China and in the EU    |
| 14 | Research Direction                      | Chinese think tank - Trade                             | Policy analysis in China and in the EU    |
| 15 | Manager                                 | Chinese State Bank                                     | Business funding in China and in the EU   |

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