



KATHOLIEKE UNIVERSITEIT
LEUVEN



Leuven Centre
for Global
Governance Studies

WORKING PAPER No. 66 - JUNE 2011

Making the Transition: EU-China Cooperation on Renewable Energy and Carbon Capture and Storage

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MAKING THE TRANSITION: EU-CHINA COOPERATION ON RENEWABLE ENERGY AND CARBON CAPTURE AND STORAGE

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ABSTRACT

In 2010, relations between the European Union (EU) and China reached their 35-year anniversary. Although initially centred primarily on economic cooperation, China's rapid industrialisation meant that over time this development placed increasing pressure on the environment. Keen to sustain this economic growth and ensure the availability of sufficient energy sources to that effect, China's progress in the field of renewable energy in recent years is as much about security of supply, as it is about counteracting the effects of environmental degradation and climate change.

In its efforts to safeguard its economic growth, China is increasingly competing with Europe over scarce fossil fuel sources, such as natural gas from Central Asia. The focus of EU-China energy cooperation is therefore structured in relation to managing the latter's energy demand to limit its impact on climate change and the environment, as well as in terms of relieving pressure on the Union's own security of supply.

Particularly since the second half of the 2000s, much has changed in China after the adoption of the Renewable Energy Law (REL or 'the Law') and the establishment of the EU-China Partnership on Climate Change at the 2005 EU-China summit. Departing from a brief chronological analysis that dates from the early 1990s until today, this Working Paper zooms in on two particular areas: (i) EU-China cooperation on Carbon Capture and Storage (CCS) technologies; and (ii) the development of the Chinese renewable energy market. The paper concludes with a number of recommendations on specific challenges identified within these two sectors of cooperation.

KEY WORDS

Renewable Energy, Energy Efficiency, Energy Security, EU-China Relations, Carbon Capture and Storage (CCS).

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INTRODUCTION*

The year 2010 was a special year for the European Union ('EU' or 'Union') and China as it marked the 35th anniversary¹ of the establishment of bilateral relations back in 1975. One of the first milestones was the signing of the Agreement on trade and economic cooperation in 1985.² In fact, most of the early dialogue between the Union and China was focused on the establishment and development of trade relations. It was not until the mid 1990s, after the 1987 Brundtlandt report³ and the 1992 UN Conference on Environment and Development⁴ had placed sustainable development at the forefront of the political agenda⁵, that an EU-China environment dialogue was launched.

Around the same time, the European Commission had intensified its efforts for the reintegration and reorientation of Europe's own energy policy following decades of Member State individual action. One of the first times that this was openly and comprehensively addressed was through the launch of the European Commission's Green and White Papers on a European Energy Policy of 1995.⁶ The documents introduced the tripartite structure of ensuring (i) the competitiveness of the European economy; (ii) the security of its energy supplies; and (iii) the protection of the

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¹ José Manuel Durão Barroso, 'Peoples of yesterday, peoples of tomorrow: 35 years of EU/China relations'. Speech given at Tsinghua University Beijing, 30 April 2010. Available at: <http://europa.eu/rapid/pressReleasesAction.do?reference=SPEECH/10/199&format=HTML&aged=0&language=EN&guiLanguage=en>. Accessed on 29 October 2010; Remarks by Herman Van Rompuy, President of the European Council and José Manuel Barroso, President of the European Commission following the EU-China summit, Brussels, 6 October, 2010. Available at: http://www.consilium.europa.eu/uedocs/cms_data/docs/pressdata/en/ec/116907.pdf. Accessed on 3 November 2010.

² See Council Regulation (EEC) No 2616/85 of 16 September 1985 concerning the conclusion of a Trade and Economic Cooperation Agreement between the European Economic Community and the People's Republic of China.

³ United Nations. (1987). Report of the World Commission on Environment and Development: Our Common Future. Available at: <http://www.un-documents.net/wced-ocf.htm>. Accessed on 29 October 2010.

⁴ United Nations. (1992). Report of the United Nations Conference on Environment and Development, Rio de Janeiro, 3-14 June 1992. Available at: <http://www.un.org/documents/ga/conf151/aconf15126-1annex1.htm>. Accessed on 29 October 2010.

⁵ COM(1998) 181 final of 25 March 1998, p. 7.

⁶ COM(94) 659 final of 11 January 1995, p. 4; COM(1995) 682 final of 13 December 1995, p. 2

environment, which became the three mutually reinforcing angles from which European energy policy was to be approached at both European and international level.⁷

In 1995, the Commission launched its first Communication on the need for having a long-term policy for China-Europe relations.⁸ The report notes the phenomenal development of the Chinese economy, but is keen to point out that it has raised China's energy consumption already second to that of the USA by the mid-1990s; turning China into an indispensable player within the wider policy exchange on issues such as the environment, population and health.⁹ The link between energy, climate change and China's pivotal role was also made early on, noting that the overall impact of energy efficient technology on climate change mitigation would depend to a great extent on the level of penetration of such technologies in areas of the globe (China, India, ASEAN, etc.) which would use more solid fuel in the future.¹⁰

Policy-makers at times have framed climate change as a sort of 'threat-multiplier' that – if left unattended – could, through changing weather patterns, cause massive droughts, crop failure, river basin degradation and bring about an influx of 'climate refugees' who would be forced to relocate to less affected areas, causing wider tension and possibly even violent conflict.¹¹ Also, there is a growing academic literature on the purported link between climate change and violent conflict; however no real consensus yet exists on the extent to which such a scenario is a real possibility.¹²

⁷ Early examples of their reflection at international level include COM(95) 279 final of 5 July 1995 on A Long Term Policy for China-Europe Relations, p. 2; COM(95) 223 final of 31 May 1995 final on the future relationship with Russia, p. 12; the SYNERGY Programme on international cooperation in the energy sector, see COM(95) 197 final of 6 September 1995, p. 2; COM(95) 206 final of 10 October 1995 on the need to formulate a strategy for relations with the independent States of Central Asia, pp. 2 and 8-9.

⁸ COM(95) 279 final of 5 July 1995, *supra* note 7.

⁹ *Ibid.*, p. 2.

¹⁰ See COM(96) 576 final of 20 November 1996, p. 45; and COM(97) 196 final of 15 May 1997, p. 8.

¹¹ Council of the European Union. (2008). 'Climate Change and International Security. Paper from the High Representative and the European Commission to the European Council'. Council Doc. S113/08. Brussels, 14 March 2008, pp. 2-5; Council of the European Union. (2008). 'Report on the Implementation of the European Security Strategy – Providing Security in a Changing World'. Council Doc. S407/08. Brussels, 11 December 2008, pp. 5-6.

¹² See, *inter alia*, C. Raleigh and H. Urdal, (2007), 'Climate change, environmental degradation and armed conflict', *Political Geography* 26, pp. 674-694; R. Nordas and N.P. Gleditsch, (2007), 'Climate change and conflict', *Political Geography* 26, pp. 627-638; J. Barnett and W.N. Adger, (2007), 'Climate change, human security and violent conflict', *Political Geography* 26, pp. 639-655; R. Reuveny, (2007), 'Climate change-induced migration and violent conflict', *Political Geography* 26, pp. 656-673; German Advisory Council on Global Change (WBGU) (2008), *World in Transition - Climate Change as a Security Risk. Report by the German Advisory Council on Global Change*. (London: Earthscan); C.S. Hendrix and S.M. Glaser, (2007), 'Trends and triggers: Climate, climate change and civil conflict in

The relations between the EU and China relations are not seen from the prism of security provision as a counterweight to the adverse effects of climate change. In fact, when seen from an energy perspective, the nature of EU-China cooperation differs compared to the type of relations the Union has with countries such as Russia or regions such as Central Asia. The EU and China do not have a consumer-producer relationship, but are rather both vying for limited energy resources in order to safeguard their economic growth.¹³ The focus of EU-China energy relations is therefore less structured in terms of security of supply questions; dialogue and cooperation is rather more oriented towards initiatives that allow for the best possible management of China's energy demand to limit its impact on climate and the environment¹⁴, whilst at the same time relieve pressure on the EU's own security of energy supply.

The present case-study report provides a thorough analysis of (i) the origins and evolution of EU-China energy relations, and (ii) assesses to what extent the Union and China are able to shape mutual cooperation such that it corresponds to the goal of setting China on the path of a sustainable energy transition. The report does not aim to be exhaustive, but instead focuses on the elements which were most commonly identified as essential to EU-China energy cooperation. It consists of three sections. The first section analyses the origins of the relationship, providing detailed information about how EU-China relations evolved over time, both discursively and institutionally. Section two focuses on the key areas of cooperation which emerged from section one and analyses their progress and challenges – set against the backdrop of important decisions in EU-China cooperation and relevant Chinese undertakings concerning its

Sub-Saharan Africa', *Political Geography* 26, pp. 695-715; and I. Salehyan, (2008), 'From Climate Change to Conflict? No Consensus Yet', *Journal of Peace Research* 45(3), pp. 315-326.

¹³ Over the years, China has developed a very active foreign energy policy. One region where China is taking a heightened interest is Central Asia – a region by many seen as vital to European energy security interests. On China's active role, see, *inter alia*, D. Zweig and B. Jianhai, (2005), 'China's Global Hunt for Energy', *Foreign Affairs* 84(5), pp. 25-38; M. Lanteigne, (2007), 'China's Energy Security and Eurasian Diplomacy: The Case of Turkmenistan', *Politics* 27(3), pp. 147-155; R. R. Hanks, (2009), 'Multi-vector politics' and Kazakhstan's emerging role as a geo-strategic player in Central Asia', *Journal of Balkan and Near Eastern Studies* 11(3), pp. 259-266; S. Howell, (2009), 'Jia You! (Add Oil!): Chinese Energy Security Strategy', in G. Luft and A. Korin (eds.), *Energy Security Challenges for the 21st Century*, (Santa Barbara CA: ABC-CLIO, LLC), pp.191-218; G. Xuetang, (2006), 'The Energy Security in Central Eurasia: the Geopolitical Implications to China's Energy Strategy', *China and Eurasia Forum Quarterly* 4(4), pp. 117-137; A. Goldthau, (2010), 'Energy Diplomacy in Oil and Gas' in A. Goldthau and J. M. Witte, *Global Energy Governance: The New Rules of the Game*, (Washington D.C.: Brookings Institution Press), pp. 25-47; and C. Mo, (2009), 'Securing China's oil supply: from Saudi Arabia to Sudan', *International Institute for Asian Studies Newsletter* 51, p. 20.

¹⁴ COM(1998) 181 final, *supra* note 5, p. 7; interview with official of the European Commission DG Energy, 23 June 2010.

(future) energy regime. The third and final section draws conclusions from this analysis and provides recommendations on the future direction of EU-China energy cooperation.

1. ORIGINS AND EVOLUTION OF EU-CHINA ENERGY RELATIONS

1.1 1995- 2000: SEARCHING FOR COMMON GROUND

The Commission was keen to point out early on that for the European Community (EC) to have the greatest possible impact, its contribution would best be geared towards environmental policymaking and technology, including clean energy technology; rendering it essential to commit to a technological partnership with China.¹⁵ Such a partnership was cemented at the end of the 1990s, when the Science and Technology Agreement¹⁶ was signed, which from then onwards served as the permanent legal basis for cooperation in the area of energy technology.¹⁷

The EU set out ambitious plans to develop cooperation projects related to clean and efficient production methods and industries, clean coal technologies, environmental standards and training, and environmental management capacities as well as appropriate technology transfer; *inter alia*, to prevent industrial pollution, limit greenhouse gas emissions and establish a presence in China's lucrative market for green technology.¹⁸

However, at this stage it still took a number of years for cooperation to go beyond more 'loose forms' of working together and a general perception of the need to strengthen cooperation.¹⁹ The first two bilateral EU-China Summits which took place in 1998 and 1999 had laid the groundwork for a more broadly based political dialogue. Following these summits, the frequency of meetings and dialogues at all levels intensified on numerous areas of concern both to the EU and China, including energy.²⁰ The late 1990s also saw the start of negotiations on an agreement between EURATOM and

¹⁵ COM(95) 279 final, *supra* note 7, p. 15.

¹⁶ Agreement for Scientific and Technological Cooperation between the European Community and the Government of the People's Republic of China, OJ L 6/40 of 11 January 2000.

¹⁷ Interview with official of the European Commission Directorate-General (DG) Energy, May 2010.

¹⁸ COM(1998) 181 final, *supra* note 5, p.21. See also COM(97) 490 final of 13 October 1997.

¹⁹ Interview with official of the European Commission DG Energy, 25 May 2010.

²⁰ COM(2000) 552 final of 8 September 2000, p. 2.

