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DEPARTMENT OF **EU INTERNATIONAL
RELATIONS AND DIPLOMACY STUDIES**

InBev-Baillet Latour Chair of
European Union-China Relations



Issue 1, 2010

EU-China Observer

www.coleurope.eu



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THE EU-CHINA PARTNERSHIP ON CLIMATE CHANGE

Artur Runge-Metzger*

Introduction

One of many common challenges facing both China and the European Union is the menacing threat of climate change. However, tackling climate change also presents an opportunity. It can help to unlock investment that will accelerate a global recovery and ease our dependence on fossil fuel imports. Tackling climate change requires the same kind of measures needed to reduce our energy dependency and improve our environment. The ingredients include energy saving and efficiency, urban planning, forest protection and importantly, the transition from hydrocarbons to renewable and nuclear energy as well as cleaner use of coal.

With this in mind, the EU and China have already embarked on strategic energy and climate technology cooperation. Various instruments are deployed, in particular, the EU and China Partnership on Climate Change agreed in 2005. This focuses on concrete actions to develop, deploy and lower the cost of clean energy technologies and reinforce China's capacity to benefit from the Clean Development Mechanisms. Our cooperation is supporting a process that is already effectively happening. China has been successfully conducting technology transfers through trade, foreign investment and international cooperation.

However, this is not enough. Additional efforts should be put in place to shift our economies towards a low carbon path and globally to achieve the 2°C target. Early actions have to be taken to mitigate the risk of carbon lock-in. Driven by energy security and industrial policy interests, China will, independently from an international agreement, implement domestically its sustainable development policies on energy efficiency and renewable energy, which will mitigate greenhouse gas emissions. The Commission stands ready to support and speed up this process. We believe that an agreement under the UNFCCC framework would be beneficial for China. It would provide improved access to technology and the carbon market, eliminate free riding, and reduce competitiveness concerns and the potential for trade frictions. Additional momentum will be added in order to put in place more progressive policies targeting more aggressively and specifically mitigation.

Strategies and Action Plans

Under the Copenhagen Accord, China and the EU agreed that a low-emission development strategy (LEDS) is indispensable to the sustainable development of a country. China could easily draw up such a strategy on the

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basis of its 12th Five-Year Plan (2011-15) and China's national climate change programme. Such a national plan then needs to be operationalised and implemented at the local level. Under the project "Provincial strategies and actions for climate change mitigation and adaptation in China," the EU is supporting the government of China in translating its National Climate Change Programme into on-the-ground action by developing local policies, institutional frameworks, partnerships and implementation capacities.

The purpose of the project is to develop strategies and actions to mitigate greenhouse gas emissions and to implement climate change adaptation in pilot provinces and autonomous regions across China. With the support of EU funds, guidelines on the preparation of Provincial Climate Change Programmes will be established together with draft programmes for seven key provinces and selected feasibility studies. Work on climate change is also supported by two other major EU-China environmental cooperation programmes: the River-Basin Management Programme (EU contribution of €25m) and the EU-China Biodiversity Programme (EU contribution of €30m). These programmes will model climate change adaptation with a focus on the water sector and protection of biodiversity.

Cooperation on carbon capture and storage

If we take a step back to evaluate our cooperation so far, and consider the progress achieved on the two main co-operation goals of the EU and China Partnership on Climate Change, then I believe we can be satisfied. We have made substantial progress on the process to develop and demonstrate in China and the EU advanced, near-zero emissions coal technology through carbon capture and storage (CCS).

In particular as for the near-zero emissions coal technology, a lot has changed since we signed the agreement in 2005. There is growing recognition, also in China, of the role of CCS as an option to face the magnitude of the climate challenge. Projections beyond 2020 indicate that CCS will play a crucial role in reducing CO₂ emissions.

In 2008, the Group of Eight industrial powers (G8) agreed to launch 20 large CCS and demonstration projects by 2010. MEF Leaders agreed in July 2009 to establish a Global Partnership to drive transformational low-carbon, climate-friendly technologies. Leading countries are now in the process of spearheading action through a Technology Action Plan, which includes carbon capture, use and storage. In the EU, we now have a clear legal framework for CCS. Emissions captured and stored are recognised as not emitted under the Emissions Trading System – this provides a major long-term incentive for CCS deployment.

Given the current trajectory of growing fossil fuel electricity generation and industrial growth in key developing countries, it is crucial that they develop and demonstrate CCS in parallel with industrialised countries. Therefore, it is important to co-finance demonstration projects as part of a range of mitigation technologies – not only in our own countries but also in



developing countries provided that the necessary technical, economic and regulatory framework exists in order to ensure environmental integrity.

In China, the first phase of the China-EU Cooperation on Near Zero Emissions Coal has been finalised. Four public and private partnerships on research and development (R&D) involving Chinese and European academic organisations, private companies, and government bodies have made significant progress. The four projects, COACH, STRACO2, Geocapacity and the UK-China Initiative, have cooperated closely with each other with a strong emphasis on knowledge sharing and building capacity, expertise and skills.

In June 2009, the Commission adopted a Communication on financing the construction and operation of an NZEC demonstration plant in China. The EU Environment Council invited the Commission to cooperate with the EU and EEA Member States, international stockholders and financial institution to find the way to co-finance this demonstration project.

