AN ASSESSMENT OF THE EFFECTIVENESS AND THE WTO LEGALITY OF CHINA'S CLIMATE ACTION:

POLICIES AND LAWS ON FEED-IN TARIFF AND EMISSIONS TRADING SCHEME AS CASE STUDIES

by

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Abstract

Climate change is one of the biggest global challenges of the 21st century and now it is the defining moment for the international community to take actions. China, currently the world's largest greenhouse gas emitter, recognises the seriousness of this environmental issue and has taken the responsibility to develop its extensive policies and laws on climate action to alleviate the global climate change. While China has made an appreciable progress in addressing climate change by putting in place national policies and laws, it has not yet set up relevant assessment mechanisms to evaluate its policies and laws, especially with regard to their effectiveness and legality.

Against this background, this thesis seeks to provide recommendations regarding feasible assessment framework and mechanisms that can be put in place in China. This framework will allow policy makers in China to assess the effectiveness and the legality of China's policies and laws on climate action. To that end, the thesis explored several research questions. First, the thesis examines policies and laws enacted and implemented to support China's climate action with the aim of assessing their effectiveness in achieving the nation's environmental protection targets, economic development targets and social targets. Corollary to this question, is the issue of legality of those measures under WTO law. Finally, the thesis explores lessons learned from the EU policies and laws on climate change and how those lessons can be applied to Chinese context.

All questions are explored through two case studies. Case study one examines China's Feed-in Tariffs (FITs) for deploying renewable energy, taking wind and solar energy as examples. This case study assesses the effectiveness and the WTO legality of China's FITs currently applied to the wind and the solar energy sectors. Case study two investigates the effectiveness and the WTO legality of China's policies and laws enacted and implemented in support of China's pilot and national Emissions Trading Schemes (China's ETSs). Through the design of the assessment and its framework, as well as the process of the assessment, this study will benefit further development of

China's climate legislation and its enforcement. Firstly, being sustainability-oriented, the effectiveness assessments conducted in this study will reveal the effects of the policies and laws of China on FITs and ETSs in reducing carbon emissions and in achieving the country's sustainable development goals. Secondly, the scrutiny of the legality of China's FITs and ETSs within the context of the WTO law will give Chinese policymakers a clear idea of the legal status of Chinese measures for combating climate change. The legality assessments will also provide an applicable policy assessment mechanism for policymakers to measure the legality of China's relevant policies and instruments against WTO rules.

When necessary, the assessments conducted in this study also take references from the regulatory measures and the assessment mechanisms adopted by the European Union (EU) for reducing the GHG emissions in its member states. The EU is one of the most vigorous advocates of addressing climate change, and it is also one of the leading forces in deploying renewable energy and in promoting ETS. Nowadays, the EU is providing the most important support to China in the field of climate actions, including both policymaking and policy implementation. This close partnership built between the EU and China determines that references to the climate actions of the EU are significant and necessary for the examination of Chinese climate policies and laws.

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List of Abbreviations

AB	Appellate Body
BRI	Belt and Road Initiative
CCER	China Certified Emission Reductions
CNY	China Yuan
CO_2	Carbon dioxide
CPC	Communist Party of China
DSB	Dispute settlement body
DSPV	Distributed solar photovoltaic
EC Treaty	Treaty Establishing the European Community
ETS	Emissions trading scheme
EU	European Union
EEG	Stromeinspeisungsgesetz / German Renewable Energy Sources Act
FIT	Feed-in tariff
FYPs	Five-Year Plans
GATS	General Agreement on Trade in Services
GATT	General Agreement on Tariffs and Trade
gce	Grammes of coal equivalent
GDP	Gross domestic product
GHG	Greenhouse gas
GW	Gigawatt (one billion watts)
GWh	Gigawatt hours

GWp	Gigawatt peak
IEA	International Energy Agency
INDC	Intended Nationally Determined Contributions
IRENA	International Renewable Energy Agency
kW	Kilowatt (1000 watts)
kWh	Kilowatt hour
LCRs	Local content requirements
MEE	Ministry of Ecology and Environment
Mtoe	Millions of tonnes of oil equivalent
MRV	Monitoring, reporting and verification
MW	Megawatt (1000 watts)
MWp	Megawatt peak
NDRC	National Development and Reform Commission
NEA	National Energy Administration
NGO	Non-governmental organization
NOx	Nitrous oxides
NPC	National People's Congress
PRC	People's Republic of China
PV	Photovoltaic
RE	Renewable energy
RE-E	Renewable energy electricity
REL	Renewable energy law
RMB	Renminbi
RPS	Renewable Portfolio Standard

SASAC	State-owned Assets Supervision and Administration Commission
SCM Agreement	Agreement on Subsidies and Countervailing Measures
SEPA	State Environmental Protection Agency
SERC	State Electricity Regulatory Commission
SETC	State Economic and Trade Commission
SGCC	State Grid Corporation of China
SNG	Synthetic natural gas
SO_2	Sulphur dioxide
SOE	State-owned enterprise
SPC	State Planning Commission
SPCC	State Power Corporation of China
TBT Agreement	Agreement on Technical Barriers to Trade
TRIMS Agreement	Agreement on Trade-Related Investment Measures
TRIPS	Trade Related Intellectual Property System
TWh	Terawatt hours
UNFCCC	United Nations Framework Convention on Climate Change
WTO	World Trade Organisation

Chapter One

Introduction: Objectives, Research Questions and Structure of this Thesis

> 'Climate change is the defining issue of our time and now is the defining moment to do something about it.'[1]

Climate change is a global problem, and its impacts are diverse and manifested around the world. There is still time to address this problem, but it will definitely require great efforts from all countries of the world.[2] Without drastic and effective action today, addressing the severe effects from continuous climate change in the future will become more difficult and costly, or even might be impossible.[3] United Nations legal instruments provided a framework for putting in place mitigation measures to address climate change. In 1992, the United Nations Framework Convention on Climate Change (UNFCCC) was the first step in addressing this problem and set out the ultimate objective to prevent 'dangerous' human interference with the climate system. Five years later, the Kyoto Protocol was adopted to strengthen the global response to climate change, with imposed quantifiable emission targets on developed countries. In2015, Parties to the UNFCCC reached a landmark agreement, the Paris Agreement, which was an effort to accelerate and intensify actions and investments required to bring about a sustainable low carbon future. The Paris Agreement sets a concrete objective to keep the global temperature rise in the twenty-first century well below 2 degrees Celsius (and even further down to 1.5 degrees Celsius, if possible) above pre-industrial levels.[4] To this date, 197 countries around the world have joined the Paris

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[1] United Nations, 'UN Climate Action Summit 2019' <https://www.un.org/en/climatechange/un-climate-summit-2019.shtml> accessed 19 September 2019

[2] ibid

[3] United Nations, 'Climate Change' <https://www.un.org/en/sections/issues-depth/climate-change/> accessed 20 September 2020

[4] The Paris Agreement, art 2 (1) (a), <https://unfccc.int/files/essential_background/convention/application/pdf/english_paris_agreement.pdf> accessed 20 September 2020

Agreement and 189 Parties have ratified,[5] which reflects public awareness of the urgency to tackle the threat of climate change.

With rapid economic growth in the past fifty years, the Chinese industry heavily relied on conventional energy and the burning of fossil fuels resulted in extensive carbon emissions in China. This demonstrates the need for China to (and now has the economic strength to) play a significant role in the global combat against climate change, as some scholars have already suggested.[6] Being the world's largest greenhouse gas emitter at present, China recognises the seriousness of the global environmental issue and has taken the responsibility to develop its national strategies on climate actions. These strategies are of international importance due to the impact that reduction of emissions in China can have on global emissions. In 2015, China submitted its first round of Nationally Determined Contributions (China's NDC) to the UNFCCC. This document not only summarises the previous efforts by China in addressing global climate change; more significantly, it sets new objectives by elaborating the intended contributions China intends to make by 2030. China's NDC pledge underlines that to achieve its commitments to combat climate change,

> 'China needs . . . to make a sustained effort in further implementing enhanced policies and measures in areas such as regime building, production mode and consumption pattern, economic policy, science and technology innovation and international cooperation.'[7]

Renewable energy policies and laws are particularly salient in addressing climate change in China and form the main focus of this study. These policies and laws are of key importance to China's climate change portfolio for the following reasons.

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[5] United Nations Climate Change, 'Paris Agreement - Status of Ratification' <https://unfccc.int/process/the-paris-agreement/status-of-ratification> accessed 20 September 2020

[6] Michael Kuby and others, 'The Changing Structure of Energy Supply, Demand, and CO_2 Emissions in China' (2011) 101(4) AAAG 795

[7] Department of Climate Change, National Development and Reform Commission, People's Republic of China, *Enhanced Actions on Climate Change: China's Intended Nationally Determined Contributions* (2015) <http://www.china.org.cn/environment/2015-06/30/content_35950951.htm> accessed 19 September 2019

First, compared with conventional energy, renewable energy not only produces less or even no greenhouse emissions into environment, but it also has far-reaching positive effects on economic and social development by providing sustainable, clean and affordable energy for relevant industries and people. In view of its environmental and economic advantages, policies and laws of deploying renewable energy nationwide have, as my detailed discussion in **Chapter Four** will reveal, the potential of producing a far-reaching, long-lasting effect on China's efforts in tackling of climate change.

Second, China's policies and laws on reducing carbon emissions are also very significant, as they are supposed to have guiding and binding forces on the nation's production mode and production scale. In order to achieve its commitments stipulated in its NDC, China has adopted (among other strategies) the innovative carbon emissions trading system (ETS) which is, as **Chapter Five** will further explain, a market-oriented and a proven cost-effective economic approach of reaching an emissions reduction caps or targets. So far, China has initiated carbon emission trading pilots in several provinces and cities and its national-wide ETS has also been launched since the end of 2017.[8] With a clear plan of 'steadily implementing a nationwide carbon emission trading system'[9] as part of its enhanced actions on climate change, China is determined to make its contribution to the alleviation of global environmental problems, at least through the promulgation of new relevant policies and laws.

Third, China's policies and laws on climate action directly reflect targets set in its 'New Normal' and 'Ecological Civilisation' development strategies. These policies and laws also illustrate that the Chinese government is committed to address this environmental crisis while maintaining its sustainable economic development. The 'New Normal' development model is 'characterized by slower but low-carbon growth, a gradual transition from heavy industry to services, increased productivity through innovation

[8] IEA, 'China's Emissions Trading Scheme: Designing efficient allowance allocation', June 2020, <https://www.iea.org/reports/chinas-emissions-trading-scheme> accessed 19 September 2020

[9] Department of Climate Change of NDRC (n 7)

and clean energy mix'.[10] 'Ecological Civilisation' development target mainly includes ecosystem protection, pollution control, improving the efficiency of natural resource utilization, and integrating them in economic, political, social, and cultural activities.[11] The idea is derived from the worldview of an ancient Chinese philosopher Lao Tzu. The worldview, named *Daodejing (Tao-te ching)*, perceived an intrinsic web of connection between human beings and the nature, which plays vital roles in China's society development.[12]

Fourth, devoting its efforts to making and enforcing these policies and laws on climate action illustrates China's commitment as a responsible nation in mitigating global climate change. The progress in domestic carbon emissions reduction through the policies and laws on renewable energy deployment and the launch of ETS will, to some degree, demonstrate that China is committed to work with other parties to fight against global climate change. The achievement of the domestic policy making and enforcement could also be helpful to build up China's leadership in the international climate cooperation and negotiations and assist in creating a positive reputation for China in addressing environmental issues.

While China has, as mentioned above, made appreciable progress in policymaking on climate action strategy, it has not yet set up relevant assessment framework and mechanisms to assess the effectiveness of its policies and laws. This will be explored in **Chapters Four** and **Five**. Moreover, as an important member of the World Trade Organization (WTO) since 2001, China also has the responsibility to ensure the legality of its policies and laws against WTO rules. This means that China should keep its domestic policies and laws compatible with WTO rules, which also include climate change policies and laws.

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[10] Changyan Ma, "How China can take the lead in adapting to the 'new normal' economy" (in Chinese, translated by the author) (2015) <http://www.gov.cn/zhengce/2015-08/13/content_2912124.htm> accessed 19 September 2020

[11] Jiahua Pan, *China's Environmental Governing and Ecological Civilization*, (Springer 2014), p ix.

[12] Stanford Encyclopaedia of Philosophy, 'Laozi' <https://plato.stanford.edu/entries/laozi/> accessed 19 September 2020

1.1 Research questions and contributions

Against this background, this thesis seeks to provide recommendations regarding feasible assessment framework and mechanisms that can be put in place in China. This framework will allow policy makers in China to assess the effectiveness and the legality of China's policies and laws on climate actions. To that end, the thesis explores several research questions. First, the thesis examines policies and laws enacted and implemented to support China's climate action with the aim of assessing their effectiveness in achieving the nation's environmental protection targets, economic development targets and social targets. Corollary to this question, is the issue of legality of those measures under WTO law. Finally, the thesis explores lessons learned from the EU laws and policies on climate change and how those lessons can be applied to Chinese context.

The above three questions are analysed through two case studies. The first case study on China's Feed-in Tariffs (FITs) scheme for deploying renewable energy, in particular wind and solar power is examined in Chapter Four. This case study will assess the effectiveness and the legality of China's FITs which are currently applied to wind solar energy sectors. In principle, feed-in tariff scheme is a policy mechanism that is designed to enhance investment in renewable energy technologies and promote renewable energy deployment. The FIT offers 'incentives that benefit private producers and subsidize the production of energy while tackling one or more market failures.'[13] This scheme is considered to be the most successful policy instrument yet designed for promoting the comparatively cost-effective deployment of renewable energy technologies around the world.[14] In China, wind energy and solar energy sectors have relatively mature renewable energy technologies in practice. They are by far the two fastest growing renewable energy industries in China, which are regulated by a series of policies and laws.

[13] Luca Rubini, '"The wide and the narrow gate": Benchmarking in the SCM Agreement after the Canada – Renewable Energy/FIT Ruling' WTR [2015] 211

[14] Miguel Mendonca, *Feed-in Tariffs: Accelerating the Deployment of Renewable Energy* (1st edn, Earthscan 2007)

The second case study investigates the effectiveness and the legality of China's policies and laws enacted in support of Chinese national Emissions Trading Scheme (China's ETS) launched in 2017. China's ETS is another significant market-oriented measure – in addition to the FIT scheme – that is included in China's climate action strategy for combating climate change. Aiming at building an effective ETS that is applicable to the specific Chinese context, China first approved and initiated ETS pilots in seven regions in 2011 (Beijing, Shanghai, Tianjin, Chongqing, Guangdong, Hubei and Shenzhen) with the assistance of the European Union. The experience and lessons from running these seven ETS pilots later enabled China to establish its national ETS at the end of 2017. Now China's national ETS is still in an initial stage and there is much work to be done to gradually improve the system. In view of this, the assessment of existent relevant policies and laws in this study – especially the focus on the ETS pilots that lay the foundation for China's national ETS – will contribute to providing recommendations and advice for China's future amendments or updates of its national ETS.

In addition to contributing to the existing scholarship on China's climate change policy and its international commitments, this thesis has significant policy implications that will be beneficial for China. The findings of this thesis, in particular with regard to two case studies, will be significant for future development of China's climate change policies and laws. The assessment will unveil and clarify two important issues – the effectiveness of China's policies and laws on the deployment of renewable energy industry and emissions trading scheme and their legality under WTO law.

First, the framework used for effectiveness assessment is designed with full consideration of China's current priority of development, which is to promote sustainability in the areas of economic development, social progress, and environmental protection. To examine whether existent policies and laws serve to achieve this goal, the effectiveness assessments in this study are done from the following three perspectives: 1) their environmental impacts by examining the environmental targets of policies and laws under discussion, 2) their economic impacts and 3) their social impacts. These three perspectives are selected, because they are in

line with the key principle of sustainable development which is, as Rachel Emas points out, 'the integration of environmental, social, and economic concerns into all aspects of decision makings'.[15] China advocates that it will scale up its renewable energy deployment, achieve the peaking of carbon dioxide emissions around 2030 and make best efforts to peak early in its NDC[16], and finally become carbon neutral by 2060[17]. Against this background, effectiveness assessments on China's policies and laws on climate change conducted in this study are valued, because the assessments will reveal to what extent the policies and laws on China's FITs and China's ETS have contributed to achieve the China's sustainable development targets and how this situation will be further improved in future.

Second, as to the legality assessments, this thesis will specially focus on testing whether China's policies and laws for renewable energy deployment and for national ETS implementation are compatible with WTO rules. Similar to the effectiveness assessments, the scrutiny of the legality of China's FIT and ETS in the context of the WTO law will also be processed respectively. As mentioned above, along with a rapid growth in the production and use of renewable energy, especially in the sectors of wind energy and solar energy, quite a few regulatory measures have been taken and economic incentives implemented by Chinese central and local governments. Moreover, in order to reduce the total emission of greenhouse gases and to achieve peak emission targets as early as possible, China has implemented, with the experience and lessons from the seven ETS pilots, a series of policies and laws to vigorously promote the national emissions trading scheme. As a member of the WTO, China has the responsibility to guarantee that all these domestic policies and laws – which constitute its national climate action strategy – are compatible with WTO rules, even though the international renewable electricity market and emissions trading markets

[15] Rachel Emas, 'The Concept of Sustainable Development: Definition and Defining Principles' <https://sustainabledevelopment.un.org/content/documents/5839GSDR%202015_SD_concept_definition_rev.pdf> accessed 19 September 2019

[16] Department of Climate Change of NDRC (n 7)

[17] Carbon Trust, 'China commits to carbon neutrality by 2060' (23 September 2020) <https://www.carbontrust.com/news-and-events/news/china-commits-to-carbon-neutrality-by-2060> accessed 10 November 2020

have not yet adequately developed around the world. Only by doing so, can China avoid the potential risks of trade conflict with other members of the WTO. The legality of China's policies and laws under WTO law which address the issues of climate change and trade competitiveness will be scrutinised against current WTO rules, although we are fully aware of the situation that increasingly more scholars, such as Lukasz Gruszczynski and Anupam Goyal etc.,[18] are appealing to the WTO to put greater effort into improving environmental regulations on international trade. The results of the legality assessments in this thesis will provide Chinese policymakers with a better understanding regarding the legal status of Chinese measures for combating climate change. The results will also, more importantly, provide an applicable policy assessment mechanism for policymakers to measure the legality of China's relevant policies and instruments in the context of WTO rules.

When necessary, the effectiveness and legality assessments conducted in this study also take into account regulatory measures and economic incentives enacted by the European Union (EU) to reduce its member states' GHG emissions. It is well-known that the EU is one of the most vigorous advocates of having an ambitious global climate change response, and it is also one of the leading forces in deploying renewable energy and in promoting emissions trading scheme. With more experience, the EU has more comprehensive and rigorous policy assessment mechanisms to guarantee the effectiveness and the legality of policies and laws in its climate actions. Nowadays, the EU provides the most important support to China in its climate actions, including both policymaking and policy implementation. The close partnership built between the EU and China on international trade and climate protection determines that references to the climate actions of the EU are significant and necessary for the examination of Chinese climate policies and laws. The benefits are twofold: firstly, the mature regulatory measures and schemes of the EU for deploying renewable energy and emissions trading can provide China with valuable references and benchmarks for policy effectiveness assessment; secondly, under the supervision of strict EU law, the

[18] Anupam Goyal, *The WTO and International Environmental Law: Towards Conciliation* (OUP 2006); Lukasz Gruszczynski, *Regulating Health and Environmental Risks under WTO Law: A Critical Analysis of the SPS Agreement* (OUP 2010)

EU's climate policies are generally considered to be more compatible with WTO rules. Based on this, taking references from the EU's climate policies can help Chinese policymakers to better understand the scope and impacts of WTO rules in tackling climate change.[19]

1.2 Research methods

This study aims to build up a comprehensive assessment mechanism so as to measure the effectiveness and WTO legality of China's policies and laws on climate action. With regard to assessment mechanisms for measuring the effectiveness of the policies and laws, this study relies on the EU experience and its mechanism for assessing public policies. The comprehensive effectiveness assessment mechanism in this study includes three lenses: economic development, environmental protection and social wellbeing. Integrating these lenses within the Chinese context, the mechanism was applied through two case studies on feed-in tariffs (FITs) and emissions trading scheme (ETS). The assessment on the WTO legality of China's policies and laws on climate action was also carried out through the two case studies: China's policies and laws on feed-in tariffs and emissions trading scheme.

For the sake of completing a comprehensive assessment on the effectiveness and the WTO legality of China's policies and laws on climate action, several research methods were deployed in this thesis. The thesis heavily relies on doctrinal research method which involves the critical examination of the evolution of China's policies and laws on climate action and measures prescribed by those policies and laws. This research approach is coupled with the empirical analysis by undertaking qualitative and quantitative analysis of data with the aim of assessing the effectiveness of policies and laws put in place. In addition, comparative analysis was also deployed by examining the EU model on climate action and how lessons learned in the EU context can be applied to current Chinese approaches to climate change. Finally, a historical method

[19] EU-China Clean Energy Centre, 'China-EU Energy Cooperation Roadmap 2020 (Concept Note, 2015)' <http://documents.rec.org/publications/EC2_roadmap_2020_EN_web.pdf> accessed 10 April 2016

was also used in the review of both the EU and China's policies and laws on climate action.

First, the doctrinal research method was very valuable in examining China's policies and laws on climate action, in particular with regard to deployment of renewable energy and promoting emissions trading scheme. As doctrinal legal research allows for an analytical study of existing statutory and regulatory instruments, case law and authoritative materials,[20] it is of great value in examining China's climate action strategy by identifying positive and negative elements on a trajectory of achieving policy goals. To that end, the doctrinal method was firstly used to review the evolution of China's policies and laws on climate action. This provided us with better understanding of how global climate change response had an impact on the development of China's policies and laws on climate change. The review on Chinese policies and laws involved examination of legislative instruments and legal and policy-making processes. Doctrinal method was also deployed in each case study with the aim of reviewing China's policies and laws regarding the feed-in tariffs on renewable energy and emissions trading scheme. Meanwhile, this method was key in assessing the legality of China's policies and laws on climate action under WTO rules, focusing in particular on compatibility of feed-in tariff scheme and emissions trading scheme with subsidy rules under WTO law. To be specific, in the WTO legality assessment, the doctrinal legal method was used to analyse whether the FIT and the free allowance in the ETS are compatible with WTO subsidy rules. Based on the case *Canada – Renewable Energy/Canada – Feed-in Tariff Program* (*Canada – Renewable Energy/Canada – FIT*) *(DS412/DS426)*[21], doctrinal legal research was applied in the legality assessment on the FIT and ETS. The legal analysis started with a discussion of whether the FIT and the free allowance in the ETS can be defined as a subsidy under WTO rules. This was followed by an analysis on whether the FIT and the free

[20] Amrit Kharel, 'Doctrinal Legal Research' (SSRN, 06 March 2018) <https://ssrn.com/abstract=3130525> accessed 10 April 2019

[21] WTO Appellate Body Reports, *Canada – Certain Measures Affecting the Renewable Energy Generation Sector/Canada – Measures Relating to the Feed-in Tariff Program* (*Canada – Renewable Energy / Canada – Feed-in Tariff Program*), WT/DS412/AB/R/WT/DS426/AB/R

allowance can be regarded as an actionable subsidy or a prohibited subsidy under WTO legal context.

Second, empirical research method was deployed by undertaking quantitative and qualitative analysis in the process of assessing whether China's policies and laws on the climate action are effective. This was done by assessing China's policies and laws on climate action through the lenses of environmental, economic and social impacts. The framework for the effectiveness assessment in this study based on these lenses was built on the basis of the EU assessment mechanism which has been used to measure the effectiveness of the public policy of EU member states. This assessment mechanism and wider assessment framework will provide China with a comprehensive public policy assessment mechanism, which will be helpful to optimise China's policy and law making. Due to the relative lack of data and lack of data transparency in China, especially with regard to sensitive environmental issues, in assessing the effectiveness of laws and policies on the FIT and the ETS the thesis relies heavily on secondary data found in existing studies in economics, reports from think tanks and relevant associations, such as REN21, IRENA, IEA, World Resources Institute, etc. as well as in published academic scholarship. Data was subsequently used to develop assessment benchmarks which have been incorporated in assessment tables which form the assessment framework. Those tables allowed for the evaluation China's policies and laws against set objectives. The effectiveness of China's climate change related policies and laws was undertaken through three different lenses, including economic, environmental and social wellbeing impacts which form main elements of sustainable development principle. The application of both qualitative and quantitative approach in this study enhanced the stringency of the effectiveness assessment.

Third, comparative research method was also broadly used in this thesis. With very advanced experience in climate policy and law makings, particularly the experience of deploying renewable energy and implementing the ETS, the EU has become a model for other countries (including China) in design and implementation of climate policy and law. China and the EU have built up very extensive cooperation in the area of

renewable energy industry and carbon emissions marketization. It was worthy of making comparison between the two parties. In this study, the comparison involves the making and implementation of climate policies and laws, and their effectiveness and WTO legality. Moreover, in assessing the EU laws and policies, the thesis also deployed a historical method. It was used to examine both China's and the EU climate change policies and laws. The EU has implemented climate action for a very long time and has put successful regulatory policies into effect and has accumulated vast experience in deploying renewable energy and promoting emissions trading scheme. The historical approach applied in the review of the EU climate policy and law was favourable to understand the evolution of China's climate policy and law. This comparative approach coupled with historical analysis provided some useful recommendations on how best to improve China's laws and policies taking into account lessons learned from the EU.

1.3 Thesis structure

The structure of the thesis is as follows. **Chapter One** provides a brief summary of research questions, research methodology and sets out the thesis structure. **Chapter Two** represents a conceptual chapter. This chapter provides a brief introduction to Chinese legal context, assessment benchmarks and frameworks. This introduction is very helpful for understanding the process of policymaking in China from formulation of laws and policies to their implementation. Benchmarks and assessment framework, as the important toolkit of this study, were also developed in this chapter to examine the effectiveness of policies and laws. Moreover, this chapter also makes use of WTO rules related to climate change to structure framework to assess WTO legality of measures. These benchmarks and frameworks are subsequently used in case studies in order to examine the effectiveness and legality of China's FITs and ETS.

Chapter Three provides an overview of policies and laws in the context of China's climate action strategy and offers a general review over these policies and laws. This chapter provides an overall understanding on China's climate actions and their status. Case studies on the effectiveness and legality of FITs and China's ETS are examined in **Chapter Four** and **Chapter Five** respectively. **Chapter Four** starts with a brief

introduction of the frameworks which will be used in this assessment. Based on the status of renewable energy development in China, wind energy and solar energy sectors are screened out to be the targets of this case study. The effectiveness assessment of FITs makes use of significant data from IEA and other research organisations and analyse them from the perspectives of emissions reduction, economic development and social impacts. In terms of the legality assessment on FITs, this study focuses on the relationship between FITs and subsidies under the context of WTO rules. Through analysis on whether FITs constitute subsidies and whether they are actionable subsidies in WTO legal system, **Chapter Four** ultimately provides the assessment of FITs. Likewise, **Chapter Five** examines the effectiveness and legality of China's ETS. These two case studies provide policy makers with comprehensive assessment mechanisms and scrutiny of China's climate action policies and laws, which should be very valuable for improving China's climate actions and making China play more effective role in combating global climate change. **Chapter Six** offers final recommendations and concluding remarks.

Chapter Two

The Chinese Context and Assessment Frameworks

This chapter outlines the conceptual framework that will underpin the assessment of China's policy and law for climate actions. The chapter begins by summarising the main features of China's legislation system and relevant departments that may be involved in China's climate actions. This is followed by an analysis of how EU policies have influenced China's climate actions, including scheme design and implementation. The third section focuses on building a framework for assessing the effectiveness which is based on the EU model deployed to assess the effectiveness of the policy and law in EU Member States. In addition, in order to analyse the legality of the policy and law for climate actions in the context of the WTO law, this chapter briefly analyses the relationship between climate actions and WTO rules, including the main agreements or rules potentially involved in the climate actions.

2.1 The Chinese context

This section outlines the Chinese context by examining the legislative system, authorities and departments and other significant institutions which are potentially involved in climate actions in China.

2.1.1 Political structures

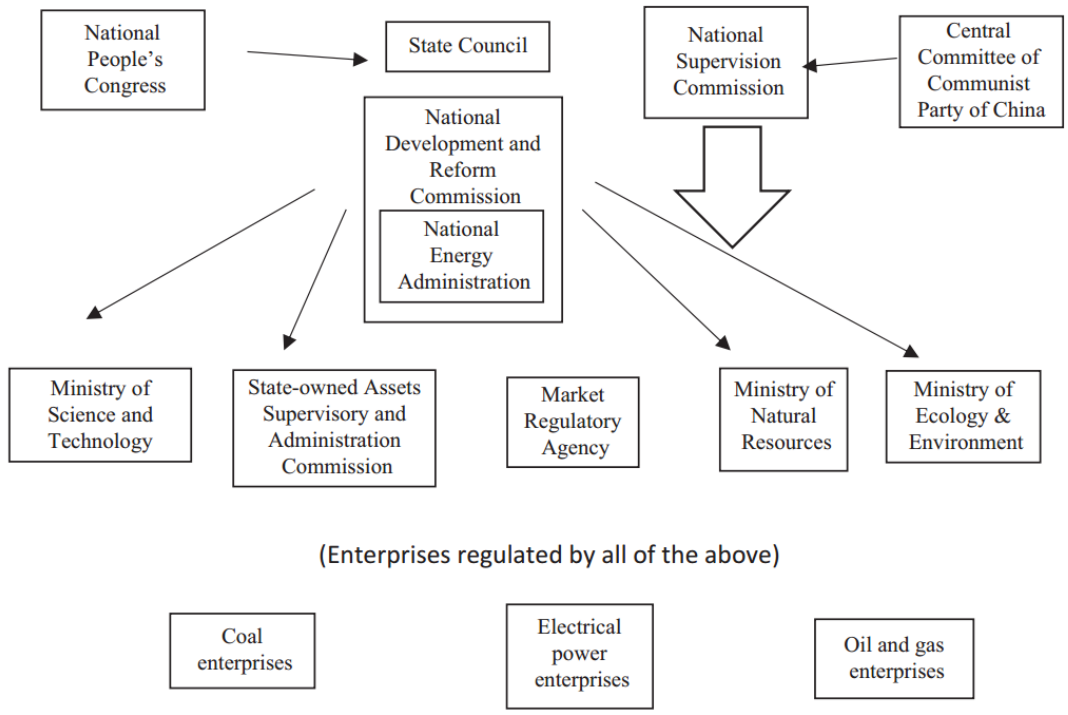
In China, political power and authority principally come from the Communist Party of China (CPC) and also from the Chinese central government and the National People's Congress (NPC).[22] As shown in **Figure 2.1**, both the CPC and the NPC are in the core position in China's policy and law marking system.[23] According to the constitution, the NPC holds extensive authorities over policy- and law-making and the appointment of Chinese senior government officials. However, these powers are subordinate to

[22] Philip Andrews-Speed and Sufang Zhang, *China as a Global Clean Energy Champion: Lifting the Veil* (1st edn, Palgrave Macmillan 2019) 74

[23] ibid 75

those of the CPC in reality, as the CPC is in the leading position almost everywhere in China, including in the process of legislation.

Figure 2.1 Energy-related authorities at the level of central government after March of 2018.[24]



Note: All authorities have corresponding local bureaus or subsidiaries at the level of provinces and counties to implement the local policies.

Despite formally a unitary state, Chinese formal authority is consisted of three main levels of the governments: central government, provincial or municipal governments, and city or county governments. Generally, being with lower level of authority, provincial or municipal governments, and city or county governments are named as local governments in China. The State Council of the People's Republic of China, a Chinese cabinet and the highest administrative authority, ranks at the top of Chinese administrative system. All ministers and chairs of national commissions, like the

[24] Andrews-Speed and Zhang (n 22) 88

NDRC and MEE, are members of the State Council. National Supervision Commission (NSC), established at the First Session of the 19th NPC which was held in March of 2018 and reporting to the CPC, has a responsibility to monitor the performance of central government agencies.

Since the Reform and Open-up in 1978, the central government has progressively granted substantial policy-making authorities to lower level governments, including provincial and municipal governments, in particular to the counties where the county governments hold considerable influence over policy designing and implementation in line with the characteristics of local areas.[25] This practice has made different localities be able to pursue specific economic policies that are fit for their local specific conditions. Moreover, this practice has also provided a channel that the central government to test policy instruments in a limited number of provinces or cities before determining whether and how to carry out the relevant policies nationwide.[26]

2.1.2 Policy processes

Policy processes to some extent impact the effectiveness of the policy. In the process, the pilot approach, named *shìdiǎn* in Chinese, is a very significant learning-by-doing model to guarantee the policy effective in its implementation. Based on the *shìdiǎn* approach, before launching a government program it is believed to be prudent and necessary to first pilot the proposal in certain regions with specific social and economic conditions.[27] This methodology not only makes policy makers to reduce the inherent risks of "one-size-fits-all" defects in policy instruments, but it is also helpful to

[25] Kenneth Lieberthal, *Governing China: From Revolution through Reform* (2nd edn, W. W. Norton & Company 2004); Yongnian Zheng, *The Chinese Communist Party as Organizational* Emperor: Culture, Reproduction and Transformation (1st edn, Routledge 2009)

[26] Derek Headey, Ravi Kanbur, and Xiaobo Zhang, 'China's Growth Strategies' in Ravi Kanbur and Xiaobo Zhang (eds), *Governing Rapid Growth in China: Equity and Institutions* (Routledge 2010); Sebastian Heilmann, 'Economic Governance: Authoritarian Upgrading and Innovative Potential' in Joseph Fewsmith (eds), *China Today, China Tomorrow: Domestic Politics, Economy, and Society* (Rowman & Littlefeld 2010)

[27] ibid 86

discover methods that are particularly suitable for China's diverse and unique social and economic conditions in different regions.[28]

Traditionally, policy discourse in China is rather limited in the public sphere and policy deliberation tends to be processed behind the closed doors among key actors. After the setting up the public hearing system, more and more common actors, like scholars, journalists, members in think tanks, non-governmental organisations (NGOs) and even individuals have been playing an increasing role in proposing policy design, debating on solutions to some popular issues and, occasionally, even arguing strongly against some policy suggestions proposed by the governments.[29] Apart from the features above, there are two other characteristics of the policy discourse: 1) a long-lived relying on slogans to call on people to participate activities, and 2) an increasing concern with the public opinion and voices in the process of policy and law making. Since the early period in 1990s, a series of slogans regarding Chinese economic sustainable development includes the 'Socialist Market Economy with Chinese Characteristics', 'Harmonious Society', 'Scientific Development', 'Ecological Civilization' and the 'China Dream' etc. Although the meanings of all these slogans are ambiguous, their repetition in all kinds of social media and official documents can to great extent affect the framework of Chinese policy-making in different levels.[30] Apart from the slogans above, some policy programmes with a narrow and clear bound, such as the Great Western Development Strategy[31] and the Belt and Road Initiative (BRI)[32], also play a significant role in determining the design of Chinese policy for the economic and social development.

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[28] World Bank Group, *State and Trends of Carbon Pricing* (Open Knowledge Repository, 2019) <https://openknowledge.worldbank.org/handle/10986/31755> accessed 20 April 2019

[29] Andrews Mertha, '"Fragmented Authoritarianism 2.0": Political Pluralisation of the Chinese Policy Process' (2009) 200 The China Quarterly <https://www.jstor.org/stable/27756540?seq=1#page_scan_tab_contents> accessed 20 April 2019

[30] Andrews-Speed and Zhang (n 22) 80

[31] USCBC, 'Economic Development Policies for Central and Western China' (China Business Review, 2010) <https://www.chinabusinessreview.com/economic-development-policies-for-central-and-western-china/> accessed 20 April 2019

[32] Lily Kuo and Niko Kommenda, 'What is China's Belt and Road Initiative?' *The Guardian* (London, 30 July 2018) <https://www.theguardian.com/cities/ng-interactive/2018/jul/30/what-china-belt-road-initiative-silk-road-explainer> accessed 20 April 2019

Whilst the Chinese government and the Communist Party is deemed to control the public opinion by strict censorship, they are actually on the way to realise the importance to respect the public opinion and voices in policy and law making. More and more examples of environmental crisis in local areas have proven that a failure to act will damage the public interest and might lead to social instability.[33] As a result, the government has launched public opinion polls and the public hearing system as platforms to participate their deliberations of policy and law making at both central and local government levels.[34]

2.1.3 The Chinese economic system

Since the Reform and Open-up in 1978, China's economy has experienced a drastic transformation, even though there are still some countries and organisations refusing to admit the status of Chinese market economy.[35] By 2013, the NDRC had shrunk its direct control over the economy. It means that more and more economic activities in China are no longer subject to central government' planning or approval as before.

Regarding the sustainable economic development, China has made considerable economic adjustments in various ways, such as slowing down the growth rates through controlling the use of incentive measures and rebalancing the economy structure. To be specific, the government has actively promoted the sustainable economy with a series of incentive instruments and, meanwhile, continuously decreased the scale of heavy industry with serious risks of pollution through the administrative orders to shut down factories with heavy pollution and inefficient industrial capacity nationwide. The

[33] Eleanor Albert and Beina Xu, 'China's Environmental Crisis' (Council on Foreign Relations, 18 January 2016) <https://www.cfr.org/backgrounder/chinas-environmental-crisis> accessed 20 April 2019

[34] David Lampton, *Following the Leader: Ruling China, from Deng Xiaoping to Xi Jinping* (1st edn UCP 2014)

[35] People's Daily Online, 'Chronicle of reform and opening-up in China' *The Telegraph* (London, 9 January 2019) <https://www.telegraph.co.uk/peoples-daily-online/business/chronicle-reform-opening-up-china/> accessed 20 June 2019

aim of all these measures is to achieve the target of the sustainable development with reducing air pollution and carbon emissions.

In order to highlight the role of market in achieving the goal of Chinese sustainable development, the Chinese government has continuously enhanced the role of market forces in economic development, including the role in allocating the goods and resources. The role of non-state financial services in industry and emerging state-owned enterprises (SOEs) have also been increased in current development of China. One of the notable examples is the Belt and Road Initiative, with the goals of alleviating industrial overcapacity at home and further enhancing connectivity with countries in Europe and Asia to promote economic development in these areas. In addition, with rapid economic development over last forty years, technological innovation in China has also become an indispensable and significant part of Chinese economic measures, given that the government pursues to increasingly enhance technologies and industrial production in the field of sustainable development. The *Medium- and Long-Term Plan for the Development of Science and Technology (2006–2020)*[36]describes in detail the strategy of promoting sustainable development coupled with technology innovation. The Plan was reinforced by provisions in *the Made in China 2025*[37] policy which was passed by the State Council in 2015. These provisions have been further supported by sector-specific policy instruments and generous funding from authorities at different levels.[38] Meanwhile, the Chinese huge domestic market and the increasingly development of export markets around the world have to great extent supported these Chinese ambitions on sustainable development.[39]

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[36] NDRC, 'The Medium- and Long-Term Plan for the Development of Science and Technology (2006–2020)' (2016) NO. 306-01-2006-774 <https://www.itu.int/en/ITU-D/Cybersecurity/Documents/National_Strategies_Repository/China_2006.pdf> accessed 20 June 2019

[37] Council on Foreign Relations, 'Is "Made in China 2025" a Threat to Global Trade?' (2019) <https://www.cfr.org/backgrounder/made-china-2025-threat-global-trade> accessed 20 June 2019

[38] Jost Wubbeke and others, *Made in China 2025: The Making of a High-Tech Superpower and Consequences for Industrial Countries* (MERICS, 2016) No.2 <http://www.documentcloud.org/documents/3864881-Made-in-China-Paper.html> accessed 20 June 2019

[39] Dan Breznitz and Michael Murphree, *Run of the Red Queen: Government, Innovation, Globalization, and Economic Growth in China* (Yale University Press 2011)

2.1.4 The Chinese legal system

Since the launch of 'Reforms and Opening-up' in the late of 1970s, the Chinese government has endeavoured to make new laws and regulations, and to continuously spread the understanding and awareness of the importance of the law. Currently, with the popularity of the internet, the law-making process has become more and more transparent and involves seeking suggestions from the public by placing drafts on the internet. Moreover, the government has passed a series of administrative laws which aim at promoting the accountability, transparency and effectiveness of the government.[40]

In terms of the role of law in economic activity, traditionally, given the failing to secure property rights, the law in China was notorious and was considered as the umbrella to protect the interest of the privileged. Public rights were poorly defined in law, and government agencies at all levels exercised their authorities to transfer and protect their private interest. Within this context, many enterprises had to build networks making use of *guānxì* involving both public and private sectors to enhance the security of their property rights, which to great extent damaged the fair competition in the market. [41] Since 2012, the government has emphasised the urgency to reform the legal system and enhance the role of the courts among government agencies. The reform in the areas of law has contributed significantly to building an economy in the context of the rule of law.[42] Moreover, the supremacy of the Communist Party over the legal

[40] Jamie Horsley, 'The Rule of Law: Pushing the Limits of Party Rule' in Joseph Fewsmith (eds), *China Today, China Tomorrow: Domestic Politics, Economy, and Society* (Rowman & Littlefeld 2010)

[41] David Wank, 'Producing Property Rights: Strategies, Networks, and Efficiency in Urban China's Nonstate Firms' in Jean Oi and Andrew Walder (eds), *Property Rights and Economic Reform in China* (Stanford University Press 1999); Barbara Krug and Hans Hendrischke, 'China's Institutional Architecture: A New Institutional Economics and Organization Theory Perspective on the Links between Local Governance and Local Enterprises' (ERIM Report Series Reference No. ERS-2008-018-ORG) <http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1131026> accessed 20 June 2019

[42] Carl Minzner, 'Legal Reform in the Xi Jinping Era' (2015) 20 Asia Policy 4

system and the judiciary has been maintained and may even be enhanced with the launch of the National Supervision Commission.[43]

2.1.5 Actors and structures relevant to China's climate action

The National Development and Reform Commission (NDRC) and its subordinate National Energy Administration (NEA) play a very important role in China's climate action, particularly in renewable energy deployment. They have passed a series of policies and regulations related to climate action, including the policy and regulation for deploying renewable energy and implementing the ETS. To be specific, before March of 2018, the NDRC, in part through its subordinate NEA, made Five-Year energy development plans; monitored investment in the energy sector; determined energy prices, and supervised the implementation of key energy policy instruments. The government reforms launched in March 2018 reduced the role of the NDRC and NEA in the governance of the energy sector. The reforms in 2018 also led to the establishment of the Ministry of Ecology and Environment (MEE) which centralises functional responsibility regarding environmental issues from the following agencies:

> [G]reenhouse gas emissions from the NDRC; surface water pollution from the Ministry of Water Resources; marine pollution from the State Oceanic Administration; groundwater pollution from the Ministry of Land and Resources; and non-point source pollution from the Ministry of Agriculture.[44]

Apart from the agencies listed above, some other government agencies have also participated in the governance of the energy industry, namely the Ministry of Finance, the Ministry of Industry and Information Technology, the Ministry of Commerce, the Ministry of Land and Resources, the Ministry of Natural Resources, the Ministry of Ecology and Environment, and the State-owned Assets Supervision and

[43] Dali Yang, 'China's Troubled Quest for Order: Leadership, Organization and the Contradictions of the Stability Maintenance Regime' (2017) 26 Journal of Contemporary China 35

[44] Andrews-Speed and Zhang (n 22) 88

Administration Commission.[45] Meanwhile, Leading Groups within the State Council organise some level of coordination in the economic development of China. For example, currently the Leading Group on Climate Change, Energy Saving and Emission Reduction, chaired by the Prime Minister Li Keqiang, is in charge of issues related to China's climate action, like energy saving and emissions reduction. The NDRC, the NEA, the MEE and other agencies at the central government level have equivalent governmental organs at provincial and municipal levels of government. All of these organisations are in charge of designing or proposing policy designs, and implementing central government policies and their derivative policy instruments at local levels. Moreover, international actors, like the World Bank, also have impacted on the policy designing in China's energy sector. The impact was obvious particularly in the 1990s when the reform in Chinese energy sector was a priority among national policies. Currently, the Chinese government is also seeking cooperation with other nations/organisations, like the US and the EU in developing renewable energy industry and promoting emissions trading scheme.[46] International cooperation is playing very important role in facilitating China's climate action.[47]

As a significant participant in the development of Chinese economy, SOEs are key policy actors as well in the coal mining, electricity generation, and oil and natural gas industries. With continuous structural reforms in Chinese economy since the 1980s, SOEs in China has seen 'progressive processes of corporatisation, structural unbundling or adjustment, forced mergers, commercialisation and partial privatisation'[48]. While these SOEs have experienced a series of reforms in China, these enterprises still keep very close relations with the governments and the Communist Party at the levels of the central and local governments.[49]

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[45] ibid

[46] European Union, 'EU-China Roadmap on energy cooperation (2016-2020)' (2016) <https://ec.europa.eu/energy/sites/ener/files/documents/FINAL_EU_CHINA_ENERGY_ROADMAP_EN.pdf> accessed 20 June 2019

[47] European Union (n 19)

[48] Andrews-Speed and Zhang (n 22) 88

[49] Philip Andrews-Speed, *The Governance of Energy in China: Transition to a Low-Carbon Economy* (Palgrave Macmillan 2012) 37

Industry associations in China also made an impact on the development of Chinese energy sector, but the role is quite modest. The role of the industry association might be stronger in some industries where SOEs do not have dominant position.[50] A good example is the Chinese power generation industry, where the China Electricity Council, the China Wind Energy Association and the China Solar Photovoltaic Industries Association have played their significant role in promoting China's renewable energy deployment by submitting their proposals to competent authorities.

Generally, in order to save energy, different end-users get access to electricity at different prices. In other words, energy-oriented users have to bear higher prices than other users. However, the agricultural sector, an energy-intensive industry in China, and households are still keeping electricity tariffs low, given that they are in the disadvantaged position in the market. This case can be seen as a kind of subsidy offered by the government.

The role of China's NGOs is enhancing obviously. Such is the case that they have allowanced more capacity to raise policy proposals, challenges and reports regarding policy implementation failures in the areas of energy and the environment. But their role in engaging in policy deliberation and design is restrained to some extent.[51] In terms of the role of international NGOs in Chinese social development, particularly those from the USA, those NGOs are active in engaging in the environmental and energy issues in China at various levels, but their influence, comparing with that of Chinese domestic NGOs, is constrained because of political factors.[52] In contrast, with the popularity of the internet, the wider public in China, through social media and

[50] Andrews-Speed and Zhang (n 22) 89

[51] Kathinka Furst and Jennifer Holdaway, 'Environment and Health in China: The Role of Environmental NGOs in Policy Formation' In Andreas Fulda (eds), *Civil Society Contributions to Policy Innovation in the PR China: Environment, Social Development and International Cooperation* (Palgrave Macmillan 2015)

[52] Joanna Lewis, *Green Innovation in China: China's Wind Power Industry and the Global Transition to a Low-Carbon Economy* (Columbia University Press 2013) 33

internet platforms, have played an increasingly foundational role in promoting government action to deal with environmental concerns.[53]

2.1.6 Policies, laws, regulations and executive orders on China's climate action

Five-Year Plans for National Economic and Social Development (FYPs), issued by the NDRC every five years, are the main sources of governmental economic development policies. The Five-Year Plans comprise a wide range of principles relevant for economic and social development issues. Moreover, the Plans encompass a series of slogans, general objectives and quantitative goals of the economic development for the following five years from the year when the Plans are issued. Building on the goals and objectives for each sector in China, these FYPs then become the principles for ministries and other government agencies to make their detailed sectoral plans and policies.

Apart from the broad FYPs, there are a series of sector-specific plans in China to promote the development in specific sectors, such as those for energy and renewable energy sector. Taking the *Renewable Energy Development Five-Year Plans* for example, these sectoral Plans contain a large number of detailed measures and quantitative development targets. However, one of the shortcomings of these plans is that they generally fail to provide a valuable and functional framework on how to achieve the targets coherently with other policies.[54] Moreover, the NDRC and other ministries also occasionally issue *White Papers* regarding the implementation of the policy and law, and *Medium- and Long-Term Plans* to govern the development of some specific sectors, such as the development in China's renewable energy industry.[55]

The formal legal framework governing climate action is characterised by laws regarding specific aspects of the strategy, such as the laws in the energy sector. There

[53] Claudio Delang, *China's Air Pollution Problems* (Routledge 2016) 55

[54] Andrews-Speed and Zhang (n 22) 90

[55] ibid

is still no formal laws regulating China's ETS, given the ETS regulation is still in draft form. In China, the government tends to enact laws at times of 'strategic change' or when a specific policy priority needs to be reinforced. Such is the case that energy conservation and renewable energy deployment have become the priorities in Chinese economic development. China has enacted *Energy Conservation Law* and *Renewable Energy Law* in 1997 and 2005 respectively. Additionally, a draft *Energy Law* has been drawn up since 2007 and the *Law on Addressing Climate Change* has been drafted since 2012, but both of them are still in the stage of consultation by now.[56]

It is worth noting that some Chinese laws themselves are very ambiguous and broad and just stipulate general principles rather than detailed measures. To address the shortcoming, the government has to enact a series of supplementary measures to guarantee the objectives in the laws to be achieved. These supplementary measures include regulations, rules, guidelines and decrees which are made by ministries, commissions and the State Council and sometimes are enacted by provincial and municipal governments.[57] There are also many administrative orders to support the implementation of Five-Year Plans or just to deal with the emerging problems during the process of policy and law implementation.

2.2 The influence from the EU and its Member States on China's climate action

As the significant effects of the EU climate policies on China's climate policy, including policy design and implementation, it is necessary to do an analysis on how the EU policy impacts China's policy. The influence involved in this study is mainly on the policy instruments for energy sector and the carbon emissions trading.

2.2.1 Renewable energy sector

The EU and China have extensive close cooperation in renewable industry, which includes policy making, research and development on renewable technologies, and

[56] The government has tried to consult the opinions of the public and issue the laws as soon as possible. However, the work on consultation is still in progress and the issuing dates are still unclear by now.

[57] Andrews-Speed and Zhang (n 22) 90

renewable products trade, etc.[58] In the case of solar photovoltaic (PV) especially, this has been mediated primarily through trade, but the impacts on wider energy policy have been considerable.

The promulgation of the *Renewable Energy Law* in 2006 provides, for the first time, the basic legal framework for China to develop and deploy renewable energy industry.[59] In terms of the provisions contained in the *Renewable Energy Law*, however, they are written in relatively general terms and lack detailed measures on how to effectively develop and deploy renewable energy in China. The lack of specificity in the policies for specific sectors cannot effectively meet the practical needs that arise in the process of developing and utilising renewable energy. In this case, after the *Renewable Energy Law* was issued in 2006, competent authorities, such as the NDRC, issued a series of regulations and rules through the form of Notices to guarantee the laws can be implemented to achieve their targets. Such supplementary measures specify the principals in the *Renewable Energy Law* to promote renewable energy industry development from different specific perspectives. Schemes, such as purchasing in full amount, classified fixed price, expenses distribution and economic incentives, are primarily fleshed out in these specific policies. All these specific measures have played various but important roles in promoting the development of China's renewable energy technologies.

In the process of drafting and formulating the *Renewable Energy Law*, China made use of legislation and policy instruments of some developed countries, like the experience from the EU members. When formulating the quantity target scheme in the *Renewable Energy Law*, the Chinese government took into consideration local conditions in deploying renewable energy and developing related infrastructures in China, and also followed German experience on renewable energy technology pricing. In this case, the existing *Renewable Energy Law* and relevant policies in China are

[58] European Union (n 19)

[59] The Renewable Energy Law of China 2009

indicated through classified fixed prices (economic incentives).[60] In order to deal with the inherent disadvantages of renewable energy, such as instability, comparing with conventional energy in the energy market, the system of guaranteeing the purchasing in full amount, also called the 'compulsory grid-connected' system, is implemented in some developed countries, including Germany and Spain.[61] Given Germany's outstanding performance on deploying renewable energy, China followed the German fully purchasing system and enacted the *Renewable Energy Law*.[62] As the development and utilization of renewable energy are generally restricted by technologies and the location of resources, the costs on deploying renewable energy are relatively higher than those on utilising conventional energy,[63] which puts renewable energy in a disadvantaged position when competing with conventional energy in energy market. As a result, a general incentive measure used for subsidising renewable energy deployment is fixed price (feed-in tariff). However, the fixed prices vary depending on the stock of renewable resource. In this case, the pricing system should reflect the differences on the types and locations of renewable energy. Germany determines its grid-connected power prices according to the development of renewable energy technology and the accessibility of energy.[64] China followed the German approach and formulated its feed-in tariff (FIT) in the *Renewable Energy Law*. The representative classified fixed grid price scheme is the one used in wind and solar energy sectors, with four and three rates of FITs in different classified regions respectively.[65]

2.2.2 Emissions trading scheme

[60] Yanfang Li and Wei Cao, 'Framework of Laws and Policies on Renewable Energy and Relevant Systems in China under the Background of Climate Change' (2012) 13 Vt J Envtl L 823

[61] Federal Ministry for the Environment, Nature Conservation and Nuclear Safety, 'EEG- The Renewable Energy Sources Act: The Success Story for Sustainable Policies for Germany' (2007) <https://www.ecolex.org/details/literature/eeg-the-renewable-energy-sources-act-the-success-story-of-sustainable-policies-for-germany-mon-082152/> accessed 20 June 2019

[62] ibid 49 art. 24-25

[63] International Energy Agency, *World Energy Outlook: Executive Summary* (2010) <https://webstore.iea.org/world-energy-outlook-2010> accessed 20 June 2019

[64] Li and Cao (n 60)

[65] ibid

The EU ETS is considered as the basis of the EU's internal policy for GHG emissions reduction and it also plays a significant role in the EU's external policy regarding mitigating global climate change.[66] As a pioneer in international climate politics,[67] the EU was ambitious to create an international network of carbon emissions trading. The experience of the EU ETS has brought profound influence on the design of ETS around the world, notably China's ETSs.[68] Following the experience of the EU ETS,[69] China implemented seven regional pilot ETSs since 2013, which is considered as a first step to establish the China's national emissions trading scheme at the end of 2017.[70] China's national ETS was launched in December 2017 after about four years' implementation of pilot ETSs in seven regions,[71] which will further expand the scope of the ETS coverage from 9% to 16%.[72] To be specific, China learnt from the EU experience on how to allocate allowances. Given the disadvantage of free allowance allocation in the first phase of the EU ETS, China adopted a combination mechanism of free allocation and auction for its seven pilot stage systems and this mechanism might be adopted in the national ETS as well.[73] China's current national ETS, launched in 2017, only covers the power sector, and covered entities receive allowances for free.[74] Also, the EU and China have set up quite similar monitoring, reporting and

[66] Anatole Boute, 'The Impossible Transplant of the EU Emissions Trading Scheme: The Challenge of Energy Market Regulation' (2017) 6 TEL 59

[67] Rüdiger Wurzel and James Connelly, 'Conclusion' in Rüdiger Wurzel and James Connelly (eds), *The European Union as a Leader in International Climate Change Politics* (Routledge 2011) 271

[68] Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety of Germany, *Emissions Trading: Basic Principles and Experiences in Europe and Germany* (2014), <http://ets-china.org/wp-content/uploads/2015/07/ets_basic_principles_and_experiences_in_europe_and_germany_eng_online.pdf> accessed 20 June 2019

[69] European Council (n 19)

[70] NDRC, *China's Policies and Actions on Climate Change* (in Chinese, translated by the author) (2014) <https://reliefweb.int/sites/reliefweb.int/files/resources/P020171122611767066567.pdf> accessed 20 June 2019; Maosheng Duan, 'From Carbon Emissions Trading Pilots to National System: The Road Map for China' (2015) 9(3) CCLR

[71] NDRC, *The Work Plan for Construction of the National Emissions Trading System (Power Sector)*, (in Chinese, translated by the author) (2017) <http://www.ndrc.gov.cn/zcfb/gfxwj/201712/t20171220_871127.html> accessed 20 June 2019

[72] ibid

[73] Noah Dormady, 'Carbon Auctions, Energy Markets & Market Power: An Experimental Analysis' (2014) Energy Economics 44 <https://doi.org/10.1016/j.eneco.2014.03.013> accessed 20 June 2019

[74] ibid

verification (MRV) mechanisms. However, the requirements for the third parties who are qualified for conducting MRV are quite different and the lack of MRV capacity is one of the barriers for China to implement its national ETS.