China on the peaceful use of nuclear energy²¹, and energy was the main driver under the Synergy Programme²², which provided several training courses for Chinese officials. Furthermore, in March 2000 discussions were held in the framework of the EC-China Energy Working Group on priority areas that could be included in a possible new EC-China Energy/Environment Programme, in which all relevant Chinese Government organisations would participate (see also *infra*, 1.2).²³

Already by then, it was clear that China's economic growth remained firmly linked with an increase in energy demand and a subsequent stark rise in CO² emissions (see *infra*, 1.2).²⁴ It is not until China is able to make the transition from an investment driven economic growth model, towards one driven by productivity that this is likely to change.²⁵ To satisfy its demand, Chinese National Oil Companies (NOCs) increasingly looked beyond borders, even if this implied accessing regions which were politically and geologically more challenging; including countries where the activities of International Oil Companies' (IOCs) are legally restricted or politically unfeasible, such as Sudan, Myanmar, Iran and Central Asia.²⁶

These differences notwithstanding, ensuring a stable energy supply was – at least at declaratory level – seen as vital to the maintenance of long-term economic growth in both Asia and Europe, as well as in other parts of the world.²⁷ Equally, the problems with respect to energy security and environmental damage were acknowledged as a challenge by all Asia-Europe Meeting (ASEM) partners.²⁸

²¹ *Ibid.*, p. 9; COM(2001) 265 final of 15 May 2001, p. 14.

²² COM(95) 197 final, *supra* note 7.

²³ COM(2000) 552 final, *supra* note 20, p. 12.

²⁴ Unlike fully industrialised nations, China has not yet decoupled economic growth from energy consumption. See A. Goldthau, (2010), *supra* note 13, p. 28. Moreover, China's long subsidising of domestic energy consumption has led China to consume up to five times as much energy to produce each dollar of economic output. See F. Umbach, (2009), 'EU-China energy relations and geopolitics: Challenges for cooperation', *International Institute for Asian Studies Newsletter* 51, p. 27.

²⁵ Interview with official of the World Bank in the margin of the EU-China Energy Conference, Shanghai, 7 July 2010. See also F. Wang, H. Yin, and S. Li, (2009), 'China's renewable energy policy: Commitments and challenges', *Energy Policy* 38(4), p. 1872.

²⁶ A. Goldthau, (2010), *supra* note 13, p. 30; and S. Howell, (2009), *supra* note 13, p. 192, 198-199.

²⁷ Chairman's Statement of the Third Asia-Europe Meeting, Seoul, 20-21 October 2000, point 4 second para. Available at: http://www.consilium.europa.eu/uedocs/cms_data/docs/pressdata/en/er/Chairmans.doc.html. Accessed on 2 November 2010.

²⁸ *Ibid.*, point 9 second para.

1.2. 2000-2005: CONCERNS OVER CHINA'S GROWTH

Although, Asia and Europe seemed to acknowledge the need for a common agreed solution, the trend of increased energy demand in Asia was set to grow continuously. The impact thereof on European energy security and the need for adequate mitigation had not gone unnoticed within the EU.

In 2000, the European Commission expressed its concerns over the energy choices made by developing countries – China and India in particular – arguing it is necessary for agreements with these nations to take the aspect of security of energy supply into account.²⁹ Furthermore, it noted that this trend could be reduced, by international efforts to promote renewable energy and energy efficiency.³⁰

Shortly thereafter the Chinese government released its 10th Five-Year-Plan³¹, which publicly introduced the term 'energy security' in China. The Plan remarked that energy and infrastructural projects should be reinforced, allowing full use of resources. The Plan however also called for a rationalisation of the country's energy structure in order to improve energy efficiency and protect the environment.³² Major measures included, *inter alia*, the development of clean coal; accelerating the prospecting, development and use of oil and gas; the active use of overseas oil and gas resources through co-operative development and other channels; to promote the construction of a nationally unified power transmission network; developing new sources of energy and renewable energies³³; and to spread energy-saving technologies.³⁴ Although, the plan did not set

²⁹ COM(2000) 769 final of 29 November 2000, p. 27. Moreover, the size of China's energy sector renders the country's energy policy and its potential impact on the world scene a matter of great international importance, particularly for air pollution and climate change. Transfer of EU environmental knowledge, skills and technologies are imperative if China is to achieve sustainable patterns of production and consumption. See COM(2001) 265 final, *supra* note 21, p. 13.

³⁰ *Ibid.*

³¹ The Five-Year-Plans of China are a series of economic development initiatives. For an overview of the 10th Five-Year-Plan see Premier Zhu Rongji's Explanation of 10th Five-Year Plan Drafting. Available at: <http://chinagate.cn/english/e-plan/index.htm>; and Chinese Government's Official Web Portal, 'The 10th Five-Year Plan (2001-2005). Available at: http://www.gov.cn/english/2006-04/05/content_245624.htm. Both accessed on 2 November 2010. Also see Commission Working Document, 'Country Strategy Paper on China 2002-2006, pp. 8-9.

³² The Plan claimed that in the areas with abundant resources and combined-grid conditions, large grid-connected wind, solar, thermal, and photo voltaic power should be exploited. See US Department of Energy National Renewable Energy Laboratory, (2004), 'Renewable Energy in China: China's Plan for Renewable Energy, p. 1. Available at: <http://www.nrel.gov/docs/fy04osti/35787.pdf>. Accessed on 2 November 2010.

³³ The Plan speaks of a Chinese desire to build large wind farms in areas with proper conditions, invite international tenders, and develop large wind farm pilot projects. *Ibid.*, p. 2.

forth specific development objectives, nor contained any quantitative targets; it is clear there was an at least partial focus on renewable energy, with the concept of sustainable development playing a key role.³⁵

The September 2001 EU-China Summit held shortly after the plan's release made no mention of it, nor did it include any mutual recognition of the need to mitigate China's energy and environmental impact. It merely spoke of the importance to strengthen sectoral dialogues on the environment and energy.³⁶ Interviewees indicated that this lack of public statements concerning energy and environment cooperation was largely due to the difficult start of cooperation, differences of opinion on energy security policy, and on how to mitigate China's environmental impact.³⁷ Conversely, the Summit spoke extensively on trade between the EU and China, its growth and the desire to improve the trade balance – claiming Chinese World Trade Organization (WTO) Membership would greatly benefit both sides.³⁸ China eventually joined the WTO in December 2001.³⁹

In its 2002-2006 Strategy Paper on China the European Commission carefully spoke about possible support for the integration of EU technical standards in China in the areas of energy and environment.⁴⁰ Promoting energy efficiency, and the transfer of energy technologies, e.g. clean coal; natural gas; nuclear fission; and alternative energy technologies, notably in the fields of new and renewable energies; were marked as top priorities.⁴¹ However, these priorities were not translated into an equally ambitious financial contribution. The €15 million of EC funding which was earmarked seemed to

³⁴ Premier Zhu Rongji's Explanation of 10th Five-Year Plan Drafting, *supra* note 31.

³⁵ US Department of Energy National Renewable Energy Laboratory, (2004), *supra* note 32, p. 1; Country Strategy Paper on China 2002-2006, *supra* note 31, p. 8.

³⁶ Joint Press Statement Fourth EU-China Summit, Brussels, 5 September 2001. Available at: http://www.consilium.europa.eu/uedocs/cms_data/docs/pressdata/en/er/ACF28D9.html. Accessed on 2 November 2010.

³⁷ Interview with official of the European Commission DG Energy, 25 May 2010; interview with official of the European Commission DG External Relations, 23 June 2010.

³⁸ Joint Press Statement Fourth EU-China Summit, *supra* note 36.

³⁹ China's WTO bid had been a long and strenuous process spanning 15 years. BBC News, 'China joins WTO – at last', 11 December 2001. Available at: <http://news.bbc.co.uk/2/hi/business/1702241.stm>. Accessed on 4 January 2011.

⁴⁰ Country Strategy Paper on China 2002-2006, *supra* note 31, p. 26.

⁴¹ *Ibid.*, pp 27-28.

fall well short of establishing this objective.⁴² Perhaps, it is telling in this regard that the fifth EU-China Summit, in fact, did not mention energy at all.⁴³

By way of contrast, at the end of 2002, China had finished its '21st Century Oil Strategy'.⁴⁴ The Strategy consisted of a US \$100 billion programme with a variety of domestic and international components. The Strategy consisted of a US \$100 billion programme with a variety of domestic and international components. The plan envisaged the creation of joint ventures overseas⁴⁵ the instalment of strategic oil reserves, the development of increased oil shipping capacity, and the strengthening of a navy and air force capable of protecting China's marine resources and energy supplies.⁴⁶ The degree of securitisation stemming from these plans and the sheer size of the available budget made clear that China's intentions were more than serious.⁴⁷

In 2003, the EU and China initiated their vice-minister level Environmental Dialogue, which coincided with the launch of the five-year long Energy and Environment Program (EEP)⁴⁸ – a €45 million co-financed project.⁴⁹ The Program aimed, *inter alia*, to foster

⁴² *Ibid.*, p. 18. Note that the European Commission itself seemed aware of the limited funding, p. 27.

⁴³ The Statement only refers to a reaffirmed commitment to environmental issues on part of the leaders. See Joint Press Statement Fifth EU-China Summit, Copenhagen, 24 September 2002. Available at: http://www.consilium.europa.eu/uedocs/cms_data/docs/pressdata/en/er/72250.pdf. Accessed on 2 November 2010.

⁴⁴ See S. Howell, (2009), *supra* note 13, p. 193.

⁴⁵ The Strategy's main priority lay squarely with securing new energy resources abroad. See B.W. Marcois, (2005), 'China, U.S. interests conflict', *The Washington Times* March 24, 2005. Available at: <http://www.washingtontimes.com/news/2005/mar/24/20050324-075950-4488r/?page=1>. Accessed on 3 November 2010.

⁴⁶ G. Christoffersen, (2004). 'Angarsk as a Challenge for the East Asian Energy Community'. Paper presented at the conference on 'Northeastern Asian Security: Traditional and Untraditional Issues'. Renmin University of China, 2-4 April 2004, p. 6. Available at: <https://www.dur.ac.uk/chinese.politics/papers%20conference%20Beijing/12Christoffersen.pdf>. Accessed on 3 November 2010.

⁴⁷ The 21st Century Oil Strategy represented in fact a strengthening of China's ongoing external energy security policy. In 2002, the China National Petroleum Corporation (CNPC) replaced several Western oil companies operating in promising Sudanese exploration projects. A few years earlier, in 1996, the CNPC was able to buy a 40% share in the Greater Nile Petroleum Operating Company (GNPOC) in Sudan and 1999 saw the completion of the Greater Nile Oil Pipeline from the south to the Red Sea. Moreover, China's protection of Sudan in the United Nations Security Council over the conflict in Darfur is also a frequently referred to example of China's approach to energy security. See A. Goldthau, (2010), *supra* note 13, p. 37; and S. Howell, (2009), *supra* note 13, p. 199; and M.E. Chen, (2007), 'Chinese National Oil Companies and Human Rights', *Foreign Policy Research Institute* 51, pp. 41-54. In 2006, the European Parliament passed a resolution on EU-China relations in which it also recognised Africa's importance for Chinese energy supply, but urged Beijing to uphold its responsibilities as a permanent member of the UN Security Council and to promote good governance, democracy, the rule of law, respect for human rights and conflict prevention in its relations with African states. See European Parliament resolution on EU-China Relations (2005/2161(INI), point 87.

⁴⁸ China Daily, 'EU-China energy and environment program launched', 4 November 2004. Available at: http://www.chinadaily.com.cn/english/doc/2004-11/04/content_388294.htm. Accessed on 3 November 2010; See also J. Holslag, (2010), 'China's Scepticism of Clean Energy Champion Europe', *The International Spectator* 45, p. 118.

cooperation between Chinese and EU industries in China's energy markets, to ensure sustainable development in line with international objectives (in particular in the context of climate change), as well as to promote new technologies by funding feasibility studies in China.⁵⁰ Between 2004 and 2008, 26 workshops and conferences were organised in the framework of the programme, and cooperation expanded to new areas, including biomass resources, rural power supply and offshore wind power.⁵¹

1.3. 2004-2010: THE EU-CHINA PARTNERSHIP ON CLIMATE CHANGE

China's rise as a global economic power meant that, politically, Beijing was increasingly viewed at the level of 'strategic partner', roughly among the ranks of the EU's more traditional partners such as Canada and Japan – and not limited to trade alone.⁵²

Whereas 2004 saw an important milestone in the EU-China partnership through the signing of an agreement on R&D cooperation on the peaceful use of nuclear energy in the margin of the 7th EU-China Summit⁵³, it was not until after 2005 that EU-China energy relations started to mature rapidly. On 28 February 2005, China adopted its Renewable Energy Law ('REL' or 'the Law'), which took effect in 2006 through the passing of detailed implementing regulations.⁵⁴ The Law served to create an integrated renewable energy policy framework and institutionalised a number of policies and instruments for China's renewable energy development and utilisation.⁵⁵ Key elements of the Law – which speaks of renewable energy as the preferential area for energy development in the context of both 'energy security, as well as 'sustainable

⁴⁹ The EU funded a €20 million share of the project, with the remainder funded by China. See COM(2003) 533 final of 10 September 2003, ANNEX 3, p. 31.

