



## Europe – China Eco-Cities Link Project



Europe-China Eco-Cities Link  
中欧低碳生态城市合作项目

# GREEN FINANCE GUIDELINE CLEAN ENERGY

**Clean energy:** The concept of clean energy encompasses action to radically increase the proportion of energy generated by low carbon/ renewable sources. This can be achieved in two ways – a) by actually changing the generation infrastructure to low carbon/ renewables and b) by reducing overall electricity use and taking fossil fuel stations offline. In China, method a) will be dominant. In this context, it is important that energy generation be understood not just the province of large-scale generating facilities. Smaller plants widely scattered geographically are also important – this form of generation is called “distributed energy” generation. For cities it will be important to make informed choices for decentralised “new energy” systems. Much of the eventual success of the new energy systems to be introduced will depend on the use of micro-grids which will supplement the existing systems of energy providers.

If cities implement a range of energy innovations, they can potentially transform their energy production and consumption and have considerable climate positive impacts. Such innovations include: a) fostering energy efficient industry and energy positive buildings – *these issues are dealt with in other ECLink Green Design Guidelines* – which will reduce energy demand (heating, cooling and electricity); and b) fostering diverse local and regional renewable energy generation sources as well as co-generation. Investment in smart grids is also necessary as it facilitates the use of such decentralized solutions. Micro grids, possibly including the use of electric vehicles as storage facilities, will also be important.<sup>1</sup>

**State of the art in clean energy for cities in China.** The publication of China’s Intended Nationally Determined Contributions (INDC)<sup>2</sup> not only announces the national targets for enhanced action on climate change for 2030 but also spells out policies and measures to implement them. Among these, the urban arena is explicitly mentioned several times as area for actions, most prominently in the section on regional policies and on controlling emissions from buildings and transportation. “The share of renewables in China’s energy mix was 13% in 2010, including an estimated 6% traditional use of biomass, and 7% modern renewables. Hydroelectricity (3.4%) and solar thermal (1.5%) accounted for most of China’s modern renewable energy use.”<sup>3</sup> “On combating climate change, China has plans for peaking carbon dioxide emissions by 2030. It also aims to increase its share of non-fossil sources in its primary energy consumption to 20% while reducing carbon intensity by 60 to 65% from 2005 levels.”<sup>4 5</sup>

China’s energy use has grown rapidly in recent years, and by 2030 it will increase by another 60%. In 2018, the total energy consumption was 4.64 billion tons of standard coal, an increase of 3.3% over the previous year. Coal consumption increased by 1.0%, crude oil consumption increased by 6.5%, natural gas consumption increased by 17.7%, and electricity consumption increased by 8.5%. Coal consumption accounted for 59.0% of total energy consumption, natural gas, hydropower, nuclear power, wind power and other clean energy consumption accounted for 22.1% of total energy consumption.<sup>6</sup> In a business as usual scenario, the country will not only be the world’s largest energy consumer by far, but also emit over twice the quantity of CO<sub>2</sub> of the next largest emitter as the coal

<sup>1</sup> EU. 2011. Cities of Tomorrow, EU Commission (DG REGIO). Brussels.

<sup>2</sup> Department of Climate Change, National Development and Reform Commission of China, Letter to the Executive Secretary of the UNFCCC Secretariat, Beijing 30 June 2015, Enhanced Actions on Climate Change – Intended Nationally Determined Contributions, unofficial translation.

<sup>3</sup> International Renewable Energy Agency (IRENA). 2014. Remap 2030. Renewable Energy Prospects: China. [http://www.irena.org/REmap/IRENA\\_REmap\\_China\\_report\\_2014.pdf](http://www.irena.org/REmap/IRENA_REmap_China_report_2014.pdf)

<sup>4</sup> Bapna, M. 2016. Golden opportunity to embrace green growth. *China Daily*. 17 March 2016. [http://www.chinadaily.com.cn/opinion/2016-03/16/content\\_23887655.htm](http://www.chinadaily.com.cn/opinion/2016-03/16/content_23887655.htm)

<sup>5</sup> Ma Tianjie. 2016. The changing narratives of China’s environmental story. *China Dialogue*. 30 December 2016. [https://chinadialogue.net/article/show/single/en/9526-2-16-The-changing-narratives-of-China-s-environmental-story?utm\\_source=Chinadialogue+Update&utm\\_campaign=ea9ab42586-A\\_B\\_TEST\\_dam\\_rhino&utm\\_medium=email&utm\\_term=0\\_5db8c84b96-ea9ab42586-46656705&mc\\_cid=ea9ab42586&mc\\_eid=5b102c48e6](https://chinadialogue.net/article/show/single/en/9526-2-16-The-changing-narratives-of-China-s-environmental-story?utm_source=Chinadialogue+Update&utm_campaign=ea9ab42586-A_B_TEST_dam_rhino&utm_medium=email&utm_term=0_5db8c84b96-ea9ab42586-46656705&mc_cid=ea9ab42586&mc_eid=5b102c48e6)

