

## Climate arsonist Xi Jinping: a carbon-neutral China with a 6% growth rate?

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### “Did Xi just save the world?”<sup>1</sup>

With California and Oregon on fire as Climate Week opened in New York on September 21<sup>st</sup> “climate arsonist” Donald Trump took to the virtual floor of the UN General Assembly and slammed China for its environmental record while ignoring his own efforts to save the coal industry and boost fossil fuel consumption – actions that earned him that sobriquet from Joe Biden. Barely an hour later, in a speech that could not have been more opposite to Trump’s, President Xi Jinping gave hope to despairing environmentalists with his stunning announcement to the UN that

“Humankind can no longer afford to ignore the repeated warnings of Nature and go down the beaten path of extracting resources without investing in conservation, pursuing development at the expense of protection, and exploiting resources without restoration. The Paris Agreement on climate change charts the course for the world to transition to green and low-carbon development. It outlines the minimum steps to be taken to protect the Earth, our shared homeland, and all countries must take decisive steps to honor this Agreement. China will scale up its Intended Nationally Determined Contributions by adopting more vigorous policies and measures. We aim to have CO<sub>2</sub> emissions peak before 2030 and achieve carbon neutrality before 2060.”<sup>2</sup>

Nevertheless, Xi’s pledge raised more questions than it answered. What did he mean by “carbon neutrality”? How can he keep growing China’s emissions for another decade – and then throw his immense coal-fired dreadnaught into reverse to force emissions down to zero in just 30 years? China’s CO<sub>2</sub> emissions are already more than double those of the United States (with GDP just 63% as large) and are currently growing by 4-5% per year.<sup>3</sup> America’s cumulative and per capita emissions still exceed those of China. But after three decades of breakneck growth China is catching up fast. Its annual emissions now account for 30 percent of the global total against 15% for the US, 10% for the EU, and 7% for India, the next biggest emitters.<sup>4</sup> If they continue growing by just 4% p.a. (which would be less than their average growth rate over the past three decades), they will be nearly 50% larger by 2030, triple the

<sup>1</sup> Adam Tooze, *Foreign Policy*, September 25, 2020, <https://foreignpolicy.com/2020/09/25/xi-chinacclimate-change-saved-the-world%E2%80%A8/>.

<sup>2</sup> “Full text: Xi Jinping’s speech at the General Debate of the 75<sup>th</sup> session of the United Nations General Assembly,” CGTN, September 23, 2020, <https://news.cgtn.com/news/2020-09-23/Full-text-Xi-Jinping-s-speech-at-General-Debate-of-UNGA-U07X2dn8Ag/index.html>.

<sup>3</sup> Climate Action Tracker, <https://climateactiontracker.org/countries/china/>, <https://climateactiontracker.org/countries/usa/>; Bloomberg, “China’s carbon dioxide emissions expand fastest since 2011,” June 17, 2020, <https://www.bnnbloomberg.ca/china-s-carbon-dioxide-emissions-expand-fastest-since-2011-1.1451806>; Lauri Myllyvirta, “China’s CO<sub>2</sub> emissions surged past pre-coronavirus levels in May,” *Carbon Brief*, June 29, 2020, <https://www.carbonbrief.org/analysis-chinas-co2-emissions-surged-past-pre-coronavirus-levels-in-may>.

<sup>4</sup> EPA, Global greenhouse gas emissions data, <https://www.epa.gov/ghgemissions/global-greenhouse-gas-emissions-data>.

level of US emissions today – and enough to precipitate climate collapse regardless of what other countries do.

In their race to set the world on fire, Donald Trump is a distant second behind climate arsonist Xi Jinping.

Many observers think Xi is well-positioned to force through the transition to renewables. Thus historian Adam Tooze writes:

“It is precisely because the Communist Party regime is bent on shaping the next century that its leader takes climate change seriously. In the calculus of the regime, Yangtze river floods are, like Hong Kong rights protestors, a threat to its grip on power. The future for Beijing’s authoritarian China Dream looks far more uncertain in a world of runaway global warming.”

