



E3G

# Low Carbon Zones

Case Studies of Potential Areas for  
Closer EU-China Cooperation

Matt Findlay, Taylor Dimsdale and  
Shin Wei Ng

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## About E3G

E3G is an independent, non-profit European organisation operating in the public interest to accelerate the global transition to sustainable development. E3G builds cross-sectoral coalitions to achieve carefully defined outcomes, chosen for their capacity to leverage change. E3G works closely with like-minded partners in government, politics, business, civil society, science, the media, public interest foundations and elsewhere.

More information is available at [www.e3g.org](http://www.e3g.org)

## Third Generation Environmentalism Ltd (E3G)

4th floor, In Tuition House  
210 Borough High Street  
London SE1 1JX

Tel: +44 (0)20 7234 9880

Fax: +44 (0)20 7234 0851

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# Low Carbon Zones: Case Studies of Potential Areas for Closer EU-China Cooperation

## Background

The concept of Low Carbon Zones (LCZs) emerged from joint work by European and Chinese research institutes summarised in a report published in November 2007: “*Changing Climates: Interdependencies on Energy and Climate Security for China and Europe*”<sup>1</sup>. This EU-China research consortium launched a project in mid-2008 under the rolling work programme of the EU-China Climate Change Partnership to establish a methodological approach for LCZs and to pilot it in Jilin Province in North-East China.<sup>2</sup> Chatham House and E3G have used the initial research findings and the results of extensive discussions in China to further elaborate the LCZs proposal in a concept paper published in October 2008.

**This note responds to requests by European governments and companies for some concrete examples of how LCZs would add value to existing EU-China cooperation, and of the practical mechanisms that could be used to channel EU support for LCZs.**

## Context

China is a vast country with a highly diverse economy and will need a range of low carbon development models. Many Chinese provinces and cities are pursuing low carbon initiatives including through partnerships with Europe. LCZs would provide a practical framework to scale up these initiatives. Their focus would vary from one region of China to another. In richer coastal

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<sup>1</sup> See <http://www.eu-china-energy-climate.net/> for copies of report, background research papers and details of partner institutions.

<sup>2</sup> The research project was launched in mid-2008 following approval by China’s National Development and Reform Commission. Project partners include the Chinese Academy of Social Sciences, Chinese Energy Research Institute, Royal Institute of International Affairs (Chatham House) and E3G.

provinces there might be a strong emphasis on reducing emissions from buildings and transport, driving construction of low carbon infrastructure and stimulating export-oriented industries in low carbon sectors. In poorer Western regions they could help attract investment in smart grids and distributed power generation, and help develop planning methods and technologies to support adaptation. In the central industrial belt they could have a focus on clean coal technology, energy efficiency in sectors such as cement and steel, and developing advanced low carbon products for the construction industry.

This note provides initial illustrative examples of how LCZs could add value to existing Chinese initiatives to move to a low carbon economy, and specifically add value to existing EU-China cooperation. They all show the potentially unique contribution of LCZs compared to project or sectoral approaches in delivering integrated packages of support across sectors and combining regulation, finance, technology and market creation. The examples are intended to promote discussion not be blueprints. They draw on innovative models from different parts of China and Europe but do not claim to be a comprehensive reflection of existing initiatives. The real value of an LCZ would lie in bringing together the full range of activity – state-of-the-art planning, low carbon buildings, innovation clusters etc -- in one geographical region to act as a showcase for low carbon development.

The examples cover six areas:

1. Low Carbon Development Plans
2. Low Carbon Buildings
3. Low Carbon Transportation Systems
4. Low Carbon Power
5. Low Carbon Finance
6. Low Carbon Strategies for Energy Intensive Industry

# 1. Low Carbon Development Plans

## Role of Low Carbon Zones

The transformation to a low carbon economy requires clear policy direction so public and private actors can make appropriate investments and initiate innovation in technologies, regulatory structures, institutions and business models. Experience from the EU shows that developing appropriate and practical low carbon development plans to guide existing institutions is a complex and iterative task, and must be tailored closely to local political, economic and administrative structures. There is no off-the-shelf model which can be applied even across Europe. To capture the full range of opportunities, synergies and efficiencies, plans must be economy-wide, rather than focused on discrete sub-sectors such as transport, power or industry. LCZs would provide the appropriate scale and scope of action to develop low carbon development plans appropriate to different areas of China; the lessons of which could be applied elsewhere both in China and globally.