2.3 The assessment of the effectiveness

Given that the number of policies and laws regarding climate actions are vast and an interdisciplinary approach is used in this study, it is necessary to structure an assessment framework to guide the evaluation of relevant policy and law. The framework here for effectiveness assessment is built up on the EU model of public policy assessment, which includes various dimensions of policies, such as economic, environmental and social impacts. An assessment of a policy instrument should not only analyse outcomes of the policy against its goals in or after its implementation, but also test both the positive and negative side effects of policy implementation, as well as the relevant outcomes resulting from the underlying objectives of the programme.[75] As for the legality under WTO law, the assessment in this study mainly examines the compatibility of the domestic policy and law for China's climate action with WTO subsidy rules. As the responsibility of WTO members, the domestic policy and law are supposed to be compatible with WTO rules.

2.3.1 The framework for effectiveness assessment

An assessment, also named evaluation, is a process of revealing the 'value' of a policy by measuring its outcomes. Defining the key concepts of an assessment will clarify the basic information and provide tools for effective assessment in this study. In order to ensure that judgements on a policy do not become arbitrary, it is necessary to building up predetermined and transparent benchmarks before starting the assessment.[76] Scriven defines evaluation and argues that the key feature of 'evaluation'

[75] Evert Vedung, 'Six Models of Evaluation' in Eduardo Araral and others (eds), *Routledge Handbook of Public Policy* (1st edn, Routledge 2013) 389

[76] Nigel Nagarajan and Marc Vanheukelen, *Evaluating EU Expenditure Programmes: A Guide – Ex post and Intermediate Evaluation* (1st edn, EU Commission Working Document 1997) 42 <http://europa.eu.int/comm/budget/evaluation/guide/guide00_en.htm> accessed 2 October 2016

refers to the process of assessing the merit, worth, or value of something, or the result of that process.[77] Evert Vedung defines 'evaluation' minimally as

> [C]areful retrospective assessment of the merit, worth and value of administration, output and outcome of government interventions, which is intended to play a role in future, practical action situations.[78]

The European Union (EU) also explicitly recognises *ex ante* assessment as an important way of evaluation.[79] Pre-evaluations are particularly valuable in the field of assessment on environmental policy. For example, one type of *ex ante* assessments – environmental impact assessment – is currently mandatory in many countries before the projects commences. The requirement for an *ex ante* environmental impact assessment has expanded widely from projects to policies and programmes as well.[80] Also *EU Better Regulation Agenda* provides a comprehensive framework for the process of policy and law designing and evaluation,[81] which can be a significant reference for China in promoting the work of policy and law making and improving the implementation.

What is the effectiveness of policy and law?

The term 'effectiveness' generally has a precise meaning, which means 'to what extent have the intervention's impacts contributed to achieving its specific and general objectives.'[82] Davidson (2005) points out that, in general, effectiveness can be regarded as the extent to which an entity to be evaluated produces desired or intended

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[77] Michael Scriven, *Evaluation Thesaurus* (4th edn, Sage 1991) 5

[78] Evert Vedung, *Public Policy and Program Evaluation* (1st edn, Transaction Publishers 1997) 7

[79] Nagarajan and Vanheukelen (n 76) 44

[80] Per Mickwitz, 'A Framework for Evaluating Environmental Policy Instruments: Context and Key Concepts' (2003) 9 Evaluation 415 <http://www.stes-apes.med.ulg.ac.be/Documents_electroniques/EVA/EVA-PROG/ELE%20EVA-PROG%207371.pdf> accessed 15 March 2017; Jane Davidson, 'Effectiveness' in Sandra Mathison (eds), *Encyclopedia of evaluation* (1st edn, Sage Publications 2005) 122

[81] European Commission, 'EU Better Regulation Agenda' <https://ec.europa.eu/info/law/law-making-process/planning-and-proposing-law/better-regulation-why-and-how_en> accessed 19 April 2019

[82] Jane Davidson, 'Effectiveness' in Sandra Mathison (eds), *Encyclopedia of evaluation* (1st edn, Sage Publications 2005) 122

outcomes.[83] Nagarajan et al. argue that 'effectiveness is concerned with only one aspect of a policy's impact: the positive, expected effects.'[84] While Mickwitz and Davidson hold different arguments, considering that effectiveness is just a measure for an instrumental relationship towards a goal and could be positive or negative effects or even very costly effective, which are unintended.[85] Heink, et al. (2016) made a summary of various arguments of different scholars and have an opinion that effectiveness and its assessment are social constructs.[86] Young and Levy defined the concept of the effectiveness from several approaches: [87] (1) a problem-solving approach: the degree to which a policy instrument 'eliminates or alleviates' the problem; (2) a legal approach: the degree to which contractual obligations are met (rules are complied with, policies changed, programs initiated, and so forth); (3) an economic approach: incorporate the legal definition (with right outcomes) and add an efficiency criterion (with the least cost); (4) a normative approach: whether the policy instruments have achieved 'fairness or justice, stewardship, participation and so forth'; (5) a political approach: 'effective regimes cause changes in the behaviour of actors, in the interests of actors, or in the policies and performance of institutions in ways that contribute to positive management of the targeted problem'.[88]

Based on conceptual distinctions about main effects (including output, outcome and impact effects) and side effects (including direct, indirect and derived side effects) (**see Table 2.1**), Gysen et al. argue that effectiveness can be identified in following

[83] ibid

[84] Nagarajan and Vanheukelen (n 76) 23

[85] Mickwitz (n 80)

[86] Ulrich Heink, Christoph Görg and Kurt Jax, 'Effectiveness' in Marion Potschin-Young and Kurt Jax (eds), *OpenNESS Ecosystem Services Reference Book* <http://www.openness-project.eu/library/reference-book/sp-effectiveness> accessed 02 October 2018

[87] Oran Young and Marc Levy, 'The Effectiveness of International Environmental Regimes' in Oran Young (eds), *The Effectiveness of International Environmental Regimes: Causal Connections and Behavioural Mechanisms* (MIT Press, 1999) 4-5

[88] ibid

categories: institutional effectiveness, target group effectiveness, impact effectiveness, societal effectiveness and side effectiveness.[89]

Table 2.1 Overview of effects and effectiveness[90]

Effect	Definition of effect	Type of effectiveness	Definition of effectiveness
Output Effect	The tangible results of a measure.	Institutional effectiveness	The match of the output of a given policy or programme with the output objective of that policy/programme.
Outcome Effect	The response of the target groups to the output.	Target group effectiveness	The degree to which the target group responds to the policy, due to the policy, as aimed for by that policy.
Impact Effect	The influence on the policy issue.	Impact effectiveness	The degree to which the change of the policy issue, caused by the policy is in line with the policy goals.
		Societal effectiveness	The extent to which the effect is in line with broader societal objectives.
Direct Side Effect	Visible and measurable first instance effects. These effects follow from the policy, even though they are not intended.	Side effectiveness	The extent to which a policy has produced unintended effects which are in line with related policy objectives and public interest.
Indirect Side Effect	Does not directly follow from the policy but from another side effect.		
Derived Side Effect	The result of the interaction of another SE and an external factor.		

The benchmark for an effectiveness assessment

To assess the effectiveness of policy instruments, Heink et al. argue that it is significant to determine the determinants and appropriate criteria (benchmarks) for assessing

[89] Joos Gysen, Hans Bruyninckx, and Kris Bachus, 'The Modus Narrandi – A Methodology for Evaluating Effects of Environmental Policy' (2006) 12(1) Evaluation 95

[90] ibid

effectiveness.[91] The criteria include credibility, relevance and legitimacy.[92] In general, credibility can be argued as the quality or power of inspiring belief, relevance as the degree of relation to the matter at hand, and legitimacy as conformity to recognized principles or accepted rules and standards.[93]

Benchmarks can be defined as standards or criteria by which the performance of an intervention (a generic term used to cover all public actions) can be assessed in a rational way.[94] A relatively easy way to acquire benchmarks can be to measure the intervention's objectives which generally are expressed as 'outputs, results and outcomes'[95]. Nagarajan and Vanheukelen argue that 'benchmarks should ideally be used to compare the policy's performance with that of other policy instruments in the same field of action or in a related one'.[96] Beyond that, they also illustrate that '(the benchmarks) may compare favourably with results achieved by similar policies executed in the past, or by national or local governments, or other countries'.[97]

In principle, benchmarks can be established through three different lenses: 1) *Time*, to what extent are the policy's objectives being met currently compared to previous ones? 2) *Space*, to what extent are the policy's objectives being met in one area compared to another? and 3) *Time and space*, taking both time and space when comparing one policy with other policy instruments. It is obvious that the comparative methodology is the main research method during the process of assessing effectiveness of policy

[91] Ulrich Heink and others, 'Conceptualising Credibility, Relevance and Legitimacy for Evaluating the Effectiveness of Science – Policy Interfaces: Challenges and Opportunities' (2015) 42(5) Science and Public Policy 676 <https://academic.oup.com/spp/article-abstract/42/5/676/1628344?redirectedFrom=fulltext> accessed 02 October 2018

[92] ibid

[93] Merriam-Webster, 'The Merriam-Webster Dictionary and Thesaurus Online 2013' <http://www.merriam-webster.com/> accessed 15 January 2017

[94] VV.AA. *Glossary on health, policy and research & innovation*. Document prepared within the project '*The European Regions Network for Health Research & Innovation* (RegHealth-RI)', (Funded by the European Union's Horizon 2020 research and innovation programme under grant agreement No 643574, 2015)

[95] Daniil Pivovarov, 'Causality, Effectiveness, Determinism' (2013) 12 Journal of Siberian Federal University 1847

[96] Nagarajan and Vanheukelen (n 76) 25

[97] ibid

instruments. In lines with the three axes, assessing effectiveness could be processed mainly through ex-ante analysis, intermediate analysis, and ex-post analysis. The key difference between them is time. Intermediate evaluations take place in the process of the implementation of a policy, while ex-post evaluations are conducted either in or after the process of the implementation of a policy instrument. Generally, intermediate evaluations highlight a policy's outputs and do not execute a comprehensive analysis on the impacts. Thus, intermediate evaluations mainly rely quite strongly on the information which is provided by the robust monitoring system. It is worth noting that intermediate evaluations may also be featured by a formative bias, e.g. a concern with updating the policy's delivery mechanisms. *Ex-post* evaluations are more likely to be a summative analysis in nature and are often conducted with the clear intention to analyse a policy's impacts or outcomes. However, since the information needed to assess a policy's impacts may often not be fully available until several years after the end of implementation of the policy, even *ex-post* evaluations can be limited in the extent to which they can provide a comprehensive assessment on the policy instrument. The *6th Environmental Action Programme for the European Union* (1600/2002/EC) points out that *ex-post* evaluating focuses on effectiveness.[98] The assessment on China's policy and law for climate actions will focus on the *ex post* impacts of the policy and law.

The framework for an assessment on the effectiveness of the policy and law

In terms of evaluation design – framework for the effectiveness assessment, Nagarajan and Vanheukelen point out that 'an evaluation design is a model which is used to describe a programme and provide evidence on the effects which may be attributable to it'.[99] Evaluation design could be considered as having the central importance in examining the effectiveness of policy and law.

[98] EEA, *Sixth Environment Action Programme* (decision No 1600/2002/EC) <https://www.eea.europa.eu/policy-documents/sixth-environment-action-programme> accessed 02 October 2019

[99] Nagarajan and Vanheukelen (n 76) 26

In order to assess the effectiveness of a specific policy clearly, Nagarajan, et al. argue that the evaluator may need to keep the following three steps in mind: 1) Determining the policy objectives against which to assess its effects; 2) Finding the effects of a policy; and 3) Combining effects due to the policy with the objectives in order to determine effectiveness.[100] Hilden et al. argue that the targets of effectiveness evaluation should include both intended and unintended effects of these policies.[101] To carry out any of the three steps, which are argued by Nagarajan, et al., the assessment work possibly involves some challenges, e.g. determining which effects are caused by the policy being evaluated, which goals should be taken into account and how to interpret the combination of objectives and effects.[102] To be specific, as Nagarajan and Vanheukelen argues, seven steps should be covered in elaborating an evaluation project; to identify the goals of the evaluation; to describe the scope of the evaluation, to draw up the analytical agenda; to set benchmarks, to take stock of available information; to map out the work plan; and to select the evaluator.[103]

As evaluation designs (framework) can help evaluator to investigate the effects which may be attributable to the effectiveness of policy instruments, Nagarajan and Vanheukelen argue that evaluation designs are closely related to the concept of causality.[104] The causal approach could be used in assessing effectiveness of policy instruments, analysing *counterfactual situation*[105], *internal and external validity*[106] of policy instruments. The causal approach will also a significant method in assessing effectiveness of policy instruments.

[100] ibid

[101] Hildén Mikael and others, *Evaluation of Environmental Policy Instruments - A Case Study of the Finnish Pulp and Paper and Chemical Industries* (Finnish Environment Institute, 2002) <https://helda.helsinki.fi/handle/10138/39345> accessed 02 October 2018

[102] Nagarajan and Vanheukelen (n 76) 27

[103] ibid

[104] ibid

[105] ibid

[106] ibid

The screening and scoping objectives of effectiveness evaluations will be in line with the main objectives (environmental protection, economic competitiveness and energy security) in developing renewable energy throughout the world. The objectives in evaluating renewable energy policy and law, as Beaton and Moerenhout argue, could be further distinguished as 1) Environmental goals – climate change mitigation, local pollution reduction, etc.; 2) Economic and social goals – industry creation, job creation and regional development, etc,; 3) Energy security goals – increased energy security, i.e. getting access to more alternative energy; 4) Development of technologies on renewable energy and energy efficiency – more advanced green technologies created with lower cost, intellectual property protection in higher degree and more international trade on green technology products, etc.; 5) Cost-effectiveness – more progress in deployment of renewables and promotion energy efficiency with lower cost. [107]

An assessment of the effectiveness of a policy is generally based upon comparing the effects or impacts of a measure to its explicitly stated objectives or intended targets.[108] These goals of policies or measures can be stated in general or a specific way, but in order to make an effective evaluation, these objectives should be as clear as possible.[109] In some policy areas, policy instruments have multiple objectives, and their effectiveness therefore needs to be assessed in relation to all of them. Occasionally, some objectives of policy instruments have not yet been translated into specific and/or operational socio-economic objectives; however, these policy instruments may in fact have produced effects on local economic competitiveness and the social welfare for citizens. Another comprehensive assessment – utility evaluation – seeks to identify and analyse all of the impacts of the measure, including intended and unintended impacts in relation to a wide range of issues – social, economic, environmental, and

[107] Christopher Beaton and Tom Moerenhout, *Assessing the Cost-Effectiveness of Renewable Energy Deployment Subsidies: Biomass Power in the United Kingdom and Germany* (Research Report of IISD, 2012) <http://www.iisd.org/library/assessing-cost-effectiveness-renewable-energy-deployment-subsidies-biomass-power-united> accessed 29 November 2018

[108] Pivovarov (n 95) 1848

[109] ibid

cultural – so as to reach some conclusion about the contribution of the measure to overall economic, environmental and social welfare.[110]

2.3.2 The framework for the effectiveness assessment in this study

Based on the earlier general conceptual analysis of relevant terms used in effectiveness assessment, the study will put the theory and model of assessing effectiveness into practice via the assessment of Chinese policy and law in deploying renewable energy and implementing emissions trading scheme.

The fact is that there is still no comprehensive mechanism for assessing public policy instruments, including the policy and law in the field of climate change in China. The official website of the Ministry of Environmental Protection of China shows one of the functions of the Department of policies, laws and regulations which is the 'post-evaluation of environmental policies and administrative regulations'[111]. Based on literature reviews in the field of evaluation of climate policy instruments, such as the study by Li[112] and Dai[113] who argue that China needs to build up proper evaluation scheme of public policy instruments, we are able to conclude that the normative and comprehensive scheme on evaluation of policy instruments has not been built up in China so far, even though the Chinese government has passed numerous policy instruments on environmental protection and supportive policies on green economic development. In this case, it is necessary and valuable to carry out this study with the aim at assessing effectiveness of policy instruments for deploying renewable energy in China.

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[110] ibid

[111] Ministry of Environmental Protection of China, *Main Function of the Department of Policies, Laws and Regulations* (in Chinese, translated by the author) <http://zfs.mep.gov.cn/> accessed 7 March 2017

[112] Zhijun Li, 'Suggestions on Setting Up Schemes of Evaluation of Public Policy Instruments in China' (in Chinese, translated by the author) (China Thinktanks, 07 June 2013) <https://www.chinathinktanks.org.cn/content/detail/id/pxgqi288> accessed 29 November 2020

[113] Yixin Dai and Tian Tang, 'A Framework for Post-Evaluation on Regulations in China – Based on Public Policy Theory' (in Chinese, translated by the author) (2014) *China Public Administration Review*, vol 12 p 4

In terms of the concept of the effectiveness of policy and law for China's climate actions, in this research, we would argue that the effectiveness of policy and law means whether the intended targets, including environmental goals, economic goals and social goals, of the policy and law have been achieved. To be specific, the evaluation of effectiveness of climate related policies and laws will mainly be done through the following perspectives: whether these policies and laws have achieved the goals of energy security, solved or mitigated environmental crisis, increased economic competitiveness and improved social wellbeing. As the benchmark for the effectiveness assessment, based on the targets or objectives of policies and laws, 'the outcome of the achievement on the targets' or 'how far the outcome is from the targets' can be considered as benchmarks for assessing the effectiveness of these policies and laws on China's climate action in this study.

2.3.3 Benchmark tables with indicators and questions regarding the effectiveness

To provide guidelines for effectiveness evaluation of Chinese policy and law on China's climate action, we prepared some tables (See **Table 2.2, 2.3, 2.4, 2.5**) with indicators and questions regarding the effectiveness of the policy and law. Questions will vary depending on the policies and laws in question. The main lenses for the assessment include the following three aspects of a policy: environmental effectiveness, economic effectiveness and social effectiveness. Importance of certain aspects will vary depending on the case study, which decides the lens that the assessment will start with. For example, in the case study of the FIT, the assessment will start with the economic perspective, as the priority of the FIT program is to promote the deployment of renewable energy. By contrast, the assessment on the ETS will start from the impacts on environmental protection. The effectiveness of the policy and law can be illustrated by examining the direct effects, indirect effects and side effects. A policy may not have direct effects on an outcome, but there is indirect relationship between them by a medium, such as the FIT scheme and carbon emissions reduction. The FIT can contribute to carbon emissions reduction by supporting the deployment of renewable energy. The following tables include analysis perspectives on direct, indirect and side effects of the policy and law. In addition, regarding the

conclusions which is expressed by a degree of effectiveness, including ‘invalid’ or ‘valid’ and the degree: ‘low’, ‘medium’ and ‘high’, this study makes use of quantitative, qualitative and descriptive methods in analysing the effectiveness of relevant policies and law so as to conclude the outcome with ‘valid’, ‘invalid’ and the degree of valid: ‘low’, ‘medium’ and ‘high’. Given that the conclusion is based on the qualitative and descriptive analysis, the results might not be completely objective to reflect the reality.

Table 2.2 Environmental effectiveness

	Objectives	**Questions**	**Invalid**	**Valid**			**Comments**
				Low	**Medium**	**High**	
1	Mitigating climate change	Whether the measure has reduced the amount of carbon emission? Make use of statistic data to prove the effectiveness of the measures.					
2	Improving air quality	Whether the measure has reduced the amount of pollutant emission from industry and households?					

Indicators of effectiveness, Invalid: 0 Valid: 1 (Low, Medium and High)

Table 2.3 Economic effectiveness

	Objectives	Questions	Invalid	Valid			Comments
				Low	Medium	High	
1	Creating new industry sectors	Whether the measure has assisted to build up new industry sectors in national market?					
2	Boosting economy	Whether the measure has become new driving force of economic development?					
3	Investment on renewable sectors and improving energy efficiency	Whether the measures have increased investment from both national and international in the renewable sectors and improving energy efficiency?					

Indicators of effectiveness, Invalid: 0 Valid: 1 (Low, Medium and High)

Table 2.4 Social effectiveness

	Objectives	Questions	Invalid	Valid			Comments
				Low	Medium	High	
1	Shrinking the development gap between the west and east regions in China	Whether the west regions have made full use of their potential of huge reservation of renewable energy and boosted their economy?					
2	Improving national's wellbeing	Whether the measures have changed citizens' lifestyle and improving their wellbeing by deploying renewables and improving energy efficiency?					
3	Changing transportation	Whether the measures have changed people's transportation with the use of renewables or improving energy efficiency					
4	Job creation	Whether the new industry sectors have created new job opportunities?					

Indicators of effectiveness, Invalid: 0 Valid: 1 (Low, Medium and High)

Table 2.5 Cost effectiveness

	Objectives	Questions	Invalid	Valid			Comments
				Low	Medium	High	
1	Achieving the objects at lower cost (subsidies)	Whether achieve the objectives at low cost (investment, subsidies and taxation)?					
2	Achieving more objectives at the same cost as before	Whether achieve more objectives at the same cost as before?					

Indicators of effectiveness, Invalid: 0 Valid: 1 (Low, Medium and High)

2.4 The assessment of the WTO legality

Besides the effectiveness assessment, WTO legal disciplines will be crucial as they affect the WTO legality of the measures in question.[114] When the measures are successfully challenged in the WTO, no matter how their effects on environmental protection, they have to be withdrawn or revised by the WTO Member who implemented them, which in turn will represent a significant obstacle to the government in dealing with climate concerns.[115] As China is a WTO Member, it needs to ensure that its policies for climate action are compliant with WTO law.

The assessment looks at the compatibility of the policies and laws on climate action with WTO rules. This section outlines the provisions in the WTO legal system that can

[114] Wen-Chen Shih, 'Taiwan's Climate Change Mitigation Policies and Their Potential Interaction with the WTO Rules: Focusing on Economic Incentive Measures' in Deok-Young Park (eds), *Legal Issues on Climate Change and International Trade Law* (Springer, Cham 2016) 121

[115] ibid

potentially get involved in climate action and finds out the rules that come into play in the assessment of China's FITs and ETSs in the two case studies.

2.4.1 WTO provisions and rules relevant to climate action

The WTO trade regime contains a series of provisions which are either directly or indirectly relevant for national climate change policy and law. The most relevant for climate action policy and law includes the most-favoured nation principle in Article I (1) GATT and the national treatment principle in Article III (4) GATT. Article I (1) GATT states that

> [A]ny advantage, favour, privilege or immunity granted by any contracting party to any product originating in or destined for any other country shall be accorded immediately and unconditionally to the like product originating in or destined for the territories of all other contracting parties.[116]

Article III (4) GATT states that:

> The products of the territory of any contracting party imported into the territory of any other contracting party shall be accorded treatment no less favourable than that accorded to like products of national origin in respect of all laws, regulations and requirements affecting their internal sale, offering for sale, purchase, transportation, distribution or use.[117]

These provisions can be particularly relevant when assessing climate policies like a FIT scheme. The aim of the two provisions is to prevent discrimination between domestic and foreign products in the international market.

The *Canada – Renewable Energy/Canada – FIT*[118] is still the most relevant WTO dispute in giving directions on the legality of incentive schemes, and in particular FIT

[116] GATT Article I (1)

[117] GATT Article III (4)

[118] WTO Appellate Body Reports, *Canada – Certain Measures Affecting the Renewable Energy Generation Sector/Canada – Measures Relating to the Feed-in Tariff Program* (*Canada – Renewable Energy / Canada – Feed-in Tariff Program*), WT/DS412/AB/R/WT/DS426/AB/R

systems, with WTO law. Ontario, the biggest region in Canada, wanted to attract investment and introduced a comprehensive policy centred on a FIT scheme (based on purchasing agreements between public authorities and energy producers). While ensuring a growth in renewable energy, the policy wanted also to spur regional development and create jobs. The operation of the FIT scheme was thus subject to an additional element, a local content requirement. In order to benefit from the preferential tariffs, the various energy producers had to source a certain percentage of the technology needed to produce energy locally, the percentage changing depending on the type of energy (e.g. wind, solar etc).

Since the beginning, while there was no complain about the FIT element (it is a good climate policy, extremely common in various jurisdiction, and, in addition, there is not much trans-border trade in green energy), it was the local content requirement (LCR) which soon constituted a diplomatic irritant because it meant that investment was going to Ontario rather than to other countries. Many countries, and in particular Japan, the EU and the US complained about the local content requirement. Eventually the first two took action against Canada.

Japan and the EU took two different claims against Canada:

a) First, that the local content requirement itself – which is nothing else than a regulation – was discriminatory (if you buy locally, you don't buy in the world market) – and hence breached GATT Article III (4) and the TRIMS Agreement;
b) Secondly, that the FIT was a subsidy (which in itself does not carry with it any negative stigma in WTO law) but it was also a prohibited one because of the inclusion of the local content requirement (Article 3.1(b) of the SCM Agreement prohibits 'local content requirement subsidies')

While the first claim was not problematic (notwithstanding Canada put forward – unsuccessfully - a defence under Article III(8)(a)[119] suggesting that the purchase of

[119] GATT Article III: 8 (a) stipulates: '[T]he provisions of this Article shall not apply to laws, regulations, or requirements governing the procurement by governmental agencies of products purchase for governmental purposes and not with a view to commercial resale or with a view to use in the production of goods for commercial sale.'

energy amounted to government procurement and was hence exempted from the prohibition of discrimination): the local content requirement (NB: not the FIT itself) is illegal and must be withdrawn, it was the second claim that created a lot of difficulty.

It has been noted that subsidies which include a condition to buy domestic over imported goods are strictly prohibited in the WTO and they must be withdrawn without delay (the defending country cannot request for a reasonable period of time for the implementation). While it is still not clear whether it is sufficient to withdraw the local content requirement or it is rather necessary to also withdraw the subsidy, it is a legal fact that, in a subsidy claim, the complainants, the Panels and the AB had to establish that the FIT was a subsidy in the first place. A positive determination does not impose any consequence of substance (but Members must notify their subsidies) but clearly to conclude that a FIT scheme which is generally considered a good policy, is a subsidy would have created a precedent that could have been followed in other cases. Both the Panel (which was divided) and the Appellate Body were at pains to exclude that the FIT is a subsidy. The previous note of background may explain why. But there is an additional factor to remember: unlike in the EU, in the WTO there are no type of exceptions for green energy subsidies.

The question of legality of an emissions trading scheme can engage WTO law both directly and indirectly. Given that the emissions trading market is entirely created by governmental intervention through relevant policy and law, the newly created market in emissions allowances or units could potentially engage WTO law directly and be subject to WTO law in the first place.[120] To be specific, allowances traded in the emissions market may be considered as either goods under the GATT, services under the GATS, or subsidies under the SCM agreement. Moreover, the trading allowance generated by products and services may cause competitive impacts upon existing markets of goods and services, and the newly created market may also change the

[120] Javier de Cendra de Larragán, 'Emission Trading Schemes and WTO Law: A Typology of Interactions' in Geert Van Calster and Denise Prévost (eds) *Research Handbook on Environment, Health and the WTO* (EE 2013) 639

existing terms of trade, so the ETS can indirectly engage WTO law.[121] Low and Marceau have in detail identified WTO rules that could engage climate change policies, including the ETS programme: the GATT, the GATS, the Agreement on Technical Barriers to Trade (TBT Agreement), the Agreement on Subsidies and Countervailing measures (SCM Agreement), the Agreement on Rules of Origin, the Government Procurement Agreement, the Agreement on Implementation of Article VII GATT (customs valuation), the Agreement on Implementation of Article VI GATT (antidumping), the Agreement on Trade-Related Investment Measures (TRIMS Agreement), and the Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS Agreement) (See **Table 2.6**).[122]

Table 2.6 Relevant WTO agreements that an ETS programme could engage with[123]

Key elements of an ETS programme	WTO agreements potentially engaged
Coverage	GATT, TBT, GATS
Cap	SCM Agreement
Allowance allocation	SCM Agreement
Use of revenues	SCM Agreement
Competitiveness concerns	GATT
Cost-effectiveness	GATT, GATS
Management on uncertainty and volatility	GATT
Monitoring, reporting and verifying (MRV)	GATT
Regulation of services	GATS

2.4.2 The framework for the assessment of the WTO legality

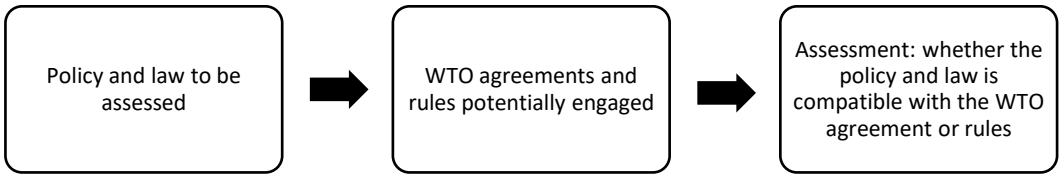
[121] ibid

[122] Patrick Low, Gabrielle Marceau and Julia Reinaud, *The Interface between the Trade and Climate Change Regimes: Scoping the Issues* (Staff Working Paper ERSD-2011-1, 2011) <https://www.wto.org/english/res_e/reser_e/ersd201101_e.pdf> accessed 7 March 2017

[123] ibid

In this study, the WTO legality of the policy and law for climate actions means to enquire the compatibility of the national policy and law for climate actions WTO rules. Before starting to measure the WTO legality, the first step is to determine the policy and law which need to be evaluated. The second step is to determine the WTO agreements or rules that potentially engage with the policy and law in question. Once the agreements or rules are determined, the next and final step is to analyse in detail how the policy and law in question is compatible with the WTO agreements or rules. The process can be illustrated in **Chart 2.1**.

Chart 2.1 The framework for an assessment of the WTO legality of the policy and law



As for the assessment of the WTO legality in this study, the analysis will focus on the WTO legality of China's FIT and ETS in two case studies respectively. Based on the literature over the studies on the FIT and WTO law, and the case law of the *Canada – Renewable Energy/Canada – FIT*, in the first case study on the WTO legality of China's FIT scheme, the assessment will look at the compatibility of the FIT with the WTO subsidy rules within the context of the SCM Agreement. The first step in the assessment of the WTO legality of China's FIT is to analyse whether the FIT falls within the definition of the subsidy based on the provisions in the SCM Agreement. Then the analysis will move on to measure whether the FIT constitutes an actionable subsidy or rather a prohibited subsidy on the basis of the rules in the SCM Agreement. As for the WTO legality of China's ETS programme, the case study aims at evaluating whether a key element of the ETS programme – the allowance and its allocation – is consistent with WTO subsidy rules. Similar to the process in the first case study, the first step in the assessment of the WTO legality of China's ETS is to analyse whether the allowance of carbon emissions and its allocation constitute a subsidy according to the definition of subsidy in the SCM Agreement. After that, the analysis will move on

to evaluate whether the allowance and its allocation will constitute actionable and prohibited subsidy in line with the rules of the SCM Agreement. Also the assessment will briefly get involved in the assessment of the WTO legality of revenue recycling and border carbon adjustment measures in the context of WTO rules so as to make a relatively comprehensive evaluation over China's ETS programme.

In addition, it should be recalled that the EU and its Member States have played great role in combating climate change and affected significantly on China's policy and law for climate actions, particularly in promoting renewable energy deployment with the FIT scheme and in implementing ETS programme.[124] In order to make a brief comparison between climate actions of China and the EU and draw some conclusions to further improve China's climate actions, this study also gets involved in a brief assessment on the effectiveness and WTO legality of the EU climate actions, including the FIT scheme and the ETS scheme. The assessment will follow the framework used in the assessment of China's climate actions. As many scholars have already conduct significant research on the effectiveness and legality of the EU's climate actions, such as the FIT scheme and the ETS in particular, this study will not do a detailed analysis over these issues of the EU climate actions.

It is worth noting that the assessment in this study makes use of lots of existent data and literature on the impacts of energy policies and the ETS scheme from economic perspectives, including measuring the effectiveness of the FIT and the ETS implemented in China and the EU. The reasons why this study does not provide original or first-hand data about impacts of energy policies and the ETS are: 1) because of low levels of information transparency, an immature legal system and a poor record of compliance and enforcement in energy sector and in the ETS programme, some of the data about the status of energy policies and ETS scheme implementation are still confidential for the public and it is very difficult to get access to the information;[125]

[124] Andrei Marcu, *China's ETS: A Vote of Confidence in Carbon Markets Ahead of Paris* (Centre for European Policy Studies, 2015) <http://www.ceps.eu/system/files/Vote%20of%20Confidence%20for%20CMs.pdf> accessed 7 March 2017

[125] Andrews-Speed and Zhang (n 22) 95

2) Most importantly, since this analysis is mostly legal, and not an economic one, we will simply rely on existing economic studies and draw conclusions and observations based on the state of the art.

Chapter Three

The Policies and Laws of China's Climate Action

3.1 Introduction

With a population of more than 1.3 billion, China is the world's second largest economy by nominal GDP and the largest if measured by purchasing price parity terms.[126] China has also been the largest single contributor to the world economic growth since the global financial crisis of 2008.[127] Rapid economic development since "Reform and Opening-up"[128] in 1970s has brought on many challenges as well, including challenges to environmental sustainability, high inequality (especially between rural and urban areas) and external imbalances.[129] Some of those environmental issues raised concerns among wider public. Alarming levels of air pollution in China that revealed the extent of environmental damage were very important in creating the public momentum. *Air pollution – Under the Dome*[130]– and informative and thought-provoking documentary directed by a renowned investigative journalist Chai Jing, ignited massive public attention nationwide and also gave rise to national debates on environmental issues.[131] As it had profound impacts on the public awareness, the film is put on par with Rachel Carson's *Silent Spring* and Al Gore's *Inconvenient Truth*.[132] Internationally, as the largest greenhouse gas emitter in the

[126] World Bank Group, 'The World Bank in China - Overview' (the World Bank, 01 October 2019) <https://www.worldbank.org/en/country/china/overview> accessed 7 March 2020

[127] ibid

[128] People's Daily Online, 'Chronicle of Reform and Opening-up in China' *The Telegraph* (London, 9 January 2019) <https://www.telegraph.co.uk/peoples-daily-online/business/chronicle-reform-opening-up-china/> accessed 7 March 2019

[129] The World Bank (n 126)

[130] The authorities in China have removed the popular documentary from websites in the early of March 2015, but the video is still available on YouTube with more than 1.2 million views. <https://www.youtube.com/watch?v=T6X2uwlQGQM> accessed 16 July 2020

[131] BBC, 'China takes Under the Dome anti-pollution film offline' (BBC, 7 March 2015) <https://www.bbc.co.uk/news/world-asia-31778115> accessed 16 July 2019

[132] Alex Lo, *Carbon Trading in China: Environmental Discourse and Politics* (Palgrave Macmillan 2016)

world, China has inevitably attracted global attention and has been blamed for its contribution to climate change.[133]

China faced both international and domestic pressure with regard to environmental issues. Although China consistently advocated the principle of 'common but differentiated responsibilities' in responding to global climate change and refused to accept compulsory emission reduction targets in the negotiations regarding international climate governance, China became more active in responding to request to mitigate global climate change and is on the way to take a leading position internationally.[134] Under the leadership of Hu Jintao and Xi Jinping, China has developed new policy instruments and devoted state funds and human capital towards promoting renewable energy and enhancing energy efficiency, constraining the rise of carbon emissions and reducing air pollution.[135] All these efforts for promoting renewable energy have contributed to building a large domestic market, which has enabled the scaling up of renewable energy manufacturing and deployment.[136] New initiatives to develop carbon markets have been launched through pilot ETS programme covering seven provincial and municipal areas, which is likely to contribute to address challenges relating to climate change. Policies for promoting renewable energy have greatly beneficial to China, especially in enabling the renewable energy equipment manufacturing, technology export, domestic installation of renewable equipment, and the growth of renewable energy generation.[137] However, it is worth noting that some of the sources devoted to renewable energy are still inefficiently used such as state funds which leads to curtailment of renewable capacity and industrial overcapacity.[138] Likewise, at local levels, provincial and municipal governments and enterprises have actively invested in an immoderate manner to

[133] Qihao He, *Climate Change and Catastrophe Management in a Changing China: Government, Insurance and Alternatives* (EE 2019) 15

[134] Andrews-Speed and Zhang (n 22) 6

[135] ibid

[136] ibid

[137] ibid

[138] Andrews-Speed and Zhang (n 22) 7

pursue the maximised profit, which has caused serious financial waste and renewable energy curtailment.[139]

This chapter focuses on outlining China's policies and laws relevant to climate action, and critically examining their implementation. As energy use contributes significantly to overall greenhouse gasses emissions and thus climate change, the scope of this chapter includes China's policy and law in energy sector and carbon emissions programme. The chapter starts with a brief analysis of China's role in the development of international climate cooperation as well as examination of external and domestic pressures that had an impact on development on national climate change policies in China. These will be followed by an overview of China's policies and laws on climate change and an analysis of some key policies and laws. The last section provides suggestions for the improvement of China's climate policies and laws.

3.2 China's position in international climate actions and the evolution of China's climate policy and law

The evolution of China's policies and laws on climate change has been driven by several forces, including external and domestic ones. First, China's journey to decarbonisation has to be placed in a wider geopolitical setting. One of the drivers of change was China's concern and ambition to create a positive international image.[140] China was very keen to be better position itself internationally and be perceived as an important player. Thus, over time it became invested in international climate negotiations.

In the report *China's Policies and Actions on Climate Change 2014*, it was clearly stated that:

[139] ibid

[140] Hongyuan Yu, *Global Warming and China's Environmental Diplomacy* (Nova Science Publisher New York, 2008); Zhihong Zhang, 'The Forces Behind China's Climate Change Policy: Interests, Sovereignty and Prestige' in Paul G. Harris (ed), *Global warming and East Asia: the Domestic and International Politics of Climate Change* (Routledge London & New York, 2004) 66-85

> Pursuing green, low-carbon development and actively addressing climate change is not only necessary to advance our [China's] ecological progress and put our development on a sustainable path, but will also demonstrate to the world that China is a responsible country committed to making an active contribution to protecting the global environment.[141]

Moreover, domestic pressures also had an important impact, in particular calls to address air pollution.[142] In addition, one of the domestic drivers for change was a need to ensure energy security[143] as well as not hampering the economic development of China. The domestic energy shortage and concern for energy security can be even regarded as the most powerful drivers of change. Energy reserves are dispersed unevenly across the country, whereby rich energy reserves are mainly located in the west and north of China, but the high-energy demand regions are in the south and east along the coast. Realising the limits and possible conflicts caused by the acquisition of overseas energy resources, the Chinese government adopted a range of other measures for energy security, such as those dealing with energy efficiency improvement and development of renewable energies.[144]

There is no doubt that China achieved a significant progress in developing key laws and policies, especially with regard to promotion of energy efficiency and energy conservation, driving the deployment of renewable energy and implementing emissions trading scheme. These measures, no matter whether they directly contribute to reduction carbon emissions, can potentially help to reduce emissions and benefit climate change mitigation.

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[141] NDRC, *China's Policies and Actions for Addressing Climate Change* (2017) <https://reliefweb.int/sites/reliefweb.int/files/resources/P020171122611767066567.pdf> p 1, accessed 20 June 2020

[142] Mun S. Ho and Chris P. Nielsen (eds), *Clearing the Air: The Health and Economic Damages of Air Pollution in China* (MIT Press 2007)

[143] Lixia Yao and Youngho Chang, 'Energy security in China: A quantitative analysis and policy implications' [2014] *Energy Policy* v 67 595-604

[144] Solveig Glomsrød and Taoyuan Wei, 'The Effects of Energy Efficiency Improvement in China with Global Interaction' [2016) *AIMS Energy* 4 (1) pp 37-51; John A. Mathews and Hao Tan, 'Economics: Manufacture Renewables to Build Energy Security' [2014) *Nature* 513 (7517) 166-168

3.2.1 China's position in the international climate cooperation

As climate change is a global problem, international community has adopted a range of measures to address this problem. It was in early 1980s, that scientists became concerned with global warming which laid foundations for future global climate change mitigation efforts.[145] This was followed by a series of international climate change conferences between 1985 and 1988, when climate change became an institutional topic rather than just a topic among scientists.[146] This prompted greater involvement of national governments who started to actively contribute to multilateral climate change negotiation processes.[147] China also slowly started to be more involved in environmental international affairs which was facilitated by domestic reforms and deepening of its open door policy.[148] As the world's second largest economy and the largest emitter, China will play a significant role in global climate mitigation by actively participating the international climate negotiation.[149]

In 1992, China participated at the Rio Earth Summit which aimed at stabilising global greenhouse gas emissions at 1990 levels through individual country's specific policies and measures.[150] The Rio Earth Summit which resulted in 154 nations signing the United Nations Framework Convention on Climate Change (UNFCCC), was seen as a landmark of early international negotiation on the global climate change policy.[151] In order to demonstrate China's position on fighting with climate change, China signed

[145] Han Lin, *Energy Policies and Climate Change in China: Actors, Implementation and Future Prospects* (Routledge, Taylor & Francis Group, 2020) 1

[146] ibid

[147] Daniel Bodansky, 'The History of the Global Climate Change Regime' in Detlef Sprinz and Urs Luterbacher (eds) *International Relations and Global Climate Change* (Achorn Graphic Sciences Inc., 2001) 23-40

[148] Gang Chen, *China's Climate Policy* (Routledge 2012) 1

[149] Miranda A. Schreurs, 'Climate Change Politics in an Authoritarian State: The Ambivalent Case of China' in John S. Dryzek, Richard B. Norgaard and David Schlosberg (eds) *Oxford Handbook of Climate Change and Society* (OUP, 2011) 449

[150] Warwick J. McKibbin and Peter J. Wilcoxen, *Climate Change Policy After Kyoto : A Blueprint for A Realistic Approach*, (Brookings Institution Press, 2002) 41

[151] Bodansky (n147) 23

and ratified the non-binding treaty at the summit. However, China's ratification of the agreement reached in the Rio Earth Summit did not mean that China took a proactive approach towards climate change mitigation.[152] Instead, China advocated the principle of 'common but differentiated responsibilities' towards international climate change mitigation.[153] In China's view, as developed countries historically emitted a huge volume of carbon emissions in the process of development on industry and economy, they should bear more responsibility for climate change and also should provide assistance or aid to developing countries with finance and technologies to facilitate developing countries' mitigation and adaptation.[154] However, very few effective policies had been implemented nationally after the summit and the level of national greenhouse gas emissions continued to rise.[155]

In an attempt to achieve the aims of the UNFCCC, further efforts have been deployed at the international level through the "Conference of the Parties" meetings. Five years later, in 1997, parties to the UNFCCC met in Kyoto to discuss how to achieve the treaty's aims and the Kyoto Protocol was drafted. The Kyoto Protocol is the first international treaty which set out specified quantifiable and legally binding obligations for industrialised countries to cut greenhouse gases emissions.[156] The protocol set up emissions targets for 39 developed countries which should assist in reaching overall 5% emission reduction from 1990 levels within the next 14 years.[157] Based on the principle of 'common but differentiated responsibilities', China, as a developing country, was not required to meet the greenhouse gas reduction targets under the Kyoto

[152] Lin (n 145)

[153] Yuka Kobayashi, "Navigating between 'Luxury' and 'Survival' Emissions: Tensions in China's Multilateral and Bilateral Climate Change Diplomacy" in Paul G. Harris (ed) *Global warming and East Asia: the Domestic and International Politics of Climate Change* (Routledge, London & New York, 2003) 88

[154] Chen (n 148)p5; Fuzuo Wu, 'China's Pragmatic Tactics in International Climate Change Negotiations: Reserving Principles with Compromise' (2013) *Asian Survey* 53(4) 780

[155] Niklas Höhne, et al. *Evolution of Commitments under the UNFCCC: Involving Newly Industrialized Economies and Developing Countries* (Federal Environment Agency, 2003) <https://www.umweltbundesamt.de/sites/default/files/medien/publikation/long/2235.pdf> accessed 16 July 2020

[156] Chen (n 148) 7

[157] The Kyoto Protocol (1998) <https://unfccc.int/resource/docs/convkp/kpeng.pdf> accessed 16 July 2020

Protocol which the industrialised countries needed to achieve. Nonetheless, China was welcome to participate in the emissions offsetting programme CDM which was defined in Article 12 of the Protocol.[158]

Although China was not required to meet any legally binding emission reduction target under the Kyoto Protocol, it ratified the Protocol in 2002 and set up national emissions inventories for reporting national programs and exchanging information with other nations.[159] The publication of the '*National Climate Change Program*' recognised the seriousness of global climate change, which was an initial sign that the Chinese government started to address climate change seriously at the national level.[160] The Kyoto Protocol is considered as a turning point where China's attitude towards global climate change mitigation switched from passive to proactive.[161] Moreover, China also actively participated in regional climate change mechanisms such as the Asia-Pacific Partnership on Clean Development and Climate in 2005, which focused on voluntary participation and energy efficiency improvement. The Partnership engages member countries to accelerate the development and deployment of clean energy technologies, with no mandatory enforcement mechanism.

As the world's largest greenhouse gas emitter and second largest economy, China's role in international climate talks has been the topic of much debate over the past decade. The Copenhagen climate conference in 2009 as an important summit in the process of combating climate change at the time, marked the culmination of a two-year negotiating process to enhance international climate efforts under the Bali Roadmap launched in December 2007. China's aim at Copenhagen was to enhance the fully effective and sustainable implementation of the UNFCCC and the Kyoto Protocol,

[158] Chen (n 148) 7

[159] Lin (n 145) 1

[160] NDRC, *China medium and long term energy conservation plan* (in Chinese, translated by the author) (2004) 7 <https://policy.asiapacificenergy.org/sites/default/files/%E8%8A%82%E8%83%BD%E4%B8%AD%E9%95%BF%E6%9C%9F%E4%B8%93%E9%A1%B9%E8%A7%84%E5%88%92.pdf> accessed 16 July 2020

[161] Lin (n 145) 1

focusing on making concrete arrangements for mitigation, adaptation, technology transfer and financial support.[162] Despite the fact that *Copenhagen Accord* was not legally binding, the Chinese government published China's climate commitments at the opening session of the UN climate summit in September 2009, manifesting China's strong resolution in shouldering responsibilities in global climate governance.[163] Chinese negotiators also actively engaged themselves during the whole process and called for all parties to reach consensus and strengthen cooperation on combating climate change. However, other countries' comments on China's roles at the Copenhagen climate conference were quite complex. China was generally considered as insincere and weak by government officials, scholars and the media from major developed countries, while developing countries tended to applaud China's indispensable role in the conclusion of the *Copenhagen Accord*.[164]

The Paris climate conference held in 2015 is widely regarded as a milestone in global climate governance. Although the Agreement still recognises 'common but differentiated responsibilities' principle,[165] it has ended division on Annex I, II and other countries and put all parties under one roof, requiring them to report regularly on their emissions and climate efforts for international review.[166] Before the conference, China announced its *Enhance Actions on Climate Change: China's Intended Nationally Determined Contributions* (INDC) for the first time to the Secretariat of the UNFCCC and contributed to the 2015 agreement negotiations with a view to making the Paris Conference a great success.[167] China's four main commitments were

[162] National Development and Reform Commission, 'Implementation of the Bali Roadmap: China's Position on the Copenhagen Climate Change Conference'(in Chinese, translated by the author) (2009) <http://en.ndrc.gov.cn/newsrelease/200905/t20090521 280382.html> accessed 16 July 2020

[163] Hu Jintao, 'Join Hands to Address Climate Challenge' (www.gov.cn, 2009) <http://www.gov.cn/ldhd/2009-09/23/content_1423825.htm> accessed 16 July 2020

[164] Xiaosheng Gao, 'China's Evolving Image in International Climate Negotiation: From Copenhagen to Paris' *China Quarterly of International Strategic Studies* (2018) 4(2) 213–239

[165] Paris Agreement, Art 2.2

[166] International Institute for Sustainable Development, 'Summary of the Paris Climate Change Conference: 29 November – 13 December 2015'; and C2ES, *Outcomes of the UN Climate Change Conference in Paris* (Arlington: Center for Climate and Energy Solutions, December 2015)

[167] NDRC, *Enhanced Actions on Climate Change: China's Intended Nationally Determined Contributions* (2015) <http://www.china.org.cn/environment/2015-06/30/content_35950951.htm> accessed 16 July 2020

stipulated in its NDC: first, to achieve the peaking of CO_2 emission around 2030 and make best efforts to peak at an earlier time; second, to lower CO_2 emissions per unit of GDP by 60% to 65% from the 2005 level; third, to increase the share of non-fossil fuels in primary energy consumption to around 20%; and finally, to increase the forest stock volume by around 4.5 billion cubic meters on the 2005 level.[168] During negotiations China made a series of proposals with regard to certain aspects of mitigation, adaptation, finance, technology development and transfer, capacity-building support, as well as transparency of actions.[169]

Most of China's proposals were accepted and incorporated in the *Paris Agreement*, with some exceptions.[170] For instance, on mitigation, the Agreement requires developed countries to continue to take the lead by undertaking economywide absolute emission reduction targets, while developing countries are encouraged to work, over time, toward economy-wide emission reduction or limitation targets in accordance with their respective national circumstances.[171] On adaptation, following China's proposal, it was not only decided to enhance and strengthen the Warsaw International Mechanism for Loss and Damage and subject it to the authority and guidance of the COP, but also to clarify the fields in which to strengthen international adaption cooperation.[172] In addition, the China's proposal on transparency was accepted and it was decided to establish an enhanced transparency framework for action and support under the UNFCCC with built-in flexibility, encouraging transparency in a facilitating, non-intrusive, and non-punitive manner, while respecting national sovereignty and avoiding undue burdens placed on any party.[173]

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[168] ibid

[169] Xi Jinping, 'Statement by H.E. Xi Jinping President of the People's Republic of China At the General Debate of the 75th Session of The United Nations General Assembly' (Ministry of Foreign Affairs of China, 22 September 2020) <https://www.fmprc.gov.cn/mfa_eng/zxxx_662805/t1817098.shtml> accessed 16 November 2020

[170] Conference of the Parties, *Report of the Conference of the Parties on Its Twenty-first Session, Addendum (Part Two): Action Taken by the Conference of the Parties at its Twenty-first Session* (Paris, 29 January 2016) FCCC/CP/2015/10/Add.1 <https://unfccc.int/resource/docs/2015/cop21/eng/10a01.pdf> accessed 16 November 2020

[171] ibid

[172] ibid

[173] ibid

With such an active role in achieving the *Paris Agreement*, China was perceived even by developed countries as a leader in international efforts to combat climate change.[174] Due to China's changing attitude and actions, the perception of international community on China regarding climate issues has started to change. China's climate commitments for post-2020 agreement received quite positive responses from major negotiating parties, yet the EU believed China could make further contribution and tended to regard China's INDCs as a starting point.[175] In contrast to Copenhagen, external perceptions of China's role at Paris were much more positive. China continued to be regarded as one of the climate leaders in terms of goal achievement. Though there is still some disappointment about China's climate commitments, international leaders, scholars and the public media all have recognised China's negotiating strategy and viewed China as a key player in the success of the Paris climate conference.

As the world is confronted with the pandemic of COVID-19 since the end of 2019, it is believed that COVID-19 is to plunge global economy into worst recession since World War II.[176] Under current situation, most nations including top emitter China are likely to miss a 2020 deadline to upgrade national plans for fighting global warming.[177] While China and the rest of the world face the challenge of recovering from the COVID-19 pandemic, it is believed that investments in sustainable physical and natural capital yield results that can be realised quickly, and create plenty of job

[174] Xiaosheng Gao, 'China's Evolving Image in International Climate Negotiation: From Copenhagen to Paris' [2018] *China Quarterly of International Strategic Studies* 4 (2) 213–239

[175] ibid

[176] The World Bank, 'COVID-19 to Plunge Global Economy into Worst Recession since World War II'(08 June 2020) <https://www.worldbank.org/en/news/press-release/2020/06/08/covid-19-to-plunge-global-economy-into-worst-recession-since-world-war-ii> accessed 16 July 2020

[177] Alister Doyle, 'China among nations likely to miss 2020 deadline for climate plans – UN's Espinosa' (02 September 2020) <https://www.climatechangenews.com/2020/09/02/china-among-nations-likely-miss-2020-deadline-climate-plans-uns-espinosa/> accessed 16 July 2020

opportunities.[178] Sustainable investments are the route to a strong economic recovery post pandemic. President Xi Jinping's address at the United Nations General Assembly in September 2020 included a historic pledge to cut China's emissions of carbon dioxide to net-zero by 2060.[179] He announced that 'China will scale up its Intended Nationally Determined Contributions by adopting more vigorous policies and measures. We [China] aim(s) to have CO_2 emissions peak before 2030 and achieve carbon neutrality before 2060.'[180] With the shift of China's climate policy and strategy at both the domestic and international levels, China's climate actions will continue to be the determining factor to the success of global climate mitigation.[181]

3.2.2 Evolution of China's Climate Action

With rapid economic growth since the Reform and Opening-up in 1970s, the priority of the Chinese energy policy was to supply sufficient energy to support economic development from domestic sources. However, renewable energy deployment was not at the time regarded as a priority. On 1994, the government issued *China's Agenda 21st: White Paper on China's Population, Development and Environment* in response to the United Nation's document with the same title and announced to implement the strategy of sustainable development.[182] An economic stimulus package launched in 2002 saw a GDP growth increase with the rate over 10%, which is to great extent due to the large scale development of energy-intensive industries.[183] China's domestic energy supply failed to keep up with the increasing demand, so the whole country was

[178] Grantham Institute, 'China's historic announcement on net-zero emissions' (25 September 2020) <https://www.lse.ac.uk/granthaminstitute/news/chinas-historic-announcement-on-net-zero-emissions/#:~:text=President%20Xi%20Jinping's%20address%EF%BB%BF,to%20net%2Dzero%20by%202060.> accessed 16 November 2020

[179] Xi (n 169)

[180] ibid

[181] Gao (n 174)

[182] The Chinese Government, *China's Agenda 21st: White Paper on China's Population, Development and Environment* (White Paper, 2003) <http://www.gov.cn/gongbao/content/2003/content_62606.htm> accessed 16 July 2019

[183] Chunbo Ma and David Stern, 'China's Changing Energy Intensity Trend: A Decomposition Analysis' [2008) 30 Energy Economics 1037

confronted with the shortages of electricity and oil products in 2003.[184] Due to large volume of conventional energy, such as coal and oil, carbon emissions were accordingly rocketing in China over that period.[185] Since 2004, China's energy policy priorities have changed dramatically. The *Medium- and Long-Term Energy Conservation Plan* issued in 2004 determines that the national energy intensity would reduce by 20% between 2005 and 2010, and will continue to decrease until 2020.[186] These priorities were reinforced in the *11th Five-Year Plan for Energy Development 2006–2010*: 1) more specific targets were stipulated for energy-intensive industries and provincial governments, and 2) the tariffs of electricity used by industrial and commercial enterprises increased accordingly.[187]

Renewable Energy Law, promulgated in 2005, for the first time, marked renewable energy as an integral part of energy policy in China.[188] This was followed by the *Medium- and Long-Term Development Plan for Renewable Energy* in 2007. In order to implement the *Renewable Energy Law* and achieve the goals stipulated in the Law, the Plan aims to raise the proportion of renewable energy in total energy consumption to 10% in 2010 and up to 15% in 2020.[189]

The *11th Renewable Energy Development Five-Year Plan (2006-2010)* reiterated the goal of renewable energy development in 2010 and stipulated further detailed

[184] ibid

[185] Michael Grubb and others, 'A Review of Chinese CO_2 Emission Projections to 2030: The Role of Economic Structure and Policy' [2015) 15 (S1) Climate Policy <https://www.tandfonline.com/doi/full/10.1080/14693062.2015.1101307> accessed 16 July 2019

[186] NDRC, *Medium- and Long-Term Energy Conservation Plan* (2016) (in Chinese, translated by the author) <http://www.chinalawedu.com/falvfagui/fg22016/44071.shtml> accessed 16 July 2019

[187] NDRC, *The 11th Five-Year Plan for Energy Development 2006–2010* (in Chinese, translated by the author) (2007) <http://www.ndrc.gov.cn/fzgggz/fzgh/ghwb/gjjgh/200709/P020150630514158560149.pdf> accessed 16 July 2019

[188] The Renewable Energy Law (n 59)

[189] NDRC, *Medium- and Long-Term Development Plan for Renewable Energy* (in Chinese, translated by the author) (2007) <http://www.nea.gov.cn/131215784_11n.pdf> accessed 16 July 2019

measures to drive the development of renewable energy.[190] Particularly, the *11th Five-Year Plan* enhanced the objective of wind energy deployment in renewable energy sector comparing with that in the *Medium- and Long-Term Plan*. Likewise, the *12th and 13th Renewable Energy Development Five-Year Plans* stipulated the goals of renewable energy deployment and the support measures respectively. Under the context of the rapid development of renewable energy, the *13th Renewable Energy Development Five-Year Plans (2016-2020)* pays more attention to the issues of healthy and sustainable development of renewable energy sector.[191]

In 2007, China issued the *National Climate Change Programme*, which not only outlines the climate change impacts that China faces but also sets out a strategy to address climate change and sustainable development.[192] Meanwhile, the Programme also indicates challenges in reducing the country's CO_2 intensity, given the existing energy structure which is still dominated by conventional energy.[193] Since 2008, China has released annual white paper of *China's Policies and Actions for Addressing Climate Change* to provide overviews of the achievement and lessons in the one-year period of implementation of climate change policies, and also to provide information for the improvement of specific climate policies.[194]

Emissions trading scheme (ETS), a very popular market-oriented measure to combat climate change, has been implemented in China since 2013 through seven regional pilots. Building on the experience of piloting carbon markets, China launched its

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[190] NDRC, *The 11th Five-Year Plan for Renewable Energy Development* (in Chinese, translated by the author) (2008) <http://www.ndrc.gov.cn/zcfb/zcfbghwb/200803/W020140220604486824065.pdf> accessed 16 July 2019

[191] NDRC, *The 13th Renewable Energy Development Five-Year Plans (2016-2020)* (in Chinese, translated by the author) (2016) <http://www.ndrc.gov.cn/zcfb/zcfbghwb/201612/W020161216661816762488.pdf> accessed 16 July 2019

[192] NDRC, *National Climate Change Programme* (in Chinese, translated by the author) (2007) <http://www.gov.cn/zwgk/2007-06/08/content_641704.htm> accessed 16 July 2019

[193] ibid

[194] MEE, *China's Policies and Actions for Addressing Climate Change* (in Chinese, translated by the author) (2018) <http://english.mee.gov.cn/News_service/news_release/201812/P020181203536441502157.pdf> accessed 16 July 2019

national ETS (only cover power sector at the moment) in December 2017.[195] The launch of the national ETS is a milestone for China's climate change policies and low-carbon development, which not only 'caps carbon emissions but also prioritises its industrial restructuring, improves energy efficiency, optimises the energy structure and increases carbon sinks.'[196] Also, the Chinese national ETS could globally send a positive signal and incentivise other nations to implement emissions trading scheme.[197] Based on the *Interim Measures for the Administration of Carbon Emissions Trading*[198] which regulate the construction of carbon markets in China, the national ETS is in early stage of the third phase[199] where China is deepening and expanding allowances spot trading for compliance purposes. There is still a long way to go before the national scheme fully implemented.

