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Briefing Paper 6

A new starting point:

China's eco-civilisation and climate action post-Paris

June 2016

This paper is part of a series of briefing papers that examine the climate change policies of the countries key to a global agreement at the United Nations Framework Convention on Climate Change (UNFCCC) negotiations in Paris in December 2015, and its effective and ongoing implementation.

Executive Summary

This briefing paper examines China's 'ecological civilisation' and what it means for the future of Chinese climate change policy and climate diplomacy.

The paper argues that China's transition from an industrial civilisation to an ecological civilisation has produced a new eco-minded meaning of economic growth, which has served to 'open-up' a new range of low-pollution policy options, while 'closing-off' other high-pollution options.

Key findings:

- The meaning of economic growth in China was different during its period of industrial civilisation (1978-2011) in comparison to its period of ecological civilisation (2016 and beyond).
- China transitioned from an industrial civilisation to an ecological civilisation between 2011 and 2016. Evidence of this is identifiable in its electricity generation and urban transport sectors.
- It is likely that China will strengthen its Paris Agreement commitments over time.

Introduction

China is undergoing a transition from a high to low greenhouse gas (GHG) polluting economy. The Chinese government has described this transition as a 'new economic model', 'new development model', 'new economic strategy', 'the new normal', 'structural change', 'supply-side reform', 'better quality growth', and 'ecological civilisation'.[1] This paper examines the rise of China's 'ecological civilisation' and the simultaneous decline of its 'industrial civilisation'. It tracks this transition in its electricity generation and urban transport sectors. These two sectors were chosen because they are core sectors underpinning the broader direction in China's national climate policy and climate diplomacy.

To date, economic analysis has dominated understandings of China's transition. This approach tends to highlight the structural shifts occurring in the Chinese economy – such as reduced coal usage, reduced energy intensity of growth, reduced investment in heavy manufacturing, and reduced economic growth rates, as well as increased emphasis on clean energy technology – then point to specific policy shifts as providing evidence of these broader structural shifts. This briefing paper aims to provide a further layer of evidence to support economic analysis.

To achieve this, the paper argues that China's transition from an industrial civilisation to an ecological civilisation has produced a new eco-minded meaning of economic growth, which has served to 'open-up' a new range of low-pollution policy options in China, while 'closing-off' the high-pollution options. The gradual redefinition of economic growth, a task principally undertaken by China's political leaders, in other words, has produced new boundaries of permissible national climate policy i.e. what policy responses are considered acceptable and achievable, and what are not.

So while economic analysis argues that China's new low-pollution climate policies are the result of changes in the structure of the Chinese economy, we argue that they are the result of a new meaning of economic growth. This is not to argue that economic analysis is wrong, indeed it is undeniable that structural changes are occurring in China's economy, but rather that it is incomplete because it neglects other perhaps less visible changes that are occurring.

From Imbalanced to Balanced Growth

Ultimately, this section shows that over the period 1978-2016 the dominant *imbalanced* meaning of economic growth (economy over environment) in China was challenged and eventually replaced with the *balanced* meaning of economic growth (environment–economy harmony).

Constructing an industrial civilisation: the problem solver, mark I

In the late 1970s – in the immediate aftermath of the Cultural Revolution – the Chinese economy was close to collapse, the economic gap between China and the developed countries was growing, and more than 250 million people in rural China, which comprised 82% of the total population, were living in poverty – most on less than a dollar a day (Table 1).[2]

In an effort to solve these problems, the 11th Central Committee of the Communist Party of China (CPC) Third Plenary, held in December 1978, launched a new strategy for rapid economic growth.[3] The strategy, operationalised at the plenum under the landmark 'Reform and Opening-up' policy, sought to gradually increase the influence of market forces on the Chinese economy – first in agriculture and later in heavy industry, minerals extraction and energy production – and integrate China with the global economy.[4] President Deng Xiaoping's (1978-89) famous maxim 'to get rich is glorious' appropriately captured the new direction that the Chinese economy would soon take.[5]

Almost 35 years later, by the end of 2011, China's GDP per capita had reached more than $US6400 or 41,908 yuan (Figure 3); it had become the world's second largest economy, behind the US; it was the largest exporter and second largest importer; it ranked first in the world in accumulated foreign exchange reserves at $US3.3 trillion; it was the largest recipient of FDI in the world; and was considered a major driver of the global growth.[6] In addition, rural poverty had declined to approximately 26.9 million, which translates into more than 200 million people being lifted out of poverty since 1978 (Table 1). Other development indicators showed successes such

Table 1: China's Rural Poverty Statistics, 1978-2010

Year	Poverty line (yuan/person)	Rural poor (millions)	Rural Poor (%)
1978	100	250.0	30.7
1985	200	125.0	14.8
1990	300	85.0	9.5
2000	530	65.0	7.1
2001	625	32.1	3.4
2003	637	29.0	3.1
2004	668	26.1	2.8
2010	1,196	26.9	2.8

Table Source: Tony Saich, Governance and Politics of China, 4th Edition (London: Palgrave, 2015), 305

as the rate of infant mortality had declined from 85 per 1,000 in 1975 to 45 in 1990.[7]

In short, China's economic rise from 1978 to 2011, which has rightly been described as a 'growth miracle',[8] successfully solved many of the problems that it set out to solve.