At the last EU-China Summit on 30 November 2009, the EC and China's Ministry of Science and Technology signed the second Memorandum of Understanding (MoU) on Phase II (feasibility study) of the NZEC project. Public bodies have a crucial role in setting up the demonstration framework and make available public financing to leverage private investments, but it is for the commercial sector to respond by showing that the technology can and will work in practice. During the feasibility study and the construction and operation of the demonstration plant, Chinese ownership of the project will be essential, in particular, the involvement of major stakeholders such as China's public power utilities and oil companies.

In view of the additional cost of CCS, setting up a carbon price will be required to enable the deployment of the technology.

Revamping the cap and trade system

The EU firmly believes that a global carbon market, through a cap and trade system, is the most cost-effective approach. China and the EU have both benefited from the Clean Development Mechanism (CDM). China is already now the largest beneficiary of the Clean Development Mechanisms (CDM) which provided nearly half of all credits. Transfers between the EU and China alone in this context will amount to billions of Euros up until 2012. Indeed, the EU and China have been the two most important protagonists of this mechanism since the Kyoto Protocol entered into force, and the selling of emission rights by China has allowed a great number of investments to take place in China in energy saving and diversification.

However, CDM projects are not delivering emission cuts on the scale needed. A more systematic approach in key emitting sectors such as power, iron and steel, cement and oil refining, has the potential to deliver greater cuts and could support China's domestic policies on energy intensity and renewable energy. Different sectoral approaches, based on accountability and a transparent system of monitoring, reporting and verification, have



been already proposed that of course still needs to be tailored on a country by country base.

On sectoral crediting, a developing country sets a sectoral emissions threshold below the business as usual trend. For all emission reductions achieved beyond the threshold, the country receives credits that can be sold to developed countries as offsets. These revenues finance mitigation in the developing country. Thresholds are “no lose”, i.e. there is no penalty if they are not met (but no credits are generated either). Also on sectoral trading, the developing country sets a sectoral emissions target below the business as usual trend. But following this mechanism, the target defines a cap on the number of tradable units, which are created in advance. If emissions are reduced below the target, the developing country has excess tradable units and can sell the excess to developed countries as offsets. These revenues finance mitigation in the developing country. If the sector emits more than the cap allows, the developing country must buy credits to make up the difference.

More advanced developing countries should set ambitious emission thresholds and targets for specific sectors as part of their low-carbon growth plans. The thresholds and targets should reflect the capability of a country. The European Commission is willing to support China and other countries in establishing a sectoral crediting system.

Technology cooperation

On the second main front of cooperation aiming “to significantly reduce the cost of key energy technologies and promote their deployment and dissemination,” an assessment of achievements can be more controversial, since the discussion about technology transfer is significantly “polluted” by the on going negotiations.

Both China and the EU have stressed the importance of strengthening technology development, deployment and transfer in the context of the climate negotiations. The approaches proposed by the EU and China to do so in the frame of the UNFCCC, however, differ on important points. China’s proposals focus on a “centrally-planned” approach with a single new fund, a single new executive body that directs international technology policy and a heavy focus on Intellectual Property Rights (IPR) transfer.

The EU’s approach, on the other hand, relies much more on a “decentralised, diversified” approach using the market and market-based mechanisms. Centrally guided efforts should be used to promote joint development and demonstration with a variable geometry as regards participation. Funding should be done through existing channels.

The EU is the world’s biggest development aid donor and we have supported climate change action in the developing world through multilateral channels such as the Global Environment Facility and the World Bank as well as through bilateral channels. According to a study on “Climate for Cooperation: The EU, China and Climate Change” developed by the



Brussels Institute for Contemporary China Studies (BICCS), funding committed in 2009 by the European Commission and European Investment Bank, in the form of grants and soft loans to China, for major projects in the field of climate change and clean energy, totalled in the range of €650 million. Between 2000 and 2008, EU Member States collectively spent €238 million on energy-related projects in China.

Europe has also provided considerable funding through the carbon market under the Clean Development Mechanism. Intensive discussions have taken place between European and Chinese experts on a number of policy reports on the CDM and the Chinese carbon market which have been prepared by the EU-China CDM Facilitation Project. A report by this project on technology transfer in CDM projects in China indicates that technology transfer accounts for about 40% of the total projects through transaction of equipments at commercial process, but to a less extent involving also knowledge transfer and capacity building.

As it is well known, China has been successfully conducting commercial transfer of technologies, and the Chinese government's policies on energy saving and emission reduction have a beneficial direct effect on the process of technology transfer. We believe that EU-China cooperation and EU Industry, via market mechanisms, have played a major role in catalysing and encouraging the distribution of green technology. Following the BICCS study, between 2002 and 2008, the total exports from European companies of solar power appliances amounted to €424 million, wind power to €283 million, and hydro-power to €273 million.

Another recent study, "The Contribution of the Commercial Transfer of Technology to Climate Change Mitigation," conducted by the Energy Research Institute (under NDRC), recognises that the most efficient means of transfer are direct purchase and the Market for Technology (production licence purchase, commissioned R&D, and joint R&D), and that ODA, which does not comprehensively cover the whole processor technology transfer, makes only gradual contributions to carbon emission reduction. Existing commercial technology transfer models have greatly reduced energy consumption and eliminated a significant amount of GHG emissions, and international cooperation and joint-venture are the major catalysts that encourage the distribution of commercial technology transfer.

