

Ways and Means:

Penalties and Incentives for Compliance in Chinese Emissions Trading Pilots

Steven Geroe*

This paper evaluates penalties and incentives to compliance in China's seven sub-national pilot Emissions Trading Schemes (ETS): financial penalties, deductions of emissions allocations; 'indirect regulation', or penalising non-compliance with ETS obligations under other laws; limiting access to state subsidies and other preferential programmes; 'green credit' schemes; extension of deadlines and notices to improve; carbon market rules designed to support market participation/liquidity and thus compliance; and auctioning reserves of permits. It then considers factors impacting on the implementation of compliance measures - including monitoring, reporting and verification issues; political and economic factors influencing administrative decisions; legal enforcement issues in Chinese environmental regulation more generally; capacity building challenges, and the development of market trading rules and institutions. Maintaining a high level of compliance performance under a more ambitious emissions cap, with a higher proportion of auctioned permits, will require more stringent penalties and more developed monitoring, reporting and verification (MRV) implementation. Accordingly, suggestions are offered for selectively adopting compliance measures in the pilots to constitute a functional regulatory 'toolkit' for the proposed national ETS. It is concluded that despite substantial implementation challenges, China's model of low-carbon economic modernisation may provide the basis for adequate compliance mechanisms, enforcement and complementary policy for the proposed national ETS to function effectively.

I. Introduction

This paper provides a comprehensive survey of the nature and function of penalties and incentives to compliance in China's seven sub-national pilot Emissions Trading Schemes (ETS). Section II examines financial penalties, alone and in conjunction with deductions of emissions allocations. In Section III 'indirect regulation', or penalising non-compliance with ETS obligations under other laws, is discussed in the context of the Tianjin ETS. Section IV covers measures combining elements of penalty and incentive. These include limiting access to state subsidies and

other preferential programmes, 'green credit' schemes, extension of deadlines and notices to improve, and carbon market rules designed to support market liquidity and thus compliance. Section V evaluates contrasting approaches to auctioning reserves of permits to facilitate compliance in Shanghai and Shenzhen. Section VI provides a summary overview of factors impacting on the implementation of these compliance measures. These include monitoring, reporting and verification (MRV) implementation issues, political and economic factors influencing administrative decisions, legal enforcement issues in Chinese environmental regulation more generally, capacity building challenges, the development of market trading rules and institutions, and the significance of these factors for the transition to a proposed national ETS.

The concluding section argues that high compliance rates in the ETS pilots have been largely attrib-

* Dr Steven Geroe is a lecturer in environmental and commercial law subjects at La Trobe University, Melbourne, Australia. For correspondence: <stevegeroe@yahoo.com.au>. DOI: 10.21552/cclr/2017/1/6

unable to over-allocate and providing free permits ('grandfathering').¹ Maintaining this level of compliance performance under a more ambitious emissions cap, with a higher proportion of auctioned permits, will require more stringent penalties and more developed MRV implementation. Nonetheless, the range of penalties evaluated in this paper provides a comprehensive 'toolkit' of regulatory measures to achieve effective performance in the proposed national ETS. Financial penalties, deduction of allowances and restricted access to grandfathered permits can impose significant consequences for firms and/or managers. This can be combined with positive incentives for compliance by restricting access to subsidies and green credit. The threat of such measures also bolsters the effectiveness of 'lighter touch' approaches such as exhortation and notices to improve. Ultimately, effective operation of the national ETS will be closely related to its integration with well-developed complementary policy and related capacity and institutional development. It is concluded that despite these implementation challenges, China's model of low-carbon economic modernisation may provide the rationale for the development of adequate compliance mechanisms, enforcement and complementary policy for the proposed national ETS to function effectively.

II. Financial Penalties and Deduction of Allowances

This section considers the role of financial penalties and deductions from liable entities' subsequent year's emissions allocations. These measures are considered together, as in some pilots they are combined in the same penalty provision. All of the pilots, except Tianjin, adopted financial penalties as a compliance measure for excess of emissions over liable entities' allocations. Other financial penalties related to MRV obligations, risk management requirements and information publication/availability. None of the sources accessed for this paper contained information as to actual enforcement under these provisions, probably due to very high compliance rates across the pilots.² The level of fixed sum penalties ranges across the pilots from RMB10,000 for lesser MRV offences to RMB100,000 for more serious MRV offences and/or excess of emissions. For example, Shanghai penalised not submitting re-

ports, falsifying verification and resisting verification. While most MRV penalties were from RMB10,000-50,000, Shenzhen imposed penalties up to RMB100,000 for more serious offences. For fraudulent reporting, Shenzhen imposed penalties at three-five times the average market price over the six months preceding the shortfall, depending on the level of non-compliance.³ The Guangdong ETS not only penalised non-compliance with MRV rules, but also with risk management and information publication requirements. Guangdong also imposed penalties for third party verifiers, for issuing false verification reports and use or disclosure of confidential information or emissions-related information.⁴ Hubei penalties for both resisting verification and fraudulent reporting included halving the following year's allocation. All pilots had public disclosure requirements.⁵ Given the centrality of effective MRV implementation to overall ETS outcomes,⁶ financial penalties regarding such offences are critical for effective ETS operation.