Tooze, like many, thinks that Xi will be able to impose his will because he’s boss of the world’s most powerful police state: “No other state, rich or poor, can match the authoritarian capacity of the Chinese regime to repress dissent among the domestic losers of transition.”<sup>5</sup>

### **My argument in brief**

I contend that regardless of his stated intentions, Xi cannot meet this carbon-neutral goal because the Communist Party’s overriding priority since Mao’s day has been to “catch up and overtake the United States” by turning China into the world’s leading superpower. To this end he has no choice but to maximize the growth of the very industries that are driving China’s emissions off the charts, including coal-fired electricity generation, even if this accelerates global warming dooming China and the planet too. Furthermore, I claim that there are technical and political barriers to decarbonizing electricity generation in China. As regards the political barriers, I maintain that Xi cannot systematically enforce his will against theoretically subordinate officials (including those putative coal-based “losers”) because he is not an absolute dictator but rather the *primus inter pares* in a collective ruling class in which power is widely dispersed such that local officials can and often do defy Beijing when it suits their interests. Lastly, I contend that Xi himself is disinclined to force through the transition to renewables even if he could, because this would disrupt and undermine his higher priorities.<sup>6</sup>

### **I. The “hard-to-abate” industries**

Let’s start with what are collectively termed the “hard-to-abate” industries that account for about 40% of global greenhouse gas (GHG) emissions and most of China’s emissions.<sup>7</sup> Xi’s first problem is that China is home to the world’s largest concentration of carbon-intensive hard-to-abate industries like steel, cement etc. Thermal electricity generation (90% coal, 10%

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<sup>5</sup> Adam Tooze, “Welcome to the final battle for the climate,” *Foreign Policy*, October 17, 2020, <https://foreignpolicy.com/2020/10/17/great-power-competition-climate-china-europe-japan/>.

<sup>6</sup> This essay draws on my new book *China’s Engine of Environmental Collapse* (Pluto Press, 2020).

<sup>7</sup> Energy Transition Commission (ETC), *Mission Possible*, Report Summary, (November 2018), [https://www.energy-transitions.org/wp-content/uploads/2020/08/ETC\\_MissionPossible\\_ReportSummary\\_English.pdf](https://www.energy-transitions.org/wp-content/uploads/2020/08/ETC_MissionPossible_ReportSummary_English.pdf).

gas and oil) accounts for around 32% of China's total CO<sub>2</sub> emissions.<sup>8</sup> Thus replacing coal-fired power plants with solar- and wind-powered generators could reduce China's emissions by about a third, a huge gain. But this is the low-hanging fruit of carbon mitigation. Forty-seven percent of China's GHG emissions come from carbon intensive manufacturing and other industries,<sup>9</sup> most of which cannot be decarbonized with current or anticipated technology either *at all* or *in time* to avert runaway global warming and climate collapse. Steel, aluminum, cement, aviation, shipping, chemicals, plastics, textiles and electronics stand out.

**Steel production** requires extreme heat and chemical processes that with current mass production technology can only be done with coal and coke. Every ton of steel emits 1.8 tons of carbon dioxide and steel accounts for about 9% of global CO<sub>2</sub> emissions. China produces more than half, 53%, of the world's steel<sup>10</sup> and this production currently accounts for more than 10% of China's total CO<sub>2</sub> emissions.<sup>11</sup>

Steel industry carbon mitigation efforts to date have largely failed. According to the International Energy Agency (IEA), the carbon intensity of steel has been relatively constant for the past two decades. Engineers have managed to reduce carbon intensity by about 1.3% per year on average since 2010, mainly by improving energy efficiency. But those alone can't achieve the deep emissions cuts the industry needs to make and in any case those gains have been rapidly outstripped by growth.<sup>12</sup> Global steel demand plateaued during 2013-2016 with China's economic slowdown but returned to growth in 2017, growing by 6-8% annually from 2017 to 2019. Thus the IEA concludes that "longer term (post 2030), shifting towards innovative primary production incorporating hydrogen or CCUS [carbon capture utilization and storage] will be required to achieve greater emissions reduction."<sup>13</sup>

What are the prospects for those technologies? There appear to be few if any remaining technical hurdles to producing steel with hydrogen in place of coke and coal. European steelmakers, who lead the world in hydrogen steel technology, already produce some specialty steels with hydrogen in demonstration plants, though the technology has yet to be tried at scale.<sup>14</sup> And the Chinese are jumping into the fray with their usual techno-optimism and synchronized euphoria around a new Party initiative.<sup>15</sup> However, many experts evince

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<sup>8</sup> Zhu Liu, "China carbon emissions report 2015," Sustainability Science Program and Energy Technology Innovation Policy research group, Belfer Center Discussion Paper #2015-02, Harvard Kennedy Center School, Cambridge MA, 2015 (in Chinese), 4, Table 3, <https://www.belfercenter.org/sites/default/files/files/publication/carbon-emissions-report-2015-final-chinese.pdf>.

<sup>9</sup> Ibid.