⁵⁰ EU China Energy and Environment Program, 'About EEP'. Available at: http://www.offshore-wind.de/page/fileadmin/offshore/Kurznachrichten/2009/070109EU-China_EEPgeneral.pdf. Accessed on 3 November 2010; J. Holslag, (2010), *supra* note 48, p. 118.

⁵¹ J. Holslag, (2010), *supra* note 48, p. 118.

⁵² China was also increasingly viewed as a strategic partner in the realm of security and sustainable development. See COM(2003) 533 final, *supra* note 49, pp. 3, 6; and, A Secure Europe in a Better World – European Security Strategy, Brussels, 12 December, 2003, p. 14. By 2007, the decreasing share of Official Development Aid (ODA) in China's GDP compared to Foreign Direct Investment (FDI) contributed even more strongly to this view. See European Commission, 'China Strategy Paper 2007-2013', p. 4.

⁵³ Joint Statement, 7th EU-China Summit, the Hague, 8 December 2004, Poin4 14, second para. Available at: http://www.consilium.europa.eu/uedocs/cms_data/docs/pressdata/en/er/82998.pdf. Accessed on 3 November 2010.

⁵⁴ The Renewable Energy Law of the People's Republic of China. Available at: http://www.frankhaugwitz.info/doks/policy/2005_07_25_China_RE_Law_Beijing_Review.pdf. Accessed on 3 November 2010.

⁵⁵ X. Zhang, W. Ruoshui, H. Molin and E. Martinot, (2009), 'A study of the role played by renewable energies in China's sustainable energy supply', *Energy* 35(11), pp. 4392 and 4394.

development'⁵⁶ – included provisions for renewable portfolio standards, along with feed-in tariffs for biomass, 'government-guided' prices for wind power, guaranteed grid access for all renewable power generated, new financing mechanisms, and other market-enhancing provisions (see also *infra*, 2.2).⁵⁷

Following the adoption of the REL, the European Commission's Directorate-General for Transport and Energy⁵⁸ and the Chinese Ministry of Sciences and Technology (MOST) agreed on two action plans. The Action Plan on Clean Coal intended to aid Chinese policy-makers with the development and implementation of European clean coal technologies. In the longer term, one of the main priorities is to develop a 'near-zero emissions coal' (NZE) fired plant that captures CO² and can store and/or use it commercially.⁵⁹ The second plan aimed more specifically at forging industrial cooperation in order to increase the use of energy efficiency and renewables in China (see *infra*, 2.2).⁶⁰

Arguably, the most significant outcome – at least in terms of the recognition of climate change as a mutual challenge – was the establishment of the EU-China Partnership on Climate Change at the 2005 EU-China Summit.⁶¹ The Partnership endorsed the objectives of the United Nations Framework Convention on Climate Change (UNFCCC) and the Kyoto Protocol, and aimed to strengthen policy dialogue on climate change and practical cooperation. Technical cooperation was agreed on six areas: energy efficiency, conservation and renewable energy; clean coal; methane recovery; CCS;

⁵⁶ Arts. 1, 2 and 4 Renewable Energy Law of the People's Republic of China, *supra* note. 54.

⁵⁷ The Renewable Energy Law of the People's Republic of China, *supra* note 54; See also E. Martinot and L. Junfeng, (2010), 'Renewable Energy Policy Update For China', *Renewableenergyworld.com*, 21 July 2010. Available at: <http://www.renewableenergyworld.com/rea/news/article/2010/07/renewable-energy-policy-update-for-china>. Accessed on 4 November 2010.

⁵⁸ Following the entry into force of the Treaty of Lisbon, the DG for Transport and Energy was split up in two separate DGs.

⁵⁹ Carbon Capture and Storage, or 'CCS', is not yet commercially available technology. Considerable research & development and demonstration is underway however. There are various possibilities for storing greenhouse gases. These include injecting CO² into mature oil fields to improve the recovery of oil – a process known as 'Enhanced Oil Recovery'. Another option is to inject CO² into depleted oil and/or gas fields or into saline aquifers.

⁶⁰ European Commission DG Energy, Bilateral Cooperation: China. Available at: http://ec.europa.eu/energy/international/bilateral_cooperation/china/china_en.htm. Accessed on 3 November 2010; see also Joint Declaration on Climate Change between China and the European Union, point 8, p. 2. Available at: http://www.consilium.europa.eu/uedocs/cms_data/docs/pressdata/en/er/86133.pdf. Accessed on 3 November 2010.

⁶¹ *Ibid.*, Joint Declaration on Climate Change.

hydrogen and fuel cells; and power generation.⁶² Building on the action plan for clean coal, the Partnership's main priority until 2020 is to develop the NZEC technology through carbon capture and storage (CCS) and to reduce the cost of such technologies.⁶³ A Memorandum of Understanding (MoU) to that effect was signed in February 2006 and the project got support from two coordinated feasibility studies (see *infra*, 2.1).⁶⁴

The Partnership proved a stimulus for a range of new initiatives. At the 9th EU-China Summit, both parties agreed to launch negotiations on a new Partnership and Cooperation Agreement (PCA) which would replace the 1985 China Trade and Economic Cooperation Agreement.⁶⁵ Interestingly, post-2005 summits showed an increase in the use of strong language, labelling climate change:

“[A] serious threat to sustainable development and the future of our planet”.⁶⁶

An integrated approach was seen as crucial in order to exploit synergies between energy security, sustainable energy supply, innovation and greenhouse gas mitigation so as to ensure coherence between energy policy goals and those of the UNFCCC.⁶⁷ Discussions at EU level about the need for a coherent external energy policy, also

⁶² *Ibid.*, point 5, p. 2.

⁶³ *Ibid.*, point 7, p. 2. See also J. Holslag, (2010), *supra* note 48, p. 119.

⁶⁴ See Joint Declaration on Climate Change between China and the European Union, point 7, p. 2; Memorandum of Understanding Between The Ministry of Science and Technology of the People's Republic of China And The European Commission On Cooperation on Near-zero Emissions Power Generation Technology through Carbon Dioxide Capture and Storage. Available at: http://ec.europa.eu/clima/documentation/international/docs/nzec_mou_en.pdf. Accessed on 3 November 2010.

⁶⁵ Joint Statement Ninth EU-China Summit, Helsinki, 9 September 2006, point 4, p. 2. Available at: http://www.consilium.europa.eu/uedocs/cms_data/docs/pressdata/en/er/90951.pdf. Accessed on 4 November 2010.

⁶⁶ Chairman's Statement of the Sixth Asia-Europe Meeting, Helsinki, 10 and 11 September 2006, point 28, p. 12. Available at: http://www.consilium.europa.eu/uedocs/cms_data/docs/pressdata/en/er/90964.pdf. Accessed on 4 November 2010. The Meeting further underlined the 'synergies between the promotion of energy security and addressing environmental concerns', *Ibid.*, point 29, p. 12.

⁶⁷ Joint Statement Ninth EU-China Summit, *supra* note 65, point 20, p. 6; The 10th EU-China Summit reiterated the above statements. See Joint Statement 10th EU-China Summit, Beijing, 28 November 2007, point 21, fourth para, p. 10. Available at: http://www.consilium.europa.eu/uedocs/cms_data/docs/pressdata/en/er/97355.pdf. Accessed on 4 November 2010. The European Parliament also highlighted the importance of China's existing and emerging energy relations, calling the relationship crucial for meeting the challenge of climate change. The Parliament also called on the Council and Commission to include energy issues in their long-term strategy for EU-China relations and to raise energy issues in their contacts with China where appropriate. See European Parliament resolution on EU-China Relations *supra* note 47, recital points D, body text points 10 and 86.

continuously emphasised that China faced similar energy and environmental challenges.⁶⁸

In late 2006, China released its 11th Five-Year Plan (5YP or 'the Plan'). The Plan, taking coal as the basis, set the objective of optimising the national energy industry, significantly reduce the energy intensity of the Chinese economy, and limit the emissions of major pollutants.⁶⁹ To combat emissions, the 5YP foresaw ambitious targets of reducing energy consumption per unit of GDP by 20%, lowering total sulphur and chemical oxygen demand (COD) emissions by 10% by 2010, and ensure that renewable energy sources account for 15% of primary energy consumption by 2020.⁷⁰ It was the first time for Beijing to set a domestic target for improving energy efficiency, together with its economic growth targets listed in its social and economic development plan during the 11th five-year period.⁷¹

The following year, the European Council set ambitious climate objectives for the EU itself. European leaders agreed to reduce greenhouse gas emissions by 20%, rising to 30% if other developed countries commit themselves to comparable emission reduction⁷²; to increase the share of renewable energy to 20%⁷³ and to make a 20% improvement in energy efficiency by 2020.⁷⁴ Additional measures were taken vis-à-vis

⁶⁸ COM(2006) 105 final of 8 March 2006, p. 16. Furthermore, an external country evaluation of the EC cooperation programme with China commissioned in 2006 reported that that overall EU project implementation was slow and follow-up in, terms of replication and roll-out, weak. Moreover, the analysis concluded that there is a particular need for a more unified European position in the area of climate change, and that more should be done to integrate aspects of climate change into current EC-financed environmental programmes in China. See 'China Strategy Paper 2007-2013', *supra* note 52, pp. 25-26.

⁶⁹ The World Bank, (2008), 'Mid-term Evaluation of China's 11th Five Year Plan'. Poverty Reduction and Economic Management Unit East Asia and Pacific Region, 18 December 2008, p. 133-134. It should be noted here that by early 2007, China had effectively surpassed the US as the world's largest emitter of greenhouse gases. See PBL Netherlands Environmental Assessment Agency. Global CO₂ emissions: increase continued in 2007. Available at: <http://www.pbl.nl/en/publications/2008/GlobalCO2emissionsthrough2007.html>. Accessed on 8 February 2011.

⁷⁰ Chinese Government Official Web Portal. Facts and Figures: China's main targets for 2006-2010. Available at: http://english.gov.cn/2006-03/06/content_219504.htm. Accessed on 5 January 2011; Z.Y. Zhao, J. Zuo, T. T. Feng, and G. Zillante, (2010), 'International cooperation on renewable energy development in China – A critical analysis', *Renewable Energy* 36(3), p. 1105; B. Buijs, (2009), *China, Copenhagen and Beyond: The Global Necessity of a Sustainable Energy Future for China*, (the Hague: Netherlands Institute of International Relations, Clingendael), p. 29.

⁷¹ X. Zhang et al., (2009), *supra* note 55, p. 4392.

⁷² Brussels European Council, 8-9 March 2007, Presidency Conclusions, point 30, p. 12. Available at: http://www.consilium.europa.eu/ueDocs/cms_Data/docs/pressData/en/ec/93135.pdf. Accessed on 12 November 2010.

⁷³ *Ibid.*, ANNEX I: European Council Action Plan (2007-2009) – Energy Policy for Europe (EPE), point 7, p. 21.

⁷⁴ *Ibid.*, point 6, p. 20.

China, when the European Investment Bank granted Beijing with a €500 million loan⁷⁵ in support of the Chinese National Climate Change Programme. The Programme aims at improving energy efficiency; to include a greater proportion of renewable and nuclear energy in primary energy supply; CCS; reforestation projects; increased R&D efforts, and raising public awareness on climate change (see *infra*, 2.1).⁷⁶

In August 2007, China released its Mid- and Long-Term Plan for Renewable Energy Development (MLTPRED). The Plan stipulates multiple targets for renewable energy in China, which should make up 10% of total energy consumption by 2010, 15% by 2015 and 20% by 2020 (see *infra*, 2.1 and 2.2).⁷⁷ To further aid the Chinese government in upgrading its performance in the focal areas of the Partnership and allow it to reach its ambitious renewable energy targets, the EU and China agreed to establish a China-EU Clean Energy Centre by 2010.⁷⁸ Other initiatives to that effect included the €2.8 million worth EU-China Clean Development Mechanism (CDM)⁷⁹ Facilitation Project; set up to support China's CDM, through policy research, capacity building, technical exchange and training activities until 2010 (see *infra*, 2.2).⁸⁰

In 2008, the parties attending that year's ASEM Meeting expressed their concern over the evolution and high level of oil prices, stressing that joint efforts were needed by all parties to contribute to the stability, transparency and predictability of the market.⁸¹ The declaration also reconfirmed the primacy of the UNFCCC and the Kyoto Protocol as the main channels for international negotiations, and reiterated the parties' commitment to work towards an ambitious, effective and comprehensive agreed outcome for long term

⁷⁵ Joint Statement 10th EU-China Summit, *supra* note 67, point 22, second para.

⁷⁶ National Development and Reform Commission People's Republic of China, (2007). 'China's National Climate Change Programme', pp. 26-29. Available at: <http://www.ccchina.gov.cn/WebSite/CCChina/UpFile/File188.pdf>. Accessed on 4 November 2010.

⁷⁷ F. Wang et al., (2009), *supra* note 25, p. 1873; Q. Wang, (2009), 'Effective policies for renewable energy – the example of China's wind power – lessons for China's photovoltaic power', *Renewable and Sustainable Energy Reviews* 14(2), p. 706.