Given that there are huge number of policies and laws relating to China's climate action, directly and indirectly, and due to the space limitation in this study, the next section just focus on some key climate policies and laws, such as the Renewable Energy Law and its supplementary measures, policies regarding promoting energy efficiency. As the case study in **Chapter Five** will do a scrutiny on China's ETS, including regional pilots and national scheme, this section will not get involved much contents regarding the ETS.

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[195] ICAP, 'China National ETS' (24 November 2020) <https://icapcarbonaction.com/en/?option=com_etsmap&task=export&format=pdf&layout=list&systems%5B%5D=55> accessed 29 November 2020

[196] IETA Insights, 'Advances in China's ETS' (2018) <https://www.ieta.org/resources/Resources/GHG_Report/2018/Insights-Q2-2018-Advances-in-Chinas-ETS-Xin.pdf> accessed 29 November 2020

[197] ibid

[198] NDRC, *Interim Measures for the Administration of Carbon Emissions Trading* (NDRC Order No. 17) <http://www.gov.cn/gongbao/content/2015/content_2818456.htm> accessed 29 November 2020. NDRC was the former national competent authority for climate change in China. With the re-assignment of climate change responsibilities to the MEE in 2018, the MEE newly drafted *National Measures* which represent an update to adapt to the latest thinking and pathways toward the national ETS.

[199] Based on *the Interim Measures for the Administration of Carbon Emissions Trading First Phase*, there are three phases to implement the national ETS. First Phase (a year as of 2018): development of market infrastructures; Second Phase (another year as of 2019): simulation trading; Third Phase (from 2020 on): expanding sectoral coverage and deepening and expanding the system.

3.3 Renewable Energy Law

As there is a clear correlation between energy use and carbon emissions, the deployment of renewable energy is supposed to be very helpful for reducing carbon emissions.[200] China's *Renewable Energy Law* aims at increasing energy supply, improving energy mix, promoting energy security and protecting environment, and could be seen as a milestone for China on the aspect of exploitation and utilisation of renewable energy.[201] As an emerging sector, renewable energy needs more support from the government to compete with conventional energy. Policies and laws could play their basic function in regulating economic activities and keep a relative fair competition environment for renewables development.

The first impression is that China fulfilled requirements of the UNFCC and the Kyoto Protocol on combating global climate change, but in fact, mitigating climate change is not among the targets of the REL.[202] The REL only declares, in the general principle part, that the targets of the law is 'to increase energy supply, optimise energy structure, safeguard energy security, protect the environment, and realize the sustainable development of the economy and society.'[203] To some extent, it is evident that China's main goal shown in the REL is not to mitigate global climate change. At least, combating and mitigating global climate change was not the major goal of the REL when it was stipulated in 2005. On the other hand, stipulations in the REL are quite general – basic principles and systems of exploration and utilisation of renewable energy – which may not meet so many needs in practice.

In order to implement the REL effectively, competent authorities, such as, the National Development and Reform Commission (NDRC), have issued a series of administrative

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[200] MEE, *China's Policies and Actions for Addressing Climate Change* (in Chinese, translated by the author) (2018) <http://english.mee.gov.cn/News_service/news_release/201812/P020181203536441502157.pdf> accessed 16 July 2019

[201] The Renewable Energy Law (n 59)

[202] Environmental and Resources Protection Committee of China, *Instructions for the Draft of Renewable Energy Law of China* (in Chinese, translated by the author) (2004) <http://www.npc.gov.cn/wxzl/gongbao/2005-04/25/content_5337638.htm> accessed 10 April 2019

[203] The Renewable Energy Law (n 59)

regulations and measures to ensure the implementation of the law. These regulations and measures include, but are not limited to, the *Trial Measures for the Management of Prices and Allocation of Costs for Electricity Generated from Renewable Energy*, the *Provisional Measures for the Administration of Special Funds for Renewable Energy Development*, the *Provisional Measures for Allocation of Additional Income for Renewable Energy Power Price*, and the *Measures for Administration of Grid Enterprises Purchasing Full Renewable Energy Power Quantity*, etc. Although the measures listed above have played positive role in facilitating implementation of the laws, the deficiency of these regulations on adjusting activities in the field of renewables should be noted. As administrative regulations lack of continuity and stability compared to laws in China, they need to be transferred into laws over time and then play more significant role in further promoting renewables development.

The REL stipulates that the state will give priority to the development and utilisation of renewable energy,[204] and, for the first time, established a national relatively systematised legal framework for promoting the development of renewable energy.[205] The legal framework includes several key mechanisms on how to promote and utilise renewable energy in China: national quantity target system, central and local planning system on renewable energy development; mandatory grid-connected system; the classified grid price system, and full guarantee purchase system; the fixed on-grid electricity price system – China's feed-in tariff (FIT) scheme; cost-sharing system and special fund system; and China's quota system or Renewable Portfolio Standard system (RPS).[206]

3.3.1 Quantity target system and quota system

[204] ibid

[205] Sara Schuman and Alvin Lin, 'China's Renewable Energy Law and Its Effect on Renewable Power in China: Progress, Challenges and Recommendations for Improving Implementation' [2012] 51 EP 89

[206] The Renewable Energy Law (n 59)

The quantity target system for renewable energy refers to the legal requirement on the proportion of renewable energy in the energy production or consumption mix.[207] When drafting and formulating the *Renewable Energy Law* (REL), China used legislation and experiences of developed countries, like Germany, and institutions as references.[208] Taking the reality of renewable energy infrastructure into account, the Chinese central government prescribed the Quantity Target system in the REL.[209] In accordance with the provisions in the REL, China has issued the *Medium and Long-Term Development Planning for Renewable Energy* in August 2007, which pointed out that the medium and long-term development objective was that 'renewable energy consumption would account for 10% of the total energy consumption by 2010, and 15% by 2020.'[210] The *Energy Development Strategy Action Plan (2014 – 2020)* also highlights that the government will take measures to optimize the energy structure, including reducing the proportion of fossil energy and increasing that of renewable energy in the consumption of energy.[211] The goal of this plan is that by 2020, non-fossil fuels in primary energy consumption will reach to 15%.[212] In *China's Nationally Determined Contributions* (NDCs), the Chinese government commits the share will increase to 20% in 2030.[213] On the other hand, Article 14 of the REL, amended in 2009, further requires that

> [T]he proportion of renewable energy power generation in the total power generation, which shall be reached during the planning period, is determined by the energy authority of the State Council, together with the national power supervisory institution, and the financial authority of the

[207] ibid

[208] Environmental and Resources Protection Committee (n 202)

[209] The Renewable Energy Law (n 59), art 4

[210] NDRC, *Medium and long-term Development Planning for Renewable Energy in China* (in Chinese, translated by the author) (2007) <http://www.martinot.info/China_RE_Plan_to_2020_Sep-2007.pdf> accessed 10 April 2019

[211] The State Council of China, *Energy Development Strategy Action Plan (2014 – 2020)* (in Chinese, translated by the author) (2014) <http://www.gov.cn/zhengce/content/2014-11/19/content_9222.htm> accessed 10 April 2019

[212] ibid

[213] Department of Climate Change of NDRC (n 7)

> State Council, in accordance with the nation-wide planning for development and utilisation of renewable energy.[214]

This provision is generally considered as China's quota system. In order to implement the Quantity Target System and the Quota System in China effectively, the NEA promulgated the *Guidance on Establishing Object Guidance System of Development and Utilisation of Renewable Energy* in 29 February 2016.[215] The guidance stipulates the state will establish renewable energy certificate trading mechanism, and the certificate holders can participate in carbon emission trading and energy savings transactions. In this case, renewable energy certificate trading mechanism will promote quota system to achieve marketization and speed up the establishment of carbon trading and carbon finance market in China. However, the specific measures on how to manage renewable energy electricity green certificates has not come out yet. How to set up this system effectively in China is worthy of analysing in future study.

3.3.2 Feed-in tariff scheme and the full guaranteed purchase system

Article 19 of the REL stipulates how the grid power price is set, which is considered as Chinese FIT scheme.[216] It provides that the determination of tariffs should be done

> [B]y the price authority of the State Council in the principle of being beneficial to the development and utilisation of renewable energy and being economic and reasonable, and timely adjusted based on the different situations and the level of development of technologies of renewable energy.[217]

But Article 19 does not include guidelines in detail about how to determine the tariffs, only endows the duty to the price authorities of the State Council – the NDRC.

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[214] The Renewable Energy Law (n 59), art 14

[215] National Energy Administration of China (NEA), *Guiding Opinions for the Establishment of the Target System of Renewable Energy Development and Utilisation* (in Chinese, translated by the author) (2016) <http://zfxxgk.nea.gov.cn/auto87/201603/t20160303_2205.htm> accessed 10 April 2019

[216] Peter Oniemola, 'Legal Response to Support Renewable Energy in China' (2014) 32(2) JENRL 179

[217] The Renewable Energy Law (n 59), art 19

The main concern for the FIT systems in China is how to make reasonable and suitable criteria for measuring the amounts of the tariff of electricity generated from renewables. The current methods are vague and lack scientific evaluation. Take Article 19 of the REL 2005 as an example.[218] Article 19 makes it clear in principle that on-grid electricity prices are determined by local competent authorities. The prices vary depending on the locations and energy resources. However, as the measures lacked parameters for price setting, the measures give room for the employment of unknown parameters and cause barriers to further deploy renewable power.[219] Another argument against the mechanism employed by China is that the Chinese government plays a dominant role in determining the price rather than the market, which could foster inefficient behaviour and cause rent-seeking.[220] This may be true from economics prospective. However, to create suitable incentives for private sectors to step in renewables sector and promote renewable development, governments' domination at the initial stage is indispensable. So, what the Chinese government could do to implement the FIT system effectively and keep its legality in the context of WTO law is worthy of analysing, which will be processed in detail in **Chapter Four**. In addition, in the history of renewables development in the EU some mistakes have been made and relevant interesting analyses have been done, which could provide useful experience for China.

In line with the principle of the FIT scheme is the full guaranteed purchase for electricity generated from renewable energy sources. The REL 2005 readily stipulated that 'the government should implement mechanisms to guarantee the purchase of all the electricity generated from renewable energy.'[221] Measures from associated departments are put in place for power-grid enterprises to prioritise the dispatch and

[218] ibid

[219] Judith Cherni and Joanna Kentish, 'Renewable Energy Policy and Electricity Market Reforms in China' [2007] Energy Policy 3616

[220] Feng Wang, Haitao Yin and Shoude Li, 'China's Renewable Energy Policy: Commitments and Challenges' [2010] Energy Policy 1876

[221] The Renewable Energy Law (n 59), art 14

full purchase of electricity generated from renewable energy.[222] The provisions in the REL 2009 brought some changes compared to those of the REL2005, which require the grid enterprises to "full guaranteed purchase" the electricity generated from renewable energy.[223] In addition, the provision of on-grid price play a similar role with guaranteed grid access in checking against market risk and uncertainties in the electricity market.[224] So, as the full guaranteed purchase system play a similar role with the quota system in promoting grid enterprises to purchase renewable electricity, the necessity of their coexistence needs to be assessed in next stage of this study.

3.3.3 Other forms of economic incentives

Apart from the major support schemes, other forms of economic incentives are also made use of to support the REL to achieve its targets. The REL as well as other legislation specifically stipulate provisions for financial and fiscal incentives for promoting investment in renewable energy, such as special funds, preferential loans and taxations.

The REL established the Renewable Energy Development Fund (REDF).[225] Based on the provisions of the REL 2009, the fund can be used to provide financial incentives for the deployment of renewable energy, support scientific and technological research, standard establishment and to build up independent renewable power systems in remote areas and islands. [226] The *Interim Measures for Renewable Energy Development Fund Collection and Use* (*2011)*, issued by Ministry of Finance of China, has more detailed provisions on how to collect and use the funds to support renewable

[222] ibid

[223] Nengye Liu, 'China's New Renewable Energy Law' [2011] IUCN 1, 74 <http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1764347> accessed 10 April 2019

[224] Hao Zhang, 'China's Low Carbon Strategy: The Role of Renewable Energy Law in Advancing Renewable Energy' [2011] Renewable Energy Law and Policy Review 2(2), 133 <https://www.jstor.org/stable/24324727?seq=1#page_scan_tab_contents> accessed 10 April 2019

[225] The Renewable Energy Law (n 59), art 24

[226] ibid

energy development in China.[227] In 2015 Ministry of Finance issued the *Interim Measures for the Administration of Special Funds for the Development of Renewable Energy*, which further defined the key areas of renewables to subsidise by the funds, including

> [S]cale development and utilization and capacity building, public platform building, comprehensive application and demonstration, demonstration, promotion and industrialisation of key technologies.

The absence of a targeted value or amount of the fund could result in inconsistency in funding. Funds appropriated to the Renewable Energy Development Fund could be various, high or low, based on the choice or priorities of the government which is in charge. This may cause uncertainty in the renewable energy industry.

Article 25 of the *Renewable Energy Law 2009* provides that

> [F]inancial institutions may offer preferential loans with subsidised interest for developing renewable energy utilisation projects. Discounts exist for loans and capital support for some specific renewable energy technologies covering hydro, wind, solar and biomass power equipment meant for export.[228]

Renewable energy is considered as a sector to be given priority in the grant of financial support by Chinese commercial banks, which may provide the renewable energy industry with more advantages to compete with conventional energy industry in the energy market.[229] Meanwhile, green technology investments have been promoted and greatly supported by some Chinese policy and state-owned banks which include

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[227] NDRC, NEC, Ministry of Finance, *Interim Measures for Renewable Energy Development Fund Collection and Use* (in Chinese, translated by the author) (2011) <http://fgcx.bjcourt.gov.cn:4601/law?fn=chl385s186.txt> accessed 10 April 2019

[228] Ministry of Science and Technology and others, *Catalogue of Chinese Hi-Tech Products for Export* (in Chinese, translated by the author) (2006) <http://www.most.gov.cn/tztg/200603/t20060323_29888.htm> accessed 10 April 2019

[229] China Banking Regulatory Commission, *Guiding Opinions for Commercial Banks on Improving and Intensifying Financial Services for Hi-tech Enterprises* (in Chinese, translated by the author) (2006) <http://www.cbrc.gov.cn/chinese/home/docDOC_ReadView/20070131F388E0D771E312E1FF1ABBA48AD8F800.html> accessed 10 April 2019

Agricultural Development Bank of China, China Development Bank, Import-Export Bank of China, Agricultural Bank of China, Bank of China, China Construction Bank and Industrial and Commercial Bank of China.[230] These banks offer preferential loans to renewable energy enterprises following the policies from the Chinese government.

Apart from the preferential loans, tax benefits are also to be provided to eligible renewable energy operators in China. Favourable tax regimes can serve as means to attract investors to invest in renewable energy sector and further promote the deployment of renewable energy industry in China. Article 26 of the REL 2009 requires governments at all levels to grant tax benefits to projects which have been listed in the catalogue of renewable energy industrial development guidance.[231] According to the catalogue, eighty-eight types of renewable energy projects are eligible to receive fiscal incentives and funding.[232]

3.4 China's policies and laws for improving energy efficiency

Although most of countries have highlight the significance of developing renewable energy in combating global climate change, improving conventional energy efficiency also needs to be addressed. Conventional energy is still the dominant source for industrial and economic development, and also in our daily life we still depend on conventional energy. Thus, improving conventional energy efficiency will be another important strategy to mitigate climate change and combat the increasing environmental crisis.

Pursuing to conserve energy and improve energy efficiency has become a hot issue among Chinese people for a long time. With realising the threat from energy to economic growth and environmental protection, the Chinese government has made energy efficiency promotion and conservation as its highest priority in its energy

[230] Greentech Networks Ltd, *The China Greentech Report* (2009) <http://www.china-greentech.com/2009report> accessed 10 April 2019

[231] The Renewable Energy Law (n 59), art. 26

[232] NDRC, *Catalogue for the Guidance of the Industrial Development of Renewable Energy* (in Chinese, translated by the author) (2005) <http://www.ccchina.gov.cn/file/source/ca/ca2006020702.doc> accessed 10 April 2016

strategy.[233] The *Medium- and Long-Term Energy Conservation Plan*[234], issued by the NDRC in 2004, serves as the guidance for China to promote energy conservation work and it is also considered as the basis for China to build up and develop energy-saving projects.[235] Moreover, the Plan also stipulates China's targets on energy conservation and the priorities of development from 2010 to 2020.[236] In this plan, four priorities are enhanced: national energy efficiency, the energy efficiency of major industrial products, the energy efficiency of major energy-consuming equipment and energy conservation management.[237]

In order to promote overall social energy conservation and improve energy efficiency, the *Energy Conservation Law* was enacted in 1997 and amended in 2007. The revised *Energy Conservation Law* has improved energy conservation in China and also built up basic requirements for energy conservation management nationwide.[238] Moreover, it also emphasises the role of the market mechanism in promoting energy efficiency, including the use of the economic instruments and market economy rules to encourage and guide people and companies to participate in the work of energy conservation.[239] To support the implementation of the *Energy Conservation Law*, since 2007, about 46 efficiency standards have been developed by the Standardization Administration of China to promote energy efficiency when the products are used. According to the requirement of efficiency standards, China issued the *Management Approach* of *Energy Efficiency Labelling* to strengthen the interaction between producers and consumers and to encourage consumers to purchase energy-efficient products, which to great extent can enhance producers' enthusiasm to develop and make good use of

[233] International Partnership for Energy Efficiency Cooperation, *Compendium of Energy Efficiency Policies of APEC Economies – People's Republic of China-Energy Efficiency Repot* (2015) <https://aperc.ieej.or.jp/file/2016/4/28/China_Compendium_2015_Final.pdf> accessed 10 April 2019

[234] NDRC, *Medium and Long-Term Energy Conservation Plan* (in Chinese, translated by the author) (2004) <http://www.china.com.cn/chinese/PI-c/713341.htm> accessed 10 April 2018

[235] ibid

[236] ibid

[237] ibid

[238] China Energy Conservation Law 2009

[239] ibid

energy-efficient technologies and further to promote the efficiency standards of the products.

Apart from the laws for promoting energy conservation and energy efficiency, China's Five-Year Plans are also significant. In the 11th Five-Year Plan (2006 – 2010), the government has set up a target of reducing energy consumption per unit of GDP by 20% by 2010.[240] In China's 13th Five-Year Plan, some principles about further promoting energy efficiency and saving energy are included, which indicates that China will continue to make relevant measures to achieve the goals in the Plan.[241]

[240] The National People's Congress, *The 11th Five-Year (2006–2010) Plan for National Economic and Social Development* (in Chinese, translated by the author) (2006) <http://www.gov.cn/ztzl/2006-03/16/content_228841.htm> accessed 10 April 2019

[241] The National People's Congress, *The 13th Five-Year (2016–2020) Plan for National Economic and Social Development* (in Chinese, translated by the author) (2016) <http://www.ndrc.gov.cn/gzdt/201603/P020160318576353824805.pdf> accessed 10 April 2019

Chapter Four

The Effectiveness and The WTO Legality of China's Feed-in Tariff

4.1 Introduction

As heavy reliance on fossil fuels has caused huge carbon emissions and serious environmental crisis, the acceleration of the transition from fossil fuels to renewable energies is of paramount importance for China to achieve the targets of environmental protection, energy and economic security, economic development and social stability. First movers, like some of the Member States of the EU, have taken huge market shares in terms of technology development, manufacture and supply. Generally, deploying renewable energy may face some barriers, like disproportionate subsidy to conventional energy sectors and uncertainty of policy for renewable energy.[242] In order to deal with these issues, feed-in tariff scheme was created and is considered as the most effective measure in regulating renewable energy development.[243]

China's *Renewable Energy Law* introduced the FIT scheme (named as the benchmark price[244] in China) for the first time in 2006 to regulate the development of renewable energy.[245] In 2005, China installed just over 1 gigawatt (GW) of onshore wind capacity. This situation was significantly improved after the implementation of the FITs, with the installed onshore wind capacity increased to 75 GW by the end of 2012, making China have the highest capacity of onshore wind energy worldwide. Currently, China's total installed capability of wind energy and solar energy is still in the leading position.[246] With this remarkable achievement in developing renewable energy over the last decade, China now sets a new goal to replace fifteen percent of the country's total primary energy use with non-fossil energy (which includes wind, solar and hydro

[242] Mendonca (n 14) 26

[243] ibid

[244] Mendonca (n 14) 48

[245] Mendonca (n 14) 39

[246] IEA, *World Energy Outlook* (2018) <https://webstore.iea.org/world-energy-outlook-2018> accessed 19 June 2019

energy) by the end of 2020.[247] The issues of how the FIT contributes to the achievement of renewable energy development and how it will continually affect the future development of renewable industries in China are worthy of assessing properly. Moreover, as a member of the WTO, China has to ensure the FIT scheme compatible with WTO subsidy rules. Thus, the legality of FIT scheme implemented in China's context has to be measured under WTO law.

This chapter will, firstly, provide an overview on the evolution of Feed-in Tariffs programme on renewable energy and its development in China. The second part will outline China's policy and law related to the FIT, mainly focusing on wind and solar energy sector, and their implementation status in China. After the summary of policy and law related to the FIT, the chapter will move on to do an assessment of the effectiveness and legality of the FIT respectively in the following two parts. In order to do an effective assessment, this chapter will also bring the FIT of the EU in and make a brief comparison.

4.2 The evolution of the FIT and its development and implementation in China

The FIT scheme, a price-based scheme, provides a guaranteed payment for the full output of the renewable and low-carbon energy systems for a contract period of usually 10 to 25 years. This payment guarantee is usually coupled with assurance of access to the grid, and the tariff is often differentiated based on technology type, project size, locality of the resource and other project specific parameters. In the view of some economists, FIT schemes are considered as 'incentives that benefit private producers and subsidize the production of energy while tackling one or more market failures.'[248]

The proto-feed-in law, which is the first form of feed-in tariff, was created and implemented in the US and it dramatically stimulated the wind industry in some states,

[247] NDRC, *Medium- and Long-Term Development Plan for Renewable Energy* (in Chinese, translated by the author) (2007) <http://www.sdpc.gov.cn/zcfb/zcfbtz/2007tongzhi/W020070904607346044110.pdf> accessed 19 June 2019

[248] Rubini, 'The Wide and the Narrow Gate' (n 13)

especially in California.[249] By the end of 2015, 75 national governments and 35 subnational governments had feed-in programs as their incentive support for the deployment of renewable energy.[250] Very well designed FITs models have contributed to great achievement on renewables capacity, technologies, manufactures and policies, with multibillion-euro industry and millions of new jobs.[251] Since 1979, great efforts have been made by German government to stimulate the demand for renewable energy, especially through the implementation of a tariff system. During that period, bound by the national competition law, German electricity distributors were obliged to purchase renewable electricity produced in their area of supply based on "the principle of avoided costs"[252]. A detailed analysis of the EU renewable energy policies by the European Commission in 2008 concludes that 'well-adapted feed-in tariff regimes are generally the most efficient and effective support schemes for promoting renewable electricity'.[253] Although the FIT policy has been proven the most successful support mechanism for generating low-cost green renewable power, experiences from the implementation of this policy instrument worldwide clearly indicate that design options of the FIT scheme are crucial for effective and efficient support for renewables industry development.[254]

The FIT is currently adopted by more than 80 countries and jurisdictions and is the most popular renewable deployment policy.[255] The main reason for its rapid adoption is due to the success of EU members such as Germany, Spain, Italy, etc. in developing

[249] Mendonca (n 14) 61

[250] REN 21, *Renewables 2016 Global Status Report* (2016) 109 <https://www.ren21.net/wp-content/uploads/2019/05/REN21_GSR2016_FullReport_en_11.pdf> accessed 19 June 2019

[251] Mendonca (n 14) xv

[252] The avoided cost is the marginal cost of the marginal cost for the same amount of energy acquired through another means, such as construction of a new production facility or purchase from an alternative supplier.

[253] European Commission, *The Support of Electricity from Renewable Energy Sources* (Staff Working Document, 2008) 3

[254] Yun-Hsun Huang and Jung-Hua Wu, 'Assessment of the Feed-in Tariff Mechanism for Renewable Energies in Taiwan' [2011] Energy Policy 39(12) 8106 <https://www.sciencedirect.com/science/article/pii/S0301421511007890> accessed 18 June 2019

[255] REN21, *Renewables 2011 Global Status Report* (Paris, 2011) <https://www.ren21.net/wp-content/uploads/2019/05/GSR2011_Full-Report_English.pdf> accessed 18 June 2019

their renewable energies through this policy. As a result, those original market-oriented countries (e.g., the UK, US, Australia, Japan, etc.) which have adopted the Renewable Portfolio Standards (RPS) have also begun to introduce the FIT as an additional instrument for accelerating RE development. Miguel Mendonca claims in his study that the FIT scheme is, so far, the most effective policy instrument that is designed for promoting the relatively low-cost deployment of technologies used for renewable energy production.[256] Based on this background, we might need to be more cautious, but the roles that FIT has played in boosting renewable power development and its popularity in the renewables markets have to be recognised.[257] China has introduced the feed-in tariff scheme to support the production of renewable electricity since 2006.[258]

Under the impacts of the achievement of FITs in the EU, China's *Renewable Energy Law* which was promulgated in 2006 introduced the FIT scheme into China for the first time.[259] Before that, China took the method of competitive tendering, with the tariff amount determined on a case-by-case basis. However, the intense competition and speculative bidding induced by this tendering approach was counter to the growth of Chinese wind industry overall.[260] The FIT scheme under the Chinese context adopts fixed price mechanism, with the aim of guaranteeing that renewable generators can sell the electricity produced to the grid at a set price and attain benefits from it. With its amendments in 2009, the *Renewable Energy Law* laid the foundation for pricing, purchasing, market share, and grid connection of renewable-generated electricity. Details of implementing the *Renewable Energy Law* and measures to encourage the utilisation of renewable energy were put forth in China's *11th Five-Year Plan* (from 2006 to 2010) for renewables development. With the contribution of FITs scheme,

[256] Mendonca (n 14) 63

[257] Steffen Jenner, Felix Groba and Joe Indvik, 'Assessing the Strength and Effectiveness of Renewable Electricity Feed-in Tariffs in European Union Countries' (2013) 52 Energy Policy 385 <https://www.sciencedirect.com/science/article/pii/S030142151200821X> accessed 18 June 2019

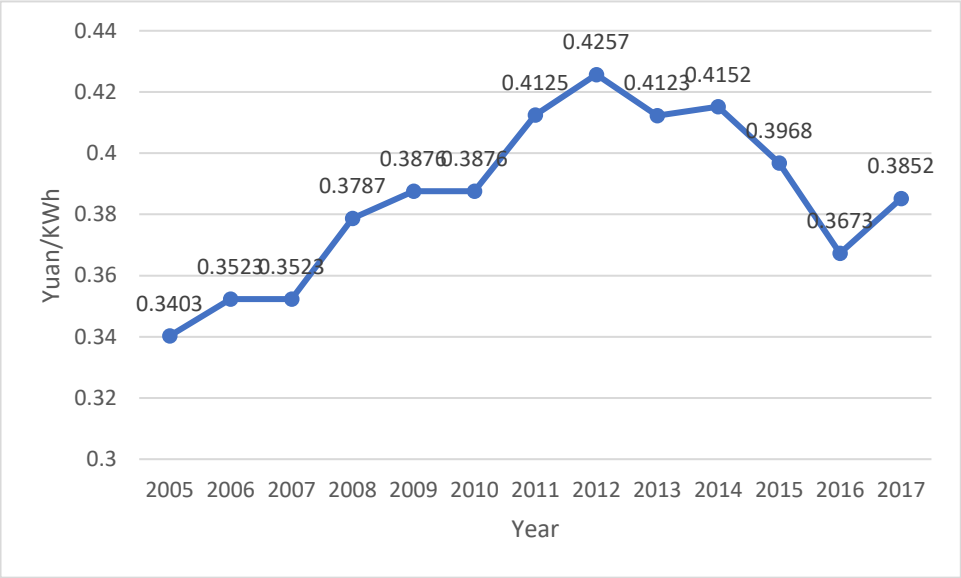
[258] Renewable Energy Law 2009

[259] Mendonca (n 14) 62

[260] Stephanie Ohshita, 'Exercising Power: China's Transition to Efficient, Renewable Energy' in Carol Hager and Christoph Stefes (eds), *Germany's Energy Transition: A Comparative Perspective* (Palgrave Macmillan, 2016) 133

Chinese renewable energy deployment has achieved an average annual growth rate of 25% over the past decade.[261] Beyond that, the FITs stipulated in *Renewable Energy Law* is also considered as a significant step towards the marketization of power pricing in China.[262]

Figure 4.1 The trend of coal-fired power price (average) in China from 2005 to 2017 (Yuan/KWh)



Source: NDRC

In China, the FIT for renewables power is set based on the desulfurized coal power price plus certain subsidies which come from the renewable energy fund. **Figure 4.1** shows the tendency of average coal power tariffs in China, which is used as benchmarking desulfurized prices for FITs of renewables power. The price of coal power in China is mainly determined by coal price. In order to deal with the increasingly serious environmental issues, especially air pollution, and achieve sustainable development targets, the Chinese government has shut down a great

[261] REN21, *Renewables Global Status Report* (2006) <https://www.ren21.net/wp-content/uploads/2019/05/GSR2006_Full-Report_English.pdf> accessed 28 July 2019

[262] Lin Lin, 'Marketisation of Pricing on Renewable Energy' (2017) Jinshi Energy Study <http://news.bjx.com.cn/html/20171027/857914.shtml> accessed 29 June 2019

number of small-scaled mining factories. Meanwhile, measures have been taken to require related entities to change energy structure and reduce the amount of coal use over past several years. The data in the graph also indicate the change of coal price from 2005 to 2016 in China. It is worth noting that the desulfurized coal power price is not the only determinant of renewable electricity. With the expansion of renewable market and technology development, the subsidy added on the desulfurized coal power price will be reduced step by step.

In China, the FIT scheme functions as the main impetus for the national development of renewable energy. In practice, for each kilowatt hour of renewable electricity sold, a renewable energy surcharge is added. The surcharge all goes to a renewable energy fund that is established to provide funding for the FIT schemes and other renewable energy-related activities. However, due to the soaring growth of windmill and solar PV installations throughout China over the past few years, the renewable energy fund has been under increasingly greater pressure. In 2017, the deficit of the fund already reached 100 billion in China Yuan (CNY).[263]

4.3 The FITs for wind power and solar PV in China

With the geographic features of China, wind energy and solar energy are very abundant in northwest, north and northeast of China. The Chinese government also makes the development of wind energy and solar energy as priorities in the energy transformation reform, so extensive policies has been enacted and continuously updated to support renewable energy application in economy development of China.

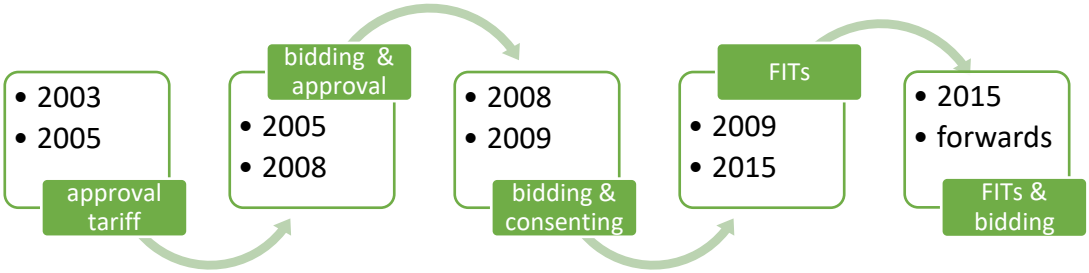
4.3.1 Chinese FIT for wind energy

So far, the pricing of wind power has gone through five phases in China (*see* **Figure 4.2**). The first few years (2003-2005) is the phase of approval tariff; The second phase (2005-2008) sees a combination of bidding price and approved tariff; During the third

[263] Energy News Net, 'The Real Income of Renewable Power Surcharges is Much Lower than Anticipated' (IN-EN.com, 20 November 2018) <https://www.in-en.com/article/html/energy-2275486.shtml> accessed 28 August 2019

phase (2008-2009), the measure of bidding plus consenting was adopted; Fixed tariffs was implemented in the fourth phrase (2009-2015); from 2015 onwards is the fifth and the latest phase which sees the coexistence of FITs and bidding price. The new pricing policy encourages local governments to make use of market competition to guide the planning and building of new renewable energy projects and making local tariffs.

Figure 4.2 Development stages of tariff on wind power in China



Note: Information is from the documents about wind electricity development in China. The diagram is designed by the author.

Before 2003, the price range of wind power in China was between 0.38 CNY/kWh (including tax, the same below) and 1.0 CNY/kWh.[264] Along with the launching of several wind power concession projects approved by China's NDRC since 2003, energy investors started to be selected through public tendering. Data show that tariffs fixed via concession bidding were generally between 0.38 and 0.5 CNY/kWh, which are relatively lower than the prices (around 0.5 – 0.8 CNY/kWh) set directly by local governments without bidding. In July 2008, tariffs of 48 wind power projects approved by China's NDRC were generally between 0.51 and 0.61 CNY/kWh.[265] In order to standardise the wind power price management and improve the sustainable development of wind power generation industry, the NDRC promulgated in August 2009 the *Notice of Improving Policies on the FITs for Wind Power*.[266] It set up four

[264] Peng Ru and others, 'Behind the Development of Technology: The Transition of Innovation Modes in China's Wind Turbine Manufacturing Industry' [2012] 43 EP 58

[265] Qingyue Yan and Zhen Li, 'An analysis of biomass power generation cost-sharing mechanism in China' [2011] 2 EM 1

[266] NDRC, 'Notice of Improving Policies on the Feed-in Tariff of Wind Power' (NDRC Pricing 2009, NO. 16) (in Chinese, translated by the author) <http://www.ndrc.gov.cn/zcfb/zcfbtz/200907/t20090727_292827.html> accessed 28 August 2019

categories of wind energy resource regions nationwide based on the wind resource status and project construction situation. A fixed benchmark feed-in tariff for wind power was also enacted for each resource region,[267] which were 0.51, 0.54, 0.58 and 0.61 CNY/kWh respectively.[268]

At the end of 2014, the NDRC issued the *Notice on Appropriate Adjustment on FITs for Onshore Wind Power Electricity*[269], which stated that the government would continue to carry out the different FITs of wind power in the four categorised regions. Besides, the FITs in region I, II and III were lowered by 0.02 CNY/kWh, thus were adjusted to 0.49, 0.52, 0.56 CNY/kWh respectively. The targets of this notice were 1) to guide properly the investment on wind power, 2) to promote healthy and orderly development of wind power industry, and 3) to enhance the efficiency of additional funds and subsidies on renewable electricity price.[270]

On 22 December 2015, the NDRC issued the *Notice of Improving the Policy on FITs for Onshore Wind and Solar Photovoltaic Power Generation*[271], which stipulates that the FITs of onshore wind and solar PV electricity will go down with the development scale expanding. The Notice determined the FITs for both 2016 and 2018 so that the investment expectation can be more explicit. The Notice also encourages local governments to make use of the way of market competition, for example competitive bidding, to determinate the owners of new renewables projects, like onshore wind power and solar PV, and the FITs. But the FITs set up by market competition cannot

[267] ibid

[268] Joanna Lewis, 'Building a National Wind Turbine Industry: Experiences from China, India and South Korea' (2011) 5 IJTG 281 <https://www.china.tu-berlin.de/fileadmin/fg57/WS_2012_13/W_T_Modern/Lewis_-_Wind_Energy_2011.pdf> accessed 28 August 2019

[269] NDRC, *Notice on Appropriate Adjustment on FITs of Onshore Wind Power Electricity* (NDRC Pricing 2014 NO. 3008) (in Chinese, translated by the author) (2014) <http://www.ndrc.gov.cn/zcfb/zcfbtz/201501/t20150109_659876.html> accessed 28 August 2019

[270] ibid

[271] NDRC, *Notice of Improving the Policy on Onshore Wind and Solar Photovoltaic Power Generation On-Grid Benchmark Price* (NDRC Pricing 2015 NO. 3044) (in Chinese, translated by the author) (2015) <http://www.ndrc.gov.cn/gzdt/201512/t20151224_768582.html> accessed 28 August 2019

exceed those of their counterparts set up by the central government.[272] This, to some degree, could indicate that the central government is on the way to loosen its control on the process of renewable electricity price setting.

On 26 December 2016, the NDRC issued the *Notice of Adjustment the FITs for Solar PV and Onshore Wind Power*[273] so as to achieve the target of pricing the FITs of wind and solar PV on the same levels with thermal power price by 2020 in *The Action Plan of Energy Development Strategy (2014 – 2020)*[274], regulate reasonable investments on renewables and promote healthy and orderly development of solar PV and wind power industry. The *Notice* also encourages local governments to determine the owners of new renewables projects and set up renewable electricity tariff through bidding or other marketization methods, but the FITs set by market competition cannot higher than their counterparts set by the central government.[275]

In May of 2019, the NDRC issued the *Notice of Improving the FITs for Wind Power*[276] which changes the pricing mechanism for wind power from the FIT scheme to guide price and further reduces the prices for wind power in every regions. The new *Notice* looks at achieving the goal of pricing wind power at the same level with coal-fired power, scientifically and rationally guiding renewable energy investment, efficiently using of resources, promoting fair competition and the healthy and sustainable development of the wind power industry.[277] The *Notice* clarifies, for the first time, that

[272] ibid

[273] NDRC, *Notice of Adjustment the FITs for Solar PV and Onshore Wind Power* (NDRC pricing NO. 2729, 2016) (in Chinese, translated by the author) (2016) <http://www.ndrc.gov.cn/zwfwzx/zfdj/jggg/201612/t20161228_833062.html> accessed 28 August 2019

[274] General Office of the State Council of China, *The Action Plan of Energy Development Strategy (2014 – 2020)* (in Chinese, translated by the author) (2014) <http://www.gov.cn/zhengce/content/2014-11/19/content_9222.htm> accessed 28 August 2019

[275] ibid

[276] NDRC, *Notice of Improving the FITs for Wind Power* (NDRC pricing NO. 882, 2019) (in Chinese, translated by the author) (2019) <http://www.gov.cn/xinwen/2019-05/25/content_5394615.htm> accessed 28 August 2019

[277] ibid

governments will further reduce subsidies to wind power and finally eliminate subsidies for wind power after 1st January 2021.[278]

Based on the information from the regulations listed above, the FIT scheme for wind power and relevant categorised regions are shown in **Table 4.1** and **Chart 4.1** respectively. To be specific, **Table 4.1** shows the changes of the FIT levels in the four categorised regions of wind resource: the prices in the four categorised regions have experienced obvious decreasing from 0.51, 0.54, 0.58 and 0.61 Yuan/kWh in 2009 to 0.34, 0.39, 0.43 and 0.52 Yuan/kWh in 2019 within a decade years in categorised region I, II, III, IV respectively. The newly issued *Notice of Improving the FITs for Wind Power* has already determined the guide price for 2020 in the four regions with 0.29, 0.34, 0.38 and 0.47 Yuan/kWh respectively.

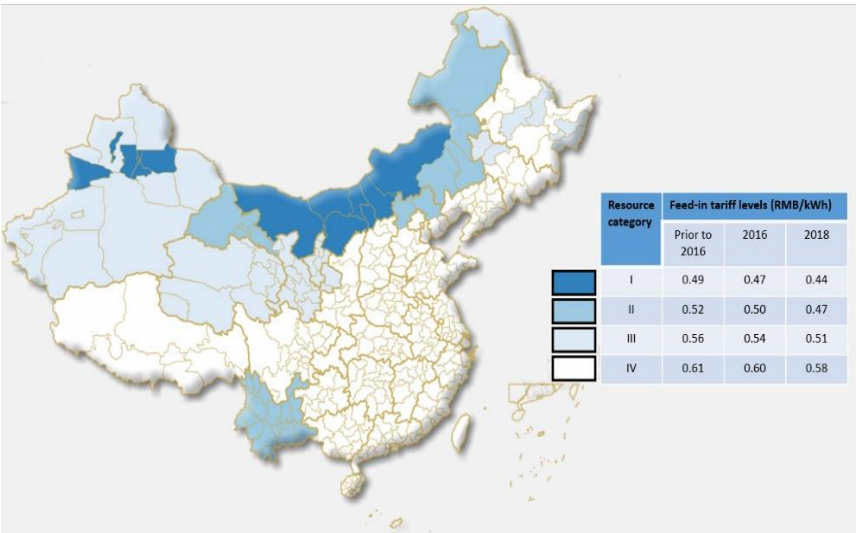
Table 4.1 Onshore Wind Power Feed-in Tariffs in China

Resource Category Areas	**Feed-in Tariffs (Yuan/kWh, including tax)**						**Places in the resource areas**
	2009 – 2014	**2015**	**2016 – 2017**	**2018**	**2019**	**2020**	
I	0.51	0.49	0.47	0.40	0.34	0.29	Inner Mongolia, not including Chifeng, Tongliao, Xing'an meng and Hulunbeier; Xinjiang, not including Wulumuqi, Yili, Kelamayi and Shihezi
II	0.54	0.52	0.50	0.45	0.39	0.34	Zhangjiakou and Chengde of Hebei Province; Chifeng, Tongliao, Xing'an Meng and Hulunbeier of Inner Mongolia; Zhangye, Jiayuguan and Jiuquan of Gansu Province, Yunnan.
III	0.58	0.56	0.54	0.49	0.43	0.38	Beicheng, Songyuan of Jilin Province; Jixi, Shuangyashan, Qitaihe, Suihua, Yichun and the area of Daxing'an Ling of Heilongjiang Province; Gansu Province, not including Zhangye, Jiayuguan and Jiuquan; Xinjiang, not including Wulumuqi, Yili, Kelamayi and Shihezi areas; Ningxia.
IV	0.61	0.61	0.60	0.57	0.52	0.47	The areas beyond the places in the region I, II and III

Source: Notices on the FITs issued by the NDRC

[278] ibid

Chart 4.1 China onshore wind power resource category areas



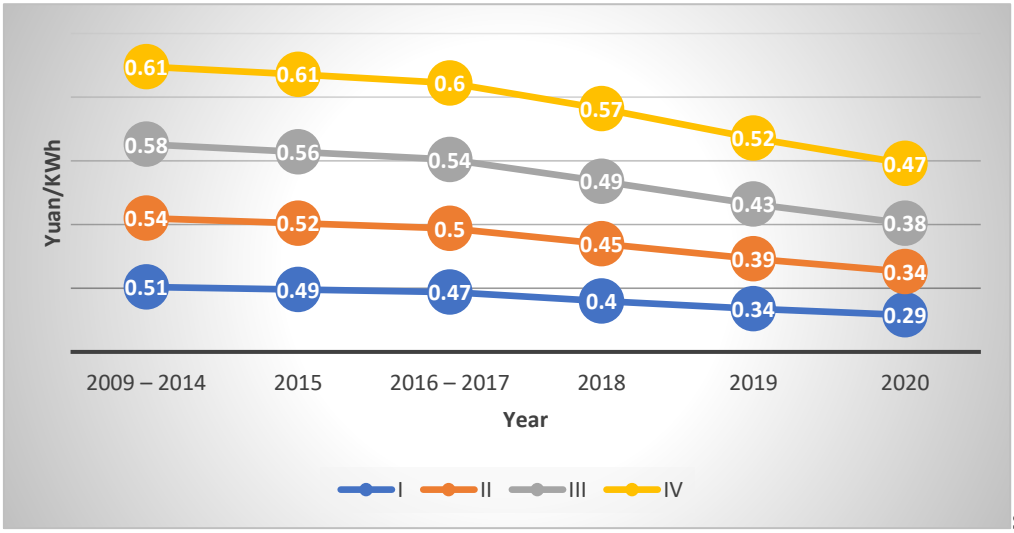
Source: China Energy Portal

Chart 4.1 shows the locations of different wind resource category areas in China and the changes of FITs on wind power with the time. The category regions I and II completely cover the areas with abundant wind resource reserves in China[279]. However, most of these places locate in remote and undeveloped areas and they are disadvantageous to develop local economy and society. Through the favoured FIT, authorities attempt to attract more investment to these areas. While it is worth noting that in the Southeast of China, such as Pearl River Delta Economic Belt (including Guangzhou, Shenzhen and Zhuhai etc.), and East of China, such as Yangtze River Delta Economic Belt (including Shanghai, Hangzhou, Nanjing etc.), all these places lack of renewable energy but are in much need of energy for society and industry development. Based on the market pricing mechanism, the FITs for wind power in those areas are higher than other areas. Comparatively speaking, in the North and Northwest of China where renewable energy are very abundant but they are in less need of energy because of underdeveloped economy, so the FITs are quite lower. This phenomenon indicates that the construction of high-speed smart grid from the north and northwest to the east and southeast of China is very urgent, which is not only vital

[279] Abundant renewable energy resource reserves mainly locate at north, northeast and northwest (Three North) of China. (noted by the author)

for sorting out energy shortage in economic developed areas of China, but also very helpful for solving the curtailment of wind energy and alleviating the poverty in remote areas of China.

Figure 4.3 The trends of the FIT levels in different category resource regions between 2009 and 2020.



Source:

Collated by the author from *Notices* issued by the NDRC between 2009 and 2019.

Note: **Resource Category Region I** includes Inner Mongolia, not including Chifeng, Tongliao, Xing'an meng and Hulunbeier; Xinjiang, but does not include Wulumuqi, Yili, Kelamayi and Shihezi.

Resource Category Region II includes Zhangjiakou and Chengde of Hebei Province; Chifeng, Tongliao, Xing'an Meng and Hulunbeier of Inner Mongolia; Zhangye, Jiayuguan and Jiuquan of Gansu Province, Yunnan.

Resource Category Region III includes Beicheng, Songyuan of Jilin Province; Jixi, Shuangyashan, Qitaihe, Suihua, Yichun and the area of Daxing'an Ling of Heilongjiang Province; Gansu Province, not including Zhangye, Jiayuguan and Jiuquan; Xinjiang, not including Wulumuqi, Yili, Kelamayi and Shihezi areas; Ningxia.

Resource Category Region IV includes the areas beyond the places in the region I, II and III

Figure 4.3 shows the trends of the FITs levels in the four category resource regions between 2009 and 2020 with different decreasing amplitudes in different regions. The biggest drop has happened in category region I, with the drop of 0.22 Yuna/KWh in the decade time. The smallest drop (0.14 Yuna/KWh) takes place in the region IV. All these trends can reflect a fact that the government continues to strongly support the deployment and development of renewables industry in the economic advanced areas where a huge amount of energy is needed, even though those areas are not abundant in renewable energy comparing to remote areas in north and west of China.

4.3.2 Chinese FIT for solar energy

In terms of the FIT scheme for solar energy generation in China, the scheme came into effect later than that for wind power. Pricing mechanism for solar power in China have experienced several stages so far: pricing for demonstration projects (before 2002), initial investment allowance (2002 – 2007), the approval tariff (2007 – 2008), bidding price (2009 – December 2011), national fixed price (2012 –December 2013), categorised price and guide price (from July of 2019).[280] With the development of solar technology and the expansion of renewable energy market, the instruments related to the FIT for solar power has been updated almost annually so as to achieve the goals of pricing the renewable power being on par with the coal-fired power by 2020.[281]

The Chinese FIT for solar power started with the *Notice on Improving Policies on the Feed-in Tariff for Solar Photovoltaic Power*[282] issued by the NDRC in 2011. This *Notice* set up a national unified FIT, which is 1.15 CNY/kWh, for solar photovoltaic power projects. This national unified price was applicable to projects (not including the projects in Tibet) that would be completed by the end of 2011. For the solar photovoltaic power projects approved before July 2011 but could not be completed by 31 December 2011, the price is 1.0 CNY/kWh.

In July 2013, the State Council of China issued *Some Opinions on Promoting the Healthy Development of Solar PV Industry*[283]. In this document, the government

[280] Shujuan Wang, 'From Demonstration Price to Parity Price, Tariffs for Solar Power Decrease by 92% in Ten Years' *Energy Trend* (Guangdong, 1 April 2019) <https://www.energytrend.cn/news/20190401-66927.html> accessed 6 June 2019; NDRC, 'The Notice on Issues of Improving the Feed-in Tariff Scheme for Solar Power' (NDRC pricing NO. 761, 2019) <http://www.ndrc.gov.cn/zwfwzx/zfdj/jggg/201904/t20190430_935312.html> accessed 6 June 2019

[281] NDRC, *Notice of Improving the FITs for Wind Power* (n 276)

[282] NDRC, *Notice on Perfecting Wind Power Feed-in Pricing Policies* (NDRC Pricing No. 1906, 2009) (in Chinese, translated by the author) (2009) <www.ndrc.gov.cn/zcfb/zcfbtz/2009tz/t20090727_292827.htm> accessed 6 June 2019

[283] State Council of China, *Some Opinions on Promoting the Healthy Development of Solar PV Industry* (in Chinese, translated by the author) (2013) <http://www.gov.cn/zwgk/2013-07/15/content_2447814.htm> accessed 6 June 2019

required that energy situation and the cost of project construction need to be taken into account when pricing the FIT for solar power and the implementation period of the FIT is 20 years in principle. The *Notice on Making Use of Price Leverage to Promote the Healthy Development of Solar PV Industry*[284], issued in August 2013, pointed out that, as the huge territory of China, the country is divided into three solar energy resource regions by the reserves of solar energy, and each region will have its own FIT level for solar power. These policies opened up China's categorised pricing mechanise for solar energy and, literally, could be helpful to adjust investment for solar energy industry in China.

In December 2016, the NDRC issued the *Notice on Adjusting Feed-in Tariffs for Solar PV Power and On-Shore Wind Power*[285], which pointed out that the government would adjust the FITs of renewables based on the progress of renewable industry and renewable technology, cost-reduction of the project building. The *Notice* also pointed out to reduce the FIT for solar PV generated from the projects built up after 1 January 2017. On 26 December 2017, the NDRC issued the *Notice on the Policy of the FITs for Solar PV (2018)*[286]. One of the purposes of this *Notice* is to further reduce the FIT for electricity generated from renewable energy and achieve the target of making the FITs for renewable electricity to be on par with the price of thermal power by 2020.[287] The *Notice* also aims at guiding reasonable investment on renewables and promoting healthy and orderly development of renewables industry.[288]

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[284] NDRC, *Notice on Making Use of Price Leverage to Promote the Healthy Development of Solar PV Industry* (NDRC pricing NO. 1638, 2013) (in Chinese, translated by the author) (2013) <http://www.ndrc.gov.cn/zwfwzx/zfdj/jggg/201308/t20130830_556127.html> accessed 6 June 2019

[285]NDRC, *Notice of Adjusting Feed-in Tariffs for Solar PV Power and On-Shore Wind Power* (NDRC pricing NO. 2729, 2016) (in Chinese, translated by the author) (2016) <http://www.ndrc.gov.cn/zwfwzx/zfdj/jggg/201612/t20161228_833062.html> accessed 6 June 2019

[286] NDRC, Finance Ministry of China, NEA, *Notice on the Relevant Issues of the FITs for Solar PV* (in Chinese, translated by the author) (2018) <http://www.ndrc.gov.cn/zcfb/zcfbtz/201806/t20180601_888637.html> accessed 6 June 2019

[287] General Office of the State Council of China (n 274)

[288] NDRC, Finance Ministry of China, NEA, *Notice on the Relevant Issues of the FITs for Solar PV* (n 286)

In April of 2019, the *Notice on Issues of Improving the Feed-in Tariff Scheme for Solar PV Generation*[289] points out that the FIT will be further reduced to 0.40, 0.45, 0.55 CNY/kWh in three categorised resource regions respectively from July 2019, and the categorised pricing scheme will also be replaced then by the guide pricing scheme. The introduction of guide pricing scheme means that China will further promote marketization of pricing for renewable energy generation. Meanwhile, the *Notice* also emphases that the FITs for village-level solar power projects which have been integrated into poverty alleviation programmes will maintain the level (0.65, 0.75 and 0.85 CNY/kWh in the category region I, II and III respectively) as before.[290] This provision will guarantee the owners of solar projects in villages will continuously get benefits for the projects and ease the poor economic situation there. About one month later, in May of 2019, the National Energy Administration (NEA) of China issued the *Notice on Issues Relevant to Construction of Wind and Solar Energy Generation Projects (2019)*[291]. The *Notice* requires local governments to actively promote construction of grid parity projects, stringently manage competition of subsided projects, create conditions for power transmission and consumption and optimise environment for construction, investment and business.[292]

Table 4.2 shows changes of the FIT schemes of solar power in three regions. To be specific, the prices in the three regions have experienced obvious decreases from the unified tariffs at 1.15 and 1.0 Yuan/kWh between 2011 and 2013 to the guide pricing scheme of the FIT in 2019 with the price levels of 0.40, 0.45 and 0.55 Yuan/kWh in three category regions of I, II and III respectively. **Chart 4.2** shows the locations of the three solar resource category regions in China and the changes of FITs on wind power with the time. The category region I mainly locates in Inner Mongolia where

[289] NDRC, *Notice on Issues of Improving the Feed-in Tariff Scheme for Solar PV* Generation (NDRC pricing NO. 761, 2019) (in Chinese, translated by the author) (2019) <http://www.ndrc.gov.cn/zwfwzx/zfdj/jggg/201904/t20190430_935312.html> accessed 6 June 2019

[290] ibid, Article 1 (4)

[291] National Energy Administration of China, *Notice on Issues Relevant to Construction of Wind and Solar Energy Generation Projects* (in Chinese, translated by the author) (2019) <http://zfxxgk.nea.gov.cn/auto87/201905/t20190530_3667.htm> accessed 6 June 2019

[292] ibid

wind energy is very abundant. The category region III covers all the areas of the middle and east part of China. These areas are quite lack of renewable energy but are in much need of energy for society and industry development, which causes the higher FITs level than that in region I and II. The FIT for solar power generated in Tibet enforces unified price scheme with 1.05 Yuan/kWh.