Some pilots linked financial penalties for excess emissions to market prices. For example, Beijing's financial penalty for excess emissions was set at three-five times the average market price over the preceding six months.⁷ Fines were set at three times the average market prices for excess emissions up to 10% of allocations, five times for excess of over 20%, and four times for 11-20%.⁸ The Shanghai, Shenzhen and Hubei pilots combined this approach with deducting a specified proportion of the following year's al-

- 1 See for example Shen Ying, 'Crossing the River by Groping for Stones: China's Pilot Emissions Trading Schemes and the Challenge for a National Scheme' (2015) 18 *Asia Pacific Journal of Environmental Law* 1, 27.
- 2 See s VI of this article. See also Zhang Zhongxiang, 'Carbon Emissions Trading in China: The Evolution from Pilots to a Nationwide Scheme' (Working Paper 1503, Crawford School of Public Policy Centre for Climate Economics & Policy, Australian National University, 2015) 16.
- 3 Zhang Zhongxiang (n 2) 6.
- 4 Shen Ying (n 1) 23.
- 5 Wang Huizhi, 'Evaluating Regional Emissions Trading Pilot Schemes in China's Two Provinces and Five Cities' (Working Paper Series Vol. 2016-01, Institute for Economic and Social Research, Tianjin Academy of Social Sciences January 2016) 31 <<http://www.agi.or.jp/workingpapers/WP2016-01.pdf>> accessed 15 January 2017.
- 6 See s VI.
- 7 Wang Huizhi (n 5) 31.
- 8 Zhang Zhongxiang (n 2) 14.

locations.⁹ Shenzhen combined a penalty of three times the average market price over the preceding six months for excess emissions, with deduction of the shortfall amount from the following year's allocation. Guangdong combined a fixed financial penalty of RMB50,000, with deduction of double the total of excess emissions from the following year's allocation.¹⁰ Hubei penalised excess emissions at one-three times the average market price (up to RMB150,000), and deducted double the shortfall of allowances from the following year's allocation.¹¹ Thus Shaozhou Qi et al conclude that Hubei had the most stringent enforcement provisions among the pilots.¹² Neither Tianjin nor Chongqing imposed financial penalties.¹³ Both relied largely on limiting preferential access to financial subsidies and complementary low-carbon policies for a three year period.¹⁴

Combining fines with deductions from future allocations combines financial penalties as a deterrence with an incentive to avoid future costs. Linking penalties to market prices limits risks of underpenalising in the event of higher prices, while setting caps on market-price linked penalties as in the Hubei pilot (RMB150,000) avoids the risk of penalising at excessive levels. Conversely, it has resulted in low levels of penalties due to low price levels in the pilot period.¹⁵ This approach was also adopted by Australia's now repealed Carbon Pricing Mechanism, which set

financial penalties at 130% during the fixed price period and 200% of the benchmark price in the flexible price period.¹⁶ In comparison, the EU ETS applied an excess emissions penalty of €100 per tonne in the second compliance period (2008-2012), increasing in line with the EU consumer price index in the third period (2013-2020).¹⁷ Similarly, the Korean ETS imposes a penalty 'within Won100,000 per tCO₂e (\$90/tCO₂e).'¹⁸ Fixed sum penalties under the Chinese ETS, at RMB10,000-100,000, are low in comparison.¹⁹ Moreover financial penalties linked to market prices in Beijing, Shenzhen and Hubei have been well below EU penalty levels due to low carbon market prices.²⁰

It is important to note, moreover, that these Chinese penalties (for example in Shanghai and Guangdong) are maximum penalties for one-off fines, not penalties imposed per tonne.²¹ If the level of such one-off penalties is averaged over the total of excess tonnes emitted, then it may be lower than the cost of abatement per tonne. While enterprises may still have an economic case to avoid abatement, in the context of other compliance measures and perceived longer-term allocation restrictions, it may be only marginally greater than a business-as-usual scenario with no penalty on emissions at all. While this paper agrees with Shaozhou Qi et al that the fine for each tonne of excess emissions should be higher than the allowance price,²² it does not go as far as Ying Shen

9 Shen Ying (n 1) Table 1 'Comparison among Seven Pilot ETS Programs in China: Penalties', 23. See also Zhang Zhongxiang, (n 2) 16.

See also Richard Mao et al, 'China Carbon Market Research Report 2016' (report for the Environmentalist Ltd, the International Finance Corporation, the United Nations Development Program and South Pole Asset Management Ltd, 2016), Table 17f 'Market Elements of Pilots', 54 <http://carbon-pulse.com/wp-content/uploads/2016/02/2016-Environmentist-China-Carbon-Market-Research-Report_En_20160217_CW.pdf> accessed 15 January 2017.

10 Mao (n 10) 54.

11 Shen Ying (n 1) 23. See also Wang Huizhi (n 5) 31; Zhang Zhongxiang (n 2) 15. See also Qi Shaozhou, Wang Banban and Zhang Jihong, 'Comparison of China's ETS Pilots and Features of Hubei' [sic], (power point for Climate Change and Energy Economics Study Centre, Wuhan University, 2015) 37 <<https://dukekunshan.edu.cn/sites/default/files/u587/Qi%20Shaozhou%20-%20Comparison%20of%20China%E2%80%99s%20ETS%20Pilots%20and%20Features%20of%20Hubei.pdf>> accessed 15 January 2017.

12 Shaozhou Qi (n 11) 38.

13 Shen Ying (n 1) Table 1, 23.

14 See discussion in s IV.

15 Shen Ying (n 1) 32.

16 See also Lingshui Mo, 'Tianjin Experience and Lessons on ETS Development and Recommendations for China Establishing a National-wide ETS' (power point presentation for the Asian Development Bank, Tianjin, September 2014) <<http://www.rksi.org/sites/default/files/document/368/panel-3-experience-lessons-ets-development-recommendation-china-establishing-national-wide-ets-en.pdf>> accessed 15 January 2017.