<sup>6</sup> Extracted and translated from National Bureau of Statistics of China: [http://www.stats.gov.cn/tjsj/zxfb/201902/t20190228\\_1651265.html](http://www.stats.gov.cn/tjsj/zxfb/201902/t20190228_1651265.html)





## Europe – China Eco-Cities Link Project



Europe-China Eco-Cities Link  
中欧低碳生态城市合作项目

consumption shares remains high. Without increased deployment of renewable energy, China's energy system will continue to result in high levels of air pollution, negatively affecting health, economic growth and the environment. Market measures to move the energy generation system to renewable energy are essential and should include pricing energy according to its climate impact and allowing/ encouraging the "wheeling" of renewable power across the grid. The latter is done in some provinces, but a nationally coordinated system is not in place.

**Policy Directions.** The Government's pronouncement of the 13<sup>th</sup> Five Year Plan objectives has stated several key objectives for the energy sector:

- Increased efficiency of energy resources development and utilization; effective control total aggregate of energy and water consumption, construction land, and carbon emissions. The total emissions of major pollutants shall be reduced significantly.
- Pilot projects will be introduced to promote comprehensive use of combined heat and power, the wide-spread adoption of energy saving regulations in government agencies, and of municipal green lighting and other urban energy saving projects.
- Technical specifications for the safety of heat supply will be introduced, as well as strengthened regulatory frameworks supporting urban energy savings, environmental protection and improved sanitation.
- Related service quality standards and evaluation methodologies will be optimized.
- Consumption-based billing for residential households will be promoted nationally, and all newly built residential buildings will need to be equipped with meters for heating, while existing buildings will be gradually retrofitted to reach 100% metered heat provision.
- Support reduced emission standards, and implement demonstration projects of "near-zero" carbon emission.
- Promote district-level combined heat and power (CHP), green lighting, energy conservation in government departments; improve heat production efficiency; newly built residential buildings must be equipped with individual measurement of household heating consumption, while that shall be gradually provided for existing residential buildings.<sup>7</sup>
- There should be 5-15% local renewable energy generation for residential areas and 2-5% for commercial areas.<sup>8</sup>
- Use smart lighting systems, and smart grid technologies which support higher energy performance targets.
- To a limited degree: utilization of clean coal. The average coal consumption for newly-built coal-fired power plants shall be reduced

<sup>7</sup> Extracted and translated from: [http://www.gov.cn/zhengce/2016-02/21/content\\_5044367.htm](http://www.gov.cn/zhengce/2016-02/21/content_5044367.htm)

<sup>8</sup> China Development Bank Capital (CBDC). 2015. *12 Green Guidelines. CDBC's Green and Smart Urban Development Guidelines*. Beijing (draft). <http://energyinnovation.org/wp-content/uploads/2015/12/12-Green-Guidelines.pdf>





## Europe – China Eco-Cities Link Project



Europe-China Eco-Cities Link  
中欧低碳生态城市合作项目

### Proposed Clean Energy Key Performance Indicators (KPIs) <sup>9</sup>

	Indicator Category	Indicators: indicative values	Current achievements / Time frame for accomplishment
1	Coal utilization rate of city [1]	___ % of total energy consumption	
2	Total residential energy input for heating and cooling within city boundaries. - Decentralised heat/cold generation (fossil energy sources, district heating and part electricity delivered to residential customers) - Delivery chain losses in district heating and electricity chain (distinguishing source of generation)	___ kWh/(m <sup>2</sup> a)  ___ kWh/(m <sup>2</sup> a)  ___ kWh/(m <sup>2</sup> a)	
3	Use of non-fossil energy [2] Renewable energy usage in buildings [3] Share of renewable-clean energy [4]	≥15% [2] ≥20% [3] ≥30% [5] ≥60% [6] ≥10% [4]	By 2020 [3] By 2030 [5]
4	Renewable energy generation: combined heat and power (CHP), waste to energy, and waste heat re-use [7]	5-15% local renewable energy generation for residential areas 2-5% for commercial areas [7]	By 2020 [7]
5	Emissions from district heating (based on renewable energy coefficient 0:8)	Reduced by 50% 105 kWh/(m <sup>2</sup> a) gross area	
6	Metered heating provision [8]	100% [8]	By 2020 [8]

