



Danish Energy  
Agency

An aerial photograph of a city street with multiple lanes of traffic, buildings, and trees. Three large, semi-transparent circles are overlaid on the image: a large white circle in the upper left containing the main title, a red circle in the middle right, and a teal circle in the lower left.

## The joint Danish-Chinese cooperation on climate and energy

# Key Data

## China

Population (millions):	1.378 (2016)
CO <sub>2</sub> -emissions (Mega tonnes):	9.085,0 (2015)
CO <sub>2</sub> (t/capita):	6.59 (2015)
kg CO <sub>2</sub> /GDP:	0.99 (2015)
Investment in RE (billion \$US):	78.3 (2016)

Source: IEA 2017, WorldBank 2016 and Frankfurt School-UNEP Centre/BNEF 2017

## NDC goals - China

To peak CO<sub>2</sub> emissions around 2030.  
To lower carbon intensity of GDP by 60% to 65% below 2005 level;

To increase the share of non-fossil fuels in primary energy consumption to approximately 20%; and

To increase forest stock volume by 4.5 billion cubic meters compared to 2005 level.



## Denmark

Population (millions):	5.7 (2016)
CO <sub>2</sub> -emissions (Mega tonnes):	32 (2015)
CO <sub>2</sub> (t/capita):	5.63 (2015)
kg CO <sub>2</sub> /GDP:	0.09 (2015)
Investment in RE (billion \$US):	2.5 (2016)

Source: IEA 2017, WorldBank 2016 and Frankfurt School-UNEP Centre/BNEF 2017

## Green government-to-government cooperation

Inclusive, sustainable growth and development is a strategic objective of Denmark's development cooperation. Economies in transition and emerging economies are considered key players for achieving the global Sustainable Development Goals and it is important to provide support for their sustainable development, as they demand expertise, knowledge, technologies and investments to make appropriate strategic choices for their sustainable development. This is not least true with regard to development of their energy sector.

The Danish Energy Agency's global cooperation intends to assist partner countries with their transition to a low carbon pathway reaching the National Determined Contribution (NDC) targets they committed to at COP21.

The primary modality of the Danish Energy Agency is to engage in government-to-government cooperation to promote the

common climate change agenda. It strives for true peer-to-peer exchange to advance the understanding of policy options, strengthen planning - and framework conditions, and strengthen enforcement of regulation.

### China and Denmark's cooperation in the energy sector

China has experienced a staggering industrial and economic development since the early 1980s, which has made China a key player when it comes to tackling carbon emissions. Whereas, Denmark is a pioneer on greening the energy system and has shown that through persistent and active policy-development, it is possible to sustain economic growth, while simultaneously reducing the use of and dependence on fossil fuels.

The Danish government has signed official Memorandums of Understandings (MoUs) with the Chinese authorities including National Development and Reform Commission (NDRC), the National Energy Conservation Center (NECC), the National Energy Administration (NEA) in order to stay on the right track and at the forefront of renewable energy and energy efficiency development within the cooperation between the two countries.



## Facing the challenges

Even though China has committed to the Paris Agreement, it still faces challenges with setting targets that are in line with a 2 degree world scenario. The power sector is the single largest emitter of CO<sub>2</sub> and manufacturing industries the second largest. This is due to a high reliance on coal for electricity generation and for steam and heat in industrial processes. While the coal sector is important for the economy, air pollution is a strategic concern, and Chinese authorities has put a cap on coal consumption and restricted construction of coal fired production units.

Renewable energy is an important emerging industry for China. Although deployment of renewables is progressing rapidly, efficient utilization is facing technical and institutional barriers that represent missed opportunities for CO<sub>2</sub> and other emissions reductions as well as an economic loss for the Chinese society. In some government ministries/agencies including departments within the NEA and in some provinces there remains hesitance towards renewables due to concerns over relative costs, displacement of coal-related jobs and security of supply.