For further detail see 'Carbon Pricing Mechanism', web site of the Australian Clean Energy Regulator <<http://www.cleanenergyregulator.gov.au/About/Pages/Accountability%20and%20Reporting/Annual%20Reports/Annual%20report%202014-15/Carbon-pricing-mechanism.aspx>> accessed 15 January 2017.

17 Directive 2003/87/EC of the European Parliament and of the Council of 13 October 2003 establishing a scheme for greenhouse gas emission allowance trading within the Community and amending Council Directive 96/61/EC, art 16. See Shen Ying (n 1) 31.

18 Hojeong Park and Won Kyung Hong, 'Korea's Emission Trading Scheme and Policy Design Issues to Achieve Market-Efficiency and Abatement Targets' (2014) 75 Energy Policy 73, Table 5 'Comparisons between the K-ETS and the EU-ETS', 82.

19 Shaozhou Qi et al (n 11) 38, note that Chinese ETS pilot penalties are also low in comparison with the Californian ETS.

20 Shen Ying (n 1) 22.

21 *ibid* 32.

22 Qi Shaozhou et al (n 11) 35.

in describing these low level penalties as effectively incentivising non-compliance.²³ Moreover, limitations on the level of fines set by sub-national governments under Chinese administrative law will no longer be relevant after the transition to a national ETS.²⁴ In the concluding section, recommendations regarding this range of financial and related penalties in the proposed national ETS are discussed.

III. Indirect Regulation: The Law on Statistics and MRV in the Tianjin Pilot

This section focuses on the Tianjin ETS, which was an unusual case in that it did not adopt financial penalties. As a result, compliance incentives played a correspondingly greater role.²⁵ Direct penalties were not adopted as non-compliance with reporting conditions was already subject to Section 41 of the Statistics Law. Regulators were also concerned that penalty provisions could be a disincentive to early participation.²⁶ Offences under the Statistics Law cover delayed, incomplete, inauthentic and fraudulent reporting of data, as well as refusing or impeding statistical investigation. Maximum penalties under Section 41 are RMB50,000 for each sub-section, with a cumulative maximum of RMB200,000 in the event of breach of all four sub-sections.²⁷ Thus the compliance mechanism is a form of 'indirect regulation', contained in different laws to those establishing the obligations that have been breached. Hao Zhang argues this approach is a common factor in weak enforcement performance across many areas of environmental regulation.²⁸ These concerns were also raised in interviews of stakeholders in the Tianjin ETS pilot, 'largely related to what consequences the indirect penalty will bring to the compliance of the market players as well as the emissions trading program as a whole.'²⁹ This illustrates the point that the effectiveness of compliance mechanisms is relevant not only to liable entities perceptions of their own obligations, but to their perceptions of the future functioning of carbon market. Thus expectations regarding the effectiveness of compliance provisions is an important element of the behaviour and strategy of market participants, and thus of the overall functioning of the market. Hao concludes that lack of effective penalty provisions could undermine the effective operation not only of critical MRV obliga-

tions, but the overall functioning of the carbon market. While this issue may be avoided in the national ETS, it does illustrate a widespread implementation issue in Chinese environmental regulation. It also illustrates the central importance of adequate compliance mechanisms to overall scheme effectiveness.

IV. Limiting Access to Preferential Measures and Green Credit Schemes

Both the Tianjin and Chongqing pilots relied heavily on limiting access to state support policies in renewable energy, energy efficiency and other low-carbon measures, for a period of two-three years.³⁰ In Shanghai, in the event of non-compliance the Development and Reform Commission (DRC) can annul an enterprise's eligibility for subsidies. This includes 'participation in 'government competitions as a "good performer", in energy-saving and other emissions reduction policies'.³¹ Moreover, the Shanghai DRC and other government agencies can refuse to issue or revoke authorisation for projects from non-compliant enterprises, for example in relation to construction or operating licenses. State-Owned Enterprise (SOE) non-compliance is included in annual performance assessments, which are linked to the salary of the Chief Executive Officer (CEO). Thus both the CEO and the SOE's performance review in-

23 *ibid* 32.

24 *ibid* 38.

25 Hao Zhang, 'Designing the Regulatory Framework of an Emissions Trading Program in China: Lessons from Tianjin' (2012) 6(4) Carbon and Climate Law Review 336, 340.

26 *ibid* 340.

27 Statistics Law of the People's Republic of China (*Zhongguo Renmin Gonghe Guo Tong Ji Fa*), People's Republic of China National People's Congress, Order No 15, 27 June 2009, art 41 <http://www.npc.gov.cn/englishnpc/Law/2007-12/13/content_1383998.htm> accessed 15 January 2017.

28 *ibid*, citing Michael G Faure and Hao Zhang, 'Environmental Criminal Law in China: A Critical Analysis' (2001) 41(1) Environmental Law Reporter 10024, 10033–10035.

29 *ibid*; Hao Zhang cites interview responses in Tianjin in September-December 2011.