#### Sources:

- [1] UN-Habitat and Tongji Urban Planning & Design Institute, Shanghai. 2014. Guiyang Green and Sustainable City Programme – Sustainable City Reviews. See also: Guiyang Municipality. 2015. Guiyang Eco-Civilization City Indicators System. Guiyang (unpublished report).
- [2] Qiu Baoxing. 2012. Combine idealism and pragmatism – a primary exploration of setting up and implementing low carbon eco city indicator system in China [in Chinese], China Construction Industry Publisher. Beijing
- [3] World Bank. 2009. *Sino-Singapore Tianjin Eco-City: A Case Study of an Emerging Eco-City in China*. Technical Assistance Report. Beijing. [www-wds.worldbank.org/.../PDF/590120WP0P114811REPORT0FINAL1EN1WEB.pdf](http://www-wds.worldbank.org/.../PDF/590120WP0P114811REPORT0FINAL1EN1WEB.pdf)
- [4] MoHURD. 2015 and 2016 versions. *Appraisal Standards for Green Eco-City/District Planning (draft)*. Beijing
- [5] Innovative Green Development Program (iGDP). 2015. *Low Carbon Cities in China: National Policies and City Action Factsheets*. [http://www.efchina.org/Attachments/Report/report-cemp-20151020/1\\_CityPolicyFactsheet\\_EN.pdf](http://www.efchina.org/Attachments/Report/report-cemp-20151020/1_CityPolicyFactsheet_EN.pdf)
- [6] SWECO. No date. Caofeidian - Detailed ecological indicators system [unpublished document]. [Unofficial Translation].
- [7] The Energy Foundation - China Sustainable Cities Program (ed.). 2011. *Design Manual for Low Carbon Development*. p .46. <http://www.chinastc.org/en/research/34>
- [8] State Council, Government of People's Republic of China. 2016. 13<sup>th</sup> Five Year Plan. Beijing.

<sup>9</sup> These key performance indicators were prepared and compiled by the EC-Link Project. See: EC-Link. 2016. *Sino-EU Key Performance Indicators for Eco-Cities*. Beijing (unpublished draft)



The Europe-China Eco Cities Link (EC-LINK) Project is a Technical Assistance project financed by the European Commission and operated by the Chinese Ministry of Housing and Urban Rural Development (MoHURD).



# Europe – China Eco-Cities Link Project



Europe-China Eco-Cities Link  
中欧低碳生态城市合作项目

## Recommendations for Action by Cities

**DO:** To develop a clean energy programme for your city, decide for the following policies and investments. The future sector agenda can be grouped by the following headers: (i) renewable energy; (ii) power supply system and market design; and (iii) technology focused policies.

### Clean Energy – Approaches and Investments

Area of Activity	Minimum requirements	Advanced approaches	High impact low carbon approaches
<b>Renewable energy policy</b>	<ul style="list-style-type: none"> <li>• Create a comprehensive city-level energy plan covering infrastructure needs for transmission and distribution of electricity, heat and gas;</li> <li>• Establish renewable energy targets for industries, buildings and transport.</li> <li>• Establish multi-sector coordination mechanisms. Strengthen the implementation of the plan and the organization and management of the use of new energy. Clarify the responsibilities and tasks of each department, divide the work and cooperate.</li> </ul>	<ul style="list-style-type: none"> <li>• Develop energy efficiency and decentralized energy pilot projects.</li> <li>• Evaluate the impact of various new energy technologies on energy security, health, land and water use.</li> <li>• Formulate supportive policies such as special funds conducive to the use of new energy, formulate investment policies conducive to the use of new energy and guide social capital investment</li> </ul>	<ul style="list-style-type: none"> <li>• Each city can set up its own renewable energy goals.</li> <li>• Develop pricing and taxation instruments, emission limits, and/or CO2 trading systems to counter the damage of CO2 emissions and air pollution from use of coal.</li> <li>• Cities should assist government in supervision and monitoring of pollution. (surrounding areas of the plants, underground water, air quality, landfills)</li> </ul>
<b>Power supply system and market design</b>	<ul style="list-style-type: none"> <li>• Provide economic incentives for operations in decentralized renewable energy (photovoltaics, wind energy, etc.), and bringing in new investors in new energy.</li> </ul>	<ul style="list-style-type: none"> <li>• Create the local power market.</li> <li>• Reform the grid to better integrate renewable energy (eg wheeling).</li> <li>• Develop “smart grids” based on decentralized new energy.</li> </ul>	<ul style="list-style-type: none"> <li>• Power street lighting through smart grids.</li> <li>• Enhance market access (eg feed in tariffs) and trade of renewables, especially decentralized renewables, and deal with variability and fluctuations in supply.</li> </ul>
<b>Technology focused policies</b>	<ul style="list-style-type: none"> <li>• Set up demonstration projects of renewable energy.</li> <li>• Use public buildings as showcases for energy efficiency and decentralized generation</li> </ul>	<ul style="list-style-type: none"> <li>• Stimulate regional (and national) government support for innovation, research and development to reduce renewable energy costs.</li> <li>• Foster next-generation renewable energy technologies.</li> </ul>	<ul style="list-style-type: none"> <li>• Enhance knowledge and data collection on biomass and the feedstock market (as alternative and supplementary energy sources).</li> <li>• Regulate for and implement carbon negative building designs</li> </ul>
<b>New Energy platform</b>	<ul style="list-style-type: none"> <li>• Establishing a new energy public information service</li> </ul>	<ul style="list-style-type: none"> <li>• Cultivate professional new energy service companies</li> </ul>	<ul style="list-style-type: none"> <li>• Strengthening the capacity building of new energy cities</li> </ul>





