



TURNING THE TITANIC

China is Within Reach of Showing Global Leadership at COP 26

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Like the Titanic ocean liner in 1912, which sank because it was going too fast and failed to avoid an iceberg, countries today are racing their dirty economies too fast, and turning to renewable energy too slowly to avert climate disaster. Just as it was for that ill-fated ship, the outcome for the good ship Earth will also be determined by leadership.

China today captains the world's leading greenhouse gas-emitting economy, though it emits less per capita than many others such as the USA. China supports the Paris Agreement and will meet its pledge to reach peak emissions by 2030. However, the current Paris pledges still fall far short of what is needed. The world is steaming merrily forward at a rate that will

increase average global temperatures by around three degrees Celsius on average since pre-industrial levels. Just to illustrate, imagine a worldwide increase in average surface temperatures from roughly 14 °C (± 1) to about 17 °C (± 1) by 2100.¹ That is big.

China has made impressive progress in curbing growth in its emissions and turning to renewables, and has promised to set itself a higher goal for 2030 at this year's COP 26. Developing countries' emissions will continue to rise for years thus the example China sets this year will be key. Real leadership, pledging to peak its emissions substantially sooner and turn to renewables even faster, would raise the bar for the rest of the world. It would demonstrate to other developing countries that sustainable, vigorous human development and emissions reductions are not in conflict. It would also demonstrate a rising great power's good global citizenry.

Where China stands now

In November 2014 China and the USA together announced their intended pledges for the upcoming Paris climate conference, COP 21. China would hold annual coal consumption below 4.2 billion tonnes, peaking by 2020. China's overall CO₂ emissions would peak no later than 2030 and the share of non-fossil fuels in its overall energy consumption would be increased to around 20% by 2030. Carbon intensity (CO₂ emissions per unit of GDP), would

decline 60 to 65% by 2030 compared to 2005. It also pledged to increase forest stock by 45,000 km². Importantly, China later went on to pledge to launch a national carbon market in 2017.

Critics immediately cried foul, claiming that these targets were essentially China's existing new energy policy aimed at curbing domestic air pollution, not at curbing climate change. However, we have one shared atmosphere and China's initial pledge showed considerable ambition.

COP 25 in 2019 was less momentous than 2020's COP 26 hopefully will be. Under the Paris Agreement of 2015, new targets are set by member parties every five years, thus in 2020. COP 25 failed to agree on guidance for market and non-market mechanisms and many decried the lack of substantial outcomes and weak language. China received a great deal of negative publicity surrounding the event for its coal production and coal-fired electricity plants, discussed below.

China is on track to keep its pledges, expected to hold coal consumption below four billion tons of coal a year and to reach peak CO₂ emissions well before 2030. But the real question is: *What will China pledge in 2020?* There is a real opportunity here for China, not an easy reach but within its reach, to truly impress and be a leader in Paris with its new targets this November.

China is now the world's biggest emitter of greenhouse gases

In recent years China has become the greatest emitter of carbon, accounting for 28% of carbon emissions in 2018 or about 10bn GtCO₂/year, compared to the USA's 15%.² Put simply, while in recent decades the CO₂ emissions per year of the OECD countries, including the USA and Japan, and of Russia, have been roughly stable or even declining a little of late, the emissions of China in particular have grown hugely, especially since 2003. Emissions from the rest of the world, including India, have also been growing markedly. Globally, total carbon emissions exceed 35bn GtCO₂/year and emissions of all global greenhouse gases over 50 GtCO₂/year. There needs to be a reduction to zero by 2050 to hold warming to plus 1.5 degrees.³

In 2010 China began changing the structure of its energy consumption. While most of China's energy still comes from coal it has capped coal in absolute terms (see below) and increased all other fuel sources including oil and natural gas which are cleaner than coal, but with the largest increase in renewables and sizeable increases in hydro-electric and nuclear-electric.

Like most countries, China's initial 2015 pledge is not consistent with the target of the Paris Agreement. China's overall emissions need to peak soon and then rapidly decline for it to be considered a leader.⁴

China's domestic air pollution

Western media made a huge deal about China's pollution on the occasion of the Beijing Olympic Games in 2008, despite the Chinese government's successful delivery of blue sky and white clouds during the Games – accomplished by halting factories and reducing traffic.

