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From rescue to recovery: towards a sustainable transition for China after the COVID-19 pandemic

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This policy paper is intended to inform decision-makers in the public, private and third sectors. It has been reviewed by internal and external referees before publication.

Contents

1. Introduction and summary:

Why the world needs a sustainable recovery from COVID-19 and the role that China can play

The unprecedented threat brought about by the COVID-19 pandemic has placed the global economy at severe risk, with the clear prospect of a strong contraction this year. The International Monetary Fund's *World Economic Outlook 2020* projections suggest an economic shock of far greater severity than the one experienced during the 2008–10 financial crisis, and the worst recession since the 1930s (IMF, 2020).

This is truly a global problem: the virus and the necessary lockdowns have affected the vast majority of countries. We are seeing large-scale loss of confidence, lack of liquidity, unemployment and supply-side disruption. Output and employment, particularly in the informal sector, are deeply damaged. Strong, collective efforts are urgently needed, to protect lives, to support the global economy and to ensure the resilience of the financial system, in terms of providing additional liquidity as needed, while avoiding debt crises, especially at the sub-national level. Without strong action the world could enter a depression that could be long lasting, posing great danger to social fabrics and political systems. What happens in the coming months will be decisive for the world; coordinated action across countries is required to manage the risk and consequences of this unprecedented crisis.

At the time of writing – late October 2020 – most countries are in either the rescue phase or moving from rescue to recovery, and only China among the G20 economies is likely to register positive growth in 2020.[1] The top priorities globally are to tackle the public health emergency and prevent or limit a COVID-19 resurgence; to protect the most vulnerable, particularly in relation to employment; to give strong support to the banking system and supply of finance, to ensure that liquidity issues do not destroy viable firms; and to foster the confidence necessary for both private consumption and investment, by setting clear paths and strategies for growth and linking short-term actions and medium-term expectations. Forceful stimulatory fiscal and monetary policies need to be in place that recognise the need for substantial deficit financing, which is likely to involve both borrowing and money creation. Tight sub-national fiscal rules risk choking off recovery and plunging economies into greater and deeper recession, with profound economic, health and social consequences.

The recovery should mark the beginnings of a global transformation to strong, sustainable, inclusive and resilient economic development and growth, if we are to limit the impact on the poor and vulnerable, make progress on the Sustainable Development Goals (SDGs) and manage the immense climate change risks. Huge though the pandemic impacts are, the dangers from unmanaged climate change are likely still bigger and longer lasting than those from COVID-19. It is therefore wise to choose a path out of the depression that is focused on investment in the sustainable economies and activities of the future, and not only in physical capital, but also in human, social and natural capital.

The short-term stimulus should support longer-term economic recovery and avoid high-carbon investments. Investment in traditional approaches and methods in industry and infrastructure, which ramp up fossil fuel consumption, could lock in decades of polluting, high-carbon and less productive growth. The consequences for the world would be devastating. We must be very clear on the necessity of not going back to pre-pandemic business as usual. We should protect and enhance natural capital to reduce the risk and consequences of both future climate change and of pandemics. We must be wary of opportunistic attempts to reinstate dirty industries in the name of recovery of growth; such policies are routes to insecurity and decline. If we follow the new path, and do it well, we can strengthen social cohesion within and across nations and in this sense build our social capital, alongside and mutually supporting physical, human and natural capital.

China's role in the world is now of a magnitude that makes its actions in the immediate future critical to how the world goes forward, both in the short term and over this century. The world will not emerge strongly and quickly enough from the recession unless China plays a very strong role through its

[1] Only countries that have succeeded in stopping the spread of COVID-19, such as China and Vietnam in East Asia, are projected to have positive growth in 2020 (IMF, 2020).

consumption and investment demand. And the commitment of the world to tackling climate change will depend on what China does in the coming months and years. This influence is even greater than is implied by China's size; it comes also from its technologies, its strategies and its leadership coming out of the COVID crisis. It is vital that the 14th Five-Year Plan (2021–25) takes into account this world context.

Recovering from the pandemic: key issues for China

China is the first major G20 country to have made the transition from rescue to recovery in the COVID-19 pandemic. The recovery has been enabled by a tight lockdown in affected provinces and cities, such as Wuhan, and the introduction of widespread testing, tracking and quarantine, made possible by local public policy actions and the use of big data and e-commerce innovations. Such measures will also facilitate the transition to a new urban design and institutional structure that will further help the economic recovery (Ahmad, 2020a).

An export-led growth strategy has served China well over the past three decades but is now at risk, given that major trading partners have yet to transition from the pandemic rescue stage and are facing deep recessions, potentially limiting the demand for Chinese exports.[2] New restrictive trade practices in some countries also increase the risks for existing Chinese production and employment patterns. Consequently, the economic recovery phase in China must embody a shift to domestic consumption, bolstered by the strengthening of innovation and new urban design, governance and fiscal institutions. This change in strategy was emphatically underlined by President Xi's address to the National People's Congress (NPC) in May 2020, in which he emphasised protecting employment and having greater reliance on domestic consumption as well as deepening the innovative capabilities of the economy, and strengthening cross-border trading to sustain long-term growth.

Many of the measures announced during the 2020 NPC support the recovery *and* move the economy and employment patterns to a more secure future. These include structural reforms and a fiscal deficit of around 4.5 per cent of GDP. The envisaged deficit will be greater than the ceiling of 3.0 per cent of GDP followed in recent years (Huang and Lardy, 2020), although it is far smaller than the deficits that will be necessary for many OECD countries that have not had the same success in controlling the virus as China.

The State Council also announced at the Congress a 'Go West' policy that identifies a need to "rebalance away from the major coastal metropolitan areas". This 'rebalancing' was also identified in the 1999 Western Development strategy, but was not effective and people have continued to migrate to the coastal hubs. It is important for the Go West programme to avoid the problems faced in implementing the earlier strategy (Ahmad, 2020b).

