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Greening the road: China's low-carbon energy transition and international trade regulation

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Abstract

This article offers one of the first comprehensive analyses of China's emerging practice in subsidizing the low carbon energy (LCE) transition by using the new energy vehicles (NEVs) industry as a case study. It puts forward a fresh framework for this analysis by dividing the NEV value chain into three segments: upstream, midstream, and downstream. Based on this framework, it expounds a strategic shift of China's subsidization strategy across the NEV value chain, that is, from disproportionately subsidizing the midstream segment that produces NEVs and parts to increasingly subsidizing the upstream and downstream segments to promote research and development (R&D) and expansion of NEV infrastructure and consumption throughout the economy. It argues that this shift mainly comes out of the evolution of China's industrial policies and economic priorities, which will continue to play a decisive role in the future restructuring and transformation of the NEVs sector. This shift may also reflect China's intention to reduce potential trade conflicts and maximize WTO-compliance but only to the extent that doing so would not unduly constrain its capacity to pursue its economic goals and industrial policies. In addition, while the WTO rules and jurisprudence may accommodate some of these subsidies (e.g., NEV infrastructure subsidies), the relevant rules will need to be further developed to provide more policy space for other types of subsidies used worldwide (e.g., R&D subsidies). Until then, it remains debatable as to whether the WTO provides sufficient room for countries to facilitate a green recovery in the post-pandemic era.

Keywords: China; low-carbon energy transition; new energy vehicles; subsidies; WTO

1. Introduction

As the world struggles to contain greenhouse gas (GHG) emissions, there is a pressing need for a transition from a high-carbon to a cleaner and more sustainable low-carbon energy (LCE) system.¹ This energy transition is essential not only for mitigating climate change and protecting the environment but also to improve social inclusiveness and facilitate technological progress.² Further, it is closely aligned to a variety of sustainable development goals (SDGs), particularly

*We would like to thank Simon Lester and Jesse Kreier for their insightful discussions and two anonymous reviewers for helpful comments.

¹K. Araujo, *Low Carbon Energy Transitions: Turning Points in National Policy and Innovation* (2017), at 2.

²G. Siciliano et al., 'Low-carbon Energy, Sustainable Development, and Justice: Towards a Just Energy Transition for the Society and the Environment', (2021) *Sustainable Development*, at 1–13; K. Araujo, 'The Emerging Field of Energy Transitions: Progress, Challenges, and Opportunities', (2014) 1(3) *Energy Research & Social Science*, at 112–21.

SDG 7, which is about ‘affordable and clean energy’, and SDG 13, which calls for ‘climate action’.³ Propelling this transition has, however, presented an existential challenge for all economies.

The COVID-19 pandemic has further intensified this challenge. For example, the resulting economic turmoil worldwide has disincentivized investment and innovation in the LCE sector and interrupted global supply chains crucial for the sector’s development.⁴ The wide spectrum of exceptionally large recovery plans has far-reaching implications for the trajectory of GHG emissions, leading to an ongoing debate on the ways to reverse the pandemic-induced economic slowdown without relying on a wave of carbon-intensive stimulus spending.⁵ Seizing the opportunity to ‘build back greener’ to set the world on track for meeting the 2030 SDGs and carbon neutrality target by around mid-century is vital.⁶ As confirmed in the global climate summit – Conference of Parties (COP)26 – recently held in Glasgow, countries will make further pledges to cut carbon emissions to keep temperature rises within 1.5 degrees.⁷ In addition, a wide range of national and sub-national governments, automotive manufacturers, and other stakeholders have committed to accelerating the transition to zero-emission vehicles to achieve the climate goals.⁸

Finding a low-carbon, high-growth recovery formula is anything but easy. Over 85 per cent of the world’s energy is still derived from fossil fuels, and LCE sources generally remain uncompetitive.⁹ Hence, governments are increasingly resorting to a range of supportive measures to foster the development of LCE technologies and the growth of their market share.¹⁰ Subsidies, as a major policy response, have attracted growing attention, especially as countries gradually shift financial support from fossil fuels towards renewable energy (RE).¹¹ The rise of subsidies for the LCE sector has triggered more trade disputes and heated debates over the rulings of the World Trade Organization (WTO).¹² Here, a fundamental issue is how to strike a balance between the use

³See the 2030 Agenda for Sustainable Development, adopted by all UN member states in 2015, available at sdgs.un.org/goals.

⁴OECD, ‘COVID-19 and the Low-carbon Transition: Impacts and Possible Policy Responses’, 26 June 2020, available at www.oecd.org/coronavirus/policy-responses/covid-19-and-the-low-carbon-transition-impacts-and-possible-policy-responses-749738fc/. See also IEA, ‘World Energy Outlook 2020’, October 2020, available at www.iea.org/reports/world-energy-outlook-2020.

⁵J. Jaeger, ‘Lessons from the Great Recession for COVID-19 Green Recovery’, *World Resources Institute*, 24 November 2020, available at www.wri.org/research/lessons-learned-green-stimulus-case-studies-global-financial-crisis; L. Dafnomilis et al., ‘Exploring the Impact of the COVID-19 Pandemic on Global Emission Projections: Assessment of Green versus Non-green Recovery’, *New Climate Institute*, September 2020, available at newclimate.org/2020/09/04/exploring-the-impact-of-the-covid-19-pandemic-on-global-emission-projections/.

⁶Over 100 countries have set, or are considering, net-zero emissions or neutrality targets. See H. L. van Soest, M. G. J. den Elzen and D. P. van Vuuren, ‘Net-zero Emission Targets for Major Emitting Countries Consistent with the Paris Agreement’, (2021) 12(1) *Nature Communications* 2140.

⁷COP 26 Goals, UN Climate Change Conference UK 2021, available at ukcop26.org/cop26-goals/.

⁸UK Government, ‘COP 26 Declaration on Accelerating the Transition to 100% Zero Emission Cars and Vans’, UK Government Policy Paper, 10 November 2021, available at www.gov.uk/government/publications/cop26-declaration-zero-emission-cars-and-vans/cop26-declaration-on-accelerating-the-transition-to-100-zero-emission-cars-and-vans.

⁹IEA, ‘World Energy Outlook 2019’, November 2019, available at www.iea.org/reports/world-energy-outlook-2019.

¹⁰D. G. Walker, F. W. Geels and S. Sharpe, ‘Accelerating the Low Carbon Transition: The Case for Stronger, More Targeted and Coordinated International Action’, *Brookings*, 9 December 2019, at 11, available at ec.europa.eu/jrc/en/news/lowcarbon-energy-technologies-successes-and-opportunities.

¹¹The scope of LCE technologies is broader than that of RE technologies because the latter forms a part of the former. Some varieties of LCEs still emit carbon emissions and would not be defined as RE technology. For instance, plug-in hybrid electric vehicles, as one type of NEVs can be considered as LCE but not RE technology. For a discussion of LCE technologies see ‘Low Carbon Energy Technologies: Successes and Opportunities’, EU Science Hub, 2021, available at www.brookings.edu/research/accelerating-the-low-carbon-transition/. It is beyond the scope of this article to cover all types of LCE technologies.

¹²See, e.g., R. Howse, ‘Climate Mitigation Subsidies and the WTO Legal Framework’, IISD Trade, Investment and Climate Series, *iisd*, May 2010, at 1–29, available at www.iisd.org/system/files/publications/bali_2_copenhagen_subsidies_legal.pdf; L. Rubini, ‘Ain’t Wastin’ Time No More: Subsidies for Renewable Energy, the SCM Agreement, Policy Space, and Law Reform’, (2012) 15(2) *Journal of International Economic Law*, at 525–79; A. Cosbey and P. Mavroidis, ‘A Turquoise Mess: Green Subsidies, Blue Industrial Policy and Renewable Energy: The Case for Redrafting the Subsidies Agreement of the WTO’,

of subsidies for legitimate policy goals such as combating climate change and the need to constrain their abuse that adversely affects the interests of trading partners.¹³

This article contributes to the existing scholarship by expounding China's emerging practice in subsidizing the LCE transition. We will use new energy vehicles (NEVs)¹⁴ as a case study since it is beyond the scope of this article to cover all types of LCE technologies that are broad and rapidly developing.¹⁵ NEVs are regarded as 'the single most important technology for decarbonizing the transport sector', accounting for 30 per cent of global emissions.¹⁶ Given the importance of this sector, China has maintained ambitious industrial policies and massive subsidies to foster the development of NEV technologies and innovation, manufacturing capability, enabling infrastructure, etc. Thanks to these policies and subsidies, China has surpassed the US and the EU to become the world's largest NEV producer in just a decade.¹⁷ More recently, NEV manufacturing companies in China, including private companies, state entities, and wholly foreign-owned companies, have taken up a large portion of the domestic market.¹⁸

With an established NEV manufacturing industry, China has been shifting its subsidization across the NEV value chain and arguably in ways that seek to make these subsidies more adherent to WTO rules or less likely to trigger trade disputes. Our primary goal in this article is to explain this policy shift and the related emerging practice in China and the reasons behind it. We argue that this shift derives mainly from the evolution of China's industrial policies and economic goals; and it may have also been influenced by recent trade disputes over RE-related measures.

Section 2 starts by classifying LCE subsidies into three categories based on the key segments of the value chain in this sector, namely, 'upstream' such as R&D, 'midstream' such as manufacturing of LCE products and components, and 'downstream' such as LCE infrastructure and consumption. This classification provides a framework for our discussion of China's strategic shift in subsidizing the NEVs sector – i.e., from heavy subsidization in the midstream segment to increasing subsidization in the upstream and downstream segments – and the main explanations for this shift throughout the article. Section 2 then sets out briefly China's overarching economic policies and goals that underpin this strategic shift. Against this backdrop, Section 3 delves into the major types

(2014)17 *Journal of International Economic Law*, at 11–47; P. D. Farah and E. Cima, 'The World Trade Organization, Renewable Energy Subsidies, and the Case of Feed-in Tariffs: Time for Reform toward Sustainable Development?', (2015) 27(4) *Georgetown International Environmental Law Review*, at 515; S. Charnovitz and C. Fischer, 'Canada–Renewable Energy: Implications for WTO Law on Green and Not-So-Green Subsidies', (2015) 14(2) *World Trade Review*, at 177; M. Karttunen and M. Moore, 'India–Solar Cells: Trade Rules, Climate Policy, and Sustainable Development Goals', (2018) 17(2) *World Trade Review*, at 215; D. Nelson and L. Puccio, 'Nihil novi sub sole: The Need for Rethinking WTO and Green Subsidies in Light of United States – Renewable Energy', *World Trade Review*, 22 June 2021, at 1–18, available at www.cambridge.org/core/journals/world-trade-review/article/abs/nihil-novi-sub-sole-the-need-for-rethinking-wto-and-green-subsidies-in-light-of-united-states-renewable-energy/D9C01F29032AF7F83F08157FE6FB243F.

¹³See, e.g., A. O. Sykes, 'The Questionable Case for Subsidies Regulation: A Comparative Perspective', (2010) 2(2) *Journal of Legal Analysis*, at 473; Charnovitz and Fischer, *ibid.*, at 207.

¹⁴NEVs include pure electric vehicles, plug-in hybrid vehicles and fuel cell vehicles.

¹⁵Many low-carbon energy technologies, such as solar, wind, hydro, nuclear, hydrogen, carbon capture, utilization, and storage and energy storage, are rapidly being developed to shift the economic activities to lower GHG emissions. See 'Low Carbon Energy Technologies: Successes and Opportunities', *supra* note 11.

¹⁶D. Kodjak, 'A Strategy to Decarbonize the Global Transport Sector by 2050, Explained', *ICCT*, 7 May 2021, at 5, available at theicct.org/publication/vision-2050-a-strategy-to-decarbonize-the-global-transport-sector-by-mid-century/.