Despite those evidences, we are expecting that the debate on this issue will continue in the coming months. A delegation of EU climate change negotiators and experts met with their Chinese counterparts in October 2009 in Shanghai to discuss the issue of technology cooperation and transfer in relation to the UNFCCC negotiations. The informal setting of the workshop allowed for an informal and frank dialogue between China and the EU on some of the key issues, including barriers, institutional arrangements, incentives, financing and intellectual property rights, and can be reproduced to facilitate mutual understanding. The presence of business representatives with vast experiences from European as well as Chinese private sector



provided a very useful “reality check.” There was a general agreement on the need to enhance and speed up development and deployment of climate friendly technologies by removing barriers and increasing incentives for international cooperation. Similarly, there was convergence of views on the need to enhance research, development and demonstration, the usefulness of roadmaps for technology development, the need to enhance sharing of information and to use public funding to leverage private investments.

On IPR, the EU conveyed the view that respecting ownership of intellectual property is of fundamental importance for innovation and investments in research and development, which has been acknowledged by China. The existing problems are in regard to capacity constraints, unfair licensing agreements and how to handle IP from publicly funded joint R&D.

Conclusion

In conclusion we can affirm that the EU and China have been closely cooperating on climate change issues since we established our climate change partnership in 2005. Thanks to this, we now have a better understanding of each other’s positions that should allow us to go into an international agreement on climate change.

The EU and China could play a more important role in joint Research Development and Deployment in low carbon technologies and expanding trade in low carbon goods, avoiding trade frictions. Such an enhanced cooperation offer should be accompanied by enhanced commitments and actions by China, and agreement to engage in new carbon market mechanisms, which can mobilise the significant financial resources required to trigger a shift towards a low carbon economy in China.

At the last Summit, we agreed to upgrade our partnership. In practice, this means that as of this year the EU and China will hold high-level meetings specifically on climate change, where there will be a focus on bilateral cooperation but we hope also on sharing experience and building up the ambitious policies necessary to move toward low carbon economies. By concerted action, both the EU and China can turn this challenge into a mutually beneficial opportunity.



A LETTER TO THE NEW EU TRADE COMMISSIONER'S CHINA TEAM

Xiaotong Zhang*

10 February, 2010

Dear colleagues:

I trust this letter finds you well.

As a Chinese diplomat working in Brussels for the past five years, I am happy to see that our commercial ties have grown increasingly stronger. I am glad that our paths have crossed at the junction of the EU-China economic and trade relationship, one of the largest, most exciting and challenging bilateral trade relationships in the world. With this letter, I hope to share with you a Chinese perspective about our trade connections over the past thirty-five years, which may contribute to laying a sound basis for our mutual understanding.

I would start this letter by paraphrasing the opening of the *Romance of the Three Kingdoms*, a classic Chinese historical novel written in the 14th century, which enriched my view of history:

The rolling Yangtze River flows eastward, heroes come and go. They may be right or wrong, win or lose, they are but fleeting shades. Green mountains are always there just as the sun sets every day [...] it is a great happiness to drink with you, and there are many stories to be told at our cheerful chats, be they old or new.

There are indeed enough stories in EU-China trade relations to withstand a lengthy conversation. I would only share with you those that I feel are most relevant so that we understand each other better.

It all goes back to the historic visit by Christopher Soames, former Vice President of the European Commission in charge of external relations, to Beijing in May 1975, where he met Chinese Premier Zhou Enlai. As early as the end of 1971, Zhou personally spoke in favour of the European Economic Community, when remarking to an Italian journalist, "as a first step towards an independent Europe, the Common Market was a good thing." In May 1972, he mentioned to a French journalist the possibility of establishing a Chinese diplomatic mission to the Community:

Since the establishment of the European Economic Community, there has been a steadily growing tendency towards unity among the West European countries. Withstanding external pressure and interference, they have made

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continuous efforts to safeguard their sovereignty and independence. This is a positive development in the international situation [...] we would like to see better relations developing between the EEC and the Third World countries. It is our belief that so long as all countries that are subjected to superpower aggression, interference and control stand united they will certainly frustrate the schemes of the superpowers to seek hegemony.

Zhou received Mr. Soames in the Beijing Hospital, where Zhou was under medical treatment for advanced cancer, just 8 months before his death. At that meeting, they agreed in principle to establish diplomatic relations between the People's Republic of China and the European Economic Community (EEC), and to start negotiations towards a trade agreement (later to be known as the 1978 EEC-China Trade Agreement). The European Parliament gave overwhelming support for the establishment of relations.

The 1978 Trade Agreement granted China national treatment and provided for the creation of a Joint Committee (JC) in the framework of which annual meetings were held at the directorate level. Whereas these discussions were mostly confined to technical issues related to the implementation of the relevant trade-related agreements, high-level consultations at the ministerial/commissioner level were launched in 1983 to address a wider range of issues. In 2008, the 23rd JC was held in Beijing, achieving 23 deliverables. The 1978 Trade Agreement was then updated to become the 1985 EC-China Trade and Economic Cooperation Agreement, with the EC extending its trade relations with China to economic and technological cooperation. Currently, negotiations are underway in order to update the 1985 Agreement.

The 1989 Tiananmen Square Incident was a serious blow to the EC-China trade relationship. Trade volume dropped in 1990-91. In 1992, the trade value started to recover and since then it has moved into the fast lane. This can be partly attributed to the complementarities of our two economies and partly to the full normalisation of bilateral relations in 1994-95, which ultimately was to develop into a comprehensive strategic partnership in 2003-04.

