

Climate finance architecture in China

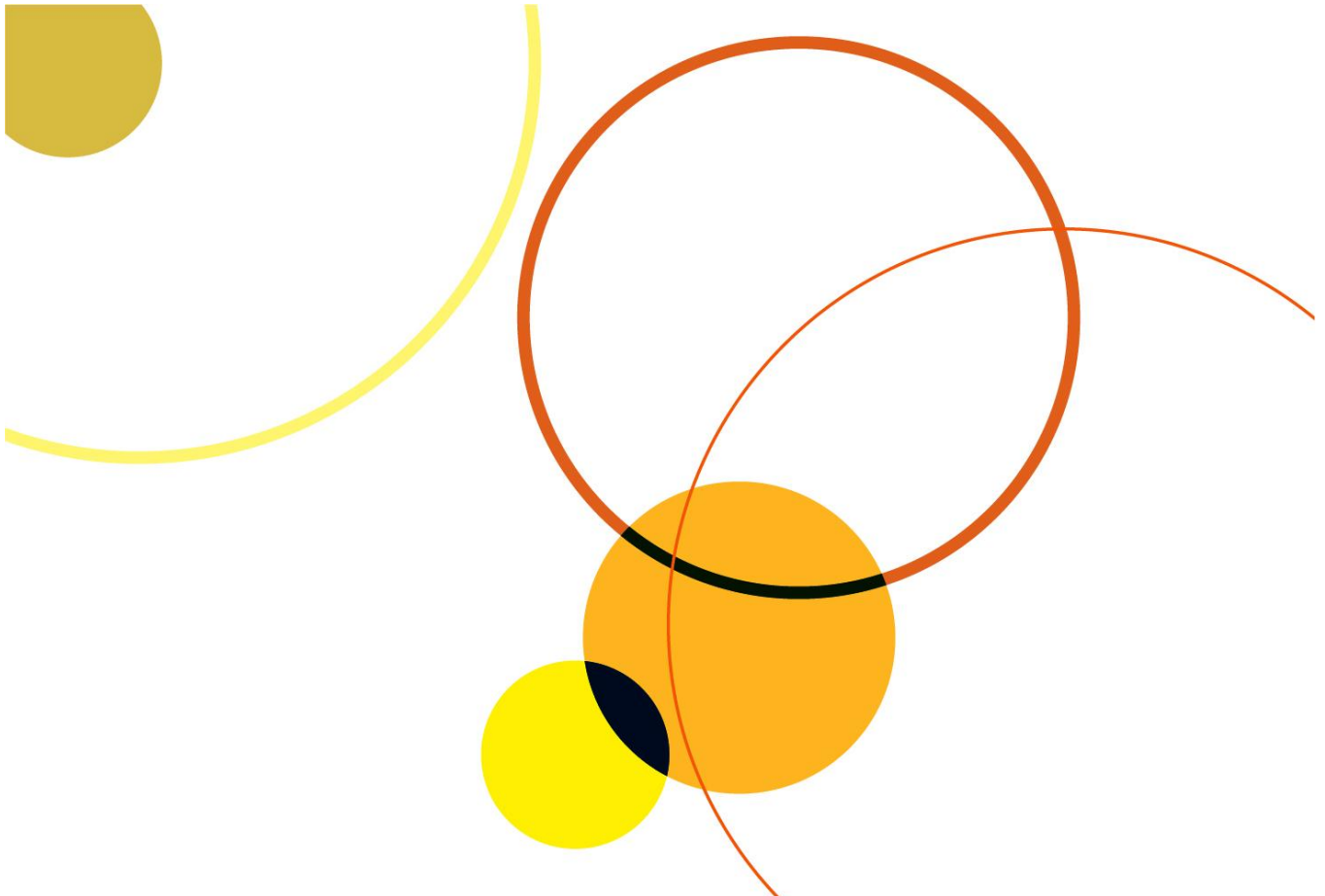
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¹ Consortium comprises Harewelle International Limited, NR International, Practical Action Consulting, Cranfield University and AEA Energy and Environment



1 China

The scale of low-carbon investment in China is immense. According to a UNEP report, written by Bloomberg New Energy Finance, China accounts for nearly a quarter of all global investment into renewable energy. Investment in China in 2010 came to USD 48.9 billion, compared to a global total of USD 211 billion (Bloomberg New Energy Finance & UNEP, 2011).