¹⁷See, Anh Bui, P. Slowik and N. Lutsey, 'Power Play: Evaluating the US Position in the Global Electric Vehicle Transition', *ICCT*, 29 June 2021, at 3, available at theicct.org/publication/power-play-evaluating-the-u-s-position-in-the-global-electric-vehicle-transition/#:~:text=Power%20play%3A%20Evaluating%20the%20U.S.%20position%20in%20the%20global%20electric%20vehicle%20transition,-June%2029%2C%202021&text=From%202017%20to%202020%2C%20the,in%20the%20other%20two%20regions.

¹⁸In the first half of 2021, the top three NEV manufacturing companies in China in terms of domestic market share are: SAIC (a state entity), Tesla China (a wholly foreign-owned company), and BYD (a private company). Three out of the remaining seven in the top 10 are the so called 'new forces' private companies – NIO, Xpeng, and Li. See Junhui Tang, 'The Annual Sale Exceeds One Million for Three Consecutive Years and Ranks World No. 1 for Six Years', *STCN*, 29 Oct 2021, available at news.stcn.com/sd/202110/t20211029_3820941.html.

of Chinese subsidies in the NEVs sector to advance our core argument about China's reorientation of its subsidization strategy in light of developing its economic goals and priorities. Section 4 critically evaluates how the major WTO rules on subsidies and cases involving RE measures may have impacted China's policy shift. In doing so, we also offer some observations on the flexibilities (or lack of flexibilities) that the WTO may have for China's new approach to NEV subsidies. While focusing on China, our analysis has broader implications as governments restructure and expand LCE subsidies in the pursuit of a green recovery. Section 5 sets forth the conclusion.

2. The LCE value chain and China's policy priorities

2.1 The LCE value chain

The increasingly sophisticated LCE value chain calls for a segment-specific analysis to facilitate a discussion of the ongoing shift of priorities in subsidization, the impact of these subsidies on international trade, and their compatibility with WTO rules. The LCE value chain can be divided into three segments: upstream, midstream, and downstream.¹⁹

The upstream segment mainly encompasses R&D activities, a market that is highly intensive in capital and technology and hence is difficult to enter. R&D subsidies are typically used to address market imperfections associated with the lack of financing and investment (e.g., due to low return on investment or long payback time) and to build technological capability and competitiveness.²⁰ For immature LCE technologies, R&D subsidies can play an important role in reducing the entry and operation cost and bringing financing and investment to socially desirable levels.²¹ The midstream segment mainly refers to the manufacturing of LCE and key components, such as NEVs and batteries. Compared to the upstream segment, the midstream segment has a relatively lower entry barrier and an increasingly expanding global market for imports and exports involving economies at different stages of development.²² The high cross-border tradability makes the midstream market the main battlefield for NEV companies. The downstream segment covers the development of infrastructure to support the supply of LCE to end-users and after-sale services. This segment is highly value-added and has the potential to generate more employment.²³ Nevertheless, compared to the midstream segment, the downstream segment remains less tradable mainly because many services (e.g., the sale of NEVs and the maintenance of charging facilities) require their providers and consumers to be in the same location.

Largely due to the different degrees of tradability of goods, services, and technologies in the different segments of the LCE value chain, the impact of the segment-specific subsidies on international trade varies significantly. Generally, the more a segment is exposed to international trade, the higher is the possibility of subsidies generating cross-border implications. A proof of this is the growing number of WTO disputes concerning midstream subsidies provided to RE producers, which are discussed in Section 4.

¹⁹The specific sections under each segment can differ when it comes to different low-carbon energy products. For instance, as discussed above, the infrastructure for solar PV is transmission grid, for NEVs it is charging station.

²⁰N. M. Koseoglu, J. C. J. M. van den Bergh and J. Subtil Lacerda, 'Allocating Subsidies to R&D or to Market Applications of Renewable Energy? Balance and Geographical Relevance', (2013) *Energy for Sustainable Development*, at 536–7.

²¹*Ibid.*, at 543.

²²At current stage, the manufacturing of NEVs and the key components is concentrated in a number of countries, namely China, Europe, the US, Japan, and South Korea which account for nearly all of global NEV production. The diffusion of NEVs relies on international trade. See 'The Role of Trade in Enabling the Global Diffusion of Electric Vehicles', *ICTSD*, July 2018, available at www.greengrowthknowledge.org/research/role-trade-policy-enabling-global-diffusion-electric-vehicles.

²³M. M. Fang, 'Old Wine in a New Bottle? Green Industrial Policy and the Use of Safeguards in the Solar Sector', (2021) 55(4) *Journal of World Trade*, at 583.

2.2 China's new strategic goals

As the world's largest carbon emitter and one of the first major economies steadily recovering from the pandemic, China is at the forefront of leading a sustainable recovery. The ambitious 2060 carbon neutrality pledge,²⁴ announced by President Xi Jinping at the 2020 UN General Assembly, calls for a 'fundamental change in China's energy supply systems', which in turn requires structural and strategic adjustments of the relevant industrial policies and supportive measures.²⁵ Such adjustments, as envisaged in the fourteenth Five-Year Plan (2021–2025), essentially encompass three broad areas and goals: technological advancement and innovation, infrastructure development, and internal market expansion.²⁶ In the technology space, China carries on its firm commitment to advancing technological competitiveness, innovative capability, and independence in strategic industries, including the LCE sector. This commitment remains key to China's economic development goals. It also reflects China's concerns about the pandemic-induced uncertainties in the global supply chain and escalating tensions with major trading partners such as the US and the EU.

Furthermore, China's emphasis on subsidizing the midstream segment in the past has led to a mismatch between strong manufacturing capacity and low deployment of certain LCE technologies.²⁷ Such disproportionate subsidization is likely to create industrial overcapacity and hinder the decarbonization process. Thus, China is ratcheting up its efforts to build new infrastructure essential for promoting the deployment of high technologies, including LCE technologies.²⁸ At the same time, the new strategy of 'dual circulation', which is also a policy response to the uncertainties in the external environment, seeks 'greater economic independence' by relying on 'the domestic cycle of production, distribution and consumption' as the main engine for economic growth while downplaying the role of international trade and investment (i.e., the external circulation).²⁹ This strategy necessarily hinges on and will lead to an expansion of the domestic market for LCE technologies. These overarching goals are not entirely new but have acquired prominence to become vital elements of China's current policy priorities. As we argue below, they have been the key drivers of China's reorientation of the subsidization strategy in the NEVs sector.

3. New trend of subsidization in China's NEVs sector

Before its reorientation of subsidization strategy, China had disproportionately subsidized the midstream segment of the NEVs sector for over a decade. The reorientation has seen an ongoing shift to increasing subsidization in the upstream and downstream segments while gradually phasing out the midstream subsidies.

²⁴Carbon neutrality means having a balance between emitting carbon and absorbing carbon from the atmosphere in carbon sinks.

²⁵M. Meidan, 'Unpacking China's 2060 Carbon Neutrality Pledge', *Oxford Institute for Energy Studies*, December 2020, at 2, available at www.oxfordenergy.org/publications/unpacking-chinas-2060-carbon-neutrality-pledge/.

²⁶See 《中华人民共和国国民经济和社会发展第十四个五年规划和2035年远景目标纲要》 [The Outline of the 14th Five-Year Plan for the National Economic and Social Development and the 2035 Long Term Goals], adopted at the Fourth Session of the Thirteenth National People's Congress on 11 March 2021, available at www.gov.cn/xinwen/2021-03/13/content_5592681.htm.

²⁷Sufang Zhang et al., 'Interactions between Renewable Energy Policy and Renewable Energy Industrial Policy: A Critical Analysis of China's Policy Approach to Renewable Energies', (2013) 62 *Energy Policy*, at 342.

²⁸中央经济工作会议举行习近平李克强作重要讲话' (Speech by President Xi Jinping and Premier Li Keqiang at the Central Economic Working Conference), 12 Dec. 2019, available at www.gov.cn/xinwen/2019-12/12/content_5460670.htm. For a more detailed discussion of the new infrastructure initiative see Weihuan Zhou and M. M. Fang, 'Subsidizing Technology Competition: China's Evolving Practices and International Trade Regulation', (2021) 30(3) *Washington International Law Journal*, at 479–82.

²⁹S. Olson, 'China's Dual Circulation Strategy Signals A New Era', *Hinrich Foundation*, 30 June 2021, available at www.hinrichfoundation.com/research/article/us-china/china-dual-circulation-strategy-signals-a-new-era/.

3.1 Phasing out midstream subsidies

The midstream segment of the NEV value chain mainly involves the manufacturing of NEVs and components such as batteries. This segment used to be the focus of China's NEV industrial policy and support.³⁰ To boost manufacturing capacity, China has set various industrial targets, such as a minimum share of indigenous electric vehicles and plug-in hybrids in the domestic market³¹ and the creation of national champions specializing in the manufacture of key components, particularly power batteries.³² Between 2010 and 2020, China accounted for 44 per cent of global NEV production while the EU and the US shares were 25 and 18 per cent, respectively.³³

China's subsidies in the midstream segment take a variety of forms, including direct transfer of funds, tax incentives, policy loans, cheap land, and electricity. The major subsidy has been the massive nationwide direct transfer of funds. In 2013, the central government selected 28 local areas as NEV promotion sites and has since provided direct payments to support the sale of eligible NEVs.³⁴ These subsidies were provided directly to producers in anticipation that the sale price was to be reduced proportionately to the level of subsidies. In practice, NEV producers have been the largest beneficiaries due to the lack of an effective monitoring system to ensure the benefits actually flow through to consumers.³⁵

Consequently, the subsidies led to a drastic increase in manufacturing capacity. To implement the national policy, local governments introduced similar financial support.³⁶ As NEV technologies became more mature, the central government reduced this subsidy six times between 2014 and 2020. Local governments were also asked to reduce their own subsidies. Moreover, the eligibility for this subsidy has been tied to increasingly stringent technology and performance requirements. The modified subsidy scheme favours NEV firms with higher levels of technical performance and is available to both domestic and foreign-invested NEV manufacturers. For example, in the first half of 2020, Shanghai-based Tesla secured the largest portion of this subsidy, approximately 20 per cent of the total amount granted.³⁷ In 2018 and 2019, Shenzhen-based BYD received nearly RMB 8 billion, making it the home-grown champion of NEVs, followed by Beijing Automotive Group and Yutong Bus.³⁸ Nevertheless, these direct payments are being phased out.

³⁰Yidan Chu, 'China's New Energy Vehicle Industrial Development Plan for 2021 to 2035', *ICCT*, 17 June 2021, at 3, available at theicct.org/publication/chinas-new-energy-vehicle-industrial-development-plan-for-2021-to-2035/.

³¹'Made in China 2025' Interpretation: To Promote Energy Conservation and the Development of New Energy Vehicles' [《中国制造2025》解读之：推动节能与新能源汽车发展] issued by the Ministry of Industry and Information Technology (MIIT) on 12 May 2016, available at www.gov.cn/zhuanti/2016-05/12/content_5072762.htm.

³²The Development Plan of Energy Conservation and New Energy Vehicles (2012–2020) [节能与新能源汽车发展规划 (2012–2020)] issued by the State Council on 28 June 2012, available at www.gov.cn/zwggk/2012-07/09/content_2179032.htm.

³³Anh Bui, Slowik and Lutsey, *supra* note 17, at 20.

³⁴See 'The Notice on Continuing on the Promotion and Application of NEVs' [关于继续开展新能源汽车推广应用工作的通知] issued by the Ministry of Finance (MOF), Ministry of Science and Technology (MOST), MIIT and National Development and Reform Commission (NDRC) on 13 September 2013, available at www.gov.cn/zwggk/2013-09/17/content_2490108.htm. The amount of the subsidy was set to reduce by 10% in 2014 and 20% in 2015. Eligible NEV firms can get pre-allocated subsidies from the central finance on quarterly basis, while the review and check are conducted on annual basis. The process is – after the NEV firms apply for the fiscal subsidy, local finance and technology bureaus need to review before submitting these documents to the central ministries.