Another important step is the decision by the NPC to provide financing and transfers directly to cities and counties for critical infrastructure and basic services, bypassing provinces and the unending demands of capital city clusters. Strengthening the city/county level, where services are delivered and activities are generated, is critical to preventing further outbreaks of viral infections, providing basic health care, fostering employment and building strong, sustainable and inclusive growth.

Fiscal underpinnings of a low-carbon transition to sustainable growth in 'clean, compact and connected' cities

Transforming China's economy for a stronger, more sustainable and resilient future in a changing world will involve action across many fronts. In this paper we focus on two key strands of analysis and action necessary to generate incentives for firms, workers and government at different levels, to foster and deliver recovery and the new form of growth.

- **The first is the coordinated development of clean, compact and connected cities** (which we refer to as 'CCC cities'), alongside the restructuring of existing metropolitan areas (drawing on Ahmad, 2020b).
- **The second involves drivers of structural change,** including institutional, fiscal and financial underpinnings.

[2] As China has recovered strongly from the pandemic, it is best placed to meet global demand for electronics and medical equipment, and exports (including with the US) and its trade balance have surged in the nine months since the WHO declared a global pandemic.

The programme of action for recovery and transformational growth will require measures for building sustainable, resilient and inclusive development across the economy and society. It will involve structural transformation of industry towards higher skills and technology, with less material input; new technologies, putting to work the extraordinary advances of recent times; recasting energy and transport systems; much stronger investment in natural capital and infrastructure than in the past; investing in different ways in human capital, in both education and health; strengthening community and social institutions; and much more.

We have written about many of these actions in other work (see Hepburn, Stern et al., 2020; Stern et al., 2020). This paper, with its focus on just two key aspects – cities and fiscal/financial structures – should be seen as part of this broader body of work. Notwithstanding this focus, because it is so important and underpins the whole response to the challenge of sustainability we also emphasise the importance of moving quickly to decarbonise the energy system, and particularly the phase-out of coal, and to make the supply of energy cleaner and more efficient, including in the design of new buildings and the retrofitting of old buildings.

Section 2 of the paper focuses on the development of clean, compact[3] and connected (CCC) cities and the restructuring of the existing metropolises and megacities. We propose that CCC cities will have to play a central role in the rebalancing towards domestic consumption, by moving activities into the interior of China, generating employment and ensuring a cleaner and healthier environment. To achieve these outcomes, it will not be sufficient to rely only on the provision of physical capital and infrastructure, as emphasised in the 1999 Western Development Strategy. Enhanced connectivity, in which China has invested so heavily in the past quarter of a century, will certainly play a role but these goals will involve much more. As described in Luo and Zhu (2020) and Ahmad (2020a), internal migration will no doubt continue towards the existing coastal megacities. Creating strong flows in the opposite direction – inland – and enhancing the attractiveness of staying in interior regions will require investment in social and human capital and services there, particularly to ensure that health and education are enhanced and more evenly distributed, in CCC cities and across the country.

The tremendous technological advances made by China with the use of e-commerce, IT and big data could also be deployed in the evolution of interior CCC cities, to be able to attract private firms to relocate closer to population centres and to bring supply chains closer to where demand is being generated. Provision of basic services to attract and retain workers and households is critical. These new forms of investment in CCC cities should proceed alongside and be complementary to the restructuring of capital-city metropolitan areas around provincial capital cities.

In the short term the pandemic has called into question the utilisation of some of the fundamental technological advances that have made the metropolises possible at the size they are, including elevators/lifts within skyscrapers, and mass transport systems. Urban architects, developers and planners, alongside those enhancing the environment, have continually stressed the need for clean and efficient metro systems to support the functioning of a dense urban area and improve the environment.

COVID-19 has highlighted that high population density can be problematic where there are highly contagious diseases. For example, the social distancing requirements that are part of the COVID-19 response make it difficult to operate lifts in very tall buildings. Crowded bus rapid transit (BRT) systems and metros also pose a risk and people have been resorting to using private cars in the aftermath of COVID-19 in many Chinese cities, with negative implications for local air quality and greenhouse gas emissions. CCC cities will require design and strategies that leverage the very strong advantages of living and working in close proximity to others, while managing the difficulties these features create in terms of disease transmission. Design, technology, behaviour and public health will have roles to play.

We assume that the existing big cities and metropolises will continue to play a strong role in development, in China and around the world. There will be major challenges in transforming these to make buildings more efficient, reduce congestion and pollution, and enhance movement and liveability. Much of this will be costly (for example, it can be expensive to retrofit skyscrapers), which can make redirecting financial transfer payments from capital city clusters difficult, but the development of local

[3] The OECD (2012) has described compact cities as "hav[ing] dense and proximate development patterns, [being] linked by public transport systems, and maintain[ing] accessibility to local services and jobs".

tax instruments can be an alternative way to meet the cost (Xiao, 2018). It is easier to design clean and efficient buildings, grids and infrastructure in more manageable county-size sub-jurisdictions and CCC cities than in the metropolises. For this infrastructure to function well, accountability for delivery of services and local tax and financing mechanisms will be crucial.

The parallel development of high-tech innovation zones is essential to drive and maintain engines of clean growth, with investments in IT infrastructure, energy grids and data management capabilities. This would permit the linked transformation of metropolitan areas, facilitated by highly skilled research centres and top-class universities, and by financial sector and product development skills. The high-tech zones in the Yangtze River Delta and Greater Bay Area are examples of investments needed for high quality growth.

The urbanisation strategy for existing major cities, for the proposed CCC cities, for high-tech zones, as well as enhanced connectivity and links, must embody both the imperative of the low-carbon transition and the public health lessons of COVID-19. There will be important implications for buildings, transport and energy. The prize is more healthy and liveable, cleaner, and more productive metropolitan areas and CCC cities.

We have emphasised both the investment necessary in all forms of capital and crucial criteria for the elements of city design that are needed to create the new growth story. For all this to occur, there are three crucial drivers of reform: fiscal, institutional and governance. These are the focus of Section 3 of this paper.