30 Shen Ying (n 1) Table 1, 23, and 31. See also Zhang Zhongxiang (n 2) 15 and 19.

31 Jeff Swartz, 'China's National Emissions Trading System: Implications for Carbon Markets and Trade' (Issues Paper No 6, International Centre for Sustainable Trade and Development, March 2016) <http://www.ictsd.org/resources/China/Chinas_National_ETS_Implications_for_Carbon_Markets_and_Trade_ICTSD_March2016_Jeff_Swartz.pdf> accessed 15 January 2017.

clude compliance with the Shanghai ETS.³² This approach combines elements of both penalty and incentive, in that it involves conditional eligibility for future incentives based on compliance. As such, it can be compared to mandatory ‘responsibility contracts’ between both sub-national governments and enterprises, and national-level energy institutions under the National Development and Reform Commission (NDRC). These ‘agreements’ obliged officials and managers to accept responsibility for compliance with energy efficiency targets set by the 11th Five-year Plan. Consequences for non-compliance included non-eligibility for honours and awards (with important consequences for promotions and preferential treatment including financing applications), publication of failure on web sites and requirements to provide formal explanations (with significant reputational consequences), and delay of approvals for other energy intensive projects.³³

Some pilots, for example Shanghai, included non-compliance in publicly accessible credit records of liable entities.³⁴ While Shanghai did not have the most severe financial penalties, it nonetheless achieved 100% compliance over the pilot period.³⁵ Additionally, from 2007 the Ministry of Environmental Protection (MEP), the People’s Bank of China (PBOC) and the China Banking Regulation Commission jointly implemented a ‘green credit’ policy. This included credit-evaluation and incorporating enterprises’ environmental compliance records into the bank’s credit-evaluation system.³⁶ In 2007, this resulted in 30 enterprises being denied loans, together with publica-

tion on the MEP web site.³⁷ Additional measures taken by individual PBOC branches included the Jiangyin Branch in Jiangsu province, which issued a color-coded lending guide. This enhanced lending scale and priority for green-rated enterprises. Red-rated companies could not increase loan levels, except for environmentally beneficial investments. Black-rated enterprises were denied new loans. Failure to comply with environmental regulations after a stipulated period could result in reductions of credit or even calls to return existing loans.³⁸

More ‘light handed’ measures include orders to improve and extended deadlines for compliance. In the Beijing pilot, 257 orders to improve were made in the first compliance period, declining to 14 in the second, corresponding to a 100% compliance rate.³⁹ Orders to improve must be regarded in the context of the threat of more stringent enforcement measures such as financial penalties. Moreover Beijing, Guangdong and Tianjin achieved good compliance after deadlines were extended by up to one month.⁴⁰ Extensions of compliance deadlines also operate in the ‘shadow’ of more stringent measures, and have proved effective. For example, both Beijing and Guangdong extended deadlines to facilitate compliance, with the Guangdong market remaining open over the weekend in the final two weeks of the compliance period.⁴¹ Thus in overall terms the availability of more stringent penalties, such as fines and emissions allocation reductions, is a necessary element of more integrated regulatory approaches that include more light-handed penalties and incentives as well.⁴²

32 *ibid.*

33 Zhao Xiaofan and Leonard Ortolano, ‘Implementing China’s National Energy Conservation Policies at State-owned Power Generation Plants’ (2010) 38 *Energy Policy* 6293, 6295 and 6300.

34 Wang Huizhi (n 5) 31.

35 Zhang Zhongxiang (n 2) 20, citing Shanghai Municipal Government (SMG) (2013) *Trial Administrative Measures for Carbon Emissions in Shanghai*.

36 *ibid.*, citing Zhang ZX, ‘Asian Energy and Environmental Policy: Promoting Growth While Preserving the Environment’ (2008) 36 *Energy Policy* 3905–3924.

37 *ibid.*

38 Zhang Zhongxiang (n 2) 23.

39 Mao (n 9) 97.

40 Zhang Zhongxiang (n 2) 18.

41 *ibid.* 6.

42 See also Ying Shen (n 1) 33.

43 Wang Huizhi (n 5) 32.

44 Zhang Zhongxiang (n 2) 14 and 17.

V. Compliance Reserve Auctions: Shenzhen and Shanghai

This section compares the approaches to auctioning reserve emissions permits in the Shenzhen and Shanghai pilots. Both pilots auctioned additional allowances at the close of the trading day. Eligibility was limited to enterprises with emissions exceeding their allocations, allowing purchase for compliance purposes only. Hence such additional allowances were not tradeable.⁴³ In the first compliance period, the Shenzhen auction reserve price was half the average market price on 27 May 2014. Bidding volume could not exceed 15% of the difference between the entities’ actual emissions and its 2013 allocation total.⁴⁴ Thus enterprises were incentivised to purchase

allowances by setting reserve prices below average market prices. In Shanghai, enterprises were entitled to purchase 100% of their allowance shortfall at auction on the last day of the first compliance period. The reserve price was set at 1.2 times the weighted average market price over 30 trading days prior to auctioning, with a floor price of RMB46 per ton of allowance.⁴⁵ The reserve price set on this basis was actually the highest sale price to that point. Setting the reserve price higher than the market price was designed to ensure that earlier buyers were not disadvantaged compared to last auction buyers in terms of purchase price, thus incentivising prior purchase at market prices. In contrast with the Shenzhen approach, Shanghai's methodology was more oriented towards creating a penalty for non-compliance. This proved effective, with 584,000 tons (37%) of the volume of trade (1.553 million tons of allowances) over the total trading period beginning on 26 November 2013 conducted in the two weeks prior to the last reserve auction.⁴⁶ Zhang concludes that while the amount of auctioned allowances was a small proportion of total allowance transactions, it was vital for compliance in Shanghai.⁴⁷ While both the Shenzhen and Shanghai ETS achieved strong rates of compliance, the auction of permit reserve rules in Shanghai was preferable in terms of incentivising a higher proportion of permit purchases at market prices prior to the reserve auction period.

VI. Related Factors Bearing on the Effectiveness of Compliance Measures

The operation of compliance measures cannot be evaluated in isolation. Clearly compliance will present less of a challenge in a market oversupplied with free (or 'grandfathered') permits, than in a market based on auctioning with a credible commitment to scarcity.⁴⁸ Other critical factors include the effectiveness of MRV systems, related capacity building challenges, the legal basis of allowances, carbon market rules and broadly political and economic factors.