## Existing Initiatives

All of China's provinces have local Five-Year Plans (2006-2010) setting out how they will achieve their energy efficiency targets and other environmental goals. In addition some provinces and cities have gone further, developing more ambitious plans and new mechanisms to achieve them. For example, Beijing has adopted "EU IV" vehicle fuel efficiency standards ahead of other parts of China. Beijing and Shanghai recently opened Environment Exchanges to facilitate trading of pollution permits and energy saving targets.<sup>3</sup>

In Guangdong Province, a pilot emissions trading scheme between Zhuhai City and Hong Kong was set up in 2006.<sup>4</sup> The aim is to enable power companies from these two regions to identify trading partners and to draw up emissions trading agreements.

## Potential for EU-China Cooperation

The EU has a long history of engagement with issues of climate change and sustainability and has developed a large network of institutions devoted to addressing these subjects, both within and outside of government. The EU has

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<sup>3</sup> <http://www.cbeex.com.cn/>

<sup>4</sup> <http://www.planetark.com/dailynewsstory.cfm/newsid/37495/story.htm>

also accumulated valuable legal, regulatory and research experience that can be of use to China as it develops its own institutions and regulatory frameworks in the environmental sector.

In the UK, the Carbon Trust <http://www.carbontrust.co.uk/default.ct>, through its Low Carbon Cities Programme, has built leadership coalitions in Manchester, Leeds and Bristol. The coalitions are made up of key public sector bodies (local government, health service, universities) and other major sources of emissions such as housing associations and businesses. Coalition members agree shared carbon saving goals and work together to implement them. The approach is similar to that of the Climate Leadership Program's C40 Initiative – which now includes Beijing and Shanghai.<sup>5</sup>

The Carbon Trust also has extensive experience of advising business on low cost ways of improving energy efficiency and developing financing vehicles to support this for small and medium-sized enterprises. It is building a partnership with the China Energy Conservation Investment Corporation.

The UK has just established a statutory independent Climate Committee which assesses progress on climate targets and gives advice on critical policy issues (e.g. power sector investment plans) relevant to putting the UK on a trajectory to reducing emissions 80% below 1990 levels by 2050. The experience, modelling and analysis methods developed by the UK Climate Committee could be a useful basis for developing low carbon development plans in China.

## 2. Low Carbon Buildings

### Role of Low Carbon Zones

Between now and 2020 the amount of new building constructed in China is expected to exceed the entire existing building stock of the EU-15. China's national building standards include a requirement to reduce the amount of energy used for heating by 50% – or by as much as 65% in cities such as Beijing and Tianjin.

Looking forward, the introduction of zero carbon – or even positive energy - buildings in China would provide real benefits for energy efficiency and energy security, and would be most cost-effective if pursued during the period of new

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<sup>5</sup> <http://www.c40cities.org/>

construction rather than through subsequent retrofitting. To achieve this China would need to develop new approaches to building design and innovative supply chains for low carbon buildings. These will need to drive low carbon construction in a Chinese context and simplify the governance problems associated with applying building standards.

LCZs provide the ideal administrative level for both driving markets for very low carbon buildings, and undertaking the research and development, regulatory design and other policy innovation needed to make this a reality.

### Existing Initiatives

In January 2008 an EU-China Conference on Standards and Energy Efficiency in Buildings in Beijing<sup>6</sup> brought together more than 350 European and Chinese representatives from government institutions, standards organisations, industry associations and construction-related businesses.