⁷⁸ Joint Statement 10th EU-China Summit, *supra* note 67, point 23, second para., p. 11.

⁷⁹ The CDM is one of the 'flexibility' mechanisms established under the Kyoto Protocol. It allows developed countries to invest in emission reductions wherever it is cheapest globally.

⁸⁰ EU-China CDM Facilitation Project – Final Report, p. 4. Available at: http://www.euchina-cdm.org/media/docs/Final%20report_EN.pdf. Accessed on 4 November 2010.

⁸¹ Chair's Statement of the Seventh Asia-Europe Meeting. Declaration II: Climate Change and Energy Security. Beijing, 24-25 October 2008, p. 10. Available at: http://www.consilium.europa.eu/uedocs/cms_data/docs/pressdata/en/er/103551.pdf. Accessed on 4 November 2010.

cooperative action up to and beyond the 2009 Copenhagen Climate Change Conference.⁸²

The evolution of oil prices dominated agendas in 2008. In fact, several months before, the International Energy Forum⁸³ had gathered in Jeddah to discuss the issue and had released a similar statement. The June 2008 meeting recognised the vital role played by spare production capacity to ensure stability in the global oil market⁸⁴; the need for better financial regulation; the necessity to intensify development assistance to alleviate the pressure of higher prices on least developed countries; and called for immediate collaboration between the International Energy Agency (IEA) and Organization of Petroleum Exporting Countries (OPEC) Secretariats, together with the IEF, on preparing shared oil market analyses.⁸⁵ However, the meeting had left leading OPEC members at odds over how to precisely deal with the situation. Subsequently, by the end of 2008, the oil market situation had completely turned around. The economic crisis had caused a drop in oil price by around 70% compared to July 2008, wreaking havoc for budgetary planning and investment-decision making of producer countries⁸⁶, but similarly dampening calls by consumers for increased transparency.

In November 2008, EU-China relations briefly cooled when, in the run-up to the 11th EU-China Summit, the Chinese informed the Union of their decision to postpone the event due to visits of the Dalai Lama to Heads of State and Government of several EU Member States around that same period.⁸⁷ The Summit however eventually did take place some six months later, in May 2009, during which both parties agreed to

⁸² *Ibid.*, p. 6.

⁸³ The IEF aims to bring both producers and consumers together in one platform. The Forum represents the world's largest biennial gathering of energy ministers with membership open to all countries that wish to participate. Meetings are attended by all major oil market nations, and countries such as Russia, China and India are among the IEF Executive Board members. The Forum was created in the early 1990s, primarily in an attempt to increase transparency and lower transaction costs between consumers and producers in order to dampen volatility in international oil markets.

⁸⁴ Spare production- and refining capacity had been eroded due to years of steeply rising demand for oil.

⁸⁵ Joint Statement by the Kingdom of Saudi Arabia and the Secretariats of the International Energy Agency, the International Energy Forum and the Organization of Petroleum Exporting Countries. Jeddah Energy Meeting 22 June 2008. Available at: <http://www.ief.org/whatsnew/Documents/Finial%20statment%2022%20june%202008.pdf>. Accessed on 28 July 2010.

⁸⁶ International Energy Forum. London Meeting Chair's Report. December 2008, p. 1. Available at: <http://www.ief.org/whatsnew/Documents/UK%20Chairs%20report%20London%20Energy%20Meeting.pdf>. Accessed on 28 July 2010.

⁸⁷ Report du Sommet UE/Chine, Déclaration de L'Union Européenne, Bruxelles, le 26 November 2008. Available at: http://www.consilium.europa.eu/uedocs/cms_data/docs/pressdata/en/er/104305.pdf. Accessed on 4 November 2010.

strengthen cooperation on climate change and signed a Joint Statement on the EU-China Clean Energy Centre.⁸⁸ One month later, the first Asia-Europe Conference on energy security was held in Brussels. Particular focus was placed on the inclusion of investment promotion in renewable energy, low carbon technology and the transfer and exchange of technology and regulatory technical know-how within comprehensive energy security policies.⁸⁹

Shortly before the 2009 Copenhagen Climate Change Conference, both parties reconfirmed their desire to work towards a comprehensive outcome, in line with the principle of common but differentiated responsibilities.⁹⁰ Furthermore, the EU and China agreed to intensify policy dialogues and cooperation under the Partnership on Climate Change.⁹¹ However, the Summit's most significant outcome was the signing of the MoU on Energy Performance and Quality in the Construction Sector.⁹²

By 2010 China had become the world's largest producer of wind turbines and solar panels⁹³ and was pushing equally hard to build nuclear reactors.⁹⁴ China's goal thereby

⁸⁸ Joint Press Communiqué, 11th EU-China Summit, Prague, 20 May 2009, point 4, p. 2. Available at: http://www.consilium.europa.eu/uedocs/cms_data/docs/pressdata/en/er/107965.pdf; Euractiv, 'Climate change, trade top agenda at EU-China summit', 20 May 2009. Available at: <http://www.euractiv.com/en/foreign-affairs/climate-change-trade-top-agenda-eu-china-summit/article-182507>. Both accessed on 4 November 2010.

⁸⁹ Joint Statement ASEM Ministerial Conference on Energy Security, Brussels, 17-18 June 2009, points 7-11. Available at: http://www.eeas.europa.eu/energy/events/asem_energy_2009/docs/joint_statement_en.pdf. Accessed on 4 November 2010.

⁹⁰ Joint Statement of the 12th EU-China Summit, Nanjing, China, 30 November 2009, point 9, p. 3. Available at: http://www.consilium.europa.eu/uedocs/cms_data/docs/pressdata/en/er/111567.pdf. Accessed on 5 November 2010. Note also that shortly before the Summit, the European Commission had pledged up to €57 million to the NZEC project. *Ibid.*, point 11, p. 4.

⁹¹ The intensification of cooperation included, but was not limited to, renewable energy, energy efficiency, joint development, demonstration and transfer of climate-friendly technologies, sustainable urban development, capacity building and regional cooperation. See Joint Statement of the 12th EU-China Summit, *supra* note 90, point 10, p. 4.

⁹² This is a much needed development as energy conservation and energy efficiency in this sector – the highest energy consuming one in all of China – remains very low. See Cooperation Framework on Energy Performance and Quality in the Construction Sector between the Directorate-General for Enterprise and Industry and the Directorate-General for Energy and Transport of the European Commission and the Ministry of Housing and Urban-Rural Development of the People's Republic of China, November 2009. Available at: http://ec.europa.eu/energy/international/bilateral_cooperation/china/doc/summit/2009_30_11_signed_mou.pdf. Accessed on 5 November 2010.

⁹³ K. Bradsher, (2010), 'China Leading Global Race to Make Clean Energy', *New York Times*, 30 January 2010. Available at: <http://www.nytimes.com/2010/01/31/business/energy-environment/31renew.html>. Accessed on 8 November 2010; B. Buijs, (2009), *supra* note 70, pp. 9, 34, 37; Ernst & Young, (2010), *Renewable energy country attractiveness indices*, May 2010 Issue 25. Available at: [http://www.ey.com/Publication/vwLUAssets/Renewable_energy_country_attractiveness_indices_Issue_25/\\$FILE/Renewable_Energy_Issue_25.pdf](http://www.ey.com/Publication/vwLUAssets/Renewable_energy_country_attractiveness_indices_Issue_25/$FILE/Renewable_Energy_Issue_25.pdf). Accessed on 8 November 2010. Early 2009, the European Parliament already stressed the opportunities for the EU in the emerging renewables market in China, urging the Chinese to improve market access and for the Union to step up the transfer of low carbon technology. See European Parliament resolution of 5 February 2009 on Trade and Economic Relations with China (2008/2171(INI)), points 29 and 30. By

is to further develop its own nuclear industry.⁹⁵ It pursues an ambitious industrial strategy in both these areas and the development of China's renewable energy market was also noted in various EU publications.⁹⁶ However, it must be said that at the same time China's coal consumption continues to grow rapidly, causing emissions to rise. This problem is in turn exacerbated by a low overall level of energy efficiency and conservation (see also *infra*, 2.2).⁹⁷

The massive growth in renewable energies and technologies in China is however also viewed with a critical eye. The Commission's 2020 Strategy⁹⁸ for example speaks of China as a growing competitor⁹⁹ in designing 'green solutions' and called on the Union to maintain its lead in the market for green technologies as a means of ensuring resource efficiency throughout its economy.¹⁰⁰ This contrasted with earlier statements made in the Stocktaking document 'Towards a new Energy Strategy for Europe 2011-2010' which rather frame Europe's lead in the market as an opportunity to promote international cooperation with China.¹⁰¹ Nevertheless, it seems the dominant view nowadays is, that China is increasingly viewed as a potential challenger to the EU's lead position in renewable energies (see *infra*, 2.2).¹⁰²

1.4 THE CURRENT STATUS OF EU-CHINA ENERGY RELATIONS

The above longitudinal analysis showed it took the EU and China roughly two decades to develop their energy relations up to the point where cooperation on renewable

2030 non-OECD economies, like China, will produce some 17% of global wind energy, rising to 57% in 2050. According to the IEA, by 2030 China overtakes the US and is market leader by 2050. See IEA Technology Roadmap: Wind energy, pp. 4, 9, 15. Available at: http://www.iea.org/papers/2009/Wind_Roadmap.pdf. Accessed on 17 November 2010.

⁹⁴ Interview with Director-General of the European Commission DG Energy in the margin of the EU-China Energy Conference, Shanghai, 7 July 2010; interview with official of French Embassy in China in the margin of the EU-China Energy Conference, Shanghai, 7 July 2010; B. Buijs, (2009), *supra* note 70, p. 40. By far the largest expansion of nuclear capacity is taking place in China. See IEA Technology Roadmap: Nuclear Energy, p. 17. Available at: http://www.iea.org/papers/2010/nuclear_roadmap.pdf. Accessed on 17 November 2010.

⁹⁵ B. Buijs, (2009), *supra* note 70, p. 40.

⁹⁶ COM(2010) 639 final of 10 November 2010, p. 15.

⁹⁷ 'China Strategy Paper 2007-2013', *supra* note 52, p. 13.

⁹⁸ COM(2010) 2020 Europe 2020: a strategy for smart, sustainable and inclusive growth of 3 March 2010.

⁹⁹ The Strategy speaks of China as a growing competitor also because of a lack of harmonisation within the EU itself. European businesses still have to deal with 27 different legal systems, whereas China does not have this problem and can draw on the full strength of its home market. *Ibid.*, p. 18.

¹⁰⁰ *Ibid.*, p.12.

¹⁰¹ European Commission. (2010). 'Stock taking document Towards a new Energy Strategy for Europe 2011-2010', p. 5.

¹⁰² The November 2010 Energy 2020 Strategy confirms Europe's lead is challenged, as China and the US are now cited as the best investment opportunities for renewable energy. See COM(2010) 639 final, *supra* note 96, p. 4.

energies and energy efficiency became a cornerstone within broader action on climate change. Today, the potential for renewable energy and energy efficiency to contribute to energy security is acknowledged on both sides. Indeed, the need for China to actively promote renewable energy as part of its national energy mix has gained high priority among the authorities, not least also given the sector's enormous market potential.

What the analysis in section one also served to demonstrate is the broad range of issues included in the EU-China energy relationship. For each and every one of these areas, achieving concrete results is naturally the top priority. However, it must be noted that some areas matter more than others when it comes to an issue such as climate change. Moreover, given China's enormous demand for energy, actions should be targeted at those areas of cooperation which provide the greatest relief for the EU's security of energy supply. Therefore, if the partnership is to remain meaningful in the long term, it is of particular importance that visible results are achieved in areas which have the greatest potential to deliver.

The Partnership on Climate Change explicitly lays out six priority areas for technical cooperation between the EU and China.¹⁰³ In general, it intends to strengthen policy dialogue on climate change and work towards intensified practical cooperation. However, one of the Partnership's most important goals is to develop and demonstrate advanced near-zero emissions coal (NZEK) through Carbon Capture and Storage (CCS), work to reduce the costs of key technology and promote its deployment and dissemination (see *supra*, 1.3).¹⁰⁴ When the NZEK project is successful, CCS technology could in the future significantly contribute to the reduction of CO₂ emissions in China and elsewhere. Moreover, CCS technology shows the potential for turning CO₂ emissions into a valuable and tradable by-product.

Next to CCS and clean coal technology, the Partnership attaches firm weight to renewable energy development and energy conservation. It should be emphasised here that China is endowed with some of the world's greatest potential for renewable energy generation. Moreover, the more this is exploited, the greater is the potential offset for

¹⁰³ These fields of cooperation are energy efficiency, conservation and renewable energy; clean coal; methane recovery; CCS; hydrogen and fuel cells; and power generation.