Jotzo and Loschel argue that institutional and operational aspects, particularly MRV implementation, have been a work in progress throughout the pilots.⁴⁹ Similarly, Ying Sheng argues that

.... monitoring systems that allow for credible measurement, reporting and verification of emissions

trading activities are among the most critical elements for the successful implementation of any ETS.⁵⁰

Moreover, Wu et al conclude that successful ETS operation requires credible MRV implementation, and that '... many aspects of an ETS have the potential for misuse and rent-seeking, thus corrupting the scheme as a whole and rendering it ineffective'.⁵¹ They also state that the most important MRV issue in the Shanghai pilot has been data quality. More specifically, Wu et al argue that 'direct reporting systems of liable entities and third party verification at the firm level is the most important institutional setting in the ETS regarding MRV'.⁵² Such accuracy and transparency in data reporting systems not only supports correct evaluation of ETS implementation at the firm level, but is necessary to limit the 'moral hazard' arising from lack of public scrutiny of data. Accordingly, they recommend that the Shanghai government

publish and validate the firm level carbon emission data in an open information platform. The trading activities of big dealers should also be registered and reported to avoid speculation.⁵³

They conclude that capacity development to support the reliability of the statistical system is critical to effective ETS implementation.⁵⁴

45 *ibid* 17. See also Lingshui Mo (n 16).

46 Zhang Zhongxiang (n 2) 17.

47 *ibid* 18.

48 See for example Oliver Sartor, 'The EU ETS Carbon Price: To Intervene or not to Intervene?' (CDC Climate Research Climate Brief No 12, 12 February 2012) 8 <http://www.cdclimat.com/IMG/pdf/12-02_climate_brief_12_-_the_eu_ets_carbon_price_-_to_intervene_or_not_to_intervene.pdf> accessed 15 January 2017.

49 Frank Jotzo and Andreas Löschel, 'Emissions Trading in China: Emerging Experiences and International Lessons' (2014) 75 *Energy Policy* 3, 9.

50 Shen Ying, 'Key Issues on Designing and Implementing Emissions Trading System in China' (The Asian Conference on Sustainability, Energy & the Environment 2013, 1 August 2013), 295 <<http://iafor.org/conference-proceedings-the-asian-conference-on-sustainability-energy-environment-2013/>> accessed 15 January 2017.

51 Libo Wu, Haoqi Qian and Jin Li, 'Advancing the Experiment to Reality: Perspectives on Shanghai Pilot Carbon Emissions Trading Scheme' (2014) 75 *Energy Policy* 22, 28.

52 *ibid*.

53 *ibid* 29.

54 Similarly, Zhang Zhongxiang (n 2) 19 concludes that emissions accounting is critical for effective MRV.

Lo relates these issues to more general challenges for the Chinese legal system:

China's regulatory infrastructure for carbon trading is far from complete. There are considerable challenges in setting up robust monitoring, reporting and verification mechanisms, which remain current in Europe and more so in China, where legal enforcement is constantly a problem confronting all levels of the society.⁵⁵

He observes that pilot ETS MRV systems lack accuracy and consistency and that official emissions data lacks reliability.⁵⁶ This is partly due to self-reporting by enterprises, with only occasional checks by environmental agencies.⁵⁷ According to Lo, enterprises are 'only required to report fuel inputs and emissions and are not monitored on a regular basis, if ever.'⁵⁸ He indicates that 'manipulation' of emission data 'is not uncommon under some allocation methods'.⁵⁹ This relates to broader problems in China with regard to effective enforcement and disclosure requirements under environmental regulation.⁶⁰ This must also be seen in the context of political and economic factors influencing administrative decisions regarding allocations and information dis-

closure. Wu et al argue that since allowance allocation methods significantly influence welfare distribution among liable entities, governments have an incentive to take into account extraneous factors such as 'regional protectionism, GDP champions, regional pollution resolution, an industrial re-distribution strategy and equity thinking'.⁶¹ Additionally, they argue that even in the absence of rent-seeking or compromises, the government's priorities regarding sectoral economic growth rates and 'imbalanced information disclosure' can impact on compliance outcomes.⁶² Parenteau takes a similar view of MRV in the context of China's legal system. He argues that 'The legitimacy of a carbon ETS depends on domestic institutions that can police transactions and make sure they are honest'.⁶³ He refers to the robust regulatory system of the US acid rain ETS, based on severe penalties and criminal sanctions, and to the role of 'citizen watchdogs' in litigating if state agencies fail to enforce ETS rules. In contrast, he argues that in China neither administrative enforcement nor judicial supervision are adequate, and that development of rule of law remains an ongoing process.⁶⁴

Several authors relate such shortcomings to capacity constraints. For example, Hao Zhang refers to 'shortage in trained and experienced personnel in emissions trading-related areas in regulatory agencies'⁶⁵ as a key factor in developing effective MRV systems. Lingshui Mo identifies weak executive capacity for compliance and enforcement as a fundamental issue in overall ETS effectiveness. He contends that enhancing capacity for MRV, compliance and enforcement will be a key issue in designing and implementing a national ETS.⁶⁶ The ETS pilots did, however, take measures to develop capacity. For example, Shanghai and Beijing ETS conducted workshops and onsite training for liable entities to support compliance.⁶⁷

Permitting entities other than liable entities under the ETS to purchase permits can also support compliance, through increasing market liquidity. This increases the incentive for firms to produce an excess of permits by reducing emissions, which can be traded on carbon markets with financial institutions, as in the Hubei pilot. Shenzhen was the first to allow foreign enterprises to participate.⁶⁸ Rules expanding opportunities for secondary market trading, such as allowing futures or derivative products trading based on carbon permits, could also support increased liquidity. Nonetheless, media reports indicate that the

55 Alex L Lo, 'China's Carbon Markets: Prospects and Institutional Barriers' (Australia-New Zealand Society for Ecological Economics Conference on 'Opportunities for the Critical Decade: Enhancing Well-being within Planetary Boundaries' (The University of Canberra 2013), 212 <http://anzsee.org/download/anzsee_2013_conference_proceedings/11_Lo.pdf> accessed 15 January 2017.