French cooperation with China includes a partnership with the Hubei Provincial Construction Commission to develop energy efficiency policies that can be implemented first for buildings in the provincial capital, Wuhan, then across the whole province. The project focuses on all aspects of thermal retrofitting, including technical (materials, equipment), economic, social and environmental, and financial.<sup>7</sup>

The Energy Efficiency in Existing Buildings (EEEB) project between Germany's GTZ and the Ministry of Construction (MOC) in China runs from November 2005 to October 2010. In 2006 the project retrofitted three residential buildings in the city of Tangshan (Hebei Province), decreasing street noise and dust penetration and saving roughly 40% of heat energy. The Tangshan Buildings Energy Efficiency office has since presented a proposal to the municipal government for wide-scale retro-fitting.<sup>8</sup>

### Potential for EU-China Cooperation

In Europe, buildings account for 40% of total energy consumption. The EU's Energy Performance Buildings Directive (EPBD) adopted in 2006 sets out a common approach for calculating the energy performance of buildings and setting performance standards. European countries have very ambitious targets going beyond EU levels. The UK has a target for all new housing to be zero-

<sup>6</sup> [http://www.euchinawto.org/index.php?option=com\\_content&task=view&id=187&Itemid=41&lang=eue](http://www.euchinawto.org/index.php?option=com_content&task=view&id=187&Itemid=41&lang=eue)

<sup>7</sup> AFD's Economic Newsletter No. 17. January 2008.

<sup>8</sup> <http://www.gtz.de/en/weltweit/asien-pazifik/china/18068.htm>



carbon from 2016; France has plans for positive energy housing to be standard from 2018. There is huge scope for further cooperation with China both in setting standards and in ensuring effective implementation.

Many European companies are carrying out joint R&D on sustainable construction in China. Saint-Gobain has set up an international research centre in Shanghai specialising in high-performance building materials. Henkel, a German insulation manufacturer, has set up R&D centres in China. BedZed – the leading zero carbon housing supplier in the UK has moved manufacturing of patented components to China for export to the EU, but with open licensing for their manufacture for use in the Chinese market. The EU is a world leader in advanced Combined Heat and Power systems – especially in Denmark – which are a vital part of low carbon urban infrastructure and currently underused in China.

Public and private sector initiatives of this kind could be scaled up in a Low Carbon Zone, with a strong focus on effective enforcement of standards and a progressive shift from low carbon housing to zero carbon housing and buildings. EU expertise and support could be provided through:

- > The European Commission's Framework Programme 7 (FP7) research budget, which will be supporting a potential Joint Technology Initiative on Energy Efficient Buildings (E2B JTI)<sup>9</sup>.
- > The European Commission's "Lead Market Initiative", which includes a specific focus on promoting Sustainable Construction, for example through smart regulation and public procurement policies.<sup>10</sup>
- > Public/private partnerships and joint ventures in sustainable construction focusing on supply chains for low carbon buildings.

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<sup>9</sup> <http://www.e2b-jti.eu/default.php>

<sup>10</sup> <http://ec.europa.eu/enterprise/leadmarket/leadmarket.htm>

### 3. Low Carbon Transportation Systems

#### Role of Low Carbon Zones

China's transport energy use is currently less than 20% of the EU, but is rising fast as car ownership takes off and people migrate from the countryside to the cities. By 2025, China will have 219 cities with more than 1 million inhabitants – compared with 35 in Europe today – and 24 cities with more than five million people.<sup>11</sup> Sustainable urban planning is therefore vital.

Building on existing initiatives for Eco-cities, Low Carbon Zones would give the opportunity to deal with regional-level issues of inter-urban transport, industrial planning and patterns of broader economic development as well as providing a larger market for purchasing low carbon vehicles and fuelling systems, and building an associated manufacturing base and technology development capability.

#### Existing Initiatives

Many Chinese cities have commissioned studies into greener transportation systems. Examples include:

- > **Tianjin:** A comprehensive plan with detailed indicators, emphasising “slow traffic” in the city centre (pedestrian walkways, bicycle lanes, public bicycle rental) and investment in public transport (railway, trams system, water bus system).
- > **Shanghai Sustainable Transport Partnership**<sup>12</sup> -- involving Shanghai Municipality, EMBARQ (World Resources Institute Center for Transport and the Environment) and Shell Foundation. This aims to create a public-private partnership to develop an integrated transportation system for Shanghai, including initial work on developing a Bus Rapid Transit (BRT) system.

