



中德能源与能效合作

Energiepartnerschaft

DEUTSCHLAND - CHINA



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National Development and Reform Commission



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Tayuan Diplomatic Office Building 2-5,
14 Liangmahe South Street, Chaoyang District
100600 Beijing, P. R. China

c/o

Deutsche Gesellschaft für
Internationale Zusammenarbeit (GIZ) GmbH
Torsten Fritsche
Köthener Str. 2
10963 Berlin

Project Director

Yin Yuxia (GIZ)
Deutsche Gesellschaft für
Internationale Zusammenarbeit (GIZ) GmbH

Editors

Yin Yuxia, Maximilian Ryssel, Weng Fangping
Deutsche Gesellschaft für
Internationale Zusammenarbeit (GIZ) GmbH

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Foreword

2019 marked the end of an important decade for Germany's Energiewende and China's energy revolution (能源革命). Between 2010 and 2019, Germany's share of renewables in electricity generation grew from 17% to over 40%. China connected more than 500 GW of renewables to its power grids and reached a renewable capacity of 790 GW. Simultaneously, German primary energy consumption dropped by 11% to approx. 437 million tons of coal equivalent (tce). China's coal share of primary energy consumption dropped from 70% to less than 60% – a positive sign showing that decoupling economic growth from coal consumption is possible.

Twelve years have passed since we decided to work closely together, exchange best practices and intensify the bilateral cooperation on the energy transition. For the Sino-German Energy Partnership, 2019 was characterized by new focus topics including hydrogen and biomethane and a focus on private sector cooperation.

An important highlight was the successful conclusion of our joint two-year demonstration project on energy efficiency in heavy industry. After conducting six energy audits in different pilot companies – from a cement plant to Beijing's Capital Airport – by March 2019, we continued to support the implementation of identified energy efficiency measures in close cooperation with German and Chinese companies. The pilots were supplemented with training on life-cycle cost analyses and an exchange on energy efficiency policies. A major success was China's decision to adopt parts of the German standard DIN EN 16427 in its new standard for energy audits. A second project phase for the further implementation of energy efficiency measures and dissemination of results and successes is planned.

The first Sino-German Energy Efficiency Cooperation Projects Award under the patronage of BMWi and NDRC marked another highlight of our private sector activities. A total of five German and five Chinese companies were recognized for their outstanding performance in the joint implementation of energy efficiency measures. The award shows that German and Chinese companies are highly active and successful in contributing to our energy transitions.

Many high-level bilateral talks shaped our political year. Among others, Vice-Minister Lin Shanqing, National Energy Administration (NEA), led a Chinese delegation to the Berlin Energy Transition Dialogue (BETD) and subsequent talks with State Secretary Andreas Feicht, Federal Ministry for Economic Affairs and Energy (BMWi) in April. In June, Director He Lifeng, National Development and Reform Commission (NDRC), welcomed Federal Minister Peter Altmaier (BMWi) to Beijing. On the working level, our two annual working group meetings reflected on yet another successful year and decided on new activities and topics for the upcoming year.

The 2010s were important for the global energy transition, but the new decade will be even more decisive. We are looking forward to continuing our platform for political, technical and economic exchange on our two countries' energy transitions throughout these challenging times. If you want to work with us on shaping our bilateral cooperation, please feel free to get in touch anytime.

Enjoy reading our annual report!
Your Sino-German Energy Partnership

About the Sino-German Energy Partnership

Since its initiation in 2006 at the Sino-German Forum for Economic and Technological Cooperation, the bilateral cooperation between China and Germany in the energy sector developed into a strategic partnership in 2016. The Sino-German Energy Partnership links three levels of action: high-level policy dialogue, business-to-government exchange and an exchange of experiences on technical and regulatory solutions that promote the energy transition. The main aim of the partnership is to foster and advance the far-reaching and profound energy transitions ongoing in both countries by exchanging views, best practices and knowledge on the development of a sustainable energy system, primarily centered on improving energy efficiency and expanding the use of renewable energy.

Overall steering and structure

For China, the National Development and Reform Commission (NDRC) and the National Energy Administration (NEA) oversee the partnership, while the Federal Ministry for Economic Affairs and Energy (BMWi) takes the lead on behalf of Germany.

Two thematic working groups have been established under bilateral agreements in order to facilitate cooperation as well as intensify the exchange of information, experiences and best practices. On the Chinese side, the working group on “energy” is led by NEA, while the working group on “energy efficiency” is headed by NDRC.