56 *ibid* 213, citing Zhang, Z, 'Assessing China's Carbon Intensity Pledge for 2020: Stringency and Credibility Issues and their Implications' (2001) 13(3) *Environmental Economics and Policy Studies* 219-235.

57 *ibid*, citing Julia Tao and Daphne Ngar-Yin Mah, 'Between Market and State: Dilemmas of Environmental Governance in China's Sulphur Dioxide Emission Trading System' (2009) 27(1) *Environment and Planning C: Government and Policy* 175-188.

58 *ibid*, Lo 213.

59 *ibid*, citing Tao and Ma 200 (n 60).

60 *ibid*, citing Arthur Mol Guizhen He and Lei Zhang, 'Information Disclosure in Environmental Risk Management: Developments in China' (2011) 40(3) *Journal of Current Chinese Affairs* 163-192.

61 Libo Wu et al (n 51) 25.

62 *ibid* 26.

63 Patrick Parenteau and Mingde Cao, 'Carbon Trading in China: Progress and Challenges' (2016) 46 *Environmental Law Reporter* 101944, 10198.

64 *ibid*.

65 Hao Zhang (n 25) 340.

66 Lingsui Mo (n 16).

67 Zhang Zhongxiang (n 2) 16.

68 *ibid* 22.

China Banking Regulatory Commission has opposed allowing futures trading in the proposed national ETS, due to concerns about excessive speculation and related price volatility.⁶⁹ Thus there is a trade-off between attracting secondary market investment and impacts on investor certainty or predictability, which could operate as a disincentive to investment. Finally, resolving uncertainties regarding the legal basis of enforcement powers and the legal status of permits would also support an effectively functioning carbon market, and thus consistency of investment and liquidity over the longer term. While this may have been an issue with the sub-national ETS pilots, it may be addressed by national legislation in the proposed national ETS⁷⁰ currently under consideration by the State Council, the peak institution in the Chinese executive branch.⁷¹

Several of the factors considered in this section will be critical in the transition to the proposed national ETS. It has been argued that the scale of a national Chinese ETS, including its application to regions not covered by the pilots and the expanded number of liable entities involved, may require several years for the MRV process to be reliable enough to enable a transition from free allocation to auctioning.⁷² Nonetheless, should a national ETS be achieved, the potential value for a domestic trading market in China has been estimated at about £125 billion a year, almost double the existing global carbon trading market.⁷³ The scale of the market of course relates to China's expanding economy, with its emissions projected to account for a third of global emissions by 2030.⁷⁴

These issues illustrate the fundamental point that properly functioning carbon market regulation and MRV systems are essential preconditions of ETS implementation, including compliance measures. Hence compliance measures cannot be evaluated in the absence of consideration of these factors. Despite these issues, all the pilots achieved over 99% compliance rates in 2015, except Chongqing.⁷⁵ 100% of liable entities achieved compliance in Beijing, Shanghai, Guangdong and Hubei. Shenzhen achieved 99.70%, Tianjin 99.11% and Chongqing approximately 70%.⁷⁶ Given the late commencement and very low trading volumes⁷⁷ in the Chongqing pilot, it may be regarded as an anomaly as opposed to an indication of the likely impact of design features over a longer time frame. These high compliance rates may reflect the relative ease of compliance arising from an over supplied permit market, combined with the predominance of grandfathering across the pilots.⁷⁸ The relative ease of compliance does not, however, indicate that the pilots can be regarded as unsuccessful. In terms of performance, the pilots covered 18.2% of Chinese emissions and 25.66% of Chinese GDP.⁷⁹ Total emissions of liable entities in Beijing fell around 4.5% in the first compliance period, with the average cost of cutting emissions falling by 2.5%.⁸⁰ In Shanghai, emissions decreased by 5.31 million tons, falling by 3.5% from 2011 to 2013. In Shenzhen, in the first implementation year, total emissions decreased by 3.83 million tons, falling by 11.7% from 2010 to 2013.⁸¹ Thus augmenting scheme ambition through tightening caps, auctioning permits and more stringent compliance mechanisms can be regarded as

69 Stian Reklef, 'China's NDRC Passes Emissions Trading Bill to State Council' (*Carbon Pulse*, 29 March 2016) <<http://carbon-pulse.com/17641/>> accessed 15 January 2017.

70 Chinese President Xi Jinping announced in September 2015 that the national ETS would commence in 2017. World Bank Group and Ecofys, 'Carbon Pricing Watch 2016: Advanced Brief from the State and Trends of Carbon Pricing 2016', 2 <http://www.ecofys.com/files/files/world-bank-group_ecofys-carbon-pricing-watch_160525.pdf> accessed 15 January 2017.

71 Reklef (n 69). For information as to progress of national ETS design see Qian Guoqiang and Yu Siyang, 'China ETS: Preparation for National System Speeds Up' (Status Report 2015 for the International Carbon Action Partnership) <https://icapcarbonaction.com/images/StatusReport2015/ICAP_Report_2015_02_10_online_version.pdf> accessed 15 January 2017.