1.1 Overall framework

Chinese climate change policy is intended to be integrated into its Five Year Plan (FYP) structure of broad economic planning. However, concerns remain that the mainstreaming of climate change issues into economic planning remains inadequate as evidenced by the fact that climate change remains is discussed within one section of the overall chapter on the environment in the FYP.

The 12th Five Year Plan (FYP) contains two elements that are particularly relevant to national climate change strategy: firstly, sector-level priority setting (with a focus on some key climate technology sectors), secondly a variety of (binding) economy-wide targets. The 12th FYP is also the first to include a full paragraph dedicated to adaptation (Yin, Cuccillato, & Kelly, 2011).

1.1.1 The 12th Five Year Plan (2011-2015)

According to the 12th FYP, seven key industries will be prioritised between 2011 and 2015. The choice of sectors reflects China's twin ambition to, first, diversify into low carbon industries, and second, to move up the value chain. The seven strategic industries are:

- alternative energies (nuclear, wind and solar power);
- biotechnology (drugs and medical technology);
- new-generation information technology (broadband networks, internet security);
- high-end equipment manufacturing (aerospace, telecom equipment);
- advanced materials (rare earths and high-end semiconductors);
- alternative-fuel cars; and
- energy saving and environmental protection (range of technologies needed to reach energy intensity and environmental protection/pollution targets). (KPMG, 2011)

Together, these are expected to account for 8 per cent of GDP in 2015, rising to 15 per cent by 2020 (Ng, 2011). This is a substantial increase from their current contribution to GDP, 2 per cent (KPMG, 2011). To achieve this aim, the government is expected to make 'substantial amounts of public investments in these sectors over the next five years' (Ng & Mabey, 2011) but these are to be complemented by 'hundreds of billions Euros of extra investment from both the private sector and local governments' (Ng & Mabey, 2011).

The 12th FYP also sets out a number of economy wide binding targets that are intended to shift China's development onto a more sustainable and climate-friendly path. Some of the key targets are set out below:

- 16 per cent energy intensity reduction compared to 2010 by 2015 (Ng & Mabey, 2011).
- 17 per cent carbon intensity reduction compared to 2010 by 2015 (Ng & Mabey, 2011).
- Forest stock volume to increase by 6 per cent in 2015 compared to 2010 (Ng & Mabey, 2011)
- Forest coverage to increase by 1.3 per cent (Ng, 2011) to an overall coverage rate of 21.66 per cent (Hilton, 2011)
- Sector-level energy consumption and pollution standards (in heavy industry) (Ng & Mabey, 2011)
- 11.4 per cent share of non-fossil fuels in primary energy supply by 2015 (to be delivered with large increases in hydro, nuclear, wind) (Ng & Mabey, 2011)²
- Further targets on SO₂, NO_x, and Ammonia Nitrogen (Ng & Mabey, 2011)

The 12th FYP contains a number of important spending forecasts, which provide a good estimate of the scale of China's low carbon ambitions. However, it is not clear what proportion of this spending is expected to come from private sources and what proportion is to come from the public sector, nor is it clear whether these figures already include any international assistance that might contribute towards investment in these sectors. This ambiguity with regards to the sources of finance remains an important obstacle to understanding the nature of future low carbon investment in China. Some of the most important investment volumes are listed below:

- 5.3 trillion yuan (USD 0.82 trillion, INR 38.5 trillion³) the power sector, with just over 50 per cent on generation and just under 50 per cent on grids, over the next 10 years,
- 2-3 trillion yuan (USD 0.3-0.45 trillion; INR 14.5-21.8 trillion) on renewable energy in the next 10 years (this seems to be additional to the investment in the 'power sector'), of which more than 50 per cent is to go to wind, and a further 7-15 per cent to solar,
- 100 billion yuan (USD 15 billion; INR 730 billion) in alternative-energy vehicles over next 10 years,
- 4 trillion yuan (USD 0.6 trillion; INR 29 trillion) on smart grids in the next 10 years, and
- 500 billion yuan (USD 11 billion; INR 3640 billion) on ultra high voltage transmission by 2015 (Ng & Mabey, 2011).