Working Group on Energy

- Power sector flexibilization and energy storage
- Electricity market regulation and reform
- Sustainable heating
- Biomethane
- Green hydrogen strategy



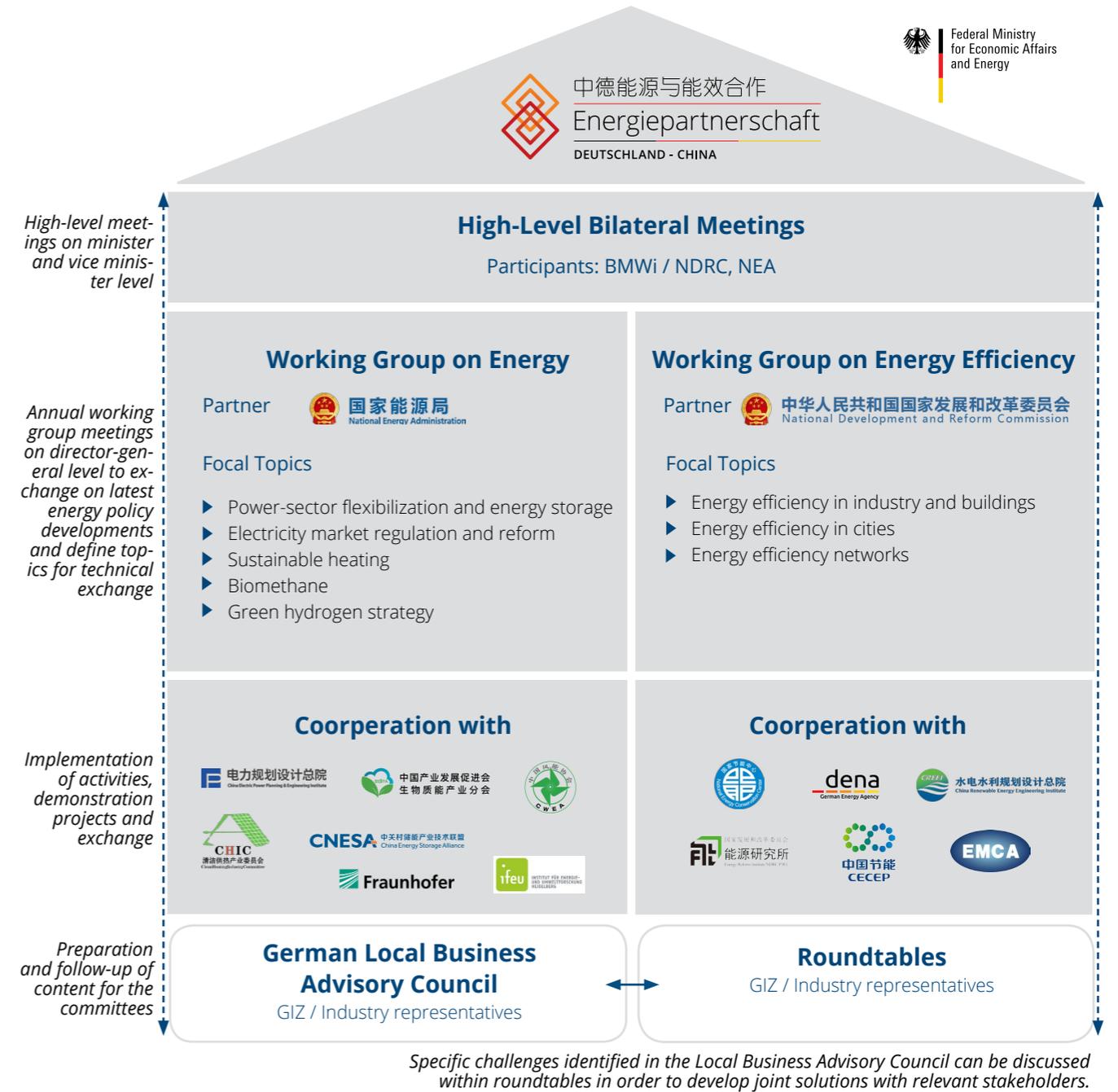
Working Group on Energy Efficiency

- Energy efficiency in industry and buildings
- Energy efficiency in cities
- Energy efficiency networks