We examine the importance of clarifying the responsibilities of different levels of administration, and identify the other key elements of the drive to the new high-tech, balanced and sustainable economy. Achieving this drive will require careful attention to national 'vertical' coordination (from the centre to local jurisdictions), and strengthened 'horizontal' decision-making across functions and departments, especially at the lower levels of government (Ahmad, 2020a). The proposed restructuring of central transfers directly to cities and counties and making 'special purpose bonds' available for infrastructure is a good start. But it is important to go beyond transfers and borrowing to include local own-source taxes, to reduce risk and ensure greater local accountability for the new responsibilities. For example, there could be a 'beneficial' location-based property tax on occupancy, linked to public services (as developed in Ahmad, Niu et al., 2020).

At the same time, appropriate local own-tax instruments or handles (administered by the State Tax Administration) are critical for accountability. Important here too are better defined financing for central objectives, and improved information flows on where the money goes and the outcomes of public spending and investment design. Own-source taxes are important in reducing and managing the risks associated with access to private finance, borrowing and public-private partnerships (PPPs). While project bonds are useful, there remains a need to record activities and expenditure as part of the budget process, since pricing regimes involve effective tax/subsidy implications, and to recognise that net liabilities arise for local or higher levels of government.

Looking forward

China's 14th Plan must take into account both its own challenge and the world context while planning the move from rescue to recovery from COVID-19. A shift is needed from the export-oriented mega 'hubs' to 'clean, compact and connected' cities, supplemented by the development of zones of non-contiguous innovation activities and of the sustainable urban transformation embodied by this structural change. These measures must be based on clean sources of energy and low-carbon technologies that facilitate e-commerce, management of big data, and fin-tech. Fiscal reforms will be needed to ensure that investment programmes, including stimulus packages, provide sustainable incentives to firms, workers and governments at different levels, strengthen local budgets and facilitate access to private finance without exacerbating fiscal risks.

2. Sustainable urban transitions for investment and employment opportunities and a cleaner, healthier environment

Difficulties caused by congested, polluted and sprawling metropolitan areas

China's phenomenal export-led growth performance over the past quarter of a century has been based on the development of coastal 'hubs'. This has led to significant internal movement of people, with an estimated 174 million migrating to these megacity hubs (out of a total 'floating' population[4] of almost 250 million), resulting in even further expansion of these megacities along the eastern seaboard. It has also led to over 750 million people being lifted out of poverty, by far the biggest reduction in poverty in the history of the world. However, these gains have come with the costs of huge urban sprawl, congestion and pollution, and loss of prime agricultural land as cities continue to finance expanding new developments through land sales that also engender opaque and off-budget access to financing that compounds financial risks (Wang et al., 2018).[5]

The difficulties presented by continuing expansion of the megacities have long been recognised. In response, a 'rebalancing strategy' – the Western Development Strategy – has been in effect since 1999, as an effort to encourage growth away from the eastern seaboard and into the interior. Huge national investment resulted in world-class transport connectivity infrastructure in the form of high-speed trains (the world's most advanced network), airports and motorways. However, the proportion of the population in major coastal cities continues to rise significantly because people continue to migrate to where the jobs are – predominantly in the Eastern coastal megacities. Thus, despite China's efforts through the Western Development Strategy, the pressures on the coastal megacities have continued to increase (Luo and Zhu, 2018).

While investment in connectivity is a necessary condition for rebalancing growth across the country (in the UK this is called 'levelling up' and in Italy and Chile it is known as 'convergence'), in reality the improvements to transport have made it easier for migrants from the poorer interior regions to move to the coastal megacities. This has led to increasing pressure on within-city infrastructure and public services, and most of the major cities have seen the expansion of their metro systems, which are environmentally-friendly (displacing some car use) but expensive. With limited own-source tax handles left at the sub-national level (described further below), many of the metro systems have been financed through local government debt, including public–private partnerships, although it has become clear that the ability of the cities and local governments to finance liabilities is, in reality, extremely limited. Concerned with the potentially unsustainable build-up of local government debt, in August 2017 the National Development and Reform Commission suspended the CNY 30bn Batou metro system which was under construction, and put requests for metro systems in 43 other cities on hold.

As well as continuing to sprawl outwards, cities have expanded upwards; 1,157 buildings higher than 200m were constructed in 2019 alone, including the 530m-tall Tianjin CTF Finance Centre skyscraper. Retrofitting existing high-rise buildings to meet the standards of the globally-used LEED green rating system can be very expensive.[6]

Challenges in modern urban design in the face of the COVID-19 pandemic

The COVID-19 pandemic has raised questions around modern urban design. High-rise and densely populated buildings are particularly susceptible to disease transmission through air-conditioning and ventilation systems, sewage systems, densely used common spaces, and, especially, lifts/elevators. Social distancing is not practicable in elevators, and little can be done to reduce transmission risk beyond

[4] The 'floating' population are temporary migrants who do not have *hukou* or residence rights, typically maintaining rights to social services in their places of origin.

[5] Land sales have also spawned off-budget activity and leveraged debt that has led to potential rent-seeking opportunities as well as spiralling debt of uncertain magnitude. The heightened risks are a serious constraint on the development of fiscally sustainable cities (Ahmad and Zhang, 2020).

[6] As an idea of cost, Leadership in Energy and Environmental Design (LEED) certification added US$120m to the retrofit of the Empire State Building in New York (out of a total cost of US$550m) to make it more eco-friendly and energy-efficient.

providing contactless operating mechanisms. In May 2020 the Ministry of Housing and Urban-Rural Development banned new buildings above 500m in height, and the construction of buildings between 250 and 500m has also been severely restricted in response to some of these concerns.[7]

The use of mass transit systems, including metros and bus rapid transit (BRT) systems, can also play a role in the spread of infectious diseases and has done so in the current pandemic. While infection is prevalent, many individuals will react by shifting to using personal cars, as appears to be happening in major Chinese cities currently. As well as increasing congestion, this trend causes more particulates to be emitted into the atmosphere and in turn a greater incidence of respiratory disease, exacerbating susceptibility to COVID-19.