New problems – environment and health

However, this period of economic growth has caused a new suite of problems. In particular, the energy-intensive pattern of China's growth in the early twenty-first century placed immense pressure on the local and global environment through growing GHG emissions and localised air pollution.[9]

Between 2000 and 2012, total coal consumption in China grew from just over 1 gigatonne (GT) annually to more than 4 GT (Figure 4). Oil consumption grew at an annual average rate of nearly 8% (Figure 6).[10] Total GHG emissions grew from just over 4,000 Million metric tons of carbon dioxide equivalent ($MtCO_2e$) to more than 10,000 $MtCO_2e$ (Figure 1), emission from transport from 240 $MtCO_2e$ to more than 600 $MtCO_2e$ (Figure 6). China's total GHG emission in 2011 was more than 10 $GtCO_2e$ (including or excluding land clearing), its closest rival, the US, at just over 6 $GtCO_2e$ (Figure 2). These indicators have led some economists to assert that China's model of economic growth since 1978, and particularly since 2000, has produced 'the strongest, most resource-intensive economic growth the world has ever seen'.[11]

The Intergovernmental Panel on Climate Change (IPCC) Fifth Assessment Report (AR5), released in 2014, finds that China's major cities are particularly vulnerable to human-induced climate change such as coastal flooding and sea level rise.[12] Indeed by 2070, the AR5 asserts, Asia's most exposed cities to coastal flooding, in terms of population and assets, are expected to include Guangzhou and Shanghai.[13] The OECD finds similarly. It ranks Guangzhou first in its 'top-ten' cities most vulnerable to climate related floods and storms, while it ranks Zhanjiang sixth and Shenzhen tenth.[14]

But China's GHG emissions are not just a localised problem. China's own GHG emissions will have a large influence on how much damage is done to China and the rest of the world by climate change.[15] Indeed, strong and effective mitigation in China is a necessary condition for achieving the United Nations goal to hold human-induced increases in temperature to the outer limit of 2°C.[16]

China's reliance on coal-fired power and heavy industries, and the growing number of vehicles in urban areas – the OECD finds that China's car population effectively doubled between 2008 and 2011 from 50 million to 100 million[17] – has led to rising air pollution and haze (e.g. particulate matter – PM2.5 and PM10), to which growing numbers of urban residents are exposed (Table 2).[18] According to the OECD, the number of deaths from air pollution in China increased by about 5% between 2005 and 2010 – from just over 1.2 million deaths to just under 1.3 million deaths, and the cost of these deaths has increased from about $US700 million to more than $US1.2 million.[19] The international medical journal, *The Lancet*, similarly finds with an annual pollution related mortality of roughly 1.21 million in 2010 (median estimate),[20] which in monetary terms, according to economists, equates to damages equivalent to roughly 9.7–13.2% of China's GDP.[21] *The Lancet* further asserts that particulate air pollution in China has led to the loss of about 40 months from the average life expectancy in China, or 7.4 times more premature deaths than in the EU.[22]

In short, the exceptionally large role of fossil fuels (coal and oil in particular) as an energy source in power generation and industry in China, which has been the driving force behind China's spectacular economic growth since 1978, as well as increasing road transport, has resulted in high costs to the environment and human health.[23]