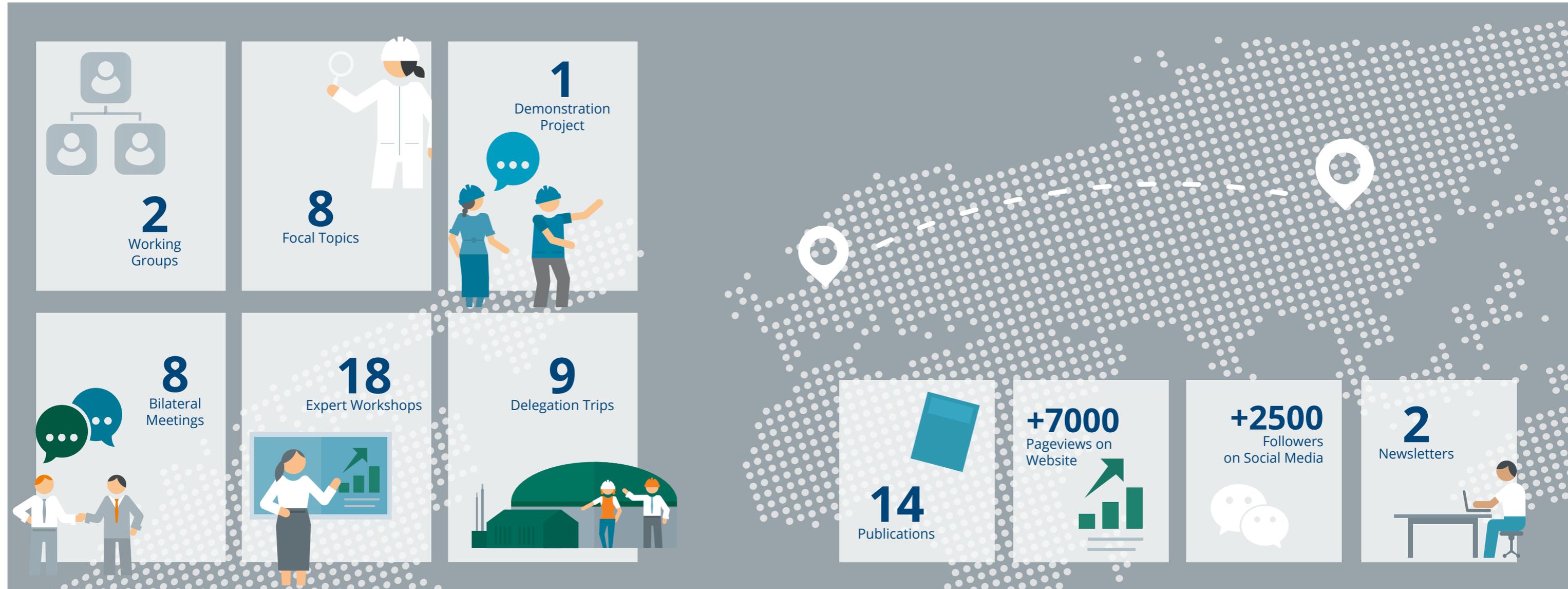
The energy partnership furthermore aims to encourage private sector cooperation and showcase successful technologies, innovative services and business models to drive the energy transition forward in both China and Germany. Both sides have agreed to jointly implement demonstration projects promoting energy conservation to demonstrate exemplary solutions for energy efficiency in industry, as well as integrated district energy planning

to serve as reference for China.

The Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH was commissioned by the BMWi with the implementation of the bilateral energy partnership with China. A secretariat with full-time advisors in Berlin and Beijing serves as a point of contact and coordination for its activities.



Key Facts and Figures



Project Impressions



Left: NDRC Vice Director Zhang Yong meeting German representatives ©GIZ

Bottom: NDRC Vice Director Zhang Yong visiting German ALBA Group in Berlin © ALBA Group



NEA and Netze BW discuss challenges and solutions of the Energiewende at the fringes of the 8th working group meeting on energy © Netze BW GmbH



Exchange between German and Chinese business representatives from the offshore wind power sector during the round table event ©GIZ



Exchange at 4th meeting of German Local Business Advisory Council in Shanghai ©GIZ



中德能效合作项目获奖项目

Winners of the Sino-German Energy Efficiency Cooperation Projects Award



Company representatives accept the Sino-German Energy Efficiency Cooperation Projects Award for their outstanding achievements ©GIZ

Focal Topics

In recent years, China and Germany have been continuously deepening bilateral cooperation on the challenges of and solutions to the energy transition. Working groups meet annually to review the previous year's activities and decide on the focal topics for the upcoming year.