Public discontent with air pollution in China has been intense for over a decade and the central government's response has been correspondingly dramatic. With the 2013 National Law on Air Pollution, air quality began to quickly improve. It helped that state-owned companies are the biggest emitters as they are easiest for to control. A cap was imposed on coal use, with some urban areas obliged to halve coal use by 2018.⁵

From 2013 to 2016, the levels of the very small, most dangerous air born particles dropped by a quarter in some places.⁶ By 2017, Greenpeace East Asia found the levels of small particles were down again by over half in Beijing, comparing the last quarter of 2017 to 2016. In 25 other cities across northern China small particle pollution levels were on average one third lower in just that year alone. Further measures continued to be introduced.^{7 8}

The black elephant

Like every industrialization in human history so far, China's has also been coal-fired. Five huge coal rail

lines now crisscross the country, exclusively transporting coal to hundreds of coal-fired electricity generating stations. Thanks to China's unprecedented economic expansion for four decades, it is now burning half the world's coal. However, the country managed to peak its consumption early, at close to 4.2bn tons in 2013.⁹

The energy sector accounts for, globally, about 40% of emissions of CO₂ and other harmful greenhouse gases. Coal currently amounts to 38% of that electricity generation worldwide and is particularly carbon-intensive. Germany, one of the world's biggest users of coal, has agreed to stop by 2038 and eight other European Union countries have announced that they will put an end to coal use by 2030. Chile has pledged to close all of its coal-fired power stations by 2040.¹⁰

Though there was a slight uptick in 2017 and 2018, coal's share of Chinese energy production was reduced from 70% to 58 or 59% in just eight years (59% in 2017) and the plan is to continue to steadily decrease that figure. Coal mining capacity during this period was reduced by about 20%.¹¹

Today, 100% of increased electricity demand in China is met from increased capacity of renewable power sources and this will be sustained. However, absolutely reducing coal consumption and overall fossil fuel consumption is still a challenge and a gradual process. Unlike the majority of developed countries, China does not have enough natural gas and oil to replace coal. While China does not use a

term like ‘clean coal’ it is advanced in deploying supercritical and ultra-supercritical coal plants as well as designing and applying technologies for coal gasification combined cycle (IGCC) plants. These new technologies are considerably cleaner per unit of energy than regular coal.

Forced closures of hundreds of older coal-fired electricity generation plants has been accompanied by construction of new, more efficient plants – attracting much criticism of China for ‘continuing to invest in coal’. However, investment in coal was badly needed so that, as of this year, *every* Chinese coal plant will be more efficient than *every* US coal plant.¹²

Emissions Exports, Per Capita and Cumulative Emissions

China has also been accused of funding hundreds of small, medium and large coal plants around the world as part of its worldwide Belt and Road infrastructure investment program. China maintains that it should not interfere in the policy-decisions and governance of other countries. Indeed, there is sympathy in China for poorer countries that need more electricity but face pressure from rich countries to forgo the same chance rich countries themselves used to climb the development ladder. Others such as Australia also continue to finance coal projects abroad (3/4 are financed from non-Chinese sources). Nonetheless, China might do well to adjust this stance.

China's per capita emissions are much lower than the USA's and still a little lower than Europe's. In addition, fully 15% of China's net emissions are produced manufacturing goods for export. China's carbon emissions per capita are far less than half those of the USA, and when adjusted for place of consumption, considerably lower than the EU's.¹³

China must nonetheless take responsibility for all of its emissions. The real problem is likely to emerge elsewhere in the future as countries with carbon cap-and-trade schemes struggle to prevent corporations from moving production to countries without such caps.

China's cumulative, historical emissions are also still a great deal less than those of the USA or the EU, which industrialized first.¹⁴ While China's annual emissions are now the greatest, this is relatively recent and mainly because China's population is so large.