¹⁰⁴ Joint Declaration on Climate Change between China and the European Union, *supra* note 64.

the EU in terms of security of energy supply in Eurasia. However, despite its rich natural endowment, it was not until the adoption of the Renewable Energy Law (REL) (see *supra*, 1.3) that the development of alternative energy sources became an actual policy issue for China.¹⁰⁵ Next to the obvious environmental reasons, the development of the REL was largely inspired by an increased awareness of the domestic energy security advantages – for without the energy drawn from renewable sources, the security risks involved in Chinese energy supply would be far greater.¹⁰⁶ The domestic energy security advantage set aside; there is a clear added value in it for the EU given the more China utilises its renewable energy potential, the greater could be the offset for the EU in terms of security of energy supply in Eurasia

In light of the potential impact that the development of clean coal and CCS technology may have on climate change mitigation, as well as the enormous chances vested in the Chinese renewable energy market these issues are the focus of the analysis conducted in this study.

With phase one of the NZEC project now completed, paragraph 2.1 analyses the project's current status and progress in greater detail and assesses the potential for the future application of CCS technology in China. Subsequently, paragraph 2.2 analyses the developments in the Chinese renewable market after the adoption of the REL and assesses the market's current status, with a particular focus on the key issues which inhibit its further development.

2. KEY AREAS OF EU-CHINA COOPERATION

2.1 CARBON CAPTURE AND STORAGE TECHNOLOGY IN CHINA

Five years after the adoption of the Partnership and the 11th Five-Year Plan (5YP); the question is where does China stand? With respect to the latter, Beijing was within reach of the goals of the 5YP by late 2009 (see also *infra*, 2.2). Chemical Oxygen Demand (COD) and sulphur emissions had dropped significantly and were expected to fall

¹⁰⁵ F. Wang, et al., (2009), *supra* note 25, p. 1872.

¹⁰⁶ X. Zhang et al., (2009), *supra* note 55, p. 4393.

further in the course of 2010, meaning the COD target was likely met.¹⁰⁷ Similarly, despite getting off to a slow start, Beijing had managed to make substantial progress towards its goal of achieving a 20% reduction in energy intensity and it is likely that this target was met, or nearly so.¹⁰⁸ It was around this time also that China announced a new goal of reducing the carbon intensity of its GDP by 40-45% by 2020, relative to 2005 levels. Since China has historically chosen to address energy intensity individually as part of its energy efficiency improvement plans, the carbon intensity target was seen as a variation and aggregation of its existing energy intensity targets.¹⁰⁹

In October 2006, the EU and China agreed on a detailed Work Plan in the framework of the Partnership. The Work Plan is dedicated to, *inter alia*, energy efficiency and energy conservation; new and renewable energy; methane recovery and use; hydrogen energy and fuel cells; and capacity building. Next to such measures, the Plan clearly reiterates the goal to develop and demonstrate NZEC technology as a priority area of cooperation.¹¹⁰

Some eight months later, China launched its own National Climate Change Programme. The Programme offered little in new targets to reduce greenhouse gas emissions, but outlined how China intended to meet the goals it had already set itself. The document emphasises the need for more wind, nuclear and hydro energy, as well as increasing the efficiency of coal-fired power plants. Clearly however, the main priority lay with sustainable development and poverty eradication.¹¹¹

¹⁰⁷ COD emissions are said to have dropped by 9.66% and sulphur emissions by 13.14% in 2009. Additional savings were expected in the course of 2010. See P. Pennay, (2010), 'The 11th Five-Year-Plan – A Report Card', *Economic Observer News Department*, 24 November 2010. Available at: <http://www.eeo.com.cn/ens/feature/2010/11/24/187148.shtml>. Accessed on 11 January 2011.

¹⁰⁸ M.D. Levine, L. Price, N. Zhou, D. Fridley, N. Aden, H. Lu, M. McNeil, N. Zheng and Q. Yining, (2010), *Assessment of China's Energy-Saving and Emission-Reduction Accomplishments and Opportunities During the 11th Five Year Plan*, (Berkeley: Ernest Orlando Lawrence Berkeley National Laboratory), p. 90; The World Bank, (2008), *supra* note 69, p. 43.

¹⁰⁹ E. Martinot and L. Junfeng, (2010), *supra* note 57.

¹¹⁰ Other elements of the Work Plan include, *inter alia*, energy efficiency and energy conservation; new and renewable energy; methane recovery and use; hydrogen energy and fuel cells; power generation, transmission and distribution; and capacity building. See Ministry of Foreign Affairs of the People's Republic of China, 'China-EU Partnership on Climate Change Rolling Work Plan'. Available at: <http://www.mfa.gov.cn/eng/wjb/zzjg/tyfls/tfsxw/t283051.htm>. Accessed on 31 January 2011.

¹¹¹ National Development and Reform Commission People's Republic of China, (2007), *supra* note 76, pp. 3, 7 and 9; BBC News, 'China unveils climate change plan', 4 June 2007. Available at: <http://news.bbc.co.uk/2/hi/6717671.stm>. Accessed on 1 February 2011.

The Chinese Programme was initiated shortly after the Partnership had decided to launch two feasibility studies to mark phase one of the NZEC project. The first of these two studies is the Cooperation Action with CCS China-EU (COACH) project. Started in late 2006, it had as its objective to coordinate the activities under the MoU, prepare the ground for large scale implementation of clean coal energy facilities by 2020, and enhance knowledge sharing and capacity building.¹¹² COACH consisted of twenty participants, of which eight were Chinese.¹¹³

The technique researched in the COACH study is that of an Integrated Gasification Combined Cycle (IGCC) thermal power plant.¹¹⁴ This type of plant has a higher development potential and the gasification process allows for the generation of electricity and methanol in the same unit; or 'polygeneration'. China takes a keen interest in this technology as the creation of methanol has the added potential for lowering the country's dependence on imported hydrocarbons.¹¹⁵

CCS is a promising technology, but at current development rates it is still far from commercialisation however. Partly this is due to the fact that the market in developing/emerging economies fails to reflect the real cost to society of the use of fossil fuels to generate electricity.¹¹⁶ In any event, CO₂ capture and storage reduces overall process efficiency and increases the amount of fossil fuels used to achieve a given power generation output.¹¹⁷ Given the fact that more fuel is consumed, experts fear that the focus on CO₂ capture technologies will lead attention away from much needed energy efficiency improvements and renewable energy development. Neglecting the importance of energy efficiency and renewables, they say can ultimately

¹¹² European Commission DG Climate Action, 'China-EU Near Zero Emission Coal Information Dossier'. Available at: http://ec.europa.eu/clima/dossiers/nzec/index_en.htm. Accessed on 27 January 2011.

¹¹³ W. Chen and R. Xu, (2009), 'Clean coal technology development in China', *Energy Policy* 38(5), p. 2129.

¹¹⁴ An IGCC thermal power plant turns coal into gas. The plant removes impurities from the coal before it combusts in an attempt to turn any pollutants into usable by-products. Sulphur dioxide, particulates and mercury emissions of such a plant are lower compared to traditional coal-fired power plants. The excess heat from the primary combustion and generation process is also used to power a steam cycle which results in improved efficiency in comparison with conventional pulverised coal plants.

¹¹⁵ COACH Cooperation Action within CCS China-EU Executive Report, pp. 11-12; W. Chen and R. Xu, (2009), *supra* note 113, p. 2128.

¹¹⁶ COM(2009) 284 final of 25 June 2009, p. 5.

¹¹⁷ China-UK Near Zero Emissions Coal (NZEC) Initiative Summary Report, pp.8-9; L. Dapeng and W. Weiwei, (2009), 'Barriers and incentives of CCS deployment in China: Results from semi-structured interviews', *Energy Policy* 37(6), p. 2423; COM(2009) 284 final, *supra* note 116, p. 5.

threaten energy security and the environment.¹¹⁸ Moreover, others assert that flue gas desulphurisation equipment – an often used technique¹¹⁹ – causes a 4 to 8% reduction in production efficiency, thereby raising the final price. Consequently, even when Chinese operators possess the equipment, they often do not turn it on in order to save money.¹²⁰ It should be noted here that this phenomenon is part of a broader lack of implementation and enforcement of regulations; a topic which cross-cuts every theme in EU-China cooperation and is not limited to environmental regulation (see also *infra*, concluding remarks).¹²¹

When compared to an IGCC plant which is not equipped with CCS technology, the net Cost of Electricity (COE) produced by a CCS equipped IGCC plant is 44% higher.¹²² In this case, the cost of capturing one ton of CO² amounts to roughly 18€, and the cost of the CO² avoided stands slightly higher at around 22,50€ per ton. The costs of transporting the captured CO² to a storage site were estimated at €0,55 per tonne per 100 miles.¹²³ Inevitably, such electricity is uncompetitive compared to the standard electricity sold on the Chinese market, unless an adequate regulatory framework is in place which favours types of electricity that emit less greenhouse gases (see also *infra*, concluding remarks).¹²⁴

The price difference set aside; there is much uncertainty over the possible capacity for CO² storage in China. According to a 2005 study, storage capacity is limited at roughly four times the country's annual CO² output.¹²⁵ The COACH project researched a

¹¹⁸ L. Dapeng and W. Weiwei, (2009), *supra* note 117, p. 2424

¹¹⁹ A technology used to remove sulphur dioxide from the exhaust flue gases of fossil fuel power plants through the use of a chemical solvent which scrubs off the flue gas stream.

¹²⁰ B. Buijs, (2009), *supra* note 70, pp. 71-72.

¹²¹ Interview with official from European Commission DG Energy, 9 November 2010; interview with officials from European Commission DG Research, 8 June 2010; interview with official from European Commission DG External Relations, 23 June 2010; B. Buijs, (2009), *supra* note 70, p. 33. See also 'China Strategy Paper 2007-2013', *supra* note 52, pp. 25-26.

¹²² The analysis is based on the assumption that both type of plants run 7000 operating hours per year. See COACH Report, *supra* note 115, p. 30.

¹²³ The transportation costs were calculated based on the following assumptions. The CO² flowrate was estimated at 3 million tonnes per year with a pipeline diameter of 300mm. The facility's lifetime was set at 20 years, with the pipeline's capital expenditure estimated at € 21,500 per mile and its operational expenditures at €3450 per mile per year. See COACH Report, *supra* note 115, pp. 30-31.

¹²⁴ COACH Report, *supra* note 115, pp. 11, 13-14 and 30; L. Dapeng and W. Weiwei, (2009), *supra* note 117, p. 2425; H. Duan, (2010), 'The public perspective of carbon capture and storage for CO² emission reductions in China', *Energy Policy* 38(9), pp. 5821-5822; COM(2009) 284 final, *supra* note 116, p. 5.

¹²⁵ L. Dapeng and W. Weiwei, (2009), *supra* note 117, p. 2423

number of oilfields, saline aquifers and unmineable coal beds in eastern China for their CO₂ storage potential. The considered sites were the Dagang oilfield province in the Tianjin municipality, the Shengli oilfield province (Shandong), the Kailuan mining area (Hebei province), and the deep saline aquifers in the Jiyang Depression in Shandong province.¹²⁶

The results are highly mixed. The Dagang oil province is estimated at 22 Megatonne (Mt) of CO₂ storage capacity. Given this limited size it was deemed ineligible for large-scale storage. It does however exert potential for Enhanced Oil Recovery (EOR)¹²⁷ pilots. The Shengli field shows more potential in this respect with estimates ranging from 463 Mt to 472 Mt. In the Kailuan mining area, geological barriers were found to inhibit large-scale storage as some of the coal is likely to be mined in the future and other formations have a too low degree of permeability. Finally, within the Jiyang Depression, the Huimin sub-basin's CO₂ storage capacity was found to be enormous at an estimated 22 Gigatonnes (Gt).¹²⁸ However, many uncertainties exist given the limited data availability due to a general lack of commercial interest in deep saline aquifers.¹²⁹ In addition, there are concerns that large-scale CO₂ storage in deep saline aquifers results in acidity, which in turn can cause geological corrosion (see also *infra*, concluding remarks).¹³⁰

The second of the studies conducted under the Partnership is the UK-China NZEC initiative, jointly led by the Chinese Ministry of Science and Technology (MOST) and the UK Department of Energy and Climate Change (DECC).¹³¹ Started in November 2007, the project's objectives included, *inter alia*, knowledge sharing and capacity building; and the performance of case studies for CO₂ capture and storage potential. The project

¹²⁶ COACH Report, *supra* note 115, p. 17.

¹²⁷ See *supra* note 59.

¹²⁸ COACH Report, *supra* note 115, pp. 17-19; and 28-30.

¹²⁹ China-UK Near Zero Emissions Coal, *supra* note 117, pp.7-8 and 21.

¹³⁰ L. Dapeng and W. Weiwei, (2009), *supra* note 117, p. 2424.