Examples of bilateral collaboration include:

- > Mega Region Transport Systems for China project, or Metrasys, a partnership between Germany and the Jiading district of Shanghai involving several German and Chinese companies. The project aims to develop

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<sup>11</sup> [http://www.mckinsey.com/mgi/publications/china\\_urban\\_summary\\_of\\_findings.asp](http://www.mckinsey.com/mgi/publications/china_urban_summary_of_findings.asp)

<sup>12</sup> <http://embarq.wri.org/en/ProjectCitiesDetail.aspx?id=4>

sustainable mobility concepts for urban mega-regions and to demonstrate promising models in Jiading as a case study.<sup>13</sup>

- > MoU between Chinese Ministry of Science and Technology and the Netherlands Ministry of Transport on the development and application of Intelligent Transport Systems (ITS). The project ran from 2001 to 2007 and involved train-the-trainer seminars for Chinese experts in improved transportation systems.<sup>14</sup>

European car makers have extensive joint ventures in China and are at the forefront of transferring efficient and clean technologies into these markets. These supply chain links give large opportunities for accelerating the development and deployment of new vehicle technologies in China.

### Potential for EU-China Cooperation

Europe has extensive experience in sustainable urban transport planning and a wide range of initiatives designed to share best practice between Member States.<sup>15</sup> Sustainable Urban Transport Plans (SUTP) are in place, or under development, in several countries.<sup>16</sup>

The EU's CIVITAS Initiative<sup>17</sup> aims to help cities to achieve a more sustainable, clean and energy efficient urban transport system through an ambitious, integrated set of technology and policy based measures. 36 European cities have participated in the Initiative since it was launched in 2002.

Europe also leads the world in targets for increasing passenger vehicle efficiency, strategic rail investment and addressing maritime emissions.

Through EU-China cooperation, structures similar to Civitas could be developed to support the development of sustainable urban transportation systems across the different cities and towns inside an LCZ. European experience in advanced mass transit systems and advanced freight logistics, including high speed rail, could be deployed more extensively in LCZs with the aim of minimising expenditure on road infrastructure from the outset.

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<sup>13</sup> [http://www.metrasys.de/index\\_en.html](http://www.metrasys.de/index_en.html)

<sup>14</sup> <http://www.narcis.info/research/RecordID/OND1318848/Language/en/?jsessionid=es704xxc455>

<sup>15</sup> For example: <http://www.eltis.org/> or <http://www.smile-europe.org/>

<sup>16</sup> [http://ec.europa.eu/environment/urban/urban\\_transport.htm](http://ec.europa.eu/environment/urban/urban_transport.htm)

<sup>17</sup> <http://www.civitas-initiative.org/main.phtml?lan=en>

More ambitiously LCZs could harmonise CO<sub>2</sub> emission standards for vehicles registered in their areas with the new EU directive currently under negotiation, and work with EU car makers to develop supply chains among local firms and provide further economies of scale between the EU and Chinese markets.

Joint R&D could be taken forward around advanced vehicle technologies such as plug-in hybrids and fuel cells – including common approaches to developing niche urban markets and fuelling systems in major urban centres to give economies of scale in demonstration programmes. This could be eligible for support under the EU's Framework Programme 7 (FP7) Research & Development budget.

Technology and market creation opportunities also exist in the areas of advanced biofuels, where the EU and China both have ambitious targets and strong innovation capabilities in biotechnology and industrial processes.

## 4. Low Carbon Power

### Role of Low Carbon Zones

China is investing heavily in renewable energy both for domestic use and for export, and has an ambitious domestic target of 15% of electricity generated from renewable sources by 2020. Over 75% of the world's solar water heaters are produced in China; 16% are produced in Dezhou city in Shandong province. Shandong's provincial authorities have supported the growth of the solar sector through support for R&D, low interest loans and tax incentives.

As with other countries, China faces supply chain constraints on building wind turbines and is facing equipment inflation in the sector. China is interested in climbing the learning curve on other renewable technologies, from off-shore wind to concentrated solar thermal – including through joint R&D with European partners.

Low Carbon Zones would provide the ideal environment to accelerate high technology investment in China and build strong research and development cooperation. Measures to reduce concerns around protection of intellectual property would encourage transfer of more advanced technologies from EU companies, and promote engagement of medium-sized European technology companies in the Chinese market.