Europe was one of the earliest interlocutors that China approached in its campaign to resume GATT membership. China's former Vice Premier and Minister for Trade, Li Lanqing recently disclosed in his book how the Chinese trade negotiator viewed the EC when in 1987 China started to pursue negotiations for the resumption of its GATT membership with the EC:

The European Communities are a powerful trading group, holding a very important position in the GATT second only to the United States. China has an excellent relationship with the European Communities. Politically, the EC welcomes and supports China's request for resuming its GATT membership, but when negotiating the terms of China's resumption of GATT membership, the EC took an uncompromising approach and seized on every economic interest. Therefore, as we see the EC as one of our major negotiating interlocutors, we need to lobby hard and enhance mutual understanding. On the one hand, we should elaborate upon our position and views on resumption of GATT membership, state China's policies of opening-up and economic reform, and show our sincerity and determination to participate in



the multilateral trading system. On the other, we should listen to the EC's feedback on China's request and have a good understanding of the specific requests from the European Communities.

In the EU-China WTO accession talks, the EU seemed intent on playing the long game, starting early, but ending late. Former Commissioner for Trade, Pascal Lamy played tough, pressing for further market access concessions, after the US and China had already signed a market access deal in November 1999. Lamy managed to conclude the talks in May 2000. He was tough, but he was well-aware that allowing China to join the World Trade Organization was not only a necessity for the EU's commercial interests, but also an inevitable historical trend, as China was re-emerging onto the world stage and committed to becoming part of the existing multilateral trading system. In his book, Commissioner Lamy revealed an interesting conversation between himself and Chinese President Jiang Zemin on the strategic basis of the EU-China relationship, after the bilateral market access talks were finally concluded:

Jiang: Nos relations sont millénaires et elles doivent s'intensifier, que ce soit dans le commerce ou l'éducation[...]Le monde est si petit, je suis heureux que la Chine et l'Union européenne soient parvenues à cet accord.

Lamy: Les relations entre la Chine et l'Europe, peut-être parce qu'elles sont situées aux extrémités du même continent, ont une forte particularité, marquée par une longue histoire commune. Ce qui nous réunit, c'est notre conception d'un monde organisé sur une base ouverte, accessible à tous, multilatérale comme nous disons, plutôt que bilatérale et exclusive. C'est cette vision qui a inspiré la construction européenne.

Lamy: Je remarque que nous avons abouti à cet accord juste à temps pour célébrer le 25e anniversaire de l'établissement des relations diplomatiques entre la Chine et l'Europe. C'est peut-être la raison qui a conduit votre ministre, mon ami Shi Guangsheng, à accélérer le mouvement [...] ne souhaitons-nous pas ensemble, pour le monde, un équilibre multipolaire?

Jiang: Vos réflexions m'invitent à renchérir. Oui, la Chine et l'Europe souhaitent un monde multipolaire plutôt qu'unipolaire [...] comme en physique, on ne peut pas obtenir une situation équilibrée sans la conjugaison de plusieurs forces.

I arrived in Brussels one month after the Barroso Commission took office in November 2004. I still remember, on the very day of my arrival, a Dow Jones article alerting me to the imminent advent of the EU-China textile row. As one Commission official summarised it afterwards:

(In the textile case), it was the first time that the EU witnessed China's genuine commercial power and massive build-up of its exporting capabilities, and directly experienced the tensions among European consumers, producers, importers and retailers. Europe was caught in a triangular trap between textile producers and the Member States representing producers' interests, importers, retailers and consumers and Member States representing their interests, as well as China.



I cannot remember all the details about how we came through this drama. However, there were three main points that were on the minds of the Chinese decision-makers: ensuring the stable growth of China's textile exports to the EU market, maintaining positive EU-China relations and avoiding harming the interests of other developing countries.

In an interview, after the conclusion of the China-EU Textile MOU in Shanghai, Minister of Commerce Bo Xilai emphasised China's strategic thinking regarding Sino-EU relations:

Consideration must be given to the overall situation of China's diplomacy. China's relationship with the European Union is much broader than the textile case alone. We have many other important issues to handle and cannot allow the single textile issue to affect the China-EU comprehensive strategic partnership.

Premier Wen Jiabao acknowledged the importance of considering the commercial interests of other developing countries when meeting with the Prime Minister of Mauritius, on 6 November 2006: "the Agreements that China signed with the EU and the US, have, to a large extent, taken into consideration the interests that the African countries have in the EU and American markets."

The timely exchange of phone calls between former Trade Commissioner Mandelson and Minister Bo Xilai, and the many technical meetings at various levels also played an important role. The negotiations, which stretched to over 10 hours in Shanghai, finally permitted the signature of the MOU on textiles. The result was the final development of a "win-win-win" situation, as Commissioner Mandelson said to the press, "[The] agreement will be fair on both sides. It provides clarity, certainty and predictability and will also provide relief for developing country textile exports to Europe. It is an agreement that helps everyone's interest."

If the buzzword of the EU-China trade relationship in 2005 was "textiles," in 2006-07 it should be "trade deficit." History repeats itself. When negotiating the 1978 Trade Agreement, China was suffering from a serious trade deficit *vis-à-vis* the EEC, and therefore tried to obtain a trade balance clause (Article 3), that would "foster the harmonious expansion of their reciprocal trade" and help to attain "a balance in such trade."