Figure 1: China's GHG emissions, 1990–2011

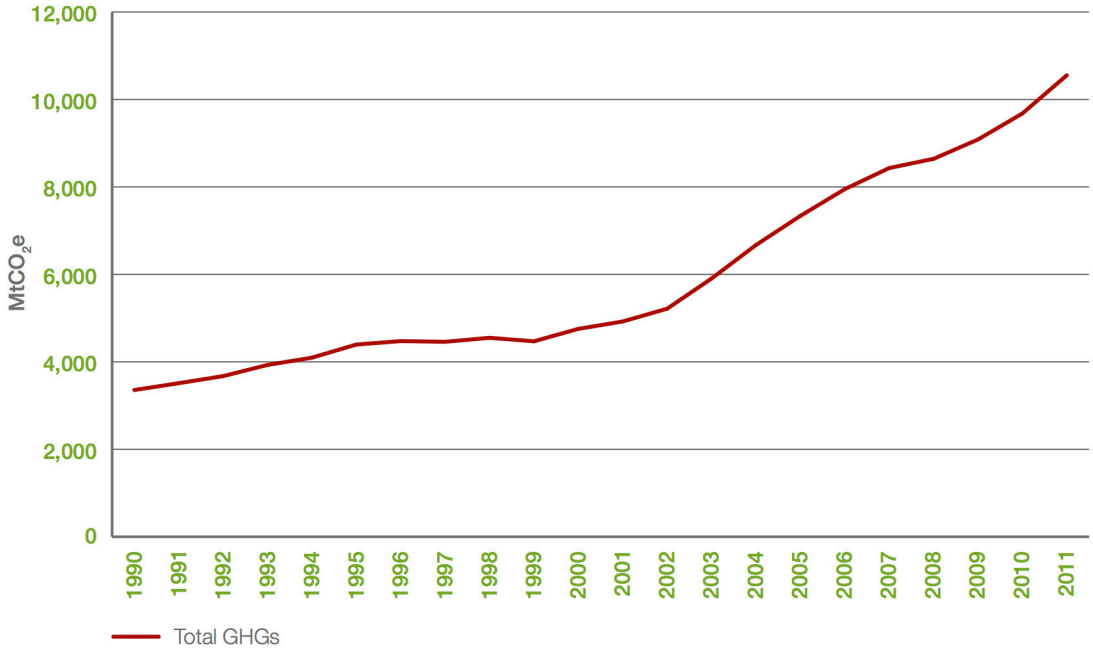


Image Source:World Resources Institute, 2014

Figure 2: World's Top 10 Emitters, 2011

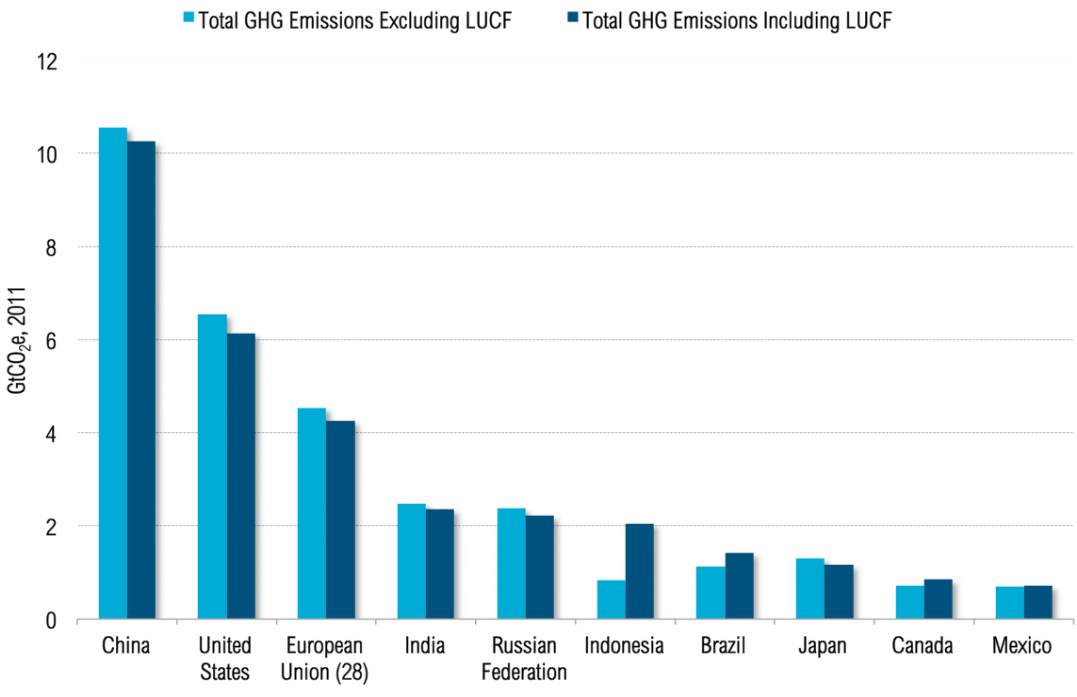


Image source:World Resources Institute

Constructing an ecological civilisation: the problem solver, mark II

The concept of ecological civilisation first appeared in official government documents at the 17th National Congress of the Communist Party (CPC) in October 2007. In his report to the CPC, General Secretary and President, Hu Jintao, proposed China 'build an ecological civilisation and a model of growth and consumption, as well as industries, which are frugal in their use of energy and resources and protect the environment'.[24] This was a watershed moment because it signalled an explicit recognition that China's model of economic growth needed to change. At the conclusion of the CPC, the state-owned China Daily reported that:

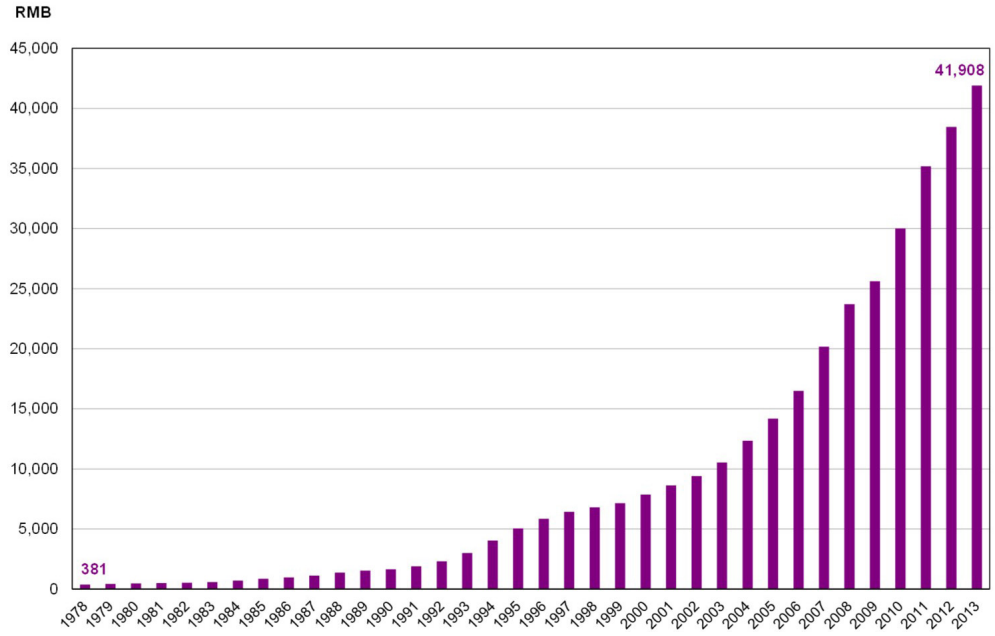
> Ecological civilisation is not just a term to fill a theoretical vacancy, but rather a future-oriented guiding concept based on the perception of the extremely high [environmental] price we have paid for our economic miracle. This concept reflects an important change in the Party's understanding of development. Rather than emphasising economic construction as the core of development as it did in the past, the Party authorities have come to realise that development, if sustainable, must entail a list of elements including the right relationship between man and nature.[25]

As this suggests, the core principle of ecological civilisation is 'tianrenhey', or harmony between human beings and nature, as the *China Daily* continues, 'to consider nature as part of human life, rather than something that humans can exploit without restraint'.[26] The notion of human-nature harmony is a long held, and prominent, Chinese tradition dating back to Confucius's teachings. Indeed, Chinese tradition is sometimes interpreted as a green philosophy.

Fast forward to 2011.

The release of China's 12th Five Year Plan (FYP) in 2011 marked a significant turning point in redefining the meaning of economic growth in China. Under the sub-heading 'transforming growth patters', the document both reflected on the 'tremendous achievements' that have been made since 2007 (11th FYP) towards building an ecological civilisation, and emphasised the importance of continuing along this path. The Plan called for more incentives to develop green and low-carbon systems, promote strategic emerging industries such as electric vehicles, a greater focus on energy conservation and emissions reductions, the establishment of resource-saving and environmentally friendly production and consumption systems, improvement in ecological standards, as well as constructing an environment-friendly society.[27]

Figure 3: China's GDP per capita, 1978-2013



Graphic Source: National Bureau of Statistics, China Statistical Yearbook, 2014; UNICEF. Note: The yuan is the basic unit of the renminbi or 'RMB'

The following year, at the 18th CPC First Plenary[1] in November 2012, the ecological civilisation concept was added to the Party's Constitution and overall development plan:[28] 'The Party must promote all-around economic, political, cultural, social, and ecological progress in accordance with the overall plan for the cause of socialism with Chinese characteristics'.[29] China's diplomatic cables reporting on first plenum stated that, 'The Congress stressed that the development of ecological civilisation should be integrated into all aspects and the whole process of economic development, political development, cultural development, and social development'.[30] Based on the outcome of this plenum, a recent UN report similarly describes ecological civilisation as a 'Five-in-One' model that integrates the more traditional features of development.[31]