³⁵The registration of NEV manufacturing firms in China has reached around 500, which arguably exceeds what China's domestic market can accommodate. See Zhenyu Pu, 'The Excessive Capacity of 25 Million Vehicles by More Than 400 NEV Manufacturers, MIIT Repeated the Need of Merger and Restructure of NEV Industry', *The Economic Observer*, 13 September 2021, available at m.eeo.com.cn/2021/0913/504461.shtml.

³⁶Jieyi Lu, 'Comparing US and Chinese Electric Vehicle Policies', *EESI*, 28 February 2018, available at www.eesi.org/articles/view/comparing-u.s.-and-chinese-electric-vehicle-policies.

³⁷Shuo Zhang, 'Tesla Secured RMB 800 Million in the First Half of 2020', *Future Auto Times*, 10 August 2020, available at auto-time.36kr.com/p/831637615485575.

³⁸'The Publicity of the Final Review of the 2019 NEVs Promotion and Application Supportive Funds and the Re-examination of Vehicles under Appeal between 2016 to 2018' [关于2019年度新能源汽车推广应用补助资金清算审核终

Initially scheduled to be removed by 2020, the central scheme has been extended for two more years until 2022 due to the declining sales induced by COVID-19.³⁹

Besides supporting NEV production, the NEV battery sector has also received sizeable subsidies.⁴⁰ In 2015, the central government introduced the so-called 'white list' of battery manufacturers without including any foreign firm, and only NEVs that use these batteries were eligible for government subsidies.⁴¹ This local content requirement (LCR) was employed to boost the manufacturing capacity of power battery, the most expensive component of an electric vehicle.⁴² It led to an astonishing growth in China's battery installation capacity by nearly 57 per cent annually from 2015 to 2018.⁴³ China has now surpassed Japan and South Korea to become the world's largest battery manufacturer.⁴⁴ After major domestic manufacturers such as CALT, BYD, and Guoxuan had acquired sufficient capabilities and global competitiveness, China abolished the LCR in 2019.

Overall, China has been scaling back and gradually removing the major subsidies granted to the midstream segment of the NEV value chain. This is a strategic move in light of China's new priorities discussed in Section 2 and particularly after China's manufacturing capacity had already been established. This move also reflects China's growing concerns about overcapacity, budget constraint, and subsidy fraud.⁴⁵ In addition, as Chinese NEVs increasingly compete with foreign counterparts in overseas markets,⁴⁶ there might also be concerns about WTO-consistencies and potential trade disputes.⁴⁷ This point will be further explored in Section 4.

However, at least two outstanding issues are worth noting. First, while China has tightened the eligibility criteria for direct payments to NEV producers and removed the LCR in favour of domestic power battery makers, it arguably has maintained a de facto LCR. The modification

审情况及2016-2018年度申诉车辆复审情况的公示] issued by the MIIT on 13 March 2021, available at www.miit.gov.cn/wzqk/wjgs/art/2021/art_5174533c85c546d5b17144c67f767e0e.html.

³⁹It is noted that NEVs using battery swapping models will not be subject to the phase out of subsidies. See 'The Notice on Improving Fiscal Subsidy Policy to Facilitate the Promotion and Application of NEVs' [关于完善新能源汽车推广应用财政补贴政策的通知] issued by the MOF, MIIT, MOST and NDRC on 23 April 2020, available at www.gov.cn/zhengce/zhengceku/2020-04/23/content_5505502.htm; 'The Notice on Further Improving Fiscal Subsidy Policy to Facilitate the Promotion and Application of NEVs' [关于进一步完善新能源汽车推广应用财政补贴政策的通知] issued by the MOF, MIIT, MOST and NDRC on 31 December 2020, available at www.gov.cn/zhengce/zhengceku/2020-12/31/content_5575906.htm.

⁴⁰The cost of battery normally makes up around 35% to 50% of the electric vehicle costs. See D. Stringer and Kyunghee Kim, 'Why Building an Electric Car is So Expensive, For Now', *Bloomberg*, 22 October 2020, available at www.bloomberg.com/news/articles/2020-10-22/why-building-an-electric-car-is-so-expensive-for-now-quicktake.

⁴¹See, 'Regulations on the Standards of Automotive Power Battery Industry' [汽车动力蓄电池行业规范条件] issued by the MIIT on 24 March 2015, available at www.mofcom.gov.cn/article/b/g/201505/20150500987728.shtml.

⁴²The cost of battery normally makes up around 35% to 50% of the electric vehicle costs. See Stringer and Kyunghee Kim, *supra* note 40.

⁴³Lulu Shi, 'China's White List of Power Battery Companies Abolished', *Neware*, 28 June 2019, available at newarebattery.com/chinas-white-list-of-power-battery-companies-abolished/.

⁴⁴China Dominates the Lithium Ion Battery Supply Chain, but Europe is on the Rise', *Bloomberg NEF*, 16 September 2020, available at about.bnef.com/blog/china-dominates-the-lithium-ion-battery-supply-chain-but-europe-is-on-the-rise/.

⁴⁵For a discussion of subsidy fraud see Hongyang Cui, 'Subsidy Fraud Leads to Reforms for China's EV Market', *ICCT*, 30 May 2017, available at theicct.org/subsidy-fraud-leads-to-reforms-for-chinas-ev-market/. The existence of local protectionism can be evidenced by the fact that, in China, NEV brands tend to perform better in markets where they are headquartered or have a manufacturing facility. See Lingzhi Jin and Hui He, 'Comparison of the Electric Car Market in China and the United States', *ICCT*, 25 May 2019, available at theicct.org/publication/comparison-of-the-electric-car-market-in-china-and-the-united-states/.

⁴⁶The Overseas Market Battle for Chinese NEVs' (Jiemian, 11 June 2021), available at www.jiemian.com/article/6223503.html.

⁴⁷EU Chamber of Commerce, 'China Manufacturing 2025: Putting Industrial Policy Ahead of Market Forces', 7 March 2017, available at www.europeanchamber.com.cn/en/china-manufacturing-2025; USTR, '2019 USTR Report to Congress on China's WTO Compliance (2020)', at 61, available at ustr.gov/about-us/policy-offices/press-office/reports-and-publications/2019/2019-report-chinas-wto-compliance.

of the direct payments in 2020 limited eligible NEVs to those priced at no more than RMB 300,000.⁴⁸ While this criterion applies to all NEV manufacturers, it induces NEV manufacturers to source from local suppliers of key components, particularly batteries, to bring down the cost. For instance, Tesla managed to reduce the price for some vehicle models by using batteries provided by Chinese manufacturers.⁴⁹ As reported, CALT supplied 20 per cent of Tesla's battery demand in 2020.⁵⁰

Nevertheless, this de facto LCR will cease to exist once the direct payment scheme is phased out in 2022. Second, some other forms of subsidies remain, particularly at the local level, which has been provided to attract NEV firms to set up manufacturing plants or headquarters in local areas. For instance, in 2017, X-Peng received a low-rate loan of around RMB 1.5 billion from Zhaoqing City, Guangdong Province, and cheap land provided by Wuhan City, Hubei Province.⁵¹ NIO signed a collaboration agreement with the Hefei government in Anhui Province and obtained an RMB 7 billion equity infusion from many state entities.⁵² While these subsidies have created issues of WTO-consistency, China's action to phase out them in an incremental manner is a positive development.

3.2 Shifting to upstream and downstream

3.2.1 Upstream R&D subsidies

China's R&D capability in the LCE sector generally remains under-developed.⁵³ In the NEVs sector, there is a significant technological gap that has constrained its quality development and competitiveness.⁵⁴ Therefore, this sector has been one of the strategic industries in which China is keen to enhance technological capability through R&D.

At the early stage, the R&D of Chinese NEVs was driven by small-scale government support. For instance, the '863 Electric Vehicle Program' identified NEVs as a priority and allocated approximately RMB 738 million for R&D.⁵⁵ The release of the Development Plan of Energy Conservation and New Energy Vehicles 2012–2020 further boosted central and local support for R&D.⁵⁶ Under the NEV Innovation Program, 17 NEV projects and eight electric battery projects were selected for fiscal awards from the Energy Conservation and Emissions Reduction Fund based on their competitive performance in innovation and industrialization.⁵⁷ Apart from

⁴⁸The Notice on Improving the Fiscal Subsidy Policy of the New Energy Vehicles Promotion and Application', *supra* note 39.

⁴⁹L. He, 'Tesla is Cutting Prices in China so the Model 3 Qualifies for Subsidies', *CNN Business*, 1 May 2020, available at edition.cnn.com/2020/05/01/tech/tesla-china-model-3-price-cut-intl-hnk/index.html.

⁵⁰It is reported that Tesla has recently been in discussions with another Chinese battery manufacturing firm – Eve Energy for supply. See 'Tesla is Discussing the Supply of Batteries with Chinese Firm Eve Energy', Reuters, 14 April 2021, available at cn.reuters.com/article/tesla-china-eve-energy-sources-0514-fri-idCNKBS2CV0K1.

⁵¹K. Bradsher, 'As Cars Go Electric, China Builds a Big Lead in Factories', *New York Times*, 6 May 2021, available at cn.nytimes.com/business/20210506/china-electric-cars/zh-hant/dual/.

⁵²'RMB 7 Billion! NIO Signed the Collaboration Agreement with Hefei Today', *Sina Finance*, 29 April 2020, available at tech.sina.com.cn/roll/2020-04-29/doc-iircuyvi0503255.shtml.

⁵³For instance, even in the well-developed solar PV sector, as pointed out by Jin Lei, a researcher from the MIIT, the outstanding problems of China's solar PV industry include: the underdeveloped basic research capability, the insufficiency of technology foresight and others. See 'Standing at the New Point and Seeking A New Development – the Overview of the 2020 Solar PV Industry Development and the Prospect in 2021', China PV Industry Association, 4 February 2021, available at www.chinapv.org.cn/association_news/928.html.

⁵⁴Na Zhou, Qiaosheng Wu and Xiangping Hu, 'Research on the Policy Evolution of China's New Energy Vehicles Industry', (2020) 12(9) *Sustainability*, at 3641.

⁵⁵See, 'China's NEV R&D Pathway between 2001 and 2009', *Sina*, 22 July 2010, available at auto.sina.com.cn/news/2010-07-22/0835628647_4.shtml.

⁵⁶The Development Plan of Energy Conservation and New Energy Vehicles (2012–2020)', *supra* note 32.

⁵⁷See 'The Notice on Organizing the NEV Industry Technological Innovation Program' [关于组织开展新能源汽车产业技术创新工程的通知] issued by the MOF, MIIT and MOST on 20 September 2012, available at www.gov.cn/gzdt/2012-10/12/content_2242395.htm; 'The Interim Measure of Administering the Fiscal Awards for the NEVs Industry Technological

NEV-specific R&D subsidies, general R&D incentives designed for emerging and strategic industries are also available. Most recently, the 2021–2035 Plan emphasizes the need to create a new industrial innovation ecosystem by promoting R&D collaboration between firms and research institutions, particularly to break major technological barriers and advance critical technologies and innovation.⁵⁸

To complement the national subsidies, local governments, particularly in the demonstration cities, have crafted R&D incentives to encourage NEVs innovation. For instance, the Guangxi provincial government provides a one-off fiscal award of RMB 500,000 to firms if their vehicles meet certain technical requirements or get listed in the national NEV Demonstration Catalogue.⁵⁹ The Yunnan provincial government offers R&D fiscal awards equivalent to 1 per cent of a NEV firm's total annual revenue when the firm's annual sale exceeds 100,000 vehicles for the first time.⁶⁰ In Guangdong, the supportive scheme is more inclusive through an annual RMB 300 million grant for major R&D projects, including NEVs, power batteries and other key components, NEV innovation platforms, etc.⁶¹

Another major form of R&D subsidies is tax reductions and exemptions for NEV firms conducting innovation and research activities or technology transfer.⁶² In recent years, China has been seeking to prioritize the use of tax incentives for R&D,⁶³ and since 2021, the ratio of additional pre-tax deductions for R&D expenses that NEV firms can apply for has been increased to 100 per cent.⁶⁴ Similarly, local governments have offered various tax incentives for NEV firms.⁶⁵ Another notable development has been China's growing emphasis on the use of non-specific tax incentives, which will be further discussed in Section 4.