The EU-China High-level Economic and Trade Dialogue was established in 2007 largely to respond to the challenge resulting from the huge trade deficit on the EU's side by giving strategic direction to the bilateral trade relationship and trying to resolve specific concerns on both sides. Having been closely involved in all the discussions and preparations, I know how difficult it was to build such a High-Level Dialogue.

This Dialogue played a vital role in contributing to the overall stability and predictability of bilateral trade ties in 2008-09, not to mention its contribution to the EU-China strategic partnership. President Barroso led a super-delegation of 9 commissioners to launch the Dialogue in April 2008.



Although Mr. Sarkozy's meeting with the Dalai Lama in December cost us the Summit in 2008, both sides made efforts to make up for lost time. The strong urge to tackle the financial crisis prompted the Chinese side to hold two summits together with the EU in 2009 and send 10 purchasing missions to Europe. Premier Wen Jiabao spent his 2009 Spring Festival in Europe, sharing with Europe's policy-makers "confidence, courage and hope" in difficult times. Although in 2009 total EU-China trade dropped by 14.5%, the EU remained China's largest trading partner, with nearly 19.7% of China's total exports ending in Europe and 12.7% of China's total imports coming from Europe.

In retrospect, what is important for the stability and development of EU-China trade relations, as far as I can see, is the strategic nature of our relationship, the unswerving support and personal involvement of leaders from both sides, regular and timely updates of bilateral institutional frameworks, a good use of dialogues, mutual trust and confidence, especially in difficult times.

2010, the year of the tiger according to China's lunar calendar, will mark the 35th anniversary of the establishment of the EU-China diplomatic relationship. The year of the tiger is a promising year. By working together, we can ensure that priorities are not marginalised, and that goals not missed. Specifically, the following multilateral and bilateral agendas need to be thought through by both sides:

- 1) Fighting protectionism: creeping protectionism is eroding the interests of our companies and endangering the recovery of the global economy. An early conclusion of the Doha Development Agenda, an effective coordination in the G20 setting and successful bilateral meetings are vital to the stability of our economic and trade relationship.
- 2) Updating bilateral trade relations: a rule of thumb, that should be applied roughly every 10-15 years, is the revamp of bilateral trade ties by negotiating new trade agreements. This was achieved in 1975, 1985 and 2000 (China's WTO accession). Now, both actors are negotiating an update of the 1985 Trade and Economic Cooperation Agreement, so as to accommodate the rapid changes in our respective business environment and guarantee to develop a better environment for the sake of companies on both sides.
- 3) Fostering new areas of cooperation: I agree with Commissioner De Gucht's view that trade must be put at the service of the broader policy goals. I believe that trade can provide added-value in other policy areas such as climate change, low carbon economy, energy, development and jobs. With the Lisbon Treaty conferring investment competence onto the EU level, investment will be an interesting area of cooperation. We need to identify priorities and experiment with an open mind on pilot projects in the abovementioned areas.



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- 4) Levelling the playing field: No true partnership can be sustained if one party feels unfairly treated. Some historical legacies and discriminatory measures need to be thrown into the dustbin of history at an early date. Also, efforts need to be made to facilitate the activities of our respective companies in Europe and China, such as facilitating the process of obtaining visa and work permits.

Our relationship is comparable to rowing against the tide: unless we row hard, our boat will be driven back and unable to make headway. In closing, I would like to quote a paragraph from one of Mao Zedong's poems written in 1963:

So many deeds cry out to be done,
And always urgently;
The world rolls on,
Time presses.
Ten thousand years are too long,
Seize the day, seize the hour!

Bon courage!

Yours sincerely,

ZHANG Xiaotong



THE EU AND CHINA: CLOUDY WEATHER FOR SOLAR ENERGY?

Rudi Deklerck* & Jing Men**

Solar technology has become a booming technology in recent years and is believed to play a key role in the battle against climate change. Both Europe and China are active in the photovoltaic (PV) industry. Since the end of the 20th century, "the European PV-production has grown on average by 50% per annum and reached about 1.9 GW in 2008. The market shares of European and Chinese manufacturers increased from 20% to 26% and from 1% to 32% respectively..."¹ The Chinese panel makers have, up until now, mainly surfed on the European solar wave and are taking the lead. However, European weather may become cloudy or even stormy for both European and Chinese manufacturers in the near future.² This paper will examine the competition between the Europeans and the Chinese in this field, and analyse the uncertain future after giving an overview on the current solar panel market.

Evolution of the solar business

The rapid increase in solar cell production, in 2004, as well as the rising Integrated Circuit (IC) unit volumes caused the price of polysilicon to double from \$30 per kg in 2003, to \$60 per kg in 2005.³ In 2004, about 65% of the polysilicon production was used to manufacture semiconductors, with the other 35% being consumed by *solar cells*. For companies using traditional mono- or polycrystalline silicon wafers in modules, which account for 91% of the industry, the polysilicon feedstock represented 25% of the module bill of materials in 2005. Due to the success of crystalline solar cell technology in these years and the delay in investments in polysilicon production, the price for polysilicon rose to excessive heights and hit \$450 per kg in the summer of 2008.⁴ Polysilicon seemed to have become the new gold overnight. The

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¹ Arnulf Jäger-Waldau, 'Research, Solar Cell Production and Market Implementation of Photovoltaics', PV Status Report 2009, August 2009, p. 101, accessed on 15 February 2010, <http://re.jrc.ec.europa.eu/refsys/pdf/PV-Report2009.pdf>.