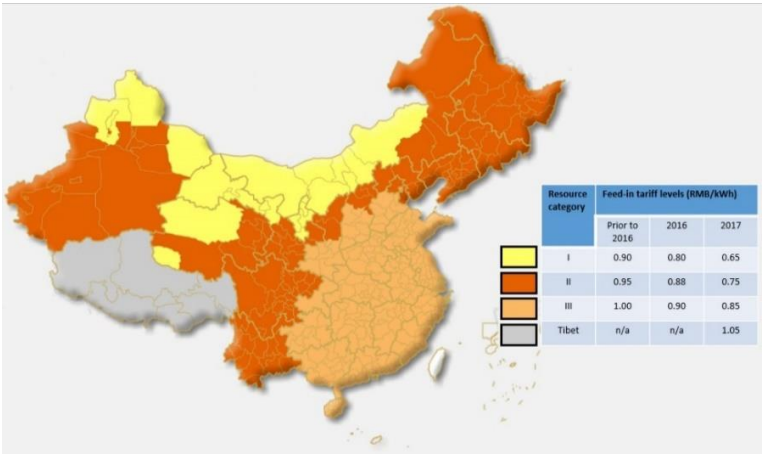
Table 4.2 The FIT scheme for solar power in China[293]

resource areas	Feed-in Tariff (CNY/kWh)							Places in the resource areas
	2011	2012 – 2013	2014 – 2015	2016	2017	2018	2019	
I	1.15	1.00	0.90	0.80	0.65	0.55	0.40	Kelamayi, Tacheng, Aletai and Hami of Xinjiang; Haixi of Qinghai; Ningxia; Jiayuguan, Jiuquan, Zhangye, Jinchang, Dunhuang and Wuwei of Gansu Province; Inner Mongolia, not including Chifeng, Tongliao, Xing'an Meng and Hulunbeier.
II			0.95	0.88	0.75	0.65	0.45	Beijing; Tianjin; Sichuan; Heilongjiang; Yunnan; Liaoning; Jilin; Zhangjiakou, Qinhuangdao, Chengde and Tangshan of Hebei Province; Yanan and Yulin of Shaanxi Province; Xing'an Meng, Chifeng, Hulunbeier and Tongliao of Inner Mongolia; Xinzhou, Datong and Shuozhou of Shanxi Province; Qinghai, Gansu and Xinjiang, not including the areas listed in the region I.
III			1.00	0.98	0.85	0.75	0.55	Other areas in China not listed in the region I and II, except for Tibet.

Source: the Notices issued by the NDRC

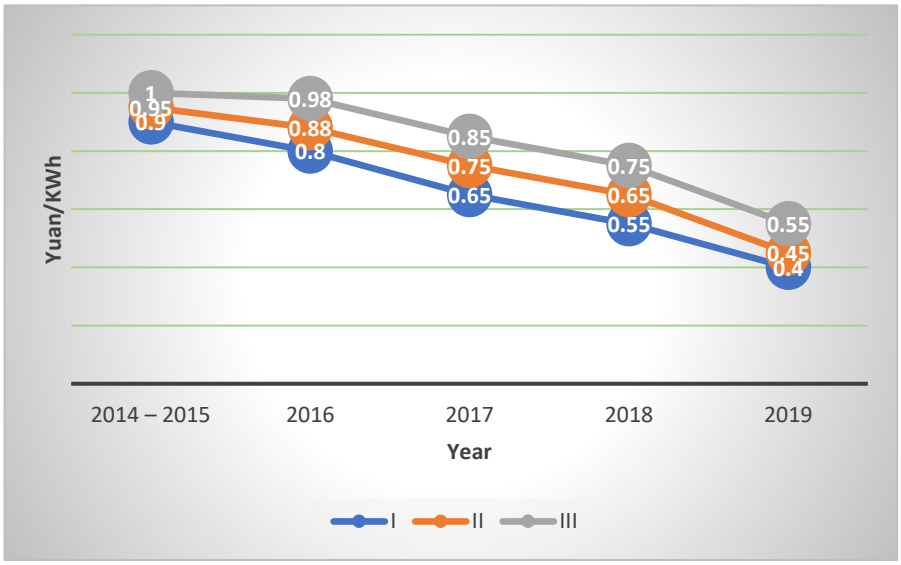
[293] The benchmark FIT for PV stations in Tibet Autonomous Region is 1.05 CNY/kWh, which is not included in the table. Based on the conditions of solar energy resources and the costs of deployments, Chinese central government divided the whole country (except for Tibet Autonomous Region) into three FIT regions/levels for solar power development. While each FIT region covers a few different cities and provinces, some provinces (such as Xinjiang and Inner Mongolia) straddle two or more FIT levels as a result of the divergent conditions of its sub-regions within the jurisdiction. The benchmark FITs for solar photovoltaic power have been tentatively adjusted annually to adapt to new conditions.

Chart 4.2 China three solar PV resource category areas



Source: China Energy Portal

Figure 4.4 The trends of the FIT levels for solar power in different category resource regions 2014-2019



Note: Collated by the author from relevant information

Figure 4.4 illustrates that the FITs levels solar power in the four categorised regions go down annually with the renewable market continuous growing and renewable technology development. Like the situation in wind energy sector, the FITs level for

solar power in category region I is higher than that in other regions and the decline is smaller over the five years. The policy tendency indicates that the government prefers to increase the efforts to develop renewable industry and make access the renewable power easy for the local economy and society.

In order to achieve the goals of optimising energy structure, maintaining energy security and achieving sustainable economic development, China actively engages in deploying renewable energy, especially wind energy and solar energy. Extensive policy instruments have been applied to promote the development of wind power and solar power respectively. The most important policy among them is the FIT scheme which has driven and dominated the development of Chinese wind and solar energy industry over the years. In order to dig out the detailed impacts of the FIT and make preparation for its further update, the effectiveness of this scheme needs to be assessed comprehensively.

4.4 The Effectiveness of the FIT Scheme in China

In 2015, the Paris Agreement set a long-term goal to limit the global temperature rise to well below 2°C above pre-industrial levels and to pursue efforts to limit the increase to 1.5°C. Recognising the urgency of mitigating global warming, UNFCCC member countries all agree to peak greenhouse gas emissions as soon as possible, which is also the short-term goal of the Paris Agreement.[294] A transition to low-carbon energy in economic activities and people's daily life is considered as an effective way to achieve these goals, given that energy-related emissions are believed to account for about two-thirds of global emissions.[295] As a type of low-carbon energy, renewable energy is considered as 'a key climate change solution'[296] that has the potential to bring a 90%

[294] European Union, 'Climate Change, The Paris Agreement' <https://ec.europa.eu/clima/policies/international/negotiations/paris_en#tab-0-0> accessed 19 July 2019

[295] IRENA, 'The Role of Renewables in Combating Climate Change and Increasing Resilience' <https://www.irena.org/climatechange> accessed 19 July 2019

[296] IRENA, 'Renewable Energy: A Key Climate Solution' <https://www.irena.org/climatechange/Renewable-Energy-Key-climate-solution> accessed 19 July 2019

reduction in carbon emissions by 2050, when combined with energy efficiency gains.[297] The plan for deploying renewable energy is thereby a key component of the Nationally Determined Contributions (NDCs) – the commitments put forward by countries under the Paris Agreement to gradually reducing greenhouse gas emissions.[298] In response to the international efforts to combat climate change, China has committed in the NDC that it will peak its CO_2 emissions around 2030 and will attempt to achieve this target early. Beyond that, China has also committed to reduce its CO_2 emissions per unit of GDP by 60-65% from 2005 level by 2030, and to increase the proportion of non-fossil fuel sources in primary energy consumption to about 20%.[299] Against this background, assessing the effectiveness of China's FIT scheme in further promoting renewables industry, in increasing the share of low-carbon energy and in reducing carbon emissions is of great importance.

This assessment of effectiveness needs to make use of the frameworks and benchmarks created in the conceptual chapter. Effectiveness of policy can be argued that whether the implementation of policy and law has achieved or the degree of achieving the intended goals or objectives. These goals and objectives include the one(s) stated in the policy and law, and the one(s) they are expected to achieve, such as economic goals, environmental goals and social goals of the FIT for renewable energy. The effects of the FIT scheme on environment, economy and society can be direct or indirect in the assessment, but they need to be tested so as to make the scheme suitable for the practice and to be updated timely. In this assessment, the effectiveness of the FIT for the wind and solar energy sectors in China will be measured from the following perspectives:

1) Economic impacts: what are the impacts of the FIT scheme on renewable electricity generation? Can it improve China's energy security and drive China's sustainable economic development?

[297] IRENA, 'The Role of Renewables in Combating Climate Change and Increasing Resilience' (n 294)

[298] ibid

[299] NDRC, *Enhanced Actions on Climate Change: China's Intended Nationally Determined Contributions* (n 167)

2) Environmental impacts: how the FIT scheme affects carbon emissions and air quality via deployment renewable energy?

3) Social impacts: how the FIT scheme affects society via expanding renewable energy access in remote areas and the contribution in the Targeted Poverty Alleviation Projects (TPAP)?

4.4.1 Economic perspective: economic development

In order to assess the impacts of the FIT scheme on economic development, the following part will focus on analysing the impacts of the FIT scheme on the growth of renewable power generation, the improvement of energy security and the development of renewable manufactures. As argued in the report of *China Renewable Energy Outlook*, China's incentive policies have played a vital role in promoting the deployment and development of renewable energy,[300] this section will analyse the effectiveness of the FIT scheme on China's economic development from these perspectives.

The FIT scheme and China's renewable power generation

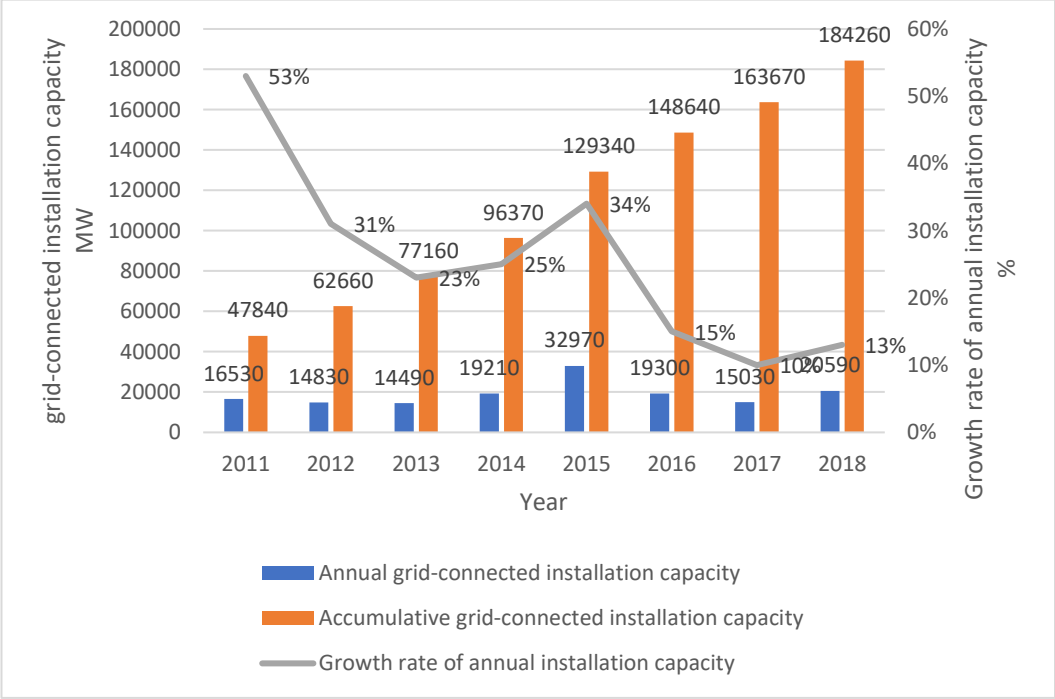
One of the main targets of the FIT scheme is to increase the growth of renewable power generation by the pricing mechanism. The following part will assess the impacts of the FIT scheme on wind and solar PV power generation from the cumulative installed and newly installed capacity growth in China under the FIT scheme implementation.

The Chinese government officially introduced the FIT scheme in 2009 to regulate wind power generation with four categorised prices, ranging from 0.51RMB/kWh to 0.61RMB/kWh. The new categorised FIT scheme replaced the dual track system – the concession tendering process and the government approval process – utilised before

[300] National Renewable Energy Centre, *China Renewable Energy Outlook* (2017) <http://boostre.cnrec.org.cn/wp-content/uploads/2017/10/CREO-2017-booklet-CN-20171206.pdf> accessed 20 July 2019

2009 in China. The categorised prices of the new FIT scheme were substantially higher than the previous concession bidding tariffs and were close to the level of the government approved tariffs over the past few years in most provinces and cities of China. The new FIT Scheme offered energy investors a quite clear expectation of the long-term framework of the development of Chinese wind energy sector.[301]

Figure 4.5 The trends of grid-connected installation capacity of wind power 2011-2018



Source: General Institute of Hydropower and Water Resource Planning and Design, *China Renewable Energy Development Report 2018*

China has been a leading wind energy market since 2008 with cumulative installed capacity of wind power 12,020 MW.[302] In 2009, the national cumulative installed capacity experienced a dramatic increase and reached 25,805 MW, which made China

[301] GWEC, *Global Wind Report* (2009) <https://gwec.net/wp-content/uploads/2012/06/GWEC_Global_Wind_2009_Report_LOWRES_15th.-Apr..pdf> accessed 20 July 2019

[302] Junfeng Li and others, *China Wind Power Outlook* (China Environmental Science Press, 2012)

the world's largest wind market.[303] It is worth noting that 2009 is also the year when the FIT scheme was implemented in the wind energy sector of China. With a rapid growth in new installation capacity of wind power under the support of the FITs, in 2012, wind energy (with a capacity of 62,660 MW) overpassed nuclear energy and became the third largest energy sector that generates power in China. However, meanwhile, the overcapacity of installations and the insufficient local demands started to cause serious curtailment in wind power sector. Due to this, the new installation capacity slowed down in 2012 and 2013.[304] The capacity of new power generation installations in 2015 was 32,970 MW, a 71.6% increase from 2014, and reached the highest point of new installation capacity after 2011. Meanwhile, what needs to be noted is that as the local demand for wind power was not sufficient, the curtailment of wind energy exacerbated in 2015, which caused a continuous slowdown of the new installation capacity of wind power in the following years. To be specific, electricity generated from wind energy reached 1,863 TWh in 2015, accounting for 3.3% of the total power generation, but the curtailment of generation capacity was about 339 TWh, with a 15% average rate of curtailment on wind energy.[305] Among the areas with the serious curtailment, the Inner Mongolia, Gansu, Xinjiang and Jilin were the top four regions, with the curtailment capacity of 91 TWh, 82 TWh, 71 TWh and 27 TWh respectively.[306] All the four regions are located in the areas with abundant wind energy resource reserves, and are covered by the Category Regions I and II where the FITs for wind power are relatively lower. By 2016, China had ranked in the leading position of global wind market for the eighth successive year by adding 19,300 MW of new capacity to the national electricity grid. This brought China's cumulative to 148,640 MW, representing 35% of the global total.[307] China's installations were down about

[303] GWEC, *Global Wind Report* (2009) (n 301)

[304] Jianlei Shi, 'New Installation Capacity of Wind Power Slowed Down Last Year' (in Chinese, translated by the author) *China News* (Beijing, 2013) <http://www.nea.gov.cn/2013-02/19/c_132177941.htm> accessed 21 July 2019

[305] NEA, 'National Wind Power Industry Continued to Maintain Strong Growth Momentum in 2015'(in Chinese, translated by the author) *Xinhua Net* (Beijing, 2016) <http://www.nea.gov.cn/2016-02/04/c_135073627.htm> accessed 21 July 2019

[306] ibid

[307] GWEC, *Global Wind Report – Annual Market Update Global* (2016) <https://gwec.net/publications/global-wind-report-2/global-wind-report-2016/> accessed 21 July 2019

20% from 2015's spectacular 30 GW, which was driven by the impending FIT reductions. Also, the growth of local electricity demand decelerated, and the existing grid system was incapable of handling and transiting the volume of new wind capacity additions to the developed areas with high demand of power, like east China and southeast of China.

In 2017, 15,030 MW of new capacity was added to China's electricity grid, which makes the country remain its leading position in global markets. Despite a 22.1% decrease from the 2016 market, it still accounted for approximately 37% of global installations. Meanwhile, China's accumulative installation capacity was brought to 163,670 MW in 2017, increased by 10.1% from the previous year. As shown in **Figure 4.5**, since 2016, the development of wind power in China was gradually slowing down again, and it is estimated that the growth will continue to be steady at least until 2020.[308] As to the electricity generation, in 2017, electricity produced from wind power was increased by 27% from the previous year and reached 305.7 TWh. This amount accounted for about 4.8% of China's total electricity supply in the same year. As the use of wind power and other renewable sources has gradually increased in China's electricity generation mix, the use of fossil fuels was correspondingly reduced from 79% in 2012 to 71% in 2017.[309] At the end of 2018 China became the first market to exceed 200 GW of total installed capacity with 206 GW total installations – reaching the target of 200 GW in the *13th Five-Year Plan for the Development of Wind Power (2016 – 2020)*[310] two years early.[311] To be specific, in 2018, the Chinese onshore market installed 21.2 GW and, in the offshore market, China installed 1.8 GW, taking the lead for the first time, followed by the United Kingdom with 1.3 GW.[312]

[308] GWEC, *Global Wind Report 2017* <http://files.gwec.net/register?file=/files/GWR2017.pdf> accessed 21 July 2019

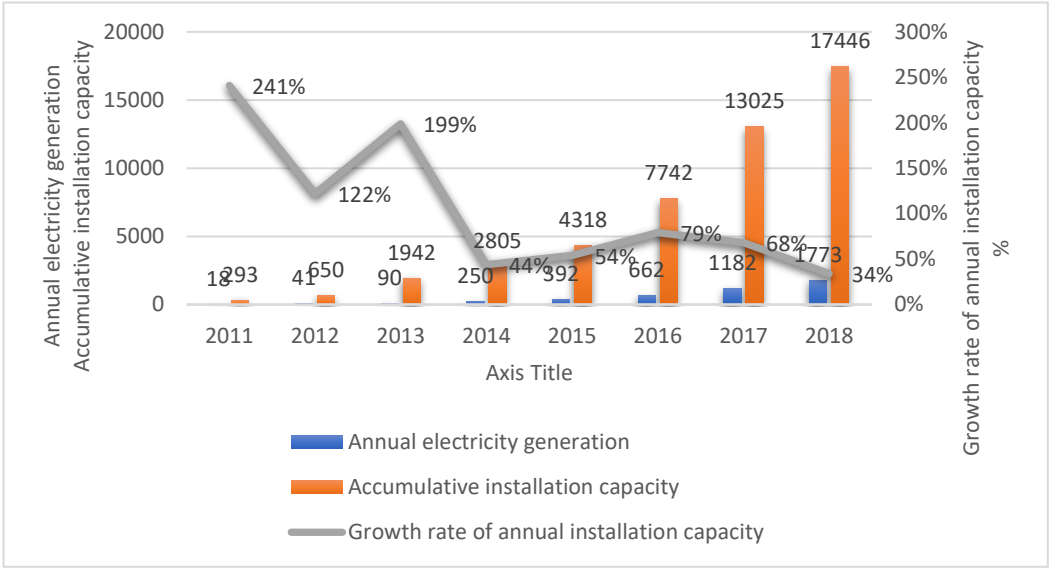
[309] ibid

[310] NEA, *13th Five-Year Plan for the Development of Wind Power (2016 – 2020*) (in Chinese, translated by the author) (2016) <http://www.nea.gov.cn/135867633_14804706797341n.pdf> accessed 21 July 2019

[311] GWEC, *Global Wind Report 2018* <https://gwec.net/wp-content/uploads/2019/04/GWEC-Global-Wind-Report-2018.pdf> accessed 21 July 2019

[312] ibid

Figure 4.6 The trends of accumulative installation capacity and annual electricity generation of solar energy (2011 - 2018)



Source: China Renewable Energy Development Report 2018

Moving on to China's solar power industry, with the implementation of FITs in solar PV market since 2011, the generation capacity of solar PV power has seen rapid increase in China, as shown in **Figure 4.6**, even though there was a great fluctuation on the growth rate during the period between 2011 and 2014. Since 2009, China has promulgated and implemented a series of incentive policies related to solar PV power generation, which helps to launch the domestic PV market promptly. The policies currently implemented primarily consist of feed-in tariff policy and policy of investment subsidies. In July 2011, the NDRC started to enforce the FIT scheme for solar power, following the pricing mechanism for wind power, and made the FIT for solar power through several rounds of biddings and tenders. With further FIT reductions in 2016, policy transition to a renewable energy certificates (REC) system[313] and curtailment challenges led to uncertainties for the annual deployment

[313] NDRC, Finance Ministry and NEA, *Notice on Trial Implementation of Issuing and Voluntary Subscription Transaction System on Renewable Energy Certificates* (in Chinese, translated by the author) (2017) <http://www.ndrc.gov.cn/zcfb/zcfbtz/201702/t20170203_837117.html> accessed 21 July 2019

trend. In 2016, the annual solar PV market expanded to more than 34 GW compared to 2015, with utility-scale projects contributing about 90% of this growth as developers rushed to commission their projects before the implementation of the planned FIT reduction.[314] A similar rush happened in 2017, given the FIT rates were reduced again as of July 2017.[315]

All these might show that suitable FITs can, to a great extent, drive growth of new installation capacity of renewable power, but, if the curtailment issues which are mainly caused by no grids for transmission and insufficient local consumption capacity cannot be sorted out effectively, it will waste lots of investment and energy resources. On the other hand, in order to attract more investment to boost renewable industry in economic advanced areas and meet the huge needs of energy in the development of local economy and society, the governments determine the FIT levels in these regions higher than that in other regions. In the situation of being no sufficient grids to transmit renewable electricity from the regions with abundant renewable energy resources, vigorously developing renewable industry locally and providing sufficient energy for the local development might be a way to sort the dilemma out. However, as these regions do not have abundant renewable energy resource reserves, much more cost needs to be paid than that in the regions with sufficient renewable energy resources so as to access the same generation. In this case, the cost effectiveness of the FIT scheme can be quite challenging.

The FIT scheme and China's energy structure and energy security

After an analysis of the growth of installation capacity and renewable generation of wind and solar power under the regulation of the FIT schemes, the following part will move to the discussion on the percentages of wind and solar power generation in total electricity generation in China, which, to some extent, can reflect the contribution of the FIT scheme to energy mix optimisation and energy security.

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[314] IEA, *Market Report Series: Renewables 2017 – Analysis and Forecasts to 2022* (2017) <https://webstore.iea.org/market-report-series-renewables-2017> accessed 21 July 2019

[315] NDRC, *Notice of Adjustment the FITs for Solar PV and Onshore Wind Power* (n 237)

With several years' development, as shown in **Figure 4.7,** wind power and solar energy use experienced a continuous increase, but the proportion in total energy consumption in China is very small compared with that of coal use. In terms of power generation, based on Xinhua News report in 2018, China's renewable generation reached 18,700 TWh in 2018, which accounts for 26.7% of total electricity generation in China,[316] while this percentage was only 20% in 2013[317]. Based on the changes in the amount of electricity generation and the proportion of renewable energy in total amount of energy consumption, it can be argue that renewable energy under the support of the FIT scheme, to some extent, is improving China's energy structure and stabilising its energy security, even though there is still a long way to go before achieving the targets of totally improving China's energy structure and stabilising its energy security.

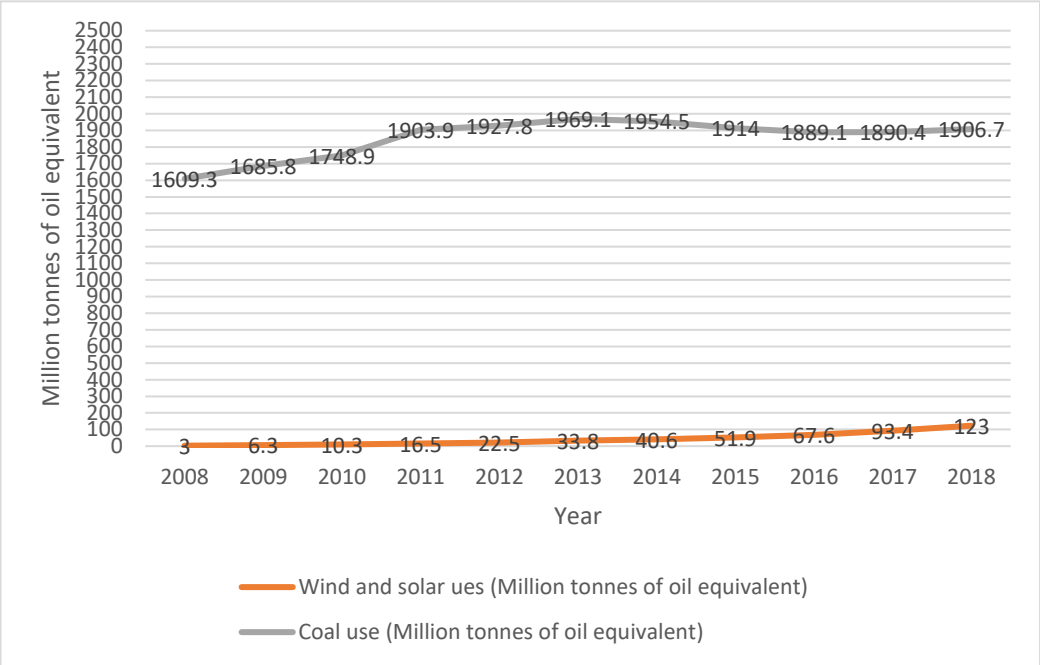
The discussion above shows the growth of wind and solar energy installation and generation capacity with the support of the FIT scheme, which has proved the argue in the report on China renewable energy outlook.[318] Based on this, we can argue that the FIT schemes for wind and solar power, as the important incentives to promote renewables, have very important impacts on promoting renewable electricity generation in China. With the increasing of alternative energy production, the consumption of coal and other fossil energy will continuously reduce and China's traditional energy structure will be improved, accordingly, even though coal energy is still in the dominant position in China's energy structure.

[316]Yuxuan Chen and Yangyang Liu, 'China's Renewable Energy Utilization Level Continuously Improving' (in Chinese, translated by the author) *Xinhua News* (Beijing, 2019) <http://www.xinhuanet.com/fortune/2019-06/11/c_1210156294.htm> accessed 21 July 2019

[317] Xinhua News, 'China's Renewable Energy Power Generation Amounted to 20% of the Country's Total Power Generation' (in Chinese, translated by the author) (2013) <http://www.npc.gov.cn/zgrdw/npc/cwhhy/12jcwh/2013-08/27/content_1804138.htm> accessed 21 July 2019

[318] National Renewable Energy Centre, *China Renewable Energy Outlook* (in Chinese, translated by the author) (2017) <http://boostre.cnrec.org.cn/wp-content/uploads/2017/10/CREO-2017-booklet-CN-20171206.pdf> accessed 21 July 2019

Figure 4.7 Coal and renewable energy (wind and solar energy) use in China 2008-2018



Source: BP Statistical Review of World Energy 2019 and Carbon Brief analysis.

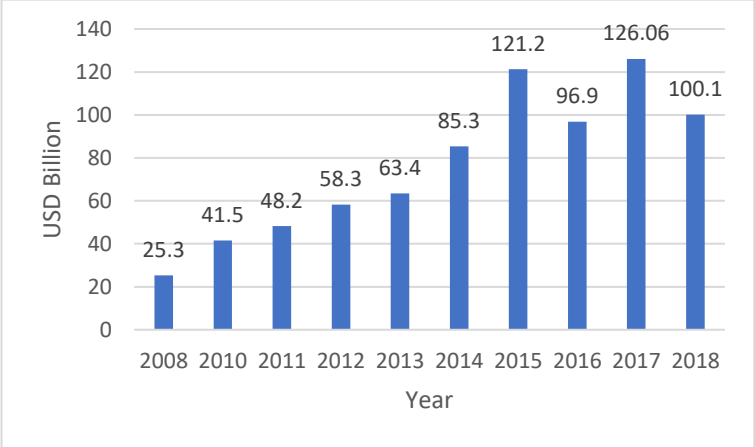
The FIT scheme and China's renewable energy investment and renewables manufacture

With the support of extensive governmental measures to promote renewable energy development, there is an unprecedented increase in renewable energy investment in China over the past few years. Among the measures, feed-in tariffs were considered as the essential to the creation of today's renewables markets.[319] **Figure 4.8** demonstrates the trend of investment in renewable energy in China between 2008 and 2018. It is worth noting that China experienced an investment plummeting of more than 20% to $96.6 billion in 2016, breaking a decade rising trend. The reasons for this fall were: the combination of lower costs per MW with the continuous development of renewable energy; a planned decrease of the FIT rates; a reduced growth in electricity demand

[319] IRENA, *Renewable Energy and Jobs: Annual Review* (2019) <https://www.irena.org/publications/2019/Jun/Renewable-Energy-and-Jobs-Annual-Review-2019> accessed 21 July 2019

and rather high level of renewables curtailment in 2016.[320] China's renewable energy investment in 2017 accounted for $126.06 billion, its highest figure ever and no less than 45% of the global total ($279.8 billion).[321] With renewable energy technology continuous maturation, the accumulative installation capacity growth and the FIT levels reduction, the investment in renewable energy inevitably decreased, as the trend of investment in 2018 shown in **Figure 4.8**.

Figure 4.8 Trend of investment in renewable energy in China 2008-2018



Source: Frankfurt School-UNEP Centre/BNEF 2018, *Global Trends in Renewable Energy Investment (2018)*[322]

The continuous increasing renewables markets have created huge demand for renewable technologies and products, especially the demand for wind and solar equipment from domestic and international markets. With the support of governmental incentives, including policy instruments and subsidies, and renewable investment from the public bodies and private entities, a large number of renewables technology institutes and manufacturing companies have been set up in China. The typical examples are happening in east and southeast of China.

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[320] Frankfurt School-UNEP Centre/BNEF 2017, *Global Trends in Renewable Energy Investment* (2017) <https://www.greengrowthknowledge.org/sites/default/files/downloads/resource/Global%20Trends%20in%20Renewable%20Energy%20Investment%202017_0.pdf> accessed 21 July 2019

[321] Frankfurt School-UNEP Centre/BNEF 2018, *Global Trends in Renewable Energy Investment* (2018) <https://www.greengrowthknowledge.org/sites/default/files/downloads/resource/Global_Trends_in_Renewable_Energy_Investment_Report_2018.pdf> accessed 21 July 2019

[322] ibid

Take solar firms and their supply chains in Yangtze River Delta for example. The area belongs to wind energy category region IV and solar energy category region III with higher FIT rates than other regions. Provincial and municipal governments also provide their own incentives, such as power price subsidies, tax rebates and preferential land use for renewable energy projects.[323] In addition, extensive industrial infrastructure and presence of suppliers from sectors such as the glass industry enables firms to purchase primary and intermediate inputs inexpensively play significant role in promoting renewables industries integration in this area. [324] Renewables manufacturing clustering in the Yangtze River Delta greatly meets the demands of China's rapidly growing renewable markets. China has been in the leading position of global solar technology production for ten years in a row by 2018, it is also the largest exporter in the field of solar PV.[325] Among the global top ten manufacturers of solar technology products, seven companies are based in China. Jinko Solar maintained the world top one in 2018, followed by JA Solar, Trina Solar and LONGi Solar.[326] Despite the regular reductions of FIT rates and the falling demands for renewables equipment in China due to its long-period development of renewables industry, some Chinese renewable technology firms still further increased their production capacity in 2018 by making significant investments.[327] These firms have also announced the development plans to further expand their manufacturing scales, aiming at continuously lowering

[323] Reuters, 'China's Incentives for Renewable or Clean Energy' (2010) <https://www.reuters.com/article/us-china-energy-clean/factbox-chinas-incentives-for-renewable-or-clean-energy-idUSTRE67Q0YV20100827> accessed 21 July 2019

[324] Jiantian Zhao, 'China's Renewable Energy Industry Flocking in Yangtze River Delta' *IN-EN.com* (2007) <http://mnewenergy.in-en.com/html/newenergy-99277.shtml> accessed 21 July 2019

[325] Paula Mints, 'The Solar Pricing Struggle' *Renewable Energy World* (2013) <https://www.renewableenergyworld.com/2013/08/28/the-solar-pricing-struggle/#gref> accessed 22 July 2019

[326] Finlay Colville, 'Top 10 Solar Module Suppliers in 2018' *PV Tech* (2019) <https://www.pv-tech.org/editors-blog/top-10-solarmodule-suppliers-in-2018> accessed 22 July 2019

[327]Christian Roselund, 'Solar Money Is All Flowing Downstream – in the West at Least" *PV Magazine* (2019) <https://www.pv-magazine.com/2019/01/09/solar-money-is-all-flowing-downstream-inthe-west-at-least/> accessed 22 July 2019

the cost of production by virtue of current advanced renewable technologies.[328] It is notable that, in the policy shift from the FIT scheme to competitive auction scheme for new wind and solar energy capacity – an approach increasingly favoured by governments around the world as it leads to lower costs in promoting renewables industry, renewable energy investments saw a 39% drop in the first half of 2019 in China, still the biggest market for renewable energy investment in the world.[329]

In order to conclude the FIT impacts on economic development, we put relevant information into an indicator table. In the following indicator table, we attempt to analyse the economic impacts of the FIT scheme from four aspects: 1) increasing renewable energy electricity generation, 2) improving China's energy structure, 3) stabilising energy security, and 4) increasing renewables investments. Promoting renewables industry and increasing renewables electricity generation are the primary targets of the FIT scheme in China.[330] Given that Chinese economic development heavily relies on energy consumption, improved energy mix and energy security will have direct effects on China's sustainable development. As for investments in renewables industry, it will play great role in boosting renewables industry, such as R&D of renewable technologies, renewables manufacturing, renewable energy project installation and maintenance. Regarding the assessment outcomes – valid or invalid – in the perspective of economic impacts, we do our best to collect as much information as possible and, based on the relevant information, give judgements on the related questions at issue by using the qualitative analysis method. To be honest, given no solid background on economics, these judgements provided in the table may not as precise as economists do in economics research. In the comment column is the summarised evidences for the judgements.

[328] Vincent Shaw, 'Risen to Build 5 GW Module Line in Zhejiang Province, China' *PV Magazine* (2018) <https://www.pv-magazine.com/2018/07/12/risen-to-build-5-gw-module-line-in-zhejiang-province-china/> accessed 22 July 2019

[329] Dominic Dudley, 'Global Renewable Energy Investment Falls In Wake Of Chinese Policy Shift', (2019) <https://www.forbes.com/sites/dominicdudley/2019/07/10/renewable-energy-investment-falls/#4c43a7294fb7> accessed 22 July 2019

[330] China Renewable Energy Law 2009

Table 4.3 Effectiveness indicators from economic perspectives

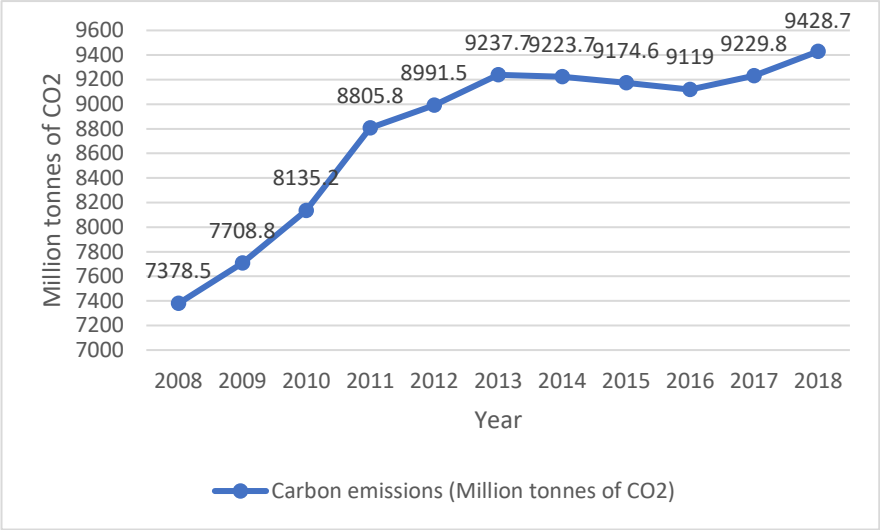
	Objectives	Questions	Invalid	Valid			Comments
				Low	Medium	High	
1	Increasing renewable electricity generation	Whether the measure has increased renewable energy electricity generation?				1	Based on the analysis above, under regulation of the FIT scheme, renewable power installation capacity and generation have seen increase, even though the curtailment issues still exist.
2	Improving energy structure	Whether the FIT scheme has increase the proportion of renewable electricity in the total power consumption in China?			1		With renewable energy and renewable power growth, China's traditional energy structure which dominated by coal and other fossil energy has been improved, even though coal energy still accounts for large share in total power generation and consumption.
3	Maintaining energy security	Has the situation of energy security changed in China with the enforcement of the FIT scheme for renewable energy?		1			The implementation of the FIT scheme has, to some extent, effectively increased renewable energy production and been improving traditional energy structure. However, with serious curtailment issues in renewable industry and lack of highspeed smart grids for power transmission from north and northwest of China to economic advanced areas in east and southeast of China, China still greatly relies on coal and other fossil energy in its super large scale economy activities. Energy security is still very acute in current China.
4	Increasing the investment in renewable industry	Has the investment in renewable energy industry increased with the support of the FIT scheme?				1	The FIT scheme for renewable energy can directly attract investment flows to renewable industry with the aim to gain more benefits from this emerging industry. The extensive renewables projects and its downstream value chains in China have illustrated this.

Indicators of effectiveness Invalid: 0, Valid: 1 (Low, Medium and High)

4.4.2 Environmental perspective: carbon emissions reduction

The FIT scheme may not directly contribute to carbon emissions reduction, but can achieve it through promoting renewables industry and increasing the share of renewable energy in primary energy consumption. Following the analysis above of the impacts of FIT scheme over the growth of renewable energy generation capacity and the increase of renewable energy share in the energy consumption, the following section will discuss the indirect contribution of the FIT scheme to China's carbon emissions reduction.

Figure 4.8 China's energy-related carbon emissions 2008-2018[331]



Source: BP Statistical Review of World Energy 2019

As shown in **Figure 4.8**, after a long phase of rapid growth, China's CO^2 emissions fell from 2013 to 2016 for the first time, but the trend changed after 2016, with an increase by approximately 3% in 2018, the largest rise since 2013.[332] Long-termed

[331] BP, 'Statistical Review of World Energy' (2019) <https://www.bp.com/content/dam/bp/business-sites/en/global/corporate/pdfs/energy-economics/statistical-review/bp-stats-review-2019-co2-emissions.pdf> accessed 22 July 2019

[332] Lauri Myllyvirta, 'China's CO2 Emissions Surged in 2018 Despite Clean Energy Gains' (2019) <https://unearthed.greenpeace.org/2019/02/28/china-coal-renewable-energy-2018-data-trends/> accessed 22 July 2019

huge reliance on fossil-fuel energy in China's growth has caused large scale and continuous increase of carbon emissions, which directly causes China to be the largest emitter of global energy-related CO^2 emissions, accounting for about 28% of the world total in 2017.[333] The decrease of carbon emissions in China during the period of 2013 and 2016 is due to China's comprehensive climate policies, including a shift away from coal intensive industries as a driver for economic development, carbon emissions trading scheme, promoting power generation from renewable energy and other policies and technologies for carbon capture and storage. Among all these measures, the contribution of renewable energy deployment should be highlighted here. Based on a report from International Renewable Energy Agency (IRENA), without the increase of renewable power generation, international total emissions from the power sector only would have been about 20% higher.[334] With the support of the FIT scheme for renewables deployment in China, the growth of renewable electricity generation increases rapidly and has reduced the share of conventional energy consumed in economy activities. In 2015, China reduced fossil-fuel power generation by 3% while total power demand increased 0.5%, by adding 30 GW of wind power and 17 GW of solar capacity.[335] China's energy sector is changing rapidly and China is making significant efforts to move to an efficient and low carbon society.

With current policies, China is on track to meet or exceed its 2030 Nationally Determined Contribution (NDC) under the Paris Agreement. In 2017, China's carbon intensity was 46% lower than that in 2005, fulfilling China's goal to cut carbon emissions by 40% to 45% by 2020.[336] It means that the rapid growth of carbon

[333] IEA, *World Energy Outlook* (2017) <https://0-www-oecd--ilibrary-org.pugwash.lib.warwick.ac.uk/docserver/weo-2017-en.pdf?expires=1565557196&id=id&accname=ocid195745&checksum=E953D1EDA18A1BECFD84502BE581860B> accessed 22 July 2019

[334] World Bank, 'World Development Indicators' (2015) <www.tsp-data-portal.org/Historical-Electricity-Generation-Statistics#tspQvChart> accessed 22 July 2019

[335] Lauri Myllyvirta and Greenpeace Energydesk, 'China's Renewables Drive Down CO_2 Emissions' (2016) <https://theecologist.org/2016/jan/21/chinas-renewables-drive-down-co2-emissions> accessed 22 July 2019

[336] Ministry of Ecology and Environment of China, *Report on China's Policies and Actions to Address Climate Change* (in Chinese, translated by the author) (2018) <http://qhs.mee.gov.cn/zcfg/201811/P020181129539211385741.pdf> accessed 22 July 2019

emissions has been initially reversed in China. However, in China's scenario, the proportion of renewable power is still quite small in total energy consumption comparing with fossil-fuel energy, and the coal-fired power still dominates China's energy market. Moreover, the curtailment, which is due to a shortage of transmission capacity to connect projects in remote regions to end users, is still very common even though the government has taken measures, such as the system of guaranteeing the purchasing in full amount[337], to sort out the problems. All these have weakened the function of the FIT scheme on carbon emissions reduction in China.

In order to conclude environmental impacts of the FIT scheme, an indicator table is placed below with indicative questions: whether the FIT scheme has impacts on reducing China's carbon emissions and whether the scheme has helped China to achieve its emission targets in its NDC. The impacts of the FIT scheme on emissions reduction are indirect, which can be reflected by the contribution of the FIT scheme to the increase of renewable energy in total energy consumption and less emissions accordingly. [338] Regarding the assessment outcomes – valid or invalid – in the perspective of environmental impacts, we may not argue that the FIT scheme has a direct causality with carbon emissions, as the initial purpose of the FIT scheme is to promote the deployment of renewable energy. We can only say that, with renewable energy growth under the support of the FIT, China's emissions trend has slowed down. The comment column shows the summarised evidences for the judgements.

[337] NDRC, *Administration Methods to Guarantee the Purchase of Electricity Generation from Renewable Energy Resources in Full Amount* (in Chinese, translated by the author) (2016) <http://www.ndrc.gov.cn/gzdt/201603/t20160328_796494.html> accessed 22 July 2019

[338] Tom Moerenhout, Tilmann Liebert and Christopher Beaton, 'Assessing the Cost-Effectiveness of Renewable Energy Deployment Subsidies: Onshore Wind Power in Germany and China' (2012) <https://www.iisd.org/library/assessing-cost-effectiveness-renewable-energy-deployment-subsidies-onshore-wind-power> accessed 26 August 2019

Table 4.4 Effectiveness indicators from environmental perspectives

	Objectives	Invalid	Valid			Comments
			Low	Medium	High	
1	To reduce energy-related carbon emissions			1		In contrast to fossil fuel energy, most renewable energy sources produce little or no carbon emissions. Even if taking its "life cycle" emissions into consideration – that is the emissions from manufacturing, installation, operation and decommissioning – renewable energy still produces minimal carbon emissions.[339] With the support of extensive measures for deploying renewable power generation, including the FIT scheme, China has achieved great progress in promoting renewable power generation, particularly in wind and solar energy sectors. In current scenario of economic development, the need for energy is relatively settled in a certain period. When the share of renewable power rises in total power consumption, the power generated from fossil-fuel energy will reduce accordingly. From this perspective, the FIT scheme for renewable energy can play very important role in reducing carbon emissions. However, in China's scenario, the curtailment issues of renewable energy are still very common even though the government has taken measures, like the system of guaranteeing the purchasing in full amount, to sort out the problems. All these have weakened the function of the FIT scheme on carbon emissions reduction in China.
2	To contribute to achieving China's commitment on mitigating global climate change		1			As fossil-fuel energy, especially coal energy, still dominates China's energy industry and the proportion of renewable energy is quite small in China's energy structure, when the government takes very stringent measures, like a shift away from fossil-fuel energy intensive industries to technology intensive industries, carbon emissions do reduce accordingly. However, when fossil-fuel energy demand rises in China's energy market, carbon emissions will rebound. Basically, China's CO2 emissions are still on track to peak and it is challenging to achieve its commitment in Paris Agreement about peaking China's carbon emissions by 2030. In order to achieve the targets, China still needs to take more stringent policies and effective measures to increase the share of low-carbon energy and, meanwhile, to promote energy efficiency to reduce carbon emissions.

Indicators of effectiveness Invalid: 0 Valid: 1 (Low, Medium and High)

[339] Intergovernmental Panel on Climate Change (IPCC), *IPCC Special Report on Renewable Energy Sources and Climate Change Mitigation* (Cambridge University Press, 2011)

4.4.3 Social effectiveness: job creation, energy access and income increase in Targeted Poverty Alleviation Projects (TPAPs)

The FIT schemes for renewable energy can indirectly contribute to the increase of job opportunities through promoting renewables industry. They can also contribute to the expansion of energy access by supporting distributed renewables projects, and to the increase of incomes for the local in remote areas of China. The following sections will analyse social impacts of the FIT scheme in China from the following aspects: job creation, energy access improvement and income enhancement for local people.

The FIT scheme and the job creation

Compared with mechanised and capital intensive fossil fuel industries, the renewable energy industry is considered to be a more labour intensive sector, which means that, to some extent, more jobs are created for each unit of electricity generated from renewable sources than that from fossil fuels.[340] As an indispensable governmental measure for supporting the expansion and maturation of renewable energy industry, the FIT scheme retains strong impacts on employment prospects.[341] To be specific, with the support of policy instruments and fiscal incentives, especially the continuously adjusted and improved FIT schemes, an increasingly expanded domestic installation market has formed in China. The domestic renewable energy market is very important for generating employment opportunities in the renewables sector and its downstream segments of the supply chain. As massive investments flowing into China's renewables industry, deeper domestic supply chains have been set up and are serving as regional or global manufacturing hubs.[342] By all these means, the extensive development of renewable industry has provided numerous employment opportunities

[340] Union of Concerned Scientists, 'Benefits of Renewable Energy Use' (2017) <https://www.ucsusa.org/clean-energy/renewable-energy/public-benefits-of-renewable-power> accessed 16 August 2019

[341] IRENA, *Renewable Energy and Jobs: Annual Review* (2019) <https://www.irena.org/-/media/Files/IRENA/Agency/Publication/2019/Jun/IRENA_RE_Jobs_2019-report.pdf> accessed 16 August 2019

[342] ibid

in China and has made China the world leader in renewable energy employment for several years.[343] China remains the leader in 2018 with 4.1 million jobs created in renewable energy employment worldwide, accounting for 39% of the world's total.[344] As policy changes, such as more competitive bidding processes and subsidy reductions, the pace of new installations has slowed down over the past two years, which in part discourages some companies from additional investment and hiring.[345] Moreover, the strong growth in the offshore wind segment[346] over the past few years has not fully translated into more domestic jobs as in solar PV sector, given that imported components play a greater role in offshore projects.[347] Even so, small reductions in market volume of renewables, partly due to the FITs decrease and the continuous maturation of renewables industry, are not assumed to cause serious job losses.[348] Improvement in the product mix and greater efforts to integrate high technology into buildings have actually provided additional job opportunities that offset volume reductions.[349]

The foregoing discussion shows that the FIT scheme has an indirect impact on employment in renewable industry by affecting on investment flows, manufacturing construction and project management activities. It can be argued that a suitable FIT level will be helpful to promote renewable industry. The industry and its downstream value chains will then provide job opportunities.

The FIT scheme and the expansion of renewable energy access

The relationship between the FIT scheme and renewable energy access expansion will be analysed in this section. The relationship will be reflected by the impacts of the FIT

[343] ibid

[344] ibid

[345] ibid

[346] REN21, *Renewables 2019 Global Status Report* (2019) <https://www.ren21.net/wp-content/uploads/2019/05/gsr_2019_full_report_en.pdf> accessed 16 August 2019

[347] ibid

[348] ibid

[349] ibid

scheme on the distributed renewables projects in China. Distributed renewable energy technologies, with access voltage below 35 kilovolts, allow renewable energy to be used at source for consumption or grid stabilization.[350] By reducing the need to transport renewable energy across vast distances between the local point of production and the places of demand, distributed projects have the advantage of reducing electricity loss in the process of transmission, and concomitantly help lower the electricity price and benefit the end users.[351]

Distributed renewables projects can be categorised into industrial and household projects, based on different targeted end-users. The government offers different supports to industrial and household distributed renewables projects. To be specific, industrial distributed projects is priced according the categorised FIT levels of the resources regions where the projects are located, while household distributed renewables projects are supported by the government with fixed subsidies. In addition, since China's grid capacity is limited, renewables installation capacities are not efficiently used and often face curtailment. With advantages of not heavily relying on distant grids, distributed renewable energy has the great potential to further improve China's energy access and energy mix.[352]

While China has worked on developing distributed solar PV for more than a decade, it has been deploying distributed wind energy systems only since 2017 in Jiangyin, Jiangsu Province.[353] In terms of the distributed solar PV sector, it is growing remarkably faster than large-scale solar power stations, generating 13.7 terawatt-hours in 2017 which is enough to power all the households in Beijing for about eight months.

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[350] Shiyu Liu and others, 'Policy Implication on Distributed Generation PV Trading in China' (2019) 159 Energy Procedia 436 <https://www.sciencedirect.com/science/article/pii/S1876610218313389> accessed 16 August 2019

[351] The World Bank, 'China to Scale Up Distributed Renewables with GEF Support' (2019) <https://www.worldbank.org/en/news/press-release/2019/05/03/china-to-scale-up-distributed-renewables-with-gef-support> accessed 16 August 2019

[352] ibid

[353] China Energy Storage Net, *White Paper for China Distributed Wind Energy System* (in Chinese, translated by the author) (2019) <http://www.escn.com.cn/news/show-704270.html> accessed 16 August 2019

Its accumulated installed capacity accounts for 27.1% of China's total solar PV installation.[354] About half of distributed solar PV installations have been placed in the eastern and southern regions of China, such as Zhejiang, Shandong, Jiangsu and Anhui provinces, where the FIT levels are the highest, economy most prosperous and demands for power greatest.[355] Considering the fact that in China electricity rates for industry and commerce are much higher than those for households, commercial and industrial distributed solar PV projects can not only alleviate the shortage of the energy access, but can also considerably reduce the energy cost for the industries.[356]

The FIT scheme and the increase of rural residents' incomes

The impacts of the FIT scheme on rural residents' incomes in China are mainly reflected by the construction and operation of the village-level, household distributed solar PV projects (namely solar PV poverty alleviation projects), given that deploying renewable energy has become a new source of economic growth and local residents' income increase. With imbalanced economic developments among different regions, especially the gap between rural and urban areas, China's estimate of impoverished population was 55.75 million in 2015, but the number has been reduced to 16.60 million by the end of 2018.[357] To further improve social welfare and promote fairness in income allocation, targeted poverty alleviation is a common topic for both policy makers and scholars. It is also one of the central government's enduring priorities.[358] Deploying distributed solar PV projects as a way to alleviate poverty in rural areas is a significant part of the comprehensive energy policy innovation in China.[359]

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[354] Ming Yuan and others, 'Distributed Solar PV in China: Growth and Challenges' (2018) <https://www.wri.org/blog/2018/08/distributed-solar-pv-china-growth-and-challenges> accessed 16 August 2019

[355] ibid

[356] ibid

[357] National Bureau of Statistics, 'National Population in Poverty Reduce by 13.86 Million in 2018' (in Chinese, translated by the author) (2019) <http://www.stats.gov.cn/tjsj/zxfb/201902/t20190215_1649231.html> accessed 16 August 2019

[358] Yan Li and others 'A Review of Photovoltaic Poverty Alleviation Projects in China: Current Status, Challenge and Policy Recommendations' (2018) 94 RSER 214 <https://www.sciencedirect.com/science/article/pii/S1364032118304489?via%3Dihub> accessed 16 August 2019

[359] ibid

Local residents take advantage of subsidies from local and central governments, investments from renewable energy firms and preferential loans from banks to launch and manage the projects.[360] Renewables power generated from village-level and household solar PV projects gets access to local or national grid, partially or in-full amount, so that villagers and household projects owners get benefits according to the local FIT rates respectively.[361] The deployment of distributed solar PV in rural areas has also encouraged local residents to use more renewable energy rather than coal or wood firing for cooking and heating. This change in the habits of utilising energy brings an additional benefit of environmental protection in rural areas, and thereby improves residents' wellbeing. Meanwhile, however, it should be recognised that some barriers, such as the lack of grids that can incorporate renewables power and the lack of stable house rooves for equipment to be installed on, still exist in the process of construction, management and maintenance. These barriers have, to some extent, limited the contribution of these projects to the alleviation of rural residents' poverty.

To conclude the social impacts of the FIT scheme, a table with indicative questions on social impacts is placed below. The social impacts of the FIT scheme can be analysed from the aspects of job creation, easy access to renewable energy and the increase of local people's incomes. While job creation is considered in some literatures to be a kind of economic impact,[362] in this thesis, it is classified into social benefits. The benefits of expanding access to renewable energy and increasing local people's incomes are mainly reflected by the deployment of distributed solar PV. In regard of the assessment outcomes – valid or invalid – in the perspective of social impacts, judgements are made by considering the development of renewable energy industry, including the growth of renewables manufacturing and renewable energy projects, and the employment opportunities created by them. The assessment of whether the FIT

[360] Sirui Cao and Ying Li, *Case Review and Research Recommendation on the Combination of New Energy and Poverty Alleviation: Taking the Solar PV Poverty Alleviation Projects for Examples* (2016) <http://www.geichina.org/_upload/file/report/Solar_Energy_Poverty_Alleviation_CH.pdf> accessed 16 August 2019

[361] Li and others (n 358)

[362] Moerenhout, Liebert and Beaton (n 338)

scheme is valid or invalid is processed with qualitative analysis method, and evidences are succinctly given in the comment column.

Table 4.5 Effectiveness indicators from social perspectives

	Objectives	Questions	Invalid	Valid			Comments
				Low	Medium	High	
1	Increasing employment opportunities	Is the FIT Scheme effective in creating jobs in renewables industry?				1	Renewable energy industry is considered to be a more labour intensive sector than the conventional energy sector. With the support of the FIT scheme, renewables industry has experienced rapid growth and has provided huge job opportunities in China.
2	Expanding energy access	Can the FIT scheme contribute to expanding energy access?				1	With the support of FITs, China has achieved great progress in developing distributed solar PV projects. Thanks to this, the energy shortage faced by industrial activities in relatively prosperous regions is, to a large extent, mitigated and the production cost correspondingly lowered.
3	Increasing the incomes of rural residents	Can the FIT scheme contribute to increasing rural residents' incomes?			1		Rural residents benefit from the on-grid distributed solar PV projects in rural areas, for the FIT rates applied locally. Their incomes are to some extent increased and wellbeing improved. However, since deploying renewable energy in rural areas is merely one part of China's comprehensive innovation for alleviating poverty and now there are still some barriers for fully developing these projects, the contribution so far is relatively limited. More work needs be done to improve the poverty-stricken condition in rural areas, particularly in remote rural areas.

Indicators of effectiveness Invalid: 0 Valid: 1 (Low, Medium and High)

4.4.4 The cost-effectiveness of Chinese FIT

The foregoing discussion has elaborated the economic, environmental and social impacts of the FITs on renewables development. This section will do a brief cost-

effectiveness assessment of the FIT scheme for promoting China's renewable development. Cost-effectiveness of the FIT scheme refers to 'the achievement of set targets at the lowest costs possible'.[363] The FIT scheme potentially bears a high risk of an excessive increase in support costs. This is because when FITs are offered without a quantitative target for a specific renewable technology, new installations may be excessively expanded. This would result in an unnecessary increase of the costs of support, hence impairs cost-effectiveness. Based on this, to ensure the cost-effectiveness of FIT schemes, mechanisms for cost and volume control need to be established. This could also give energy investors a clearer view of the development trends of renewable energy industry.[364] Assessing the cost-effectiveness of a policy basically begins with estimating the costs, and then moves on to the analysis from the following two perspectives: 1) in an absolute sense – whether other policies are more effective at the same cost, and 2) in a relative sense – whether the scheme is designed in one way that makes it more effective than the other.[365]

Considering the limited knowledge of economics and the great difficulties in dealing with relevant data, this section does not provide an in-depth investigation of the cost-effectiveness of China's FIT scheme for renewable energy. What this section focuses on is a brief discussion of whether China's FIT scheme is cost-effective in promoting renewables industry, and this will be done by examining the surcharge collection and distribution, as well as the curtailment rates of wind and solar energy.