Accordingly, there is a clear trend of increased subsidization in the upstream segment of the NEVs sector, with a focus on R&D. Given the vital role of NEV technologies, continued growth is envisaged in China's R&D subsidies in the coming years. The shift from midstream subsidies to the upstream serves China's policy priorities and economic needs and is necessary to manage any potential budget constraint. One major issue, though, has been how to maximize the efficacy of the

Innovation Program' [新能源汽车产业技术创新工程财政奖励资金暂行办法] issued by the MOF, MIIT and MOST on 20 September 2012, available at www.caam.org.cn/chn/9/cate_95/con_5079954.html. The requirements for NEV firms include the minimal requirement on the share of R&D investment of the firm's total revenue, the capacity of NEV integration design, and continuous innovation; the requirements for battery firms include mastering the core technology and holding the IP rights for battery cells.

⁵⁸The Notice on Issuing the Development Plan of NEVs Industry (2021–2035)' [关于印发新能源汽车产业发展规划(2021-2035)的通知] issued by the State Council on 2 November 2020, available at www.gov.cn/zhengce/content/2020-11/02/content_5556716.htm.

⁵⁹See 'The Implementation Opinion of Accelerating the Promotion and Application of NEVs' [关于加快新能源汽车推广应用的实施意见] issued by the Guangxi Zhuang Autonomous Region Government on 20 July 2015, available at www.gxzf.gov.cn/zfgb/2015nzfgb_35094/d15q_35131/zzqrmzfbgtwj_35132/t1511284.shtml.

⁶⁰The Measures on Facilitating the Promotion and Application of NEV Industry' [云南省加快新能源汽车产业发展和应用若干政策措施] issued by the Yunnan Government on 3 August 2020, available at www.yn.gov.cn/zwgk/zcwj/yzfb/202008/t20200807_208579.html.

⁶¹The Opinions on Facilitating the Innovation Development in the NEVs Industry' [广东省人民政府关于加快新能源汽车产业创新发展的意见] issued by the Guangdong Government on 13 June 2018, available at www.gd.gov.cn/gkmlpt/content/0/146/post_146920.html#7.

⁶²The Implementation Plan of Facilitating the NEVs Industry Development' [上海市加快新能源汽车产业发展实施计划(2021-2025年)] issued by the Shanghai Government on 25 February 2021, available at www.shanghai.gov.cn/nw12344/20210225/c76899471d0d4abea77b26d54d7fb972.html.

⁶³See, e.g., Kejun Wang, 'China to Spur Business Innovation with More Tax Incentive', State Council, 24 March 2021, available at english.www.gov.cn/premier/news/202103/24/content_WS605b2f76c6d0719374afb5b0.html.

⁶⁴The Announcement on Further Improving the Policy for Pre-Tax Additional Deductions for R&D Expenses' [关于进一步完善研发费用税前加计扣除政策的公告] issued by the MOF and State Taxation Administration on 7 April 2021, available at szs.mof.gov.cn/zhengcefabu/202104/t20210402_3680563.htm.

⁶⁵The Implementation Plan of Facilitating the NEVs Industry Development' [上海市加快新能源汽车产业发展实施计划(2021-2025年)] issued by the Shanghai Government on 25 February 2021, available at www.shanghai.gov.cn/nw12344/20210225/c76899471d0d4abea77b26d54d7fb972.html.

subsidies so that the R&D goals are achieved. As these subsidies are provided directly to the firms, there is a high probability that they may be (mis)used for other objectives (such as to increase production) instead of achieving breakthroughs in key NEV technologies.⁶⁶ This issue is being addressed partly through the introduction of the new industrial innovation ecosystem, as mentioned above, to encourage R&D collaboration between firms and research institutions.

3.2.2 Downstream infrastructure subsidies

Enabling infrastructure, which is critical for the delivery of LCE to end-users, remains underdeveloped in many countries.⁶⁷ In the NEVs sector, the development of nationwide, reliable, and affordable charging infrastructure is essential for the penetration of NEVs.⁶⁸ Although the absolute number of charging facilities installed has risen quickly in China, the density remains low and has become a major constraint for the growth of NEV adoption.⁶⁹

China did not place emphasis on developing charging infrastructure until 2015.⁷⁰ Consequently, the development of such infrastructure lagged far behind the rapidly-growing NEV production.⁷¹ To address this deficiency, the State Council issued a Guiding Opinion to set the overarching goals and specific targets for the development of charging infrastructure and direct increasing financial support in this sector.⁷² Over time, NEV infrastructure, including charging stations, has become one of China's strategic priorities, particularly under the new infrastructure initiative mentioned in Section 2.

Following the national policy, an increasing number of local governments have introduced subsidy programs to support the expansion of charging infrastructure. These subsidies are of various types, such as compensation for the construction costs of charging infrastructure, fiscal support for installation and maintenance, and preferential utility rates, which reduce electricity costs for charging operators.⁷³ More specifically, the Shenzhen government has set a target to build around 840,000 charging points by 2025 and provides fiscal incentives based on the installed capacity of charging points, ranging from RMB 100/kW to 400/kW.⁷⁴ The Shanghai government offers a

⁶⁶Cailou Jiang and others, 'The Effectiveness of Government Subsidies on Manufacturing Innovation: Evidence from the New Energy Vehicle Industry in China', (2018) 10(6) *Sustainability*, at 1701.

⁶⁷R. Walton, 'Propelling the Transition: New and Better Transmission is Key to Zero Carbon: Here is What's Driving It', *Utility Dive*, 19 August 2020, available at www.utilitydive.com/news/propelling-the-transition-new-and-better-transmission-is-key-to-zero-carbo/582331/.

⁶⁸J. Perkowski, 'The Electric Car Market Has a "Chicken or Egg" Problem – And China is Solving It', *Forbes*, 26 September 2016, available at www.forbes.com/sites/jackperkowski/2016/09/26/china-electric-car-charging-station/?sh=7a635187123c.

⁶⁹Lingzhi Jin et al., 'Driving a Green Future: A Retrospective Review of China's Electric Vehicle Development and Outlook for the Future', *J CCT*, 14 January 2021, at 26, available at [theicct.org/publication/driving-a-green-future-a-retrospective-review-of-chinas-electric-vehicle-development-and-outlook-for-the-future/#:~:text=Report-,Driving%20a%20green%20future%3A%20A%20retrospective%20review%20of%20China's%20electric,and%20outlook%20for%20the%20future&text=In%20just%20a%20decade%2C%20China,electric%20vehicle%20\(EV\)%20market.&text=This%20report%2C%20written%20with%20our,growth%20of%20China's%20EV%20market](http://theicct.org/publication/driving-a-green-future-a-retrospective-review-of-chinas-electric-vehicle-development-and-outlook-for-the-future/#:~:text=Report-,Driving%20a%20green%20future%3A%20A%20retrospective%20review%20of%20China's%20electric,and%20outlook%20for%20the%20future&text=In%20just%20a%20decade%2C%20China,electric%20vehicle%20(EV)%20market.&text=This%20report%2C%20written%20with%20our,growth%20of%20China's%20EV%20market;); R. McLane and Qiyu Liu, 'China's Timely Charging Infrastructure Plan', *Rocky Mountain Institute*, 8 July 2020, available at rmi.org/chinas-timely-charging-infrastructure-plan/.

⁷⁰Lei Xu and Jun Su, 'From Government to Market and from Producer to Consumer: Transition of Policy Mix towards Clean Mobility in China', (2016) 96 *Energy Policy*, at 336.

⁷¹'The Gap of 3.6 Million Private Charging Points and Four Major Problems that Hinder the Development', *New Energy*, 10 September 2020, available at newenergy.in-en.com/html/newenergy-2392573.shtml.

⁷²Supportive measures include the use of central infrastructure investment fund to support the construction of charging infrastructure and the preferential electricity tariff. See 'The Guiding Opinion on Facilitating the Construction of Electric Vehicles Charging Infrastructure' [关于加快电动汽车充电基础设施建设的指导意见] issued by the State Council on 9 October 2015, available at www.gov.cn/zhengce/content/2015-10/09/content_10214.htm.

⁷³McLane and Liu, *supra* note 69.

⁷⁴See 'The Notice of Organizing the Submission of NEV Charging Points Subsidies in 2020 in Shenzhen' [关于组织开展深圳市2020年度新能源汽车充电设施建设补贴申报工作的通知] issued by the Shenzhen Development and Reform Bureau on 28 August 2020, available at fgw.sz.gov.cn/zwgk/qt/tzgg/content/post_8038503.html; 'The Work Plan of the Promotion

range of supportive programs, such as preferential electricity rates to firms and direct payments to NEV users to promote the installation and operation of public and private charging stations.⁷⁵ Notably, in 2020, the Shanghai government removed the LCR, compelling the use of domestically made charging equipment.⁷⁶

As NEV infrastructure remains at the development stage in China, government support for the construction and operation of charging facilities will remain or even be stepped up in the near future. Nevertheless, as installation-based subsidies may lead to low-quality and low-efficiency investment, we may see a shift to operation-based subsidies based on the efficiency and performance of charging infrastructure operators.⁷⁷ If one considers the NEVs sector as a whole, the strategic reorientation of subsidies can also be discerned in this downstream segment and is also well aligned with China's overarching economic goals and needs. A shifting policy priority from NEV subsidies to charging infrastructure construction and maintenance subsidies is underway.⁷⁸

3.2.3 Downstream consumption subsidies

End-user subsidies can directly reduce consumption costs and enhance the affordability of and access to LCE by consumers.⁷⁹ Over time, such subsidies may well induce a fundamental change of consumer behaviour towards environment-friendly consumption, thereby expanding and securing the market for LCE and eventually promoting an economywide adoption of low-carbon technologies. In this sense, stimulating domestic application and consumption of LCE constitutes an indispensable part of achieving decarbonization goals.

China's policy shift from midstream to downstream subsidies in the NEVs sector has also involved a growing emphasis on consumer-oriented incentives that have contributed to a fast-growing adoption of NEVs.⁸⁰ As of this writing, China has become the world's second largest NEV market, accounting for half of the world's NEVs and more than 90 per cent of electric buses and trucks.⁸¹

and Application of NEVs in Shenzhen (2021-2025)' [深圳市新能源汽车推广应用工作方案(2021-2025)] issued by the Shenzhen Development and Reform Bureau on 30 March 2021, available at fgw.sz.gov.cn/zwgk/zcfjzcyj/zcfg/content/post_8667568.html.

⁷⁵See 'The Interim Measures of Facilitating the Connectivity and Orderly Development of Charging and Battery Swapping Infrastructure for Electric Vehicles in Shanghai' [上海市促进电动汽车充电换电设备互联互通有序发展暂行办法] issued by the Shanghai Development and Reform Bureau on 1 April 2020, available at www.caam.org.cn/chn/9/cate_104/con_5229561.html. For instance, the government sets detailed criteria for firms operating charging business, which becomes the basis on which electricity subsidies for each charging facility/station is calculated.

⁷⁶The Supportive Measures on Encouraging the Development of NEV Charging and Battery Swapping Facilities' [上海市鼓励电动汽车充电换电设施发展扶持办法] issued by the Shanghai DRC on 6 April 2016, available at www.shanghai.gov.cn/nw12344/20200814/0001-12344_47395.html.