## Joint effort to accelerate green development

The Sino-Danish cooperation in energy sector can be traced back to 2005, where the Wind Energy Program (WED) was initiated. The WED Program was designed

as a three-year program from 2006 to 2008 with the broad development objective: "Renewable energy contributes significantly to the energy supply in China." The program focused on exploitation of wind energy at national level and in three selected provinces. In 2009, the Renewable Energy Development (RED) was established by the Chinese and Danish governments. The program was completed at the end of 2014 with two components: 1) establishing China National Renewable Energy Centre (CN-REC) in order to help address the 'whys and hows' of green transition through undertaking policy research in China and thereby enhancing the Chinese government's capacity in managing renewable energy sectors; 2) to establish Sino-Danish institutional and business partnerships to pursue further development of renewable energy technologies in China. In 2015, CNREC reached an agreement with the British Children's Investment Fund Foundation (CIFF) for support from 2015-2019. The DEA has continued to provide technical support to CNREC.

## Danish Energy Agency Partnership Program (2017-2020)

The rationale of the partnership program between Denmark and China is that China requests support for their energy sector transition towards higher share of renewable energy in the supply mix, and that Denmark can contribute to this effort with experience and expertise from the transition of the Danish energy system. The program

is primarily based on a partnership between the DEA, CNREC and NECC, both of which are partners in the existing phase of the Sino-Danish cooperation.

The program builds on the successes of the present cooperation, but with a stronger focus on utilization of the models and research methodologies developed with CNREC to perform sector specific analysis and with extended support focusing on local/regional level decision making on renewable energy for heating and utilization of excess heat from industries for district heating with NECC. Additionally, the program will provide an international Long-Term Advisor, based at CNREC but working half-time with NECC, to strengthen the programs input to strategic advice on energy efficiency and sustainable district heating.

### **Cooperation with CNREC on China Renewable Energy Outlook (CREO)**

One of the outcomes of RED Program was the establishment of CNREC. It was set up to help address the whys and hows of China's transition towards achieving these goals through undertaking policy research and submitting policy recommendations to the key energy policy makers.

In order to do so, experts from the DEA work closely with CNREC staff on developing strategic energy policies, state-of-the-art methodologies and tools to encourage the use of renewable energy in the Chinese energy system. One of the main outstanding

is to provide technical assistance to contribute to boosting renewable energy in China by developing an annual China Renewable Energy Outlook. It is the flagship publication of CNREC, which contains scenarios for further integration of renewable energy towards 2030 and 2050.

Ambitious renewable energy long-term scenarios for China are generated and published in the CREO that includes identification of main barriers and effects on stakeholders of full renewable energy penetration such as social, economic and environmental effects, and sector specific analysis of main barriers for renewable energy deployment. In addition, other several initiatives that the DEA is assisting with CNREC work including:

- Providing assistance through drafting recommendations and justification for renewable energy targets and policy option for the next five-year plan;
- Dissemination of renewable energy roadmaps and help to identify barriers and solutions for faster implementation;
- Focus on renewable energy in heating by testing the guidelines for heat planning in countries and small cities in pilot countries/small cities;
- Facilitate CNREC's involvement in international energy institutions, e.g. International Energy Agency (IEA) and International Renewable Energy Agency (IRENA).

## **Pilot project on district heating with National Energy Conservation Center (NECC)**

As part of DEPP, China and Denmark has developed a district heating pilot project in the Chinese city of Tongchuan, representing key challenges in the transition towards a cleaner China. The pilot project is entered into by a Project Agreement signed in October 2017 in Xi'an between DEA and NECC.

The pilot project will demonstrate potentials to increase energy efficiency and district heating based on Danish regulatory experiences, methodologies, technologies and knowhow tailored to a Chinese context. A District Heating Assessment Tool (DHAT) based on Denmark's 40 years of experiences with planning of district heating has been developed as a user friendly tool.