¹³¹ In total, the NZEC project involves twenty Chinese partner organisations.

modelled a number of energy scenarios, using projections of energy demand and assessments of potential energy supply technologies.¹³²

The analysis showed that in a carbon constrained scenario under the assumption of continued domination of coal; limited availability of renewable energy and no CCS; emission reductions would strongly depend on the instalment of nuclear capacity. If deeper emission cuts are needed, it would be necessary to create up to 1000 Gigawatt equivalent (GWe) of nuclear power. In addition, over 400GWe of coal-fired plants equipped with CCS technology would be required by 2050 as part of a portfolio of measures to achieve the greatest amount of CO₂ emission cuts.¹³³ Next to the obvious issues of public acceptance, site selection, safety and waste disposal, considerable other doubts exist with regard to such enormous nuclear expansion. Some experts view this as a negative factor for CCS deployment, given that large-scale growth in nuclear capacity could lead attention away from CCS technology and consequently slow the development of this important technology.¹³⁴

In support of the above analysis, the project performed a case-study in China's Jilin Province to judge its CCS potential. The study equally found that coal-fired power plants continue to play a major role in the future with up to 28,000 Megawatt equivalent (MWe) in use by 2030, which would account for at least 51% of Jilin's total installed capacity. The model used suggested that up to 480 Mt of CO₂ could be captured, depending the availability of CO₂ storage as indicated by the COACH project.¹³⁵

A further eight case-studies were performed on options for CO₂ capture in coal-fired power stations, the bulk of which focused on the incorporation of CCS as part of the design of new plants or retrofitting existing ones. Some however, also investigated the option of polygeneration.¹³⁶ The analysis concluded that solvents needed for post-combustion capture¹³⁷ are currently established in other applications and have been

¹³² China-UK Near Zero Emissions Coal , *supra* note 117, p 10; W. Chen and R. Xu, (2009), *supra* note 113., pp. 2129-2130.

¹³³ China-UK Near Zero Emissions Coal , *supra* note 117, pp. 12-13.

¹³⁴ L. Dapeng and W. Weiwei, (2009), *supra* note 117, p. 2425.

¹³⁵ China-UK Near Zero Emissions Coal , *supra* note 117, p. 15.

¹³⁶ *Ibid.*

¹³⁷ See *supra* note 119.

demonstrated at smaller scale, which means the technology is readily applicable to commercial power plants. Pre-combustion capture¹³⁸ on the other hand requires a wide deployment of IGCC power plants. Provided these are to be deployed in the required quantity, the technique could be an attractive way to capture CO₂, but at this stage it remains speculative whether such expansion will in fact take place. Finally, oxyfuel combustion¹³⁹ was seen as a technique which is still in development. It thus remains to be seen how it could contribute effectively in the future. Across the board, it was concluded that for all techniques improving efficiency remains a key-challenge in order to be competitive (see also *infra*, concluding remarks).¹⁴⁰

Apart from the issues related to the competitiveness of CCS generated electricity; the availability of sufficient storage capacity; and the lack of an adequate and effective regulatory system, two additional barriers to the successful development and implementation of CCS technology in China exist. First, when it comes to clean coal technologies, there is a general lack of coherence between EU operations and actions at Member State level. According to several interviewees there is no real inclusion, nor coordination with EU Member States on policy actions towards China.¹⁴¹ This is further exacerbated by the fact that China views Europe as constituting 27 markets, rather than one.¹⁴² Chinese representatives understand that at European level the dominant view is that environmental and commercial objectives are well balanced, however they frequently complain that countries such as for example Germany and the Netherlands do not wish to share their know-how over fears of intellectual property theft (see *infra*, 2.2 and concluding remarks).¹⁴³

The second problem is that China's state-owned enterprises still dominate the transmission, distribution and sales of electricity (see also *infra*, 2.2). The current

¹³⁸ Pre-combustion capture involves removal of CO₂ prior to combustion, to produce hydrogen. Hydrogen combustion produces no CO₂ emissions, with water vapour being the main by-product.

¹³⁹ Oxyfuel combustion involves burning fossil fuels in pure oxygen as opposed to air resulting in a more complete combustion. This results in an exhaust stream which consists of almost pure CO₂ (typically 90%) and water vapour, which can be easily separated from the CO₂ by condensation.

¹⁴⁰ China-UK Near Zero Emissions Coal, *supra* note 117, p. 19.

¹⁴¹ Interview with official from European Commission DG Energy, 9 November 2010; interview with officials from European Commission DG Research, 8 June 2010.

¹⁴² Interview with Director-General of the European Commission DG Energy in the margin of the EU-China Energy Conference, Shanghai, 7 July 2010.

¹⁴³ J. Holslag, (2010), *supra* note 48, p.123.

system's uneven distribution of profits makes it difficult to deploy CCS in China. Under current practice, the price on the grid is determined by competition and the final selling price by the grid companies. Should CCS technology be used therefore, this causes most profits to reside with the grid companies, whereas electricity companies are faced with rising costs of power generation without an equal adjustment in profits (see *infra*, concluding remarks).¹⁴⁴

The above analysis has shown that there is a definite potential for CCS technology development and implementation in China. Nevertheless, significant barriers remain. Phase two of the NZEC project commenced in late 2009 and will run until 2012. It will continue the work done on storage and capture options, taking into account the relevant technical, economical, legal and socio-economic aspects.¹⁴⁵ Yet, however vital CCS technology may be for China to reduce its CO² emissions and limit the country's impact on the environment, its development should at all times be *complementary* to that of renewable energy.

It is important therefore to have a clear overview of the current status of the Chinese renewable market. The next paragraph analyses the potential for renewable energy in China in more detail against the backdrop of significant policy initiatives undertaken in the last five years.

2.2 THE CHINESE RENEWABLE ENERGY MARKET

Since the introduction of the Renewable Energy Law (REL) in 2005, a number of important supporting regulations and guidelines have been put in place to implement it and stimulate the creation of a Chinese renewable energy market.¹⁴⁶ The REL set up guaranteed grid access which obligates power grid companies to acquire all the

¹⁴⁴ L. Dapeng and W. Weiwei, (2009), *supra* note 117, pp. 2429-2430.

¹⁴⁵ Memorandum of Understanding between the European Commission and the Ministry of Science and Technology of the People's Republic of China on Cooperation on Near Zero Emissions Coal (NZEC) Power Generation Technology through Carbon Dioxide Capture and Storage (CCS), Nanjing, 30 November 2009, p.2.

¹⁴⁶ F. Wang, et al., (2009), *supra* note 25, p. 1872; Q. Wang, (2009), *supra* note 77, p. 706.

electricity generated from renewable projects that are within the vicinity and coverage of their grids when sufficient power demand exists.¹⁴⁷ Moreover, as the costs of renewable energy are often higher than of conventional energy, the law stipulates that the cost difference is ultimately levied on the end user.¹⁴⁸

Next to grid access and cost sharing, the law provided for the establishment of a government sponsored special 'Renewable Energy Public Fund'. The fund was primarily set up in order to grant financial support to projects that stimulate renewable energy generation and development such as wind, solar and oceanic energy, rural clean energy projects and independent power systems construction in remote areas and outlying islands.¹⁴⁹ Additionally however, it has another important priority, namely to support scientific research on energy sources that have the capacity to replace oil, and stimulate the use of renewable energies for the heating and cooling systems of buildings. Money can be issued as a grant, or used to subsidise the loan of eligible renewable projects.¹⁵⁰ Other stimulation measures include customs duty exemption to imported renewable energy power generation equipment and high-tech parts, and tax benefits to eligible renewable energy projects. Such tax benefits would often take the form of credits on value-added tax (VAT) and income tax.¹⁵¹

Since the adoption of the REL and its associated measures, the Chinese renewable energy market has grown tremendously. Total renewable energy capacity in China reached 226 GW in 2009. This number is composed of 197GW of hydropower, 25.8GW of wind, 3.2 GW of biomass and 0.4 GW of grid-connected solar photovoltaic power (PV). Combined, renewable energy capacity made up more than 25% of China's total installed power capacity of 860GW.¹⁵² In terms of annual energy use, renewable energy accounted for about 250 million tons of coal equivalent (tce) and renewables made up a

¹⁴⁷ *Ibid.*, p. 1873; J.H. Su, S.S. Hui, and H. Tsen, (2010), 'China Rationalizes Its Renewable Energy Policy', *The Electricity Journal* 23(3), p. 28; L. Mastny (ed.) (2010). *Renewable Energy and Energy Efficiency in China: Current Status and Prospects for 2020*. Worldwatch Institute. October 2010, p. 28; E. Martinot and L. Junfeng, (2010), *supra* note 57, p. 3.

¹⁴⁸ J.H. Su et al., (2010), *supra* note 147, p. 32.

¹⁴⁹ F. Wang et al., (2009), *supra* note 25, p. 1874; J.H. Su et al., (2010), *supra* note 147, p. 32.

¹⁵⁰ F. Wang et al., (2009), *supra* note 147, p. 1874.

¹⁵¹ *Ibid.*, pp. 1874-1875; Q. Wang, (2009), *supra* note 77, p. 1996; X. Zhang et al., (2009), *supra* note 55, p. 4934.

¹⁵² E. Martinot and L. Junfeng, (2010), *supra* note 57.

9% share of the country's total primary energy use by the end of 2008, compared to 7.5% in 2005. Hydropower is the largest contributor (180 million tce), followed by solar, wind and modern biogas energy (70 million tce).¹⁵³ When it comes to renewable electricity generation, the share of total electricity generated by renewable sources was 16% in 2009.¹⁵⁴ Given the continued growth of the Chinese renewable sector in 2010, wind energy in particular, China seems to have few difficulties to stay on course for reaching its target of 10% of primary energy from renewables.¹⁵⁵

China's many rivers endow the country with an impressive potential for hydroelectric power generation. Based on a review conducted in 2005, the technically exploitable capacity is 542GW, with an annual power generation capacity of 2474 Terawatt hour (TWh). These impressive figures make China rank first in the world among hydroelectric producers.¹⁵⁶ The goal set within the Mid- and Long-Term Plan for Renewable Energy Development (MLTPRED) of reaching 50 GW of installed small hydro capacity¹⁵⁷ by 2010 was already accomplished as early as 2008.¹⁵⁸

Since 2005, China's newly added wind power capacity doubled for four consecutive years.¹⁵⁹ By as early as 2007, cumulative wind power installations in China exceeded 5 GW – a goal originally set for 2010 by the MLTPRED. This achievement caused the Chinese government to adjust the goal to 10 GW for 2010. The development of wind power in China proceeded at such an enormous rate however that already by 2008 wind power installed capacity had reached 12.15 GW.¹⁶⁰ By the end of 2009, total

¹⁵³ REN21, (2009). Recommendations for Improving the Effectiveness of Renewable Energy Policies in China. October 2009, p. 7.

¹⁵⁴ L. Mastny (ed.) (2010), *supra* note 147, p.26.

¹⁵⁵ Renewable Energy Magazine, '2010: renewables continue their unstoppable growth', 31 December 2010. Available at: <http://www.renewableenergymagazine.com/paginas/ContenidoSecciones.asp?ID=14&Cod=7044&Nombre=News>. Accessed on 12 January 2011.

¹⁵⁶ W. Liu, H. Lund, B.V. Mathiesen, and X. Zhang, (2010), 'Potential of renewable energy systems in China', *Applied Energy* 88(2), p. 519; L. Mastny (ed.) (2010), *supra* note 147, p. 26.

¹⁵⁷ Installations below 50 Megawatt (MW) in capacity.

¹⁵⁸ L. Mastny (ed.) (2010), *supra* note 147, p. 27.

¹⁵⁹ *Ibid.*, p. 28.

¹⁶⁰ Q. Wang, (2009), *supra* note 77, p. 703; W. Liu et al., (2010), *supra* note 156, p.521.

installed capacity was 26 GW, surpassing that of Germany and trailing only to the United States.¹⁶¹

China receives a great amount of sunshine per year. More than 96% of China receives more than 1050 Kilowatt hour (KWh) of solar radiation per M² and over two thirds of the country receives radiation of over 5000 Megajoule (MJ) per M² a year and more than 2200hrs of sunshine.¹⁶² The solar PV industry in China is growing fast. In 2004, China had a production capacity of 100 MW of PV, roughly one twelfth of global production capacity at the time.¹⁶³ From 2004 onwards, the production of solar cells increased twentyfold to 2.6 GW in 2008. This feat has made China the largest producer of solar PV cells, the majority of which is exported.¹⁶⁴

Biomass energy technology in China is of a mature level and the country is home to many biomass boiler manufacturers.¹⁶⁵ Biomass gasification has developed strongly, with gasifiers of up to 6 MW in capacity, and system efficiencies reaching 28%.¹⁶⁶ China's total power generation capacity stemming from biomass was 2 GW in 2005.¹⁶⁷ By 2008, this number had increased to 3 GW. Annual biomass resources amount to 500 million tce per year, with yearly consumption being around half of this amount, primarily used for traditional fuel. Around 220 million tce of biomass energy is available for rural household energy purposes, but actual consumption is said to lie much lower (see *infra*, this paragraph).¹⁶⁸

However – notwithstanding these impressive growth figures – there are still a number of substantial barriers which impede the further development of the Chinese renewable energy market. More generally applicable issues include a lack of funds and technology, innovation, an underdeveloped industrial structure and a shortage on development

¹⁶¹ L. Mastny (ed.) (2010), *supra* note 147, p. 28.