72 Swartz (n 31) 18.

73 Qin Tianbo, 'Climate Change and Emissions Trading Systems: China's Perspective and International Experiences' (Report for Konrad Adenauer Foundation No 102, 2012), 76 <http://www.kas.de/wf/doc/kas_31160-1522-1-30.pdf?121018044105> accessed 15 January 2017.

74 *ibid* 76.

75 Qi Shaozhou (n 11). See also Swartz (n 31) 15.

76 Mao (n 9), Table 26 'Compliance Effectiveness of Each Pilot in 2015' 80. See also Zhang Zhongxiang (n 2) 18.

77 Wang Huizhi (n 5) 30.

78 See s IV.

79 Fei Teng, 'Status of China's Regional Trading Programs: Progress and Challenges' (power point for the Institute of Energy, Environment and Economy, Tsinghua University, 13-15 August 2013) <https://unfccc.int/files/focus/mitigation/application/pdf/status_of_chinas_regional_trading_programs.pdf> accessed 15 January 2017.

80 Wang Huizhi (n 5) 32, citing National Development and Reform Commission 'Beijing Carbon Trading Trial Achieves Evident Results' [] (author translation) (*NDRC*, 28 September 2014) <http://www.sdpc.gov.cn/dffgwdt/201409/t20140928_626928.html> accessed 15 January 2017.

81 *ibid* Wang Huizhi.

building on a basis of at least functional pilot ETS implementation.

VII. Conclusion

All commentators on the Chinese pilots, and indeed other ETS as well, are agreed that effective enforcement measures are essential to achieve high rates of compliance with emissions and MRV requirements. While the level of financial penalties in Chinese ETS pilots is low by international standards, compliance rates for all ETS except Chongqing were over 99%. This level of compliance may be more difficult to sustain with tighter emissions caps and more auctioning of permits as the national ETS becomes more established. Lower penalties, together with grandfathering and fairly accommodating allowances allocations, were adopted in the pilots to facilitate participation and encourage scheme acceptance by liable entities. In order to achieve China's low-carbon objectives through a national ETS, a more credible commitment to scarcity of permits will need to be implemented over time, necessitating an increased focus on enforcement of more stringent compliance obligations. The very high rates of compliance do not enable quantitative analysis of the impact of differing compliance measures in the pilots on compliance rates. Nonetheless, the evidence in the commentary does provide a basis for several conclusions and related recommendations for the transition to a national ETS.

Financial penalties should apply comprehensively, not only to excess of emissions over liable entities' allocations, but also to MRV obligations, risk management requirements and information publication/availability. It is essential that stringent penalties be applied in relation to data provision, accuracy and transparency, given the centrality of emissions-related data to effective scheme functioning. Penalties should also apply to third party verifiers in the MRV process, as in the Guangdong pilot. Moreover penalties should be higher for fraudulent breaches, as in Shenzhen. This should be designed to create effective deterrence for data manipulation, in addition to outright falsification. Linking financial penalties to market prices limits risks of under-penalising in the event of higher prices, while setting caps on market-price linked penalties (as in Hubei) avoids the risk of penalising at excessive levels. Nonetheless, in the Chinese pilots it has resulted in low levels of

penalties due to low price levels. For this reason, the European approach of fixed penalties per tonne of excess emissions, linked to changes in line with consumer price indexes, should be adopted. Penalties per tonne of excess emissions are preferable to maximum penalties for one-off fines, which may be less than costs of abatement per tonne when averaged over the amount of the excess. Penalties per tonne should also be set higher than the allowance price, to ensure adequate incentive for compliance. Combining financial penalties with deduction of allowances from the following period (as in Shanghai, Shenzhen and Hubei) in effect compounds the consequences of non-compliance, in that reduced future allocations make future compliance correspondingly more difficult to achieve. If business-as-usual practices are continued with emissions at above allocation levels, penalties will be greater in subsequent periods than if financial penalties alone were imposed. In this way such measures provide an amplification of the aspects of incentive and penalty in any compliance measure.

The Chinese ETS pilots have also shown a degree of innovation in the interaction of compliance measures with complementary policies – such as limiting access to low-carbon subsidies and green credit programs. Given the large-scale financial support involved, this amounts to a considerable incentive for compliance. Measures such as linking compliance to managers' remuneration and performance records in SOEs are reminiscent of more heavy handed approaches adopted in China's energy efficiency programme under its 11th Five-year Plan. Direct regulatory approaches adopted in that programme, such as mandatory closure of heavy polluting plants, however, have not been adopted. Pilot measures limiting access to state support policies in renewable energy and other low-carbon projects in the event of non-compliance could be usefully adopted to support the national ETS. While some of these measures may be implemented on a sub-national basis, overall planning conducted by the State Council and NDRC could specify such initiatives. Green credit schemes correlated to ETS compliance, such as those trialled by the Ministry of Environmental Protection, the People's Bank of China and the China Banking Regulation Commission, could also strengthen national ETS implementation.

With regard to compliance reserve auctions, the Shanghai approach of setting reserve prices at levels above market prices could be usefully adopted, in or-

der to incentivise a higher proportion of permit purchases at market prices prior to the reserve auction period. Other market-oriented measures include opening up markets to entities not liable under the scheme, such as financial institutions and foreign investors. Such measures can support market liquidity, as can market rules allowing secondary market activity. This involves a trade-off between inflows of capital and the potentially destabilising effects of shorter-term speculative capital flows. Still, it is a useful means to balance incentives and penalties, through enhancing returns on investments in abatement. Market-oriented and penalty provisions can also be combined with 'lighter touch' measures, such as extending compliance deadlines in conjunction with notices to improve and exhortation to compliance by officials. These approaches reinforce the message that consequences of non-compliance are unavoidable, forming an efficient means of enforcement when backed by credible sanctions.