Working Group on “Energy”

Power sector flexibilization and energy storage

Renewable energy (RE) – mainly wind and solar – are drastically reshaping our energy systems. Where central, fossil generators had delivered a steady energy supply in the past, intermittent and decentralized RE has seen an astronomical growth in installed capacities and record cost decreases over the last decade. As partners, Germany and China share best practices on power-sector flexibilization and energy storage, aiming to achieve efficient system integration of RE. This includes exchange on the right market mechanisms (including spot markets and ancillary services, see below), business models for energy storage, standards, and sector coupling.

Electricity market regulation and reform

China's power sector is currently undergoing thorough market reform. Today, electricity spot markets are being trialed on provincial level to gain experience for the introduction of a nationwide spot market in the near future. In 2000, Germany's first electricity exchange started trading in Frankfurt. Two decades later, German and European power markets are ever more integrated with numerous products, from futures to intra-day products, offered on the trading floor. Within the Sino-German Energy Partnership, German and international experts share best practices and offer advice for China's efforts to establish effective and efficient spot trading mechanisms.

Sustainable heating

To achieve a holistic energy transition and the decarbonization of all sectors, increasing the share of renewable and low-carbon power sources in the heating sector is essential. Today, the Chinese and German heating sectors still largely depend on the fossil fuels coal, oil and gas. However, Germany's push-and-pull approach consisting of such measures as the obligatory use of renewable heating technologies in new buildings and incentives for the retrofitting of existing buildings already paves the way for a sustainable heating future. In China, waste heat utilization, power-to-heat, direct utilization of renewable heat sources and fuel switching from coal to gas are being discussed as viable options for the heat transition. Both countries are actively exchanging on policy and technology aspects of the heat transition.

Biomethane

With several reforms of the biomass sector underway in China, the Chinese biomethane industry is anticipating accelerated growth in the 2020s. Therefore, China is actively seeking both policy advice and technological upgrading for its biomethane processes. Germany offers years of experience in both biomass policies and world-class technologies for biomethane production. Against this background, the Sino-German Energy Partnership aims to support China's policy framework for biomethane and connect both countries' private sectors.

Green hydrogen strategy

While renewable energy generation technology has already become competitive in the power sector and is starting to gain a greater share of the heating sector, some sectors are much more difficult to decarbonize. For sectors such as heavy industry, the petrochemical industry and long-distance freight transport, hydrogen from renewable sources could become a viable solution in the

mid-term future. Currently, Germany and China are both looking into possibilities for leveraging the industrial and transformative potential of hydrogen. Within the Energy Partnership, both countries have agreed to exchange on strategies for the production and utilization of green hydrogen.

Working Group on “Energy Efficiency”

Energy efficiency in industry and buildings

Enhancing energy conservation and efficiency in industry and buildings is key to a successful energy transition. The demonstration project on Energy Diagnosis in Energy-Intensive Industry showcases the intensive bilateral cooperation on energy audits and improving energy consumption in China's industry sector. The project's first phase, concluded in 2019, aimed to introduce state-of-the-art energy audits and diagnoses to Chinese companies, provide training on life-cycle cost analysis (LCCA), and connect German and Chinese companies to implement energy efficiency measures. The demonstration project is jointly implemented by GIZ, German Energy Agency dena and China's National Energy Conservation Center. A second project phase for further implementation of energy efficiency measures and dissemination of results and successes is planned. Additionally, Chinese and German experts regularly discuss and exchange on policy advancements and best practices for energy efficiency in the building and industry sector, suitable business and financing models.

Energy efficiency in cities

Integrated city-level energy planning, i.e. an integrated and holistic approach to designing and developing energy generation, transportation and consumption, provides