Based on the foregoing analysis, the FIT scheme implementation in wind and solar sectors has great effects on economic development, environmental protection and social wellbeing. To be specific, the FIT scheme has stimulated a large scale of investments flowing into renewables industry, which then bring rapid growth in wind

[363] Climate Policy Information Hub, 'Cost-Effectiveness of EU Renewable Energy Support Systems' <https://climatepolicyinfohub.eu/cost-effectiveness-eu-renewable-energy-support-systems> accessed 20 August 2019

[364] Anne Held and Malte Gephart, *Design Features of Support Schemes for Renewable Electricity*, (Ecofys, 2014) <https://ec.europa.eu/energy/sites/ener/files/documents/2014_design_features_of_support_schemes.pdf> accessed 20 August 2019

[365] Moerenhout, Liebert and Beaton (n 338)

and solar generation capacity and the development of downstream supply chains for renewables industry. By virtue of the promotion in deploying renewables industry and the growth of wind and solar power generation, diversification of the energy mix in China is experiencing optimisation. The increasingly diversified energy mix enables and drives continuous improvement in China's energy structure and energy security. Apart from the progress mentioned above, two changes happening behind the progress should be noticed.

Firstly, the FIT rates for wind energy and solar energy in different energy resource regions keep decreasing recently in response to technology advances and cost reductions. However, in order to continuously back up distributed renewables projects and the projects in some remote areas, such as the projects in Tibet, the FIT rates for these projects are not adjusted as regularly as the rates for wind and solar farms in categorised resource regions.[366] The continuing reduction of the FIT rates can potentially prevent from or at least alleviate excessive investments into renewables deployment, hence avoid the potential chaos that might happen in the rapidly rising renewables market.[367] Meanwhile, regularly decreasing FIT rates may also have the effect of lowering the risk of overcompensation from the local and central governments.

Secondly, the surcharge in the FIT scheme has experienced an increase from 0.001 Yuan/kWh in 2006 to 0.019 Yuan/kWh in 2016, with the total amount of surcharges reaching RMB 89.7 billion (equivalent to 12.8 billion USD) theoretically.[368] These surcharges are collected in the form of electricity tariffs from the end-users and constitute, with the special funding from the government, renewable energy development funds. These funds are used for subsidising renewables industry, including paying for the extra cost in renewable power generation and renewables

[366] NDRC, *Administration Methods to Guarantee the Purchase of Electricity Generation from Renewable Energy Resources in Full Amount* (n 337)

[367] Julie Chao, 'Report Confirms Wind Technology Advancements Continue to Lower Wind Energy Prices' (2018) <https://newscenter.lbl.gov/2018/08/23/report-confirms-wind-technology-advancements-continue-to-drive-down-wind-energy-prices/> accessed 28 August 2019

[368] Ang Zhao and Jiaqiao Lin, 'How Big the Deficit of Renewable Project Development Funds Is?' *Energy News Network* (2018) <https://www.in-en.com/article/html/energy-2275486.shtml> accessed 28 August 2019

technology innovation, etc.[369] With the rapid growth of on-grid renewable power generation, the majority generated from wind and solar energy, the total amount of surcharges reached about RMB 452.7 billion (equivalent to 65 billion USD) in 2018 theoretically, but the real incomes of surcharges in 2017 was only RMB 70.55 billion, RMB 26 billion less than anticipated in the year.[370] This situation reveals a very huge gap in the Renewable Energy Development Fund, amounting to more than RMB 110 billion (equivalent to 15.8 billion USD) by the end of 2018.[371] China's support period for renewables projects is supposed to last for 20 years since their launching in 2006. This means that the deficit situation can hardly be improved until 2026 when some projects' support periods are due to expire.[372] To control and reduce the growing gap, Chinese government issued new policies to provide less or no financial support to newly installed projects in 2018. The government has also further lowered the FIT rates and have made them indicative prices to achieve the goal of grid price parity.[373]

While rapid expansion of renewable power generation capacity is happening in China under the support of the FIT scheme, as shown in the foregoing discussion, growing curtailment rates for wind and solar energy remain the most critical challenge for China's renewables industry. This challenge is particularly severe in remote areas, due to the lack of speed smart grids for long-distance power transmission and the relatively weak local demand. In 2015, about 33.9 TWh of wind energy was curtailed in China, with 15% average curtailment rate.[374] In order to solve this problem, the Chinese government has issued a guarantee system that requires grid companies to purchase

[369] Jingli Shi and others, *A Research on Renewable Power Tariffs and Subsidies Formation Mechanism Under the Framework of Power System Reformation* (in Chinese, translated by the author) (Energy Research Institute of NDRC, 2017) <http://www.efchina.org/Attachments/Report/report-cpp-20170630-zh/report-cpp-20170630-3-zh> accessed 28 August 2019

[370] Zhao and Lin (n 368)

[371] ibid

[372] ibid

[373] NDRC, *The Notice on Issues of Solar PV Power Generation in 2018* (in Chinese, translated by the author) (2018), <http://www.ndrc.gov.cn/gzdt/201806/t20180601_888639.html> accessed 28 August 2019

[374] NEA, 'The Development of Wind Energy Industry in 2015' (in Chinese, translated by the author) (2016) <http://www.nea.gov.cn/2016-02/02/c_135066586.htm> accessed 28 August 2019

on-grid renewable power generation in full amount.[375] With the implementation of this guarantee system, grid curtailment of renewable power generation was alleviated in 2018, with 27.7 TWh of wind curtailment and 7% average curtailment rate.[376] Regions where curtailment rates were higher than 8% include Xinjiang (23%, 10.7 TWh), Gansu (19%, 5.4 TWh), and Inner Mongolia (10%, 7.2 TWh). The total curtailment in these three regions amounts to 23.3 TWh, accounting for 84% of the national average curtailment rate.[377] In terms of the curtailment rate for solar energy, the rate in 2018 was 3%, declining by 2.8% compared with the rate in 2017.[378] Although the curtailment rates have been substantially reduced, there is still a long way to go before achieving the target of healthy development of renewable energy.[379] The high curtailment rate is eating up the profits that renewable project operators gain from the declined prices of technology and equipment. It also strongly limits the cost-effectiveness of the FIT scheme.[380]

To conclude, the cost-effectiveness of the FIT scheme, a table with indicative questions on costs and effects is placed below. The first question in the table is whether the FIT scheme has achieved the target of promoting renewable energy development. This question can be regarded as a conclusion of the FIT's impacts on economic development. The second question is whether the surcharge – an important part of the FIT scheme – has been made good use of in promoting renewable energy industry development. If the surcharge fails to play the role as itis supposed to do, it indicates

[375] NDRC, *The Administration Methods to Guarantee the Purchase of Electricity Generation from Renewable Energy Resources in Full Amount* (in Chinese, translated by the author) (2016) <http://www.ndrc.gov.cn/gzdt/201603/t20160328_796494.html> accessed 28 August 2019

[376] NEA, 'The Status of On-Grid Wind Power Generation' (in Chinese, translated by the author) (2019) <http://www.nea.gov.cn/2019-01/28/c_137780779.htm> accessed 28 August 2019

[377] ibid

[378] NEA, 'Summary of the Development of Renewable Energy in 2018' (in Chinese, translated by the author) (Press Conference, 2019) <http://www.nengyuanjie.net/article/23230.html> accessed 28 August 2019

[379] NEA, 'Further Reduce Renewable Energy Curtailment in 2018' (in Chinese, translated by the author) *Economics Times* (2018) <http://www.gov.cn/xinwen/2018-01/25/content_5260301.htm> accessed 28 August 2019

[380] Xiaohe Yan and others, 'Cost-Benefit Comparison of Different Techniques for Addressing Wind Curtailment' (2017) 142 Energy Procedia 1759 <https://www.sciencedirect.com/science/article/pii/S1876610217363166> accessed 28 August 2019

that the FIT scheme is not very valid in promoting the deployment of renewable energy industry. The third question is whether ordinary people truly benefit from the rapid growth of installation and generation capacity, which is about the problem of the curtailment of renewable energy in China. As for the assessment outcomes – valid or invalid – in the perspective of cost-effectiveness, judgements are still processed by using the qualitative analysis method and outcomes are provided by employing three subcategories (low, medium and high) of the valid. The evidences of the judgement are briefly given in the comment column.

Chinese FIT scheme, which is adjusted regularly in response to the development of renewable technologies and the expansion of renewables industry, plays a key role in promoting the deployment of China's renewables industry. Taking existent policy reviews as references and the qualitative analysis as method, this assessment has examined the impacts of the FIT scheme on wind and solar sectors from the perspectives of economic development, environmental protection, social wellbeing and cost-effectiveness. With the support of the FIT scheme, China has made remarkable achievements in the deployment of renewables industry, ranking among the world's top ones in renewables manufacturing and project installation capacity. The increasing expansion of the renewables industry not only reduces the amount of carbon emissions and air pollutant, but also improves China's energy mix and energy security. By funding distributed renewable projects, which attract investments and boost renewables manufacturing, the FIT scheme has an additional advantage of creating job opportunities and raising local people's incomes. In this sense, the FIT scheme has definitely contributed to boost China's renewables industry and has positive impacts on economic development, environmental protection and social benefits.

Table 4.6 Cost-effectiveness indicators of the FIT scheme

	Objectives	Questions	Invalid	Valid			Comments
				Low	Medium	High	
1	To promote renewable industry development	Whether the FIT scheme is effective in increasing the renewable power generation and in improving diversified energy mix in China?				1	With the support of the FIT scheme, China's renewable industry has experienced rapid growth in installation capacity and generation capacity. Therefore, the FIT scheme has boosted China's renewables industry and has also improved China's energy structure.
2	To make the best use of the surcharge of the FIT to promote the deployment of renewable power generation and to reduce the government's financial pressure	Whether the surcharge is collected and distributed effectively to promote the renewables industry development in China?		1			The effective collection and distribution of surcharge, an important component of the FIT scheme and also one of the main sources of the renewable energy development fund, is an important premise of China's further development of the renewables industry. However, the current situation is some deficiencies in the surcharge collection have caused a huge gap in the renewable energy development fund. The gap may not only impede the rapid development of renewables industry; It may also give more pressure to the governments' finance, given that the governments have to reduce the gap to maintain the development of the emerging industry.
3	To make full use of renewable projects to increase the share of renewable power in China's energy mix	Have the renewables projects supported by the FIT scheme been fully and efficiently used? And has the power generated been fully accessed to the grid?		1			The high curtailment rate of renewables projects reflects that the degree to which the FIT scheme promotes renewables industry and improves energy security is not ideal yet. The implementation of the FIT scheme does increase renewables power installation capacity and generation capacity. However, very high curtailment rate of renewables projects happens in China, particularly in remote areas, such as Xinjiang, Gansu and Inner Mongolia, due to the lack of long-distance grid for power transmission and low power demand in remote areas. The serious curtailment issue has to a large extent reduced the cost-effectiveness of the FIT scheme.

Indicators of effectiveness Invalid: 0 Valid: 1 (Low, Medium and High)

With all these achievements of implementing the FIT scheme (and its complementary policies) recognised, it is also worth noting that the FIT is a price-oriented fiscal incentive. It mainly makes use of a relatively fixed price and fixed contract period (normally 20 years) to promote renewables industry. However, the relative stability of the price and the fixed term of protection have a side effect of resulting in excessive installations. The contradiction between excessive power generation and the lack of grids for long-distance power transmission then incurs renewables curtailment in practice, and the consequence is an increase of the governments' financial burden. This side effect has, to some extent, undermined the effectiveness of China's FIT scheme in promoting the sustainable development of renewables industry, due to its damage to the effective utilisation of renewable energy and the reasonable distribution of public finance. A feasible way to avoid this problem is to review and update the FIT scheme regularly, to make it adaptable to the new conditions of and changes in the renewables industry.

Apart from the effectiveness, the legality of China's FIT scheme should also be assessed to give a clear view of whether this fiscal incentive is compatible with WTO rules, so that the potential risk of international trade conflicts could be reduced. The following section will do a legality assessment of China's FIT scheme under the context of WTO law.

4.5 The WTO Legality of the Chinese FIT Scheme

This section will firstly, discuss the relation between feed-in tariff schemes and subsidies in WTO law system, the second part will analyse the WTO subsidy cases like *Canada – Renewable Energy/Canada – FIT*[381], etc. to identify the benchmarks for

[381] World Trade Organization, *Canada – Certain Measures Affecting the Renewable Energy Generation Sector / Canada – Measures Relating to the Feed-in Tariff Program (WT/DS412, WT/DS426): Reports of the Appellate Body*, Dispute Settlement Reports 2013, vol 1 (Cambridge University Press 2015). *Canada – Certain Measures Affecting the Renewable Energy Generation Sector and Canada – Measures Relating to the Feed-In Tariff Program* (Complaints by the European Union and Japan) (2013), WTO Doc WT/DS412, 426/AB/R (Appellate Body Report), online: WTO <docsonline.wto.org> [*Canada – FIT ABR*]. *Canada – Certain Measures Affecting the Renewable Energy Generation Sector and Canada – Measures Relating to the Feed-in Tariff Program* (Complaints by the European Union and Japan) (2012), WTO Doc WT/DS416, 426/R at para 1.1 (Panel Report), online: WTO <docsonline.wto.org> [*Canada – FIT Panel*].

assessing the legality of certain FITs in the context of WTO law. The third part will focus on the assessment of the legality (legal status in the WTO legal context) of Chinese and the EU's FITs using the benchmarks concluded in the second part. The last part concludes.

4.5.1 The FIT scheme and the WTO subsidy rules

Feed-in tariffs (FITs) are commonly defined as state-backed fiscal incentives to invest in the projects of power generation from renewable sources.[382] FITs provide a guaranteed payment for the full output of the renewable electricity (RE) system for a contract period, usually ranging from ten to twenty-five years. As one of the important support instruments for renewable energy deployment, the FIT programme offers 'incentive(s) that benefit private producers and subsidise the production of energy while tackling one or more market failures.'[383] The FIT rates are normally differentiated based on the technology type, the project size, the locality of the resource and some other specific parameters of the project. In terms of the design of FITs, while almost all FIT systems follow a similar underlying idea of accelerating investment in renewable energy technologies, their design and implementation may have substantial differences.[384] In countries where the electricity sector is state-owned or state regulated via state-owned enterprises, FIT schemes are public matters. Their design and implementation are largely decided by the relevant public regulatory institutions, such as China's NDRC, which means that the fixed price is determined by the legal form. In other nations, the government may require grid operators to purchase renewable energy at a minimum price. Occasionally, some countries incorporate local content requirements (LCRs) in the FITs design in order to hopefully boost local economy and sort out social problems. For example, in the case *Canada – Renewable Energy/Canada – FIT*, a local content requirement was included in the FIT scheme by the government. It stipulated that 'only renewable energy installations using a certain

[382] Béatrice Cointe and Alain Nadaï, *Feed-in tariffs in the European Union: Renewable Energy Policy, the Internal Electricity Market and Economic Expertise* (Springer International Publishing, 2018) 15

[383] Rubini, 'The Wide and the Narrow Gate' (n 13)

[384] Marie Wilke, *Feed-In Tariffs for Energy and WTO Subsidy Rules: An Initial Assessment*, (Issue Paper, 2011) ICTSD 17

proportion of equipment produced locally' were eligible to participate in the FIT program.[385] As noted above, that was the main trade irritant and the element which led to the WTO dispute.

In the Chinese context, the FIT scheme adopts fixed price mechanism, which aims at guaranteeing that electricity generators can sell their electricity generated from renewable energy to grid companies at a fixed price and thereby make a profit to keep operating. China's *Renewable Energy Law* (2009) further clarifies the FIT scheme from the following three aspects: the mechanism for pricing and purchasing, market share, and the grid connection of renewable-generated electricity.[386]

As for the subsidy, it is a significant measure adopted by the government to support emerging industries which need much more incentives to compete with traditional industries.[387] Specific to the energy industry, the emerging renewable energy sector has been facing very strong competition from the conventional energy sector, therefore subsidies are playing a very important role in promoting the deployment of renewables industry in the competitive energy market. One important distinction to bear is between energy production and technology production. While support to the former does not generally attract disputes in itself (for the simple reason there is not much international trade in green energy), the scenario is completely different for green technology. It is here that most of the trade remedies action domestically and WTO litigation has focused on.

Under WTO legal system, there are some agreements and provisions concerning subsidies. Among these, the one that may be most relevant to the regulation of FITs is the SCM Agreement which focuses on dealing with subsidies in goods trade activities. Rubini distinguishes the various types of green subsidies in various categories (which

[385] Mark Wu and James Salzman, 'The Next Generation of Trade and Environment Conflicts: The Rise of Green Industrial Policy' (2014) 108 Nw. U. L. Rev. 401 <https://scholarlycommons.law.northwestern.edu/nulr/vol108/iss2/1> accessed 29 June 2019

[386] Renewable Energy Law 2009

[387] Luca Rubini, *The Definition of Subsidy and State Aid: WTO and EC Law in Comparative Perspective* (OUP Oxford, 2009) 20

may then affect their legal categorisation): green technology subsidies, green energy subsidies, green electricity subsidies, subsidy to support transmission, distribution (i.e. the grid) or storage and subsidy for energy consumption. [388] Following this categorisation, the FIT scheme in question in this research should be categorised as green electricity subsidy, while any ancillary requirement in support of local technology should be categorised as green technology subsidy.

The case law: Canada – Renewable Energy/FIT Program (2013)

Canada – Renewable Energy/Canada – FIT is the first and most prominent FIT scheme that has ever been challenged before the WTO dispute settlement bodies.[389] The key facts and legal issues – and also the legal significance of the case – have been already outlined above at pages 41 and 44. For its importance, we will now briefly take the reader back to those factual and legal issues and build on them. This will pave the way to the analysis of the Chinese FIT schemes.

Let's start with few facts. It should be recalled that the measure at issue in the case was a FIT programme which included a local content requirement enacted by the Province of Ontario. Although the official defendant in this case is Canada, the scofflaw is the provincial government of Ontario. That subnational government enacted a law in 2009 to incentivise the production of electricity from wind or solar generators that included a scheme to source a minimum level of the component parts and services from producers within Ontario. The government-owned Ontario Power Generation was the major supplier of electricity generation. The sub-state-owned enterprise Hydro One was the largest distribution utility in the province and almost completely owned the high-voltage transmission system. The grid was managed by the so-called Independent Electricity System Operator, another agency of Ontario's government. The legacy of

[388] Luca Rubini, 'ASCM Disciplines and Recent WTO Case Law Developments: What Space for "Green" Subsidies?' in Thomas Cottier and Ilaria Espa (eds), *International Trade in Sustainable Electricity: Regulatory Challenges in International Economic Law* (Cambridge University Press, 2017) 312

[389] Henok Birhanu Asmelash, 'The Trade and Environment Debate on the Regulation of Energy Subsidies in the WTO: What Kept Fossil Fuel Subsidies Off the Radar Screen?' in Klaus Mathis and Bruce Huber (eds), *Energy Law and Economics* (Springer, 2018)

regulatory interventions includes long-time public ownership, long-time electricity price freeze,[390] strict regulatory management by the governmental Ontario Power Authority, and a decision taken in 2007 to phase out all coal-fired generation in the province by 2014. Note that in 2010, Ontario's installed capacity shares by source, in rank order from highest to lowest, were nuclear, hydropower, gas and oil, coal, and wind; other technologies had minute shares.[391] Seeking to replace the capacity being lost by the coal phase-out with cleaner options, the Ontario government sought to incentivise greater production of wind and solar energy,[392] choosing the widely used instrument of a feed-in tariff (FIT). A FIT is a long-term contract by a government agency to secure wholesale electricity at a set price that reflects a rate of return attractive to investors and developers. The incentive occurs because the price in the contract is generally above the wholesale price of power in the region (otherwise, there would be no incentive).

Ontario had early success with renewable energy procurement, both through competitive bidding and the Renewable Energy Standard Offer Program (RESOP), a type of FIT program that began in 2006 for small-scale (<10 MW) sources and reached its ten-year target of 1,000 MW in just over one year.[393] With the Green Energy and Green Economy Act of 2009, the RESOP was replaced with a new FIT program that was wider in scope, required made-in-Ontario components, and provided renewable energy generators with significantly more attractive contract prices, adding about $4.4 billion in costs over the 20-year contract terms as compared with the previous terms.[394] Rapid oversubscription to the new contracts, for which caps were not set, has led to Ontario exporting power at a loss.[395]

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[390] *Canada – FIT Panel*, (n 381) para. 7.284

[391] *Canada – FIT ABR*, (n 381) para 4.10 Table 2

[392] Note: Only wind and solar energy are subject to the domestic content requirements in the case of *Canada–Renewable Energy/Canada–Feed-in Tariff Program.*

[393] Auditor General of Ontario (2011), 'Electricity Sector – Renewable Energy Initiatives', 2011 *Annual Report of the Auditor General of Ontario*, Chapter 3, Section 3.03.

[394] ibid

[395] Steve Charnovitz and Carolyn Fisher, 'Canada – Renewable Energy: Implications for WTO Law on Green and Not-So-Green Subsidies', World Trade Review [2015] 14(2) 177–210

Ontario's goals were not only to increase the role of wind and solar in the supply-mix of electricity, but also to 'enable new green industries' and to provide incentives for investment in the manufacturing of renewable energy technology in a remote area of the Province. Importantly, Ontario linked eligibility for its generous FIT to a local content requirement (LCR), thus creating a second instrument to promote green industries. The combined policies help Ontario successfully negotiate an agreement with a Korean consortium that was estimated to bring $7 billion of renewable generation investment, as well as 16,000 green energy jobs, to Ontario.[396] The LCR defines 'content' in terms of the total project costs, and designated activities range from manufacturing certain components in Ontario to retaining labour and consulting services provided by Ontario residents. Specifically, the applicable regulations require that by 2012, the minimum required domestic content be 50% for large wind installations and 60% for solar photovoltaic (PV).[397] Hence, to summarise, there are two measures that are linked with each other: the FIT (potentially a subsidy under WTO law) and the local content requirement (quite certainly a discriminatory requirement).

In the case of *Canada – Renewable Energy/Canada – FIT,* the problematic element was the LCR, not certainly the FIT. The complainants had two alternative legal tracks to follow: either attack the LCR directly arguing it was discriminatory and hence not in compliance with inconsistent with TRIMS Article 2.1[398] (by virtue of being inconsistent with GATT Article III:4).[399] Alternatively, they could have challenged the

[396] Ministry of Energy, 'Ontario Delivers $7 Billion Green Investment' (2010) <http://news.ontario.ca/mei/en/2010/01/backgrounder-20100121.html> accessed 16 July 2020

[397] *Canada – FIT Panel*, (n 381) para. 7.158 (Table 1)

[398] TRIMS Article 2 (National Treatment and Quantitative Restrictions) states:

1. Without prejudice to other rights and obligations under GATT 1994, no Member shall apply any TRIM that is inconsistent with the provisions of Article III or Article XI of GATT 1994.

2. An illustrative list of TRIMs that are inconsistent with the obligation of national treatment provided for in paragraph 4 of Article III of GATT 1994 and the obligation of general elimination of quantitative restrictions provided for in paragraph 1 of Article XI of GATT 1994 is contained in the Annex to this Agreement.

[399] GATT Article III:4 requires that imported products be treated no less favourably than like products of domestic origin.

whole FIT programme (which included the LCR) as a subsidy which was prohibited exactly because it was contingent on the use of local over imported goods. The complainant – Japan and the EU – followed both paths. While, as seen above, the first claim based on discrimination was easily won, it was the second subsidy claim that generated difficulties and controversy, mostly because the preliminary step of the legal analysis necessitated to determine that the FIT was a subsidy (only, afterwards, the contingency of the subsidy with the LCR would need to be established). SCM Articles 3.1(b) and 3.2, the SCM provisions forbid subsidies contingent on the use of domestic over imported goods.

While there was no particular problem in concluding that the FIT programme amounted to one of the forms of 'financial contribution' of the definition of subsidy of Article 1.1 of the SCM Agreement (in the form of a 'purchase of goods'), the main focus of the analysis focused on whether this form of financial contribution also 'conferred a benefit' on the recipient companies. Japan and the EU put forward various benchmarks which in their view clearly showed that the FIT deviated favourably from. However, neither of the Appellate Body nor the Panel agreed with the benchmarks proposed by the claimants, and they concluded that that the complainants had not been able to prove that the scheme conferred a benefit and there were no sufficient factual findings on the record to complete the scrutiny.[400]

This conclusion not only sparked heated debate among scholars in WTO law;[401] it also drew the Appellate Body criticisms, for their attempt to avoid identifying the FIT scheme as a subsidy to support the deployment and development of renewables

[400] See, for example, Appellate Body Report, *Canada – Renewable Energy/FIT* para 5.128

[401] See e.g. P. D. Farah and E. Cima, 'WTO Law and Renewable Energy: Lessons from the Case Law', 49(6) Journal of World Trade 1103 [2015] 1113–16; Howse, 'Securing Policy Space for Clean Energy under the SCM Agreement: Alternative Approaches' 2; Shadikhodjaev, 'Renewable Energy and Government Support: Time to Green the SCM Agreement?', 14(3) World Trade Review 479 [2015] 499–505; B. J. Condon, 'Disciplining Clean Energy Subsidies to Speed the Transition to a Low-Carbon Economy' 51(4) Journal of World Trade 675 [2017] 685–90; and Luca Rubini '"The good, the bad, and the ugly": Lessons on Methodology in Legal Analysis from the Recent WTO Litigation on Renewable Energy Subsidies' [2014] 48 JWT 153, 561–6.

industry.[402] Various reasons have been put forward to justify this attitude: the lack of specific exceptions for 'good' green energy subsidies in the WTO and, against this gap, the unwillingness to create a precedent that a 'good' policy is a subsidy, thus potentially opening to other challenges in the future.

It is worth noting that the Appellate Body's reasoning is particularly important for examining the relationship between an incentive scheme and a subsidy, a topic that has already been analysed and discussed by some scholars .[403] The Appellate Body's reasoning has produced two innovations on the benefit analysis under Article 1 of the SCM Agreement: 1) by requiring the performance of a full market definition[404] in which the appropriate market benchmarks can be found. Moreover, the analysis should take account of both the demand-side substitutability and supply-side substitutability.[405] 2) by vaguely distinguishing government intervention for creating a new market from government intervention in an existing market.[406] This reasoning approach adopted by the AB potentially gives more leeway to Member States for designing their incentives in a 'newly created' market.[407] Although the Appellate Body did not make a decision on whether Ontario's FIT scheme constitutes a subsidy, its findings show the anticipation that certain forms of subsidisation in the renewables sector do not fall within the subsidy notion of the SCM Agreement.[408]

4.5.2 Whether a FIT scheme constitutes a subsidy under the WTO subsidy law

To measure the FIT scheme against the subsidy in the WTO law, the definition of subsidy in the WTO legal system will be given in the first place. Then the discussion

[402] Luca Rubini, 'The good, the bad, and the ugly' (n 401); Rubini, 'The Wide and the Narrow Gate' (n 13)

[403] Rubini, 'ASCM Disciplines and Recent WTO Case Law Developments' (n 388) 313

[404] *Canada – FIT ABR,* (n 381) para 5.167 – 79

[405] *Canada – FIT ABR,* (n 381) para 5.171

[406] *Canada – FIT ABR,* (n 381) para 5.188

[407] Jean-Francois Mayoraz, 'Renewable Energy and WTO Subsidy Rules: The Feed-In Tariff Scheme of Switzerland' in Angela Lupone and others (eds), *International Economic Law: Contemporary Issues* (Springer International Publishing, 2017) 169

[408] ibid

will move on to analyse whether the FIT scheme constitutes a subsidy in the context of the WTO law with the reasoning used in the case law.

4.5.2.1 Definition of a subsidy in the WTO legal system

There was actually no clear definition of subsidy and no elaboration of its main constituent elements in the GATT. It is only later on in the WTO era that the regulations of subsidies appear in the WTO legal system. Examples are the SCM Agreement and the Agreement on Agriculture (AG).[409] The definition of subsidy first appears in the SCM Agreement.[410]

The SCM Agreement defines the subsidy notion in Article 1: a subsidy exists when there is a financial contribution is made by a government or a public body within the territory of a member, or, alternatively, any form of income or price support, and any of this confers a benefit.[411] Article 1.2 further clarifies that only specific subsidies that support certain enterprises or industries as defined in Article 2 of the SCM Agreement are subject to the WTO's subsidies discipline.[412] In sum, to determine whether a certain support measure for renewable energy is a qualified subsidy under the SCM Agreement, the following requirements need to be taken into consideration: (1) the existence of a financial contribution (or any form of income or price support); and (2) the existence of a benefit.

Financial contribution by a government

The first requirement for a measure by a state to be considered a subsidy is, according to article 1.1 of SCM Agreement, the existence of a financial contribution by a government or a public body. In other words, two conditions need to be satisfied to constitute a subsidy: 1) the existence of a financial contribution; 2) the financial contribution has to be made by a government or public body.

[409] Rubini, *The Definition*, (n 387) 105 – 106

[410] ibid, 108

[411] SCM Agreement, art 1

[412] SCM Agreement, art 1.2

As a pre-condition, article 1.1(a) SCM Agreement encompasses only financial contributions made by a government or a public body. Article 1.1(a) (1) (i) – (iv) SCM Agreement exhaustively enumerates four possible forms of financial contributions that could be deemed as subsidies, with paragraphs (i)–(iii) being direct in nature. Specifically, to constitute a subsidy, a financial contribution can be made by a government or a public body either directly, i.e. providing funds, goods, services or forgoing income due; or indirectly, i.e. channelling payments through a private body.[413] Alternatively, any form of income or price support (by a government or a public body) may also be considered a subsidy.[414] While a subsidy requires a government or a public body as the subsidising entity, the interpretation of the term 'public body' is pretty controversial in practice. Generally there are three approaches when interpreting the term 'public body': the governmental control approach, the governmental function approach and the governmental authority approach.[415] Meanwhile, due consideration should be given to all relevant facts regarding the characteristics and functions of an entity as appropriate in the particular circumstances of a case. The case *Korea – Measures Affecting Trade in Commercial Vessels*[416] suggests that a public body in the sense of the SCM Agreement refers to 'any entity controlled by a government'[417]. However, this view was overturned by the Appellate Body in the case *United States – Definitive Anti-Dumping and Countervailing Duties on Certain Products from China*, where the term "public body" was reinterpreted as 'an entity that possess, exercises or is vested with governmental authority'.[418] As a *de jure* evidence for delegation of governmental authority is not readily available in each case, it seems unavoidable that whether an entity's operation is a part of governmental

[413] SCM Agreement, art 1.1(a)(1)

[414] SCM Agreement, art 1.1(a)(2)

[415] Ru Ding, '"Public Body" or Not: Chinese State-Owned Enterprise' (2014) Journal of World Trade 48 (1) 167–190

[416] WTO, *Korea – Measures Affecting Trade in Commercial Vessels* (WT/DS273/R) (Panel Report, 2005) para 7.50

[417] WTO, *United States – Definitive Anti-Dumping and Countervailing Duties on Certain Products from China* (WT/DS379/AB/R) (Appellate Body Report, 2011) para 320

[418] ibid

authority can only be assessed on a case-by-case basis.[419] This interpretation, which requires a public body to have government prerogatives, has been pretty controversial because – so the argument goes – it makes more difficult to capture action by State-Owned Enterprises (SOEs).

As an alternative to a financial contribution, any form of income or price support which confers a benefit to a specific recipient may also constitute a subsidy. Without further explanation, this range seems so broad that it could cover almost any government measure that results in raising prices within a market. Later in practice, the panel in *China – GOES* case helped, to some extent, to clarify the ambiguity by narrowing down the scope to include only government measures that set or target a given price. Therefore, measures having a random or incidental effect on prices do not constitute a subsidy defined in SCM Agreement.[420]

Are involved agencies governments or public bodies?

According to subparagraph (i), (ii), (iii) and (iv) of article 1.1, to constitute a subsidy under the SCM Agreement, a financial contribution must be made by a government or a public body. However, as to how a government or a public body makes this financial contribution, the requirements are relatively flexible. The most straightforward way is that a government or a public body directly transfers the funds; Otherwise the government or public body can also act indirectly through making payments to a funding mechanism or by authorising a private body to make the financial contribution in its place.[421] In other words, this means that article 1.1 of the SCM Agreement could also be applicable to the financial contributions made by private entities, but only on the condition that the private bodies act on behalf of the governments, and exercise

[419] Mayoraz (n 407) 170

[420] WTO, *China – Countervailing and Anti-Dumping Duties on Grain Oriented Flat-Rolled Electrical Steel from the United States* (WT/DS414/R) (Panel Report, 2012) para 7.84

[421] SCM Agreement, art 1.1

functions that normally belong to the governments.[422] Their actions should not deviate from the normal or usual ways followed by the governments in practice.[423]

As the Appellate Body in *US – Countervailing Duty Investigation on DRAMS*[424] clarifies, to constitute a subsidy under the SCM Agreement, a financial contribution must exist. However, apart from this initial condition, article 1.1 of the SCM Agreement also requires the financial contribution to be made by a government or a public body, which means that acts by exclusively private bodies are excluded.[425]

The Existence of a Benefit

A subsidy in the sense of the SCM Agreement requires that a *benefit* must be conferred to a recipient. The article 1.1(b) of the SCM Agreement stipulates that, to constitute a subsidy, a financial contribution by a government or a public body must confer a benefit.[426] However, unlike the detailed interpretation of what counts as a financial contribution, no clear definition or explanation of the term benefit is given in the SCM Agreement.[427] Generally speaking, the most apparent manifestation of the existence of a benefit is that the recipient obtains an advantage that it originally could not gain from competitions in the market place. Based on this, to judge whether a benefit has been conferred, we need to examine if the recipient is "better off" than it would have been in the absent of the financial contribution.[428]

The case *Canada – Renewable Energy/Canada – FIT* offers important insights into the *benefit* assessment in relation to FIT schemes, especially in the aspect of defining

[422] SCM Agreement, art 1.1(a)(1)

[423] Wilke (n 384) 19

[424] WTO, *US – Countervailing Duty Investigation on DRAMS* (WT/DS296/11) (Panel Report, 2005) para 107

[425] ibid

[426] SCM Agreement, art 1.1

[427] Gilbert Gagné and François Roch, 'The US-Canada Softwood Lumber Dispute and the WTO Definition of Subsidy' (2008) 7 WTR 547

[428] WTO, *European Communities – Countervailing Measures on Dynamic Random Access Memory Chips from Korea* (WT/DS299/R) (Panel Report, 2005) para 7.176

the relevant market. The judgement on whether a benefit exists in this case presupposes an appropriate market benchmark for assessment. To find this benchmark, the AB believes that necessary steps need to be taken to first and foremost determine what the 'relevant market is in this case.[429]

A. the relevant market

The finding of the panel indicates that 'the relevant market was the market for electricity from all sources of energy from the demand-side perspective'.[430] However, the AB disagreed with this definition of the relevant market. Following the judgement of the case *EC and Certain Member States – Large Civil Aircraft*[431], the AB underlines the need to analyse both demand-side and supply-side factors when determining the relevant market.[432] Moreover, due to such factors as high capital costs and limited economies of scale, renewable energy electricity generation can hardly compete fairly with conventional energy generating technologies in an existing market. Therefore, the AB concludes that markets (created markets) for renewable energy could only come into existence with the government's intervention via, for example, determining prices for renewable energy or requiring distributors to buy a certain or full amount of renewable energy at a fixed (above-market) price.[433] With the focus on supply-mix factors and the consideration of the necessity of government's intervention to create a market for renewable energy production, the AB concludes that the relevant market in the case of *Canada – Renewable Energy/Canada – FIT* – for the assessment of whether a benefit has been conferred – is the market for wind and solar (renewable) power.

B. an appropriate benchmark

In order to establish an appropriate benchmark for benefit analysis, the AB argues that the benchmark could be administered prices for the same product, under the

[429] *Canada – FIT ABR,* (n 381) para 5.169

[430] ibid para 5.168

[431] ibid para 5.171

[432] ibid

[433] *ibid* para 5.172

circumstance that the prices are determined by a price-setting mechanism which ensures market prices. Alternatively, the prices can also be negotiated prices or be determined through competitive bidding, so long as these prices reflect the lowest possible price offered.[434] Although this interpretation of benchmark has drawn many criticisms [435] from experts in WTO Law, *Canada – Renewable Energy/Canada – FIT (2013)*, a case on the benefit determination as well as the only case concerning FIT programmes, has nonetheless provided significant reference information for the benefit assessment in regard to FIT programmes under current laws and rules. There is a reasonable prospect that future decisions of the AB will further clarify the exact scope of its reasoning.

4.5.2.2 The specificity of a FIT scheme

In addition, Article 1.2 of the SCM Agreement stipulates that a subsidy must fulfil the requirement of specificity for the SCM Agreement to be applicable. [436] Here, the term specificity mainly concerns the breadth of subsidy recipients, which is whether the subsidy is broadly available to all industries and enterprises or it is targeted towards and limited to only certain ones of them. Non-specific subsidies which are neutral and do not favour certain industries or enterprises are excluded from the SCM Agreement even if they fulfil the definition of a subsidy. [437] To put it another way, 'the more targeted and specific subsidies are, the more likely it is that they may face problems under subsidy laws'[438]. Since in practice specific subsidies are more likely to distort international trade in market, they are thereby subject to the SCM Agreement disciplines.

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[434] *ibid* para 5.228

[435] Rajib Pal, 'Has the Appellate Body's Decision in *Canada – Renewable Energy/Canada – Feed-in Tariff Program* Opened the Door for Production Subsidies?' [2014] 17 JIEL 125, 127

[436] SCM Agreement, art 1.2

[437] Magnus Lodefalk and Mark Storey, 'Climate Measures and WTO Rules on Subsidies' (2005) 39 JWT 23, 30 <https://heinonline.org/HOL/LandingPage?handle=hein.kluwer/jwt0039&div=8&id=&page=> accessed 19 July 2019

[438] Rubini, 'ASCM Disciplines and Recent WTO Case Law Developments' (n 388) 313

Specific to the design of FIT schemes, Howse argues that, if subsidies were offered to renewable energy users and were available across the board to all enterprises in the economy, then it would be possible to provide non-specific subsidies to encourage the use of renewable energy.[439] However, different from Howse's point of view, some other scholars such as Wilke and Rubini argue that since a subsidy for renewable energy inevitably has producers of renewable energy as its target enterprises, it is very likely to be deemed as a specific subside provided for a particular industry. Wilke points out that FIT schemes, as subsidies for renewable energy, are by definition available only to those industries and enterprises involved in producing green energy.[440] Therefore, the nature of a FIT scheme determines that it is inevitably specific, no matter how broadly it is designed. Rubini questions not only the possibility, but also the desirability of designing subsides for renewable energy as non-specific.[441] Seeing Article 2.1(b) and Article 2.1 (c) of the SCM Agreement as essentially paradoxical, Rubini argues that 'designing certain climate change subsidies in a neutral and non-discriminatory way may not be enough to escape a finding of specificity'.[442] He explains that even if a FIT scheme could be designed as broad enough to provide subsidies for all different enterprises (including renewable sources, applications and technologies, etc.) in the renewable energy industry, its target still covers merely a small, albeit increasingly significant, part of the overall energy market. Then the overall energy market accounts for, again, only a very small portion of the total economy, which means that even if one day renewable energy expand to become the dominant actor of the energy market, thus subsidies are (theoretically) broadly available throughout the energy market, FIT schemes are still specific subsidies, targeting one industry of the total economy.[443] Beyond that, Rubini also thinks it is undesirable to design subsidies for renewable energy as non-specific. He insightfully

[439] Robert Howse, 'Climate Change Mitigation Subsidies and the WTO Legal Framework: A Policy Analysis' (2010) IISD 22-23 <https://www.iisd.org/pdf/2009/bali_2_copenhagen_subsidies_legal.pdf> accessed 19 July 2019

[440] Wilke (n 384) 17

[441] Luca Rubini, '"Ain't Wastin Time No More": Subsidies for Renewable Energy, the SCM Agreement, Policy Space and Law Reform' [2012] 15(2) JIEL 525

[442] ibid 549

[443] ibid 548-49

points out that a subsidy for renewable energy is, to a large extent, necessary to be designed as more targeted, so that it would be more effective in practice from an environmental and economic perspective.[444]

Notably, the SCM Agreement also includes two countervailing measures: the WTO Dispute Settlement System (DSS) and the Members' domestic laws and procedures consistent with rules in the SCM Agreement.[445] According to the provisions, when a Member deems that a subsidy/FIT scheme carried out in another Member is inconsistent with the rules of subsidies in the SCM Agreement, even though there is no local content requirement (LCR) element contained in the provisions, the Member could appeal to the Dispute Settlement Body or make use of its domestic countervailing measures to deal with the disputes.

Based on the discussion above, FIT programmes are likely to meet the specificity requirement of the SCM Agreement, no matter whether they target certain types of renewable energy (such as solar energy, wind, falling water, etc.) or the industry in general, as the renewable energy industry is still a specific, small part of both the overall energy market and the total economy.[446]

4.5.2.3 The compatibility of the FIT with WTO rules

FIT programmes are allowed under the SCM Agreement. However, it is worth noting that specific subsidies are compatible with WTO subsidy rules unless they cause adverse effects in one of the forms defined by the SCM Agreement,[447] or unless they are conditional on exports or include local content requirements.[448] This means that if a subsidy is proved to be conditional on exports or encompass local content

[444] ibid 548

[445] SCM Agreement, part V

[446] Aaron Cosbey and Petros Mavroidis, 'A Turquoise Mess: Green Subsidies, Blue Industrial Policy and Renewable Energy – the Case for Re-drafting the Subsidies Agreement of the WTO' [2014] 17(1) JIEL 28 – 9

[447] SCM Agreement, art 5, 6

[448] SCM Agreement, art 3

requirements, the subsidy will be considered a prohibited subsidy by the WTO subsidy rules and there is no need to prove its specificity.[449] As to a FIT scheme, if it is conditional on exports or includes LCR elements which are prohibited by the WTO subsidy rules, the FIT scheme will be considered a prohibited subsidy accordingly. In this case, members can complain to the dispute settlement body (DSB) by the WTO subsidy law or make use of domestic measures to sort out the disputes.

4.5.3 The legality of Chinese FIT scheme under WTO subsidy rules

Based on the discussion above about the definition of subsidy, this section will analyse whether Chinese FITs, taking the FITs for wind and solar energy sectors as examples, should be included in actionable subsidies and prohibited subsidies in the WTO legal context.

While China is a world-leading producer and exporter of wind and solar modules, it is an easy target for anti-dumping (AD) and/or countervailing duty (CVD) cases, as it is widely considered as a so-called 'non-market economy' (NME) by the EU, the United States and India, among others.[450] With the support of FITs and other incentives for deploying renewable energy in China, both wind energy industry and solar energy industry have achieved great progress, as the analysis in the first case study about the effectiveness shows. As a WTO member, China's FITs policies and laws should be consistent with the rules of the WTO law. To see if that is actually the case, the following parts will do an assessment of the legality of Chinese FITs policies under the context of the WTO legal system.

To assess whether Chinese FIT Scheme constitutes subsidies in the WTO legal context, the following two questions will be answered:

1) Can Chinese FITs for renewable energy (wind and solar electricity) be considered as 'subsidies' according to the SCM Agreement?

[449] Rubini, 'ASCM Disciplines and Recent WTO Case Law Developments' (n 388) 314

[450] Edwin Vermulst and Madison Meng, 'Dumping and Subsidy Issues in the Renewable Energy Sector' in Thomas Cottier and Ilaria Espa (eds), *International Trade in Sustainable Electricity: Regulatory Challenges in International Economic Law* (Cambridge University Press 2017) 342

2) If yes, are they legal in the WTO law context: actionable or prohibited?

Does Chinese FIT programme for renewables constitute a subsidy according to the SCM Agreement under WTO context?

Based on the definition of subsidies in the SCM Agreement introduced above and on the analysis of the Reports from the AB and the Panel, the following discussion will focus on examining the legality of Chinese FITs for renewable energy. In line with the assessment of the effectiveness of FITs for wind and solar energy sector, this legality assessment is also going to focus on the FITs for wind and solar sectors.

A subsidy is deemed to exist pursuant to Article 1.1 of the SCM Agreement where two distinct elements are present. First, there must be a financial contribution by a government or a public body, or in the form of income or price support. Second, any financial contribution, or income or price support, must constitute a benefit.[451] Based on the concept of subsidies analysed above, to determine whether the Chinese FITs for wind and solar energy sectors are consistent with the rules of the SCM Agreement, the following three aspects need to be analysed:

1) The existence of any financial contribution by a government or public body, or income or price support;

2) The existence of any benefit given to recipients by the FITs from governments or public bodies; and

3) Whether the FITs are given to specific recipients and cause adverse effects.

The first two requirements are with respect to whether the FIT scheme can be defined as a subsidy under the SCM agreement, while the third one is regarding whether the Chinese FIT scheme is a actionable or prohibited subsidy.

A. Whether Chinese FITs for wind and solar energy constitute financial contribution by governments?

[451] WTO, *United States – Final Countervailing Duty Determination with Respect to Certain Softwood Lumber from Canada* (WT/ DS257/ AB/ R) (2004) para 51

This question can be analysed by two steps. First, who is the implementation entity of Chinese FIT scheme? Is it a public or private body? Second, is there any financial contribution by the government or the public body?

a. Are Implementation Entities (Grid Companies) public bodies in China?

Although the concept of the public body is not clearly defined in the SCM Agreement, the Panel and the AB have given interpretations of it in a series of case law under WTO context. The term government or public body, according to their interpretations, refers to not only the government in a narrow sense, but also regional/local authorities and state-owned enterprises.[452] Case law has clarified the following few points for further interpretations of the qualified public bodies:

1) The entity in question possesses, exercises or is vested with governmental authority.[453]

2) The entity in question has been assigned or delegated authority or responsibility, or the entity has statutory authority and responsibility to perform a public function or service.[454]

3) The entity is under meaningful control of the government which has imposed a duty on the entity to operate (including such as generation facilities and distribution systems), and meanwhile the government has extensive powers to define the conditions of activities the entity is carrying out.[455]

In terms of Chinese FIT programmes, the State Grid Corporation of China (SGCC) and China Southern Power Grid (CSPG) are responsible for implementing the FIT programmes under the instruction of the NDRC about the rates of the FIT, and for entering into FIT contracts.[456] In accordance with Article 1.1 of SCM Agreement and

[452] Peter Van den Bossche and Werner Zdouc, *The Law and Policy of the World Trade Organisation: Text, Cases and Materials* (4th edn, Cambridge University Press, 2017) 104

[453] WTO, *United States – China* (n 417) para 321

[454] *Canada – FIT Panel*, (n 381) para 7.235

[455] ibid paras 7.234-35

[456] NDRC, *The Notice on Adjustment of FITs for Solar PV and Onshore Wind Power* (n 237)

the analysis above of the interpretation of the public body, the SGCC and the CSPG should be considered as qualified '"public bodies' that are under "meaningful control" of the governments. The reasons are as follows: Firstly, both of the two entities were established by the statute – the Plan of Reform on Electricity Power Mechanism of China – issued by the NDRC in 2002. Article 3(9) of the Plan demands the previous National Electricity Power Company to be divided into the SGCC and the CSPG.[457] Secondly, both of the entities are state-owned enterprises (SOEs) controlled by the central government's ownership agency – the State-Owned Assets Supervision and Administration Commission (SASAC), which includes a complex state-controlled network composed of institutional linkages that are largely invisible in the company law or securities regulations.[458] Last but not least, both the entities have responsibility to comply with and perform policies and duties made by the governments, which includes purchasing electricity from renewable electricity generators by the FIT issued by the governments.[459] In sum, the Grid Companies in Chinese FIT programmes meet the requirement and should be deemed as qualified public bodies.

b. Whether financial contribution exists in Chinese FITs implementation?

As to the judgement of whether a financial contribution exists, article 1.1 (i) - (iv) lists the different qualified ways in which a government or a public body can provide a financial contribution: 1) via direct transfer of funds (for example grants, loans, equity infusion) or potential direct transfers of funds or liabilities (for example loan guarantees); 2) via government revenue that is due is forgone or not collected (for example fiscal incentives); 3) via providing goods or services other than general infrastructure or purchasing of goods, or lastly via 4) providing payments to a funding mechanism or entrusting a private body to make the financial contribution on its behalf .[460]

[457] ibid

[458] ibid

[459] NDRC, *The Notice on the Requirement of Guaranteeing the Purchasing of Electricity Generated by Using Renewable Energy Resources in Full Amount* (in Chinese, translated by the author) (2016) <http://www.ndrc.gov.cn/gzdt/201603/t20160328_796494.html> accessed 27 June 2019

[460] SCM Agreement art 1

Among the different categories of qualified financial contributions clarified in Article 1.1(i) – (iv), purchasing of goods is a kind of financial contributions that the governments or public bodies can transfer to the recipients. So far, no consensus has been reached as to whether 'electricity [is] a good or service,' even though most Members consider electricity as a good.[461] It is not the concern of this study to give a detailed analysis of this question. However, it is worth noticing that electricity is classified as a commodity under Chapter 27 of the Harmonized System Nomenclature, along with other energy products like gas, coal and oil.[462] So far, the only case that is related to energy subsidy and that has reached the Appellate Body stage is the *Canada – Renewable Energy/FIT* case. In this case, the AB confirms the Panel's decision that 'the government purchase of electricity under the FIT Programme constitutes a government purchase of goods' within the meaning of Article 1.1(a)(1)(iii) of the SCM Agreement.[463]

In regard to Chinese FIT programme, as mentioned in the summary of the Chinese FIT scheme in **Chapter Three**, grid companies pay renewable electricity generators at a fixed (above-market) price following the instruction of the government (the NDRC) to get renewable electricity access to the grid. So far, no stipulations have clearly designated electricity as a property that is regulated by Property Law and is then possessed by the grid companies. However, considering the fact that the grid companies have the right to manage and distribute electricity once it gets access to the grid, this does make sense in *Chinese Property Law*.[464] Therefore, the action of grid companies, that is the action of getting renewable electricity access to grid from the renewable electricity generators by paying the fixed (above-market) price to them, should be deemed as 'purchasing goods' in the meaning of Article 1.1(a)(1)(iii) of the SCM Agreement. Beyond that, by setting a fixed (above-market) price for renewable

[461] WTO, Energy Services (S/C/W/52) (1998) at 2

[462] ibid

[463] *Canada – FIT ABR*, (n 381) para 5.128

[464] The State Council of China, *The Plan of Reform on Electricity Power Mechanism of China* (in Chinese, translated by the author) (2017) <http://www.gov.cn/zhengce/content/2017-09/13/content_5223177.htm> accessed 27 June 2019

electricity which is normally higher than the tariff of the electricity from the conventional energy, Chinese FITs can be regarded as a form of 'price support' under the SCM Agreement.

Based on the discussion above, it is reasonable to conclude that Chinese FITs constitute a financial contribution or price support by a government, and thereby meet the first set of conditions on the qualified subsidy required by Article 1.1 (a) of the SCM Agreement.

B. Whether benefit conferral exists in Chinese FITs implementation?

Based on the further requirement of Article 1.1 (b) on what constitutes a qualified subsidy under the SCM Agreement, this section is going to analyse whether benefit conferral exists in Chinese FITs.

The Chinese FITs remunerate renewable electricity producers by offering them a premium tariff that is set above the market price for electricity generated from conventional energy. Meanwhile, the FIT programmes of China are designed with different FIT rates for renewable electricity from wind and solar source in different areas of China. Since renewable energy sources and conventional energy sources normally compete in the same wholesale electricity market, it is commonly assumed that (especially before AB issued its report on the *Canada – Renewable Energy/Canada – FIT* case) a fixed above-market tariff paid specifically to renewable energy producers confers a benefit.[465] Following this line of thought, Chinese FITs are likely to be considered as a subsidy under the SCM Agreement, because by ensuring renewable energy enterprises a profit they may not obtain in the normal market competition, Chinese FITs fulfil the second condition of a qualified subsidy which requires the existence of a benefit conferral. To confirm this judgement, the relevant

[465] Sadeq Bigdeli, 'Incentives Schemes to Promote Renewables and the WTO Law of Subsidies' in Thomas Cottier, Olga Nartova and Sadeq Bigdeli (eds), *International Trade Regulation and the Mitigation of Climate Change* (CUP, 2009) 155

market for Chinese renewable electricity needs to be determined first, so that an appropriate market benchmark can be found for evaluation.[466]

a. The relevant market for Chinese renewable electricity

In the findings of the case *Canada – Renewable Energy/Canada – FIT*, the AB has enlarged the policy space for Members' measures that pursue legitimate policy objectives such as mitigating climate change. It has also introduced a new approach that emphasises both supply-side substitutability and demand-side substitutability in determining the relevant market and in assessing whether benefit conferral exists in a FIT scheme.[467]

Firstly, following AB's stress on the importance of *supply-side substitutability* in determining the relevant market, each type of renewable sources used in China for electricity production constitutes a separate market, such as wind power market, solar power market, biomass power market, etc. The costs on technology development and electricity production from different energy sources may vary a lot. Even within the single sector/field of the renewable energy, the costs still differ greatly. Based on this, it seems hardly possible for renewable electricity to compete fairly with the electricity generated from conventional energy sources. Likewise, renewable electricity from different sources, such as wind and solar energy, cannot compete fairly with each other either. In this case, *supply-side substitutability* seems to exist neither in Chinese whole electricity market nor in its specific renewable electricity market.

Secondly, as to the demand-side substitutability, the concerned product of FITs for renewables is the electricity generated from renewable energy. Grid companies follow the governments' guidelines to purchase the product in full amount and transmit it to end-users, which means that both grid companies and end-users of renewable electricity are in the demand-side market. This analysis is in line with the opinion of the AB in the Report of the case *Canada – Renewable Energy/Canada – FIT* about the

[466] *Canada – FIT ABR* (n 381) para 5.169

[467] ibid

issue of benefit conferral. From the perspective of end-users, as electricity has very high homogeneity no matter from which source it is generated, the end-users are not likely to distinguish whether it is renewable electricity they are using or not. Thus, for end-users, electricity generated from different sources has very high substitutability. However, the result is quite different when discussing from the perspective of grid companies. As public bodies in China, grid companies have the responsibility to purchase renewable electricity in full amount from renewable electricity producers. Therefore, in the whole electricity market, grid companies, are capable of distinguishing renewable electricity from the non-renewable one by the sources. Beyond that, due to the pursuit of environmental benefit and sustainable development, renewable electricity and non-renewable electricity is not substitutable. Based on these factors, the demand-side substitutability does not exist for grid companies in the whole electricity market of China. However, within the renewable electricity market, FITs programme of China do not focus merely on a single type of renewable energy, but include various types, such as onshore and offshore wind energy, solar energy and biomass energy, and different fixed (above-market) prices (FITs rates) are used in different regions of China. This means that the demand-side substitutability does exist for grid companies in the renewable electricity market.

Based on the analysis above about the substitutability of renewable electricity in the markets of supply-side and demand-side, it could be concluded that in Chinese whole electricity market, substitutability exists in neither supply-side market nor demand-side market. In this case, the analysis of whether there is benefit conferral to recipients in Chinese FITs programme should be processed in the renewable electricity market. The renewables market is notably not a free competitive market, but a newly created and distorted market with interventions from governments. In line with the findings of the AB in the case *Canada – Renewable Energy/Canada – FIT*, the benefit conferral is, in essence, a kind of distortion for the established free competitive market, which suggests that benefit conferral presupposes the existence of an established market.[468]

[468] *Canada – FIT ABR* (n 381) 188

b. An appropriate benchmark for analysing the existence of benefit conferral

Following the analysis of the relevant market for renewable electricity in China, this section will go further to discuss how to find an appropriate benchmark to measure whether benefit conferral exists in Chinese renewables market.

Based on the Article 14 (d) of the SCM Agreement, an appropriate benchmark should be 'in relation to prevailing market conditions for good or service in question in the country of provision or purchase.'[469] This issue was also raised in *US – Softwood Lumber IV*, where the AB argues that the benchmark could only be based on market-based prices rather than private prices which are very much affected by financial contributions in the country.[470] So, is there an appropriate benchmark in Chinese renewable electricity market?

Article 3 in the *Notice on Adjustment of FITs for Solar PV and Onshore Wind Power* published by the NDRC in 2016 stipulates that the central government appeals to local governments and relevant parties to set prices for renewable electricity via market competition mechanisms such as the bidding mechanism, and the prices in the areas should not be higher than the FITs set by central government.[471] Responding to the claim from the central government, many provinces in China now have different levels of prices for renewable electricity which are set via bidding schemes. These prices should not be higher than the FIT levels set by the central government. In this case, the average prices of the bidding prices for renewable electricity can be considered to be the market benchmark for the renewable electricity in the Chinese renewable market. The reasons for this conclusion are: 1) the bidding prices derive from the relevant market of renewable electricity, such as the market of wind and solar power; 2) the bidding prices are the results of the competition among different renewable electricity producers; 3) the average prices could as much as possible reflect the condition of renewable electricity market with different producers tendering at different prices. As

[469] SCM Agreement, Article 14 (d)

[470] Gilbert Gagné and François Roch, 'The US – Canada Softwood Lumber Dispute and the WTO Definition of Subsidy' [2008] 7 WTR 569

[471] NDRC, *The Notice on Adjustment of FITs for Solar PV and Onshore Wind Power* (n 237)

shown in the *Notice on Adjustment of FITs for Solar PV and Onshore Wind Power*, the bidding prices are not allowed to be higher than the FITs and accordingly, the average prices coming from bidding prices are definitely not higher than the FITs.[472]

In this case, if a renewable energy operator is offered the FIT at the level determined by the central government (the level is higher than the average price of bidding), the Chinese FIT will constitute benefit conferral within the context of Chinese renewable energy market.