Renewables

China today is by far the world's biggest producer of renewable energy. At the start of 2020, China's electricity generation capacity had reached 2000 GW (billion watts), of which 18% are hydropower, 10.5% wind, 10% solar and, perhaps most surprisingly, over 1% from biomass (on-grid). China's wind power capacity quadrupled in the four years to 2019 while solar power tripled in the same period. This nearly 800 GW of renewable electrical energy capacity out

of a total of 2000, almost 40% of China's electricity produced from renewables in 2020, is a staggering achievement. China now produces one third of the world's wind power and one fourth of the world's solar power.

Plans are to steadily increase the share of its energy generated using hydro, wind, solar, fission, biomass and geothermal in the period 2020 to 2030. However, the rate of reduction in the use of coal is less than might be expected as so much of the new power generation capacity added goes to meet China's growing demand for electricity.

Wind and solar power are now so well developed in China that they are no longer expected to need subsidies to compete. Indeed, this would lead to subsidizing most of the electricity sector and the subsidies now have to be withdrawn.

Hydro power projects continue to be built, including on the Mekong River (the 'Lancang') and in neighboring Central Asia, especially Tajikistan which has huge hydro potential.

To quote the Center for American Progress: "In reality, China's energy economy is a massive ship that cannot turn on a dime. The shift toward renewables is happening: China's Paris commitment includes a promise to install 800 gigawatts to 1,000 gigawatts of new renewable capacity by 2030, an amount equivalent to the capacity of the entire U.S. electricity system."¹⁵

China Has Established the World's Largest Carbon Market

In 2017, China fulfilled its pledge to launch such a national carbon market. Initially for electricity generation, it caps power generation emissions at 3.5 GtCO₂/year, twice the size of Europe's cap and trade market and equivalent to about a tenth of global CO₂ emissions. China plans to gradually increase the scheme to cover almost all its emissions.

In reality, the Chinese carbon market still does not have much traction. Prices are too low and limits too high to have yet had a noticeable effect on emissions. However, 2020 is the first year the system is supposed to become effective so time will tell if it will acquire sufficient bite.

Electric Automobiles

China is also the world leader in electric vehicles. While much of the power used to charge them is still generated with coal, electric cars have the potential to enable the transition to a green economy. China's vision is to switch to electric automobiles while simultaneously transitioning to the renewable energy needed for recharging them cleanly.

China began with subsidies to stimulate production and purchase of electric vehicles. Shenzhen, a huge city opposite Hong Kong, is now in its ninth year of requiring all taxi cabs to be entirely electric powered.

In many cities the majority of motorbikes are electric with sales growing by 8-9% per year. ¹⁶

Sales of electric cars in China are now well above 1 million per year. Initially stimulated with generous government subsidies of as much as \$6,000 to buy an electric sedan, these subsidies are already being phased out in favor of imposing industry targets. Beginning in 2020, car manufacturers must sell passenger cars averaging 42 mpg or more or buy credits from other companies to offset the deficit. In addition, beginning in 2020 car manufacturers must sell at least 12% new energy vehicles per year (electric, hybrid or hydrogen), with the target rising about 2% annually. Failing to meet the target can result in withdrawal of a company's right to sell automobiles in China.

Fission and Fusion

Nuclear fission already generates 14% of the world's electricity and it would be higher were so many people were not uncomfortable producing radiation instead of CO₂. Fusion power is an even higher-density energy source than conventional fission and much cleaner and safer.

The private sector has recently begun showing interest in fusion power. Both Amazon and Microsoft are working with Canada's General Fusion, a fusion power start-up. Microsoft is also working with Google on another fusion research project. Lockheed Martin is trying to develop compact fusion reactors.¹⁷

However, the private sector alone cannot muster the scale of investment that is needed to develop fusion successfully as it is unable to bear the full weight of risk associated with an individual project.