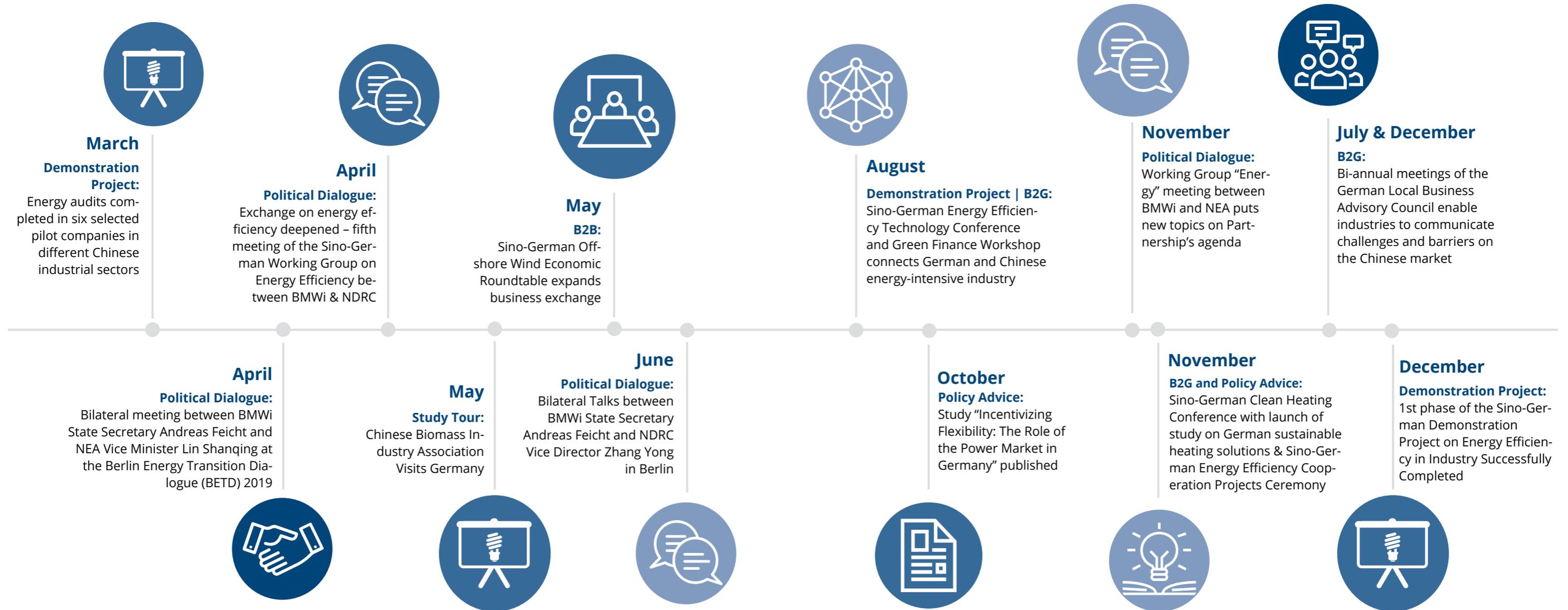
an important baseline for increasing energy efficiency in cities. The Sino-German demonstration project Energy Efficiency in Cities/City Quarters will showcase the integrated and efficient utilization of renewables, industrial waste heat and conventional power suppliers on the supply side, and demand-side management and smart energy consumption technologies on the demand side. The demonstration project is scheduled to start in 2020.

Energy efficiency networks

Energy efficiency networks (EEN) comprise up to a dozen companies with the goal of identifying energy conservation potentials, setting efficiency goals, and regularly exchanging on best practices and lessons learnt. In Germany, EEN have been very successful in enhancing energy efficiency in small and large companies alike. Within the Energy Partnership, German and Chinese experts and practitioners joined forces to evaluate and determine guidelines for setting up EEN in the Chinese context.



Timeline of Highlights 2019



Highlights 2019

March | Demonstration Project: Energy audits completed in six selected pilot companies in different Chinese industrial sectors

On March 28, a group of Chinese and German experts conducted a thorough energy diagnosis in one of the world's largest buildings – terminal 3 (T3) of Beijing Capital International Airport (PEK) with an area of one million square meters. Being the last of six energy audits, this marked a milestone for the Sino-German Demon-

stration Project on Energy Efficiency in Industry. Other demonstration branches included cement, coal power, glass fiber, ceramics and paper. The project's aim was to conduct state-of-the-art German energy diagnoses in China's heavy industry, introduce and spread life-cycle cost analysis in China's industry and implement the identified measures in a close partnership between German and Chinese companies. The project's first phase was concluded in December. The project was implemented by GIZ, German Energy Agency dena and China's National Energy Conservation Center (NECC).