¹⁶² *Ibid.*, pp. 29-30; W. Liu et al., (2010), *supra* note 156, p. 521.

¹⁶³ X. Zhang et al., (2009), *supra* note 55, p. 4395.

¹⁶⁴ L. Mastny (ed.) (2010), *supra* note 147, p. 30; B. Buijs, (2009), *supra* note 70, p. 38.

¹⁶⁵ X. Zhang et al., (2009), *supra* note 55, p. 4395.

¹⁶⁶ *Ibid.*, p. 4396.

¹⁶⁷ *Ibid.*

¹⁶⁸ L. Mastny (ed.) (2010), *supra* note 147, pp. 32.

experience.¹⁶⁹ Furthermore, most of the currently applied renewable energy technologies are either within the R&D or demonstration stages of development, or are only in the stages of early commercialisation. Few technologies are fully commercialised and able to compete equally – in terms of both price *and* quality – with western technology; hydropower and biogas being the exception.¹⁷⁰

According to some, the quality of Chinese renewable energy technology – photovoltaic in particular – is underpriced and does not correspond to EU standards.¹⁷¹ Greater financial contributions are necessary to improve this situation. However, the high cost of the most efficient technologies hinders their deployment.¹⁷² Moreover, often private companies are reluctant to invest during the earlier stages due to the low economic return, the risk of free-rider behaviour and intellectual property theft.¹⁷³ Conversely, Chinese stakeholders frequently complain that companies in developed countries are able to monopolise access to clean technology and limit its transfer for private interests (see also *infra*, concluding remarks).¹⁷⁴

However, a more immediate issue in terms of actual renewable electricity provision is the difficulty to feed renewable energy – wind in particular – into the Chinese grid as legally required by the REL. Whereas China's generation capacity has grown tremendously, there are real concerns that not all power is being fed into the grid.¹⁷⁵

¹⁶⁹ Z.Y. Zhao, et al., (2010), *supra* note 70, p. 1105.

¹⁷⁰ X. Zhang et al., (2009), *supra* note 55, p. 4395; Z.Y. Zhao, et al., (2010), *supra* note 70, p. 1107.

¹⁷¹ Interview with officials from Permanent Representations of Slovenia and Slovakia to the EU, 23 April and 20 May 2010. Zhao et al., similarly remark that there is a lack of an adequate accreditation system for scientific technology and the quality of PV products. See Z.Y. Zhao, et al., (2010), *supra* note 70, p. 1108.

¹⁷² Q. Wang, (2009), *supra* note 77, p.710; Z.Y. Zhao, et al., (2010), *supra* note 70, p. 1108.

¹⁷³ Interviewees confirmed that there is a lot of bad experience in European industry in this regard. Interview with research fellow of the Oxford Institute for Energy Studies in the margin of the EU-China Energy Conference, Shanghai, 9 July 2010; interview with officials from European Commission DG Research, 8 June 2010; interview with official from European Commission DG External Relations, 23 June 2010. See also X. Zhang et al., (2009), *supra* note 55, pp. 4397-4398; B. Buijs, (2009), *supra* note 70, p. 33; J. Holslag, (2010), *supra* note 48, p. 122; EU-China CDM Facilitation Project. Key Findings and Recommendations, p. 4. Available at: <http://www.euchina-cdm.org/media/docs/EU-China%20CDM%20Policy%20Brief%20Aug%2009.pdf>; EUobserver, 'China catching EU on innovation, amid industrial espionage scandals', 2 February 2011. Available at: <http://euobserver.com/9/31733>. Both accessed on 2 February 2011.

¹⁷⁴ EU-China CDM Facilitation Project. Key Findings and Recommendations, *supra* note 173, p.4; J. Holslag, (2010), *supra* note 48, p. 122.

¹⁷⁵ It is reported that up to one-third of wind energy generation capacity is not connected to the grid and thus remains idle. See S. Schuman, (2010), 'China Renews Its Commitment to Renewable Energy', *National Resources Defense Council Staff Blog*, 1 February 2010, p. 1. Available at:

The main problem is reluctance on part of grid enterprises to build and expand grids to connect producers of wind energy. The reason is that many wind energy producers are located in remote areas, where generation circumstances are most optimal. Connecting these operators to the grid requires a significant financial investment.¹⁷⁶ Moreover, grid operators feel that given renewable energy's modest share of total electricity generation and its higher cost per KWh, it is too risky to invest in innovation in this area.¹⁷⁷ The problem of grid connectivity is exacerbated by the fact that the Chinese market is dominated by a few large state owned companies who simultaneously own the energy infrastructure, making it harder for new players to enter the market (see also *infra*, concluding remarks).¹⁷⁸ A further compounding factor is the Chinese renewable electricity sector's low operating efficiency, compared to other producers, such as the US.¹⁷⁹

In an attempt to amend some of the above issues, China decided to revise the REL in 2009. When drafting the law, the Chinese consulted the European Commission on a number of occasions – a feat which European officials labelled as 'promising' for future bilateral relations.¹⁸⁰ The updated law took effect on 1 April 2010.

First, in order for grid development to keep pace with renewable energy growth, one of the amendments provides for closer coordination of renewable energy with overall power sector development, transmission planning, as well as between local- (provincial-) level development and national development plans.¹⁸¹

Second, the amendments strengthened provisions which guarantee the purchase of all generated renewable energy. Companies are now obliged to meet a target with respect

http://switchboard.nrdc.org/blogs/bfinamore/china_renews_its_commitment_to.html. Accessed on 17 January 2011; and F. Wang et al., (2009), *supra* note 25, p. 1875

¹⁷⁶ F. Wang et al., (2009), *supra* note 25, pp. 1875-1876; J.H. Su et al., (2010), *supra* note 147, p.30; Q. Wang, (2009), *supra* note 77, p. 708; W. Liu et al., (2010), *supra* note 156, p. 520; S. Schuman, (2010), *supra* note 175, p. 2; B. Buijs, (2009), *supra* note 70, p. 37.

¹⁷⁷ REN21, (2009), *supra* note 153, p. 26.

¹⁷⁸ X. Zhang et al., (2009), *supra* note 55, p. 4398.

¹⁷⁹ According to Wang et al., in 2007 1MW of Chinese renewable electricity capacity generated 955MWh, compared to 1433 MWh in the US. See F. Wang et al., (2009), *supra* note 25, p. 1875.

¹⁸⁰ The fact that China consulted the Commission whilst drafting the law was said to be 'unusual'. In comparison, the European Commission conducts a stakeholder consultation via the internet, but does not seek advice of other States. It was heralded as a significant step in bilateral relations. Interview with official of the European Commission DG Energy, 9 November 2010.

¹⁸¹ E. Martinot and L. Junfeng, (2010), *supra* note 57, p. 2; Su et al., (2010), *supra* note 147, p. 30.

to the proportion of renewable power relative to overall power generation under all circumstances, yet are allowed to transfer the power to the national grid company for use elsewhere. No precise amounts are mentioned, however government agencies are directed to set the targets and enforce them; financial penalties are issued upon non-compliance.¹⁸² This enforcement capability makes the Chinese system move in the direction of a kind of 'Renewable Portfolio Standards' system¹⁸³, similar to the one used in the US (see also *infra*, concluding remarks).¹⁸⁴

A third important change has to do with China's Renewable Energy Public Fund. Under prior conditions, the fund collected a surcharge on electricity which was sold to final consumers.¹⁸⁵ Now, instead of the companies collecting the surcharge, the customer pays the charge directly into the fund. After these charges have been pooled together, the grid companies can then seek compensation for the additional cost of purchasing renewable energy and the costs associated with their integration. What makes this change important is that, when pooled together, it allows the Chinese government to use the money to invest in renewable energy projects and R&D. Similarly, it allows the charges collected in China's wealthier eastern provinces, to be invested in its less developed western region which is most well-endowed with renewable energy resources (see also *infra*, concluding remarks).¹⁸⁶

The amendments provide for some important and much needed changes. Some important issues remain unresolved however. With respect to renewable energy's modest share of total electricity generation it should be noted that, as renewable electricity will only make up around 20% of primary energy consumption by 2020, there is a clear need for a strong strategy on non-electric renewable energy sources, such as biofuels, biogas, rural fuel wood and agricultural waste heating.¹⁸⁷ In August 2009, the

¹⁸² E. Martinot and L. Junfeng, (2010), *supra* note 57, p. 3; S. Schuman, (2010), *supra* note 175, p. 2.

¹⁸³ The Renewable Portfolio Standards system is a regulation which places an obligation on electricity supply companies to produce a specified fraction of their electricity from renewable energy sources.

¹⁸⁴ S. Schuman, (2010), *supra* note 175, p. 2; F. Wang et al., (2009), *supra* note 25, p. 1876.

¹⁸⁵ E. Martinot and L. Junfeng, (2010), *supra* note 57, p. 3.

¹⁸⁶ S. Schuman, (2010), *supra* note 175, p. 3; Reuters, 'China legislators seen mulling renewables fund', 24 August 2009. Available at: <http://www.reuters.com/article/idUSTRE57N26720090824>. Accessed on 20 January 2011.

¹⁸⁷ Interview with official from the Sino-Danish Renewable Energy Development Programme in the context of the July 2010 EU-China Energy Conference, Shanghai, 27 July 2010. See also U. Weber, (2010). 'Achieving China's Non-

biomass tariff was adjusted upwards from US \$ 0,037/KWh to US \$ 0,052/KWh.¹⁸⁸ However, the current scale of development and use is said to be still relatively small, causing China to have difficulties to reach its capacity target of 5000 MW for 2010 and 30GW for 2020. Biofuel is an alternative to oil and thus potentially interesting. However, China restricted biofuel production from food feedstocks in 2007.¹⁸⁹ The reason is that, as it does not possess enough crops and arable land for it to sufficiently feed its own population, China views getting involved in the biofuels debate as potentially treacherous. Naturally, Beijing would be interested in purchasing biofuels from elsewhere if doing so reduces its use *of* and dependence *on* fossil fuels. However, because of the aforementioned reason, it is wary to get actively and visibly involved in this debate, let alone support domestic production (see also *infra*, concluding remarks).¹⁹⁰

Particularly in the wind power sector – China’s fastest growing renewable energy source – several fundamental issues continue to exist. First, China remains to a large extent dependent on other countries’ knowledge and expertise with respect to turbine manufacturing, wind farm maintenance and management. Manufacturing is well developed, however when it comes to the fabrication of the software controls and refined technical components, the Chinese are – yet – unable to adequately duplicate Western technology.¹⁹¹ However, China is catching up fast.¹⁹²

Second, since 2003 investors and developers of wind power projects (those of more than 50 MW in capacity) are selected through a concession bidding process whereby the winning bid is conditioned on the extent of ‘local content’¹⁹³ involved and the price offered per KWh.¹⁹⁴ Up until recently, local content had to represent 70% of the final product in terms of the value of incorporated materials and components. This

Fossil Fuel Target: Beyond the Electricity Sector’. Available at: <http://dcbf.dk/Latest/From+DCBF/ca40/newsid/19804>. Accessed on 20 January 2011.

¹⁸⁸ E. Martinot and L. Junfeng, (2010), *supra* note 57, pp. 3-4.

¹⁸⁹ L. Mastny (ed.) (2010), *supra* note 147, p. 33.

¹⁹⁰ Interview with official of the European Commission DG Energy, 25 May 2010.

¹⁹¹ Interview with research fellow of the Oxford Institute for Energy Studies in the margin of the EU-China Energy Conference, Shanghai, 9 July 2010; W. Liu et al., (2010), *supra* note 156, p.520.

¹⁹² EUobserver, ‘China catching EU on innovation...’, *supra* note 173.

¹⁹³ Materials and components used which come from China.

¹⁹⁴ Q. Wang, (2009), *supra* note 77, pp. 705-706.

precondition clearly aided the Chinese to build up a strong domestic wind industry as foreign companies were forced to set up subsidiaries in China in order to meet the criterion.¹⁹⁵ By 2010, this requirement was dropped and considered no longer necessary.¹⁹⁶

Only a few months before, in August 2009, the Chinese government had decided to amend the feed-in tariffs for wind energy. The wind energy market was basically divided into four different geographical regions, each with its own tariff. The price offered depended on the ability of the region to generate wind power energy. The best endowed region provides the lowest tariff (US \$ 0,075/KWh) which then gradually increases up to US \$ 0,09/KWh for the least endowed region. Tariffs correspond with prices offered by prior projects which were accepted in the past three years.¹⁹⁷

As much as this approach has the appeal of being market based, the reality is still somewhat different. This is because in practice the prices do not truly correspond to the 'market'. Prior experience has shown that out of the two criteria, local content often mattered much less compared to price per KWh when it came to winning a bid. This practice results in a fierce price competition among bidders. A phenomenon which subsequently occurs is that large (mostly state-owned) corporations, who possess profitable coal-fired, hydropower- or nuclear power stations, undercut competing bidders by setting their prices so low that the project could actually be considered economically undevelopable.¹⁹⁸ Market size and financial power allows these companies to sustain such a (small) loss for a period of time, if by doing so, they gain a foothold in this emerging industry. The possibility for market entrants or smaller companies to make a successful bid however is thereby significantly reduced. Similarly, under such conditions the incentives for firms to invest in research and development which could improve the

¹⁹⁵ B. Buijs, (2009), *supra* note 70, p. 37.