LCZs would also be at sufficient scale to enable the implementation of advanced distributed power systems (smart grids) with real-time demand management and a high penetration of intermittent renewables (wind, solar, wave). Grids of this type would require a coordinated shift in infrastructure investment, regulation and incentives on both the demand and supply side, all of which are best managed at the LCZ level.

### Existing Initiatives

Several new renewable energy initiatives have recently been established between the EU and China, and many European companies are well represented in China through joint ventures. For example, Spain (Institute of Electric Engineering and Inceisa S.A.) and China's Ministry of Science and Technology set up a China-Spain Joint Centre for Solar Thermal Power Generation (CCASA) in 2008.<sup>18</sup> China's Zhengtai Enterprise (China) has also recently invested €120 million in Spain to build Europe's largest solar power plant.<sup>19</sup> Spanish company Solarig has also signed an R&D agreement with the China Electronics Technology Group Corporation (CETC) on the development of the solar energy industry in China and will invest €10 million in Hunan Province to build a solar power battery production line.<sup>20</sup>

Denmark's public and private sectors have been active in the Chinese market for wind power. In 2006 the government granted €6 million to China for aid in the development of wind power in the northeast.<sup>21</sup> Denmark's Risø DTU National Laboratory for Sustainable Energy is collaborating with the Centre for Bamboo and Rattan in China to develop blades made of bamboo for small and medium-sized wind turbines. Risø DTU is responsible for testing and certification while the Chinese centre is developing the necessary technology.<sup>22</sup> In the private sector, Vestas has been supplying wind turbines to China since 1986.<sup>23</sup>

The EU and China have also agreed to collaborate on demonstrating clean coal technology, including a large-scale carbon capture and storage power plant.

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<sup>18</sup><http://www.mfa.gov.cn/ce/cero/rom/kjwh/t467276.htm>,  
<http://www.iee.ac.cn/Website/index.php?ChannelID=16&NewsID=4611>

<sup>19</sup> [http://www.in-en.com/capital/html/energy\\_1132113256145108.html](http://www.in-en.com/capital/html/energy_1132113256145108.html)

<sup>20</sup> [http://www.in-en.com/capital/html/energy\\_1610161035143234.html](http://www.in-en.com/capital/html/energy_1610161035143234.html)

<sup>21</sup> [http://www.gov.cn/misc/2006-06/09/content\\_305139.htm](http://www.gov.cn/misc/2006-06/09/content_305139.htm)

<sup>22</sup> <http://www.denmark.dk/en/servicemenu/News/Environment-Energy-Climate-News/ChinaAndDenmarkInBambooWindTurbineBladeCollaboration.htm>

<sup>23</sup> [http://www.chinadaily.net/bizchina/2007-12/10/content\\_6309294.htm](http://www.chinadaily.net/bizchina/2007-12/10/content_6309294.htm)

### Potential for EU-China Cooperation

As part of its Strategic Energy Technology Plan the European Commission is sponsoring a number of public-private partnerships including a “Solar Europe Initiative”.<sup>24</sup> There is also funding available for research from the European Commission – including for joint R&D between European and Chinese partners.

There is strong potential for deeper collaboration in less mature areas such as solar thermal power and distributed grids, where co-development of technologies and markets could increase incentives for private sector investment and reduce public sector risks in developing the technology. For example, an LCZ could partner with a European region or country to develop in both China and Europe large-scale smart grid systems containing high percentages of solar power. This would increase joint learning and technology co-development. European carbon finance could be used to support Chinese infrastructure investment.

An LCZ would also be the ideal site for possible EU-China cooperation on the development of a significant “CCS hub” in a specific region of China. This could involve a major CCS demonstration plant (300MW or above) – potentially part of the planned European CCS demonstration programme. It would include sufficient transport and storage infrastructure to allow a number of CCS applications to be developed, including different power capture technologies and industrial applications such as cement, steel and refineries. The scope of EU-China cooperation could be expanded to include technology collaboration on CCS in industrial applications (involving the existing EU Technology Platforms in these areas), enhanced R&D cooperation through Framework Programme 7 and an expansion of current EU-China work on improving efficiency along the coal supply chain.