Finally, the 12th FYP creates 13 'Low carbon zones' across 8 cities and 5 provinces (covering more than 300m people).⁴ These are described as 'testing grounds for regulatory, economic, trade and investment policies promoting the necessary scale of economic transformation for a low carbon future' (Ng & Mabey, 2011).

Although the 12th Five Year Plan is considered by many to represent an ambitious trajectory for low-carbon growth, there are a couple of important caveats:

- First, 'the 12th FYP [...] does not include an energy consumption cap' (Ng & Mabey, 2011). This is contrary to expectations, and to the draft 12th year plan, which featured a 4 billion tonnes of coal equivalent energy cap to be reached by 2012.

² According to the IEA, China in 2009 sourced 3.7 per cent of its primary energy supply from nuclear, hydro and other renewables (excluding biomass and waste), and another 9 per cent from biofuels and waste (International Energy Agency, 2011)

³ This, and all other conversions in the report, converted using average 2011 market exchange rates unless otherwise stated.

⁴ The five provinces are Guangdong, Hubei, Liaoning, Shaanxi and Yunnan. The eight cities are Tianjin, Chongqing, Hangzhou, Xiamen, Shenzhen, Guiyang, Nanchang and Baoding.

- Second, the 12th FYP 'does not contain detailed information about the introduction of a carbon tax and trading scheme' (Ng & Mabey, 2011). Although some information about the pilot ETS schemes is available (see below), this leaves investors with considerable uncertainty.

1.1.2 New Energy Industry Development Plan 2011-2020

In 2010, the National Energy Administration (NEA) compiled a draft 'New Energy Industry Development Plan 2011-2020'. The headline feature of this plan is a total investment volume in emerging energy industries of 5 trillion yuan between 2011 and 2020. According to the People's Daily, 'the plan has specified major policy measures for the development and utilization of nuclear, wind, solar, biomass, geothermal, unconventional natural gas and other new energies'. The plan is also said to detail 'the industrialized application of new clean coal, smart grid, distributed energy and alternative-fuel vehicle technology' (Wen, 2010).

However, according to Vivid Economics' research, this plan has not yet been released in its final form, and it has been impossible to determine the policies mentioned above in any detail. There have been indications of its impending publication surrounding the adoption of the 12th Five Year Plan in March 2011, but it seems as though publication has been delayed. It is therefore unclear whether this plan has been subsumed into the 12th FYP, or if it will be released as a separate document in the future.

1.2 Arrangements using public resources

1.2.1 China CDM Fund

The China CDM Fund, established by the National Development and Reform Commission (NDRC) and the Ministry of Finance became operational in November 2007 ("China Clean Development Fund - About Us," 2012).

It draws its resources from three main sources: revenues generated by CDM projects in China; earnings from CDM business operations; and grants and other types of support from multilateral development banks and international institutions (Flynn, 2011).

Funds are disbursed as either grants or project investments. Grants are mainly intended for climate-related capacity building and the promotion of public awareness. Only 'institutions with research and training capabilities that are working on climate change in China' (Flynn, 2011) are deemed eligible for grants. Project investments, which include straightforward equity investments but also entrusted loans, financing guarantees and other government-approved approaches, are directed at industrial activity that contributes towards climate change abatement and mitigation.

Responsibility for implementation lies with either the CDM Fund Management Centre (for investment-type disbursements) or with Project Applicant Organisers (relevant departments of the State Council or Provincial Development and Reform Commissions).