In sum, taking into account both the financial contributions by the different levels of Chinese governments and the existence of benefit conferral of the Chinese FITs for renewable energy, it is reasonable to conclude that the Chinese FIT programme constitutes a subsidy under the SCM Agreement.

C. The specificity of Chinese FIT scheme

Pursuant to Article 2 of the SCM Agreement, specificity could be manifested in three forms: 1) *de jure* specificity, means that 'the granting authority, or the legislation pursuant to which the granting authority operates' clearly spells out that only 'certain enterprises' can get access to a subsidy; 2) *de facto* specificity, means that notwithstanding any appearance of non-specificity, the subsidies are, in practice, specific to certain enterprises; 3) Regional specificity, means that a subsidy 'is limited to certain enterprises located within a designated geographical region within the jurisdiction'.[473] In a word, the specificity of FITs is primarily concerned with whether the programme has limited access to the subsidy to certain enterprises.[474]

The Chinese FIT for renewable energy can be considered as a subsidy in line with the rules of the SCM Agreement. On the one hand, all regulations about FITs, such as the

[472] ibid

[473] SCM Agreement, art 2.2

[474] SCM Agreement, art 14 (a)

Notice on Adjustment on the FITs for Solar PV and Onshore Wind Power[475] and the *Notice on Appropriate Adjustment on the FITs for Onshore Wind Power*[476], explicitly stipulate the specific renewable electricity producers that they support, such as onshore wind power producers and solar PV enterprises, etc. This specificity constitutes *de jure* specificity. On the other hand, the central government has set up a zonal FIT system[477] which is a pricing system focusing on providing different FITs for different types of renewable energy in different areas.

The Chinese FIT scheme is specific to renewable energy industry. However, this does not necessarily mean China has violated the rules of the WTO law. In order to prove that a FIT scheme it is actionable, 'adverse effects' caused by the FIT should be proved beforehand. However, this is not an easy route both legally (very high legal requirements) and factually (there is not a lot of trade in renewable energy).

Does the Chinese FIT scheme constitute a prohibited subsidy under the SCM Agreement?

Since the Chinese FIT scheme for renewable electricity generation can be defined as a subsidy under the SCM Agreement, now the discussion moves on to interrogate whether Chinese FIT scheme potentially constitutes a prohibited subsidy and is thereby banned by the WTO subsidy law.

According to Article 3.2 of the SCM Agreement, subsidies contingent on export performance or contingent on the use of domestic over imported goods constitute prohibited subsidies. Chinese FIT programme is comprised of the FIT rates determined by the central government and policies issued by local governments. Based on the Chinese political system, local governments' policies have to be compatible with the

[475] NDRC, *The Notice on Adjustment of FITs for Solar PV and Onshore Wind Power* (n 237)

[476] NDRC, *Notice on Appropriate Adjustment on the FITs for Onshore Wind Power* (in Chinese, translated by the author) (2014) <http://www.ndrc.gov.cn/zcfb/zcfbtz/201501/t20150109_659876.html> accessed 18 July 2019

[477] Based on the abundance of renewable energy (wind and solar energy), China has set up several rates of FITs in different areas for wind and solar power. See the tables in the section of this chapter about Chinese FIT scheme for wind and solar power.

central government's policies. Basically, the central government enacts the principles of the FITs programme, and the local governments, including provincial and municipal governments, make detailed regulations following the principles from the central government. Before the FITs programme initially launched in the wind energy sector in 2009, China mainly adopted two types of measure to promote the growth of wind power industry. One was a tendering system under a nationally-set FIT program for nationally approved projects over 100 MW, where tenders generally produced a price below the level of the national FIT.[478] LCRs were included in this system as an element for achieving a high bidding score. The other policy stipulates that for wind power projects involving an installation of 50 MW or more, they fell within the scope of the NDRC. These projects also lasted until 2009 and similar to the tendering system, they required the use of local content to obtain the score representative of compliance with the LCRs. Based on the analysis above, renewable energy support measures with LCRs are prohibited under the SCM Agreement. In 2009, however, when the countrywide FIT programme was firstly implemented in the wind energy sector, the LCR was abolished from the incentive measures and now there is no provisions involving LCRs in the nationwide FITs programme.[479] However, some FITs policies on provincial and municipal levels, such as *Regulations on Subsidies for Distributed Solar Projects*[480] in Shaan'xi Province and Jiangsu Province, still attach LCRs to their local FIT schemes. As a condition to enter into FIT programme contracts, enterprises are required to set up factories locally or make use of a certain percentage of locally produced wind turbines or solar panels for electricity generation. LCRs may stimulate local investment in and boost manufacturing of RE generation equipment, but the measures with LCRs could also face legal risks under current WTO subsidy disciplines. Local governments should remove articles related to LCRs from the FIT policies and

[478] GWEC, *The Development of Wind Power Tariffs in China* (2010) 18 <http://probeinternational.org/library/wp-content/uploads/2011/10/LinkClick.aspx_.pdf> accessed 18 July 2019

[479] NDRC, *Notice of Improving Policies on the Feed-in Tariff of Wind Power* (NDRC Pricing NO. 16, 2009) (in Chinese, translated by the author) (2009) <http://www.ndrc.gov.cn/zcfb/zcfbtz/200907/t20090727_292827.html> accessed 18 July 2019

[480] Finance Department of Shaanxi Province, *Methods of Subsidy Management on Provincial Demonstration of Promotion Distributed Solar PV* (in Chinese, translated by the author) (2015) <http://www.hzqg.com.cn/Item/4874.aspx> accessed 18 July 2019

regulations to keep China from the potential countervailing measures of other WTO Members. In addition, the transnational renewable energy power trade has not been very common around the world, and so far there is no renewable energy power trade in China that is involved in international trade. Therefore, the FIT scheme for renewable energy electricity cannot be conditional on any exports in China.

Based on the elaboration above of the effectiveness and the legality of Chinese FIT scheme on renewable energy, it can be argued that China needs to continuously improve its incentives for promoting renewable energy industry and to explore more market-oriented instruments to realise a sustainable development of the renewables industry. What China can do to further improve its FIT schemes? An examination of the EU FIT programme, which is the prototype of Chinese FIT scheme, may help give the answer. As the EU FIT programme has provided significant references for China in policy designing and the enforcement of FITs, a brief discussion on the effectiveness and legality of the EU FIT programme can help reveal the potential directions for China to go further in the deployment and development of the renewables industry.

4.6 The effectiveness and the WTO legality of the EU FIT scheme

As one of the key players on mitigating global climate change and deploying renewable energy, the European Union (EU) has enacted a series of relevant policies and directives. Many scholars in the EU have seen RE FITs as the best option for the present in terms of capacity development, which is developing a renewable power industry and bringing down cost and prices.[481] This section is going to look at the effectiveness and legality of the EU FIT programme, given that the programme has already provided lots of experience and lessons regarding policymaking and implementation for Chinses FIT programme. Even so, there is still quite a lot that China can learn from the EU FIT programme to further improve its FIT scheme. The analysis in this section will use the same assessment framework as it was used in discussing Chinese FIT scheme. A brief comparison of the two FIT programmes will

[481] Volkmar Lauber and Lutz Mez, 'Renewable Electricity Policy in Germany, 1974 to 2005' [2006] *Bulletin of Science, Technology and Society* 26 (2) 105

be given at the end of this section from the perspectives of effectiveness and legality. On this basis, the experience of the EU that China can learn to further improve its FIT scheme will be concluded. To be specific, the effectiveness of the EU FIT programme will be analysed from its impacts on the economic development, environmental protection and social wellbeing, and its legality will be evaluated in the context of WTO subsidy law.

4.6.1 The synopsis of the EU FIT scheme

EU laws and guidelines are of great importance for the development of member states' renewables electricity policies. The EU strategy for promoting renewable energy constitutes a framework and acts as an impetus for the policy-making of renewable energy in individual EU member states, although the choice and design of specific support schemes are up to the member states themselves.[482] The promotion of renewable energy in the EU member states is guided by EU directives, and in this sense FIT scheme could be deemed as a part of EU renewable energy policies even though articles directly related to FITs cannot be found in the Directives or Guidelines.

The EU has taken interest in and promoted the use of renewable energy since the late 1980s. In 1988, a Council Recommendation 'on developing the exploitation of renewable energy sources' was issued.[483] After more than a decade's effort on working out a feasible strategy for promoting renewable energy, the EU Commission (EC) finally enacted the first directive 'on the promotion of electricity produced from renewable energy sources in the internal electricity market' in September 2001. The directive set a long-term goal of producing 22% of the EU gross electricity consumption from renewables by 2010.[484] To achieve this objective, indicative targets were set for individual member states as their guidance for contributing renewable energy sources for electricity (RES-E) to the EU's gross electricity consumption.

[482] Cointe and Nadaï (n 382) 56

[483] Council Recommendation of 9 June 1988 on Developing the Exploitation of Renewable Energy Sources in the Community [1988] OJEC 160/46 – 48

[484] Council Directive 2001/77/EC of 27 September 2001 on the promotion of electricity produced from renewable energy sources in the internal electricity market [2001] OJEC L 283/33 – 40

In 2008, the Energy-Climate Package clearly drew together the European climate policies and energy strategies, by stressing 'the promotion of the use of energy from renewable sources' in the Directive 2009/28/EC.[485] This package set new binding national targets for RES-E contribution by 2020 for EU member states.[486] From the beginning of the 21st century, the EU Commission regularly reviewed the progress of renewable energy policies implemented in member states and worked on coordinating the interrelationship among the different specific support schemes for renewable energy across the EU. A European Tradable Green Certificates (TGC) scheme was put on the agenda, but the plan was not made through in the 2001 and the 2009 directives.[487]

With the renewable energy industry gradually getting mature, in 2014, the EU commission issued *Guidelines on State Aid for Environmental Protection and Energy 2014 – 2020*, advocating 'a gradual phase-out of FITs' and the replacement of them by 'either market premiums or tendering schemes'.[488] Following this, the Energy Union Package adopted in 2015 articulated five mutually supportive dimensions, which are energy security; a fully-integrated internal energy market; energy efficiency; climate action of decarbonising the economy; and research, innovation and competitiveness. The energy union strategy also set a new target of producing 27% of the EU total energy consumption from renewables by 2030, a steady improvement from the target of 20% by 2020.

In fact, although FITs have played a significant role in supporting RES-E in EU member states, the Commission was originally inclined to disapprove this instrument,

[485] Council Directive 2009/28/CE DIRECTIVE 2009/28/EC on the promotion of the use of energy from renewable sources and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC [2009] L 140/16

[486] ibid

[487] Lena Kitzing, Catherine Mitchell and Poul Erik Morthorst, 'Renewable Energy Policies in Europe: Converging or Diverging? (2012) 51 *Energy Policy* 192 <DOI: 10.1016/j.enpol.2012.08.064> accessed 19 July 2019

[488] European Commission, *Guidelines on State Aid for Environmental Protection and Energy (2014 – 2020)* (2014) 200/01

for fear that its requirement of state intervention in market operation might potentially distort fair competition.[489] As a result, the Commission has always been very cautious and hesitant to designate FITs as "market-based instruments" and has, as observed by Cointe and Nadaï, 'alternated between shunning them and recognising them as the most effective form of support for renewable energy electricity'.[490]

The *Guidelines* 2014 which, as mentioned above, advocates the replacement of FITs with either market premiums or tendering schemes[491], implies that FITs might no longer be the best choice for renewable energy policy under the new situation. In the *Guidelines*, the Commission advocated three aspects that need to be considered in the design and assessment of a renewable energy policy, which are the confidence of investors; any additional cost burden passed on to electricity consumers; and the increasing maturity of renewable energy technologies.[492] For the last element, the EU Commission highlights that since renewable energy technologies gradually grow into maturity and costs decline accordingly, production and investment decisions on renewable energy should be driven increasingly by the market rather than by the guaranteed tariffs fixed by governments. In this new situation, any necessary support should be designed to only supplement market prices, but not replace them, and the support should be limited to the minimum degree.[493]

Under the support of FIT scheme, the most popular renewable energy electricity generation support scheme in European countries, renewable energy production of the EU has extensively expanded over the past decades.[494] The effectiveness of the EU FITs in Member States, particularly in Germany and Spain, has also been recognised by the European commission. Although the FIT programme is phasing out in Member States according to European Commission SWD(2013)439/F1 and there are some

[489] Cointe and Nadaï (n 382) 57

[490] ibid 2

[491] European Commission, *Guidelines on State Aid for Environmental Protection and Energy* (n 488)

[492] ibid

[493] Cointe and Nadaï (n 382) 5

[494] Jenner, Groba and Indvik, (n 257)

existent literature discussing the effectiveness of the EU FIT programme,[495] the brief assessment of the effectiveness and legality of EU FITs in this study is still necessary and significant, as the aim and the perspective of this assessment is to see what further references the EU FITs can provide for China's improvement of its FIT schemes.

As Germany has played significant roles on deploying renewable energy in the EU, the following analysis will take the German policy as example.

4.6.2 The effectiveness of the EU FIT scheme

Literature on the role of the EU FIT programmes in deploying and promoting the use of renewable energy is abundant,[496] the majority of which have adopted a descriptive approach. Most of these qualitative evaluations indicate, from different perspectives, that the FIT programme is an important policy instrument contributing to the achievements of RES-E development in the EU member states.[497] The following analysis mainly focuses on the FIT programmes implemented in Germany and Spain, given these two countries' leading position in the EU in terms of the installed power and the production capacity of renewable energy.[498]

Employing 1992–2008 panel data, Jenner et al. did the first econometric analysis of the effectiveness of FIT programme in promoting solar PV and onshore wind power development in EU Member States.[499] Adopting a quantitative ex-post approach, they conclude that the FIT programme has subsidised the solar PV development more effectively than onshore wind, and this finding is in line with other studies of the cost-

[495] European Commission, *European Commission Guidance for the Design of Renewables Support Schemes* (2013) <https://ec.europa.eu/energy/sites/ener/files/com_2013_public_intervention_swd04_en.pdf> accessed 8 July 2019

[496] Jenner, Groba and Indvik, (n 257); Maria Teresa García-Alvarez and Rosa María Mariz-Pérez, 'Analysis of the Success of Feed-in Tariff for Renewable Energy Promotion Mechanism in the EU: Lessons from Germany and Spain' [2012] 65 *Procedia – Social and Behavioral Sciences* 52; Margarita Ortega-Izquierdo and Pablo del Río, 'Benefits and Costs of Renewable Electricity in Europe, [2016] 61 *Renewable and Sustainable Energy Reviews* 372

[497] Jenner, Groba and Indvik, (n 257) 387

[498] García-Alvarez and Mariz-Pérez, (n 496) 54

[499] ibid

competitiveness of renewable energy technologies.[500] To be specific, in the aspect of economic impacts, German FIT scheme had the effect of increasing the share of renewable electricity (generated from solar PV, solar thermal, wind and biomass) in the nation's gross electricity consumption from 6% in 2000 to 15% in 2008;[501] in Spain, the FIT scheme made positive contribution to the growth of the renewable energy industry which can be valued as 55% in terms of GDP.[502] The rapid increase of the proportion of renewable energy electricity in total electricity consumption has greatly improved the energy mix and is beneficial for maintaining energy security in Germany and Spain.

As to the environmental impacts of the FIT, with a growth of electricity consumption from renewable sources under the support of the FIT programme and a concomitant decrease in the use of conventional energy, the emissions of CO_2 in Germany was reduced by 60 million tons over the period 2005-2010. The FIT programme of Spain also contributed to a reduction of 82.6 million tons of carbon emissions over the same period.[503] A continuous decline in carbon emissions will significantly benefit environmental protection, particularly climate change mitigation.

In terms of the impacts on social wellbeing, in Germany, many job opportunities were created in the renewable energy industry, amounting to around 280,000 opportunities in 2008 among which most were contributed by the wind sector.[504] By the end of 2008, the creation of employment in Spanish renewable energy industry almost reached

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[500] ibid

[501] Uwe Büsgen and Wolfhart Dürrschmidt, 'The Expansion of Electricity Generation from Renewable Energies in Germany: A Review Based on the Renewable Energy Sources Act Report 2007 and the New German Feed-in Legislation' (2008) 37 *Energy Policy* 2536 <https://www.sciencedirect.com/science/article/pii/S0301421508006526> accessed 19 July 2019

[502] García-Alvarez and Mariz-Pérez, (n 496) 55

[503] The World Bank, 'Data – Carbon emissions' <https://data.worldbank.org/indicator/EN.ATM.CO2E.KT?end=2014&locations=ES&start=1960&view=chart> accessed 19 July 2019

[504] Frithjof Staiss, *Renewable Energy Sources in Figures: National and International Development* (2006) *Environmental Policy* <http://www.globalbioenergy.org/uploads/media/0605_Renewable_energy_sources_in_figures_-_national_and_international_development__Germany_intl_.pdf> accessed 19 July 2019

120,722 jobs. The expansion of renewables industry in Germany and Spain has not only created a large number of employment opportunities for local people. It has also made the renewable energy electricity easily accessed by consumers. Therefore, the FIT programme in Germany and Spain has the social effect of increasing incomes and improving people's daily life.

Analysing from three main aspects which are economic development, carbon emissions reduction and social wellbeing, the discussion above indicates that FIT programmes for renewables industry in both Germany and Spain could be qualified as being cost-effective, considering their contribution to job creation, increasing income and expanding access to renewable energy among others. Beyond that, the FITs of Germany and Spain are cost-effective also in the sense that the extensive expansion of renewable energy industry in these two countries has allowed greater opportunities for the further development of relevant renewables technologies. This has not only brought about a gradual reduction in cost, but has also contributed to the more efficient and reliable renewable energy installations in the two countries.[505]

4.6.3 The legality of the EU FIT in the context of state aid rules and WTO subsidy rules

While the EU FITs programme has played a key role in promoting the renewable energy deployment in Member States, is it compatible with the EU state aid rules and WTO subsidy law? To answer this question, the next section will give a brief analysis of the legality of the EU FIT programme, taking the German FIT as an example, in the context of the EU state aid rules and WTO subsidy rules.

4.6.3.1 The legality of economic incentives in the context of the EU state aid rules

As the decision by the European Court of Justice (ECJ) on 13 March 2001 in Case C-379/98, *Preussen Elektra Aktiengesellschaft v. Schleswag Aktiengesellschaft*, [506]

[505] García-Alvarez and Mariz-Pérez, (n 496)

[506] Case C-379/98, *Preussen Elektra AG v Schhleswag AG* [2001] ECR para 10

constitutes an important judgment regarding state aid rules for the development of the renewable energy sector and climate change policies in EU Member States, before doing an analysis in the context of WTO rules, this part will focus on a brief analysis in the context of state aid rules, taking the appliance of economic incentives in the German case of *Preussen Elektra AG v. Schleswag AG* (2001) as a brief case study.

In 1998 the German Government amended the *Stromeinspeisungsgesetz* (German Renewable Energy Sources Act or EEG) and introduced into the 'hardship clause'.[507] This clause allows the grid operator to legally charge the supplier of the renewable electricity for the extra costs incurred because of its obligation to purchase electricity generated from renewable energy, if the amount of renewable electricity exceeds 5% of the total kilowatt hours supplied by the grid operator.[508] Preussen Elektra operated more than 20 conventional and nuclear power stations in Germany during that period.[509] It supplied electricity to regional electricity suppliers, medium-scale local businesses and industries. Schleswag was a regional electricity supplier then,

[507] The 1998 Law made several amendments to Paragraph 4 of the Stromeinspeisungsgesetz (Renewable Energy Sources Act or EEG). As amended by the 1998 Law, Paragraph 4 of the Stromeinspeisungsgesetz is worded as follows:

1. In so far as the kilowatt hours to be compensated for exceed 5% of the total kilowatt hours supplied by the electricity supply undertaking through its network during a calendar year, the upstream network operator shall be obliged to reimburse the electricity supply undertaking in respect of the supplementary costs resulting from the kilowatt hours exceeding that share. In the case of upstream network operators, the burden constituted by the right to reimbursement within the meaning of the first sentence also forms part of those supplementary costs. If there is no such operator, the obligation laid down in the first sentence of Paragraph 2 ceases, as regards electricity supply undertakings in the circumstances referred to in the first and second sentences, at the beginning of the first calendar year after those circumstances arose, in the case of installations not yet essentially completed at that time. In the case of wind turbines, the relevant time is the installation of the mast and the rotor.

2. The obligations laid down in Paragraphs 2 and 3 shall not exist where, even if the reimbursement clause in subparagraph 1 is applied, compliance with them would cause undue hardship. In such a case, the obligations are transferred to the upstream network operator.

3. There is undue hardship in particular where the electricity supply undertaking would be obliged to raise its prices to a level significantly higher than those of similar or upstream supply undertakings.

4. The Federal Minster for the Economy shall make a report to the Bundestag as to the effects of the hardship clause not later than 1999, and in any event in time for another compensatory provision to be adopted before the consequences referred to in the third sentence of subparagraph 1 arise.

[508] EEG 2000, para 4 (1)

[509] Case C-379/98, *Preussen Elektra AG v Schhleswag AG* [2001] ECR para 17 – 18

supplying the German Federal State of Schleswig-Holstein.[510] Almost all the amount of its electricity was bought from Preussen Elektra. Schleswag also owned 65.3% of Schleswag's shares.[511] At the end of 1998, Schleswag's share of electricity generated from renewable sources reached 5% of its total sales.[512] Invoking the hardship clause from the EEG, Schleswag invoiced Preussen Elektra for the additional costs caused by the obligatory purchase of wind-generated electricity from Preussen Elektra, claiming monthly instalments of 10 million Deutschmarks.[513] Preussen Elektra subsequently brought Schleswag before the Landgericht (Regional Court) Kiel for the repayment of 500,000 Deutschmarks. It argued that the sum claimed had been paid to Schleswag without a valid legal reason since the EEG was contrary to the European Community Treaty's directly applicable provisions on State aid.[514] According to Preussen Elektra, the German Government should have notified the European Commission of the changes made to the law in 1998, under Article 88(3) (ex Article 93) of the EC Treaty[515], since those amendments constitute State aid.

The Regional Court of Kiel referred some questions to the ECJ for a preliminary ruling. The Court's questions related to whether the German EEG constitutes state aid under EU law and whether the obligation to purchase electricity produced in Germany from renewable energy sources.[516] The purchase obligation was acted under conditions which could not be obtained on the open market and which might decrease demand of electricity produced in other Member States.[517] This obligation might constitute a

[510] Sara Poli, 'National Schemes Supporting the Use of Electricity Produced from Renewable Energy Sources and the Community Legal Framework' JEL [2002] 14(2) 209

[511] Case C-379/98 (n 508)

[512] ibid

[513] ibid

[514] ibid

[515] Article 88(3) of the EC Treaty provides that the Commission shall be informed, in sufficient time to enable it to submit its comments, of any plans to grant or alter aid. Member States shall not put its proposed measures into effect until this procedure has resulted in a final decision.

[516] Case C-379/98 (n 510)

[517] Mercedes Fernández Armenteros and Jürgen Lefevere, 'European Court of Justice, 13 March 2001,Case C-379/98, PreussenElektra Aktiengesellschaft v. Schleswag Aktiengesellschaft' RECIEL (2001) 10(3) 344

barrier to trade between Member States which is prohibited by Article 28 (ex Article 30) of the EC Treaty.[518]

The Court first solved the question whether the obligation for suppliers to buy renewable electricity generated in the area of supply at minimum fixed prices higher than the real economic value of that type of electricity, with the financial burden arising from that obligation allocated to the electricity supply firms and the upstream private electricity grid operators, constitutes State aid.[519] On the basis of Article 87(1) (ex Article 92) of EC Treaty any aid granted by a Member State or through State resources in any form whatsoever which distorts or threatens to distort competition by favouring certain enterprises or the production of certain goods is, in as far as it affects trade between Member States, incompatible with the common market.[520] The Court confirmed the obvious fact that the obligation to purchase electricity produced from renewable energy at minimum prices confers a certain economic advantage on renewable electricity producers, since it guarantees higher prices than the ones they would obtain in the absence of such regulation. It then focused its discussion on the issue of what constitutes 'granted by a Member State or through State resources'. It referred to earlier case law in which it held that only advantages granted directly or indirectly through State resources fall under the scope of Article 87(1).[521] The Court continued on to state that the distinction included in Article 87(1) between aid granted by a Member State and aid granted through State resources 'does not signify that all advantages granted by a State, whether financed through State resources or not, constitute aid but is intended merely to bring within that definition both advantages which are granted directly by the State and those granted by a public or private body designated by the State'.[522] The Court thus concluded that the purchase obligation

[518] Article 28 (ex Article 30) of the EC Treaty provides that quantitative restrictions on imports and all measures having equivalent effect shall be prohibited between Member States.

[519] Mercedes Fernández Armenteros and Jürgen Lefevere (n 516)

[520] Article 87 (ex Article 92) (1) of the EC Treaty provides that any aid granted by a Member State or through State resources in any form whatsoever which distorts or threatens to distort competition by favouring certain undertakings or the production of certain goods shall, insofar as it affects trade between Member States, be incompatible with the common market.

[521] ibid

[522] Case C-379/98 (n 505), para 58

combined with the setting of minimum prices does not imply a transfer, either directly or indirectly, of State resources, since the payments for those purchases go directly to the producers of renewable electricity and do not originate either from the State or from a public or private body designated or established by the State. The Court thus further concluded that the German EEG's imposition on private electricity suppliers of the obligation to purchase electricity from renewable sources at a guaranteed price and the resulting financial burden for the private sector did not constitute State aid.[523]

Through the analysis of the case of *Preussen Elektra AG v. Schleswag AG* above, the fiscal incentives for supporting renewable energy deployment in the early stage in the EU member states were considered compatible to the EU state aid rules. It is, however, of some importance to note that the German scheme was also challenged under free movement rules, as a measure having an effect equivalent to a quota (if you must buy all green electricity produced in the area, you won't be able to buy it outside it, for example in Austria).[524] The Court of Justice concluded that this was indeed similar to a quota but it was in the end justified because the obligation had an environmental objective.[525]

4.6.3.2 The WTO legality of the EU FIT scheme

As WTO Members, the EU and its Member States have to obey WTO rules when making policies, which means that the EU FITs have to be within the scope of WTO rules. EU Member States normally make their own FITs policies following the EU relevant Directives. However occasionally, due to the priority of promoting the development and deployment of renewable power generation technologies, the EU Member States may embrace some measures that potentially distort competition or are prohibited by the WTO subsidy rules, such as local content requirements (LCRs). A relevant case is, as will be discussed later in this section, *WT/DS452 - European Union and certain Member States – Certain Measures Affecting the Renewable Energy*

[523] Mercedes Fernández Armenteros and Jürgen Lefevere (n 516)

[524] Eric Engle, 'Environmental Protection As An Obstacle to Free Movement of Goods: Realist Jurisprudence in Articles' [2008] Journal of Law and Commerce 27(1) 113

[525] ibid

Generation Sector filed by China in 2012.[526] In addition, Germany, as a top-ranking Member State of the EU in deploying renewable energy, has provided very significant and valuable experiences to China in its renewables deployment. In this context, the following section will take the FITs of Germany and the case *European Union and Certain Member States – Certain Measures Affecting the Renewable Energy Generation Sector* as examples to briefly analyse the legality of the EU FITs in the WTO subsidy law context.

The WTO legality of German FITs for renewable energy

The *Electricity Feed-in Law 1991* was one of the first support schemes for the deployment of renewable energy in Germany. It required grid operators to purchase all electricity generated from renewable energy power plants at premium prices (FITs), so that grid access for renewable electricity was ensured.[527] However, as the law was proved not very effective in promoting the development of solar PV, bioenergy and geothermal energy, it was replaced by the German Renewable Energy Sources Act or EEG in 2000 which advocates the market development of renewables as a way to encourage renewable energy production. The EEG was successively amended in 2004, 2009, 2012 and 2014 to ensure that it adapts to the continuously changing situations of the renewable energy industry.[528]

With the aim of completing the transition from FIT schemes to the market orientated pricing mechanism, EEG 2017 entered into force on 1 January 2017 and introduced into Germany public tendering systems for onshore wind, offshore wind, solar and biomass projects.[529] With this change, renewable energy projects are no longer eligible for statutory feed-in tariff remuneration, but need to compete for it in public biddings

[526] WTO, *European Union and Certain Member States – Certain Measures Affecting the Renewable Energy Generation Sector* (DS452)
<https://www.wto.org/english/tratop_e/dispu_e/cases_e/ds452_e.htm> accessed 19 July 2019

[527] Electricity Feed-in Law of Germany 1991

[528] Legal Sources on Renewable Energy, 'Feed-in tariff (EEG feed-in tariff)' <http://www.res-legal.eu/search-by-country/germany/single/s/res-e/t/promotion/aid/feed-in-tariff-eeg-feed-in-tariff/lastp/135/> accessed 19 July 2019

[529] EEG 2017 art 19

held and supervised by the Federal Network Agency (Bundesnetzagentur). Successful projects will be offered contracts for the duration of 20 years which allow them to sell the produced electricity at the price that they bid during the auction process.[530] Based on the EEG 2017, a plant operator is entitled to receiving a feed-in tariff according to the subsequent provisions of the law for the amount of energy fed into the grid.[531] The grid operator is obliged to purchase all electricity generated by a plant operator and pay the tariff set out by law.[532] Subsequently, the grid operator is obliged to transfer the electricity received to the transmission system operator without undue delay.[533] The costs of the feed-in tariff scheme are borne by the final consumers via their electricity bills.[534] The implementation of the EEG is monitored by the Federal Network Agency.[535]

According to the provisions in EEG and its amendments, the implementation of the EEG is monitored by the Federal Network Agency and the evaluation of the Act is carried out by the Federal Government.[536] Based on the definition of a subsidy in the SCM Agreement, to verify whether a measure constitutes a subsidy, the following two elements need to be considered: (i) the existence of a financial contribution from a government or any public body; (ii) the contribution confers a benefit.[537] In addition, according to the definition of a subsidy in the reports of the Panel and the AB on the case *Canada – Renewable Energy/Canada – FIT*, the fact that the grid operators are obliged to purchase all electricity generated by a plant operator and pay the tariff set out by law can be interpreted as follow: the government has obtained possession of electricity by empowering the grid operators to purchase, at a certain price set by the government, all the electricity generated by renewable energy power plant operators.

[530] ibid

[531] EEG 2017 art 19 par 1

[532] EEG 2017 art 11 par 1, art 19 par. 1 (2)

[533] EEG 2017 art 56

[534] EEG 2017 art 60 par. 1

[535] EEG 2017 art 85

[536] EEG 2017 art 85 and 97

[537] SCM Agreement, art. 1. 1

In line with the definition of subsidy in the SCM Agreement, especially the sub-paragraphs (i) – (iii) of Article 1.1(a)(1) in the SCM Agreement, this act of purchasing in full amount constitutes a government's purchase of goods and confers benefit to renewable electricity plant operators by paying the tariff (surcharges from the end-users) set by law. It is not too difficult to conclude that the features of the German FIT scheme meet the requirements of the definition of a subsidy under the SCM Agreement and the FIT scheme constitutes a subsidy.

However, as there are no provisions involving prohibitive elements (i.e. LCR) in German FITs, the scheme is compatible with the WTO subsidy rules hitherto. Meanwhile, as cross-border electricity trade is still unpopular at the moment, there are still no cases that are really involved in a FIT programme and no complaint filed to the dispute settlement bodies so far.

Based on the theoretical analysis of the legality of German FIT, it can indicate that the FIT programme constitutes a compatible subsidy with the WTO subsidy rules. In reality, there is a case complained by China to the DSB about certain measures adopted by some EU member states for supporting the deployment of renewable energy. Using the framework of the foregoing analysis, the discussion in the next section will hypothetically evaluate the case *European Union and certain Member States – Certain Measures Affecting the Renewable Energy Generation Sector (DS452).*

The case of European Union and certain Member States — Certain Measures Affecting the Renewable Energy Generation Sector (DS452)

In 2012, China filed a complaint before the WTO, alleging that the FIT programmes of Greece, Italy, and other EU member states constituted subsidies that violated the SCM Agreement.[538] This case is similar to the complaints that Japan and the EU filed

[538] WTO, *DS452 – European Union and Its Member States – Certain Measures Affecting the Renewable Energy Generation Sector* (2012*)*
<https://www.wto.org/english/tratop_e/dispu_e/cases_e/ds452_e.htm> accessed on 20 November 2020

against Canada in the case of *Canada – Renewable Energy/Canada – FIT*, given that the relevant policy gets involved in LCRs.[539] Some EU Member states, including, but not be limited to, Italia and Greece, attached LCRs to their FITs to promote the development of domestic industries in around 2010. This led China to file a dispute before the WTO against the EU and certain Member states in 2012.[540] China considered that the above-mentioned FITs with the attachment of the use of domestic over imported goods are inconsistent with Articles 3.1(b) and 3.2 of the SCM Agreement.[541] Based on the information shown on the WTO website, the case is still at the consultation phase;[542] but it is said that the case has been sorted out with the LCRs withdrawn by the concerned EU Member states.

Although the case of *European Union and certain Member States — Certain Measures Affecting the Renewable Energy Generation Sector* has come to an end with the LCRs withdrawn by the concerned Member states, and even no a Panel had set up to investigate the case, the following will just try to analyse the potential reasoning behind the withdrawal of the LCRs.

As the Complainant in the case, China believed that 1) the measures include subsidies within the meaning of Article 1.1 of the SCM Agreement and 2) they are prohibited, because these measures are provided contingent upon the use of domestic over imported goods.[543] The next step will hypothetically analyse the case under the SCM Agreement.

In line with the definition of a subsidy in the SCM Agreement and the experience in the case of *Canada – Renewable Energy/Canada – FIT*, a contested FIT programme is only subject to regulation under the SCM Agreement if it meets the SCM

[539] *Canada – FIT ABR*, (n 381) para 5.126

[540] WTO, *DS452* (n 538)

[541] ibid

[542] ibid

[543] ibid

Agreement's definition of a subsidy.[544] Based on Article 1 of the SCM Agreement, two requirements need to be met: 1) the existence of a financial contribution by a government or a public body, and 2) the existence of a benefit.[545] Just as the analysis in the case of *Canada – Renewable Energy/Canada – FIT*, the challenged Canadian FIT program was deemed as a government's "purchase of goods" under Article 1.1(a)(1)(iii) and thus constituted a financial contribution.[546] Pursuant to the principles of the WTO case law, it is reasonable to conclude that EU Member states' FITs constitute financial contributions under Article 1.1(a)(1) of the SCM Agreement.

Taking the analysis in the Canadian dispute as a reference, the contested FITs confer benefits within the specific renewable energy markets that they are designed to promote (as opposed to the wholesale electricity market).[547] As the contested FIT programs transfer financial contributions and confer benefits to the recipients by making them better off within the specific renewable electricity markets than they otherwise would have been, we can conclude that EU Member states' FIT programs constitute subsidies under Article 1.1 of the SCM Agreement.[548] As EU Member states' FITs contain LCRs, based on Article 3 (any subsidy that contains a LCR is *per se* prohibited) of the SCM Agreement, the contested EU FITs can be considered as prohibited subsidies under the SCM Agreement (under Article 3).[549] In this case, the contested measures need to be withdrawn by the concerned Member states 'without delay'.[550]

Based on the case study on the legality assessment, although the narrowing of the definition of the relevant market by the AB in the case *Canada – Renewable Energy/Canada – FIT* has resulted in a difficulty in finding any FIT incompatible with

[544] *Canada – FIT ABR*, (n 381) para 4.12

[545] SCM Agreement, art.1

[546] *Canada – FIT ABR*, (n 381) para 4.12

[547] *Canada – FIT ABR*, (n 381) para 5.178

[548] SCM Agreement art 1

[549] SCM Agreement, art 3

[550] SCM Agreement, art 3.2 and 4.7

the WTO's subsidy laws, it is still advisable for WTO members to carefully design their future FIT schemes in accordance with the AB's decision in the case *Canada – Renewable Energy/Canada – FIT*. This means that WTO members should abolish LCRs and grant the aid through competitive bids, so that the potential incompatibility between the FITs and the WTO legal rules can be avoided.

4.7 A brief comparison between the FIT schemes in China and in the EU

Based on the assessments above on Chinese and the EU FIT schemes for the deployment of renewable energy, a brief comparison will be given in this section with the attempt to find out the pros and cons of Chinese FIT scheme, compared with its EU counterpart. The comparison will start from analysing policy designs of the two FIT schemes, and then move on to compare their effectiveness and legality.

Given that Chinese FIT scheme for deploying renewable energy follows the experience of the EU (particularly Germany) in policy design and enforcement of the FIT programme, the two incentives for supporting renewable energy development share some common points. Firstly, they have the same pricing mechanism, with the FIT rate priced by coal-fired tariff plus the surcharge (premium). These surcharges are collected in the form of electricity tariffs from the end-users of renewable electricity. The surcharges are distributed by the government to support renewable energy industry development. Secondly, electricity generated from renewable energy is purchased in full amount by grid companies. This is a very significant experience China has learnt from the EU. Before the full amount purchasing system enacted in China in 2016, the contradiction between the rapid increase in renewable energy installations and the lack of grids for power transmission has caused very serious curtailments of renewable energy.

In terms of the differences between the two schemes, given Chinese special context, especially its huge territory, the whole nation has been categorised into several different energy resource regions according to the scale of energy resources and the cost of project construction. Based on this, different FIT rates are applied to different regions in China, with lower rates applied in regions with abundant renewable energy

resources and higher rates in economically developed regions with high energy consumption. This energy region categorisation is very helpful to encourage investors to develop renewable energy industry in economically developed regions, even though the reserve of renewable energy resources in these regions may be relatively low. As can be seen, unlike the EU's plan to phase out the FITs in the renewable energy market, China tries to improve the FIT scheme by adjusting the role it plays in pricing the renewable electricity. For example, in the *Notice 2019* on FIT rates adjustment, the NDRC requires local governments to take the new FIT rates as guiding prices for newly installed renewable energy projects and set prices for new projects through competition.[551]

As for the effectiveness of the two FIT schemes, China has achieved rapid growth in the installation and generation capacity of renewable energy, which then has increased the share of renewable energy in the national energy mix, improved energy security, reduced carbon emissions and benefited social wellbeing. The FIT of the EU has also played a similar role in improving economic development, environmental protection and social wellbeing. However, it is worth noting that, under the support of FITs and other continuous, huge-scale subsidies from Chinese government for renewable energy industry, China has taken a leading position on renewables installation capacity for several years. Additionally, China has also established renewable manufacturing hub and downstream supply chain for renewable energy projects both domestic and abroad, whereas the EU is gradually losing its dominant position in renewables manufacturing. In terms of cost-effectiveness, considering the different contexts of China and the EU, it is very difficult to judge which side has a better cost-effectiveness in the deployment of renewable energy.[552] However, it seems that the EU has done better than China in dealing with the curtailments of renewable energy, given that EU member states have comparatively abundant grids to guarantee the access of renewable electricity to the grids. In China, with electricity generated from renewable energy

[551] NDRC, *The Notice of Improving Policies on the Feed-in Tariff of Wind Power* (NDRC Pricing NO. 16, 2009) (in Chinese, translated by the author) (2009) <http://www.ndrc.gov.cn/zcfb/zcfbtz/200907/t20090727_292827.html> accessed 18 July 2019

[552] Moerenhout, Liebert and Beaton (n 337)

being purchased in full amount and the promotion of deploying distributed renewables projects, the curtailment has been significantly reduced, but the curtailment rate is still very high at the moment.[553]

Regarding the legality of the two FIT schemes in the context of WTO legal system, China and the EU have similar design mechanisms and the two schemes are in the scope of WTO subsidy rules. They are, as already discussed above, actionable subsidies based on the definition for subsidy in the SCM Agreement. However, since there is still not much cross-border trade in electricity, the chance of having a WTO case directly challenging a FIT scheme in itself is currently small. So far, all cases complaint to the DSB concerning prohibited subsidies are related to the LCRs, a supplementary condition sometimes required by governments when implementing FITs in practice, but not the general provisions of the FIT per se. In this case, currently, the FIT scheme per se, of both China and EU member states, is compatible with WTO subsidy rules. However, as a way of improving local renewable energy technologies, LCRs are still quite frequently attached to FIT schemes, a phenomenon that may violate WTO subsidy rules and may cause disputes in international trade.[554] Therefore, both the provincial governments in China and EU member states should be very cautious about the legality of any supplementary LCRs when enforcing the FIT scheme for supporting renewable energy development.

[553] NEA, 'The Status of On-Grid Wind Power Generation' (in Chinese, translated by the author) (2019) <http://www.nea.gov.cn/2019-01/28/c_137780779.htm> accessed 18 July 2019

[554] Lewis (n 268) 16

Chapter Five

The Effectiveness and the WTO Legality of China's Emissions Trading Scheme

5.1 Introduction

As the international community has committed to mitigate global climate change, a broad range of policy instruments have been discussed, enacted and implemented worldwide. Among these, emissions trading scheme, also referred to as cap-and-trade, is increasingly popular and has been widely deployed around the world as the important climate change mitigation policy.[555] Apart from the extensive deployment of renewable energy, China, as the world's largest emitter of greenhouse gas (GHG), also actively participates in emissions trading scheme (ETS) which is the leading market-based instrument for reducing GHG emissions.[556] Building on the experience of running ETS pilots in seven regions, China launched its national ETS at the end of 2017. Once fully implemented, China's ETS would surpass the EU ETS and would become the world's largest carbon trading system, with an annual coverage of more than 3.5 billion tons of CO_2 emissions.[557] The launch of a national carbon market shows China's ambition to play the leading role in mitigating global climate change. It also reflects China's determination to achieve its commitments in China's Nationally Determined Contribution (China's NDC) under the Paris Agreement 2015, where the ambitious goal of peaking CO_2 emissions at about 11.3 billion tonnes around 2030 was set.[558] China's ETSs, including the regional pilot schemes and the national scheme, are under most notable influence of the EU ETS, which is currently the world's leading

[555] ICAP, 'ETS Map' (2017) <https://icapcarbonaction.com/ets-map> accessed 28 June 2019

[556] Anatole Boute and Hao Zhang, 'Fixing the Emissions Trading Scheme: Carbon Price Stability in the EU and China' (2019) 25 European Law Journal 333 <https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3370705> accessed 19 June 2019

[557] ICAP, *Emissions Trading Worldwide: Status Report* (2019) <https://icapcarbonaction.com/en/?option=com_attach&task=download&id=625>; Thomas Stoerk, Daniel Dudek and Jia Yang, 'China's National Carbon Emissions Trading Scheme: Lessons from the Pilot Emission Trading Schemes, Academic Literature, and Known Policy Details' (2019) 19(4) Climate Policy 472 <https://doi.org/10.1080/14693062.2019.1568959> accessed 19 June 2019

[558] Department of Climate Change of NDRC (n 7); Zhongxiang Zhang, 'Carbon Emissions Trading in China: The Evolution from Pilots to a Nationwide Scheme' [2015] 15 Climate Policy 104

GHG emissions trading system and has been serving as a model for developing carbon trading systems around the world.[559]

This chapter addresses, firstly, whether China's ETS is effective, not only in reducing carbon emissions but also in promoting economic development and improving social welfare; secondly, whether China's ETS is compatible with WTO subsidy rules. To achieve these objectives, this chapter first gives an overview of the evolution of the ETS and its implementation in China. The second section will outline elementary characteristics of China's ETS, including both regional and national policies. Based on these characteristics, the chapter will move on to do assessments on the effectiveness and legality of China's ETS respectively. In addition, given that the EU has the most developed ETS scheme and has also provided a very useful example for identifying lessons learned, the chapter will also do a brief assessment of the EU ETS from the perspectives of effectiveness and legality. Following the assessments on the ETSs in China and the EU is a brief comparison between the two schemes, which aims at finding out how lessons learned from the experience of the EU can be applied to China in its process of developing a national scheme.

5.2 The evolution of the emissions trading system

As one of the major instruments to control GHG emissions, emissions trading systems (ETSs) have been successfully implemented in a diverse range of economic and political contexts.[560] By August 2019, the ETS has been implemented in more than 20 countries and regions including China and its eight regions, and several other countries have either scheduled their ETS or made the system under consideration.[561] The original concept of the scheme can likely be traced as far back as 1960, when Ronald Coase argued that a market must be created so as to apply property rights to air pollution or other environmental issues that cause harm to others by business.[562]

[559] Boute (n 66)

[560] ICAP, *Emissions Trading Worldwide: Status Report* (2019) (n 557)

[561] ibid

[562] Ronald Coase, 'The Problem of Social Cost' [1960] 3 JLE 1

Coase's argument was further developed by some scholars and the concept of emissions trading was first put into practice under the Montreal Protocol. It was then applied by the US Environmental Protection Agency.[563] By the 1990s, the concept of 'cap-and-trade' was already very popular among international community, including academics, policymakers, business, and environmental groups.[564]

Under the influence of the US sulphur dioxide (SO2) trading scheme, [565] the first ETS – and also the largest one so far (before China's national ETS fully implemented in the power sector) – was launched in the EU in 2005.[566] The EU ETS is considered as the cornerstone of the EU's internal GHG emissions reduction policy and it also plays a significant role in the EU's external policy on climate change.[567] As a 'leader in international climate politics',[568] the EU is ambitious to develop a 'global network of emissions trading systems' (more details about the EU ETS will be given later in the section of brief assessment of the effectiveness and legality of the EU ETS).[569] Following the EU ETS, carbon markets have been put into place in Alberta (2007), Switzerland and New Zealand (2008), nine north-eastern US states under the Regional Greenhouse Gas Initiative – RGGI19 (2009), Tokyo (2010), Saitama (2011), California, Québec, and Kazakhstan (2013), seven Chinese provinces and cities (five in 2013 and two in 2014), as well as South Korea (2015).[570] Several other countries (including Vietnam, Mexico, Turkey, Morocco, Thailand and Indonesia, among others) are exploring ETSs through participating in the World Bank's Partnership for Market

[563] Jeff Swartz, 'China's National Emissions Trading System: Implications for Carbon Markets and Trade' (Geneva, 2016) <www.ictsd.org> accessed 19 June 2019

[564] ibid

[565] Stefan Weishaar, *Emissions Trading Design: A Critical Overview* (Edward Elgar, 2014) 4

[566] European Council Directive 2003/87/EC

[567] Boute (n 66)

[568] Rüdiger Wurzel and James Connelly, 'The European Union's Leadership Role in International Climate Change Politics Reassessed' in Rüdiger Wurzel and James Connelly (eds), *The European Union as a Leader in International Climate Change Politics* (Routledge, 2011) 271

[569] Elisa Morgera, Kati Kulovesi and Miquel Munez, 'Environmental Integration and Multi-faceted International Dimensions of EU law: Unpacking the EU's 2009 Climate and Energy Package' [2011] 48 (3) *Common Market Law Review* 862-3

[570] ICAP, *Emissions Trading Worldwide: Status Report* (2019), (n 557)

Readiness (PMR).[571] As can be seen, ETSs have been widely included in the contracting parties' emissions reduction strategy, as stressed and agreed in the Nationally Determined Contributions (NDCs) under the 2015 Paris Agreement.[572]

The experience of the EU ETS has influenced the design of other emissions trading schemes around the world, notably China's ETSs.[573] Drawing from the experience of the EU ETS,[574] China took the first step by launching and implementing seven regional pilot ETSs by the end of 2014, following which a national ETS was established in December 2017.[575] The launch of China's national ETS [576] has the potential of further expanding the scope of global GHG emissions covered by the ETS programme from 9% to 16%.[577] Furthermore, with the launch of a national ETS in China, jurisdictions with an operating ETS by 2018 generated more than 50% of global gross domestic product.[578] Both the achievements and challenges faced by the UNFCCC's carbon market, as well as the many different national/subnational carbon markets already in

[571] ibid

[572] UNFCCC Secretariat, 'Synthesis Report on the Aggregate Effect of the Intended Nationally Determined Contributions' (2015) 33 <http://unfccc.int/resource/docs/2015/cop21/eng/07.pdf> accessed 19 July 2019

[573] Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety of Germany, 'Emissions Trading: Basic Principles and Experiences in Europe and Germany' (2014) 1 <http://ets-china.org/wp-content/uploads/2015/07/ets_basic_principles_and_experiences_in_europe_and_germany_eng_online.pdf> accessed 19 July 2019

[574] Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ), 'Capacity Building for the Establishment of Emissions Trading Schemes in China' <http://ets-china.org> accessed 19 July 2019; EU Commission, Climate Action, 'International Carbon Market' <http://ec.europa.eu/clima/policies/ets/linking/index_en.htm> accessed 19 July 2019; European Council, 'EU-China Joint Statement on Climate Change' (2015) <http://www.consilium.europa.eu/en/press/press-releases/2015/06/29-eu-china-climate-statement> accessed 19 July 2019

[575] NDRC, *Interim Measures for Carbon Emissions Trading* (in Chinese, translated by the author) (2014) <http://qhs.ndrc.gov.cn/gzdt/201412/t20141212_652035.html> accessed 19 July 2019; NDRC, *China's Policies and Actions on Climate Change* (in Chinese, translated by the author) (2014) 37 <http://en.ccchina.gov.cn/archiver/ccchinaen/UpFile/Files/Default/20141126133727751798.pdf> accessed 19 July 2019

[576] NDRC, *The Work Plan for Construction of the National Emissions Trading System (Power Sector)* (n 71)

[577] ibid

[578] ICAP, *Emissions Trading Worldwide International Carbon Action Partnership* (Status Report 2018) <https://icapcarbonaction.com/en/icap-status-report-2018> accessed 19 July 2019

operation, can provide valuable experiences for countries in the process of designing their own climate policies.

5.3 China's carbon emissions trading scheme

Since China has replaced the United States as the world's largest GHG emitter in 2013,[579] it has been the focus of scrutiny in international climate negotiations and cooperation.[580] Facing both tremendous pressure and huge challenges in reducing its GHG emissions, China has established very ambitious long term targets for GHG emissions control, as initially elaborated in the *US – China Joint Announcement on Climate Change* on 12 November 2014[581] and reiterated in *Enhanced Actions on Climate Change: China's Nationally Determined Contributions* (NDC) submitted to the Climate Change Secretariat on 30 June 2015.[582] In the 11th Five-year Plan (FYP) (2006–2010), China's national government set a number of progressive energy and air quality targets to address domestic environmental problems and energy challenges. Supporting programmes were established to achieve these targets through laws, FYPs, national guidelines, and local or provincial pilot programs.[583] The first nationwide goal for CO_2 intensity (targeting a reduction of 17%) was established during the 12th FYP (2011–2015).[584] In 2015, the 13th FYP (2016 – 2020) established several climate and energy targets, including: 1) reducing national energy intensity (energy/GDP) by 15% from 2015 levels, 2) capping total energy consumption, 3) increasing non-fossil energy (e.g. renewable energy) to 15% of total primary energy, and 4) reducing carbon dioxide

[579] IEA, *CO_2 Emissions from Fuel Combustion – 2015 Highlights* (2015) <https://www.iea.org/publications/freepublications/publication/CO2EmissionsfromFuelCombustionHighlights2017.pdf> accessed 19 July 2019

[580] Zou Ji, 'What the World Is Getting Wrong about China and Climate Change' (2016) *China Dialogue* <https://www.chinadialogue.net/article/show/single/en/5711-What-the-world-is-getting-wrong-about-China-andclimate-change > accessed 19 July 2019

[581] David Belis and others, 'China, the United States and the European Union: Multiple Bilateralism and Prospects for a New Climate Change Diplomacy' (2015) 9 (3) *Carbon & Climate Law Review* 203 <https://cclr.lexxion.eu/article/cclr/2015/3/5/display/html> accessed 19 July 2019

[582] ibid

[583] Jeremy J.Schreifels, Yale Fu and Elizabeth Wilson, 'Sulfur Dioxide Control in China: Policy Evolution During the 10th and 11th Five-Year Plans and Lessons for the Future' (2012) 48 *Energy Policy* 779 <https://doi.org/10.1016/j.enpol.2012.06.015> accessed 19 July 2019

[584] ibid

intensity (CO_2/GDP) by 18% from 2015 levels.[585] These targets are intended to help achieve the broader strategic goals of the government to restructure the economy, to enhance energy security, to address air pollution, and to realise China's Copenhagen pledge of a 40% – 45% CO_2 intensity reduction from 2005 levels by 2020.[586] These targets also lay the foundation for meeting China's more ambitious Paris pledge of a 60 – 65% reduction in CO_2 emissions by 2030, a pledge that is in line with China's goal of achieving peak CO_2 emissions in the same year.[587] Now that China has pledged its best efforts to peak its carbon emissions as soon as possible before 2030 and to lower carbon dioxide emissions per unit of GDP by 60% to 65% from the 2005, the ETS is probably the most applicable policy instrument to adopt to reduce carbon emission at a minimum cost.[588] Many Chinese scholars point out that China's commitments are even more ambitious than the relevant targets already announced by the European Union and the US. It is therefore very challenging to achieve these targets, especially in the context of China.[589] Against these background, the ETS is not only an important market-based policy instrument for China to control its continuously growing GHG emissions; it also plays a vital role of urging China to comply with its commitments under international climate negotiations.[590]

Apart from the influence of the EU ETS, China has also obtained some experience from participating in the Clean Development Mechanism (CDM). Before the launch of regional pilot ETSs in 2011, China had already actively participating in the CDM for six years, during which period its central state-owned enterprises (from the petrochemical, power and cement sectors, among others) benefitted from Certified

[585] ibid

[586] ibid

[587] ibid

[588] Junjie Zhang, Zhenxuan Wang and Xinming Du, 'Lessons Learned from China's Regional Carbon Market Pilots' (2017) 6(2) *Economics of Energy & Environmental Policy* 19 <https://doi.org/10.5547/2160-5890.6.2.jzha> accessed 19 July 2019

[589] Jiankun He, 'Promoting Energy Revolution and Achieving China's Nationally Determined Contributions' (2015) <http://theory.people.com.cn/n/2015/0702/c40531-27241483.html> accessed 19 July 2019; Sha Fu, Ji Zou and Linwei Liu, 'Analysing the Targets Contained in China's Nationally Determined Contributions' (2015) <http://www.ncsc.org.cn/yjcg/zlyj/201506/t20150630_609569.shtml> accessed 19 July 2019

[590] ibid

Emission Reduction (CER) trading arrangements with partners from European and other Organisation for Economic Co-operation and Development (OECD) countries.[591] Based on this experience, China well understood the notions and the advantages of a market-based system for reducing GHG emissions.[592] The direct experience obtained from participating in the CDM gave NDRC enough confidence to establish the seven regional ETS pilots in China, especially in the aspect of policymaking. It also helped create the Chinese Certified Emissions Reductions (CCER) offset programme.[593]

The two provinces and five cities included in the seven regional ETS pilots together create 26.7% of China's 2014 GDP.[594] By 2015, more than 57 million tonnes of carbon have been traded under the ETS pilots which is approximately worth US$308 million.[595] Apart from the decisions of provincial and municipal Development and Reform Commission's (DRCs), advices and opinions from local emissions trading exchanges, scholars in universities and think tanks were also taken into consideration for the design of each pilot region.[596]

5.3.1 China's regional ETS pilots

Following the development strategy of 'learning by doing',[597] the launch of pilot ETSs is China's first step towards the establishment of a national scheme. The experience and lessons gained from designing and operating the seven regional pilot ETSs have

[591] ibid

[592] ibid

[593] ibid

[594] Josh Margolis, Daniel Dudek and Anders Hove, 'Rolling out a Successful Carbon Trading System' (2015) *Paulson Institute* 14 <http://www.paulsoninstitute.org/wp-content/uploads/2015/09/5-Emissions-Trading-EN-fnal1.pdf> accessed 19 July 2019

[595] ibid

[596] Zhe Deng and others, 'Effectiveness of Pilot Carbon Emissions Trading Systems in China' (2018) 18(8) *Climate Policy* 992 <https://www.tandfonline.com/doi/full/10.1080/14693062.2018.1438245> accessed 19 July 2019

[597] In another way of expression, "touching stones to cross the river", in Chinese "mo zhe shi tou guo he" (noted by the author)

played a key role in the establishment of China's national ETS.[598] An assessment of the implementation effectiveness of the regional pilot ETSs, along with an examination of the measures currently adopted to ensure the effectiveness of the schemes, can provide significant references for the construction and improvement of the national ETS of China.[599]

5.3.1.1 Key design features of Chinese ETS pilot schemes

The successful implementation of an ETS presupposes a strong legislative basis of the scheme. **Table 5.1** has listed legal documents issued specially for the pilot ETSs in different regions: some of them are enacted by the local People's Congress Standing Committees, while others are orders from provincial or municipal governments. Apart from legal tools, administrative methods are also used in some regions to promote compliance among firms, such as confiscating permits for the following year and circulating a notice of criticism.