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NEA Vice Minister Lin Shanqing discusses China's solutions for the Energy Revolution on the panel "Mission Possible – Challenges and Solutions for the Energy Transition" at BETD 2019 © BETD2019

April | Political Dialogue: Exchange on energy efficiency deepened – fifth meeting of the Sino-German Working Group on Energy Efficiency

April | Political Dialogue: Bilateral meeting between BMWi State Secretary Andreas Feicht and NEA Vice Minister Lin Shanqing at the Berlin Energy Transition Dialogue (BETD) 2019

The NEA and the NDRC participated in the fifth Berlin Energy Transition Dialogue (BETD) in Berlin on 9-10 April. High-level bilateral talks between State Secretary Andreas Feicht (BMWi) and Vice Minister Lin Shanqing (NEA) and the fifth meeting of the Sino-German Working Group on Energy Efficiency (BMWi and NDRC) were particular highlights for the Sino-German Energy Partnership. The Berlin Energy Transition Dialogue (BETD), held at the Federal Foreign Office in Berlin in 2019 for the fifth time, marked the annual highlight for high-level policy-makers and industry leaders from around the globe to discuss their vision and way forward towards a global Energiewende.

On April 11, the fifth meeting of the Sino-German Working Group on Energy Efficiency took place at the German Federal Ministry for Economic Affairs and Energy (BMWi) in Berlin. At the meeting, representatives of the NDRC and the BMWi discussed the progress of the cooperation. Both sides agreed to deepen the exchange on energy efficiency and push forward the Sino-German demonstration project on energy efficiency in industry. Furthermore, it was agreed to deepen and accelerate the demonstration project on energy efficiency in cities and the cooperation on energy efficiency networks. German and Chinese government representatives expressed the wish to strengthen the countries' economic ties in the energy efficiency sector and deepen private-sector involvement in the Sino-German Energy Partnership. The next meeting of the Sino-German Working Group on Energy Efficiency is scheduled for spring 2020.

May | Expert Exchange: Energy Partnership facilitates exchange on energy storage standards

On May 18, Chinese and international industry experts met at the Energy Storage International Conference and Expo (ESIE) in Beijing to discuss energy storage, spanning topics such as flywheels, batteries in electric vehicles and large-scale storage designed to providing ancillary services. At the invitation of the Sino-German Energy Partnership, Mr. Alexander Nollau, Head of Energy at the German VDE Association for Electrical, Electronic & Information Technologies, contributed to the subforum Global Energy Storage System Safety & Standardization. In his talk, Mr. Nollau discussed how energy storage is playing an increasingly important role in Germany's Energiewende – on all levels of the power generation value chain, from balancing intermittent renewables on the generation side to time shifting on the level of electricity consumers.

May | Study Tour: Chinese biomass industry association visits Germany

With several reforms of the biomass sector underway in China, the Chinese biomethane industry is looking towards an accelerated growth in the 2020s. Against this backdrop, the Sino-German Energy Partnership supported a study trip by Chinese biomass industry representatives to Germany on May 19 – 26. The delegation was led by the Chinese Biomass Industry Promotion Association (BEIPA) and focused on the status quo and development of the German biomethane sector and state-of-the-art technologies. German and Chinese industry representatives alike expressed the wish for further exchanges and cooperation in the near future.

Representatives of China's biomass industry visit Alensys Engineering GmbH in Rathenow ©GIZ



May | Business Exchange: Sino-German Offshore Wind Economic Roundtable

On May 31, the Sino-German Energy Partnership organized the Sino-German Offshore Wind Economic Roundtable in Yangjiang, Guangdong province, jointly with the Chinese Wind Energy Association (CWEA). In China, ambitions for the development of offshore wind are high. The 13th Five-Year-Plan sets the target of increasing offshore wind capacity to 5 GW by 2020. The event enabled German technology providers, Chinese investors, manufacturers and industry experts from the offshore wind power sector to exchange and showcase best practice technologies and innovative solutions in the offshore wind power sector and to discuss future cooperation opportunities.



June | Political Dialogue: BMWi State Secretary Andreas Feicht and NEA Vice Administrator Li Fanrong met at the G20 summit in Japan

On June 16, State Secretary Andreas Feicht (BMWi) and Vice Minister Li Fanrong (NEA) met for bilateral talks on the fringes of the G20 Ministerial Meeting on Energy Transitions and Global Environment for Sustainable Growth in Karuizawa, Japan. During their meeting, they exchanged on the challenges of the energy transitions in China and Germany. Both sides expressed their interest in closer exchange and cooperation on the development and testing of hydrogen as an alternative method of storing energy.