China continues to be a leader in pursuing this new energy source, contributing 9% of ITER's budget. ITER is a 35-year project worth 20 billion Euros building the world's largest fusion research in France, to become operational in 2025. In addition, China's own EAST reactor reached 100 million degrees Celsius for up to 10 seconds at a time in 2018 – proof of concept. Its new HL-TM reactor in Sichuan Province will become operational in 2020 and is expected to operate at 200 million degrees Celsius, 13 times hotter than the sun.¹⁸

A Global Grid

In 2016, China's State Grid Corporation unveiled an ambitious blueprint for creating a global electricity network – a breathtaking \$50 trillion plan that would eventually build international long-range electricity transmission lines around the globe using ultra-high voltage. The goal is a world grid that can move renewable energy from where it is most easily generated, such as in the Arctic (wind) and the Equatorial (solar) Belt, to where it is most needed.

Initially China will connect its grid with those of its closer neighbors. Very large-scale battery storage of renewable energy is part of the vision, to help balance daylight cycles. The project could only realistically

come on line by 2050 but pilot projects are beginning now and the vision is, well, visionary.¹⁹

Forest Cover

Like most countries, China has decimated the dense forests that once covered most of the land. Cutting was particularly intense in the 18th and 19th centuries.²⁰ Large swathes of the remaining tropical forests in Hainan and Xishuangbanna were cut in the 70s and 80s to make room for fruit, rubber and banana plantations. By 1990, forest cover had been reduced to 12% of the country.

China then began to try to repair some of this damage. In the 20 years to 2010, forest cover was increased to 18%, though of course not always of good quality. Reforestation continued annually and in 2018 alone an area of nearly 70,000 km₂ – the size of Ireland – was reforested. The plan is to increase forest cover further from nearly 22% in 2018 to 23% by 2020 and 26% by 2035.²¹

The most ambitious plan, the ‘Green Wall’ begun in 1978, aims to stop the advancing northern deserts. There have been setbacks and criticisms but the government is persistent, continuing the work each year with the aim of re-growing, by 2050, a forest over 3,000 km long and up to 900 km wide across the north of the country.²² So far, more than 70 billion trees have been planted.

Forest cover is only an accessory to the main challenge of reducing emissions, but increased forests, even of medium quality, can absorb greater stocks of carbon from the atmosphere.

China's Opportunity – Within Reach

China has made great strides in switching from mainly coal to renewable energy and despite its continuing inherited dependence on coal, it deserves some considerable credit for its efforts. Fast-growing economies such as China's enjoy better opportunities to change their energy mix in favor of renewables by building future capacity that is green, rather than having to replace old plants.

China is keen to invest in new renewable energy sectors rather than compete in the old. Electric cars are a good example where China is gaining an edge, in contrast to their brands' lack of international sales of small conventional combustion engine vehicles.

China also enjoys the advantages of a strong central government. While Westerners may be alienated from China's political system, it is able to intervene decisively in the economy through a combination of state corporate governance, laws, rules and subsidies.

For all of these reasons, China is uniquely placed to be a leader in the transition to sustainable energy sources, and the slowing and eventual halting of human-induced climate change. There *is* a risk of China underwhelming the world with its new pledge

at COP 26. This is because strictly meeting targets or exceeding them has been the practice for decades and officials are cautious in setting such targets. In contrast, Western politicians frequently set aspirational targets for which they will not be around to take responsibility.

While China should not adopt Western goal-setting practices, neither should it restrain itself from setting and reaching a target that does not leave itself much slack. It is only such a ‘stretch’ target that will gain China begrudging recognition. With China already on track to peak its emissions earlier than 2030, a good target would be to pledge to peak emissions by 2025. This seems doable, especially as the rate of change to service industries, slowing of GDP growth and lessening of carbon intensity of GDP are all exceeding expectations.

Another doable target, again requiring some extra effort, would be to raise from 20 to 25% the share of renewables in total energy production by 2030. China is already on track to reach more than 20% by 2030. China could also pledge to reduce carbon intensity (CO₂ emissions per unit of GDP), by 65 to 70% by 2030 compared to 2005.

To truly show its leadership, China especially needs to improve its pledge on coal, for instance aiming to halve coal’s share of electricity production between 2010 and 2030, from 80% to 40%.

China is in fact now in a position to pledge to produce the *majority* of its electricity from renewable energy

or nuclear by 2030, just a decade from now. If achieved, this would be an historic accomplishment for nearly one fifth of humanity.