# Europe – China Eco-Cities Link Project



Europe-China Eco-Cities Link  
中欧低碳生态城市合作项目

<b>establishment</b>	platform- promote the co-construction and sharing of information resources, promote application of new energy technology and improve the level of new energy development and utilization		
<b>Examples</b>	<b>Photovoltaic building elements – Suntech Wuxi</b>  Source: Florian Steinberg		

**DON'T:** Further, as a mirror image of the above, don't undertake action which undermines green policies and investments.

<b>Area of Activity</b>	<b>Key Non-actions</b>	<b>Explanations</b>
<b>Renewable energy policy</b>	<ul style="list-style-type: none"> <li>• Stop Business as usual (BAU) approach of unplanned energy sector development.</li> <li>• Do not build more coal-powered or fossil fuel-powered energy plants.</li> <li>• <b>Do not abandon renewable energy infrastructure already built.</b></li> </ul>	<ul style="list-style-type: none"> <li>• A city's energy sector needs to have targets for its renewable energy market.</li> <li>• Coal power and fossil fuels needs to be phased out, and cities need to ensure that their energy consumption is sources from other sources than coal.</li> <li>• Promote the new energy market through green certificates and transaction systems, improve the energy pricing system, adjust the energy supply between busy hours and night hours, incentive subsidies to lower the electricity cost, cross-regional supply and consumption</li> </ul>
<b>Power supply system and market design</b>	<ul style="list-style-type: none"> <li>• Do not allow "silos" in energy generation, storage and network infrastructure to discourage innovation and investment in clean, decentralized energy</li> </ul>	<ul style="list-style-type: none"> <li>• Despite the trend that many renewables are becoming cheaper than fossil sources of energy, some</li> </ul>



The Europe-China Eco Cities Link (EC-LINK) Project is a Technical Assistance project financed by the European Commission and operated by the Chinese Ministry of Housing and Urban Rural Development (MoHURD).



# Europe – China Eco-Cities Link Project



Europe-China Eco-Cities Link  
中欧低碳生态城市合作项目

	<ul style="list-style-type: none"> <li>Do not ignore the positive role of economic incentives for the introduction of renewable energy.</li> </ul>	economic incentives will help to expedite introduction of renewables.
<b>Technology focused policies</b>	<ul style="list-style-type: none"> <li>Do not forget the importance of the public sector to lead by example.</li> <li>Do not overlook the potential of battery recycling.</li> </ul>	<ul style="list-style-type: none"> <li>Examples are always the most convincing arguments for innovations.</li> <li>Batteries can be treated as a source of renewable energy. It is estimated that replaced battery can reach 200,000 tons (approximate to 24.6GWh) in the year of 2020.</li> </ul>
<b>Example</b>	<p><b>Don't do this: Cities will be clean only if energy sources are clean</b></p>  <p>Source: Florian Steinberg</p>	

**Aspirations for China.** China is already leading in renewable energy production figures. It is currently the world's largest producer of wind and solar energy, and the largest domestic and outbound investor in renewable energy. As of early 2017, China owns five of the world's six largest solar-module manufacturing companies and the world's largest wind turbine manufacturer. This capacity provides opportunities for cities.

We can use Baoding as an example. The city has rapidly developed to be the first "carbon positive" city in the world, largely due to local efforts along with additional national and international support. Baoding has undergone a transformation from a traditionally dirty textile and automobile manufacturing city to a central hub for renewable energy production and deployment with over 200 producers of wind, photovoltaic and thermal mass solar, biomass and energy efficiency technologies, resulting in the creation of over 20,000 additional jobs. Partners include the World Wildlife Fund for Nature (WWF) and the Chinese national government. It took advantage of the national government designating it as a High-Tech Development Zone, securing low-interest loans from the national government to start its transition.

While all cities cannot develop industries focused on generating technologies there is great scope for green technology in all industries and potential to develop renewable energy that can power such industry.