Some of the short-term adjustments that are possible include greater reliance on remote working, staggered office hours in urban districts/counties within metropolitan areas to prevent congestion, and more use of e-commerce. Huge advances in big data can help to track, test, quarantine and support people who might have come into contact with infections. However, in terms of the current pandemic, there is likely to be a continuing impact on service sector workers; 50 million floating workers are stranded in their places of origin (or *hukou*) because COVID-19 has caused businesses in the service sector to shut down in the major metropolitan areas.

As in other countries, firms and workers in export-oriented industries are being affected by the recessionary trends in their major trading partners as a result of COVID-19. Although China's export sectors are being supported in the short run through stimulus measures, including loans and income support programmes, and this is reflected in official numbers of the unemployed (under the International Labour Organization definition), jobs in these sectors remain at significant risk.[8] The stimulus measures will have to be underwritten by the central government as local governments are already bearing the debt overhang from the 2008–10 stimulus package that played an important role in 'salvaging' the global economy. The build-up of inventories in export-oriented firms might be diverted towards new trading patterns, such as with Belt and Road Initiative (BRI) countries, which will also support the Go West programme of rebalancing growth away from the coastal megacities, as re-emphasised in May 2020.

Over the medium term, the policy design and investment challenges will be to find ways of combining the great advantages of high density living and working in functioning, efficient and attractive cities, with successfully addressing the challenges associated with the transmission of diseases. This will involve innovation in design, technology and public health, and is a priority for R&D and public policy.

The combination of environmental and climate challenges, new technologies and the lessons of the pandemic provide a reason to accelerate structural measures for a 'rebalancing' that will also generate investment and employment opportunities in both the short and longer terms, including for migrant workers stranded in the interior of the country. These measures could help to strengthen the intended pivots that have been announced – from exports to domestic consumption, and from further development of the coastal megacities to clean, compact and connected cities in the interior. As we explain next, together these changes could make the rebalancing and Go West programmes key in the drive to strong, sustainable, resilient and inclusive growth in China.

Clean, compact and connected (CCC) cities at the core of rebalancing programme

The potential advantage of good connectivity and proximity to markets in the proposed CCC cities may alone not be sufficient to attract enough firms to relocate from the coastal megacities,[9] even when the development costs are financed through land sales and access to off-budget borrowing (Ahmad and Zhang, 2020). Workers continue to migrate to established metropolises instead; indeed, the improved transport systems facilitate this by reducing the associated costs.

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[7] A new policy, released in May 2020 on the Ministry of Housing and Urban-Rural Development's website, sets out a wide range of measures determining limits on the height of buildings.

[8] There are, in addition, a number of workers on furlough or reduced pay but who are not formally unemployed.

[9] As emphasised in the case studies in the LSE/Coalition for Urban Transitions programme on sustainable urban transition in China. For a summary of the main findings of the programme, see Ahmad and Colenbrander (2020).

A CCC-oriented investment programme would result in buildings that meet LEED environmental standards, as well as WELL[10] building standards which focus on health and living conditions, and that might also reflect some of the precepts of traditional Chinese architecture. Of course, the widespread use of e-commerce and new technologies will be central to the design principles of CCC cities.

Attractive cities can be created, where inhabitants enjoy clean air, water and light, and can walk or cycle to work and to shops and entertainment. But for this to happen, it will be necessary to clearly identify responsibilities, including for financing education and preventative health care. This clarity in spending and own-source revenues would ensure that local governments can more easily be held accountable for results, and would enable speedy implementation of preventative health care and support networks. Advances in health care will draw on the experiences of 2020 in terms of testing, tracking, quarantining and supporting those people who might have been affected by COVID-19. The fiscal aspects of this transformation and the key drivers of change are summarised in Section 3.

The development of CCC cities in the interior could provide employment opportunities for many of the estimated 50 million stranded migrant workers in the short run, by investing in infrastructure to upgrade existing human habitats. As facilities are created and good public services ensured, firms will move to take advantage of the new, and nearby linked markets, and also the new value chains facilitated by the BRI trade routes. To some extent this has begun with, for example, the spontaneous development of Khorgos on the border with Kazakhstan, financed by Jiangsu-based firms to leverage the rail-based trade to Central Asia and Europe. These new value chains will clearly be an important element in the success of the Go West programme, as will shorter supply linkages for domestic consumption.

A 'rebalancing' strategy would see more labour-intensive value-added activities shifting to CCC cities within China. The generation of employment opportunities outside the principal metropolitan areas in this way will be a core element in an effective transition to new economic activities, while maintaining economic stability in the face of what will be major structural change. Improvements in financing and managing cities, including greater clarity over responsibilities as described above, will be crucial in the process of building CCC cities and in their functioning (see Section 3 below).

Transformation of megacities and innovation zones

In utilising e-commerce and fin-tech, new value chains will lead to a transformation in the way that business is done, including in the eastern megacities and planned innovation zones. This will directly affect the spatial dynamics of the transition; stronger cross-city and cross-provincial coordination mechanisms will be required. Innovation, R&D and science parks would need to be matched with financing mechanisms from the regional finance hubs (e.g. Shenzhen and Guangzhou in the Greater Bay Area, and Shanghai and Hangzhou in the Yangtze River Delta), infrastructure for the establishment of new firms, and the internationally recognised legal frameworks being created in Hong Kong and Shenzhen.