For a middle-income country of China's size to promise and then accomplish such an ambitious emissions-reduction agenda in the next decade would significantly raise the global bar. It would be remembered for generations that China had shown true global leadership and good global citizenry at a time of crisis for all humanity. We could then only wish that on that fateful night in 1912, the Titanic had been captained with equal wisdom.

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- ¹ The pre-eminent source for such data is the IPCC (Inter-governmental Panel on Climate Change), arguably the greatest scientific collaboration in human history. <https://www.ipcc.ch/>. Their data is freely available at www.ipcc-data.ch. Nothing in this article is intended to challenge their data which is the best and represents a virtually irrefutable consensus among thousands of leading scientists. However, to illustrate with actual temperatures what a three degree increase would mean, we have a variety of estimates of the global average surface temperature today (and thus at pre-industrial levels). These estimates of today's average surface temperature around the world vary according to methodology (notable satellite vs. land readings), and range from 14 to 16 degrees. See. https://data.giss.nasa.gov/gistemp/faq/abs_temp.html. See [temperature.global](https://www.earthdata.nasa.gov/global-temperature) for the world's current temperature. On 12 February 2020 it was an estimated 13.83 degrees Celsius based on nearly 70,000 weather stations with a deviation of -0.17°C.
- ² <https://checkyourfact.com/2019/12/18/fact-check-china-global-carbon-emissions-90-percent/> See also the China Power Project for graphs.
- ³ UNEP (2017), Emissions Gap Report.

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- 4 <https://climateactiontracker.org/countries/china/> (as accessed 12 February 2020).
- 5 中华人民共和国大气污染防治法,
<http://www.npc.gov.cn/npc/sjxflfg/201906/daae57a178344d39985dcfc563cd4b9b.shtml>
- 6 PM1.5 which means 2.5 microns in diameter or less. 2.5 microns is 30 times smaller than the width of a human hair.
- 7 <https://www.economist.com/the-economist-explains/2018/01/25/how-china-cut-its-air-pollution>
- 8 大气中国 2019 报告：中国大气污染防治进程（169 个重点城市空气质量综合评估和排名），
<http://huanbao.bjx.com.cn/news/20191128/1024240.shtml>
- 9 <https://www.brookings.edu/2018/01/22/chinas-coal-consumption-has-peaked/>
- 10 <https://news.un.org/en/story/2019/11/1052271>
- 11 <https://www.ceicdata.com/en/indicator/china/coal-consumption>
- 12 <https://www.vox.com/energy-and-environment/2017/5/15/15634538/china-coal-cleaner>
- <https://www.americanprogress.org/issues/green/reports/2017/05/15/432141/everything-think-know-coal-china-wrong/>
- 13 UNEP (2019), Carbon Emissions Gap. They have some very clear graphs.
- 14 Our World in Data (2019), has clear graphs based on data from the Global Carbon Project and Carbon Dioxide Analysis Center. Data is production based (not adjusted for trade), and not including international travel. The USA and Europe are clearly responsible for most of the accumulated carbon in our atmosphere.
- 15 <https://www.americanprogress.org/issues/green/reports/2017/05/15/432141/everything-think-know-coal-china-wrong/>
- 16 <https://www.statista.com/statistics/996087/china-market-growth-of-electric-motorcycles-and-e-scooters/>
- 17 <https://www.chinadialogue.net/article/show/single/en/10042-Private-sector-companies-are-firing-up-the-fusion-race>
- 18 中国国际核聚变能源计划执行中心 / China International Nuclear Fusion Energy Program Execution Center, www.iterchina.cn
- 19 中国建成全球最大的电网到底有多不容易？
<http://www.chinapower.com.cn/moments/20160929/57221.html>
- 20 ELVIN, Mark (2004), The Retreat of the Elephants, Yale U. Press, New Haven and London, ISBN 0-300-10111-2.
- 21 This data is all in the public domain, with little dispute about the numbers. The debate is about the quality and likelihood of success.
- 22 <https://www.motherjones.com/environment/2017/08/china-plants-billions-of-trees-in-the-desert/> 17