¹⁹⁶ E. Martinot and L. Junfeng, (2010), *supra* note 57.

¹⁹⁷ E. Martinot and L. Junfeng, (2010), *supra* note 57, pp. 3-4; Renewable Energy Focus, 'China launches differentiated wind energy tariffs', 7 September 2009. Available at: <http://www.renewableenergyfocus.com/view/3817/china-launches-differentiated-wind-energy-tariffs/>. Accessed on 20 January 2011.

¹⁹⁸ Q. Wang, (2009), *supra* note 77, pp. 706-707; B. Buijs, (2009), *supra* note 70, p. 37; Q. Wang and Y. Chen, (2010), 'Barriers and opportunities of using the clean development mechanism to advance renewable energy development in China', *Renewable and Sustainable Energy Review* 14(7), p. 1997.

competitiveness of renewables are lower than they should be (see also *infra*, concluding remarks).¹⁹⁹

A third (related) issue has to do with the financial benefits for wind power projects to acquire Clean Development Mechanism (CDM) status. The costs of CDM wind power projects are lower compared to those without CDM backing, as the latter cannot benefit from Annex I Certified Emission Reductions (CER).²⁰⁰ However, in order to be eligible for CDM status a wind park must be for 51% owned by a Chinese company. Foreign investors argue that with such a restriction it is difficult for them to manage a company efficiently. The consequence is that given the nature of the bidding process – lowest price per KWh usually wins – it becomes impossible for foreign companies to factor in CDM income and hence get a decent chance at acquiring the concession (see also *infra*, concluding remarks).²⁰¹

The extent to which these fundamental issues can be resolved, hinges both on the extent and quality of international cooperation, as well as the future direction of Chinese national policy. With regard to the latter much depends on the 12th Five-Year-Plan. A preliminary version of the plan detailed that China aims to nurture and develop seven new strategic industries with favourable policies in the next five years. These include new-generation information technology, energy-saving and environment protection, new energy, biology, high-end equipment manufacturing, new materials and new-energy cars. Fiscal, tax and financial benefit can be expected in order to boost science and technology development.²⁰²

¹⁹⁹ Interview with official from the Sino-Danish Renewable Energy Development Programme in the context of the July 2010 EU-China Energy Conference, Shanghai, 27 July 2010; F. Wang et al., (2009), *supra* note 25, p. 1876.

²⁰⁰ Certified Emission Reductions (CER) are so-called 'Carbon Credits' which are issued by the Clean Development Mechanism Executive Board. CERs can be used by the Annex I parties – the industrialised countries – under the Kyoto Protocol in order to comply with their emission limitation targets.

²⁰¹ Interview with research fellow of the Oxford Institute for Energy Studies in the margin of the EU-China Energy Conference, Shanghai, 9 July 2010; B. Müller, D. Robinson, and Z. Xiliang (eds.), (2010). 'Addressing Large Developing Country Emissions'. Oxford, Oxford Institute for Energy Studies, pp. 27 and 46; EU-China CDM Facilitation Project. Key Findings and Recommendations, *supra* note 173, p. 5.

²⁰² China Daily, 'China to nurture 7 new strategic industries in 2011-15', 28 October 2010. Available at: http://www.chinadaily.com.cn/business/greenchina/2010-10/28/content_11470638.htm. Accessed on 21 January 2011.

Furthermore, the plan sets some clear objectives with regard to the types of energy used. Coal is to stay China's dominant form of energy, whilst production of hydro-, wind-, biomass-, solar-, and nuclear power is to be enhanced. Hydropower is to be the 'backbone' of renewable energy in China with installed capacity forecasted to reach 280 TW by 2015. Similarly, wind power capacity is set at 90 TW, biomass at 1.3MW, nuclear at 30TW and solar at 5TW – all by 2015. In total, renewable energy will rise to a share of 11,4% of primary energy consumption.²⁰³

Ultimately, the plan is to direct China from a net importer of fossil fuels towards an exporter of renewable energy and energy efficiency technologies. The plan places emphasis on efficiency as a source for business, and aims to move towards smaller, distributed energy generation; away from large central hubs. The idea is to stimulate development of regional-scale energy enterprises across China.²⁰⁴ What is very important in this respect is that the plan appears to allow private capital to get involved in what hitherto were state-controlled monopolies and industries. This could increase competition and raise the incentive for research and development (see also *infra*, concluding remarks).

The above analysis has shown the enormous growth and potential of the Chinese renewable energy market. The progress that has been made in the past decade can be hailed as an outstanding achievement which surpassed all initial expectations. However, it is equally clear that significant barriers to development and application of renewable energy technology in China remain. Without a proper solution to these issues, and taking into account China's continued reliance on heavy coal, it is unlikely for the People's Republic to make a successful transition to a sustainable energy future.

²⁰³ Caijing, 'China Mapped out Energy Program During 12th Five-Year Plan', 22 October 2010. Available at: <http://english.caijing.com.cn/2010-10-22/110549828.html>. Delegation of the European Union in China, (2011), 'Full Translation 5yr Plan 2011-2015', pp. 3-4. Available at: http://cbi.typepad.com/china_direct/2011/05/chinas-twelfth-five-new-plan-the-full-english-version.html. Accessed on 17 May 2011.

²⁰⁴ Global Fund Exchange Investing in the Future of Energy Blog, 'China's 12th Five-Year Plan Emphasizes Clean Energy Exports', 10 January 2011. Available at: http://www.globalfundexchange.com/?p=3250&option=com_wordpress&Itemid=267. Accessed on 21 January 2011.

3. CONCLUSIONS AND RECOMMENDATIONS

As the analysis has demonstrated, the importance of China in the global debate on climate change has had a significant impact on the development of stronger energy ties between Brussels and Beijing. The EU-China Partnership on Climate Change has allowed both parties to come to an impressive level of integration, particularly in the field of renewable energy, energy efficiency and green technology. Nevertheless, important issues remain as were highlighted in section two.

With respect to cooperation on CCS and clean coal technology various inhibiting factors were identified. One of the most pressing issues, which is not limited to CCS alone, is **the lack of a proper enforcement of regulations and follow-up** on bilateral cooperation in China.²⁰⁵

The cause of the problems stems partly from the fact that both the EU and China possess an intricate bureaucratic apparatus which is responsible for conducting dialogue and to follow up on bilateral cooperation. This causes multiple departments on both sides to work on a given issue, which at times can cause overlap, inefficiencies, or delays due to insufficient coordination.²⁰⁶ On the EU side, it was therefore suggested to create **a more efficient dialogue structure**; one which would allow the various projects to run on time and exert a higher level of discipline. The basic idea would be to incorporate future projects into **one single operating framework**, with a clearer hierarchy. It is important for such a framework to possess a disciplined reporting line which allows for a stronger form of accountability and for projects to stay on track.²⁰⁷

On the Chinese side, the Renewable Energy Law (REL) and its amendments introduced an impressive regulatory framework and caused a significant improvement with respect to implementation of EU-China cooperation and beyond. However, as often with new legislation, the law suffers from various uncertainties and difficulties with respect to the integration of renewable energy into the national energy system (see *infra*, this

²⁰⁵ Interview with officials from European Commission DG Research, 8 June 2010; interview with official from European Commission DG Energy, 9 November 2010.

²⁰⁶ Interview with official of the European Commission DG External Relations, 23 June 2010.

²⁰⁷ *Ibid.*

paragraph). A more fundamental issue to which we turn our attention first is the fact that an effective regulatory framework concerning CCS and related technology is still missing.

As CCS generated electricity requires more energy and is ultimately more expensive, there is a clear need for **a regulatory system which ‘rewards’ electricity that exhaust less CO²**. One possible way of achieving this is to introduce a ‘Carbon tax’ on electricity which exceeds a given amount of CO² output during the generation process.²⁰⁸ Such fiscal measures could benefit CCS generated power and allow it to more effectively compete with both conventional and renewable electricity. Over time such taxes and subsidies can be phased out when CCS technology becomes more efficient, and hence more competitive.

At the same time, power generation should **move away from treating CO² as a ‘waste product’**, towards viewing it as a useful by-product of electricity generation (see also *infra*, this section). The current industrial use of CO² is very limited. The stimulation of industry to utilise CO² for specific purposes, such as Enhanced Oil Recovery, could boost demand for CCS and help develop the value chain of CCS technology.²⁰⁹ Furthermore, if CCS technology is to become a success story in China, it is necessary to gradually challenge the dominant position of Chinese state-owned grid companies. An increase in **liberalisation of the energy market** would benefit the possibility of new market entrants and allow non-state owned energy companies to compete more effectively.

There is an additional reason why the monopolies should be gradually challenged. As the Chinese energy market is dominated by a few large state owned companies who also own the energy infrastructure, their reluctance to expand the grid to producers of ‘competing energy’ is reinforced. The announcement of the 12th Five Year Plan to allow private capital go get involved in these industries is hopeful in this regard as it could (i) increase competition; (ii) stimulate companies to invest more in research and development as a result of this competition; and (iii) discourage large companies from

²⁰⁸ L. Dapeng and W. Weiwei, (2009), *supra* note 117, pp. 2426-2427.

²⁰⁹ *Ibid.*, pp. 2429 and 2431.

undercutting break-even prices on wind power concessions to crowd out competitors. However, such a development could take a long time. Therefore, as a first step, the Chinese State could **use money from the Renewable Energy Public Fund** to extend favourable loans to renewable energy producers in remote regions to allow them to (partially) finance the necessary grid expansions.

The current obligation for power companies to buy a given amount of renewable electricity relative to total electricity purchased proves a very useful feat in order to raise the competitiveness of renewables. However, in the long term it is preferred that China introduces a kind of **Renewable Portfolio Standard system**, comparable to the one used in the US. However, given that by 2020 renewable *electricity* will only make up around 20% of primary energy consumption, it is recommended that such a system incorporates **clear targets for non-electric renewable energy sources**, such as biofuels, biogas, rural fuel wood and agricultural waste heating. Should implementation of such a regulation prove too sensitive domestically, it is worth exploring possibilities for the larg(er) scale purchase of such fuels from abroad.

Specifically with regard to **wind energy**, it has been made clear that minimal requirements placed on Chinese ownership of wind parks render it practically impossible for foreign companies to factor in Clean Development Mechanism income, and thus successfully bid for a concession. A recent study by the Oxford Institute for Energy Studies (OIES) however provides suggestions which could increase EU-China cooperation on wind park siting, development, and operations; grid development and extension; and the systems required to integrate and back up the wind power.²¹⁰

The idea would be for China and the EU to engage in a **Joint Commitment Framework Agreement (JCFA)**. Under, such a JCFA the EU would commit itself to financial, technical and policy support for wind park development in China, either through carbon offsets or Nationally Appropriate Mitigation Actions (NAMAs). The wind parks will reduce CO² emissions coming from China; the 'amount' of which is

²¹⁰ B. Müller, D. Robinson, and Z. Xiliang (eds.), (2010), *supra* note 201, p. ii; interview with research fellow of the Oxford Institute for Energy Studies in the margin of the EU-China Energy Conference, Shanghai, 9 July 2010.

subsequently purchased by the EU in the form of Certified Emission Reduction credits. In return, the Chinese commit themselves to adapt the 51% rule.²¹¹

Finally, it should be reminded that the Union's collective efforts risk being undermined if there is a **lack of coherence** between the actions of EU capitals on the one hand and those of Brussels on the other. Interviews with European civil servants and research within China conducted by others have indicated that such lack of coherence is acknowledged as problematic. In this regard, the European Council recently noted that a strategic partnership such as the one with China:

“will only work if [it is a] two-way street based on mutual interests and benefits and on the recognition that all actors have rights as well as duties”.²¹²

An imbalance in environmental and commercial objectives between the European and national level can fuel mistrust between the EU and China. Moreover, it can serve to create uncertainties about bilateral commitments, as well as among European companies who then increasingly compete against each other, rather than engage in cooperation. Also, it strengthens the Chinese perception that Europe overprotects its key technologies and limits their transfer.

Therefore, if practices as proposed by the OIES are to eventually succeed, it is imperative for coordination between the European Commission and EU Member States to improve. For if not, the EU-China Partnership on Climate Change risks becoming a framework which Beijing increasingly views as one which favours the protection of European business interests over Chinese green technology development.

²¹¹ *Ibid.*

²¹² European Council, 16 September 2010, Presidency Conclusions, point 4, p. 2. Available at: http://www.consilium.europa.eu/uedocs/cms_data/docs/pressdata/en/ec/116547.pdf. Accessed on 14 February 2011.

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