The Chinese government has been emphasising in recent years the idea of governing the country in accordance with the rule of law. The essence of an ETS is to restrict the GHG emissions of a covered entity through requiring the submission of allowances equivalent to their emissions, so it is critical that a proper legal basis is established for the piloting ETS in the seven regions. However, it should be acknowledged that due to many reasons, mainly the importance attached to this issue by the top local leaders, the highest levels of decisions made on ETS piloting in the seven regions, i.e. the main legal basis, are quite divergent. They can generally be classified into three types.

[598] Maosheng Duan and Li Zhou, 'Key Issues in Designing China's National Carbon Emissions Trading System' (2017) 6(2) *Economics of Energy & Environmental Policy* 55 <https://www.iaee.org/eeep/eeepexec/EEEP62_ExecSum_duan.pdf> accessed 19 July 2019

[599] Deng and others (n 596) 993

Table 5.1 Legislative basis of the seven regional ETSs

Region	Legal document
Beijing	Resolution on Beijing to Carry Out Carbon Trade Pilot under the Premise of Strictly Controlling Total Carbon Emissions (Beijing Municipal People's Congress Standing Committee) (31 December 2013)[600]
Shanghai	Shanghai Carbon Emission Management Interim Guidelines (Shanghai Municipal People's Government Order No. 10) (18 November 2013)[601]
Guangdong	Guangdong Province Carbon Emission Management Interim Guidelines (Guangdong Provincial People's Government Order No. 197) (15 January 2014)[602]
Shenzhen	Regulation on Carbon Emission Management for the Shenzhen Special Economic Zone (Shenzhen Municipal People's Congress) (30 December 2012)[603]
Tianjin	Notice on Issuing the Interim Measures on Carbon Emissions Trading in Tianjin (General Office of Tianjin Municipal People's Government) (21 May 2013)[604]
Hubei	Hubei Province Carbon Emissions and Trade Management Interim Measures (Hubei Provincial Government Order No. 371) (25 April 2014)[605]
Chongqing	Chongqing Carbon Emission and Trade Management Interim Measures (Chongqing Municipal People's Government 41st Executive Meeting) (27 March 2014)[606]

Note: the information in the table is available on local municipal government websites.

[600] Beijing Municipal People's Congress Standing Committee, *Resolution on Beijing to Carry Out Carbon Trade Pilot under the Premise of Strictly Controlling Total Carbon Emissions* (2013) <http://www.bjrd.gov.cn/zdgz/zyfb/jyjd/201312/t20131230_124249.html> accessed 19 July 2019

[601] Shanghai Municipal People's Government, *Shanghai Carbon Emission Management Interim Guidelines* (2013) <http://www.bjrd.gov.cn/zdgz/zyfb/jyjd/201312/t20131230_124249.html> accessed 19 July 2019

[602] Guangdong Provincial People's Government, *Guangdong Province Carbon Emission Management Interim Guidelines* (2014) <http://zwgk.gd.gov.cn/006939748/201401/t20140117_462131.html> accessed 19 July 2019

[603] Shenzhen Municipal People's Congress, *Regulation on Carbon Emission Management for the Shenzhen Special Economic Zone* (2013) <http://www.sz.gov.cn/zfgb/2013/gb817/201301/t20130110_2099860.htm> accessed 19 July 2019

[604] General Office of Tianjin Municipal People's Government, *Notice on Issuing the Interim Measures on Carbon Emissions Trading in Tianjin* (2013) <http://qhs.ndrc.gov.cn/qjfzjz/201312/t20131231_697047.html> accessed 19 July 2019

[605] Hubei Provincial Government, *Hubei Province Carbon Emissions and Trade Management Interim Measures* (2014) <http://fgw.hubei.gov.cn/ywcs2016/qhc/zg_gzdt/bgs_wbwj/201404/t20140425_76918.shtml> accessed 19 July 2019

[606] Chongqing Municipal People's Government 41st Executive Meeting, *Chongqing Carbon Emission and Trade Management Interim Measures* <http://www.cq.gov.cn/publicinfo/web/views/Show!detail.action?sid=3874934> accessed 19 July 2019

Firstly, in both Beijing and Shenzhen, the standing committees of the Municipal People's Congresses, which are the local legislatures, make detailed decisions on the ETS. Although decisions made by the legislature are not laws, they are regulations providing the strongest legal basis available for short term policies like the ETS piloting, and can be passed in a short time period. The advantage of this is that a great deal of flexibility is afforded to the local government to establish and enforce effective ETS requirements, especially the compliance rules, such as imposing sufficiently high financial penalty for entities not complying with the requirements. Secondly, in Tianjin, Shanghai, Guangdong and Hubei, specific decrees on ETS have been issued by the local governments. In their case, the highest level of financial penalty, in absolute terms, that can be imposed on a non-complying entity is strictly restricted and is not allowed to exceed 150,000 Chinese Yuan. Lastly, in Chongqing, an administrative Notice, rather than a formal decree, has been issued by the local government, making it the weakest legal basis among all seven regions.[607]

Table 5.2 Key social-economic indicators (2013) for seven pilot ETSs in China

Region	Population (million)	GDP (billion, USD)	GDP per capita (1000 USD)	Fiscal revenue (billion, USD)	Energy consumption (10000 tce)	Industry structure (primary/ secondary/ tertiary)	Coal in primary energy (%)
China	1361	9249.5	6.8	1906.6	341094	10.0/43.9/46.1	70.6
Beijing	21.2	317.1	15.0	50.8	7178	0.8/22.3/76.9	29.5
Tianjin	14.7	233.7	15.9	18	8208	1.3/50.6/48.1	51.4
Shanghai	24.2	351.3	14.5	55.7	11362	0.6/37.3/62.2	41.8
Shenzhen	10.4	235.8	22.7	73.2	6525	0.04/43.4/56.6	Not available
Guangdong	106.4	1010.8	9.5	82.5	29144	4.9/47.3/47.8	48
Chongqing	29.7	205.8	6.9	15.8	9278	7.9/50.5/41.6	67.4
Hubei	58	401.11	6.9	21.5	17675	12.6/49.3/38.1	75

Source: Statistics Bureau of China: http://data.stats.gov.cn

[607] Maosheng Duan, 'From Carbon Emissions Trading Pilots to National System: The Road Map for China' (2015) 9(3) CCLR 231 <www.jstor.org/stable/26245322> accessed 19 July 2019

Seven regional pilot ETSs which include Beijing, Shanghai, Tianjin, Chongqing, Guangdong, Shenzhen and Hubei were launched by the end of 2014. These carbon trading pilots together cover the regions with approximately 265 million people, contributing about 2,755 billion dollars to the GDP in 2013. The design of the pilot schemes was based on the regional characteristics of the seven provinces and cities, thereby reflecting their divergent social, economic and institutional contexts. For example, as shown in **Table 5.2,** the seven pilot regions have divergent industry structures which contain different component proportions of the primary, secondary and tertiary sectors. Correspondingly, the energy use and average levels of income are also divergent across different regions. Among the seven pilot ETSs, the economies of high-income cities, such as Shenzhen, Shanghai, Beijing, are dominated by services and some manufacturing industry, whereas in the relatively less developed Hubei province, heavy industry accounts for a comparatively larger proportion in the economic structure.[608]

While there are many differences among the seven regional pilot ETSs, some similarities can also be observed among them (See **Table 5.3**). These include (but are not limited to) the coverage of indirect emissions related to the consumption of electricity and heat, free allocation of most allowances (although with divergent specific allocation methods), as well as the acceptance of offsetting credits. **Table 5.3** gives an overview of the main characteristics of the seven pilot ETSs in China. Shenzhen, Guangdong, Chongqing and Hubei have issued predetermined emission caps for their ETSs respectively. All pilot schemes cover only CO_2 emissions, except for Chongqing ETS that covers CO_2, CH_4, N_2O, HFC, PFC, SF_6. Different from the EU ETS, all seven pilots cover enterprises rather than emission sources.[609] Another difference from the EU ETS is that all the pilot schemes of China cover both direct

[608] Frank Jotzo and Andreas Löschel, 'Emissions Trading in China: Emerging Experiences and International Lessons' (2014) 75 *Energy Policy* 3 <https://doi.org/10.1016/j.enpol.2014.09.019> accessed 19 July 2019

[609] Zhang, 'Carbon Emissions Trading in China' (n 558)

and indirect emissions.[610] This means that enterprises are not only liable at the point of emission but also liable for their downstream if the energy source they make use of is electricity or heat.[611] The feature of including indirect emissions into the pilot ETSs has a potential benefit of reducing carbon leakage.[612] While all of the seven pilot ETSs in China cover electricity and heat production, only Shanghai ETS pilot includes transport-related emissions that cover railways, ports, civil flights and airports from the very beginning.[613] Existing and new installations in the seven pilot ETSs are all provided with most of the allowances for free, but the method of allocation varies. To be specific, for existing installations, emission-based grandfathering is the most common allocation method, whereas for new installations, except for Chongqing, all other six pilot ETSs have provided free allowances. Compared with free allowances, auctioning, adopted only in four regions, is less commonly used to allocate allowances in the pilot ETSs.[614] To reduce the cost of compliance, all of the seven pilot ETSs allow banking during the trading period.[615] However, borrowing is not allowed so as to improve the liquidity of the carbon market.[616] For the purpose of compliance, all ETS pilots are allowed to make use of domestic carbon offsets, namely Chinese Certified Emission Reductions (CCERs).[617]

As shown in the **Table 5.3,** all ETS pilots in China have annual reporting cycles which requires verification from third parties. Various methods have also been adopted in the ETS pilots to ensure that enterprises comply with the regulations. If enterprises fail to

[610] Sean Healy, Martin Cames and Felix Matthes, 'Climate Action and the Emissions Trading System (ETS) in China' (2016) <http://www.europarl.europa.eu/thinktank/en/document.html?reference=IPOL_BRI(2016)595330> accessed 19 July 2019

[611] ibid

[612] ibid

[613] ibid

[614] Tao Pang and Maosheng Duan, 'Cap Setting and Allowance Allocation in China's Emissions Trading Pilot Programmes: Special Issues and Innovative Solutions' (2015) 16 (7) *Climate Policy* <https://doi.org/10.1080/14693062.2015.1052956> accessed 19 July 2019

[615] Healy, Cames and Matthes (n 610)

[616] Zhang, 'Carbon Emissions Trading in China' (n 558)

[617] Healy, Cames and Matthes (n 610)

comply, they may be confronted with public disclosure or fines or future ineligibility for government support. It is worth noting that, based on the recommendations of the NDRC, the monitoring and reporting of emissions are conducted by covered entities directly, and data verification is granted to third parties which do not include international (non-Chinese) companies so far.[618] Given that China is quite protective of its emissions data, it is very difficult to get access to the full indicators of its emissions data for international community, although this situation is slowly changing.[619] This opacity has become a barrier for international community to monitor China's climate action and may eventually cause adverse effects on the credibility of Chinese carbon market, hence reduce the effectiveness of the pilot ETS programmes.[620]

Table 5.3 Key design features of the Chinese ETS pilot schemes[621]

	ETS Pilot Schemes						
	Beijing	Chongqing	Guangdong	Hubei	Shanghai	Shenzhen	Tianjin
GHG target							
Cap (predetermined)		✓	✓	✓		✓	
Scope							
Sectoral coverage							
Electricity & heat	✓	✓	✓	✓	✓	✓	✓
Water supply						✓	
Manufacturing	✓	✓	✓	✓	✓	✓	✓
Services	✓				✓		

Continue on next page

[618] Swartz (n 563)

[619] Angel Hsu, Andrew Moffat and Kaiyang Xu, 'Data Transparency: New Dynamic at COP-21 in Paris' (2015) *China FAQs* <http://www.chinafaqs.org/blog-posts/data-transparency-newdynamic-cop-21-paris> accessed 19 July 2019

[620] Yifei Hua and Feng Dong, 'China's Carbon Market Development and Carbon Market Connection: A Literature Review' (2019) 12(9) *Energies, MDPI, Open Access Journal* 1 <www.mdpi.com/journal/energies> accessed 19 July 2019

[621] Sean Healy, Martin Cames and Felix Matthes, 'Climate Action and the Emissions Trading System (ETS) in China' (2016) <http://www.europarl.europa.eu/thinktank/en/document.html?reference=IPOL_BRI(2016)595330> accessed 19 July 2019

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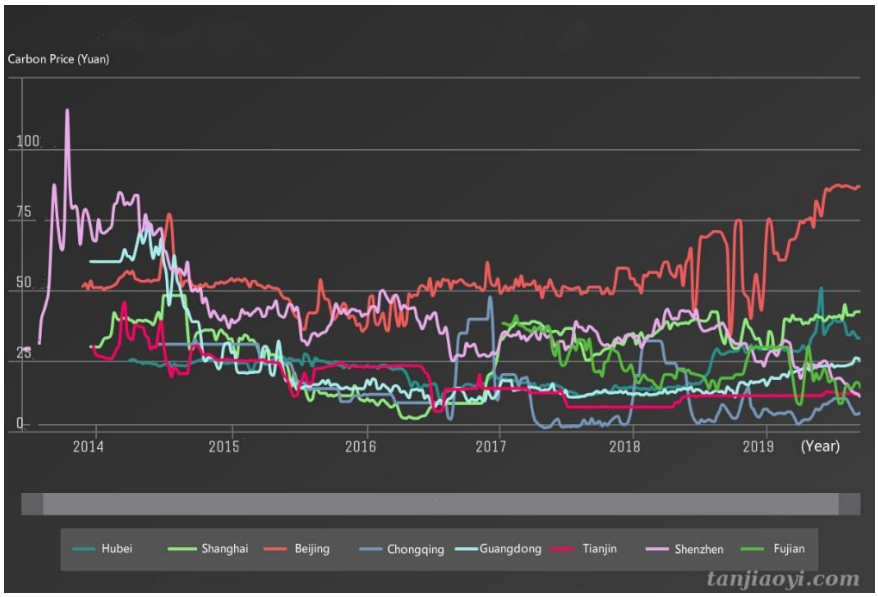
Buildings	✓				✓	✓	
Transport					✓		
Direct and indirect emissions	✓	✓	✓	✓	✓	✓	✓
GHG Coverage							
CO_2 only	✓		✓	✓	✓	✓	✓
CO_2, CH_4, N_2O, HFC, PFC, SF_6		✓					
Share of total emissions	~40%	~40%	~55%	~35%	~57%	~40%	~60%
Allocation							
Free allocation							
Existing installations_existing enterprises	✓	✓	✓	✓	✓	✓	✓
Ex-ante							
Historical emissions_grandfathering	✓		✓	✓	✓		✓
Historical production_benchmarking			✓				
Ex-post							
Current production_grandfathering	✓					✓	✓
Current production_benchmarking			✓	✓	✓	✓	
Current emissions_updating		✓					
New installations_existing enterprises	✓		✓	✓	✓	✓	✓
Production based allocation	✓		✓			✓	✓
Emission based allocation				✓	✓		
Auctioning			✓	✓	✓	✓	
Flexibility							
Banking	✓	✓	✓	✓	✓	✓	✓
Borrowing							
Offset (CCER) limit as a share of:	✓	✓	✓	✓	✓	✓	✓
annual allocation	5%			10%	5%		
annual compliance obligation		8%	10%			10%	10%
Provisions for price management	✓	✓	✓	✓	✓	✓	✓
MRV							
Annual reporting	✓	✓	✓	✓	✓	✓	✓
Third party verification	✓	✓	✓	✓	✓	✓	✓
Compliance							
Public disclosure		✓		✓			
Financial penalties	✓		✓	✓	✓	✓	
Disqualified from financial support		✓			✓		✓

Note: Key commonalities shaded in light green and key differences shaded in yellow in the table. Source: ICAP (2016); Pang & Duan (2015).

5.3.1.2 The market performance of China's regional ETS pilots

This section analyses the intermediate effects of the seven ETS pilots through the market performances which can partially be reflected by the carbon price and the trading volume of each of the seven pilots.[622]

Figure 5.1 Carbon prices in emission trading market pilots and the non-pilot region Fujian (June 2013 – September 2019)



Source: http://k.tanjiaoyi.com/

The seven ETS pilots have yielded seven different carbon prices in China (see **Figure 5.1**). As shown in **Figure 5.1**, carbon prices in the regional ETS pilots have experienced fluctuations since the schemes were initiated. Among the seven pilot ETSs, the most significant fluctuation happened in Beijing and Shanghai, while the price fluctuation of the Hubei ETS was relatively small. Although the fluctuation of carbon price is common at the initial stage of ETS globally,[623] the excessive fluctuation is not conducive to reflecting the actual cost of carbon emissions, and it may bring risks to scheme participants and uncertainty to the covered companies.[624]

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[622] Xing Chen and Jintao Xu, 'Carbon Trading Scheme in the People's Republic of China: Evaluating the Performance of Seven Pilot Projects' (2018) 35(2) *Asian Development Review* 131 <https://doi.org/10.1162/adev_a_00117> accessed 19 July 2019

[623] ibid

[624] ibid

Low trading volumes is another feature of Chinese regional ETS pilots. It is also a big challenge for China's carbon market.[625] In 2015, the total trading volume of all ETS pilots increased to around 66 million tonnes of allowances, making China the second largest carbon market in the world following the EU. The allowance trading volume in Hubei ETS was 13 million tonnes in 2015 which was the highest among the seven pilot ETSs. This is followed by Guangdong ETS with 5 million tonnes. Tianjin and Chongqing ETSs had the lowest traded carbon volumes.[626] So far (2019), the seven ETS pilots have all completed their first annual compliance cycle. The earlier established schemes with their second compliance cycle completed (such as Beijing, Shanghai, Tianjin, Shenzhen and Guangdong) have shown improved rates of compliance.[627] Among these, 'Shanghai was the only region [achieving] a 100% compliance rate for two consecutive years. In contrast, Chongqing had the lowest compliance rate of only 70% for its first compliance cycle'.[628]

Figure 5.2 shows the compliance rates across the seven pilot ETSs and the later established Fujian ETS from their launch dates to September 2019. As can be seen, the emission trading in Hubei, Guangdong, and Shenzhen ETSs were the most active. To be specific, the cumulative trading volume of Hubei ETS was 59.6 million tons, which accounts for 32% of the cumulative nationwide trading volume (185.18 million tons in total). Following Hubei ETS, both Shenzhen and Guangdong ETSs had much larger trading volumes than that of the Beijing and Shanghai ETSs. In addition, Tianjin and Chongqing were far behind other regional ETS pilots on the volume of carbon trading. As Fujian ETS was launched later than others in September 2016, relevant data is not suitable for comparison in this analysis.

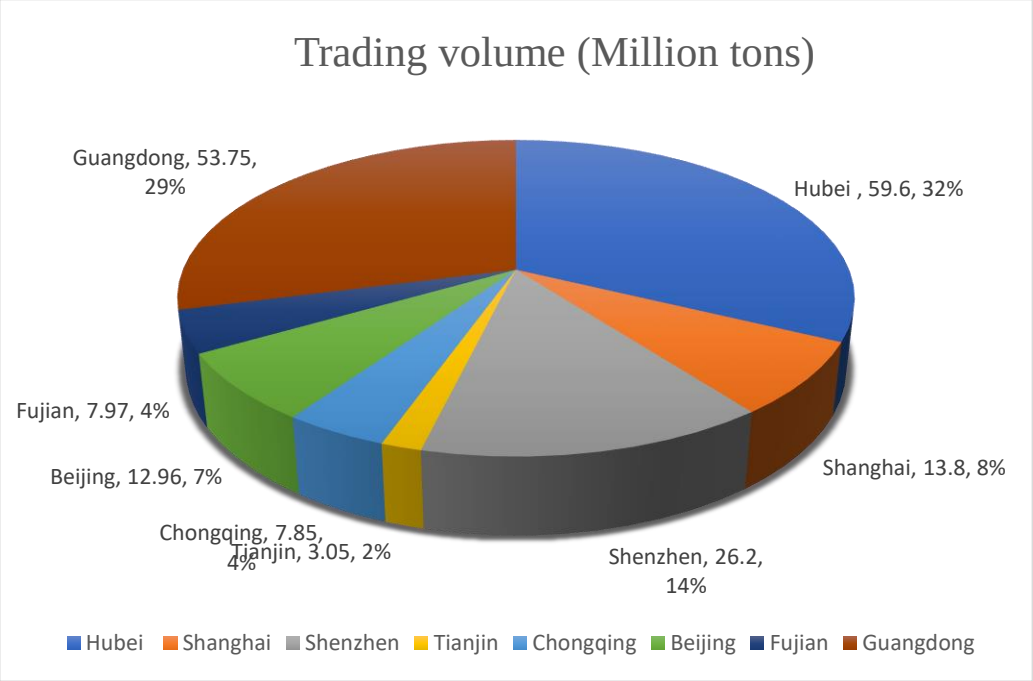
[625] ibid

[626] Environmist, 'China Carbon Market Research Report' (2016) <http://carbon-pulse.com/wp-content/uploads/2016/02/2016-Environomist-China-Carbon-Market-Research-Report_En_20160217_CW.pdf> accessed 19 July 2019

[627] ICAP, *Emissions Trading Worldwide International Carbon Action Partnership* (Status Report 2018) (n 578)

[628] Environmist (n 626)

Figure 5.2 Trading Volume of the seven pilot schemes and the Fujian ETS (June 2013 – September 2019)[629]



Source: http://k.tanjiaoyi.com/#k

Following the foregoing analysis of the legal basis, the design features and the market performance of China's regional pilot ETSs, next section will make an assessment of the effectiveness of the regional ETSs from the perspectives of environmental impacts, economic development impacts and social wellbeing impacts. This assessment is partly built on existent researches done by other scholars, particularly the ones relevant to the impacts of the ETSs on carbon emissions reduction. Since the primary concern of the ETS is to reduce carbon emissions and mitigate global climate change, this assessment will commence with the analysis of the environmental impacts of the Chinese regional ETSs. In addition, given that Chinese government takes the regional pilot ETSs as the first step towards a national ETS, this assessment will also involve an analysis the impacts of policy design on China's national ETS.

[629] China Carbon Trading Market, <http://k.tanjiaoyi.com/#k> accessed 19 July 2019

5.3.1.3 The effectiveness of China's regional pilot ETS programmes

Many scholars have done evaluations on the effectiveness of the carbon trading pilots which have been run in China for several years with experience and lessons. Given that it was a very short period of time from the preparation to the implementation of China's ETS pilots, some existent studies, especially the early ones, made relatively rigorous ex-ante simulation evaluations of the pilot ETSs by regions. After the successive implementations of the pilot ETSs which enable increasingly more observations in practice, ex-post empirical impact assessments began to attract attention.[630] Alongside an overview of the theoretical arguments for the ETS, the main aim of this assessment is to provide a review of China's regional pilot ETSs, based on the evidences from scientific studies and official reports.

Most literature on the effects of China's pilot ETS mainly focuses on the theoretical aspect. A straightforward concerns is regarding whether China's highly regulated and centralised energy industry threatens the effectiveness of China's regional pilot ETS programmes.[631] For example, Zhao analyses the seven pilot projects from the angles of 'carbon prices, trading volumes, market liquidity and information transparency', arguing that China's regional carbon markets are inefficient.[632] He observes that the lack of transparent market information and the uncertainty over the transition to the national ETS have affected market behaviour across the seven pilot ETSs. This, he presumes, may inhibit the demand for carbon allowances.[633] Lo points out in his research that the incomplete legal basis of and excessive government intervention in

[630] Jingjing Jiang and others, 'Research on China's Cap-and-Trade Carbon Emission Trading Scheme: Overview and Outlook' (2016) 178 (C) *Applied Energy* 902 <https://doi.org/10.1016/j.apenergy.2016.06.100> accessed 19 July 2019

[631] Fei Teng, Xin Wang and Zhiqiang LV, 'Introducing the Emissions Trading System to China's Electricity Sector: Challenges and Opportunities' (2014) 75 *Energy Policy* 39 <https://doi.org/10.1016/j.enpol.2014.08.010> accessed 19 July 2019

[632] Xin-gang Zhao and others, 'How to Improve the Market Efficiency of Carbon Trading: A Perspective of China' (2016) 59 RSER 1229 <https://doi.org/10.1016/j.rser.2016.01.052> accessed 19 July 2019

[633] Swartz (n 563)

China's carbon emissions market will limit the ETSs' development.[634] Meanwhile, there are also some scholars holding optimistic attitude towards the regional pilot ETSs. For instance, by modelling the economic performance of inter-provincial emission reduction quota trading scheme in China, Zhou argues that inter-provincial emissions trading under the pilot ETSs can reduce costs of carbon reduction by more than 40%.[635] Making use of the same model as in Lo's research, Cui et al. estimate that the pilot ETSs in China can save up to 4.42% of carbon emissions reduction costs and a nationwide ETS can save 23.44% of the costs.[636] By means of data envelopment analysis, Wang predicts that the pilot ETSs in China can play a substantial role in reducing carbon emissions at low costs.[637] Through an analysis of the relationship between abatement technology development and a high carbon trading price, Huang illustrates that the ETS in Shenzhen can increase the abatement technology investment when the carbon trading is at a high carbon price. As can be seen, adopting the analytical methods or models of economics and statistics, these recent studies have provided theoretical predictions of the impacts of the pilot ETSs on carbon emissions abatement at low costs.

A. Environmental effectiveness: perspectives on carbon emissions, carbon leakage and air quality

The main objective of the ETS is to reduce GHG emissions through marketisation and interest-driven mechanism, and to achieve the target of mitigating climate change. In view of this main objective, this section will firstly assess whether the pilots are helpful in abating carbon emissions in China. Following this, the analysis will be given on

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[634] Alex Lo, 'Carbon Trading in A Socialist Market Economy: Can China Make A Difference?' (2013) 87 *Ecological Economics* 72 <https://doi.org/10.1016/j.ecolecon.2012.12.023> accessed 19 July 2019

[635] Pei Zhou and others, 'Modelling Economic Performance of Interprovincial CO_2 Emission Reduction Quota Trading in China' (2013) 112 *Applied Energy* <https://doi.org/10.1016/j.apenergy.2013.04.013> accessed 19 July 2020

[636] Lian-Biao Cui and others, 'How Will the Emissions Trading Scheme Save Cost for Achieving China's 2020 Carbon Intensity Reduction Target?' (2014) 136 *Applied Energy* 1043 <https://doi.org/10.1016/j.apenergy.2014.05.021> accessed 19 July 2019

[637] Ke Wang, Yi-Ming Wei and Zhimin Huang, 'Potential Gains from CO_2 Emissions Trading in China: A DEA Based Estimation on Abatement Cost Savings' (2016) 63 *Omega* 48 <https://doi.org/10.1016/j.omega.2015.09.011> accessed 19 July 2019

whether the regional pilot ETSs have caused carbon leakage. The discussion will then move on to analyse the impact of pilot ETSs on China's air quality improvement.

a. Impacts on carbon emissions

As a cap-and-trade scheme, the ETS clearly defines the maximum quantity of emissions by setting an absolute cap. Although emissions levels may be influenced by a range of economic, political, and social factors of the regions, the quantity-based approach of the ETS 'can ensure emissions remain at or below a specified limit across the covered sectors, as determined by the cap'[638]. If the legislative basis of the ETS keeps stable and solid over time, the emissions abatement targets are very likely to be achieved.[639] In the Chinese context, have the pilot ETS schemes contributed to the reduction of carbon emissions? Since all Chinese pilot schemes, except for Chongqing, cover only CO_2 emissions, this assessment mainly focuses on discussing the effects of pilot ETSs on carbon emission reduction.

Zhang et al. assess six provincial pilots and pilot industries covered by the regional pilot ETSs in their research and find out that only the ETSs of Beijing and Guangdong have a significant inhibitory effect on the carbon emission intensity.[640] Although most enterprises participating in the ETS pilot programmes (except for those in Guangdong and Chongqing) have set their own emission reduction targets or strategies,[641] the implementation of ETS in other pilots in China has not inhibited carbon emissions as expected,[642] due to the limited range of industries covered by the pilot schemes, the

[638] Alexander Eden and others, 'Benefits of Emissions Trading: Taking Stock of the Impacts of Emissions Trading Systems Worldwide' (2018) <https://icapcarbonaction.com/en/?option=com_attach&task=download&id=575> accessed 19 July 2019

[639] ibid

[640] Kangkang Zhang and others, 'Has China's Pilot Emissions Trading Scheme Influenced the Carbon Intensity of Output?' (2019) 16 IJERPH 1854 <https://pdfs.semanticscholar.org/4ec9/078ab932813602f9cd7b1fbbaf1ab0b2408d.pdf?_ga=2.268974899.311200342.1574033537-984154619.1574033537> accessed 19 July 2019

[641] Deng and others (n 596) 993

[642] Zhang and others (n 640) 1854

lack of policy formulation, and the lack of substantive actions from the participating pilot enterprises.

In an empirical research, Wang et al. employ the difference in differences (DiD) method to evaluate the abatement effects of the pilot ETSs in China.[643] The result of their research shows that carbon intensities in the pilot regions are lower than those in the non-pilot regions.[644] The research also illustrates that, under the pressure of achieving the targets of the allocated allowance, the pilot regions decrease the proportion of coal use in total energy consumption, thereby have substantially reduced their carbon emissions.[645] These results, to some extent, suggest that the seven pilot ETS projects in China have a significant causal impact on reducing carbon intensities, but no substantial effect on carbon emissions abatement in the pilot regions.

b. Impacts on carbon leakage

While ETS is considered as one of the highly cost effective measures to achieve the targets of allocated allowances, covered entities still face a new cost factor under an ETS, including the cost of using cleaner energy, of promoting energy efficiency and seeking technology invention.[646] Concerns are often raised that, with this extra cost, the polluting industries may become less competitive in regulated regions, which will make them move to regions with lower carbon prices or simply move to non-regulated regions, causing what is termed as carbon leakage.[647] However, so far, existent studies of ETS have not found any significant evidence showing that carbon leakage happens in ETS projects, which indicates that these concerns are largely overstated.[648] The

[643] Qian Wang, Cuiyun Gao and Shuanping Dai, 'Effect of the Emissions Trading Scheme on CO_2 Abatement in China' (2019) 11(4) *Sustainability* 1055 <https://doi.org/10.3390/su11041055> accessed 19 July 2019

[644] ibid

[645] ibid

[646] Eden and others (n 638)

[647] ibid

[648] John Ward and others, 'Carbon Leakage: Theory, Evidence, and Policy Design (English)' (2015) 11 <http://documents.worldbank.org/curated/en/138781468001151104/Carbon-leakage-theory-evidence-and-policy-design> accessed 19 July 2019

reason behind this, as some scholars suggest, is that the policy design of ETS can actually address these risks through, for instance, 'the free allocation of some allowances to emissions-intensive, trade-exposed sectors, or through price equalisation measures for imports of energy-intensive products'.[649]

In terms of China's regional pilot ETSs, most of the allowances are allocated for free in the covered regions and sectors, while only a small portion is allocated by auction. There is no significant evidence from studies or relevant reports to date which suggests a carbon leakage side effect of the pilot ETS projects in China.

c. Impacts on air quality

As for the much hoped for co-benefit of improving air quality, the function of Chinese pilot ETS projects on this is relatively limited. This is because the national air pollution regulation of China has a stronger binding force than the climate principles of the regional ETSs. The strict national air pollution control policies require that companies should reduce conventional energy consumption and promote energy efficiency in the process of production, which to a large extent has helped reduce emissions of the main air pollutants. The function of the pilot ETS programmes on the improvement of air quality is thereby mainly ancillary to China's national air pollution regulation.

Beyond that, in most regions for ETS pilots, except for Chongqing, the scope of coverage includes CO_2 emissions only. This is another reason why the pilot ETS scheme has very limited effects on China's air quality improvement. However, with the launch of China's national ETS scheme, the enforcement of supporting laws, and the expansion of the scope of coverage to include other GHGs (such as H_2O, CH_4, O_3, etc), the national ETS has the potential to play a more significant role in improving the air quality of China. By this, it will also help achieve a broader public policy objective of improving the public health.[650] To conclude the analysis above of the

[649] Andrei Marcu and others 'Carbon Leakage : Options for the EU' (2014) <https://www.ceps.eu/ceps-publications/carbon-leakage-options-eu/> accessed 19 July 2019

[650] Eden and others (n 638)

environmental effectiveness of China's ETS pilots, the following table with indicators is given to provide an overview of the outcomes of the assessment, together with a brief summary of the relevant evidences or reasons behind.

Table 5.4 Indicators for the environmental effectiveness of China's pilot ETSs

	Objectives	Questions	Invalid	Valid			Comments
				Low	Medium	High	
1	Reducing carbon emission	Whether the regional pilot ETSs have the effect of reducing the amount of carbon emission in China?			1		Based on existent economics studies of the effects of the pilot ETSs, some regional pilots have evident impacts on local carbon emissions reduction, such as in Beijing and Guangzhou, but other regional pilots have not shown clear impacts on reducing carbon emissions.
2	Improving air quality	Whether the regional pilot ETS has helped reduce air pollutant emissions?	1				Chinese pilot schemes have no direct influence on air quality, as they cover only CO_2 emissions in most of the pilot regions. In addition, China's law on preventing and controlling air pollution has much stronger binding force than the requirements of the pilot ETS. Therefore, at present stage, there is no evidence showing that China's pilot ETS has the effect of significantly improving the air quality.

***Indicators of effectiveness Invalid**: 0 **Valid**: 1 (**Low**, **Medium** and **High**)*

B. Economic and social effectiveness: perspectives on economic growth and social wellbeing

Under the ETS scheme, after the allowances are allocated for free or by auction, emissions reduction becomes a matter of self-governing behaviour for covered entities to achieve the emission targets.[651] With the ETS being implemented for some time, enterprises will realise that carbon emission management can be linked to profitability, cash flow and business investment. Also, participating within the ETS can bring covered entities reputational benefits, such as establishing a green corporate image,

[651] ibid

which sometimes can be a kind of intangible asset for their business and may have a knock-on effect on consumers who may prefer green companies. Many enterprises included in the pilot carbon markets have increased their research and development (R&D) investment to control GHG emissions,[652] thereby helping achieve the regional emission reduction targets. As currently there is not much data on the social effects of the pilot ETS available, this assessment will mainly focus on the impacts of pilot ETSs on economic growth. The effects on low-carbon investment and technology invention will also be involved.

Due to the historically dominant role of energy in economic growth, it is commonly assumed that reducing emissions, mainly from energy generation, may undermine the economic development.[653] This is not necessarily true nowadays, as there are many underlying drivers of modern economic development, such as the increased energy efficiency, productivity, and the technological level of economies.[654] With specific emissions targets, ETS can give impetus to the transformation from the traditional energy-oriented economy to the clean and high-tech economy. In this respect, the ETS can serve to decouple carbon emissions from economic growth, which means that deep emission reductions are possible with little or no effect on economic growth. By this, the ETS can also, and more importantly, support countries to shift away from a carbon-intensive development path.[655]

Specific to China's pilot ETSs, there are some existent researches focusing on the impacts of individual ETS pilot on regional economic growth. For the Shanghai ETS, Zhou simulates its economic impacts and the results illustrate that a double dividend of carbon emissions reduction and economic growth from the pilot ETS scheme can be achieved, if the labour released from the ETS affected sectors is absorbed properly

[652] Deng and others (n 596) 994

[653] Eden and others (n 638)

[654] ibid

[655] ibid

and immediately.[656] This result also indicates that the pilot ETS sometimes may have adverse effects on the employment in the sectors covered in pilot regions. For the Guangdong ETS, Wang et al. assess the effects of the ETS on achieving the carbon intensity target and on carbon mitigation. The result illustrates that, with a specific abatement target, the implementation of ETS can reduce abatement costs and decrease GDP losses.[657] This study of carbon intensity shows that the pilot ETS constitutes a cost-effective way of achieving carbon reduction. Tan, Liu, and Wang evaluate the economic and environmental impacts of the Hubei pilot ETS. The result shows that by early 2016, the carbon emission of Hubei was reduced by 1%, with GDP only declining slightly by 0.06%.[658] The similar situation happens in the Tianjin ETS. The research result of Liu et al. shows that carbon emissions in Tianjin have decreased by 0.62%, while GDP declines a marginal 0.04%.[659] Deng et al. conclude in their study that enterprises in Shanghai, Beijing and Shenzhen performed better in technology innovation than in other pilot regions.[660]

To sum up, the results of these studies show that, at this stage, in order to achieve the carbon emission targets, some adverse impacts of China's pilot ETSs do exist, such as small scale workforce reductions due to the reduced scale of production and a slight decrease in GDP. These side effects differ across regions and sectors but seem to be more evident in the economically advanced regions like Shanghai. Although currently these side effects might put regional economic growth and social wellbeing at risk, they are still under control and will be gradually improved along with the maturation of China's regional and national ETS. Generally speaking, China's pilot ETS schemes

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[656] Shenglv Zhou, 'Economic and Environmental Impacts of the Shanghai Carbon Emissions Trading: Based on CGE Model Analysis' [2015] 11 *Advances in Climate Change Research* 144

[657] Peng Wang and others, 'Achieving Copenhagen Target through Carbon Emissions Trading: Economic Impacts Assessment in Guangdong Province of China' (2015) 79 *Energy* 212 <https://doi.org/10.1016/j.energy.2014.11.009> accessed 29 June 2019

[658] Xiujie Tan, Yu Liu, and Yi Wang. "The Economic and Environmental Impacts of the Hubei Pilot Emission Trading Schemes-based on Chinese Multi-Regional General Equilibrium Model' [2016] 2 *Wuhan University Journal* 64

[659] Yu Liu and others, 'Assessment of Impacts of Hubei Pilot Emission Trading Schemes in China – A CGE-Analysis Using Term CO_2 Model' (2017) 189 *Applied Energy* 762 <https://doi.org/10.1016/j.apenergy.2016.05.085> accessed 29 June 2019

[660] Deng and others (n 596) 994

are developing benignly at present and have the potential of achieving a double dividend of carbon emissions reduction and economic growth. **Table 5.5** with indicators briefly summarises the economic and social effectiveness of China's regional pilot ETSs.

Table 5.5 Indicators for economic and social effectiveness of China's pilot ETSs

	Objectives	Questions	Invalid	Valid			Comments
				Low	Medium	High	
1	Promoting economic growth	What is the effect of pilot ETS on economic growth?	0				As most part of Chinese economy is still energy-oriented, the pilot ETS may potentially threaten economic development in covered regions. However, given most of the allowances of emissions are allocated by free and excessively, even though the speed of economic development slows down within a narrow range in some regulated regions, the adverse effects on economic development are not very evident at present stage. ETS may be very helpful in promoting low-carbon economic development when carbon emissions trading instruments are getting mature over time.
2	Promote low-carbon technology development	Has the pilot ETS promoted low-carbon research and technology development in regulated regions?		1			While there are some enterprises investing on the developing low-carbon technologies in Shanghai, Beijing and Shenzhen, low-carbon technology is still not a very urgent objective for companies to do at current stage, given that most of the allowances are allocated by free and covered firms do not really suffer from too much stress in achieving the emissions targets. In this case, the pilot ETS is not very valid in promote low-carbon technology development at the moment.
3	Improving social wellbeing	What are the impacts of the pilot ETSs on employment creations		1			Based on limited date and existent studies on the impacts of the pilot ETS, there is not sufficient evidence to illustrate that pilot ETSs currently provide more employment opportunities for local people. On the contrary, some enterprise may reduce jobs so as to achieve the targets of allowances allocated

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		and income growth?					under the pilot schemes. In addition, as shown in the part of impacts on the emissions reduction, the pilot ETS has very limited effects on reducing air pollutant emissions. To sum up, at the current stage of implementation of the pilot ETSs, its benefits on improving social wellbeing have not distinct yet. In addition, under the regional pilot ETS, local governments promote to build low-carbon projects in remote areas. These projects, once verified and certified by the CCER, can be traded in carbon market as offsetting and bringing benefits for local people. For example, Hong'an, under the Hubei pilot ETS, builds a group of biogas projects and brings benefits to local people.

Note: Indicators of effectiveness, Invalid: 0 Valid: 1 (Low, Medium and High)

C. Policymaking effectiveness: perspectives on the Impacts on policy-designing of the national ETS

The main purpose of implementing pilot ETS schemes in China is to prepare toward the national scheme. This learning-by-doing approach

> '[A]llows policy makers to simultaneously avoid risks inherent in a one-size-fits-all policy, discard those approaches that have proven to be inadequate, and discover approaches that are particularly appropriate to China's diverse and unique circumstances.'[661]

In this case, pilot ETS programmes also play a vital role in setting up fundamental instruments for China's national ETS scheme. The effectiveness of the ETS pilots also can be analysed from the perspective of policymaking or design. Based on analysis in the sections about the impacts on carbon emissions and economic development, it can be seen that the regional pilots have generated moderate emission trading activities so far, and their impacts on carbon emission reduction and cost saving are very limited. The primary goal of the regional ETS pilots is to test whether China can make use of

[661] World Bank, *Emissions Trading in Practice: A Handbook on Design and Implementation* (World Bank, 2016) <http://documents.worldbank.org/curated/en/353821475849138788/Emissions-trading-in-practice-a-handbook-on-design-and-implementation> accessed 29 June 2019

market mechanisms to regulate carbon emissions; the experience and lessons learned from the implementation of pilot programmes will be very significant for setting up the national ETS. Based on existent studies, the following section will make use of empirical analysis method to outline the potential contributions of pilot ETSs to the national ETS programme on policymaking.

In the regional pilot ETS, some key elements, such as allowance allocation, MRV system and compliance, have been criticised by many scholars due to the deficiencies in the implementation of the pilot programme.[662] Based on the lessons learned from the implementation of pilot ETSs, policymakers may need to pay more attention on the following aspects: 1) Allowance allocation: most of the seven ETS pilots have over-allocated emissions allowances and done so for free in order to generously compensate covered entities for their initial participation.[663] The Ministry of Ecology and Environment (MEE), a new department of the Chinese government in charge of ETS, will have to weigh carefully the merits and risks of over-allocation and free allowances in the national ETS in order to avoid a policy outcome similar to what has caused the current surplus of allowances in the pilot ETSs. 2) MRV system: while China has set up a robust MRV programme under the seven pilot ETSs, the size of China's national ETS and the number of potential entities and sectors that will be covered will prove to be a great challenge for the MRV system.[664] In order to match with the huge scale of China's national ETS programme, a comprehensive and effective MRV system need to be built up. 3) Promoting liquidity and trading of the allowances: allowance trading in the seven ETS pilots has been very low to date and this has caused liquidity of allowances to be abnormally low compared with other cap-and-trade programmes, such as the EU ETS.[665] Low liquidity and low trading volumes have made it difficult for the covered entities to show any proactivity under the pilot

[662] Dong Sun and others, 'Carbon Markets in China: Development and Challenges' (2016) 52 (6) *Emerging Markets Finance and Trade* 1361 <https://doi.org/10.1080/1540496X.2016.1152811> accessed 29 June 2019; Boute and Zhang (n 547) 334

[663] Swartz (n 563)

[664] ibid

[665] ibid

scheme. The national ETS need to emphasise policy designing to deal with the over-allocated allowances and the surplus and to encourage covered entities to participate allowance trading.

In order to summarise the contribution of the pilot ETS to the national scheme on policymaking, the following table covers three aspects, namely experience accumulation, lessons learned and potential contribution to the national ETS on policymaking. This is also the purpose that the Chinese government implements the pilot scheme.

Table 5.6 Indicators for policy-making effectiveness

	Objectives	Questions	Invalid	Valid			Comments
				Low	Medium	High	
1	Experience accumulation	What kind of experience have been gathered from the implementation of the ETS pilots?				1	Based on the specific features of different regions, the design of the pilot ETSs has different characters. This method can make the scheme to great extent suitable for the covered regions. As a huge carbon market, the regional ETS may co-exist with the national ETS scheme so as to guarantee the effectiveness of China's ETS. In addition, the linking between the regional, the national and the international ETS should be built up to make the scheme more effective in mitigating carbon emissions.
2	Lessons learned	What lessons have been gathered from the implementation of the ETS pilots?				1	In the implementation of the pilot scheme, 1) overallocation of allowances and the surplus of allowances have not been solved properly; 2) the enthusiasm of covered entities has not been stimulated, which threatens the achievement of the targets and have adverse effects on the implementation of the pilot scheme; 3) low carbon price is not conductive to encouraging covered entities to trade the surplus; 4) the lack of

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							legal basis is not conductive to the implementation of the ETS programme.
3	Contribution to policymaking	What contribution the pilots could do for the national scheme?				1	Experience and lessons learned from the implementation of the pilot scheme will contribute a lot on policymaking of the national ETS, no matter the experience and lessons are positive or negative. Almost three years have passed since the launching of the national scheme. However, the Chinese governmental has not issued a comprehensive policy to support the national scheme. It may to some extent illustrate that the Chinese government has learned significantly from the implementation of the pilot scheme and is attempting to make great improvement on the regional schemes, instead of just following the design of the regional pilot scheme.

Indicators of effectiveness **Invalid**: 0 **Valid:** 1 (Low, Medium and High)

5.3.2 China's national ETS programme

China officially announced the launch of the national emissions trading scheme in December 2017 and had planned to establish the national market by 2020. However, the relevant support mechanisms are still under construction and the scheme has not established yet. As there is no enough precise data available, this part will not do a detailed assessment of the effectiveness of China's national ETS. Instead, this part will briefly introduce the progress of the national ETS construction.

With the experience and lessons learned from the implementation of the regional pilot ETSs, China officially launched its national ETS programme in December 2017 by issuing the *Work Plan for Construction of the National Emissions Trading System (Power Sector*) (the Work Plan).[666] This launch has been a goal set in 2015 at China's highest political level, which was reaffirmed by its Nationally Determined Contribution under the Paris Agreement, and the 13th Five-Year Work Plan for

[666] NDRC, *The Work Plan for Construction of the National Emissions Trading System (power section)* (n 71)

Greenhouse Gas Emission Control.[667] The creation of a national carbon market shows China's ambition to play a leading role in mitigating global climate change and achieve its commitment in its Nationally Determined Contribution (NDC) under the 2015 Paris Agreement, including the ambitious goal of peaking its CO_2 emissions before 2030.[668] Once fully implemented in the power sector, the only sector covered at this stage, China's ETS will surpass the EU ETS and California's Emissions Trading Scheme to become the world's largest carbon market, with the coverage about 3.5 billion tons of CO_2 emissions annually.[669] It is expected that the national ETS will lead China to greatly reduce the cost of achieving the country's long-term targets of decarbonisation.[670]

5.3.2.1 Three phases of the development of China's national ETS

According to the Work Plan, the government foresees a three-phase roadmap for the development of the China ETS into a fully-fledged carbon market, which looks similar as the development phases in the EU ETS.[671] The three development phases are as follows:[672]

Phase I: The period of market infrastructure development (roughly one year). China will focus on building up the required market infrastructures for the national ETS, including data reporting, a carbon registry, a trading system and a management system. In addition, China will undertake capacity development for market participants.

Phase II: The period of simulation trading in the power sector (roughly one year). Through mock allowance trading in the power sector, China will test the reliability and

[667] ICAP, *Emissions Trading Worldwide International Carbon Action Partnership* (Status Report 2018) (n 578)

[668] Zhang, 'Carbon Emissions Trading in China' (n 558)

[669] William Pizer and Xiliang Zhang, 'China's New National Carbon Market' (Working Paper, 2018) <https://nicholasinstitute.duke.edu/content/chinas-new-national-carbon-market-2> accessed 29 June 2019

[670] Cui and others (n 636)

[671] NDRC, *Work Plan for Construction of the National Emissions Trading System (Power Sector)* (n 71)

[672] ibid

efficiency of the national carbon market, test price management mechanisms, and optimise the management system.

Phase III: The period of deepening and perfecting (roughly starting from 2020). Likely starting from 2020, real spot trading will happen at the national scale for the power sector, with allowances likely allowed to be banked and traded across compliance periods. Once the carbon market in the power sector runs robustly, more sectors and participants are likely to be gradually covered, and various kind of products and transaction methods will be introduced then. Chinese certified emissions reduction (CCER) will be allowed as offsets in the national carbon market when conditions permit.[673]

As for the transition of the Chinese pilots, the Work Plan foresees that the existing regional ETS pilots are expected to operate in parallel to the national carbon market, covering the non-power sectors, and to be integrated into the national market once conditions permit.[674]

5.3.2.2 The legal basis of China's national ETS programme

The lack of a comprehensive legal framework to support the ETS has been criticised by scholars since the regional pilot ETS launched.[675] Despite the fact that the national ETS has been launched for almost three years now, China has not completed the market infrastructure construction, and the legal framework to operate a national carbon market has not been developed either. It is worth noting that, on 29 March 2019, the Chinese government issued the draft ETS regulation for public consultation.[676] Another currently updated good news, on 2 November 2020, the General Office of the MEE issued two policy documents on the national ETS which aim at establishing regulatory authority and specifying general rules for key areas of Chinese carbon

[673] ibid

[674] ibid

[675] Lo (n 634)

[676] MEE, 'The Notice on Calling for public consultation on ETS Regulation (draft)' (in Chinese, translated by the author) (2019) <http://fgs.mee.gov.cn/yfxzyfzzfjs/201904/t20190403_698483.shtml> accessed 29 June 2019

market operation and design. The two documents, entitled 'The National Measures for the Administration of Carbon Emissions Trading (Trial),' and 'The Administrative Measures for the Registration, Trading, and Settlement of the National Carbon Emissions Rights (Trial)' are now under public consultation.[677] The new consultation plan is a new push for the long-awaited carbon trading platform – China's national emissions trading system (ETS) which was originally launched in 2017. President Xi Jinping's pledge made in September to achieve China's carbon neutrality by 2060 has added new urgency to China's emissions reduction plans.

According to the status of China's ETS, looking to the future, the main tasks of China national ETS development will focus on establishing and improving national ETS regulations, promoting the development of market infrastructure for emissions trading, improving reporting, verification and carbon management schemes, and further strengthening capacity-building of covered entities. Based on the development phases in the Work Plan, China should complete the work on market infrastructure development before 2019, but it seems more complex and difficult than expected. The work is still in progress and there is no specific timeline of completion. Based on the new consultation plan issued by the Ministry of Ecology and Environment (the MEE) in November 2020, [678] China is currently targeting the launch of a nationwide emissions trading scheme during the period from 2021 to 2025 (the 14th Five-Year Plan), which signals another delay for the long-awaited national carbon trading market.[679]

5.4 The WTO legality of China's ETS

An ETS programme makes use of pricing mechanisms on carbon emissions to incentivise climate change mitigation, with a quota on total emissions that are

[677] MEE, The Notice on the Consultation for *The National Measures for the Administration of Carbon Emissions Trading (Trial)*, and *The Administrative Measures for the Registration, Trading, and Settlement of the National Carbon Emissions Rights (Trial)*, (in Chinese, translated by the author) (2020) <https://www.mee.gov.cn/xxgk2018/xxgk/xxgk06/202011/t20201102_805822.html> accessed on 20 November 2020.

[678] ibid

[679] The State Council, *China's 14th Five-Year Plan* (in Chinese, translated by the author) (2020) <http://www.gov.cn/zhengce/2020-11/03/content_5556991.htm> accessed on 29 November 2020

permissible (commonly referred to as a cap-and-trade system) from governments. Meanwhile, ETSs also provide entities participating in the ETS with the chance to trade their scarce and surplus emissions allowances on a secondary carbon market. Currently, various domestic ETS implemented across the world are largely designed to satisfy national needs and interests, with limited capacity for inter-scheme trading and with noticeable risk of increasing barriers to trade in products and services in the markets in allowances.[680] Thus, the reality of current ETS indicates that the potential for a harmonious relationship between ETS as a theoretical instrument and WTO law remains largely unfulfilled, and numerous issues of conflict still arise. As shown in the foregoing analysis of the features of ETS, the scheme usually constitutes a complex system, with a series of assistance measures to help the scheme achieve mitigation climate change. Some of the flanking measures, including allowances (free allocated or auctioned), border tax adjustments schemes, revenues recycling, are 'directly or indirectly'[681] relevant to WTO rules. They are also vulnerable and potentially to be challenged in the context of WTO legal system. The legality of various national climate policy measures may eventually depend on this.[682]

5.4.1 Emissions trading system and WTO law

Emissions allowances are the central feature of any cap-and-trade emissions trading system that is designed to reduce GHG emissions and mitigate climate change.[683] These allowances, representing a particular quantity of GHG emissions, are generally issued by the government either by free allocation or by auction.[684] From the financial perspective, as free allocation approach reduces the financial burden of domestic entities participating in the ETS, free allocation allowances are widely used to deal

[680] Larragán (n 120) 639

[681] ibid

[682] Luca Rubini and Ingrid Jegou, 'Who'll Stop the Rain? Allocating Emission Allowances for Free: Environmental Policy, Economics, and WTO Subsidy Law' (2012) 1(2) *Transnational Environmental Law* 325 <https://core.ac.uk/download/pdf/85220632.pdf> accessed 29 June 2019

[683] EU ETS refers to emissions 'allowance' and the Australian carbon pricing mechanism (CPM) refers to the unit of trade as carbon units. See Felicity Deane, *Emissions Trading and WTO Law: A Global Analysis* (EE 2015) 3

[684] Australian Clean Energy Act 2011 (No. 131, 2011) s 99

with competitiveness issues and carbon leakage concerns under existing national cap-and-trade systems.[685] While the free allocation allowances may help to sort carbon leakage issues out, but there is no conclusive evidence so far.[686] It could negatively affect the state budget and reduce incentives for entities to reduce emissions as well.[687] On the other hand, a free allocation can also cause the risk of windfall profits to entities.[688] Faced with these issues, the EU Member States are transferring from free allocation allowances towards auctioning of an increasing part of allowances in the Phase III of the their ETS.[689] Meanwhile, concerns have also been raised in the literature about the consistency of free allocation allowances with the WTO subsidy rules,[690] with some studies focusing on the particular issues of emissions trading.[691] Based on literature review, the free allocation allowances are, indeed, subsidies in accordance with the definition in the SCM Agreement.[692] Furthermore, the free allocation system may be a prohibited or actionable subsidy, according to the different thresholds for allocation and levels of assistance set by each scheme.[693]

As a multilateral trading system, the WTO and its rules are generally involved in governmental measures that could affect the competition of trade between domestic

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[685] Susanne Dröge, 'Tackling Leakage in a World of Unequal Carbon Prices' (2009) *Climate Strategies* 46

[686] Ingrid Jegou and Luca Rubini, *The Allocation of Emission Allowances Free of Charge: Legal and Economic Considerations* (Issue Paper No.18, 2011) 21 <https://www.ictsd.org/sites/default/files/downloads/2011/08/the-allocation-of-emission-allowances-free-of-charge.pdf> accessed 29 June 2019

[687] ibid

[688] Beat Hintermann, 'Emissions Trading and Market Manipulation' in Stefan Weishaar (eds), *Research Handbook on Emissions Trading* (EE, 2016) 89

[689] Jegou and Rubini, 'The Allocation of Emission Allowances Free of Charge' (n 686) 22

[690] Jegou and Rubini, 'The Allocation of Emission Allowances Free of Charge' (n 686) 23; Christina Voigt, 'WTO Law and International Emissions Trading: Is There Potential for Conflict?' (2010) 1 (2) *Carbon and Climate Law Review* 54; Larragan (n 120)

[691] Kateryna Holzer, 'Proposals On Carbon-Related Border Adjustments: Prospects for WTO Compliance' (2010) 4 (1) *Carbon and Climate Law Review* 51; Jegou and Rubini, 'The Allocation of Emission Allowances Free of Charge' (n 686) 23

[692] Jegou and Rubini, 'The Allocation of Emission Allowances Free of Charge' (n 686); Voigt (n 690); Larragán (n 120)

[693] Elena de Lemos Pinto Aydos, *Paying the Carbon Price: The Free Allocation of Permits and the WTO Discipline of Subsidies* (EE, 2017) 142

and imported products, services or other kind of international trade.[694] In the context of WTO law, *market access* and *non-discrimination* are the main benchmarks against which an instrument is assessed on the compatibility/legality to WTO rules in majority of relevant cases. Meanwhile, WTO rules also provide for exceptions when instruments are taken for the purpose of environmental protection. For example, paragraph (g) of GATT Article XX provides an exception for the measures that are used to conserve exhaustible natural resources. Regulations on the use of state aid or subsidies are involved in Article XVI of the GATT and the provisions of the SCM Agreement. In the context of WTO legal system, the use of subsidies is supposed to be under legal scrutiny when subsidies promote exports or support import substitution[695] and adversely affect the interests of other WTO members, including injury to their industries, impairment of their benefits under tariff concessions and serious prejudice to their interests.[696]

In line with the relation of demand-supply theory, because normally the supply of emissions allowances is less than that of the demanded by covered entities, emission allowances inevitably constitute a *scarce resource* with a positive price in the market which correspondingly raises the total costs of production in entities.[697] It is not difficult to conclude that entities covered in an ETS are at a disadvantage comparing with competitors that are not participating in any ETS. Accordingly, in the context of WTO law, when a higher cost burden is placed on foreign producers, the cost increases relating to ETS will, in some degree, raise trade disputes under WTO rules.[698] Because trading in emissions allowances is not alike trade in its traditional sense, such as trading in goods and services, but involves rights to emit certain amounts of emissions

[694] Steve Charnovitz, "The Law of Environmental 'PPMs' in the WTO: Debunking the Myth of Illegality" (2002) 27 (1) 4 *Yale Journal of International Law* <http://digitalcommons.law.yale.edu/cgi/viewcontent.cgi?article=1170&context=yjil> accessed 27 June 2019

[695] SCM Agreement, art 3

[696] SCM Agreement, art 5

[697] Tracey Epps and Andrew Green, *Reconciling Trade and Climate Change: How the WTO Can Help Address Climate Change* (EE, 2010) 65

[698] Kateryna Holzer, 'Emissions Trading and WTO Law' in Stefan Weishaar (eds), *Research Handbook on Emissions Trading* (EE, 2016) 328

during the process of entities' production and consumption, the scrutiny on the legality of the ETS under WTO rules is very important and needed.