⁷⁷Subsidy is Not Panacea and Charging Station Operators' Struggle to Make Profits', Sina News, 26 April 2021, available at auto.sina.com.cn/zz/wb/2021-04-26/detail-ikmyaawc1771645.shtml.

⁷⁸The Action Plan on Green Mobility (2019-2022) calls for a gradual shift from NEV purchase subsidies to supporting the development of charging infrastructure. See 'Action Plan on Green Mobility (2019-2022)' [绿色出行行动计划 (2019-2022)] issued by the Ministry of Transport on 20 May 2019, available at www.gov.cn/xinwen/2019-06/03/content_5397034.htm; The Government Work Report 2021, for the first time, did not refer to the development of NEVs but emphasized the need to expand charging stations. See, 2021 Government Work Report made by Premier Li Keqiang at the Fourth Session of the Thirteenth National People's Congress on 5 March 2021, available at www.gov.cn/zhuanti/2021lhfgzbg/index.htm. A number of central ministries require local governments to transfer subsidies from NEVs to charging infrastructure.

⁷⁹C. Mwirigi, 'How End-user Subsidies can Help Achieve Universal Energy Access', *PV Magazine*, 25 January 2021, available at www.pv-magazine.com/2021/01/25/how-end-user-subsidies-can-help-achieve-universal-energy-access/.

⁸⁰Xu and Su, *supra* note 70, at 338.

⁸¹China surpassed the US to become the world's largest NEV market in 2015 while the EU overtook China in 2020. See W. Boston, 'How Europe Became the World's Biggest Electric-Car-Market and Why it Might Not Last', *Wall Street Journal*, 28 February 2021, available at www.wsj.com/articles/how-europe-became-the-worlds-biggest-electric-car-market-and-why-it-might-not-last-11614508200.

Since the launch of the ‘Ten Cities, Thousand Vehicles’ programme in 2009, government procurement became the mainstream policy instrument to expand the consumption of NEVs.⁸² In 2013, the central government released specific targets for the share of NEVs in government procurement and public purchases.⁸³ This was followed by the introduction of a number of national measures mandating public procurement to promote the demand for NEVs.⁸⁴ As estimated, around RMB 3 billion was spent on government procurement of NEVs for public transit in 2019.⁸⁵ The enthusiasm for the private purchase of NEVs started to pick up when supportive policies for private consumers were gradually expanded and diversified, particularly after 2013.⁸⁶ Unlike the direct payments to producers based on NEV sales (treated as midstream subsidies above), these subsidies are provided directly to consumers typically by way of tax incentives, including the exemption of vehicle and vessel tax, purchase tax, and registration tax.⁸⁷ While the purchase tax exemption is available only for NEVs listed on the catalogues published by competent authorities,⁸⁸ the exemption from vehicle and vessel tax and registration tax applies to all NEVs. At the local level, consumer subsidies have been developed in a variety of forms.⁸⁹ For example, the Shanghai government waives application fees and processes for NEV buyers while

⁸²This programme was initiated in 13 cities at first and expanded to cover 25 cities later, which were chosen as demonstration sites. Subsidies for passenger NEVs ranged from RMB 50,000 per vehicle to RMB 250,000 per vehicle, while subsidies for NEV buses can reach as high as RMB 600,000 per bus. Local governments also were mandated to provide subsidies. See ‘The Notice on Implementing the Demonstration and Promotion Pilot Programs for Energy Conservation and NEVs’ [关于开展节能与新能源汽车示范推广试点工作的通知] issued by the MOF and MOST, available at www.gov.cn/zwggk/2009-02/05/content_1222338.htm.

⁸³See ‘The Notice on Furthering the Promotion and Application of NEVs’ [关于继续开展新能源汽车推广应用工作的通知] issued by the MOF, MOST, MIIT and NDRC on 13 September 2013, available at www.gov.cn/zwggk/2013-09/17/content_2490108.htm.

⁸⁴See, for instance, ‘The Guiding Opinion on Accelerating the Promotion and Application of NEVs’ [关于加快新能源汽车推广应用的指导意见] issued by the State Council on 14 July 2014, available at www.gov.cn/zhengce/content/2014-07/21/content_8936.htm. The Guiding Opinion required local governments to design the plan for promoting NEVs and expand the size of NEVs procurement by governmental and public entities; ‘The Three-Year Action Plan on Winning the Battle for Blue Sky Protection’ [打赢蓝天保卫战三年行动计划] issued by the State Council on 27 June 2018, available at www.gov.cn/zhengce/content/2018-07/03/content_5303158.htm. The Action Plan mandated the use of NEVs for public buses in designated cities; ‘The Implementation Opinion on Facilitating the Expansion of Consumption to Accelerate the Formation of Dynamic Domestic Market’ [关于促进消费扩容提质加快形成强大国内市场的实施意见] issued by the NDRC on 28 February 2020, available at www.gov.cn/zhengce/zhengceku/2020-03/13/content_5490797.htm. The Opinion highlights use to incentives, such as subsidies to support for the adoption of NEVs in urban bus system; ‘The Notice on Issuing the Development Plan of NEVs Industry (2021-2035)’, *supra* note 58. The Notice sets the target to achieve more than 80% addition or conversion to NEVs in public areas in designated regions.

⁸⁵RMB 3 Billion Purchase of Buses were NEVs Last Year’, *Chinese Government Procurement News*, 4 February 2021, available at www.cgpnnews.cn/articles/55433.

⁸⁶Although subsidies for private consumers were in a number of demonstration programs, the size of which was very limited and the effectiveness in bolstering consumption was not satisfactory. In 2013, the central government expanded the scope of consumer subsidies and set the declining rate to be 10% in 2014, and 20% in 2015 based on the 2013 level. See ‘The Notice on Continuing on the Promotion and Application of NEVs’, *supra* note 34.

⁸⁷We discussed this form of subsidies in the previous section about midstream subsidies.

⁸⁸See ‘The Notice of NEV Purchase Tax Exemption’ [关于新能源汽车免征车辆购置税有关政策的公告] issued by the Ministry of Finance, State Tax Administration and Ministry of Industry and Information Technology on 16 April 2020, available at www.chinatax.gov.cn/chinatax/n810341/n810755/c5148808/content.html. The latest Catalogue can be found, ‘The Notice on Adjusting Performance Requirements of NEVs Eligible for Purchase Tax Exemption’ [关于调整免征车辆购置税新能源汽车产品技术要求的公告] issued by the MIIT, MOF and State Tax Administration on 13 May 2021, available at www.miit.gov.cn/jgsj/zbwj/wjfb/art/2021/art_dd9c5440ab974919b289c453aaf2281c.html. The release of the fifth Catalogue marks the first time imported NEVs can also be eligible for purchase tax exemption. See ‘The Exemption of Purchase Tax, The First Time Import NEVs Received Policy Incentive’, *People.cn*, 23 September 2015, available at auto.people.com.cn/n/2015/0923/c1005-27622120.html.

⁸⁹*Ibid.*

such application costs up to RMB 80,000 and often takes time.⁹⁰ The Shenzhen government offers preferential parking fees for NEVs.⁹¹ Reimbursement of charging-related electricity tariff has also been increasingly used by local governments.⁹²

Currently, there is no sign that the above support for the consumption of NEVs is to be scaled back. Given China's 'dual circulation' strategy and strong commitments to developing the NEVs sector, consumer subsidies may well continue to grow in the foreseeable future while midstream subsidies are gradually reduced or removed.

4. Impact/flexibility or lack of impact/flexibility of WTO rules

While China's reorientation of the subsidization in the NEVs sector has been driven primarily by its own policy priorities and economic needs, it may also have involved considerations of how to reduce trade conflicts and ensure WTO-compatibility. This section discusses the extent to which this reorientation has led to a gradual shift to subsidies that are less likely to trigger trade disputes and/or less controversial under WTO subsidy rules.

Industrial subsidies are one of the most controversial areas of international trade regulation. Given their widespread use by governments worldwide for economic recovery and other policy goals, subsidies pose growing challenges for the multilateral trading system largely due to their spill-over effects on trading partners and potential inconsistencies with WTO rules.⁹³ Thus, as mentioned, the fundamental challenge lies in striking a balance between allowing sufficient policy space for the legitimate use of subsidies and preventing their abuse that harms the interests of trading partners. As subsidies often provide the first-best policy response to market failures, trade economists have cautioned against excessively intrusive disciplines, which may prompt governments to resort to second-best instruments and inefficient outcomes.⁹⁴ As will be shown below, WTO tribunals are fully aware of the need for a balancing act in dealing with RE subsidies, although the current rules may be further developed to provide more policy space for their legitimate use.

Industrial subsidies are mainly governed under the Agreement on Subsidies and Countervailing Measures (ASCM), one of the most litigated WTO agreements.⁹⁵ However, RE or LCE subsidies have been adjudicated in only three recent cases,⁹⁶ including *Canada* –

⁹⁰See 'The Implementation Measure of Stimulating the Purchase and Use of NEVs in Shanghai' [上海市鼓励购买和使用新能源汽车实施办法] issued by the Shanghai Government on 10 February 2021, available at www.shanghai.gov.cn/nw12344/20210210/432b54af74bb48b093d6b0108b2eb286.html.

⁹¹'The Measures on Coping with COVID-19 and Facilitating the Promotion and Application of NEV' [应对新冠肺炎疫情影响促进新能源汽车推广应用若干措施的通知] issued by the Shenzhen Government on 7 June 2020, available at fgw.sz.gov.cn/zwgk/qt/tzgg/content/post_8400647.html. As estimated, the Shenzhen government allocated RMB 380 million as subsidies in one and half years for NEV consumers. See 'Shenzhen Provides Additional RMB 160 Million Subsidies for NEVs', (CCTV, 12 April 2021), available at auto.cctv.com/2021/04/12/ARTITVRcyMM0KywYVYfOoWD0210412.shtml.

⁹²See 'The Detailed Implementation of Subsidizing Electricity Tariff for NEV Consumers' [消费者购买新能源汽车充电补助实施细则] issued by the Shanghai DRC and Bureau of Finance on 6 May 2020, available at www.shanghai.gov.cn/nw49129/20200929/0001-49129_65244.html.

⁹³See, e.g. D. Ambaw et al., 'Lessons from the Pandemic for Future WTO Subsidy Rules', in S. Evenett and R. Baldwin (eds.), *Revitalising Multilateralism: Pragmatic Ideas for the New WTO Director-General* (2020), 203, at 203–8; L. McGuirk, E. Eriksson and H. Jägerstedt, 'The Use of Industrial Subsidies by Major Economies: Economic and Legal Perspectives', *Kommerskollegium*, 2020, 1, at 10–14, available at www.kommerskollegium.se/en/publications/reports/2020/the-use-of-industrial-subsidies-by-major-economies/; B. Hoekman and D. Nelson, 'Subsidies, Spillovers and Multilateral Cooperation', EUI Working Papers RSCAS 2020/12, available at cadmus.eui.eu/handle/1814/66209.

⁹⁴See, e.g., Sykes, *supra* note 13; K. Bagwell and R. W. Staiger, 'Will International Rules on Subsidies Disrupt the World Trading System?', (2006) 96(3) *American Economic Review*, at 877.

⁹⁵See WTO, 'Dispute Settlement Activity – Some Figures', available at www.wto.org/english/tratop_e/dispu_e/dispustats_e.htm.