The central Communiqué from the CPC's Third Plenary session[2] in November 2013, under new leadership from President Xi Jinping and Premier Li Keqiang, continued to consolidate this concept in the central government's development plans:

> We should accelerate system building to promote ecological progress, improve institutions and mechanisms for developing geographical space, conserving resources and protecting the ecological environment and promoting modernisation featuring harmonious development between Man and Nature.[32]

Indeed President Xi's 2013 remark that 'The pursuit of harmony between human and nature is about having both gold mountains and green mountains', aptly describes China's new balancing act, as well as contrasts sharply with President Deng's famous remark of 1978. [33]

On 25 April 2015, China released the landmark Document entitled, 'Opinions of the Central Committee of the Communist Party of China and the State Council on Further Promoting the Development of Ecological Civilisation'.[34] This four-part Document, which Xu Shaoshi, head of the powerful National Development and Reform Commission, described as a 'breakthrough' moment – presents a detailed explanation of ecological civilisation.[35] The Document not only restates the high-level intentions to clean-up China's economic model – ecological civilisation, it argues, will mean a real transformation of the growth model, which would represent a final break with the 'pollute first, clean up later' policies of the recent past – but it also systematically addresses the obstacles to effective policy to realise this ambition by setting out standards, mechanisms and assessments that aim to improve implementation.[36]

Later in 2015, on 30 November, President Xi addressed the opening ceremony of the Twenty-First Conference of the Parties (COP21) in Paris. Shifting to a balanced growth model was a key message:

> In the past few decades, China has seen rapid economic growth and significant improvement in people's lives. However, this has taken a toll on the environment and resources. Having learned the lesson, China is vigorously making ecological endeavours to promote green, circular [reuse and recycling], and low-carbon growth. [China's suite of low pollution policies] will foster a new pattern of modernisation featuring harmony between man and nature…The Paris conference is not the finishing line, but a new starting point.[37]

The Paris Agreement reached in December 2015 achieved a much bolder temperature target than expected: a ceiling of 2°C warming, plus the pursuit of a safer target of 1.5C. Yet the parties have formally acknowledged that the 185 INDCs submitted for the post-2020 period are well short of what is required to prevent dangerous climate change (warming under INDCs pledges, 2.7-3.5C). The success of the Paris Agreement will therefore turn on how quickly the parties are able to ratchet up their ambition over time.[38] China, as the world's biggest GHG emitter, is critical to the achievability of 1.5C temperature rise and to prevent a 2°C overshoot.

On 16 March 2016, China released its Thirteenth Five Year Plan (13th FYP). This policy blueprint, which will shape China's economic development over the next five years, from 2016 to 2021, has been described at the 'greenest FYP ever'[39] that heralds 'the beginning of a new phase of intensive transition' from a heavily polluted low-end manufacturing towards a lucrative, high-tech, modern country powered by clean energy, with cleaner air, a greater role for markets in allocating scarce re-

1. The first plenary session is used to introduce new leadership, here, Xi Jinping was elected leader (replacing Hu Jintao), and Li Keqiang was elected Premier (replacing Wen Jiabao).
2. The third plenum if often regarded as important because they take place when the new leadership has established power and is ready to focus on presenting an economic and political blueprint.

sources and driven by low-to-zero emission vehicles.[40] Accompanying the FYP, Premier Li Keqiang, explained that 'we need to protect the environment while pursuing development. Over the next five years…We must work to build, through tireless efforts, a Beautiful China where the sky is blue, the land is green, and the water runs clear'.[41]

The increasing centrality of the eco-civilisation concept in the Party's development plans suggests that China is very likely to ratchet up its GHG reduction ambitions over time – a claim consistent with prominent economic analysis.[42]

In short, the eco-civilisation concept, which is underpinned by a new 'balanced' meaning of growth, seeks to solve the many environmental and health problems caused by China's industrial civilisation period – imbalanced growth.

Other key aspects of ecological civilisation

i) Ecological civilisation, the notion of harmony between economic development and nature conservation, sharply contrasts with Western notions of human-nature relations. In practice, for example, it signals a shift from a GDP obsessed development model to one that balances GDP with ecological impact. In the aftermath of the third plenum of the 18th CPC's aftermath, Xinhua News Agency, the official government press agency explained:

> China must find a way different from the industrialisation in the West to build ecological civilisation, which concerns the future of both the nation and the world.

ii) Ecological civilisation provides a new model of industrialisation for other developing countries to follow. This goes to the point that China is not a 'missionary society in the Western sense of the term' – it seeks to induce respect, not conversion. As Xinhua News Agency states:

> China's pursuit of a new development path has great significance as it will set an example for other developing countries and thus help the world transform traditional industrial civilisation into ecological civilisation.

This global agenda need not necessarily be achieved via Western-established institutions such as the UNFCCC.

iii) Ecological civilisation has a strong cultural dimension. As early as 2010, Premier Li Keqiang suggested that inculcating a new understanding of a human-nature relationship in Chinese society will help drive new ecologically-friendly modes of production that embrace environmental protection and green technology that will serve to 'accelerate the transformation of economic development patterns', for example, he explained:

> China's new economic direction requires people to be brave to be the first to practice ecological civilisation and environmental protection and disseminate environmental culture and expand environmental forces so that ecological civilisation will take root in the whole society, and environmental cause will gain stronger momentum on the new [economic] journey.

One scholar describes the process outlined by the Premier in the following way: 'sublimating ecological thoughts into the level of civilisation is intended to comprehensively institutionalise environmental protection, a mission unaccomplished by Western ecological modernists'.

iv) Ecological civilisation has a strong focus on 'interests'. The Chinese leadership justifiably describe the construction an ecological civilisation as being 'in the people's interests' and something that 'directly concerns the people's well-being and livelihood'. Not only is a cleaning up the environment essential in the pursuit of growth, but cheap, abundant, and low-skilled labour is ceasing to be China's competitive advantage. High-end low pollution technology development provides a new competitive edge.