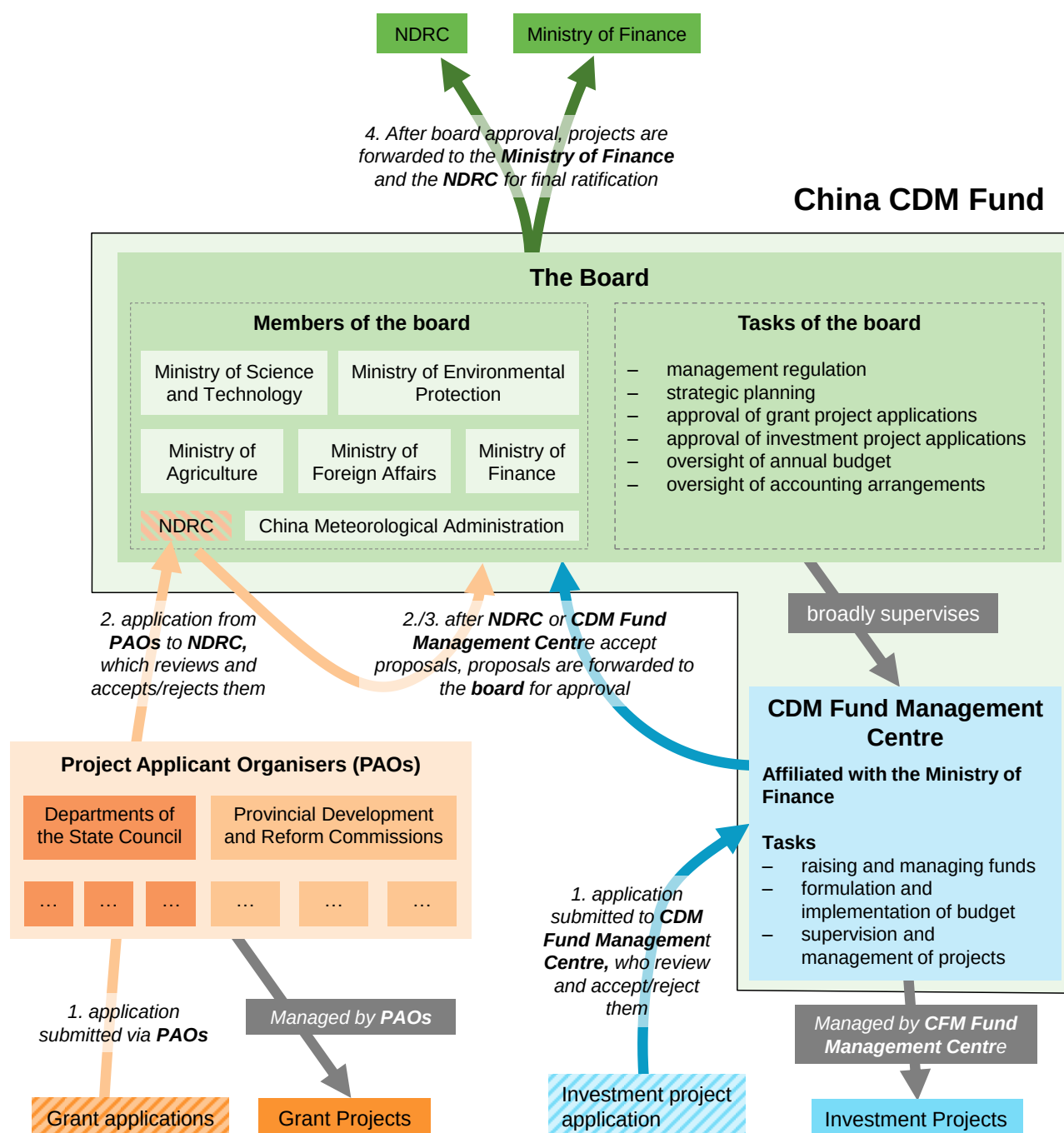
The fund is governed by a board and managed by the CDM Fund Management Centre. The board is responsible for management regulation, strategic planning, approval of grant applications and investment

decisions, as well as for overseeing the annual budget and accounting arrangements. Board members include the NDRC, the Ministry of Finance, the Ministry of Foreign Affairs, the Ministry of Science and Technology, the Ministry of Environmental Protection, the Ministry of Agriculture, and the China Meteorological Administration (Flynn, 2011).

The CDM Fund Management Centre, affiliated with the Ministry of Finance, is responsible for the collection, management and use of funds. It develops guidance and rules for the fund's operations, supervises and manages projects, raises and manages funds, prepares and implements investment decisions, and formulates and executes the annual budget.