Such a project would provide the basis for a comprehensive exploration of CCS technologies and applications in China, and allow the development of business models covering large-scale infrastructure and storage. The broader framework for cooperation would give greater opportunities for EU-China cooperation around a single strategic programme, increasing efficiency and giving greater access to EU expertise and financing programmes.

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<sup>24</sup> [http://www.eupvplatform.org/uploads/media/Press\\_release\\_PV\\_Pltaform\\_GA\\_-\\_6\\_June\\_2008.pdf](http://www.eupvplatform.org/uploads/media/Press_release_PV_Pltaform_GA_-_6_June_2008.pdf)

Cooperation in these areas could be supported by an EU-China MoU on intellectual property rights - similar to the one China already has with Japan, which provides for government-to-government resolution of disputes. This could either be agreed at national level or initially developed and trialled in LCZs.

## 5. Low Carbon Finance

### Role of Low Carbon Zones

There is a range of financing mechanisms available to drive low carbon development in China, from the carbon market (e.g. Clean Development Mechanism, voluntary offsets) to concessional loans and grants (e.g. World Bank funds, Global Environment Facility, European Investment Bank facilities, bilateral assistance). Successful conclusion of the global post-2012 climate agreement should result in a dramatic up-scaling of these mechanisms, and the creation of new multilateral funding facilities for both mitigation and adaptation.

The main constraint on the use of public, private and blended low carbon financing has been the availability of high quality programmes and projects to support. As low carbon finance scales up this problem will become even more acute.

LCZs provide an ideal environment to deploy low carbon finance for three reasons. Firstly, the underlying low carbon development strategies in each zone will result in high priority and large scale opportunities for funding. Secondly, the active engagement of regional authorities should facilitate the swift generation and approval of projects in areas such as housing and transport which require coordination between multiples agencies and have traditionally been hard to finance. Thirdly, supportive conditions for effective financing can be created at the zone level in terms of a clear regulatory environment, monitoring, and capacity building in local financial service providers.

### Existing Initiatives

China is the second largest recipient of sustainable energy investment after Germany with approximately US\$12 billion invested in 2007.<sup>25</sup> China's current Five-Year Plan reaffirms sustainable development as a strategic priority focus, with €140 billion in investment projected for the 2006-2010 period.

China is the leading beneficiary from the CDM. Projects in China are projected to reduce 900 million metric tons of CO<sub>2</sub> emissions by 2010, for a total value of over US\$10 billion.<sup>26</sup> In 2007 China accounted for 73% of global emissions reduction through the CDM. EU countries that are actively involved in CDM projects in China include Denmark, Sweden, France, Germany, the UK, Netherlands and Italy.

The International Finance Corporation (the private sector lending arm of the World Bank) and China Industrial Bank jointly launched the China Utility-based Energy Efficiency Finance Program (CHUEE) in 2006. The first phase of CHUEE involved creation of a fund worth US\$25 million enabling energy efficiency loans worth over US\$126 million. In the second phase the volume of lending is expected to reach around US\$220 million.<sup>27</sup> The World Bank's Climate Investment Funds (Clean Technology Fund and Strategic Climate Fund) are an important new source of interim funding pending decisions on the post-2012 multilateral financing framework.<sup>28</sup>

The European Investment Bank's Asia Facility has created the China Climate Change Framework Loan (CCCFL) and has allocated €500 million to support climate change in China.<sup>29</sup> The EU is setting up a Global Energy Efficiency and Renewable Energy Fund (GEEREF) to mobilise private investment in developing countries such as China. Initial contributions to GEEREF from the European Commission and others, worth around €100 million, are expected to leverage between €300 million and €1 billion in risk capital. This will be targeted to support small investments, below €10 million, usually ignored by commercial investors and international financial institutions.

<sup>25</sup> The Climate Group, "China's Clean Revolution", July 2008

<sup>26</sup> Ibid.

<sup>27</sup> Ibid.