BMWi State Secretary Andreas Feicht and NEA Vice Administrator Li Fanrong at G20 Ministerial Meeting on Energy Transitions and Global Environment for Sustainable Growth in Karuizawa, Japan ©NEA

June | Political Dialogue: Talks between BMWi State Secretary Andreas Feicht and NDRC Vice Director Zhang Yong in Berlin

On June 27, Mr. Andreas Feicht, State Secretary at BMWi, met with Mr. Zhang Yong, Vice Director of NDRC, in Berlin. During the meeting, they discussed the latest development of energy policies in Germany and China. Despite the significant progress achieved in both countries' energy transitions, both Mr. Feicht and Mr. Zhang stressed the importance and the necessity of continuous efforts to increase the share of renewables in the power generation mix and increase energy efficiency in all sectors.



Participants of the workshop series at Beihang University gather for a group picture ©Beihang University

June | Expert Exchange: Intensive workshops and exchange on current issues of the energy transition

From June 25 to 28, the Sino-German Energy Partnership co-hosted and co-organized four days of intensive workshops together with Fraunhofer ISI and Beihang University, encompassing all aspects of the energy transition. More than 120 experts from academia and government discussed topics such as energy efficiency and networks, energy transition policies, energy system modelling, decarbonization and 2050 renewable energy scenarios, the role of hydrogen and synthetic fuels, future mobility and electricity markets. The workshops enabled German and Chinese experts to share the challenges and existing best-practice solutions of the energy transition.

July & December | B2G: Bi-annual meetings of the German Local Business Advisory Council hosted in Beijing & Shanghai

As in 2019, the Sino-German Energy Partnership organized two meetings of the German Local Business Advisory Council with support of the German Embassy in Beijing and the German Consulate General in Shanghai, respectively. The German Local Business Advisory Council is a key instrument of business-to-government exchange for German companies in the energy sector in China. Its bi-annual meetings enable German companies to communicate challenges and barriers that they are experiencing in their respective industry branches on the Chinese market. Articulated challenges are integrated into the EP's activities, including business roundtables, workshops and dialogue formats the EP holds with its political partners. This year, participants discussed the topics and challenges associated with integrated energy planning and decentralized electricity generation, as well as the importance of demonstration projects for the Chinese market.

August | Demonstration Project | B2G: Sino-German Energy Efficiency Technology Conference and Green Finance Workshop successfully held in Qingdao

On August 8-9, over 200 representatives from government authorities, Chinese energy-intensive industries, German technology providers and green finance experts met at Qingdao's Passive House Technology Center for discussions and exchange on cutting-edge, highly energy efficient technologies. The event provided a platform for technology exchange and showcasing of German best practice examples. It marked yet another milestone for the Sino-German Demonstration Project on Energy

Efficiency in Industry. The showcased technologies and solutions strongly focused on the six selected industry branches identified in the demonstration project. The event provided a sound basis for the implementation of energy-saving measures – identified by German and Chinese experts in previous onsite energy diagnoses at the demonstration plants – in a close partnership between German and Chinese companies.

Sino-German Energy Efficiency Technology Conference and Green Finance Workshop successfully held in Qingdao ©GIZ



September | B2G: Hydrogen – quo vadis? Roundtable convened at the German Embassy

Hydrogen is expected to play an increasingly important role in future energy systems. To better understand the role of hydrogen in China, and to discuss hydrogen strategies of German companies in China, the Sino-German Energy Partnership and the German Embassy in Beijing jointly hosted a roundtable discussion on September 23. Experts from the International Energy Agency (IEA), the Foshan Environment and Energy Research Institute and the German private sector exchanged on the prospects of hydrogen in China and abroad.

November | Demonstration Project: Train the Trainer on life cycle cost analyses (LCCA)

On November 6-7, the Sino-German Energy Partnership and the National Energy Conservation Center (NECC) organized a training workshop on life cycle cost analyses (LCCA). Training and capacity building on LCCA are part of the Sino-German Demonstration Project on Energy Efficiency in Industry, and aim to help Chinese industrial companies to make better energy-related investment decisions. During the two-day training event, participants were provided with a comprehensive and systematic introduction into the topic and learned how to independently calculate and assess investment decisions. Participants are expected to organize LCCA trainings within their respective organizations and further disseminate the concept in industry.