² Michael McManus, 'Solar crisis set to hit in 2010, 50% of manufacturers may not survive, says The Information Network', DIGITIMES, 4 September 2009, accessed on 15 February 2010, <http://www.digitimes.com/news/a20090903VL200.html>.

³ Jesse W. Pichel and Ming Yang, '2005 Solar Year-end Review & 2006 Solar Industry Forecast', 11 January 2006, accessed on 15 February 2010, <http://www.renewableenergyworld.com/rea/news/article/2006/01/2005-solar-year-end-review-2006-solar-industry-forecast-41508>.

⁴ Harish Rao, 'Polysilicon prices go through the roof', September, 2008, accessed on 15 February 2010, <http://www.projectsmonitor.com/detailnews.asp?newsid=16898>.



global production of polysilicon in 2012 is conservatively estimated at 240.000 MT.⁵

The Chinese government and investors have also been active to explore this golden opportunity. "Many Chinese local governments made it 'the important investment-attracting field' to draw polysilicon enterprises. Sichuan Leshan, Chongqing, Wuhan and Luoyang in Central and West China, and Xuzhou, Yangzhou and Lianyungang in East China have been regarded as polysilicon bases."⁶ It is estimated that Chinese domestic polysilicon productivity will exceed 60.000 MT in 2011 and exceed 100.000 MT in 2012.⁷

Many companies invested in this field in order to join the gold rush, but the problem of oversupply has already taken shape, resulting in a decline of polysilicon prices by 80% in 2009 and a further forecasted drop of 56% in 2010.⁸ The situation may become dramatic by 2012, even with the most optimistic increase in world demand of PV panels, up to 17GW.⁹ At a realistic ratio of 3 gram to 1W output¹⁰ for cell modules by 2012, about 51,000 MT of polysilicon will be required to fulfil this demand. This will lead to an overcapacity of about 160.000 MT per year, given the aforementioned estimation for the total polysilicon production of 240.000 MT.¹¹ As polysilicon projects are very capital intensive, many companies will have to struggle to survive or to abort construction projects, as they will be confronted with razor-sharp profit margins in an over-supplied market.

The extremely high growth rates of the PV industry in the past years have not only boosted the polysilicon industry, but also cell and panel manufacturers. The following five companies, which are active in China – China Sunergy, Solarfun, Suntech Power, Trina Solar and Canadian Solar – succeeded in accomplishing incredible growth in just a few years, thanks to their aggressive capacity expansion. Due to the huge demand for capital, all

⁵ Eileen Gu, 'Outlook of Chinese Polysilicon Industry', China Research and Intelligence, 12 October 2009, accessed on 15 February 2010, <http://www.prlog.org/10373508-outlook-of-chinese-polysilicon-industry.html>.

⁶ Ibid.

⁷ Ibid.

⁸ Mark Osborne, 'iSuppli: PV component price declines set to continue with polysilicon declining 56.3% in 2010', 25 February 2010, accessed on 27 February 2010, http://www.pv-tech.org/news/_a/isuppli_pv_component_price_declines_set_to_continue_with_polysilicon_declin/.

⁹ 'Global Market Outlook for Photovoltaics until 2013', European Photovoltaic Industry Association, April 2009, accessed on 15 February 2010, http://www.epia.org/index.php?eID=tx_nawsecured1&u=0&file=fileadmin/EPIA_docs/publications/epia/Global_Market_Outlook_Until_2013.pdf&t=1267623238&hash=39323aed995c81192328cd1999f341d.

¹⁰ A solar panel of 1m², with an efficiency of 20% would yield about 200 W under standard test conditions. Supposing the cell thickness being around 200 µm, the volume of Si material will be around 10.000cm²*0.02cm=200cm³. With a density of 2.33g cm⁻³, the panel will hold 466g of Si, hence about 2.33g of Si is needed to generate 1W under standard test conditions. With some losses, for example, due to the sawing process needed to produce the cells, a realistic estimation is around 3g per Watt.

¹¹ About 30.000 MT will be consumed by the chip industry in 2012.



these companies went to the American stock market about three years ago. Together, these five companies will reach an output of 4.3 GW by the end of 2010.¹² Suntech power has now become the largest producer in the world of cells and modules, thus overtaking the leading European manufacturer Q-Cells in 2009.¹³

The global output of cell modules for 2009, affected by the economic downturn, was revised to 5.2 GW, a decline of 3.8% compared to 2008. Yet an unexpectedly strong demand in Germany somehow helped keep sales figures up. According to the latest data, German customers might have installed some 2.5 to 3 GW worth of solar panels in 2009 (which represents about 50% of world production), up from previous forecasts of 1.53GW.¹⁴ Yet, supply may still have exceeded demand by as much as 66% for 2009. On average, crystalline module prices dropped 37.8%, solar wafer prices fell by 50% in 2009, and further price declines of 20% for crystalline modules and 18% for solar wafers have been forecasted for 2010.¹⁵

Competition between the EU and China

Chinese solar panel producers are, by far, mainly exporting to Europe and the US, due to its limited domestic market. "98 percent of Chinese solar cells, which use domestically produced polysilicon, are exported."¹⁶ Although the Chinese Golden Sun project foresees the installation of a total of 20 GW by 2020,¹⁷ the major parts will only be installed after 2015, meaning that domestic demand will remain small in comparison to overseas demand. Since solar energy is heavily subsidised in Europe (up to €0.3 per kWh),¹⁸ the question for

¹² Tom Cheyney, 'Chinese PV quintet: Canadian Solar, Sunergy, Solarfun, Suntech, Trina sing song of stellar shipments', 20 November 2009, accessed on 15 February 2010, http://www.pv-tech.org/chip_shots/_a/chinese_pv_quintet_canadian_solar_sunergy_solarfun_suntech_trina_sing_song/.