⁹⁶But note that subsidies in the RE sector have been subjected to many anti-dumping and countervailing measures. See I. Espa and G. Marin Duran, 'Renewable Energy Subsidies and WTO Law: Time to Rethink the Case for Reform

*Renewable Energy*⁹⁷ (2010), *India – Solar Cells*⁹⁸ (2013), and the *US – Renewable Energy*⁹⁹ (2016).¹⁰⁰ All three cases involved certain LCRs designed to incentivize the use of domestic goods over imported ones in the RE sector. All the LCRs were found to be WTO-inconsistent as they treated imported goods less favourably than domestic ones in breach of the national treatment (NT) rule under Article III of the General Agreement on Tariffs and Trade (GATT). In the first two disputes, the respondents – Canada and India – tried to justify their measures under existing WTO exceptions but were unsuccessful. Canada’s reference to GATT Article III(8)(a) was rejected by both the panel and the AB, although based on different reasoning.¹⁰¹ India invoked not only GATT Article III(8)(a) but also GATT Article XX (d) and (j), which were also dismissed by the WTO tribunals.¹⁰² Given the dim prospect of justifying LCRs under the WTO regime, it is not surprising that the US did not raise any defence under the dispute brought by India.

Only the *Canada – Renewable Energy* tribunal considered the ASCM in detail, which will be further discussed below. In *India – Solar Cells*, the US did not proceed with its claims under the ASCM while the *US – Renewable Energy* panel exercised judicial economy on ASCM-related issues after it found NT violations. Thus, the Appellate Body’s (AB) rulings under the ASCM in *Canada – Renewable Energy* have profound implications for future disputes over LCE subsidies. Our discussions below are focused on select legal elements under the ASCM and the GATT. Our goal is not to provide a comprehensive analysis¹⁰³ but to examine the potential flexibilities these legal elements may provide for the Chinese subsidies in the NEVs sector.

4.1 Financial contributions

The ASCM applies to an exhaustive list of subsidies within the meaning of ‘financial contributions,’ including (i) direct transfer of funds, (ii) foregoing or non-collection of government revenue otherwise due, and (iii) provision of goods or services (other than general infrastructure) or purchase of goods (Article 1(1)(a)(1)). Despite the closed list, the different categories of covered subsidies have been interpreted broadly and applied to successfully discipline a wide range of government measures. China’s NEV subsidies, as contemplated in Section 3, are all in the standard forms that fall within the ambit of ‘financial contributions’. These include, *inter alia*, direct

Beyond *Canada – Renewable Energy/Fit Program*, (2018) 21(2) *Journal of International Economic Law*, at 628–32. Some of the trade remedies were challenged under the WTO, see S. Shadikhodjaev, ‘Renewable Energy and Government Support: Time to “Green” the SCM Agreement?’, (2015) 14(3) *World Trade Review*, at 488–92.

⁹⁷Appellate Body Report, *Canada – Certain Measures Affecting the Renewable Energy Generation Sector/Canada – Measures Relating to the Feed-In Tariff Program*, WT/DS412/AB/R/WT/DS426/AB/R, adopted on 24 May 2013.

⁹⁸Appellate Body Report, *India – Certain Measures Relating to Solar Cells and Solar Modules*, WT/DS456/AB/R, adopted on 14 October 2016.

⁹⁹Panel Report, *United States – Certain Measures Relating to the Renewable Energy Sector*, WT/DS510/R, adopted on 27 June 2019. Note the panel report was appealed by both parties to the void.

¹⁰⁰There are two other disputes over biodiesel/biofuel subsidies in which no decisions have been made. For an official summary of the disputes see *European Union and Certain Member States – Certain Measures on the Importation and Marketing of Biodiesel and Measures Supporting the Biodiesel Industry* (DS459), available at www.wto.org/english/tratop_e/dispu_e/cases_e/ds459_e.htm; *European Union – Certain measures concerning palm oil and oil palm crop-based biofuels* (DS593), available at www.wto.org/english/tratop_e/dispu_e/cases_e/ds593_e.htm. For a discussion of how LCRs were assessed by the WTO in the three disputes see M. M. Fang, ‘Local Content Measures and the WTO Regime: Addressing Contentions and Trade Offs’, in D. S. Olawuyi (ed.), *Local Content, Sustainable Development and Treaty Implementation in Global Energy Markets* (2021), at 41.

¹⁰¹See Panel Reports, *Canada – Certain Measures Affecting the Renewable Energy Generation Sector/Canada – Measures Relating to the Feed-In Tariff Program*, WT/DS412/R/WT/DS426/R, adopted 19 December 2012, para. 7.151; *supra* note 97, Appellate Body Report, *Canada – Renewable Energy*, para. 5.79

¹⁰²The panel’s rulings regarding the applicability of GATT Article III:8(a), GATT Article XX(d) and(j) were upheld by the Appellate Body. See *supra* note 98, Appellate Body Report, *India – Solar Cells*, paras. 5.40, 5.145, 5.88.

¹⁰³For a recent detailed analysis of the ASCM and its applicability to Chinese high-tech subsidies see Zhou and Fang, *supra* note 28.

payment to NEVs and parts producers,¹⁰⁴ policy loans,¹⁰⁵ equity infusion,¹⁰⁶ tax reductions and exemptions (such as for R&D),¹⁰⁷ provision of goods or services to consumers (such as car plates), and government purchase of NEVs.¹⁰⁸

China's RE subsidies were challenged only once at the WTO in the *China – Wind Power Equipment* case.¹⁰⁹ This case concerned subsidies in the form of grants, funds, or awards to manufacturers of wind power equipment contingent upon the purchase of domestic wind power components rather than imported ones. While these subsidies were designed to foster the domestic manufacturing of wind power equipment which contributed to the growth of China's RE industry, the LCRs were prohibited under Article 3(1)(b) of the ASCM and impacted the interests of US competitors. China removed these subsidies after consultations with the US. There were several reasons behind China's decision to settle the dispute rather than to proceed with the litigation.¹¹⁰ Since China was already the world's leading producer of wind power equipment at the time of the dispute, the subsidies were dispensable and began to cause over-capacity and over-production.¹¹¹ Sustainable growth of the wind power industry, therefore, required a strategic shift to new priorities and approaches.¹¹² A similar strategy is now seen in the NEV manufacturing sector. As shown in Section 3.1, having acquired world-class manufacturing capacity and capability, China is phasing out subsidies including LCRs used to foster the production of NEV batteries while prioritizing upstream R&D, which is key to enhancing the global competitiveness of Chinese NEVs and the downstream expansion of infrastructure and domestic consumption which is crucial for sustained growth of China's NEVs sector.

To our knowledge, China's NEV subsidies have not attracted any trade disputes yet. While China is now the world's largest NEV producer, its NEV exports remain marginal largely due to the lack of competitiveness in overseas markets.¹¹³ In the EU, for instance, Chinese NEV firms accounted for only 3.3 per cent of the market share in 2020, even after a 13-fold growth from 2019.¹¹⁴ Most China-made NEVs are still consumed in the domestic market and a few developing countries, such as Bangladesh, India, and Brazil.¹¹⁵ However, as China's technological capability and global competitiveness continue to advance, its NEV exports are expected to grow, generating more trade conflicts. Therefore, China's ongoing restructuring of NEV subsidies to focus more on the upstream and downstream segments can also be seen as a strategy to avoid such potential

¹⁰⁴WTO Panel Report, *Australia – Subsidies Provided to Producers and Exporters of Automotive Leather*, WT/DS126/R (adopted 16 June 1999).

¹⁰⁵*Ibid.*

¹⁰⁶WTO Panel Report, *European Communities and Certain Member States – Measures Affecting Trade in Large Civil Aircraft* (hereinafter *EC – Aircraft*), WT/DS316/R (adopted 1 June 2011), para. 7.1291; Appellate Body Report, *United States – Measures Affecting Trade in Large Civil Aircraft* (Second Complaint) (hereinafter *US – Aircraft* (2nd complaint)), WT/DS353/AB/R (adopted 23 March 2012), paras. 613–624.

¹⁰⁷Appellate Body Report, *US – Aircraft* (2nd complaint).

¹⁰⁸Appellate Body Report, *United States – Final Countervailing Duty Determination with respect to Certain Softwood Lumber from Canada* (hereinafter *US – Softwood Lumber IV*), WT/DS257/AB/R (adopted 17 February 2004), paras. 52–53.

¹⁰⁹For a summary of the dispute see WTO, Dispute Settlement, *China – Measures concerning Wind Power Equipment* (DS419) (US), available at www.wto.org/english/tratop_e/dispu_e/cases_e/ds419_e.htm.

¹¹⁰See Seung-Youn Oh, 'How China Outsmarts WTO Ruling in the Wind Industry', (2015) 55(6) *Asian Survey*, at 1116–45.

¹¹¹*Ibid.*

¹¹²For a detailed discussion of this dispute and China's compliance see Weihuan Zhou, *China's Implementation of the Rulings of the World Trade Organization* (2019), at 28–30.

¹¹³S. Kennedy, 'The Coming NEV War? Implications of China's Advances in Electric Vehicles', CSIS, 18 November 2020, at 6, available at www.csis.org/analysis/coming-nev-war-implications-chinas-advances-electric-vehicles.

¹¹⁴Bin Zheng, 'China is Speeding Up the Sales of Electric Vehicles in the EU Market', *People Daily*, 24 February 2021, available at finance.people.com.cn/n1/2021/0224/c1004-32035400.html.

¹¹⁵Kennedy, *supra* note 113.

disputes. While upstream and downstream subsidies can also be problematic under WTO rules, they are less likely to be challenged due to the low tradability of NEV technologies, infrastructure, and related services to end consumers.¹¹⁶

Moreover, all major economies are committed to advancing LCE R&D and infrastructure, including in the NEV sector.¹¹⁷ This presents a typical ‘glasshouse’ dilemma that would discourage WTO litigation.¹¹⁸ In addition, compared to the midstream subsidies provided specifically to producers of NEVs and parts, upstream and downstream subsidies may enjoy more flexibility under the current trade rules.

One such flexibility may arise from the exclusion of provision of goods or services in the form of ‘general infrastructure’ from the scope of ‘financial contributions’. In *EC – Aircraft*, the panel observed that ‘general infrastructure’ refers to ‘infrastructure that is not provided to or for the advantage of only a single entity or limited group of entities, but rather is available to all or nearly all entities’.¹¹⁹ Therefore, a key criterion here concerns whether the infrastructure is made available to the general public or merely to a limited group of entities. The access to the infrastructure may be limited by law or in effect.¹²⁰ In *EC – Aircraft*, the fact that the facilities involved were created for use by Airbus was found to be sufficient to disqualify these facilities from being ‘general infrastructure’ even though they were intended to serve public policy goals.¹²¹ However, China’s subsidization of the NEVs infrastructure sector may be considered as the provision of goods or services in the form of ‘general infrastructure’ under the current case law. As noted in Section 3.2.2, faced with market imperfections such as insufficient investment in and hence a striking shortage of NEV infrastructure, China is rolling out various types of subsidies to incentivize investors and companies to enter this market so that the construction and operation of NEV charging stations can reach socially desirable levels. Since these stations are created for public use, they constitute ‘infrastructure of a general nature’.¹²² There is no evidence to suggest that these stations or other major NEVs infrastructure has been or is being built for use by a limited group of actors or entities. One issue here, though, concerns the fact that currently, the Chinese subsidies are provided to entities that build and operate NEV charging stations as opposed to the government providing the infrastructure directly. However, as Lee has argued persuasively, it is possible to interpret the ‘general infrastructure’ exception as encompassing a government’s indirect provision of goods or services so as to leave policy space for *bona fide* green programs.¹²³ Since China’s subsidization of construction and operation companies constitutes an integral part of its provision of NEV charging stations countrywide, these subsidies fall within the ‘general infrastructure’ exception. Even if this argument fails, one may still find some flexibility under the element of ‘benefit conferred’.

4.2 Benefits

A financial contribution must confer a benefit to the recipient before it can be treated as a subsidy under the ASCM (Article 1(1)(b)). In essence, the test of ‘benefit conferred’ hinges on a

¹¹⁶For a similar view see Charnovitz and Fischer, *supra* note 12, at 185; Espa and Duran, *supra* note 96, at 638–9.

¹¹⁷See IEA Global EV Outlook, ‘Policies to Promote Electric Vehicle Deployment’, 2021, available at www.iea.org/reports/global-ev-outlook-2021/policies-to-promote-electric-vehicle-deployment.