Policies of an Ecological Civilisation

This section provided a basic policy narrative from the electricity generation and urban transport sectors in an effort to show that the rise of China's ecological civilisation, and new meaning of growth, has permitted the establishment of a new range of low-pollution policy options – making them seem natural and necessary – that would have be unthinkable during the industrial civilisation period. Specifically, it examines the period 2011-2016, which covers, we argue, the 'transition years' in which China's political leaders challenged and eventually replaced the dominant *imbalanced* meaning of economic growth, with the *balanced* meaning.

Electricity Generation

China's 12th FYP of 2011 consisted of policy actions that firmly directed China's shift toward a new development model – an ecological civilisation. The Plan included a 16% cut in energy intensity (energy consumed per unit of GDP), 17% cut in carbon intensity (carbon emitted per unit of GDP) and a boost in non-fossil fuel energy sources to 11.4% of primary energy consumption (from 8.3%). There was also an 8% reduction target for sulphur dioxide and chemical oxygen demand and a 10% reduction target for ammonia nitrogen and nitrogen oxides, the latter of which came mainly from China's coal sector. [43] It also identified improvements to greenhouse gas emissions monitoring systems – important for compliance with its carbon intensity target and to prepare China's national GHG inventories. Other environmental economic instruments promoted in the Plan included green credit, green insurance, green trade and green taxation.[44]

In 2013, China launched a $US277 billion investment in improving air quality, instituted regional bans on new coal-fired power plants, invested more in renewable energy than any other country (21% of the global total), and installed nearly 13 gigawatts (GW) of solar photovoltaic projects, about 50% more than any other country installed in a single year.[45]

In March 2014, Premier Li Keqiang delivered his annual 'Report on the Work of the Government' to the 12th National People's Congress.[46] The Premier declared that 'we will declare war against pollution and fight it with the same determination we battled poverty',[47] and he had a message for the electricity generation sector:

> This year, 50,000 small coal-fired furnaces will be shut down, and we will carry out desulphurisation in coal-burning power plants with production capacity of 15 million kilowatts, denitrification in plants with 130 million kilowatts of production capacity, and dust removal in those with 180 million kilowatts of production capacity…We will continue to raise the proportion of electricity generated by non-fossil fuel, develop smart grids and promote balanced distribution of energy resources, encourage the development of wind and solar power and biomass energy, and start construction of a number of hydropower and nuclear power projects.

In November 2014, at the close of the Asia Pacific Economic Cooperation Summit in Beijing, President Xi announced that China would seek to curb emissions as part of a strengthened Sino-US agreement on climate change – previously, China had only agreed to reduce the rate of growth in emissions.[48] Under the new agreement, China would aim to peak CO2 emissions around 2030, with the intention to peak early, and to increase the non-fossil fuel share of all energy to around 20% by 2030.[49]

Also in 2014, according to official Chinese government figures, coal production and consumption in China fell for the first time in 14 years.[50] Coal consumption fell 2.9% to less than 4 billion tonnes of coal (Figure 4), coal imports fell 10.9%, coal-fired power generation fell by around 1.4%, and the use of coal in electricity fell by about 3%.[51]

By contrast, the renewable energy sector was booming (Figure 5). Indeed China's policies to provide financial encouragement for wind and solar have stimulated one of the largest renewable energy programs in the world.[52]

Premier Li's March 2015 Report committed to upgrading coal-burning power plants to achieve 'ultra-low emissions' as well as 'striving for zero-growth in the consumption of coal in key areas of the country', and the reduction of CO_2 intensity by at least 3.1% in 2015.[53] He also flagged future policy changes including a new environmental protection tax, stricter enforcement of environmental laws and regulations, and heavier penalties on those guilty of creating illegal emissions.

Figure 4: Total coal consumption in China, 1990–2014

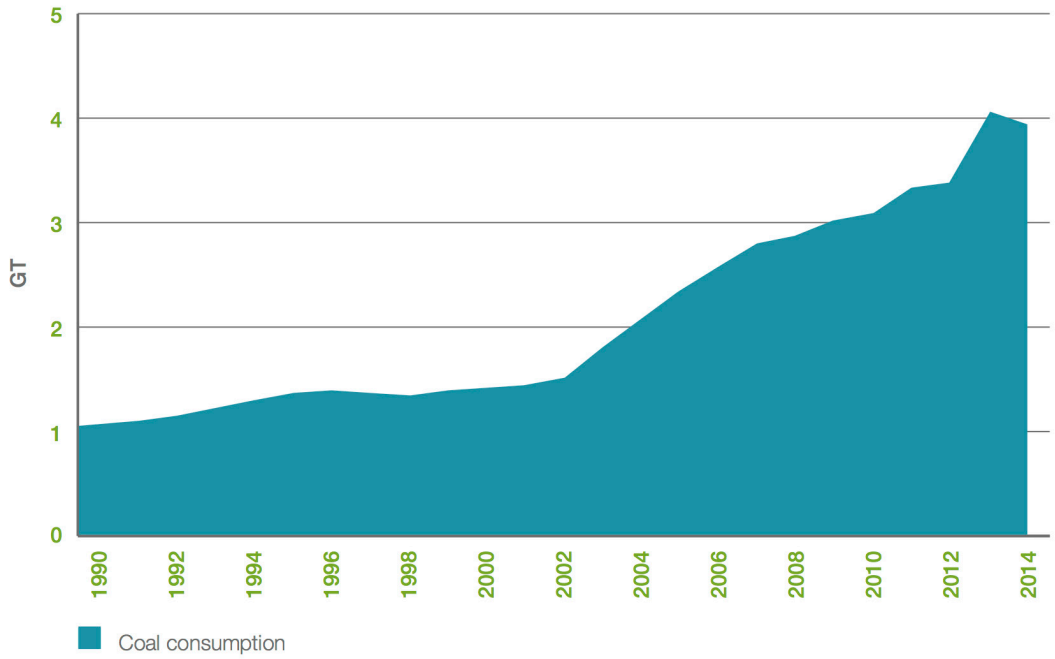


Image Source: National Bureau of Statistics (China) 2015 in Stern and Green; BP (2015), and Ross Garnaut (2015) find similarly