¹³ iSuppli, 'Suntech to be biggest panel maker in '09-iSuppli', Reuters, 10 August 2009, accessed on 15 February 2010, <http://uk.reuters.com/article/idUKN1015843120090810>.

¹⁴ Christoph Hammerschmidt, 'PV market continues to suffer from glut, iSuppli says', 16 November 2009, accessed on 15 February 2010, <http://www.eetimes.com/news/latest/showArticle.jhtml;jsessionId=FSCYCX5RAGQNRQE1GHRSKH4ATMY32JVN?articleID=221800075>; Erik Kirschbaum, 'Germany to post record rise in solar capacity', Reuters, 23 November 2009, accessed on 15 February 2010, <http://www.reuters.com/article/idUSTRE5AM36E20091123>.

¹⁵ Mark Osborne, 'iSuppli: PV component price declines set to continue with polysilicon declining 56.3% in 2010'.

¹⁶ Zhang Qi, 'Solar industry is reined in', China Daily, 26 October 2009, accessed on 15 February 2010, http://www.chinadaily.com.cn/bizchina/2009-10/26/content_8846229.htm.

¹⁷ 'China selects 294 solar power plants for subsidy', Reuters (Beijing), 15 November 2009, accessed on 15 February 2010, <http://www.reuters.com/article/idUSTRE5AF0L420091116>.

¹⁸ Conventionally produced electricity cost less than €0.05 per kWh in Germany in January 2010. Yet, electricity from photovoltaic systems is generally produced during times of peak demand, or economically speaking, when electricity is the most expensive. Assuming a more balanced price for PV generated electricity of €0.13 per kWh, it means that for a feed-in tariff as high as €0.43 per kWh, €0.3 per kWh will have to be subsidised by the German government and this for 20 years, supposing constant prices. In 2008 alone, the total eco-compensation was approximately €8.95 billion in Germany (see reference 24) and the 2.5 GW installed in 2009 –



Europe is whether it is right that a large part of its subsidies are going to Chinese panel producers as well as to the persons or companies who decide to install the panels. For example, China Suntech Power became the largest supplier of solar panels in the world in 2009. In the meantime, a considerable return on investment – as high as 20% – was realised by the German inhabitants who installed Chinese panels. In addition, as solar energy will be more price competitive than classical energy sources from 2015 onwards, the Chinese government will only contribute a marginal investment in its own solar industry, compared to Europe.

The competitive price of Chinese-made panels aroused concern in Europe, particular in Germany. The chief executive of Conergy AG, Germany's second-biggest solar company in terms of revenue, claimed that Chinese prices are close to what other countries consider to be "dumping": "It cannot be the aim of our environmental and economic policy to lose to the Far East our pioneering role with regard to the last great future technology, which was raised here with great efforts."¹⁹

Yet in recent years, European companies set up plants overseas in order to lower their cost of production, (for instance Q-Cells invested in Malaysia),²⁰ which does not benefit the European labour market either. It seems to be one of the few choices that the European companies now have if they want to compete with Chinese companies. There does exist another alternative: to invest in fully automated manufacturing plants, a business field in which Europe has built-up a strong lead in the recent years. This investment is, however, very capital intensive and risky in the current climate (overcapacity, weak economy, technological progress).

Coming back to the issue of labour, what needs to be emphasised is that the installation of solar panels, especially on roof tops, will remain very labour intensive. Greenpeace and the European Photovoltaic Industry Association estimated that about 10 jobs were created per MW during production and about 33 jobs were created per MW during the process of installation.²¹ Hence installation, which will always remain a local business, is about three times as labour intensive as the production.

Next to the placement of the panels, the cost of inverters to connect them to the grid is not negligible either. The cost of an inverter is around €0.5 per Watt, compared to the full installation cost of €4 to €6 per Watt.²² In

given that 1W PV is about generating 1kWh per year in Germany - will draw about €0.75 billion from the yearly budget for 20 years.

¹⁹ Leonora Walet and Christoph Steitz, 'Not so sunny: trade war looms in solar space', Reuters, 6 September 2009, accessed on 15 February 2010, <http://www.reuters.com/article/idUSTRE5833F220090906>.

This article mentioned that Chinese modules sell in Europe at about €1.70 per Watt.

²⁰ 'Q-Cells to Invest \$1.6 Billion in Malaysian Solar Plant', Reuters, 2 June 2008, accessed on 15 February 2010, <http://www.reuters.com/article/idUSSIN4358720080603?rpc=401&>.

²¹ Arnulf Jäger-Waldau, 'Research, Solar Cell Production and Market Implementation of Photovoltaics, PV Status Report 2009', p. 87.

²² 'Vraag : Wat is de kostprijs van een fotovoltaïsche installatie/zonnepanelen?', accessed on 15 February, <http://www.zonnecellen.be/faq/kostprijs%20zonnepanelen.html>.



addition, the lifespan of these inverters is only guaranteed for 10 years compared to the 20 or 25 years for solar modules. The inverter business is a segment that until now has been mainly dominated by European and American companies and so pushes the balance a little bit further back in favour of the West. It needs to be pointed out that Chinese solar cell and panel producers are buying European manufacturing equipment, hence part of the money is also flowing back. Furthermore, by buying Chinese solar panels, Europe is indirectly profiting from cheap Chinese black coal – the main energy source for the production process of solar cells – and can thus, at the same time, make serious savings in terms of green house gas emissions.