The application and review process for projects depends on the amount and type of funding in question. All grant applications are channelled through Project Applicant Organisers and reviewed by the NDRC. Applications for major equity investment projects, 70 million yuan (USD 11 million; INR 510 million) and above, are submitted to the CDM Fund Management Centre, which reviews them. Proposals that have been accepted by the NRDR/the CDM Fund Management Centre are then forwarded to the board for approval. Once approved, the applications are sent to the NDRC and the Ministry of Finance for joint ratification. Small equity investment projects (smaller than the threshold) are approved and ratified by the CDM Fund Management Centre, which has to report ratified projects to the NDRC and the Ministry of Finance within 15 working days of ratification (Flynn, 2011).

Figure 1. Organisation chart of the China CDM Fund



Source: Vivid Economics

1.2.2 State subsidies – Golden Sun Demonstration Scheme, Subsidy for Solar PV in Buildings

There are a number of subsidy schemes that support low carbon investment in China with government resources. The most prominent of these are the ‘Golden Sun Demonstration Scheme’, and the subsidy for solar PV in buildings.

The Golden Sun Demonstration Scheme, introduced in July 2009 by the NDRC (SERN, 2010) provides capital subsidies for both on-grid and off-grid solar PV projects. On-grid projects are eligible for a subsidy of up to 50 per cent of project capital investment, while off-grid projects can receive up to 70 per cent of capital investment (National Development and Reform Commission, 2009). As of November 2009, the volume of this subsidy programme was estimated at approximately 20 billion yuan, (USD 3 billion, INR 145 billion) (Wang, 2009).

A second capital subsidy scheme is aimed at PV solar energy on buildings and rooftops. This instrument was also introduced in 2009, as a joint project between the Ministry of Finance and the Ministry of Housing and Urban-Rural Development. The subsidy is given as a grant per unit of capacity, with building-integrated solar PB (BIPV) eligible for 20 yuan (USD 4; INR 145) per watt-peak (Wp), and roof-top PV eligible for 15 (USD 2.3; INR 110) yuan/Wp. It has been suggested that 70 per cent of the cost of this programme were to be handled by the provincial Finance Ministries, but it is unclear whether this structure was actually implemented (SERN, 2010).

1.2.3 Adaptation initiatives drawing on public funds

The 12th FYP is the first to include a paragraph on adaptation (Yin et al., 2011). A National Adaptation Strategy is currently being drafted. However, ‘the country still lacks an overarching strategy to bring climate change concerns into decision-making processes’ (Yin et al., 2011). Nevertheless, there are two notable adaptation programmes: the Grain for Green (GFG) programme, and the Adapting to Climate Change in China programme.

The *Grain for Green* programme was first introduced in three provinces in 1999, before being launched nationwide in 2002. Part of it was suspended in 2007, and it is unclear if the programme is still on-going. The original aim of the programme was to stop and reverse soil erosion and desertification in China. In 2005, rural poverty reduction and the increase of rural households’ income were added as further goals to the programme. It also helps mitigate emissions by increasing carbon sinks within China.

The scheme operates by compensating farmers for converting farmland into forests, paying out a per-hectare cash subsidy for a number of years⁵ depending on the type of forest that replaces the farmland. In 2007 the programme was suspended in response to food global shortages, except for the afforestation of barren land. As far as the research reveals, this part of the programme is still on-going. Approximately 30 million rural households have participated in the programme so far, and a total of approximately RMB 150 billion (USD 19 billion, INR 840 billion, using 1999-2008 average exchange rates) were disbursed between 1999 and 2008 (Liu & Wu, 2010). More than 8 million hectares of land have been converted from cropland to forestland under this programme (Liu & Wu, 2010).

The *Adapting to Climate Change in China* (ACCC) programme, a collaboration between China, Switzerland and the UK, was launched in 2009. Funding is sourced from DECC, DFID, and the Swiss Agency for Development and Co-operation (SDC). On the Chinese side, the NDRC is leading. The programme aims to provide assistance with adaptation planning and research in three pilot provinces: Guangdong, Ningxia, and

⁵ Eight years for ‘ecological forest’, five years for ‘economic forest’, or two years for grassland

Inner Mongolia. While it does not fund adaptation projects directly, it aims to support the adaptation policy making process (ACCC, 2012).

Finally, it is worth noting that China has decided to opt out of receiving international adaptation finance (Birdsall & de Nevers, 2012).