Figure 5: Renewable energy growth in major economies

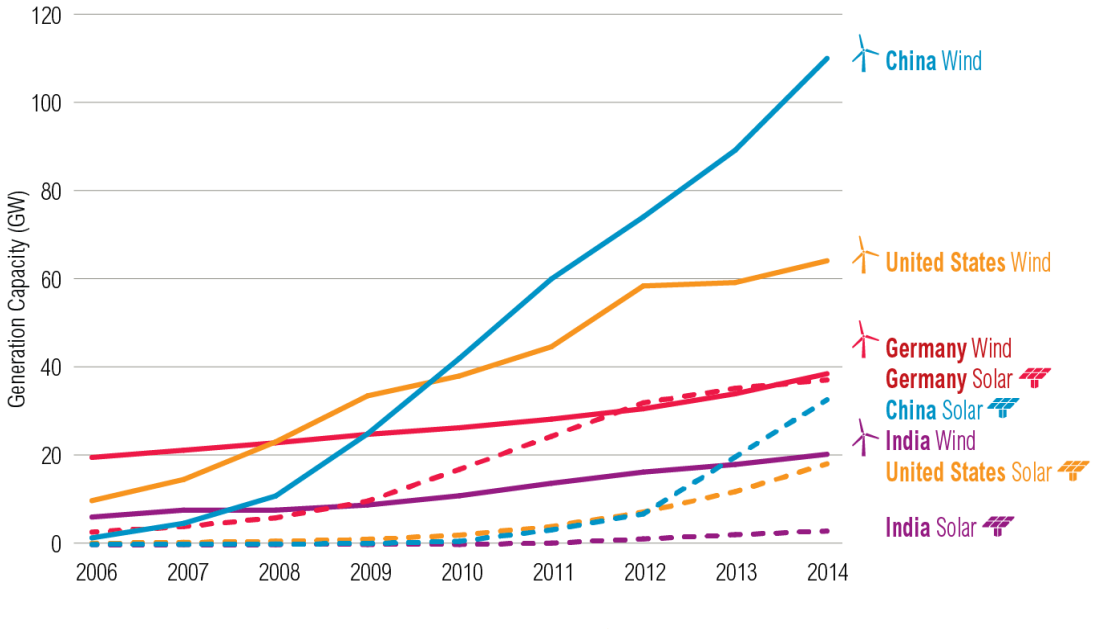


Image Source: World Resources Institute 2015

On 30 June 2015, China submitted its Intended Nationally Determined Contribution (INDC) to the UNFCCC. It begins by explaining that industrialisation based on fossil fuel, which has been the driving force behind climate change, 'poses a huge challenge to the survival and development of the human race'.[54] It then outlines a suite of policy actions that China has taken to 'promote green and low-carbon development as important components of the ecological civilisation processes' in an effort to mitigate this risk:

- Carbon dioxide emissions per unit of GDP is 33.8% lower than the 2005 level;
- The share of non-fossil fuels in primary energy consumption is 11.2%;
- The installed capacity of hydro power is 300 gigawatts (2.57 times of that for 2005);
- The installed capacity of on-grid wind power is 95.81 gigawatts (90 times of that for 2005);
- The installed capacity of solar power is 28.05 gigawatts (400 times of that for 2005); and
- The installed capacity of nuclear power is 19.88 gigawatts (2.9 times of that for 2005).

China's INDC also looks to the future, explaining:

> China has identified transforming the economic development pattern, constructing ecological civilisation and holding to a green, low-carbon and recycled development path as its policy orientation…Resource conservation and environmental protection have become the cardinal national policy as well as the transformation of energy production and consumption.[55]

Which includes the following actions by 2030:

- To achieve the peaking of CO2 emissions around 2030, and making best efforts to peak early;
- To lower carbon dioxide emissions per unit of GDP by 60% to 65% from the 2005 level;
- To increase the share of non-fossil fuels in primary energy consumption to around 20%.

On 25 September, while visiting the US, President Xi announced that a nation-wide emissions trading scheme would be up-and-running in 2017.[56] It would cover power generation, steel, cement and other key industrial sectors. President Xi would also mention the ecological civilisation concept directly, which was the first time it had been expressed in a US-China document:

> China is making great efforts to advance ecological civilisation and promote green, low-carbon, climate resilient and sustainable development through accelerating institutional innovation and enhancing policies and actions.[58]

On 2 January 2016, China's National Energy Administration (NEA) announced that more than 1000 existing coal mines will be closed over the coming year, reducing total coal production by 70 million tonnes, and it will not approve any new coal mines for the coming three years. Analysts have pointed out this is the first time China has put a ban on the opening of new mines.[60]

Economic analysis has continued to chart the decline in coal production and consumption in China since 2014. For instance, in the first quarter of 2015 coal production fell 3.5% year-on-year, and imports fell 45%, suggesting that coal consumption overall fell by around 4-5% year-on-year.[61]

China's 13th FYP of 2016, the 'greenest FYP plan ever', revealed initiatives to reduce emissions from coal burning industries, bolster cleaner and more efficient use of coal, support for wind, solar and bio power sectors, and increase the proportion of clean energy.[62]

Urban Transport[3]

Since 2011 in particular, China seems to be increasingly focused on ensuring that its urban transportation reflects its new eco-minded understanding of economic growth and development.

China's 12th FYP of 2011 included tougher policies for reducing energy consumption and emissions from road transport, especially through improvements in the efficiency of combustion engine vehicles.[63] Plans were also outlined to expand urban rail networks in Beijing, Shanghai, Guangzhou and Shenzhen, among many other cities.[64] It also gave high priority to extend China's high-speed railway (HSR) network, known as gaotie, to 28,000 miles (45,000 km) by 2015, connecting every city with a population of at least 500,000, and allocated 700

[3] We include High Speed Rail (HSR) in our definition of 'Urban Transport' because this method of transport connects China's urban centres.

billion yuan annually towards this endeavour.[65]

By 2013 nine in ten battery-powered bikes (or 'e-bikes') sold worldwide were sold in China,[66] and it had developed an extensive HSR network that connected more than 100 cities and carried more than 2 million passengers a day, which was about one-third of the total number of rail passengers in China.[67]

In March 2014, Premier Li Keqiang's Report explained that China's old growth model of 'inefficient and blind development' had delivered negative consequences for the urban environment and needed to change. He proposed 'forceful measures' to resolve this problem, including:[68]

> Full implementation of the plan for preventing and controlling air pollution, with the focus on mega cities and regions with frequent occurrence of smog - starting by reducing PM10 and PM2.5 emissions by improving the industrial structure, raising energy efficiency, and reducing vehicle exhaust emissions.