¹¹⁸For a similar view see Rubini, *supra* note 12, at 555.

¹¹⁹WTO Panel Report, *EC – Aircraft*, para. 7.1036.

¹²⁰*Ibid.*, para. 7.1043.

¹²¹*Ibid.*, paras. 7.1080–7.1084.

¹²²Appellate Body Report, *US – Softwood Lumber IV*, para. 60.

¹²³Jaemin Lee, ‘SCM Agreement Revisited: Climate Change, Renewable Energy, and the SCM Agreement’, (2016) 15(4) *World Trade Review*, at 613, 640–3.

determination of whether the financial contribution is provided ‘on terms more advantageous than those [that would have been] available to the recipient in the market’.¹²⁴ Thus, the selection of a market benchmark is crucial. In *Canada – Renewable Energy*, the AB rejected the panel’s use of the wholesale electricity market, in which electricity was generated from all energy sources, as a benchmark in determining whether the Canadian feed-in-tariff (FIT) program conferred a benefit on wind power and solar photovoltaic (PV) generators.¹²⁵ It ruled:

a distinction should be drawn between, on the one hand, government interventions that create markets that would otherwise not exist and, on the other hand, other types of government interventions in support of certain players in markets that already exist, or to correct market distortions therein. Where a government creates a market, it cannot be said that the government intervention distorts the market, as there would not be a market if the government had not created it. While the creation of markets by a government does not in and of itself give rise to subsidies within the meaning of the SCM Agreement, government interventions in existing markets may amount to subsidies when they take the form of a financial contribution, or income or price support, and confer a benefit to specific enterprises or industries.¹²⁶

In drawing a distinction between ‘creation of a new market’ and ‘intervention in an existing market’, the AB endorsed the legitimacy of government actions that promote the use of RE sources which contribute to securing ‘the sustainability of electricity markets in the long term’.¹²⁷ Given this distinction, the AB held that the appropriate benchmark should be ‘the terms and conditions that would be available under market-based conditions’ in the wind power and solar PV markets.¹²⁸ Such a benchmark should be based on the relevant markets in Canada, and only if this is not available, an external or constructed benchmark may be used subject to adjustments in light of the factors contemplated under Article 14(d) of the ASCM.¹²⁹ Due to the lack of relevant factual findings by the panel, the AB was unable to complete the benefit analysis, which effectively saved the FIT scheme.

Drawing upon the AB’s approach in *Canada – Renewable Energy*, one may argue that Chinese subsidies for the development of NEVs infrastructure serve to create a market for NEVs charging facilities that would otherwise not exist without government intervention. Due to the high upfront cost and long-term payback, NEV infrastructure, such as charging stations, is considerably under-invested and under-supplied in China. Although China now has one of the world’s largest NEVs charging networks, there remains a significant shortage of reliable and affordable charging facilities.¹³⁰ This shortage calls for government intervention to ensure the sustainability of the NEV market, which is closely aligned with the overarching goal of mitigating climate change. This creation of a market for NEV infrastructure contrasts with the government intervention in the existing market where NEVs and parts are produced. Notably, the AB’s rulings quoted above have suggested that government intervention to create a market would not distort the market being created and hence should not be treated as subsidies under the ASCM.¹³¹

¹²⁴Appellate Body Report, *US – Large Civil Aircraft* (2nd complaint), para. 636. See also Appellate Body Report, *Canada – Renewable Energy*, paras. 5.163–5.164.

¹²⁵Appellate Body Report, *Canada – Renewable Energy*, para. 5.169.

¹²⁶*Ibid.*, para. 5.188.

¹²⁷*Ibid.*, paras. 5.177, 5.185–5.189.

¹²⁸*Ibid.*, para. 5.190.

¹²⁹*Ibid.*, paras. 5.225–5.228, 5.235.

¹³⁰J. S. Hill, ‘China Dominates Rollout of EV Charging Stations – 4,000 a day in December’, *The Driven*, 20 April 2021, available at thedriven.io/2021/04/20/china-dominates-rollout-of-ev-charging-stations-4000-a-day-in-december/.

¹³¹Note the AB’s benefit analysis was criticized as being overly broad, creating a wide loophole for industrial policies. See Cosbey and Mavroidis, *supra* note 12, at 26; L. Rubini, ‘What Does the Recent WTO Litigation on Renewable Energy Subsidies

In addition, it is worth noting that while the AB treated the FIT programme as WTO-compatible, it ruled against the LCRs in the programme, which required certain minimum domestic content to be used in the development and construction of wind power and solar PV generation facilities. The different treatment of the FIT programme as a whole and the LCRs was a reasonable balancing exercise that accorded due respect to a *bona fide* green measure while condemning a trade-distortive industrial policy.¹³² This suggests that China must not introduce similarly trade-distortive and WTO-illegal LCRs by, for example, requiring the use of domestically made NEVs chargers over imported ones for its rollout of NEVs charging facilities nationwide.

4.3 Specificity

The ASCM applies only to subsidies that are ‘specific’ within the meaning of Article 2. Thus, subsidies ‘broadly available and widely used throughout an economy’ are not actionable under the ASCM.¹³³ In essence, ‘specificity’ concerns whether only ‘certain enterprises’ or ‘geographical regions’ are eligible for a subsidy. It may arise from an explicit limitation on eligibility (i.e., *de jure* specificity) or where the eligibility appears to be automatic and based on objective criteria or conditions, such as limitation in effect (i.e., *de facto* specificity).¹³⁴

The issue of specificity can be contentious in dealing with R&D and consumer-oriented subsidies. R&D activities that develop new technologies and products generate positive spill-overs economy-wide, and hence subsidies are widely used by governments to promote such activities. At the same time, R&D subsidies help reduce a firm’s costs and raise its productivity.¹³⁵ When the firm competes globally, the subsidies impact the interests of foreign competitors and may trigger competitive subsidization and trade conflicts. The 16-year-long US-EU disputes over the subsidization of their own national champions in the aviation sector (i.e., Boeing vs. Airbus) offer a perfect illustration of how the ASCM may restrain R&D subsidies. In *EC – Aircraft* and *US – Aircraft*, the two disputing parties cross-challenged a range of each other’s R&D subsidies mainly in the form of grants and loans (in the case of Airbus) and government procurement (in the case of Boeing).¹³⁶ In both cases, most of the R&D subsidies were found to be specific because they were targeted directly at the civil aeronautics sector.¹³⁷ Only a handful of programs were found to be non-specific because they were made available to R&D activities across a broad spectrum of economic sectors. In *EC – Aircraft*, for instance, the UK Technology Program funded seven key technology areas based on open competitions by all sectors without targeting aeronautics-related research.¹³⁸ Similarly, in *US – Aircraft*, the US’s Advanced Technology Program, which was designed to support R&D on high risk, high pay-off, emerging and enabling technologies, was found to be generally available to all economic sectors and not limited to any group of enterprises or industries.¹³⁹

Tell us about Methodology in Legal Analysis? The Good, The Bad, and the Ugly’, *European University Institute*, January 2014, at 15, available at cadmus.eui.eu/handle/1814/29518.

¹³²Rubini, *ibid.*, at 6–7; Cosbey and Mavroidis, *supra* note 12, at 29–32; Charnovitz and Fischer, *supra* note 12, at 180.

¹³³WTO Panel Report, *United States – Subsidies on Upland Cotton*, WT/DS267/R (adopted 21 March 2005), para. 7.1143.

¹³⁴Appellate Body Report, *United States – Definitive Anti-Dumping and Countervailing Duties on Certain Products from China* (hereinafter *US – Anti-Dumping and Countervailing Duties (China)*), WT/DS379/AB/R (adopted 25 March 2011), paras. 367–368.

¹³⁵For a comprehensive discussion of traditional and emerging technology policies see generally WTO, *World Trade Report 2020: Government Policies to Promote Innovation in the Digital Age* (2020). For a good and brief summary see K. Maskus, ‘Research and Development Subsidies: A Need for WTO Disciplines?’, *E15Initiative*, 2015, at 2–4, available at e15initiative.org/publications/research-and-development-subsidies-a-need-for-wto-disciplines/.

¹³⁶For a short summary see Maskus, *ibid.*, at 4–5. For a more detailed analysis of the R&D subsidies see Wonkyu Shin and Wonhee Lee, ‘Legality of R&D Subsidies and Its Policy Framework under the World Trading System: The Case of Civil Aircraft Disputes’, (2013) 4(1) *STI Policy Review*, at 27.

¹³⁷See panel report, *EC – Aircraft*, paras. 7.1504–7.1580; panel report, *US – Aircraft* (2nd complaint), paras. 7.1042–7.1210.

¹³⁸See panel report, *EC – Aircraft*, paras. 7.1581–7.1591.

¹³⁹See panel report, *US – Aircraft*, paras. 7.1211–7.1257.

China's ambitious economic goals and industrial policies for technological development and innovation are widely documented.¹⁴⁰ Currently, China's R&D expenditure is the second largest in the world, including massive subsidies to firms.¹⁴¹ However, since the thirteenth Five-Year period (2016–2020), China has emphasized using non-specific subsidies, particularly tax incentives, to ensure all eligible entities are involved in R&D activities.¹⁴² The fourteenth Five-Year Plan (2021–2025) reiterated the principle of using non-specific R&D subsidies and upgraded the priority technology areas, which now include new generations of artificial intelligence, quantum computing, integrated circuits, neuroscience, gene and biotechnology, clinical medicine and health, aerospace, and deep land and deep-sea technology.¹⁴³ This shift from subsidizing select firms and industries to nationwide subsidies in strategic areas is another demonstration of China's intention to avoid WTO-incompatible subsidies in light of the existing jurisprudence. This shift, however, is not easy to implement and will take time since industry-specific R&D subsidies remain pervasive at both national and local levels, including in the NEVs sector, as shown in Section 3.2.1. More generally, given the importance of R&D subsidies to all economies, it is imperative for the WTO to leave sufficient policy space for governments. Such policy space should not be created mainly through treaty interpretation on a case-by-case basis, which is likely to generate inconsistencies and uncertainties. A better approach would be for WTO members to revive the category of non-actionable subsidies, which include those for R&D and environmental protection, through negotiations.¹⁴⁴ As many have rightly recommended, such non-actionable subsidies should be reinstated and further developed to allow legitimate use of subsidies subject to pre-determined conditions (such as policy rationale, scope, and magnitude notification) that serve the shared goals and interests of all economies.¹⁴⁵

The analysis of specificity above also applies to consumption subsidies. While such subsidies are granted to consumers rather than producers, they can still be found to be specific if they support the consumption of goods produced by a limited group of enterprises or industries.¹⁴⁶ To avoid specificity, these subsidies need to be made generally available to all enterprises in the economy.¹⁴⁷ However, it would be hard to create an economywide consumption subsidy, and such subsidies are typically targeted at select industries.¹⁴⁸ Despite this potential specificity, whether subsidies provided to consumers may be 'actionable' under the ASCM remains controversial. The WTO Secretariat holds the view that Article 1(1) of the agreement may not cover 'transfers

¹⁴⁰See, e.g., Zhou and Fang, *supra* note 28.

¹⁴¹See, 'The Continuation of Tax Incentives for Technological Innovation, the Tax Reductions Reach RMB 2540 Billion in Five Years', State Taxation Administration, 12 March 2021, available at www.chinatax.gov.cn/chinatax/n810219/n810780/c5162281/content.html.

¹⁴²See, e.g., 'Several Opinions on Deepening the Reform of Systematic Institution and Accelerating the Innovation-led Development Strategy' [关于深化体制机制改革加快实施创新驱动发展战略的若干意见] issued by the Central Committee of the CCP and State Council on 13 March 2015, available at www.most.gov.cn/kjzc/gjkjzc/gikjzczh/201701/t20170117_130532.html;

¹⁴³See 'The 14th Five-Year Plan for the National Economic and Social Development of the People's Republic of China and the Outline of the Long-Term Goals for 2035', *supra* note 26.