Some of the most promising developments in urban structure and accompanying governance and financing relate to the high-tech innovation zones that are being planned in the Greater Bay Area as well as in the Yangtze River Delta. The stronger regional cooperation that will be enabled by enhanced connectivity and public infrastructure will improve the overall potential for growth and rebalancing activities within China, as well as among trading partners (including the BRI countries). This transformation will therefore also have implications for strengthening or developing new regional and global value-chains. As the Greater Bay Area becomes a high-tech 'hub' or zone, new sustainable growth patterns will emerge, based on changing patterns of innovation, product development and financing. Further, the Special Economic Zones (SEZs), the first of which were established in 1979/80, will need to move into a new phase, with a removal of within-country borders to encourage the development of linkages between cities, within the broader economic space. Good governance will be important to ensure that the new zones are sustainable in economic, administrative, financial and fiscal terms. China can learn lessons from the difficulties experienced in Europe and the US in adjusting cities' administrative and political boundaries to better match new economic spaces, and also in coordinating responses to the pandemic (Ahmad, 2020a).

[10] See https://www.usgbc.org/articles/what-well for an explanation of these standards.

Transition towards a low-carbon economy: priorities for the medium term and the 14th Five-Year Plan

Regardless of the speed of transformation of the metropolitan areas and CCC cities, it will be critical for China to ensure that all investments are geared towards building a resilient and sustainable future and the transition to a low-carbon economy. Lessons should be learned from the CNY 4 trillion (US$586 billion) stimulus plan brought in to manage the impact of the global financial crisis in 2008: the plan included massive infrastructure and real estate investment and created a huge surplus of high-carbon capacity. It also created a huge debt overhang for Chinese local governments that is now seriously constraining the ability of the central government to act on the same scale as it did in the 2008–10 crisis. Indeed, the measures announced in response to COVID-19 are relatively modest in scope and more targeted to achieving the structural reforms – including the pivot to domestic consumption and the Go West programme.

The UN Secretary General Antonio Guterres appealed to the world for a green recovery in his speech on 19 March 2020, stating that "we have a responsibility to recover better". Central to recovering better is the prevention of investment spilling over into traditional and dirty infrastructure, including coal power plants and standard road construction. A much more effective and stable recovery that flows into the necessary low-carbon transformation will come from a focus on the technology of the 21st century. Investments based on the technologies of the 20th century will become stranded assets with stranded jobs. Further, it is now clear that a recovery that embodies the principles of sustainability can be stronger and faster than the alternatives. So much of what is necessary for sustainability can be rapidly implemented, is labour-intensive and has strong economic multipliers.[11]

Energy choices – switching from coal to cleaner energy

President Xi has pledged that China's goal is to be carbon-neutral by 2060, and this entails going beyond its commitments in the Paris Agreement with a major reduction in carbon intensity of its economy by 2030 and peaking emissions before that. Cutting coal consumption and replacing it with cleaner energy, such as natural gas and renewables, has been a key part of China's energy strategy since the 11th Five Year Plan (2006–2010). China should accelerate the transition to cleaner energy in urban areas, with an aim of peaking its coal-fired electricity now. Policies for retraining and reallocating coal workers should be a core part of such a strategy. China has also committed to a greening of the BRI. That means no more investment in coal-fired electricity. Worryingly, China has been building more coal capacity, at home and abroad. The use of coal is deeply damaging to economies, societies, health and environment, bad for development and has no valid economic justification.

Major low-carbon measures in cities are required, including the replacement of bulk coal burning with clean heating and clean energy and grids, and further reduction of industrial coal consumption through industrial restructuring and technological progress. In many cases, the pressure to continue with coal mining comes from local governments that are dependent on royalties from mining operations. Tackling this dependency involves the joint determination of alternative tax assignments for local governments, as well as tax and pricing policies. These reforms should be undertaken in tandem with decisions to stop building more coal-fired plants, while promoting renewable energy generation.

Renewable energy is an important part of China's energy resource endowment and a feasible solution for ensuring energy supply security. It has become economically competitive, with wind and solar PV becoming ever-cheaper, energy storage costs falling and network management improving. It is also technically feasible, with a wide range of advancing energy storage technologies contributing to electricity stability and to ensuring that power systems with high penetration of renewables will not suffer from system balance problems. A recent study by He et al. (2020) suggests that if the cost trends for renewables (wind and PV) continue, 62 per cent of China's electricity could come from non-fossil sources by 2030, at a cost that is 11 per cent lower than achieved through the current electricity generation mix. The economic cost advantage is even higher when the costs of the greenhouse gas

[11] While this is not the main topic of this paper, it is a crucial part of a recovery strategy (for more, see, for example, Hepburn, O'Callaghan et al., 2020).

emissions and pollution are taken into account. It is crucial to overcome the distortions in grid management so that coal is not prioritised.

Strategies for carbon-intensive sectors

Electricity demand in China is still rising rapidly, especially demand from the service and residential sectors. China should focus on measures for meeting and managing increasing demand, while promoting the clean energy transition. In 2018, 46 per cent of China's total energy-related CO_2 emissions came from the energy sector (electricity and heat), with the rest mainly caused by the industry, transport and building sectors (Climate Transparency, 2019).

Sound economic and practical measures include grid management to balance demand and supply in a smarter way and avoid the irrational prioritisation of coal-fired sources; power sector reforms on pricing, plus the possibility of a carbon tax with a local 'piggy-back' or surcharge on the central tax rate; investment in renewables and energy storage facilities to generate electricity in a clean way and support the increasing penetration of renewables; and continuously increasing energy and resource efficiency across the whole economy. There is an urgent need for the Chinese government to push forward market-based economic dispatch in a way that the generation unit with the lowest costs is prioritised for meeting electricity demand, to reduce the total costs of providing energy to consumers, and to improve renewable integration by taking advantage of the near-zero marginal cost of wind and solar generators.

Digital management has a critical role to play in integrating variable renewables, by enabling grids to better match energy demand to times when solar PV and wind resources are abundant, and in supporting the demand response programmes in buildings, industry and transport. Investment in developing digital transformation strategies is of great significance for promoting the low-carbon transition.