Soon after, China's unveiled its first official plan on urbanisation. One of the core principles set by the Plan was to 'integrate ecological civilisation into the entire urbanisation process' in order to 'steer the country's urbanisation onto an environmentally friendly path' by 2020.[69]

In late 2014, the Beijing Electric Vehicle Company announced that sales revenue of electric cars had jumped 12 times from 2013, to 65.15 million yuan.[70] Also in 2014, daily ridership on China's HSR network continued to show strong growth hitting 2.49 million, double the number of passengers on domestic flights.

The Premier's March 2015 Report continued to endorse the idea of a new eco-minded approach to transportation and urbanisation:

> We will work to achieve breakthroughs in promoting a new type of urbanisation. We will ensure the effective governance of urban maladies such as pollution and traffic congestion to make transportation more convenient and improve the environment for urban living. We will promote the use of new-energy vehicles, reduce vehicle exhaust emissions, raise the national production standards for and improve the quality of fuel. This year we will remove from the roads all high-emission commercial vehicles registered before the end of 2005.[71]

In the Report, the Premier also foretold of a coming environmental protection tax, stricter enforcement of environmental laws, and harsher punishment for those found guilty of producing illegal smog emissions.[72]

Also in March, China's Minister of Transport, Yang Chuantang, delivered a speech in which he stressed that the work of transport sector 'must accurately grasp the strategic task of promoting a new-type of urbanisation' as well as 'clearly seize the hard task of striving to build an ecological civilisation focus'.[73]

Later in 2014 the government announced plans to accelerate the rollout of electric vehicles.[74] This included plans for 1 million 'green cars' to hit the domestic market by 2020, and by 2025, the market share of green cars to jump to 80%. To incentivise on-the-ground change, local governments were directed to ensure that more than 30% of the vehicles in their order list are fired by new energy. Provincial governments, which deviate from the new norms, it was explained, risked losing subsidies on fuel and operating expenses.[75]

China INDC of June 2015 placed a strong emphasis on the transport sector, for example:

- to develop a green and low-carbon transportation system, optimising means of transportation, properly allocating public transport resources in cities, giving priority to the development of public transportation and encouraging the development and use of low-carbon and environment-friendly means of transport, such as new energy vehicle and vessel;
- to improve the quality of gasoline and to promote new types of alternative fuels;
- to promote the development of dedicated transport system for pedestrians and bicycles in cities and to advocate green travel and;
- to accelerate the development of smart transport and green freight transport.

These eco-focused diplomatic overtures in the UNFCCC were also evident in the US-China joint presidential statement of September 2015:

Figure 6: China's total oil consumption (all sectors) and CO_2 emissions from transport sector

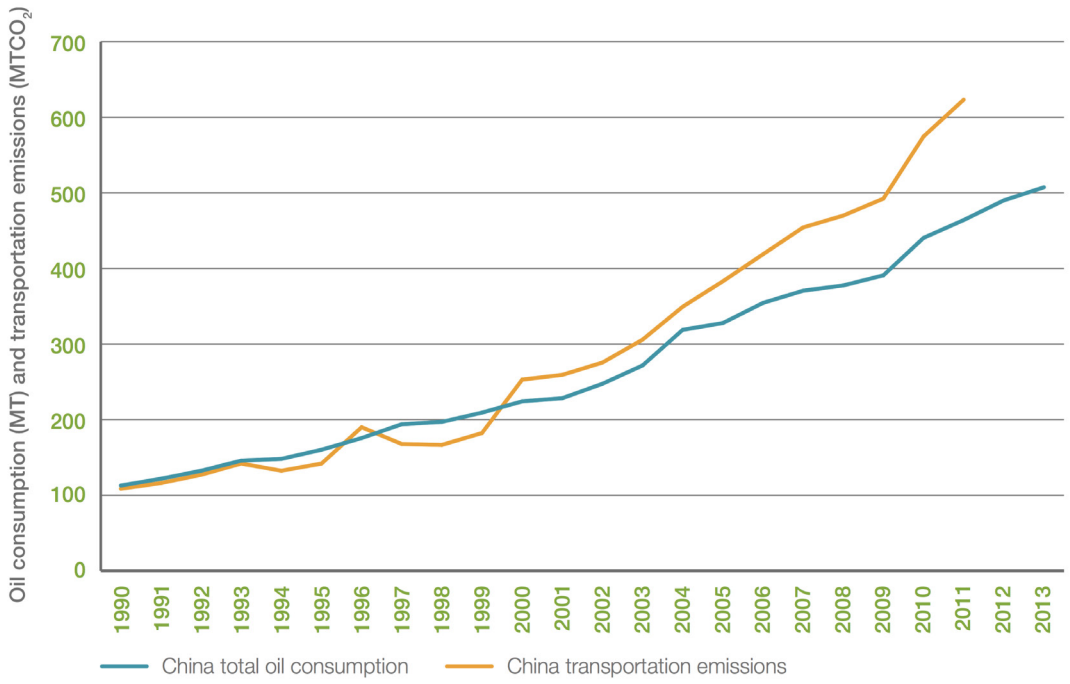


Image Source: British Petroleum, 2014 (Oil consumption data); World Resources Institute, 2014 (CO_2 from transport data)

> China commits to promote low carbon transportation, with the share of public transport in motorised travel reaching 30% in big-and medium-sized cities by 2020. It will finalise next-stage fuel efficiency standards for heavy-duty vehicles in 2016 and implement them in 2019.[76]

Meanwhile, also in September, one of China's largest state-owned automakers announced that it would build 'e-cars' in California's Silicon Valley in partnership US electric-car start-up Atieva. In December, Faraday Future, an electric car venture with the backing from Chinese billionaire, Yeuting Jia, announced plans to invest $US1 billion to build its first manufacturing facility in Las Vegas to make green 'cars of the future'.[77] According to figures by China's Association of Automobile Manufacturers, sales of new energy cars in China surged 220% year-on-year to 20,477 units in the first half of 2015, including 11,177 electric cars.[78]