In terms of the relation of emissions trading and WTO rules, it is actually still controversial in literature over the issue of the legal nature of emissions allowances and whether the WTO Agreement could regulate them and their trade. Werksman and Lefevere argue that 'allowances cannot be described as either products or services under the WTO, and thus rules governing the transfer and mutual recognition of allowances are not covered by WTO disciplines.'[699] By contrast, some others compare emissions allowances to commodities: like commodities, because of 'emissions allowances are traded on the market and have a price'.[700] Based on WTO rules, if emissions allowances were considered to be commodities, they would fall within the regulatory scope of the GATT. With the summary of relevant literature, one can find out that the prevailing view regarding the nature of emissions allowances is that they are like services – financial services to be precise – and accordingly could be regulated by the GATS rules on financial services.[701]

Although the legal status of emissions allowances is still controversial and will remain so until it is clarified in a future WTO dispute over the emissions allowances issues, one thing seems to be certain: emissions allowances and other design features of emissions trading and flanking support instruments have the potential influences on international trade directly or indirectly, through an impact on trade in goods and services, and therefore to come into conflict with the provisions of the GATT and/or the GATS.[702]

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[699] Jacob Werksman and Jürgen Lefevere, 'WTO Issues Raised by the Design of an EC Emissions Trading System under the Kyoto Protocol' (Contracted work for the EU, 1999) 3

[700] Jillian Button, 'Carbon: Commodity or Currency? The Case for an International Carbon Market Based on the Currency Model' (2008), 575–577 <https://harvardelr.com/wp-content/uploads/sites/12/2019/07/32.2-Button.pdf> accessed 27 June 2019

[701] Robert Howse, 'World Trade Law and Renewable Energy: The Case of Non-Tariff Barriers' (United Nations Conference on Trade and Development, 2009) 15–16 <https://unctad.org/en/Docs/ditcted20085_en.pdf> accessed 27 June 2019

[702] *EC-Bananas III*, (AB Report, 2012) paras 221–22

5.4.2 The WTO legality of the free allocation of allowances

Before commencing with the assessment, this section will firstly analyse whether the free allocation constitutes a subsidy within the meaning of the WTO Agreement. This is a general analysis but will provide a framework for the following assessment.

5.4.2.1 Whether free allowances fall in the scope of subsidies within the SCM Agreement?

Article 1 of the SCM Agreement gives the WTO definition of a subsidy which consists of two components: (1) a measure must constitute a 'financial contribution' by a government or any form of 'income or price support'; and (2) must confer a 'benefit'. The financial contribution by a government can take three forms: (1) direct transfers of funds (for example, loan guarantees); (2) fiscal incentives (government revenue that is otherwise due is forgone); and (3) provision of goods or services apart from general infrastructure or purchase of goods.[703] In addition, it covers situations where a government entrusts a private body to provide a financial contribution in any of the three forms or provides financial support indirectly (for example, through a funding mechanism).[704] According to the foregoing analysis of subsidy in legality of FITs, currently, subsidies can be categorised into actionable subsidies and prohibited subsidies.[705] Subsidies which are specific and given to particularly firms or industries are actionable and the ones with adverse effects for industries of other WTO members can also face countermeasures.[706] Subsidies that directly induce export performance and subsidies contingent upon the use of domestic inputs will constitute prohibited subsidies.[707] Non-specific subsidies, which are available across the board to all sectors of the economy, do not fall within the regulatory scope of the SCM Agreement and cannot be challenged in the context of WTO law.[708]

[703] SCM Agreement art 1.1(a)(1)(i)–(iii)

[704] SCM Agreement art 1.1(a)(1)(iv)

[705] SCM Agreement (n 703)

[706] SCM Agreement Part V

[707] SCM Agreement art 3

[708] Holzer, 'Emissions Trading and WTO Law' (n 698)

A. Does a financial contribution exist?

A financial contribution under Article 1.1(a)(1) of the SCM Agreement exists if one of the following can be proved: a 'transfer of funds'; 'governmental revenue that is otherwise due is foregone or not collected'; or 'a provision of goods or services'.[709] The free allocations of allowances does not easily fit within the category of a 'transfer of funds' in the SCM Agreement, which refers to specific forms of financial supports, such as loans, capital injections and guarantees, but they could qualify as either governmental revenues that are foregone, or provision of goods or services.[710]

B. Is the "government revenue that is otherwise due" foregone?

With experience and lessons from the EU ETS, the Chinese ETS adopts the free allocation when distributing emissions allowances. Meanwhile, a certain of proportion of emissions allowances are allocated by auctioning both in the pilot phase and in the initial phase of the national scheme. Based on the fact that under the free allocation allowances are distributed for free of charge instead of being exchanged for money, Holzer argues that the free allocation could be considered to be a *financial contribution by a government* in the form of the revenue foregone that would otherwise have been due.[711] In order to examine this issue, Rubini and Jegou analyse it from the perspectives of the polluter pays principle (PPP) in international law and 'the general norm in domestic law' and argue that 'the free allocation of allowances would constitute a financial contribution' if the charge for emissions allowances is considered as a tax in the scenario of domestic law.[712] Under China ETS programme, emissions allowances are mainly allocated to emitters for free. Following this analysis, it can be

[709] SCM Agreement art iv

[710] Lauren Henschke, 'Going it Alone on Climate Change: A New Challenge to WTO Subsidies Disciplines – Are Subsidies in Support of Emissions Reductions Schemes Permissible under the WTO' (2012) 11(1) *World Trade Review* 30-9 <https://doi.org/10.1017/S1474745611000450> accessed 27 June 2019

[711] Holzer, 'Emissions Trading and WTO Law' (n 698)

[712] Rubini and Jegou, 'Who'll Stop the Rain?' (n 682)

argued that the free allocations of emissions allowances can constitute a financial contribution to the emitters in the context of WTO law.

C. Provision of goods or service

As emissions allowances can be distributed as financial rewards or economic returns and even traded as securities on the market, one could argue that emissions allowances have economic value and thus they are regarded as financial instruments, and their transfer could involve financial services in GATS. On the other hand, relying on an argument in the *US - Lumber IV* dispute[713], the free allocation of emissions allowances could be essentially considered as the grant from the government of an entitlement to pollute a kind of natural resource, such as the atmosphere. From this perspective, it can be argued that the allocation of emissions allowances can be considered as a provision of goods under the SCM Agreement as well. To sum up, the emissions allowances are involved in the provision of goods and/or services, and thus, can be considered as a form of financial contribution under Article 1 of the SCM Agreement.[714] Moreover, Rubini and Jegou point out that the free allocation of allowances could also be regarded as a form of income support by making use of an analogic analysis of feed-in tariffs in the context of policy instruments to fight climate change.[715] Consequently, the free allocations meet the first element of the subsidy definition under Article 1.1 (a) (1) (ii) of the SCM Agreement.

D. Is there a benefit conferral?

To qualify the free allocation of emissions allowances as a subsidy under the SCM Agreement, a financial contribution or an instrument of income support has to confer a benefit to recipients.

[713] WTO, *United States - Canada* (n 451)

[714] Rubini and Jegou, 'Who'll Stop the Rain?' (n 682)

[715] Rubini and Jegou, 'Who'll Stop the Rain?' (n 682); Sadeq Bigdeli, 'Incentive Schemes to Promote Renewables and the WTO Law of Subsidies' in Thomas Cottier, Olga Nartova and Sadeq Bigdeli (eds), *International Trade Regulation and the Mitigation of Climate Change* (Cambridge University Press, 2009) 170

One could argue that free allocation confers a benefit to entities so long as an emissions allowance, which was granted for free, can always be traded on the market if an entity achieves emissions cap and has no need in the allowance to comply with its emissions quota.[716] Thus, due to the receipt of free allowances, an entity gets a better financial position than before, which constitutes the conferral of a benefit.[717] So, if the free allocation of emissions allowances constitutes a state financial contribution and confers a benefit to an entity, it would be enough to conclude that the free allocation constitutes a subsidy under WTO law. But this is not the end of the story. A subsidy determination would not be enough for the complaining party to win a dispute in the WTO or to serve as justification for the unilateral imposition of countervailing duties (CVDs) on subsidised imports.

5.4.2.2 The legality of the free emissions allowances under WTO subsidy rules

In line with the definition of prohibited subsidies, as long as emissions allowances are not allocated for free specifically on products for exportation or on the condition that a firm covered by the ETS has to use locally produced components, the free allocation of allowances is unlikely to be considered as a prohibited subsidy. However, since the free allowances are usually available only to certain firms or industries under an ETS, basically to those with a significant risk of carbon leakage in their activities of production, according to the definition of subsidy in the SCM Agreement, the free allocation is likely to be viewed as a specific subsidy. In this case, the free allocation of allowance could potentially be an actionable subsidy. This means that, in line with WTO subsidy rules, the free allocation of allowance could successfully be challenged under the WTO legal system, and eventually be forced to be withdrawn, or could be challenged by trading partners through provisions on countervailing duties, if the complaining parties are able to claim 'adverse effects' (such as 'material injury') to their domestic industries caused by the measures.[718]

[716] Jegou and Rubini, 'The Allocation of Emission Allowances Free of Charge' (n 678) 22

[717] Jegou and Rubini, 'The Allocation of Emission Allowances Free of Charge' (n 678) 575–576

[718] SCM Agreement art 5

In the case of *US-Softwood Lumber IV*, the claim over a subsidy was on account of the fact that the companies failed to pay 'adequate remuneration' to the government for the access to the natural resource (lumber).[719] An analogy could be drawn from the case[720]: if complaining countries themselves have emissions trading in place, the

> '[C]ountries, especially those with ETSs based on auctioning, might be able to claim that their domestic industries buying emissions allowances in an auction are adversely impacted by imports from countries where emissions allowances are distributed for free.'[721]

Yet, currently there are very few countries where domestic entities bear emissions costs. For the countries that do not have legislation regarding climate change in place,

> '[I]t would be difficult to claim that the free allocation of emissions allowances causes adverse effects to their domestic industries, which bear no emissions costs at all.[722] Therefore, the potential of disputes that could be appealed under the SCM Agreement against the free allocation of emissions allowances currently still seems to be minimal.'[723]

5.4.2.3 The legality of the free allocation allowances under WTO anti-dumping rules

Besides subsidy issues, the free allocation of emissions allowances may breach anti-dumping rules in the context of WTO law as well. Pursuant to WTO anti-dumping rules, WTO Members could initiate anti-dumping procedures and impose anti-dumping duties on imports from countries where producers receive emissions allowance for free. Because the free allocation allowances enable producers to charge unusually low prices comparing with the entities which receive allowances by an

[719] Robert Howse, 'Climate mitigation and the WTO legal framework: A policy analysis' (2010) 10 – 11 <https://www.iisd.org/system/files/publications/bali_2_copenhagen_subsidies_legal.pdf> accessed 27 June 2020

[720] Holzer, 'Emissions Trading and WTO Law' (n 698) 212–213

[721] ibid

[722] Holzer, 'Emissions Trading and WTO Law' (n 698) 213

[723] ibid

auction or purchase them on a secondary carbon market. In this situation, imports coming from these entities could therefore be considered as dumped imports. Under WTO anti-dumping rules, if dumped imports cause or threaten material injury to a domestic industry, WTO members may in some degree offset the negative impacts by the imposition of anti-dumping duties charged over the ordinary import duties, but 'not greater in amount than the margin of dumping in respect of such product'.[724]

However, whether mere free-of-charge emissions allowances would suffice to trigger WTO anti-dumping rules and then cause the imposition of anti-dumping duties? Article VI: 1 of the GATT lists the situation where the export price of products constitutes dumping:

> '(a) less than the comparable price, in the ordinary course of trade, for the *like* product when destined for consumption in the internal market of the exporting country, or,
>
> (b) in the absence of such domestic price, is less than either
>
> (i) the highest comparable price for the *like* product for export to any third country in the ordinary course of trade, or
>
> (ii) the cost of production of the product in the country of origin plus a reasonable addition for selling cost and profit.'[725]

In all these circumstances, the price of the exported product does not reflect the 'normal value' of the product. In an anti-dumping case, the comparison is always made with the price at which the *like* product is sold in the market of the exporting country.[726] In the case of free allocation allowances, the comparison is made with the price of the *like* product in the market of the importing country that allocates allowances via an auction. This does fall within the meaning of dumping in the context of WTO law and accordingly there is no imposition of ADDs taken place.[727]

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[724] GATT art II: 2 and GATT art VI

[725] GATT art VI:1

[726] ibid

[727] Joost Pauwelyn, 'Carbon Leakage Measures and Border Tax Adjustments under WTO Law' (2013) 505 <http://dx.doi.org/10.2139/ssrn.2026879> accessed 28 June 2019

However, based on the provisions of Article 2.2 of Anti-Dumping Agreement over the issue of no 'a proper comparison' can be made 'because of the particular market situation',[728] some scholars refer to the EU case *Council Regulation (EC) No 954/2006*, where the dumping resulted from the fact that the price of energy in Ukraine was not reasonably reflected in the production costs of Ukrainian steel and hence in the price of Ukrainian steel. An analogy is drawn in the case of the free allocation of emissions allowances: the country with an ETS fully based on auction could argue that the price of exports from countries with the free allocation of emissions allowances does not reflect the normal value.[729] The gap between the 'normal value' and the actual export price would then be a margin of dumping to be offset with anti-dumping duties.[730]

As there is still no cases over the free allocations allowances issues appealed to the WTO, whether the analysis above can really establish a solid foundation for the imposition of anti-dumping duties in the cases of the free allocations of allowances in exporting countries remain uncertain.[731] But the analysis above is very important and needed for policymakers in the process of relevant policy making.

5.4.2.4 The WTO legality of revenue recycling and border carbon adjustment measures

In addition to the assessment of free allowances from the perspective of subsidy disciplines, some scholars also examine the legality of revenue recycling and border carbon adjustment measures of the ETS. Although China ETS has not got involved in these measures so far, they could help to improve Chinese ETS and harmonise it with other ETS on international carbon market. The following is a brief analysis of these issues.

[728] Anti-Dumping Agreement art 2.2

[729] Peter Holmes and others, 'Border Carbon Adjustments and the Potential for Protectionism' (2011) 889 <https://doi.org/10.3763/cpol.2009.0071> accessed 28 June 2019

[730] ibid

[731] Pauwelyn (n 727) 505

A. WTO legality of the revenue recycling

Another element relevant in the context of ETS and WTO law compliance is the mode of distribution of revenues from the allocation of emissions allowances by auction. Governments can make use of revenues received from the distribution of emissions allowances through auctioning in many ways,[732] one of which is to fund climate actions and other environmental projects. From this perspective too, one can argue that the ETS can be, to some extent, an important method for international community to combat with global climate change.[733] To be specific, the revenues can be reallocated to entities which are at a disadvantage by increasing emissions costs and/or vulnerable in competition with other trade partners. In that case, while the revenue recycling can be used as a tool to prevent or reduce the risk of carbon leakage,[734] it may be likely to cause potential conflicts with other trade partners under WTO rules on subsidies. Similar to the analysis of the free allocated allowances under the context of WTO law, the assessment of ETS revenue recycling schemes under WTO rules also looks at the issue of whether a revenue allocation in the context of global climate change will subsidise national entities and cause the detriment on other entities, and whether it will constitute an actionable subsidy within WTO subsidy rules.[735]

B. WTO legality of the border carbon adjustment (BCA)

Border carbon adjustment (BCA), a trade measure equalising emissions costs of domestic and foreign producers, can be used to alleviate the competitive disadvantages of domestic producers caused by ETS obligations. The measure can be categorised as an inclusion of imports in an ETS and export rebates.[736] The EU was close to putting

[732] Andrea Baranzini, José Goldemberg and Stefan Speck, 'A Future for Carbon Taxes' (2000) 400 <https://doi.org/10.1016/S0921-8009(99)00122-6> accessed 28 June 2019

[733] Anja Esch, 'Using EU ETS Auctioning Revenues for Climate Action: What is the Appetite for Earmarking within Specific EU Member States?' (Briefing Paper, 2013) 6–7 <https://germanwatch.org/en/6853> accessed 9 December 2020

[734] Carolyn Fischer and Alan K. Fox, *Climate Policy and Fiscal Constraints: Do Tax Interactions Outweigh Carbon Leakage?* (Resources for the Future Discussion Paper No. 12-19, 23 August 2012) <*https://ssrn.com/abstract=2145574*> accessed 9 December 2020

[735] Holzer, 'Emissions Trading and WTO Law' (n 698) 239

[736] ibid

the BCAs into practice with its decision to include international aviation in the EU ETS.[737] But, the attempt was frustrated by the opposition of other countries who threatened the EU with retaliatory measures. The WTO-compatibility of BCAs is still not clear, but the legal status of BCAs in the WTO seems to be recognised in WTO case law when BCAs apply on the basis of non-discriminatory.[738] In line with the provision in GATT Article XX for measures which are taken with moral, health, environmental and other public policy objectives, even though BCAs are found to discriminate against imports, there may still be justified exceptions for them.[739] It is worth noting that, the border carbon adjustment on exportation is mainly regulated by WTO subsidy rules, which is unlike the inclusion of imports in an ETS and falls within non-discrimination rules of the WTO. According to GATT Ad Art. XVI, indirect taxes are justified for the border adjustment on importation and exportation,[740] but direct taxes are likely to constitute a prohibited subsidy. As Kateryna Holzer argues, the border adjustment on exportation in the form of remission or compensation of emissions allowances costs has an uncertain legal status in WTO law.[741] This feature makes the BCA scheme likely to be a prohibited export subsidy and reduces the possibility to be reasonable and justified measure within the GATT exceptions for environmental purposes.[742]

China's national ETS is still in initial phase and need to learn from other successful ETSs. With the development of Chinese ETS and the international carbon market emerging, all these measures of the ETS and the analysis under WTO rules will play more important role on regulating carbon emissions trading on international emissions trading market.

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[737] EU Directive 2008/101/EC

[738] Kateryna Holzer, *Carbon-Related Border Adjustment and WTO Law* (EE, 2014) 96 – 98

[739] Jeffrey Frankel, 'Climate and Trade: Links between the Kyoto Protocol and WTO' (2005) 8 <https://doi.org/10.3200/ENVT.47.7.8-21> accessed 9 December 2018

[740] GATT Ad art XVI

[741] Holzer, 'Emissions Trading and WTO Law' (n 735)

[742] Frankel (n 739)

5.4.3 The WTO legality of China's ETS

In terms of Chinese ETS, as the scheme on design and implementation mainly imitate the EU ETS, the legality and compliance of the EU ETS will be relevant to understand the legality of the China's ETS. After several years of trailing provincial ETS, China is on the track to set up the national ETS. Currently, the key element related to WTO rules is free allocations of allowances. Based on the analysis above, the free allocations of allowances indeed constitute subsidy in the context of the SCM Agreement, and could constitute actionable subsidies under WTO subsidy rules when they are only allocated to specific entities (specificity) and cause adverse effects on other WTO Members. In this case, they will constitute actionable subsidies and could be challenged by other WTO Members under the WTO subsidy rules.

Based on the foregoing analysis, it is not difficult to find that the legality of ETS and it flanking measures is still in the debate. Significant research has focused on this area, but no study by now can indicate with confidence the compatibility of an ETS under WTO law. There are two key reasons for this: 1) There is not a fixed design and design elements of the ETS; 2) No disputes on ETS scrutinised by the dispute settlement system of the WTO. This no doubt will add uncertainty to this study on the WTO legality of Chinese emissions trading scheme. The close scrutiny of the legality of the ETS should be emphasised, as it could be very helpful in perfecting the ETS and achieving the final goal of mitigating global climate change.

5.4.4 The ways to improve China's ETS within the context of WTO rules

In terms of the design of Chinese national ETS, as the EU ETS has already made three-phase plans to achieve their emissions targets, and is phasing out the free allocation of emissions allowances step by step, Chinese policymakers who are engaged in the national scheme design should pay close attention to the following aspects: 1) balancing the function of the free allocations and auction in distributing allowances so that the scheme can play an effective role in mitigating emissions and bridging other ETSs in the scenario of international carbon market; 2) the measures of border carbon adjustment, recycling of ETS revenues to domestic producers, the inclusion of imports in an ETS and emissions allowance rebates on exportation. All these instruments of

ETS could to be challenged by trade partners under the context of WTO rules, particularly under the GATT non-discrimination rules and the SCM Agreement disciplines on subsidies. Therefore it is necessary to scrutinise the justified exceptions of these measures and provide detailed references for policymakers during the process of policymaking.

Additionally, although the international carbon market has not set up yet, WTO rules are still likely to be valid for the potential international market. The reasons are as follows: 1) with more and more countries building up their own ETSs, national ETSs are likely to be interconnected through the mutual recognition of emissions allowances; 2) with the development of ETSs in more and more jurisdictions, the common design features of ETSs will be shared in more and more countries, which will bring ETSs of different jurisdictions into compatibility with each other. In this case, WTO law will be applied to ensure that the emissions allowance allocation does not damage the competitive market that domestic and foreign firms trade in. China will become the largest carbon market throughout the world when the national ETS set up completely. The policy design should reflect the feature of international ETS so that China can actively participate into international carbon market and make contribution to global climate change mitigation.

Meanwhile, the analysis above also outlines some of the current issues in climate change governance. Firstly, in different context of jurisdictions, the justifications for these instruments might be various, some of which are even in contradiction with each other. From this perspective, the test on the legality or compatibility needs to be processed on case by case basis. Secondly, climate change, being a global challenge, need to be addressed under the context of international governance and at various levels. In addition, the regulations for emissions allowances can be implemented at domestic, regional and international levels and in various context. For these reasons, the assessment of the legality of the ETS features with a certain degree of uncertainty and even challenges. There are so many elements that need to be taken into consideration during the process. But the work should be done so that a more effective

and legitimate ETS can be formed in near future, which will play more effective role on fighting with global climate change.

After the assessment of China ETS, the next section will briefly analyse the EU ETS, the first and still the largest carbon market by now. As the EU ETS provides lot of experience and lessons for the development of China ETS, it is necessary to outline the features of policy design of the EU ETS and analyse its effectiveness. Given that there is huge literature on the effectiveness of the EU ETS from lots of scholars, this section will not do detailed analysis of the effectiveness. Instead, this section will summarise the existent literature on the effectiveness of the EU ETS and conclude whether the EU ETS is effective. As for the legality of the EU ETS in the context of WTO rules, as Chinese ETS shares the EU ETS on mechanisms, the legality assessment of the EU ETS will follow the sane framework used in the assessment of China ETS. Through this brief analysis, we hope to find more valuable experience for the development of China national ETS.

5.5 The Effectiveness and the WTO legality of the EU ETS

The EU ETS is considered as the most prominent example of trading in greenhouse-gas emissions, with the position of being the world's first GHG ETS, largest ETS for any type of emission and the first multinational ETS.[743] The goal of this scheme is to achieve the reduction of the emissions which are from more than 12,000 power and manufacturing plants in 31 countries and accounted for about 45% of the EU's emissions and about 5% of global ones.[744] Accordingly, the discussion of the comparison between China and the EU ETS in the aspect of climate instrument should start with an evaluation of the EU ETS during its decades of existence. The purpose here is simply to provide a brief overview on the effectiveness of the EU ETS from previous relevant research in order to provide elements for the comparison.

[743] A. Denny Ellerman, 'The EU ETS: What We Know and What We Don't Know' in Marc Gronwald and Beat Hintermann (eds), *Emissions Trading as a Policy Instrument: Evaluation and Prospects* (MIT Press 2015) 26

[744] European Commission, 'EU Emissions Trading System (EU ETS)' <https://ec.europa.eu/clima/policies/ets_en> accessed 9 December 2018

While considered as an innovative and the most prominent example of policy instrument for reducing carbon emissions, the EU ETS did not have a smooth development experience during its first two phases.[745] The major setbacks in Phase I and Phase II of the EU ETS include over-allocated allowances, large windfall profits from free allocated allowances and financial fraud issues related to the allowances. Imperfect experience of the EU ETS has provided abundant data for *ex-post* evaluation studies from the perspective of the environmental economics. Lots of studies have measured and analysed the performance of the EU ETS through examining the mechanism designs, its effectiveness and the political trade-offs. All this research have provided policy makers around the world with the EU's experience and lessons on designing and implementation of the ETS. With these references, new designed carbon pricing policies or the ones in planning are likely to be more effective and efficient in combating global climate change.[746]

5.5.1 The effectiveness of the EU ETS

The EU Emissions Trading System (the EU ETS) is considered as Europe's flagship tool to achieve its carbon mitigation objectives. In line with the assessment framework in **Chapter Two**, this assessment will process from environmental effectiveness, economic effectiveness and social effectiveness. As the financial crisis in 2008 had obvious influence on the effectiveness of the EU ETS, this analysis will be processed by two periods, pre-financial crisis and post-financial crisis.

5.5.1.1 Environmental effectiveness: perspective on emissions reduction

One of the key objectives of the EU ETS is to achieve the capped level of emissions in the sectors of power and industry within the EU, which is in line with the EU official objective on carbon emissions to promote greenhouse gas reductions in a cost-effective

[745] ibid

[746] Tim Laing and others, 'Assessing the Effectiveness of the EU Emissions Trading System', (Centre for Climate Change Economics and Policy Working Paper No. 126, 2013) <http://www.lse.ac.uk/GranthamInstitute/wp-content/uploads/2014/02/WP106-effectiveness-eu-emissions-trading-system.pdf> accessed 9 December 2018

and economically efficient manner.[747] As the financial crisis in 2008 caused serious effects on European production, it also influenced the level of European emissions then. So the performance of the EU ETS in that period was also affected.[748] In this case, the literature review on effectiveness of the EU ETS will be made by two periods: pre-financial crisis and post-financial crisis.

A. Pre-financial crisis

This section synthesises the literature which has looked at quantifying the reduction of emissions before the financial crisis in 2008. Most of the studies selected here share similar methodology in economics study, econometrically estimating the level of the EU emissions without the ETS, and comparing with recorded emissions.[749] Making use of this approach, Ellerman and Buchner analyse the mitigation status in Phase I (2005-2007) of the EU ETS.[750] Delarue et al., in a similar study in 2006, argue that the carbon price signal can lead to emissions reduction in the power sector.[751] In the study done by Abrell, et al., they finds out the result that the EU emission reductions between 2007 and 2008 were much greater than that in the period of 2005-2006. This result, to some extent, indicated that the EU ETS had a better performance in Phase II than that in Phase I.[752] Moreover, their study also finds out some sectors, such as non-metallic

[747] European Council, 'Reform of the EU Emissions Trading Scheme' <https://www.consilium.europa.eu/en/policies/climate-change/reform-eu-ets/> accessed 9 December 2018

[748] Laing and others (n 746)

[749] ibid

[750] Denny Ellerman and Barbara Buchner, 'Over-Allocation or Abatement? A Preliminary Analysis of the EU ETS Based on the 2005-2006 Emissions Data' (2008) 41(2) *Environmental and Resource Economics* 269 <https://content.ebscohost.com/ContentServer.asp?EbscoContent=dGJyMMvl7ESep7Y4zOX0OLCmr1GeprFSrqe4TLSWxWXS&ContentCustomer=dGJyMPGntk60p65Juerwgd%2FiuY%2Fx1%2B6B&T=P&P=AN&S=L&D=eoh&K=1008117> accessed 9 December 2018

[751] Erik Delarue, Kris Voorspools, William D'haeseleer, 'Fuel Switching in the Electricity Sector under the EU ETS: Review and Prospective' (2008) 134(2) *Journal of Energy Engineering* 40 <https://ascelibrary.org/doi/10.1061/%28ASCE%290733-9402%282008%29134%3A2%2840%29> accessed 9 December 2018

[752] Georg Zachmann, Anta Ndoye and Jan Abrell, 'Assessing the Impact of the EU ETS Using Firm Level Data' (Bruegel Working Paper 2011/08) <https://bruegel.org/wp-content/uploads/imported/publications/WP_2011_08_ETS_01.pdf> accessed 9 December 2018

minerals and basic metals, more to the reduction), make more contribution to the reduction than electricity and heat sectors.[753]

B. Post-financial crisis (after 2008)

Based on the report *Cambridge Econometrics 2009*, the effects of the financial crisis on UK GHG emissions indicate that the emissions reduction in the EU is much more due to the economic downturn than the EU ETS. Grubb et al. show emissions data from the IEA to analyse the influence of the financial crisis on emissions reduction, and argue that the financial crisis caused a structural damage during the process of European emissions reduction and energy intensity.[754] Additionally, some initial studies focusing on the effects of the EU ETS after the financial crisis conclude that the EU ETS has only reduced emissions at small levels, which is similar to the conclusions of the studies finished before the financial crisis.[755] In sum, based on the overview above from pre-financial crisis and post-financial crisis periods, it could be argued that the EU ETS has played role in reducing emissions, even though the literature shows the role is pretty weak before and after the financial crisis.

5.5.1.2 Economic and social effectiveness

In addition to achieving the capped emissions target, the effect of the ETS on low-carbon technologies is considered as another key objective of the EU ETS.[756] Martin et al. make use of a survey method to analyse about 800 manufacturing firms in six European countries to examining the influence of the EU ETS on emissions reduction-related technologies and clean innovation.[757] The study finds that a large number of firms have put more investment on technology innovation to reduce emissions.[758]

[753] ibid

[754] Laing and others (n 746)

[755] ibid

[756] ibid

[757] Ralf Martin, Mirabelle Muûls and Ulrich Wagner, 'Climate Change, Investment and Carbon Markets and Prices – Evidence from Manager Interviews' (2011) <https://climatepolicyinitiative.org/wp-content/uploads/2011/12/Climate-Change-Investment-and-Carbon-Markets-and-Prices.pdf> accessed 9 December 2018

[758] ibid

Rogge et al. also did a survey study and analysed on German power sector with a finding that the EU ETS had a limited effect on technology innovation because of the lack of urgency in early stage and relatively lower importance comparing to other factors.[759] While the influence on technology innovation was limited, the study found the ETS has promoted existing fiscal incentives to improve efficiency in the coal plants and CO_2 become a part of the investment appraisal in the construction of the power sector.[760] To sum up, based on the analysis in the existent literature, it can be argued that the EU ETS has contributed to the investment increase in low-carbon industry and also promoted the technology innovation to help the emissions targets to be achieved.

In terms of the social effects, while the primary objective of ETS policy is to reduce GHG emissions, a well-designed ETS will deliver social co-benefits. ETS is likely to create positive outcomes for public health, energy security, job creation and land-use change. As for the social impacts of the EU ETS, the assessment can be processed from perspectives of job creation, air quality improvement and income growth. Given that the literature is very limited, this section will not analyse the social effectiveness of the EU ETS in detail here. Further study may analyse social co-benefits of the EU ETS from the perspectives of air quality, public health, job creation, etc.

5.5.2 The WTO legality of the EU ETS

As the EU ETS is a model for China ETS, from policy design to implementation, both programmes have similar mechanisms in policy design and implementation. The WTO legality assessment also follows the same framework.

Almost all emissions allowances under the EU ETS were allocated for free over the first phase (2005-2007) and the proportion of free allocation reduced to around 90%

[759] Karoline Rogge, Malte Schneider and Volker Hoffmann, 'The Innovation Impact of the EU Emission Trading Scheme – Findings of Company Case Studies in the German Power Sector" (2010) 70 (3) *Ecological Economics* 513 <https://ideas.repec.org/a/eee/ecolec/v70y2011i3p513-523.html> accessed 9 December 2018

[760] ibid

over the second phase (2008-2012).[761] Over the current trading period, the third phase (2013-2020) 57% of the total amount of allowances are auctioned (almost all electricity generators are obliged to buy emissions allowances at an auction), while the remaining allowances are available for free allocation for carbon-intensive sectors with a significant risk of carbon leakage.[762] While there is no clear evidence on whether the free allocation of emissions allowances will help prevent carbon leakage,[763] it is evident that free allowances can negatively affect the state budget[764] and reduce incentives for entities covered to reduce emissions.[765]

Based on the foregoing analysis on page 202 – 205, the free allocation of allowances constitutes a subsidy in WTO law. Thus, the free allocation allowance within the EU ETS also constitutes a subsidy in the context of WTO subsidy rules. Additionally, since the free allowances are usually available only to certain firms or industries, namely to those under a significant risk of carbon leakage in the third phases of the EU ETS, the free allocation is likely to be viewed as a specific subsidy, and as such, could potentially be actionable if the adverse effects caused can be proved based on WTO subsidy rules.[766] This means that the measure of free allowance allocation could successfully be challenged in the WTO, and eventually forced to be withdrawn, or could be targeted by trading partners through CVDs, if the complaining party could demonstrate that adverse effects exist, including material injury to its domestic industry.[767] However, as long as emissions allowances under the EU ETS programme are not provided for free specifically on product exportation or under the condition that

[761] European Commission, 'The EU ETS: Phases 1 and 2 (2005-2012)' <https://ec.europa.eu/clima/policies/ets/pre2013_en> accessed 9 December 2018

[762] European Commission, 'The EU ETS: Free allocation' <https://ec.europa.eu/clima/policies/ets/allowances_en> accessed 9 December 2018

[763] Jegou and Rubini, 'The Allocation of Emission Allowances Free of Charge: Legal and Economic Considerations' (n 678) 21

[764] ibid

[765] Frank Muller and J. Andrew Hoerner, 'Greening State Energy Taxes: Carbon Taxes for Revenue and the Environment' (1994) 12 Pace Envtl. L. Rev. 5 <http://digitalcommons.pace.edu/pelr/vol12/iss1/2> accessed 9 December 2020

[766] WTO, *US – Upland Cotton*, Panel report, para 7.1142

[767] SCM Agreement art 5

a firm would meet local content requirements, under the current WTO subsidy rules, the free allocation is unlikely to be considered as a type of prohibited subsidy.

5.6 A brief comparison between the EU and China's ETS pilots

The EU ETS has represented a very helpful model of inspiration for China's seven pilot regional carbon markets, particularly on the designing of China's ETS system. Thus, it is very necessary to make a brief comparison between the EU and China's ETS so as to identify key factors that China can make use of to improve the pilot ETSs and the national ETS. **Table 5.7** illustrates the evolution of the EU ETS over the first three phases and the design features of the Chinese regional pilot ETSs.

Table 5.7 Overview of the ETS design elements in both the EU and China

Building block	**EU ETS**	**China existing seven pilot ETSs(2013-2016)**
Coverage	Covers 28 EU member states and Iceland, Liechtenstein, and Norway —over 11,000 installations. Largest ETS in the world. GHG: carbon dioxide (CO_2), methane, nitrous oxide (N_2O), sulphur hexafluoride, hydro fluorocarbon (HFCs), perfluorocarbons, and nitrogen trifluoride. Sectors: power stations and other combustion plants with ⩾20 MW thermal rated input, oil refineries, coke ovens, iron and steel, cement clinker, glass, lime, ceramics, pulp, paper and board, aluminium, bulk organic chemicals, ammonia, nitric / adipic / glyoxylic acid production, hydrogen, soda ash, carbon black, CO_2 capture and storage. In aviation, limited to flights within the European Economic Area until 2016.	Chongqing, Shanghai, Tianjin, Guangdong Province: Installations' annual emissions above 20,000 t CO_2 equivalents, in the power, iron, steel, ferrous metals, chemical and petrochemicals, cement sectors where present. Shanghai further includes airlines, harbours, airports, railways, and commercial sector, with Tianjin including residential buildings. Hubei Province: Installations with annual energy consumption above 60,000 tce, targeting similar sectors as above. GHG: only CO_2.
Targets and caps	Targets relative to 1990 and absolute cap: i) Phase I (PI) - 2005-2007: Not applicable, 2298.5 Mt CO_2eq ii) Phase II (PII) - 2008-2012: 8%, 2086.5 Mt CO_2eq (1st Kyoto Protocol commitment period) iii) Phase III (PIII) - 2013-2020: 20%, 1777 Mt CO_2eq iv) Phase IV (PIV) - 2021-2028: 40%, Not applicable	Targets: All areas covered have intensity-based targets for economy-wide GHG emission reduction, ranging from 17% - 21% reduction by 2015 from 2010 levels, which are set at the national level. Cap: Following intensity-based targets and economic or sector growth projections, all ETSs have absolute caps, which in some cases permit growth in emission levels. The first compliance period is timed with the Preparatory stage, 2013-2016, lasting 2 - 3 years, depending on the start date in each province.

Continue on next page

		The volume of the caps in Mt CO_2eq for 2013 were: Beijing (50), Chongqing (125), Shanghai (160), Shenzhen (33), Tianjin (160), Guangdong Province (388), and Hubei Province (324).
Allocation of allowances and carbon leakage	Phase I and Phase II: decentralized mainly free allocation, minimum auctioning requirements 5% and 10%. PIII: 43% allowances auctioned. Fully auctioned in power sector. (At least half of auctioning revenues are required to be used for climate and energy-related purposes.) Full auctioning is required by 2027. Carbon leakage is mitigated by free allocation to certain sectors considered vulnerable, such as manufacturing and aviation, based on harmonized benchmarks. The proportion of allowances auctioned decreases over time.	Plans: Allocation plans are established at a national level and implemented by provincial authorities, which may be more stringent with regards to free allocation. Free allocation: Allowances are mostly freely allocated, using benchmarking methodologies based on different base years. Auctioning: Guangdong, Chongqing and Hubei intended to use auctioning for a small percentage, but only Guangdong has done this so far. Future China national ETS: combination of free allocation and auctioning.
Monitoring, reporting and verification	Installations are required to have an approved monitoring plan and monitor and report their emissions according to the monitoring and reporting regulations. Third-party verification of an annual emissions report is required. Verified annual emissions reports are due 31 March of the subsequent year, and it is required to surrender the equivalent number of allowances by 30 April.	Monitoring, reporting, and verification (MRV) procedures in accordance with respective guidelines for each jurisdiction at the sectoral or installation level. Guidelines for verification of these emissions exist in many ETSs. Most of these guidelines have been improved during this pilot phase. Guidelines and oversight of qualification of verification bodies is done at the national level and implemented at the provincial level.
Flexible measures (banking and borrowing, credit mechanisms or offsets and linking)	Banking was not permitted between phases PI and PII. It was permitted from PII to PIII, and is going on. Borrowing: Not permitted Linking: Norway, Iceland, and Liechtenstein linked in 2008. Negotiations with Australia launched in 2012 but repealed in 2014, with Switzerland under discussion. Offsets: Quantity restrictions: in PI determined by member states. Subsequently, offsets limited to 50% of compliance 2008-2020. Quality restrictions: credits from Kyoto Protocol mechanisms (CDM and JI) permitted from PII.	Banking: Permitted between years in pilot period, except in Hubei province. Borrowing: Prohibited. Offsets: Qualitative restrictions: No international credits accepted. All ETSs accept domestic credits, with Beijing requiring 50% and Guangdong 70%, of credits be sourced locally, and Chongqing requiring credits be sourced through their voluntary or forest schemes. Quantitative restrictions: 5% - 10% of compliance can be met by credits. Linking: Efforts will be made to explore options for linking with other markets in the Stability Phase (post-2020).
Measures to manage market supply & price	Back-loading of allowances: To deal with structural surplus, auctioning of 900 m allowances was postponed from 2014-2016 until 2019-2020. Market stability reserve: To manage a structural surplus, from 2019, if surplus allowances are above a maximum threshold, they will be placed in a reserve and only released when surplus drops below minimum threshold. Back-loaded allowances will be placed in the reserve. Offset restrictions: Due to flooding of the market, JI offsets delivered after 2012 were restricted.	Strategic reserve: Shenzhen, Guangdong, and Hubei have established a strategic reserve for price management. Such a reserve is also intended in Shanghai, Beijing, Chongqing, and Tianjin have not yet declared clear rules for price management. Auction and buy-back of allowances: Beijing and Tianjin intend to use auctioning and buy-back of allowances to control supply and prices.

Source: (1) ADB (2016) Emissions Trading Schemes and Their Linking: Challenges and Opportunities in Asia and the Pacific. Asian Development Bank, Manilla, 17-52. (2) EU (2014) The EU ETS System. European Union, Brussels,1-26.

Based on the information in **Table 5.7**, the EU has the largest ETS in the world by now with a volume of 1.7 - 2.0 billion tonnes of CO_2eq. In the EU, the coverage of the ETS has included all GHGs and about 11,000 installations in the EU Members are covered. By contrast, China's seven pilot ETSs and its newly launched national ETS only cover CO_2, given that the data regarding to other GHGs are unavailable. China launched its national ETS at the end of 2017, but it is not going to be the largest ETS in the world until it is fully implemented, when the estimated volume of CO_2 about 3 - 4 billion tons, double-sized of the EU carbon market. In terms of the main difference in the type of participants, in the EU installations and all GHGs have be covered, while in China the coverage only includes companies and CO_2. Because China currently only has the data at company level, statistic data at installation level still unavailable.

With regard to targets and caps of the ETS, the EU has set absolute targets and caps in tons of GHGs, in China the emissions target is relative in tons of CO_2 per GDP and the cap is also calculated in tons of CO_2. The EU emissions have peaked already and GHG emissions are going down. However, in China the emissions have not yet peaked and the peaked CO_2 emissions are estimated to come around 2030. Currently, the absolute amount of CO_2 emissions in China is still rising, so it is not reasonable for China's ETS to follow the EU ETS and to include the absolute amount of CO_2 in the defining targets. Regarding the allowance allocation, given the shortcoming of free allocations in the Phase I of the EU ETS, based on China's characteristics on carbon emissions, China combines the methods of free allocation and auctioning in its seven regional pilot ETSs and the method is also used in the national scheme.[768] The auctioned allowances in China now only accounts for about 5% - 10% of the allowances allocated in the national ETS, as a higher proportion of auctioned allowances might cause negative impacts on China's economic competitiveness in a short period.

[768] Noah Dormady, 'Carbon Auctions, Energy Markets & Market Power: An Experimental Analysis' (2014) 44 *Energy Economics* 468 <https://doi.org/10.1016/j.eneco.2014.03.013> accessed 19 June 2019

In terms of monitoring, reporting and verification (MRV) mechanism, China follows the EU's experience and set up quite similar MRV. The thing is that China makes a higher threshold for the third parties to conduct MRV and limits their capacity, which might also become one of barriers for China to fully implement its national ETS. Comparing with the EU where a series of market-based measures have been taken to manage market supply and price, in China the government still intervenes a lot in the ETS market. In this case, improving sustainability of China's ETS should be highlighted and market instrument should play the dominant role in the implementation of China's national ETS.

Based on the brief comparison above on the design features between the two schemes, even though China has learned from the EU ETS and followed its experience on designing and implementation, there are still some differences on the design, such as allowance allocation methods, market risk management, and legislation framework, and so on, due to the different context in both jurisdictions. Implementation of both EU ETS and China's ETS have shown the need to improve the existing schemes. For example, China's national ETS which is still in the initial stage should have more ambitious caps, constant emission reduction, and stringent policy instruments to solve uncertainties in the markets, specific funds to support low-carbon innovations. Particularly, a well-functioning ETS cannot be fully implemented without a complete and integrated legal framework. In the EU, the Directive 2003/87/EC[769] plays a fundamental role in guiding carbon emission trading. As for China's pilot ETSs, the *Interim Measures for the Administration of Carbon Emission Trading*[770], a regulation published by NDRC in 2014, is just an administrative regulation used for directing regional carbon trading activities. China has not enacted any formal basic laws to regulate carbon emissions trading so far. It is necessary for China to establish a comprehensive and unified legal framework to regulate the regional and national ETS,

[769] Directive 2003/87/EC of establishing a scheme for greenhouse gas emission allowance trading within the Community and amending Council Directive 96/61/EC, 13 October 2003

[770] NDRC, 'Interim Measures on China's Carbon Emission Trading Management' (in Chinese, translated by the author) (2014) <http://qhs.ndrc.gov.cn/zcfg/201412/t20141212_652007.html> accessed 6 July 2019

which will be helpful to strengthen the cooperation among regional ETSs and manage the national carbon market.

While the international carbon market has not built up, as a policy instrument aiming at reducing emissions and mitigating global climate change, ETS should be implemented under the global scenario. As the largest emitter, China should pay more attention to the cooperation with other jurisdictions that have implemented ETS. Broad international collaboration will be helpful to optimise resources and exchange ETS-based theories and experience. In particular, China will benefit from the global cooperation on the scheme and then further improve and optimise its regional and national ETSs, including the MRV mechanism, carbon finance and risk management, etc.

Chapter Six

Conclusion

This study has initiated a comprehensive assessment of policies and laws enacted for supporting China's climate actions, with special focus on the effectiveness and legality of China's feed-in tariff programme and emissions trading scheme. The main contribution of this study is to provide Chinese policymakers with a comprehensive view of the effectiveness and legality of China's current climate policies and laws, and to offer references for the future amendments and continual improvement of these policies and laws especially by drawing on the EU's experience.

Before commencing the assessments, Chapter Two of this study has given an overview of China's legislation system and has introduced the Chinese government departments that are relevant to policy and law making for climate actions. Following this, Chapter Three has introduced the specific climate policies and laws China has enacted and implemented so far to achieve its environmental commitments to the international community. The content of these two chapters has not only offered readers a glimpse of Chinese characteristics, but has also, more importantly, provided a detailed view of China's political context. As a very significant part of Chinese context, political context plays an extraordinary role in understanding and assessing China's policies and laws on climate action. An assessment framework has also been developed in Chapter Two for evaluating the effectiveness and legality of China's policies and laws relevant to climate actions. Compared with other existent relevant studies, the framework constructed in this study tends to support a comprehensive assessment of the effectiveness of a policy or law, which extends horizontally to cover its impacts on environmental protection, economic development, and social wellbeing and cost efficiency. The framework, as a conceptual construction, is put into practice, hence tested in the two detailed case studies of China's FIT and ETS in Chapter Four and Chapter Five respectively. This framework could be more widely used to assess the effectiveness of other public policies, as this method of assessment can offer policy or

law makers a multifaceted panorama of how, and to what extent, the influence of a certain policy or law permeates social, economic, productive and environmental activities.

Taking this framework as the guideline for assessments, this study has scrutinised not only the economic impacts of policies and laws related to China's FIT and ETS programmes, but also their impacts on environmental protection and social development and wellbeing. This multifaceted evaluation is particularly valuable for modern China who is seeking for a sustainable "win-to-win" development taking into account societal and economic development, while at the same time preserving among society, economy and environment. Since the Chinese economy reform in 1978, China has prioritised industrialised construction and economic growth for the past forty years. Its long-lasting energy-oriented economic development model has now made China confront with significant environmental issues, such as the sustained and extensive haze clouds caused by air pollution. With the determination to change this situation, China is now in an important transitional stage from the conventional energy-oriented economic development model to sustainable development, promoting what the government describes as the 'ecological civilisation construction'. To achieve this aim in practice, China tries to draw on, as discussed in this study, the experience and lessons of developed countries (especially the EU member states) in climate actions, by introducing and piloting in China their relatively mature schemes designed for sustainable development. The assessments of China's ETS and FIT programmes in this study thereby also contribute to reveal whether these 'imported' climate policies and schemes have been appropriately 'localised' to adapt to the specific social, economic and environmental context of modern China; and whether they have taken effect so far to mitigate the environmental crisis. This information is significant for China's future adjustments and further improvements of its policies and laws relevant to climate actions.

Detailed case studies of the effectiveness and legality of the policies and laws related to China's FIT and ETS programmes are given in Chapter Four and Chapter Five. By scrutinising the economic, environmental and social impacts of China's policies and

laws for deploying renewable energy and implementing the ETS, these two case studies have demonstrated how the framework structured in Chapter Two can be adopted in practice to evaluate the effects of policies and laws. Apart from the effectiveness, these two case studies have also assessed the legality of China's current policies and laws on climate actions against the context of WTO legal system. The results of the legality assessments contribute to giving Chinese policymakers a clear idea about the compatibility of China's FIT and ETS policies with the WTO subsidy rules. The knowledge of this enables policymakers to dissipate or avoid the conflicts between China's current or upcoming climate policies and WTO subsidy rules, so that the chances of potential global trade disputes can be reduced.

As already introduced, the EU and its member states (especially Germany) have provided a great deal of assistance in the policy design and the implementation of China's FITs and ETSs. Based on this, brief comparisons of the EU countries' ETS and FIT programmes with their counterparts in China have been given at the end of each case study, regarding the effectiveness and legality of relevant policies and laws from both sides. The comparisons have revealed some different performances of the two schemes within the different social contexts of China and the EU. Since the EU has more advanced sustainable development strategies and policies, these comparisons offer Chinese policymakers some prospective ideas about the potential issues China may face in its future climate actions, and – above all – also the importance of context of policies. In the meantime, they also indicate the possible directions in which China can further improve its climate policies and laws based on the experience and lessons of the EU.

The two case studies are conducted by using descriptive and qualitative research methods. The relevant data used for effectiveness assessment are mainly from existing studies in economics, and journals and reports from think tanks and relevant associations, such as REN21, IRENA, IEA, World Resources Institute, etc. The lack of first-hand data may be a limitation of this study, as the potential errors in existent literature may affect some of the findings of this thesis However, this limitation is currently not easy to be overcome, due to the relative lack of data transparency in

Chinese political system, especially when touching upon the sensitive environmental issues. As China opens further to the world, this obstacle may be gradually removed, so that authentic first-hand data can be collected for more accurate studies of the effectiveness of China's climate policies and laws.

In response to the potential shortcoming of this study regarding the lack of original data on China's implementation of climate policies and laws, some interdisciplinary cooperative research in future with scholars in economics, environmental technology and statistics may help collect and process latest, detailed, and multifaceted original data. In so doing, the accuracy and up-to-dateness of the effectiveness assessments of China's climate actions can be further improved. This multi-perspective, interdisciplinary approach is also my interest for further study of Chinese climate policies and laws.

Beyond that, future studies of China's climate policies and laws may also focus on examining the particular procedures of policy and law making in Chinese political context, as the legislative basis functions as an important prerequisite for effective implementation. China's procedures of policy and law making has, to a large extent, reflected Chinese characteristics: the Communist Party of China plays a core role in the process of policy and law making, which differs from how this is processed in most European jurisdictions. Studies can be conducted to explore whether the top-down approach of policy and law making under China's one-party system can ensure the applicability of the concrete climate policies and laws put into practice in different regions of the nation. Should the local conditions, such as the divergent geographical, historical, economic, social and environmental contexts be fully considered in policy and law design? Also has the implementation status of the regional climate policies and laws been constantly monitored, so that any necessary adjustments can be spotted and made promptly? All these potential studies will undoubtedly help the Chinese central and regional governments play a better role in improving the design and implementation of climate policies and laws, so that China can contribute more in combating global climate change.

As China's roles at the Copenhagen Conference shows, with the power shift in the international system, China is moving from a stage of passively accommodating the existing international institutions to participating actively in the regime-building process.[771] With the shift of China's role in global climate negotiations, future research could explore and scrutinise the roles of China from the very beginning of global climate negotiations to current climate cooperation. The study will help readers to understand the evolution of China's climate diplomacy and the reasons in depth behind the policy shifting.

In terms of the roles of the WTO in mitigating global climate change, even though the WTO is not an environmental protection organisation, the very close relationship of international trade and environmental protection makes the WTO to play very key roles in global climate actions. The WTO trade regime contains several provisions, which are either directly or indirectly relevant for national climate change policy and law. This research has shown the importance of the provisions that prohibit discrimination and, given the nature of support of many of the climate policies, of subsidy rules. While it may be difficult that discriminatory policies may be really necessary to foster a green revolution (the evidence is still not there), the difficulties in applying subsidy rules to incentive schemes may support the case for amending the current rules and make them more friendly towards state actions in support of renewable energy (changes could include a clarification of the benefit analysis, the introduction of specific exemptions for good green subsidies). It is a fact that these rules were negotiated in the 1980s and very early 1990s, when the climate emergency was simply not there. They are largely ineffective (with transparency and governance not really working) and not up to date to contemporary challenges like the fight against climate change. It is in particular a fact that it is only with further reflection of the policies and laws that are currently implemented we will be in a position to craft better rules for the future. Any reform should be based on an informed discussion and the future governance subsidy system should include a permanent forum of discussion and evaluation of the effectiveness of national policies.

[771] Lichao He, 'China's Climate Change Policy from Kyoto to Copenhagen: Domestic Needs and International Aspirations'[2010] *Asian Perspective* 34 (3) 5-33

This specific discussion about the relationship of the SCM Agreement and national measures of support brings us to broader reflections about the balance between trade liberalisation and environmental protection in the WTO.

International trade and climate change are two of the most vexing global policy problems.[772] While the rise of trade wars and the inability of states to deliver meaningful climate results are well known, the links between trade and climate change have been under-explored. For too long, climate and trade policy-makers have operated in distinct silos. But the fact is that trade impacts the climate; and regulation in one sphere will inevitably impact the other. A more sophisticated research about trade and climate change is vital to solve the issues:

- How can the multilateral trading system meaningfully help towards meeting the goals of the Paris Agreement, namely to limit global warming to 1.5°C and reach net-zero greenhouse gas emissions by 2050?
- What national or regional/bilateral trade policy tools, for example, the environmental previsions stated in the Free Trade Agreements (FTAs) or Preferential Trade Agreements (PTAs), could be used to combat climate change and how to make use of the tools to achieve the targets without being disguised protectionism?
- How can the WTO regime, with the 12th WTO Ministerial Conference upcoming, be used to achieve a step-change in how the world deals with trade and climate change, particularly in the context of the US-China trade war and of the coronavirus pandemic, and beyond those?
- How to improve the alignment of climate and trade regimes with following core principles: First, achieving meaningful progress on the trade-climate nexus demands more concerted and effective leadership as well as focused attention on breaking down policy silos. Is China really able to play the role of leading international negotiations to combat global climate change with its 'One Belt One Road' strategy? Second, as both trade rules and climate policy are complex, and aligning the two regimes will be

[772] Carolyn Deere Birkbeck and John W.H. Denton, 'We need better alignment between climate and trade – Here's a roadmap' (World Economic Forum, 2020) <https://www.weforum.org/agenda/2020/01/how-can-we-align-climate-and-trade/> accessed 11 November 2020

more difficult, from a policy, legal and technical standpoint, there needs to be more serious thinking around how to make sure the complex issues of policy coherence on trade and climate. Third, with the US withdrawal from the Paris Agreement and the world confronting with coronavirus pandemic, it will be very tough to achieve the first five years milestone reduction on emissions for every single country in 2020. The upcoming major opportunity to align trade and climate governance will be the WTO's 12th Ministerial Conference. Future research is still supposed to discuss how the WTO regime will step up efforts to meaningfully address climate change and support inclusive multilateralism, even though some may say the WTO already has enough tough issues to deal with. [773]

Last but not least, as the solutions to future climate issues will more and more rely on interdisciplinary cooperation in the future, researchers really need to widen the horizon and break through the disciplinary constrain to explore out the effective and compatible measures to meet the demands of harmonising the relationship of international trade and global climate change.

[773] ibid

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