<sup>28</sup> On September 26 2008 donors announced pledges amounting to over US\$6.1 billion. <http://web.worldbank.org/WBSITE/EXTERNAL/TOPICS/ENVIRONMENT/EXTCC/0,,contentMDK:21713769~menuPK:4860081~pagePK:210058~piPK:210062~theSitePK:407864,00.html>

<sup>29</sup> <http://www.eib.org/projects/press/2007/2007-123-eur-500-million-to-support-climate-change-mitigation-in-china.htm>



The EU's Framework Programme 6 for Research and Development (FP6, 2003-2007) provided €1.2 billion for joint research between China and Europe.<sup>30</sup> FP7 (2007-2013) earmarks €1.9 billion for the environment (including climate change) and €2.35 billion for energy – both budget lines are open to non-EU members including China.

The German Development Loan Corporation (KfW Bankengruppe) has signed a contract for approximately 1.4 million Certified Emission Reductions (CERs) from three hydropower projects in China. In 2007 KfW entered into an Emission Reduction Purchase Agreement (ERPA) with 11 wind farms associated with the China Power Investment Group.<sup>31</sup>

### Potential for EU-China Cooperation

Creating an ambitious low carbon strategy and clear regulatory environment in LCZs will on its own attract financing from existing vehicles such as the World Bank and European Investment Bank.

There is also scope for constructing special purpose financial vehicles around the zones, aiming to leverage private capital into low carbon investment. CalPERS (the Californian State Pension Fund) uses a portion of “patient capital” invested for long term, relatively low returns (e.g. 5-7%) to attract commercial capital and venture capital into low carbon investments<sup>32</sup>. GEEREF follows a similar model and instruments of this kind have been deployed on a small scale in China by the German Development Loan Corporation (KfW). A consortium of European public funders could be brought together to lay down the initial financing for a larger instrument specifically geared towards LCZs.

Building a substantial bespoke financing vehicle around the LCZs, linked to work on the enabling investment environment, would accelerate the pace of cooperation in the zone, provide opportunities for Chinese and foreign firms to increase their investments, and give the EU a capital stake in the success of LCZs.

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<sup>30</sup> Dr Ph. Vialette, DG Research, European Commission, Strengthening EU-China S&T Cooperation, 2008

<sup>31</sup> [http://www.kfw-foerderbank.de/EN/Home/Carbon\\_Fund/Archive/index.jsp](http://www.kfw-foerderbank.de/EN/Home/Carbon_Fund/Archive/index.jsp)

<sup>32</sup> <http://www.calpers.ca.gov/index.jsp?bc=/investments/environ-invest/home.xml>

## 6. Low Carbon Strategies for Energy Intensive Industry

### Role of Low Carbon Zones

China's economy is highly energy-intensive. It is the world's largest producer of both steel and cement, which is overwhelmingly used to supply domestic demand, and the second largest producer of chemicals<sup>33</sup>. The cement industry alone discharges 1.1 billion tonnes of CO<sub>2</sub> a year, 26 times as much as Norway's total CO<sub>2</sub> emissions. There is significant scope for efficiency improvements of around 15-20% in each of these industries by using best available technologies and removing outdated facilities.<sup>34</sup>

Europe is a world leader in reducing the energy demand and carbon footprint of its heavy industry, especially in the steel sector; China has advanced energy efficient technology of its own in the cement and aluminium sectors. EU-China initiatives to develop and diffuse advanced technologies could have significant benefits for both sides.

Action in LCZs could focus on RD&D collaboration in new low carbon industrial production techniques, including carbon capture and storage for industrial sectors. LCZs could also use regulation and advanced design techniques to create new markets for substitutes for high carbon products, such as reclaimed materials, timber composites, and high specification steel as an alternative to cement. This could be linked to work in the buildings sector described above.

### Existing Initiatives

In 2006 China launched the "Top 1000 Enterprises Programme" to improve energy efficiency – particularly in sectors such as iron, steel, cement and chemicals. Some provinces have introduced additional measures – for example Guangdong's "Double 1000 Enterprises Programme".

Under the EU-China Shanxi Region Partnership Project, launched in August 2007, Taiyuan Municipal Economic Commission is working with UNIDO's Investment and Technology Promotion Office to attract companies with expertise in less energy and carbon intensive production techniques. This

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<sup>33</sup> In steel China is accounts for 37% of world production of which 6% exported. In cement China accounts for 50% of global production of which 1 % is exported.