1.3 Arrangements aimed at encouraging private sector investment

China is highly successful in attracting private funds into low-carbon investment. It comes top in to Ernst & Young Renewable Energy Attractiveness Index (Ernst & Young, 2012), and attracts approximately 68 per cent of worldwide renewable energy FDI (Buchner, Falconer, Hervé-mignucci, Trabacchi, & Brinkman, 2011). Below are some of the current and prospective future policies that are (or might further) attract and direct private capital flows into low carbon investment.

1.3.1 Emission trading scheme pilots

According to Reuters, the NDRC has ordered five cities⁶ and two provinces⁷ to set ‘overall emissions control targets’, to submit proposals as to how these targets are to be allocated, and to submit implementation plans. The NDRC has also ordered the cities and provinces to create dedicated funds to support the project (Stanway, 2012). Tianjin’s emission trading scheme, supported by the Asian Development Bank (ADB), could begin operations as soon as 2013 (Asian Development Bank, 2012).

The overall aim of these pilot schemes may be to pave the way for a national emission trading scheme by 2015. Mr Wang Shu of the NDRC was quoted by the World Bank as saying the following in June 2011: ‘The initial plan is to establish carbon emissions trading schemes in some pilot regions, and try to establish a unified national system in 2015’ (World Bank, 2011).

However, there remains considerable uncertainty surrounding both the coverage (which companies) and the tightness of the seven pilot schemes, and accordingly the carbon price that might emerge from trading. Equal uncertainty surrounds an eventual national scheme.

1.3.2 Various feed-in tariffs

There are a variety of feed-in tariffs (FiTs) in place in China which leverage private capital investment into the renewable energy sector. The wind power and biomass FiTs are national schemes, while the only solar FiT revealed by the research is a single-province programme in Jiangsu province.

The current wind FiT provides project developers with 15 year contracts at rates varying between 0.51 yuan per kWh and 0.61 yuan (USD 0.08-0.09; INR 3.7-4.4) per kWh, depending on region. Given that this is around 1.5 to 1.8 times the rate for coal fired electricity, these represent a substantial premium (World Resources Institute, 2009). This system of FiTs replaces a previous system of project-based concessions.

⁶ Beijing, Shanghai, Shenzhen, Chongqing, and Tianjin

⁷ Hubei and Guangdong

The biomass feed-in tariff provides a more generous subsidy of 0.75 yuan (USD 0.11, INR 5.45) per kWh, and appears to be a national programme (Productivity Commission, 2011a)

The Jiangsu province solar FiT offers differentiated rates for solar PV projects depending on the type of project: Solar PV farms receive 1.4 yuan per kWh, rooftop projects 2.4 yuan/kWh, and building-integrated projects 2.9 RMB/kWh (2011 rates). (Australian Productivity Commission Report China Annex). This equates to a range of between USD 0.21 and 0.44/kWh and INR 10-21/kWh.

The resources for these feed-in tariffs are met through a levy on domestic electricity bills of 4 yuan (USD 0.6; INR 29) per MWh (Productivity Commission, 2011a).

1.3.3 Large Substitutes for Small (LSS) programme

The Large Substitutes for Small (LSS) programme was launched in 2007, and is intended to remove most of China's existing small scale and inefficient power plants from operation (Tian, 2008). Under this policy, utilities can only construct new coal-fired power plants once smaller and older facilities have been decommissioned. It also requires all new coal power plants constructed after 2008 to be state of the art, including a requirement to install flue gas desulphurisers (Seligsohn, Heilmayr, Tan, & Weischer, 2009). It may also be the case that the government lowered the generation tariff paid out to small thermal power plants, thus making them less profitable (Productivity Commission, 2011c). The programme for the power sector was part of the 11th FYP, and no further requirements were added in the 12th FYP.

Requirements also apply outside the electricity sector: all steel-producing blast furnaces smaller than 100m³ were to be closed by 2007, all cement plants with a capacity of less than 200,000 tonnes per year were to be closed by the end of 2008, and all blast furnaces smaller than 300m³ were to be closed by the end of 2010 (International Energy Agency, 2012). Further requirements have been integrated into the 12th FYP, and the programme continues in various industrial sectors (Institute for Industrial Productivity, 2012).