October | Policy Advice: Study “Incentivizing Flexibility: The Role of the Power Market in Germany” published

The study, commissioned by the Sino-German Energy Partnership, shows that spot markets and market reforms acted as key enablers of the successful system integration of renewables in Germany. The study highlights how changes in system design and operation, as well as market liberalization and the introduction of spot markets and intra-day trading, amongst others, has helped Germany to increase system flexibility and provide optimal conditions for the grid-integration of renewable energy. On October 30, Chinese and German experts gathered in Beijing to discuss the study results, market mechanisms and flexibility options.





Participants of the eighth Sino-German Working Group Meeting on Energy ©GIZ

November | Political Dialogue: Eighth meeting of the Sino-German Working Group on Energy held in Berlin

On November 14, representatives of the NEA and the BMWi met in Berlin for the eighth meeting of the Sino-German Working Group on Energy. After reviewing the previous year's activities, both sides agreed to continue bilateral cooperation and exchange on electricity spot markets, power sector flexibilization and sustainable heating. Furthermore, two new topics were put on the partnership's agenda, hydrogen strategies and biomethane. The delegations were headed by Inspector General

Li Ye and Mr. Thorsten Herdan, Director-General, respectively. Prior to the meeting, the NEA delegation took advantage of the chance to discuss current challenges of the energy transition as well as innovative solutions with German companies including Netze BW GmbH and Siemens AG. A visit to and discussions with the Mayor of Spremberg in Germany's Lusatia mining region showed that the German coal exit is closely followed abroad.

November | B2G and Policy Advice: Sino-German Clean Heating Conference and Technology Forum – Sino-German Cooperation Projects receive Energy Efficiency Awards

On November 26, the Sino-German Energy Partnership organized the Sino-German Clean Heating Conference and Technology Forum in Beijing. Aim of the event: Discuss both policy-related, economic and technological aspects of the heating transition with representatives of government, business and academia. One of the event's highlights was the launch of the study German Sustainable Heating Solutions – Best Practices and Applicability in China. The study, conducted by renowned German experts from Fraunhofer Institute for Systems and Innovation Research ISI, ifeu - Institute for Energy and Environmental Research and the Institute for Resource Efficiency and Energy Strategies (IREES) identifies ten German best-practice solutions for sustainable heating and discusses their applicability in the Chinese context. In the afternoon, German companies presented their advanced heating technologies and solutions to an audience of over 150 representatives from utilities, energy service companies and the heating industry.

Furthermore, the Sino-German Energy Partnership was proud to award the 1st Sino-German Energy Efficiency Cooperation Projects Award to five Sino-German cooperation projects under the auspices of the BMWi and the NDRC. The award aims to select and promote outstanding best-practice examples of Sino-German cooperation in the field of energy efficiency and energy conservation. Winners were chosen out of a pool of applications based on different criteria – such as innovativeness, solutions, technologies, business models and energy-saving effects – by a jury of renowned German and Chinese experts. The selection process was jointly organized by GIZ and the ESCO Committee of China Energy Conservation Association (EMCA).

December | Demonstration Project: 1st phase of the Sino-German Demonstration Project on Energy Efficiency in Industry successfully completed

The successful completion of the first project phase of the Sino-German Demonstration Project on Energy Saving in the Energy-intensive Industry through Energy Diagnosis and Energy Efficiency Measures in China was marked by a review meeting in Beijing on December 17, 2019. From 2017 to 2019, the project partners – the GIZ, dena and the NECC – implemented energy audits in six pilot companies and supported the realization of identified measures, conducted training and capacity-building on LCCA, energy audits and energy efficiency instruments, and connected German and Chinese companies. Major success: China will adopt parts of the German standard DIN EN 16427 in its new standard for energy audits. In the second project phase, the GIZ and its partners will continue to support the implementation of energy efficiency measures in the selected pilot companies and further disseminate the lessons learned and experiences by organizing sector-specific information events and capacity-building activities.



Contact



Yin Yuxia

Project Director
Sino-German Energy Partnership

Deutsche Gesellschaft für
Internationale Zusammenarbeit (GIZ) GmbH



Tayuan Diplomatic Office Building 2-5, 14 Liang-
mahe South Rd, Chaoyang District,
100600 Beijing, PR China



+86 10 8527 5589 ext. 306



yuxia.yin@giz.de



www.energypartnership.cn



Website



Wechat



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