<sup>34</sup> Liu & Diamond, "China's environment in a globalizing world", *Nature*. Vol435(5), 2005

project involves the participation of 6 European business promotion organisations, 60 European companies and 140 Chinese companies. Taiyuan Stainless Steel Industrial Zone is China's largest steel production location.

In 2002 a US\$ 180 million Chinese-German joint venture was initiated in the north-eastern port city of Dalian (Liaoning Province) focusing on galvanized steel sheet production. This involves ANSC-TKS Galvanizing Co. Ltd. (TAGAL), a company funded by ANSC, one of China's leading steel companies, and German steel company Thyssenkrupp Sahl AG. More recently Siemens Metals Technology received a contract from the Chinese steel producer Maanshan Iron and Steel Company to install the first Meros (Maximized Emission Reduction of Sintering) plant outside Europe, in Maanshan (Anhui Province).<sup>35</sup>

There are many examples of private sector partnerships between European and Chinese companies in the chemicals industry. BASF has invested heavily in China; in 2005 it opened the Integrated Petrochemical Site in Nanjing, a \$2.9 billion joint venture with China Petroleum and Chemical Company. BASF is increasingly conducting R&D in China – opening several new laboratories in Shanghai in 2007.<sup>36</sup> Royal Dutch Shell recently completed a \$4.3 billion petrochemical complex in Daya Bay, Guangdong, through a 50-50 joint venture with CNOOC Petrochemicals Investment Limited – the largest joint venture capital investment in China to date.<sup>37</sup> Lafarge, the world's biggest cement producer, is working with Chinese partners to improve the efficiency of its plants.

The European Commission (DG Enterprise) is supporting a collaborative initiative between Chinese and European partners on increasing energy efficiency and sustainability in nine energy intensive industries – including iron and steel, chemicals, buildings, non ferrous metals, and textiles. The project will use Chinese and international data and a process of consultation to establish benchmarking tools for companies in these industries.<sup>38</sup>

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<sup>35</sup> [http://www.innovations-report.de/html/berichte/umwelt\\_naturschutz/bericht-111905.html](http://www.innovations-report.de/html/berichte/umwelt_naturschutz/bericht-111905.html)

<sup>36</sup> [http://www.greater-china.basf.com/apw/AP/GChina/en\\_GB/portal/show-content/content/abo/chi/StandardDocument](http://www.greater-china.basf.com/apw/AP/GChina/en_GB/portal/show-content/content/abo/chi/StandardDocument)

<sup>37</sup> [http://www.shell.com/home/content2/china-en/about\\_shell/what\\_we\\_do/chemicals\\_12282001\\_1600.html](http://www.shell.com/home/content2/china-en/about_shell/what_we_do/chemicals_12282001_1600.html)

<sup>38</sup> <http://www.ccchina.gov.cn/cn/NewssInfo.asp?NewsID=14583>

### Potential for EU-China Cooperation

The European Steel Technology Platform (ESTEP), launched in 2004, has established a Strategic Research Agenda including the ULCOS Project – “Ultra–Low Carbon Dioxide (CO<sub>2</sub>) Steelmaking”. The project involves a consortium of 48 European companies and organisations from 15 European countries. Phase 1 (2004-2010) is focusing on research and pilot activities. Phase 2 (2010-2015) is due to focus on demonstration. This could provide a basis for joint projects with Chinese steel producers, either as part of ULCOS Phase 2 or through a separate initiative – with possible funding from either Framework Programme 7 or the €60 million/year Research Fund for Coal and Steel (RFCS).

Similar cooperative platforms exist in the cement sector. A major EU project led by SINTEF (The Foundation for Scientific and Industrial Research) could lead to significant cuts in CO<sub>2</sub> emissions in China's cement industry using both waste co-firing and CO<sub>2</sub> capture and storage.

An LCZ in a province such as Shanxi could become a focal point for cooperation between Europe and China on ultra efficient steel and cement production. Taiyuan Iron & Steel Company (TISCO) already has some links with partners in Germany. Linking this to a wider zone-level initiative would present opportunities for improving efficiency along the entire supply chain and using government regulation to boost demand for ultra efficient steel.