<sup>10</sup> Global Steel Trade Monitor, Global Steel Report, November 2019, <https://legacy.trade.gov/steel/pdfs/global-monitor-report-2018.pdf>.

<sup>11</sup> China Power Project, How is China managing its greenhouse gas emissions? (Washington D.C.: Center for Strategic & International Studies, 2020), <https://chinapower.csis.org/china-greenhouse-gas-emissions/>.

<sup>12</sup> Christian Hoffmann et al., "Decarbonization challenge for steel," McKinsey, June 3, 2020, <https://www.mckinsey.com/industries/metals-and-mining/our-insights/decarbonization-challenge-for-steel>.

<sup>13</sup> Peter Levi et al., "Iron and steel: more efforts needed," EIA, June 2020, <https://www.iea.org/reports/iron-and-steel>.

<sup>14</sup> Leigh Collins, "'World first' as hydrogen used to power commercial steel production," *Recharge*, April 20, 2020, <https://www.rechargenews.com/transition/-world-first-as-hydrogen-used-to-power-commercial-steel-production/2-1-799308>.

<sup>15</sup> Frank Zhong, "How hydrogen is gaining momentum in the Chinese steel industry," World Steel Association Blog, September 16, 2020, <https://www.worldsteel.org/media-centre/blog/2020/hydrogen-technology-momentum-Chinese-steel-industry.html#.X63syM4CVH8.twitter>.

skepticism about hydrogen over concerns about safety, handling, storage, transportation and fugitive emissions, issues that have dogged this technology for decades.<sup>16</sup>

Apart from those concerns, another daunting problem is that 96% of the world's commercially produced hydrogen is derived from fossil fuels. Of the four methods for commercial production of hydrogen, the only one that does not use fossil fuel is electrolysis, which separates water into its constituent elements (hydrogen and oxygen).<sup>17</sup> This is an electricity-intensive process and the three main electrolyzer technologies are still in their infancy.<sup>18</sup> Scaling up "green hydrogen" steel mills would require construction of a massive infrastructure of industrial-scale electrolyzers along with an enormous expansion of renewable electricity to provide the "immense" amounts of power it's said those electrolyzers and steel mills will require.<sup>19</sup> The International Renewable Energy Agency (IRENA) says that the world will need some 19 exajoules of green hydrogen in the energy system by 2050 to decarbonize industry, transportation and other sectors. That would equal the output of 2,243GW of onshore wind farms or 4,240GW of solar PV. To put that in perspective, in 2018 the world had installed capacity of just 540GW of onshore wind power and 480GW of solar PV – and all of that capacity is used to generate electricity, not green hydrogen.<sup>20</sup>

In short, transitioning to green hydrogen steel is not going to happen overnight, if ever. Bloomberg's New Energy Frontier analysts estimate that the global steel industry could adopt hydrogen for between 10% and 50% of output by mid-century given the right pricing.<sup>21</sup> But that's way too little too and late to meet the IPCC's target of net zero CO<sub>2</sub> emissions by 2050, or even Xi Jinping's target of 2060. As to carbon capture and storage, McKinsey concludes that this is unlikely: "At present, carbon capture and usage remains technologically premature and yet to be proven economically."<sup>22</sup>

**Cement production** emits CO<sub>2</sub> from both high temperature heating and chemical processes. China produces three-quarters of the world's cement, more than the next 19 countries combined, and this accounts for 8% of China's CO<sub>2</sub> emissions.<sup>23</sup> Scientists and engineers are

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<sup>16</sup> Eg. Joseph J. Romm, "The hype about hydrogen," *Issues and Technology*, 20.3 (Spring 2004), <https://issues.org/romm/>; Michael Liebreich, "Liebreich: separating hype from hydrogen – part one: the supply side," *Bloomberg NEF*, October, 2020, <https://about.bnef.com/blog/liebreich-separating-hype-from-hydrogen-part-one-the-supply-side/>; Bloomberg, "China defies Elon Musk's warnings and pushes ahead with hydrogen," November 19, 2020, <https://www.bloomberg.com/news/articles/2020-11-19/china-defies-elon-musk-s-warnings-and-pushes-ahead-with-hydrogen?sref=4KuSK5Q1>.

<sup>17</sup> U.S. Department of Energy, Hydrogen Production: Electrolysis, <https://www.energy.gov/eere/fuelcells/hydrogen-production-electrolysis>.

<sup>18</sup> International Renewable Energy Agency (IRENA), Hydrogen from renewable power (September 2018), 18-30; Patrick Molloy and LeeAnn Baronett, "The truth about hydrogen," Rocky Mountain Institute, August 20, 2019, <https://rmi.org/the-truth-about-hydrogen/>.