In the transport sector, a crucial measure to reduce carbon emissions involves discouraging the use of diesel and petrol-powered vehicles, especially in inner cities. As more and more electric vehicles (EVs) are used, there will be huge capacity from EV batteries and smart charging piles available to balance flexible loads to help smooth electricity load variation in urban areas. In the aftermath of the COVID-19 pandemic, as the inhabitants of Chinese cities have returned to work, they have been reluctant to use public transport and there has been a major shift towards cars (satellite images confirm this trend). The problems this causes in terms of emissions and congestion, particularly in the short term but likely in the longer term as well, could be addressed partially by a shift in work patterns (staggering commutes could encourage the use of public transport if it is less crowded), using e-commerce and more remote working. Investment in EV technology and charging stations is beginning to reap reasonable returns, and differential local taxing policies and regulations would further encourage people to shift to EVs from petrol and diesel vehicles. A local area 'piggy-back' on a national carbon tax could be very valuable here, in terms of both incentives and of revenues accruing to the local levels (Ahmad, 2020b).

The building sector is another major source of greenhouse gas emissions, which highlights the importance of employing best practices in building, energy and resource conservation to ensure green building construction in new buildings. Green or environmentally-friendly buildings make efficient use of resources including land, water, energy and materials (Wu et al., 2019). And the efficient and coordinated use of urban land can mean that CCC cities can avoid the pressure on environmental resources caused by urban sprawl.

Making existing buildings more energy-efficient will be a key element in reducing energy use. This can also be central to a strong and sustainable recovery: for example, Hepburn, O'Callaghan et al. (2020) describe how retrofitting buildings has been identified across the world as core to the economic recovery from COVID-19 in terms of being quick to implement, providing significant employment, and generating strong economic multipliers. The nature and costs of retrofitting depend on the stock of buildings, which varies across locations. But there is a great potential in all countries.

Improving the energy efficiency (in providing both electricity and heat) of existing buildings through retrofitting should be a high priority for public policy in China. Most of the buildings are owned by private individuals, or property management companies, many of whom have made huge profits through the land value capture mechanisms that also led to the urban sprawl and off-budget operations of Urban

Development Investment Corporations. Generating incentives to retrofit buildings must involve organisations to coordinate transparent activity to achieve scale and finance, and meet local regulations and local tax policies. Desirable measures include incorporating digital technologies, such as fitting smart displays to existing meters, increasing installation space for solar photovoltaic (PV) panels on building surfaces, and renovating to install new types of flexible power systems in buildings, which have benefits for the low-carbon transition as well as for the COVID-19 recovery.

Retrofitting can also generate a host of co-benefits, including improved indoor conditions for building users, higher real estate values and better local air quality (Qi et al., 2020). Public monies for retrofitting have to be carefully dovetailed with the level of government deciding on the priorities and allocation of financing – either through earmarked grants from higher levels if there are national mandates, or directly from local budgets and tax revenues.

3. Fiscally sustainable recovery: taxation and incentives for improved employment and health outcomes and fostering growth

How the recovery from COVID-19 is managed and financed matters a great deal if China is to 'build better' and avoid mistakes from the past. The G20 response to the pandemic was to agree to 'do what it takes', and many Central Banks, including the US Federal Reserve Board (Fed), have been engaging in quantitative easing. The Fed has also purchased municipal and corporate bonds. The People's Bank of China (PBC) has not yet followed suit, on the grounds that monetisation of the deficit is not permitted under PBC law and amid concerns that the additional funding might not get to those who need it (Zhou, 2020). Further, without active policy that looks to the future structure and sustainability of the economy, there is a danger that 'blanket funding' would reinforce current productive structures that need to adapt and change in order to generate the rebalancing and new employment necessary for a more sustainable growth trajectory.

There needs to be an appropriate combination of investment in physical infrastructure and in social and human capital, including skills and provision of appropriate levels of preventative health care. The current fiscal reform context in China is important, particularly in relation to reforms of spending and governance, which are far from complete. Thus, short-term recovery measures need to be designed, along with a fiscal transformation to drive the recovery and also to support the structural change. We should recognise that the recovery phase will probably involve a substantial part of the 14th Five-Year Plan period.

While China has made good progress in developing modern national tax instruments and forms of administration, and has made central budget and treasury reforms, these have not yet been followed by adjustments in spending responsibilities and appropriate sub-national tax instruments, or effective public financial management tools, including the monitoring of sub-national liabilities. The shortfalls in these areas were highly visible during the 2008–10 global financial crisis, when China engaged in a stimulus of CNY 4 trillion, largely predicated on local government borrowing from the banking system.

Does local government bond financing reduce risk?

Another watershed juncture in Chinese public finances came in 2015, when the budget law was amended to permit bond issuance by local governments to reduce the risks inherent in opaque local government liabilities. At the same time, the local business tax was subsumed into the value-added tax (VAT). This was appropriately designed to reduce the cost of doing business, and to facilitate linkages between the SEZs, such as Shenzhen, and their neighbouring regions. Local governments were compensated with a higher proportion of shared revenues. While there are local taxes on the transfer of properties, with a band or surcharge legislated by the National People's Congress (see Ahmad, Niu et al., 2020), these are small and variable, and do not effectively constitute an adequate source of own-source revenues over which a sub-national jurisdiction has control. This leaves local governments largely dependent on shared revenues that fluctuate as the central government pursues its overall goals, including macro-fiscal stabilisation.

Shared revenues, however, are not appropriate to anchor a system of local government bonds or effectively manage the build-up of liabilities including through PPPs (see Ahmad and Zhang, 2020). Thus, the new local government bond system, while an important structural measure if properly sequenced, has not achieved either the objective to reduce the risk or that of tackling the lack of transparency in sub-national debt. The debt overhang remains, and local government finances are precarious, with an absence of own-source revenues, and incomplete information on the true magnitude of the build-up of liabilities, much of which remain off-budget and hidden. Budget pressures and incomplete balance sheets generate incentives for these liabilities to spiral.