Yet even without a climate agreement, the solar market could still develop faster than expected in countries abundant with sun, such as India, and countries in the Middle East and Northern Africa, as the same solar panel in these places can generate about double the electrical energy per year when compared to Europe, making grid parity a much more achievable target. When this happens, the European solar industry should be strong enough to compete with the Chinese companies in these countries.

Uncertain future ahead

As mentioned earlier, for the European PV industry to survive in an open market it requires either further investment in fully automated manufacturing plants, which is, however, very capital intensive and risky, or moving cell-production to low-cost countries. Yet, this means that most of the low-profile jobs in cell production and module assembly will disappear in the next few years, unless the EU takes special measures and couples some hard conditions on the feed-in tariffs. The EU could, for instance, follow Ontario's feed-in-tariff model in Canada, which imposes that at least a substantial percentage (currently 50% but 60% in 2011) of the goods and labour must be locally sourced.²³ The feed-in tariff model should also be designed in such a way that fully automated production and the previously invested labour-intensive production can co-exist in the next ten years. In this way, the leading automation industry in Europe could be further scaled to cope with the TeraWatt production levels that will be mandatory after 2020.

In Germany, the prospect that solar panel installation could yield a considerable return on investment (15%-20%) at the 20 years' guaranteed feed-in tariff of 43 cents per kWh, attracted many German citizens and led to a very strong increase of German solar energy capacity in 2009. Other European countries with high feed-in tariffs showed similar growth, thus partly eliminating, together with Germany, the overcapacity and keeping the PV business alive. Yet the high solar subsidies, which are in fact funded by energy consumers and tax payers, gave rise to a lot of criticism. This led to the

²³ Mark Osborne, '200MW module plant planned by Canadian Solar in Ontario', PV-tech.org, 3 December 2009, accessed on 15 February 2010, http://www.pv-tech.org/news/_a/200mw_module_plant_planned_by_canadian_solar_in_ontario/.



decision taken by the German government to lower the feed-in tariffs by 16% from 1 June 2010 onwards,²⁴ which was, however, contested by a study from Fraunhofer ISE, that claimed that only a 6% extra reduction would be attainable without significant disruption to the industry.²⁵

Another factor that has to be taken into account is that crystalline silicon-based solar panels may not be the winning technology after all. The many alternatives (thin film PV,²⁶ solar thermal, CPV (Concentrated PV)) and the more cost-and-performance-efficient *scene-changing* future technologies, based on nanomaterials, will make it difficult to predict which technology will prevail in the next years. This may also hamper the development of a harmonised and strategic approach towards renewable energies by the 27 Member States of the EU, who will report independently to the Commission on their progress in view of achieving the 20% target share of renewable energies in the overall EU energy consumption by 2020, as agreed at the European Council Meeting in Brussels, on 8-9 March 2007.²⁷

Each of the technologies should be given a fair chance to develop. Yet, given the fact that feed-in tariffs are a national matter, some technologies may be promoted and others disfavoured. Solar thermal and CPV technologies may lack support in the next few years, since they only can be deployed in southern Europe, a region where most EU Member States find themselves in difficult financial situations. Continuing economic troubles and the lack of a binding agreement at the Climate Conference in Copenhagen may also drive the other EU member states to lower their feed-in tariffs precipitately.

The conclusion is that for a divided Europe, it will be a difficult task to take all these factors into account and come forward with a balanced strategy towards energy development in the near future, as the coming years will be critical to keeping the European solar business on its feet.

²⁴ Emma Hughes, 'German feed-in tariff cut will be 15-17% - updated, PV-tech.org', 19 January 2010, accessed on 15 February 2010, http://www.pv-tech.org/editors_blog/_a/german_feed-in_tariff_cut_will_be_16-17_-_confirmed/.

²⁵ Mark Osborne, 'Fraunhofer ISE study supports a 6% German feed-in tariff cut: higher cuts jeopardizes PV industry', PV-tech.org, 17 February 2010, accessed on 20 February 2010, http://www.pv-tech.org/news/_a/fraunhofer_ise_study_supports_a_6_german_feed-in_tariff_cut_higher_cuts_jeo/.

²⁶ The idea behind thin film technology is to deposit a thin layer of photovoltaic materials (i.e. a few micrometer compared to a few hundreds of micrometer for thick crystalline solar cells) directly on a glass plate or on a flexible sheet in a roll-to-roll process. It is to be expected that thin film technology will also take a large share of the market as it may have currently a price advantage, since it is less capital intensive and requires less photovoltaic material. The most successful company at this moment is the US-based firm First Solar, which uses Cadmium Telluride (CdTe) and has a manufacturing cost less than \$1 per Watt. Copper Indium Gallium Selenide (CIGS) is another thin film technology. Yet as both Telluride and Indium are rare elements, CdTe and CIGS will only be successful in the short-term. This is not the case for thin film technology based on micromorph silicon (SHARP expects to reach 12% efficiency by 2012).

²⁷ 'Council of the European Union 8-9 March 2007, Presidency Conclusions 7224/07', 9 March 2007.