Effective implementation of compliance measures, indeed ETS implementation in general, requires sound MRV provisions and enforcement. This in turn requires ongoing capacity building on a national level. The proposed national ETS is likely to provide greater legislative authority and clarity regarding the legal status of enforcement measures, and the legal status of emissions permits. Along with enhanced MRV rules and capacity building, this is a necessary basis for an effective compliance regime. However, it is one thing to draft laws, and another to enforce them. The energy efficiency programmes under the 11th Five-year Plan illustrate that the Chinese central government is in a position to effectively enforce measures when it is focused on doing so.⁸² Conversely, there is considerable evidence of a lack of this kind of focus in enforcement of environmental regulation more generally. Clearly, it is not realistic to view this in isolation from political and economic factors, at a national, sub-national, industry and enterprise level.⁸³

This highlights the need for a broad policy approach to ETS implementation, in terms of the right balance of penalties and incentives, and interactions with complementary policies such as financial support for low-carbon projects and access to credit. Given very large-scale lending by state-related banks to Chinese low-carbon projects,⁸⁴ it is germane to observe that China's ETS pilots form part of its economic modernisation approach through low-carbon de-

velopment.⁸⁵ This forms additional grounds for optimism that the central government will sustain a commitment to a credible scarcity of auctioned permits, backed by a compliance regime designed to ensure effective implementation. Conversely, previous pilots such as wholesale electricity market schemes, were discontinued on the grounds that market and institutional conditions were not ripe.⁸⁶ Quota-based renewable portfolio standards regulations remained in the drafting and negotiation stage in the State Council for several years.⁸⁷ Similarly, implementation issues have been identified in relation to Chinese SO₂ (sulphur dioxide) and COD (chemical oxygen demand) ETS. While they provide a useful reference for Chinese carbon ETS pilots, important differences include the role of sub-national governments in trading in several pilots, direct regulatory control of emissions, and market 'thinness' due to narrowly defined access for participants.⁸⁸ While Bing Zhang et al conclude that overall performance of these pilots has been disappointing,⁸⁹ the data is complex and variable in terms of outcomes in different locations, at different times and abatement costs for different technologies.⁹⁰ Nonetheless, issues raised regarding

82 See for example Lynne Price, Wang Xuejun and Jiang Yun, 'The Challenge of Reducing Energy Consumption of the Top-1000 Largest Industrial Enterprises in China' (2010) 38 Energy Policy 6485-6498.

83 See s V.

84 See for example Sufang Zhang et al, 'Interactions Between Renewable Energy Policy and Renewable Energy Industrial Policy: A Critical Analysis of China's Policy Approach to Renewable Energies' (2013) 62 Energy Policy 342, 345; Joel B Eisen, 'China's Renewable Energy Law: A Platform for Green Leadership?' (2010) 35(1) William and Mary Environmental Law Policy Review 1, 29.

85 See for example Olivia T Boyd, 'China's Energy Reform and Climate Policy: the Ideas Motivating Reform' (Working Paper 1205, Australian National University Centre for Climate Economics and Policy, May 2012), 12 and 17 <http://www.academia.edu/1620811/Chinas_Energy_Reform_and_Climate_Policy_The_Ideas_Motivating_Change> accessed 15 January 2017. See also Zhang et al, *ibid* 350.

86 See Ma, JL, 'On-grid Electricity Tariffs in China: Development, Reform and Prospects' (2011) 39(5) Energy Policy 2633.

87 Interview with Li Yanfang, Director of the Environmental and Resources Law Teaching and Research Centre, Renmin University, Beijing, 10 November 2012; Interview with Mr Wang Changui, General Secretary of the Tianjin Wind Energy Association, Tianjin, 10 January 2013.

88 Bing Zhang et al, 'The Indecisive Role of the Market in China's SO₂ and COD Emissions Trading' (2016) 25(3) Environmental Politics 875, 891-2.

89 *ibid* 875 and 891.

90 Zhengge Tu and Renjun Shen, 'Can China's Industrial SO₂ Emissions Trading Pilot Scheme Reduce Pollution Abatement Costs?' (2014) 6 Sustainability 7621, 7631-8.

the central importance of enforcement of obligations, particularly in relation to MRV, and regulatory risk arising from of uncertainty as to changes in scheme design,⁹¹ are instructive in the context of the proposed national carbon ETS. None of these pilots have evolved into nationally implemented schemes.⁹² The Chinese government has indicated, however, that a national carbon ETS will be implemented in 2017.⁹³ While it may not be ambitious in terms of scarcity of

permits or auctioning in the early stages, the seven ETS pilots do provide a useful toolkit for effective compliance measures in the event the scheme progresses as planned. Despite the magnitude of the challenges of transitioning to a national ETS, China's model of low-carbon economic modernisation may provide the rationale for the development of adequate compliance mechanisms, enforcement and complementary policy for effective scheme implementation.

91 Zhang et al (n 88) 892.

92 *ibid* 877.

93 Only 33% of respondents in a 2015 survey of relevant stakeholders expected scheme commencement by 2018 or earlier. 74% expected it to be fully operational and covering all of mainland

China by 2020 or earlier, see Dimitri De Boer, Renato Roldao, and Huw Slater, 'The 2015 China Carbon Pricing Survey' (Report for the China Carbon Forum, August 2015), 15 <http://www.chinacarbon.info/wp-content/uploads/2015/09/2015-China-Carbon-Pricing-Survey-EN-FINAL-Low-Res.pdf> accessed 15 January 2017.

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