Further, in the first half of 2015, sales in electric buses in China reached almost 20,000. This is significant because only 27,000 sales were recorded throughout the year 2014, which was up 160% from 2013. It is expected that China will sell 154,000 electric buses in 2020, which means new electric public buses added in 2020 will make up 70% of new public buses added that year.[79]

Plans to expand rail were also announced. In part to reduce traffic congestion and air pollution as well as cater for growing demand, in April, Yang Xuhui, the Beijing's top economic planner, released a guideline designed to attract more funds from private sources to grow the subway.[80] There are now 18 lines covering a total distance of 527 kilometres in Beijing. This is expected to expand to 1000 kilometres by 2020. It is also expected that HSR in China should capture almost one-third of the global market by 2020 and 50% by 2025.[81]

Looking forward, on 7 January 2016, China's Transport Ministry described its plan as follows:

> The nation's transportation industry will thoroughly implement the concept of ecological civilisation. Green represents the people's hope for a better life…the traditional development mode of high input, high consumption, and high pollution has been unsustainable. We must unswervingly push forward with green transportation construction – including

developing low energy consumption technology, strengthening rail and bus transit construction, and promoting new energy vehicles and other low carbon transport equipment [and many more].[82]

China's 13th FYP of March 2016, accompanied by the Premier's Annual Report forecast that China will 'strive for major progress in the control and prevention of air pollution and see to it that the air quality of cities at and above the prefectural level is good or excellent for 80% of the year'.[83] The Premier also indicated that the government would reduce factory emissions of particulate matter (PM2.5) - a major cause of air pollution - by 25%. This was the first time in China's history that a specific PM2.5 target has been included in a FYP.[84] The Premier foretold of this change in his 2014 address.

Fast-tracking China's Ecological Civilisation

This section identifies some of the key hurdles that if eliminated, will permit China to fast-track its efforts to construct an ecological civilisation, and thus strengthen its GHG mitigation ambitions under the Paris Agreement.

Electricity Generation

i) China could expand resource taxes, particularly on coal, to reflect the associated health and environmental costs. At present coal is very lightly taxed. This would not only help to secure a possibility to reach the aspirational 1.5C goal, but it would also deliver increased tax revenue for China's central government, and perhaps reduce the need for ad hoc local fees and charges.[85]

Table 2: Comparing WHO particulate recommendations against China's urban air pollution, 2014

WHO recommendations	not >10 ug/m3 PM 2.5	not >20 ug/m3 PM 10
Cities in China more than five-times above WHO recommendations		
Anyang	50	109
Beijing	56	121
Hefei	53	115
Jining	53	116
Jinan	54	117
Kaifeng	51	111
Lanzhou	71	155
Nanjing	52	114
Urumqi	61	133
Yan'an	55	120
Weinan	51	112
Wuhan	50	108
Xining	57	124
Xi'an	58	126
Zhengzhou	51	111
Zibo	51	110

Source: List compiled by authors from 'Ambient air pollution database, by Country and City', World Health Organisation, 2014.

ii) China's nation-wide ETS should be up-and-running in 2017. This market mechanism will potentially accelerate the adoption of cleaner sources of energy such as renewable energy and realise Beijing's aspirational pledge of peaking GHG emissions in 2030 or earlier.[87] However, much will depend on just how the Chinese system is designed, how stringent it is, and whether it can be at some point linked together with other international cap-and-trade systems.

iii) The chances of limiting warming to the 1.5C goal would be greatly enhanced if China were to implement deeper and more comprehensive low and zero emissions infrastructure financing and institutional reform. While China's is already playing a significant role in financing renewable energy technology, and it is becoming increasingly cost competitive with high carbon alternatives, recommendation proposed by the UNEP explain that this could be enhanced by establishing a green financial system in China, spanning: specialised investment institutions, fiscal and financial policy support, financial infrastructure, and legal infrastructure.[88]

Urban Transport

i) China could consider establishing congestion charges ('smog tax') for vehicles in major cities. Motorists contribute to road damage, emit harmful pollutants, noise and vibrations and cause delays for others. Yet these costs, which are imposed on all city dwellers, are not fully paid for by motorists. A congestion charge is a way to put such costs on drivers and ultimately lead to less pollution and health costs to the broader community.[89] In May 2016 it was announced that Beijing has worked out preliminarily policies on congestion charge for vehicles.[86]

ii) While the increasing manufacture and use of electric vehicles in China is encouraging, authorities have the formidable task of providing standardised battery charging posts and batteries. At present, it's like mobile phones – certain charging plugs only work with certain batteries and phones. Standardisation would likely hasten the uptake of electric vehicles usage.

iii.) China could consider implementing policies to encourage urban populations to return to traditional peddle powered bicycle travel and electric bicycles. In just a decade the e-bike population in China has grown from near zero to more than 150 million in 2015.[90] However, bus-lanes and roads have taken over bike lanes. In Beijing, for example, if electric bicycles could recover some of the usage lost by bicycles to cars, the effect on the city's notorious air quality problems (not to mention traffic and parking issues) would be enormous.

Conclusion

This briefing paper suggests that China's post-Mao economic history can be divided into two major blocs. Between 1978 and 2011, China's economic decision-making was dominated by the idea of constructing an industrial civilisation. It was a spectacular success. But it also produced immense environmental and health problems. The paper tentatively speculates that China's decision-making between 2016 and 2050, the next 35 years or so, will be dominated by the idea of constructing an ecological civilisation – COP 21 as 'a new starting point'. Success is not assured, but all signs are positive. We also showed that bridging this period, 2011–2016, were the 'transition years'. In this period, China's leadership sought to redefine the meaning of economic growth to make it more sympathetic to environmental concerns – to ensure harmony, or 'tianrenhey', between humans and nature. Redefining the meaning of economic growth in these years served to make a new range of eco-minded policies seem natural and necessary, while excluding the high pollution policies of the past. This new meaning of growth suggests that China will likely ratchet up its climate change mitigation ambitions over time.

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