The balance sheets of a county-level government in Central China, which could be a potential CCC city (Ahmad and Zhang 2020), and another in the coastal Jiangsu province (Ahmad and Zhang, 2018), suggest that the true magnitude of liabilities (excluding PPPs) was a multiple of the official estimates,

including both special purpose and general bonds. Own-source revenues are crucial not only for the management of overall liabilities, but also for creating revenue flows to provide for the financial sustainability and appropriate inventive structures for infrastructure projects, many of which must be carried out and run at local levels.

The high level of indebtedness, together with reliance on shared revenues that have declined as the central government has reduced taxes over the past year to stimulate the economy, has reduced the ability of local governments to meet extensive expenditure mandates. Mayors and local officials are faced with difficult choices between financing basic spending, including spending on preventative health care, or the more visible promotion of investments to meet growth targets and thereby enhance their career prospects.

Weak monitoring mechanisms and the absence of accountability, which requires own-source revenues at the margin, have meant that local governments have incentives to indulge in irresponsible spending, hide liabilities and give low priority to preventative health care. The resulting local weakness in health care may have delayed recognition of the magnitude of the COVID-19 problem, both in the city of Wuhan and by the central government. However, the central government acted decisively in shutting down the city – of 11 million people – by the third week in January 2021 (see Ahmad, 2020a). Interestingly, Wuhan had experienced a very rapid increase in in-migration during 2010–15, greater than Shanghai or Guangdong, but budget pressures led it to spend less per head than these other two metropolitan areas on preventative health care, as hospitals were prioritised (Ahmad, Niu et al., 2020).

Whether within rich coastal provinces such as Guangdong, Jiangsu or Zhejiang, or in the interior of the country, the weak fiscal positions of Tier 3 and 4 cities[12] make it difficult for them to take advantage of the local bond market to utilise the national investments in connectivity infrastructure to create sustainable CCC cities and engines of new and sustainable employment generation. This will be a major constraint to efforts to rebalance activities within rich provinces (Ahmad et al., 2018), and within China as a whole, particularly to the poorer western provinces.

The 1999 Western Development Strategy focused largely on physical connectivity infrastructure. As seen also in Italy and the UK, investment in physical capital and connectivity, while necessary, has not been enough to generate activities in new 'employment hubs' in poorer regions. By itself, this kind of investment in fact might exacerbate inequalities by facilitating outward movement from poorer regions. Thus, it is important also to invest in human and social capital, including the provision of health care and education. If local governments are to play this crucial role effectively in China, their responsibilities need to be clarified, with greater local accountability for results. Local governments also must be provided with the ability to raise the necessary resources.

As already discussed, in May 2020 the State Council announced the Go West plan – a new policy of 'rebalancing', to persuade firms to move westward inland. To enable this, the policy has a focus on transport/connectivity, energy provision and irrigation for agriculture. The pursuit of the goal of moving firms could generate substantial employment opportunities in the interior in the short run. To be sustainable over the medium and longer term, the projects chosen should be carefully assessed, using appropriate weights for labour and skills, the environment, and the distribution of income. These criteria can be used to direct tax, public sector pricing and investment decisions (Drèze and Stern, 1987), including at the local levels. The intention to permit the issue of CNY 1 trillion in local government special bonds for infrastructure is appropriate in this context. But while strong revenue streams are important for their financial sustainability, these projects cannot be entirely ring-fenced, given that tax/subsidy implications apply in each case; there are consequent implications for local government balance sheets.

Tax revenues and instruments

We have emphasised the importance of own-source tax revenues. Ahmad, Niu et al. (2020) propose a 'beneficial'[13] property tax to raise 2 per cent of city-level GDP by applying a relatively modest occupancy

[12] Though not recognised officially, China's city tier system is widely used to classify its cities, which are usually divided into four tiers. For example, see Tier classification for 613 cities in China by *South China Morning Post*: https://multimedia.scmp.com/2016/cities/.

[13] As argued by Alfred Marshall (1890), the property tax is one of the most visible of taxes and generates opposition. The political economy changes if the property tax is directly linked to local benefits – turning it into a 'beneficial tax' that people are quite willing to pay. This also generates greater local accountability in the use of the public funds.

tax based on property size and location linked to key elements of the benefit structure that such taxes can finance (see Table 1 below). The linkage with city-level GDP is designed so that richer metropolitan areas are taxed at higher rates than poorer jurisdictions. For example, Table 1 shows that Guangzhou would generate the highest tax per square metre (CNY 121/m^2) of the cities in the sample. By comparison, the tax in Wuhan would be CNY 85/m^2 and in Xi'an only around CNY 49/m^2. This variation in property tax rates across cities would provide an important signal to firms and workers, encouraging efficient use of land in metropolitan areas as well as investment in and migration to lower-income cities. In practice, the tax could be differentiated further by neighbourhood within cities, to achieve equity objectives and recognising that poorer neighbourhoods often receive weaker services.

The beneficial property tax on its own is progressive – i.e. benefiting lower-income groups more and thus addressing inequality – in Wuhan (see Table 1), and becomes progressive in all cities when linked to basic services (see Ahmad, Niu et al., 2020). The replacement of land sales with this tax as the primary source of additional funding in all cases is critical in ensuring a transition that is not only economically sustainable but also designed to help create better managed and functioning cities. Such a tax instrument would make the proposed CCC cities more accountable and also permit access to private sources of finance for the investments that are needed.