¹⁴⁴The non-actionable category was introduced on a provisional basis for five years (Art. 8 and 31 of the ASCM). It subsequently expired as WTO Members failed to reach a consensus to renew it by 31 December 1999. See WTO, Committee on Subsidies and Countervailing Measures, Minutes of the Special Meeting Held on 20 December 1999, G/SCM/M/22 (17 February 2000).

¹⁴⁵See, e.g., Cosbey and Mavroidis, *supra* note 12, at 42–6 (proposing an expanded category of non-actionable subsidies); S. Charnovitz, 'Green Subsidies and the WTO', World Bank Policy Research Working Paper 7060, October 2014, at 59–72, available at openknowledge.worldbank.org/handle/10986/20500 (discussing the approaches to incorporate an expanded list of green subsidies into the category of non-actionable subsidies); Howse, *supra* note 12, at 20–1 (proposing a simplified and principle-based approach to reviving non-actionability for green subsidies).

¹⁴⁶See, e.g., Cosbey and Mavroidis, *ibid.*, at 28–9.

¹⁴⁷See Howse, *supra* note 12, at 13.

¹⁴⁸Rubini, *supra* note 12, at 549; H. B. Asmelash, 'Energy Subsidies and WTO Dispute Settlement: Why Only Renewable Energy Subsidies Are Challenged', (2015) 18(2) *Journal of International Economic Law*, at 272–3.

to consumers',¹⁴⁹ although that provision does not require the recipient of a financial contribution to be a producer.¹⁵⁰ This means that the test of 'benefit conferred' may be satisfied by showing that some benefits have been conferred on consumers as opposed to producers.¹⁵¹

Moreover, where consumer subsidies are granted on a non-discriminatory basis, i.e., without discriminating against imported NEVs, they would be less likely to cause adverse effects within the meaning of Article 5 of the ASCM.¹⁵² As shown in Section 3.2.3, China's consumer subsidies in the NEV sector are generally applicable to all NEVs regardless of their origin and hence may not adversely affect the interest of foreign NEVs producers. In this sense, China's shift from producer subsidies to consumer subsidies is another evidence of its attempt to reduce trade disputes and breaches of WTO rules.

Towards this end, it is worth noting that given the importance of R&D and consumption subsidies to China's pursuit of a nationwide adoption of NEVs or LCE technologies, it would be unlikely for China to remove these subsidies even if they are challenged under the WTO. This means that the impact of WTO rules and jurisprudence on China's policymaking is limited, and WTO-compliance is subordinate to the need to pursue economic goals and industrial policies.

4.4 Government procurement

Government procurement has been a major policy tool in China's pursuit of technological development and indigenous innovation. A range of national and local policies mandate government purchase of high-tech products supplied by qualified Chinese entities.¹⁵³ While the overarching policy documents typically make government procurement available to all eligible firms and technologies,¹⁵⁴ there are numerous industry-specific policies, including in the NEVs sector, as shown in Section 3.2.3.

Government procurement that favours domestic goods over imported ones constitutes NT-type discrimination under GATT Article III. However, Article III(8)(a) exempts such discriminatory measures from the NT rule as long as the procurement is made by governmental agencies and the products purchased for governmental purposes and not for commercial resale. In *Canada – Renewable Energy*, the AB ruled that this exemption applies only to products that fall within the product coverage of the NT rule, that is, 'like' or 'directly competitive or substitutable' products.¹⁵⁵ Thus, it did not apply to the LCRs, which targeted RE generation equipment that was not like or

¹⁴⁹See WTO, *World Trade Report 2006: Exploring the Links between Subsidies, Trade and the WTO* (2006), at 54.

¹⁵⁰See Cosbey and Mavroidis, *supra* note 12, at 28.

¹⁵¹To our knowledge, there have been no WTO rulings on the issue of whether, in the situation of a subsidy granted to end consumers, 'benefit conferred' can be established based on either consumer benefits or producer benefits. If producer benefits need to be established, then one will need evidence to show the subsidies/benefits to consumers have flowed through to NEVs producers by way of, for example, more sales and higher prices than what would have been in the absence of the subsidies.

¹⁵²See Rubini, *supra* note 12, at 550. Art. 5 refers to three types of adverse effects: (i) injury to the domestic industry of another member, (ii) nullification or impairment of benefits accruing directly or indirectly to other members under the GATT, and (iii) serious prejudice to the interests of another member. 'Serious prejudice' is further elaborated under Art. 6(3) of the ASCM, mainly including the following types: (i) displacement or impedance of imports in the market of the subsidizing member or a third country market, (ii) significant price cutting, price suppression, price depression or lost sales, and (iii) increase of world market share of the subsidizing member in a particular subsidized primary product or commodity.

¹⁵³See The US-China Business Council, 'Update: China's Innovation & Government Procurement Policies', May 2015, available at www.uschina.org/reports/update-chinas-innovation-government-procurement-policies.

¹⁵⁴See, e.g., 《国家中长期科学和技术发展规划纲要（2006-2020）》[The National Medium- and Long-Term Science and Technology Development Plan for 2006-2020], issued by the State Council on 9 February 2006, available at www.gov.cn/gongbao/content/2006/content_240244.htm; 《关于促进国家高新技术产业开发区高质量发展的若干意见》[Several Opinions on Enhancing the High Quality Development of National High-tech Industrial Zones], issued by the State Council on 17 July 2020, available at www.gov.cn/zhengce/content/2020-07/17/content_5527765.htm.

¹⁵⁵Appellate Body Report, *Canada – Renewable Energy*, para. 5.63. For a discussion of WTO jurisprudence of GATT Art. III(8)(a) see A. Davies, 'The GATT Article III:8(a) Procurement Derogation and Canada – Renewable Energy', (2015) 18(3) *Journal of International Economic Law* 543; M. M. Fang, 'Shades of Green: Mapping the Parameters of the GATT Article

competitive with electricity generated from such equipment and purchased by the Canadian government under the FIT program.¹⁵⁶ With this ruling, the AB did not need to consider the other elements of Article III(8)(a). It merely observed that whether the products purchased are used for ‘commercial resale’ requires an assessment of the entire transaction concerned based on factors such as whether the sale is made at arm’s length and for profits.¹⁵⁷ China’s government procurement policies on NEVs are generally targeted at domestic goods.¹⁵⁸ They are vulnerable to challenges under the NT rule (i.e., GATT Article III(4)). However, such policies are possibly exempted under Article III(8)(a) as they set purchase targets for government organs and agencies only and confine the purchased NEVs to public use.¹⁵⁹ Here, it is worth noting that under paragraph 339 of the *Working Party Report on the Accession of China*, China committed to granting all foreign entities an MFN treatment in its government procurement. However, this commitment does not include NT. Thus, China will remain exempted under GATT Article III(8)(a) until it becomes a party to the WTO Agreement on Government Procurement.¹⁶⁰ This current gap in China’s WTO obligations explains why China is strengthening and expanding government procurement of NEVs.

The relationship between GATT Article III(8)(a) and the ASCM, particularly subsidies provided by way of government purchase of goods (Article 1(1)(a)(1)(iii)), has never been considered by WTO tribunals. Thus, the issue of whether government procurement permitted under Article III(8)(a) is also exempted from the ASCM remains unsettled. A detailed discussion of this issue is beyond the scope of this article. Here, we merely note that government purchase of goods may constitute actionable subsidies and has frequently been subject to countervailing actions.¹⁶¹ However, despite being specific, China’s government procurement of NEVs may well survive the scrutiny of ASCM because there is no evidence to suggest that the purchase is made on terms and conditions more favourable than those available in the market or at more than adequate remuneration. In other words, as long as China ensures that it is NEV procurement does not confer a ‘benefit’ to NEV producers or suppliers,¹⁶² such procurement would be unlikely to be captured by the ASCM.

5. Conclusion

As many commentators have rightly pointed out, the pandemic provides a unique opportunity to leverage policy responses in pursuit of a broad and long-term transition from high carbon to LCE.¹⁶³ Decarbonizing the transportation sector by promoting the development and deployment

III:8(a) Government Procurement Derogation in the Renewable Energy Transition’, (2019) 20(4) *Journal of World Investment and Trade*, at 553.

¹⁵⁶ Appellate Body Report, *Canada – Renewable Energy*, paras. 5.75–5.79.

¹⁵⁷ *Ibid.*, para. 5.71.

¹⁵⁸ N. Marro, Hengrui Liu and Yu Yan, ‘Opportunities and Challenges in China’s Electric Vehicle Market’, *China Business Review*, 2 February 2015, available at www.chinabusinessreview.com/opportunities-and-challenges-in-chinas-electric-vehicle-market/.

¹⁵⁹ See *supra* notes 83–5.

¹⁶⁰ For an official introduction of the Agreement on Government Procurement see WTO, ‘WTO and Government Procurement’, available at www.wto.org/english/tratop_e/gproc_e/gproc_e.htm. Currently, China is seeking to join the agreement. See WTO, ‘China Submits Revised Offer for Joining Government Procurement Pact’, 23 October 2019, available at www.wto.org/english/news_e/news19_e/gpro_23oct19_e.htm.

¹⁶¹ See, e.g., Appellate Body Report, *US – Large Civil Aircraft* (2nd complaint). See also Espaa and Duran, *supra* note 96, at 628–32; Shadikhodjaev, *supra* note 96, at 488–92.

¹⁶² For a more elaborated analysis of why some forms of government procurement do not confer a benefit see D. Collins, ‘Government Procurement with Strings Attached: The Uneven Control of Offsets by the World Trade Organization and Regional Trade Agreements’, (2018) 8(2) *Asian Journal of International Law*, at 301, 310–12.

¹⁶³ J. Markard and D. Rosenbloom, ‘A Tale of Two Crisis: COVID-19 and Climate’, (2020) 16(1) *Sustainability: Science, Practice and Policy*, at 53.

of NEVs contributes significantly to this transition. The NEVs sector has been an integral part of China's economic policies for over a decade and remains a strategic priority that will attract increasing government support, particularly through subsidies.

While China's industrial subsidies have been widely debated, this article has contributed to this debate by identifying and expounding a nuanced and sophisticated shift in China's subsidization strategy across the NEVs value chain, that is, from the provision of disproportionate subsidies in the midstream segment that produces NEVs and parts to an increased focus on subsidizing the upstream and downstream segments to promote R&D, and the expansion of NEVs infrastructure and consumption throughout the economy. The key driver of this shift, as discussed in detail in this article, has been the evolution of China's industrial policies and economic needs, which will continue to play a decisive role in the future restructure and transformation of the NEVs sector.

As China's NEVs industry becomes more technologically advanced and globally competitive, the coming years and decades will likely witness increasing footprints of China-made NEVs in overseas markets. This increase will, in turn, lead to more trade disputes over China's NEV subsidies. Thus, this article has also considered China's reorientation of the subsidization in the NEVs sector in light of WTO law and jurisprudence on subsidies. It has been argued that this reorientation may also reflect China's intention to reduce potential trade conflicts and maximize WTO-compliance, but only to the extent that doing so would not unduly constrain its capacity to pursue its economic goals and industrial policies. In this sense, WTO-compliance is merely a secondary consideration and will remain so in China's policymaking.

In analysing the impact (or lack of it) of the WTO on China's strategic restructuring of NEV subsidies, we have also shown that the current rules and jurisprudence may accommodate some of these subsidies (e.g., NEV infrastructure subsidies) but would need to be further developed to provide more policy space for other types of subsidies used by all governments (e.g., R&D subsidies). And such development should be pursued via negotiations as opposed to judicial interpretation. Until then, it is still highly debatable whether the existing WTO rules provide sufficient policy space for countries to facilitate a green recovery or build back greener.