According to the IEA 'compensations [sic] can be provided to facilitate and accelerate this process' (International Energy Agency, 2012). However, it is not clear who pays the compensation (though presumably this is paid by the government), nor what proportion of costs are covered, or who is eligible.

The programme is overseen by the NDRC and implemented at the provincial and regional level.

1.4 Overview of China's domestic climate finance arrangements

Table 1. Arrangements for public funding for low carbon investment in China

Instrument	Sources of funding	Institutional structure/governance	Implementation agencies	Financial instruments	Resource allocation (sector as well as adaptation/mitigation split)
China CDM Fund	- Revenues from CDM projects in China - Earnings from CDM business operations - Grants and support from multilateral banks and other international institutions	See organogram	- For investments: the CDM Fund Management Centre - For grants: Project Applicant Organisers (relevant departments of the State Council or Provincial Development and Reform Commissions)	- Grants - Equity investments - Entrusted loans - Financing guarantees 'Other government-approved approaches'	N/A
Golden Sun Demonstration Scheme	Government budget, i.e. general taxation revenue	- Introduced and broadly overseen by the NDRC - No evidence found for more detailed governance structures	- Private sector investors (initiating projects) - NDRC (broadly responsible) - It is not clear which government agency actually executes the programme, reviewing applications and disbursing funding	- Capital subsidy - Up to 50 per cent of capital investment for grid-connected solar - Up to 70 per cent of capital investment for off-grid solar	Exclusively solar PV
Capital subsidy for solar PV on buildings	- Government budget, i.e. general taxation revenue - It may be the case that 70 per cent of the costs of this programme are borne by provincial Ministries of Finance	Introduced by the Ministry of Finance and the Ministry of Housing and Urban-Rural Development	- Private sector investors (initiating projects) - Ministry of Finance and Ministry of Housing and Urban-Rural Development - It is not clear which government agency actually executes the programme, reviewing applications and disbursing funding	- Capital subsidy 20 RMB/Wp for BIPV 15 RMB/Wp for rooftop PV	Exclusively solar PV
Grain for Green Programme	- Government budget, i.e. general taxation revenue 1999-2008 total spending was approximately RMB 150 billion (USD 19 billion, INR 840 billion)	- Introduced by the China government - Further details are unclear	Not clear	- Per-hectare subsidies paid for a number of years - Number of years depends on the type of forest that is planted; 8 years for 'ecological forest', 5 years for 'economic forest', 2 years for grassland	- Adaptation (via reductions of soil erosion) - Mitigation (carbon sequestration in biomass of forests)

Note: This overview does not necessarily give an exhaustive account of all relevant instruments

Source: Vivid Economics



Table 2. Arrangements for private funding for low carbon investment in China

Instrument	Policy description	Forms of capital	Which parts of the private sector are involved?
Emission trading scheme pilots	– 5 cities and 2 provinces have been ordered to set overall emissions targets and to allocate them – Though some uncertainty remains, it seems as though the first of these emission trading schemes may be in place in 2013 (in Tianjin)	– As a carbon pricing scheme, this policy encourages all types of private capital to participate in low carbon investment – A Reuters report points out that ‘the provinces and cities have also been ordered to set up a dedicated fund to support the project’, so it may be the case that some government support finance becomes available*	– The scope and coverage (besides the geographical area concerned) have not yet been determined – It is therefore not clear which sectors will be covered
Feed-in tariffs (FiTs)	– There are a variety of feed-in tariffs available to renewable energy generators in China, which encourage investment in low carbon power generation technologies – FiTs for wind and biomass are available nation-wide, while it seems as though a solar FiT is only available in Jiangsu province	– As FiTs are a revenue-subsidy, they are agnostic across different forms of capital investment.	– Power generators
Large Substitute for Small (LSS)	– Small and inefficient power plants and industrial facilities are encouraged to shut down with a mixture of quotas, incentives and cost-raising measures – This frees up capital for investment in more efficient and less emission-intense facilities	– The programme does not seem to focus on one particular type of capital provision	– Power generators

* However, it is not clear if the required fund is intended to support the establishment of the carbon trading platform, or intended to support firms’ mitigation efforts

Note This overview does not necessarily give an exhaustive account of all relevant instruments

Source: Vivid Economics



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