Table 1. Projected impacts of a 'beneficial' property tax to raise 2 per cent of city-level GDP

City	Property tax revenues equal to 2% of GDP (CNY bn)	Current local education spending (CNY bn)	Property tax rate to reach 2% of local GDP (CNY/m^2)	Impact on inequality (Atkinson index)			Impact on inequality (Gini coefficient)		
				Initial A_1	Tax only A_2	Tax/ benefit education A_3	Initial G_1	Tax only G_2	Tax/ benefit education G_3
Guangzhou	39.2	32.12	121.4	0.60	0.76	0.75	0.39	0.40	0.39
Shanghai	54.9	84.10	90.81	0.71	0.51	0.50	0.40	0.41	0.40
Shenyang	10.9	11.51	52.68	0.63	0.49	0.47	0.33	0.34	0.33
Wuhan	23.8	23.11	85.11	0.52	0.47	0.46	0.33	0.35	0.33
Xian	12.5	11.96	48.8	0.47	0.57	0.49	0.35	0.36	0.34
Fuzhou	12.4	15.31	54.6	0.51	0.89	0.55	0.36	0.37	0.36

Notes: The Gini coefficient (G) and Atkinson index (A) are two different measures of interpersonal inequality. The Atkinson index explicitly attaches higher weights to increments in income to lower-income groups.
Source: Ahmad, Niu et al. (2020)

4. Conclusions

The COVID-19 pandemic has brought an unprecedented threat to public health in all countries and the global economy. China's 14th Plan must take into account both its own challenge and the world context while planning the move from rescue to recovery, to build a resilient and sustainable future and promote the transition towards a low-carbon economy.

China needs to continue to spend on urban infrastructure as part of its rebalancing to interior CCC cities, as well as transformation of the megacities in light of COVID-19. This infrastructure could be a major driver of, and requirement for, sustainable, resilient and inclusive economic growth. The choices made in cities today on transport, infrastructure, buildings and energy use, and as they grow rapidly over the coming decades, will determine, via the technology and way of life they lock in, whether China can both manage climate change and realise the benefits of low-carbon growth. Achieving these goals can be very attractive in terms of creating stronger and more sustainable and inclusive development. China can show how measures for an urgent and strong recovery from COVID-19 can also accelerate the transition to the inevitable low-carbon economy.

Policymakers have argued for some time that the next phase of China's development, following an extended period of emphasis on low-cost, energy-intensive, export-oriented manufacturing, would involve a transition from exports to domestic consumption, along with higher-tech, more service orientation and a cleaner economy, strengthening China's drive for an 'eco-civilisation'. These aims were emphasised by President Xi at the NPC meeting in May 2020, and are strengthened by the commitment to reaching net-zero by 2060.

We argue that this whole process can be enhanced in a way that fosters the recovery and ensures a cleaner environment, poverty reduction and reduction of risk, through a shift from the export-oriented mega 'hubs' to smaller, well-contained, 'clean, compact and connected' cities, supplemented by the development of the already-planned zones of non-contiguous innovation activities, including those in the Greater Bay Area and the Yangtze River Delta. This structural change and the sustainable urban transformation it embodies must be based on clean sources of energy and low-carbon technologies that facilitate e-commerce, management of large data, and fin-tech.

Hepburn, O'Callaghan et al. (2020) conducted a survey of the relative performance of 25 major fiscal recovery archetypes and suggest that stimulus plans can deliver both economic and climate goals. And because of the nature of so many sustainable projects and programmes, usually quick to implement, labour-intensive and with strong economic multipliers, the flow from strong and sustainable recovery into transformation to low-carbon growth works well. Projects that cut greenhouse gas emissions as well as stimulate economic growth can deliver higher returns from government spending in the short and long term than conventional stimulus spending. It is crucial to avoid the investment patterns of the 2008–10 stimulus package in China, which locked in many high-carbon production, practices and methods.

To drive these changes reforms will be needed that include fiscal measures to ensure that investment programmes, including stimulus packages, provide sustainable incentives to firms, workers and governments at different levels. Principal measures include:

- Own-source revenues at the sub-national level, such as the 'beneficial' property tax, as well as a piggy-back on a carbon tax or income tax (administered by the STA[14])
- Coordinated multi-level decisions on public investment
- Much tighter information generation and tracking of what is spent and the outcomes
- Recording of all liabilities.

These measures should provide a basis for the Ministry of Finance (MOF) to work in parallel and harmony with the National Development and Reform Commission over the short to medium term, to ensure a consistent package that leads to high quality growth, with positive distributional and environmental outcomes and prudent management of risk.

[14] The STA is the State Taxation Administration (Chinese: 国家税务总局), a ministerial-level department within the government of the People's Republic of China. It was previously known as the State Administration of Taxation.

This is a crucial moment for the future of the world. We have seen how dangerous and fragile the old model is. Not only does it cause severe damage to the climate and biodiversity: it also makes pandemics more likely. Further, it carries with it the stresses of insecurity and inequity. The world must not go into reverse and lapse back into the old, dirty technologies of the 20th century. China's leadership in the recovery phase is crucial.

As China leads the world out of the COVID-19 crisis, it has a great opportunity. China can show how recovery measures can also accelerate the transition to the inevitable low-carbon economy. China is already at the forefront of the development of new low-carbon technologies and it has a great deal to gain by being in the vanguard of the new global growth story, driven by the stimulus of greater investment in sustainable and climate-positive projects.

China's domestic commitment to environmental protection and ecological conservation (or ecological civilisation) was recently re-emphasised, along with poverty reduction, during President Xi's visit to Shaanxi Province in April 2020. To achieve a Chinese version of eco-civilisation, high-quality development, and strong, sustainable, resilient and inclusive growth, there is a great need for the 14th Plan to embody a 'Green New Deal', reinvigorating economic growth through innovation and investment in the drive to new low-carbon technology, clean infrastructure, new forms of urbanisation, and fiscal reforms. The innovation and investment in low-carbon growth can create sustainable finance systems that can enable investment in better health and education alongside physical capital. This is a crucial moment too to invest strongly in China's natural capital and infrastructure on which its economy, and indeed the world economy, depends. That includes land, forest and water systems.

If China takes this approach it can establish its leadership in the world economy and set an example to other countries on how to achieve a sustainable recovery and transformational growth. The years following the COVID-19 crisis will be a decisive period for the world. The 14th Plan will be an absolutely critical part of this whole process. Decisions taken now will shape China and the world for a long time to come.

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