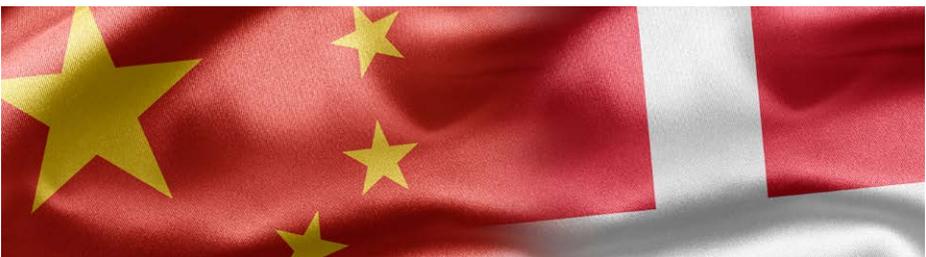
An important aim of the pilot project is to demonstrate the opportunities in district heating and scale up the implementation by sharing tools, methods and lessons learned in order to support China in reaching their ambitious energy transition targets. Furthermore it is an opportunity to identify potential regulatory, technical and capacity related barriers to harvest the fruits from district heating.

By working on a specific Chinese case in district energy the pilot project in Tongchuan will develop and evaluate implementable energy efficient solutions based on Danish experiences and methods. The pilot project aims to deliver:

- Policy recommendation and dissemination;
- Specific tools for heat planning, Cost benefit analysis, decision support tools for project evaluation and total cost of ownership.

## **The China Thermal Power Transition Program (2016-2018)**

Besides the funding provided by CIFF to support CNREC's work, they provide additional funding to support a program for called China Thermal Power Transition. The Chinese power system is strongly influenced by two major trends, namely, an increasing share of variable renewable energy (VRE) primarily wind and solar, that needs to be integrated into the power system and the ongoing work towards establishing a power market. However, the challenge with integrating the increasing share of VRE in China is clearly reflected in the large curtailment



(loss) of wind and solar power that takes place to maintain system stability. Hence there is a need to have a more flexible power system.

The 'China Thermal Power Transition' program was initially presented to NEA in November 2015. As the program targets high priority areas in NEA's power market reforms they fully endorsed the program and stressed the need for fastest possible implementation.

The 'China Thermal Power Transition' program has contributed significantly to China's ability to integrate increasing shares of renewable energy and enable a low carbon future. The program's overall objective is to push the short and long term structural transformation of the thermal power sector through the development of thermal plant flexibility and power market conditions together with involving the thermal power sector proactively in the power market reforms.

## Strategic Sector Cooperation in Quality Offshore Wind Energy

In September 2017, administrator Nur Bekri from NEA met with the Danish Minister for Energy, Utilities and Climate, Lars Christian Lilleholt in Denmark where the two governments agreed to establish a Offshore Wind Cooperation ("Quality Offshore").

The Sino-Danish Offshore Wind Cooperation ("Quality Offshore") project has an initial

of 12 months duration (2018). The main objective of the Strategic Sector Cooperation (SSC) project is to assist Chinese government agencies and other relevant stakeholders in developing relevant strategies, policies and solutions to improve their roll-out of offshore wind energy and to achieve the government's long-term objectives for the technology. The project design puts focus on three parallel tracks:

- Regulatory track;
- Test and certification track;
- Best practice demonstration track.

In addition, it aims to create more transparent rules and processes around allocation of sites, subsidies, grid connections etc. This project will provide methodologies to manage processes and risks in a complex development cycle through policy exchange, policy practice awareness, analysis, and dissemination of Danish experiences, enabling China to establish state of the art, cost-efficient offshore wind.

The Danish Energy Agency's Centre for Global Cooperation supports emerging economies to combine sustainable future energy supplies with economic growth. The initiative is based on four decades of Danish experience with renewable energy and energy efficiency, transforming the energy sectors to deploy increasingly more low-carbon technologies.

Learn more on our website:

<https://ens.dk/en/our-responsibilities/global-cooperation>

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