<sup>19</sup> Leigh Collins, "A wake-up call on green hydrogen: the amount of wind and solar needed is immense," *Recharge*, March 20, 2020, <https://www.rechargenews.com/transition/a-wake-up-call-on-green-hydrogen-the-amount-of-wind-and-solar-needed-is-immense/2-1-776481>.

<sup>20</sup> Collins, "Wake-up call."

<sup>21</sup> "How hydrogen could solve steel's climate test and hobble coal," Bloomberg NEF, September 2, 2019, <https://about.bnef.com/blog/hydrogen-solve-steels-climate-test-hobble-coal/>.

<sup>22</sup> Hoffman, "Decarbonization." Critics complain that CCUS is just a smoke and mirrors PR scam to keep coal plants in operation. See Lu Guang, "Carbon capture scam," Greenpeace, April 2015, <http://www.greenpeace.org/usa/wp-content/uploads/legacy/Global/usa/planet3/PDFs/Carbon-Capture-Scam.pdf>; Katie Fehrenbacher, "Carbon capture suffers a huge setback as Kemper Plant suspends work," *Green Tech Media*, June 29, 2017, <https://www.greentechmedia.com/articles/read/carbon-capture-suffers-a-huge-setback-as-kemper-plant-suspends-work>. For a list of failed projects see MIT [http://sequstration.mit.edu/tools/projects/index\\_cancelled.html](http://sequstration.mit.edu/tools/projects/index_cancelled.html).

<sup>23</sup> Jocelyn Timperley, "Q&A: Why cement emissions matter for climate change," *Carbon Brief*, September 13, 2018; <https://www.carbonbrief.org/qa-why-cement-emissions-matter-for-climate-change>.

working on technologies to mitigate emissions from cement production. But the few gains in mitigation that have been achieved to date have been outstripped by soaring demand, while hopes for greening cement via “novel cements” and such, have failed to gain commercial viability.<sup>24</sup> Chatham House, the author of a major study on decarbonizing cement concedes that “there’s no silver bullet,” and moreover, when considering alternatives to Portland cement where safety and longevity are top concerns: “New approaches and especially new industry standards require a lot of discussion and testing. For example, it can take decades for a new standard to be approved and implemented in the EU.”<sup>25</sup> We don’t have decades before we *begin* suppressing cement emissions, particularly in an industry that’s growing at 7-10% per year.<sup>26</sup>

A November 2019 OECD paper on greening the steel and cement industries states that while new emissions reduction technologies are being tested, none will be available until at least 2030 (and then would have to be tested, approved and adopted). Thus the author of the report concludes “The most effective way to reduce steel and concrete emissions is to *use them only for necessary applications* in new products, vehicles, and structures” and “maximize recycling”.<sup>27</sup> In other words, suppress their production and ration what we do produce.

**Aluminum production** releases CO<sub>2</sub>, methane, nitrous oxide, hydrocarbons, perfluorocarbons and sulfur hexafluoride. While the industry has reduced emissions in recent decades, a recent study concludes that “the target to cut down carbon emissions up to 50% by 2050 cannot be accomplished by just making policies and regulations, but could only be achieved through *reduced demand for final goods*, and other existing and developing strategies to mitigate carbon emissions.”<sup>28</sup> And that’s just to achieve a 50% reduction, which seems to be the most the industry thinks it can achieve by 2050. Global aluminum output is expected to fall this year to an annual growth rate of “only” 11.5 percent. At this reduced rate, aluminum output (and its emissions) will only double every six and a half years, outstripping the gains of mitigation as it rises. China produces 56% of the world’s aluminum and it has grown at double-digit rates for decades.<sup>29</sup> Again, barring some dramatic breakthrough, the

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<sup>24</sup> Timperley, “Q&A”. The Global Cement and Concrete Association roadmap to decarbonization: “Concrete – the world’s most widely-used material – targets carbon neutrality,” is just a statement of ambitions with no methodology or timetable: <https://gccassociation.org/news/concrete-the-worlds-most-widely-used-material-targets-carbon-neutral-future/>.

<sup>25</sup> Chatham House, Johanna Lehne and Felix Preston, “Making concrete change: innovation in low-carbon cement and concrete,” Chatham House Report, June 13, 2018, <https://www.chathamhouse.org/2018/06/making-concrete-change-innovation-low-carbon-cement-and-concrete>.

<sup>26</sup> “Global cement & concrete market report, 2019”, *Businesswire*, September 12, 2019, <https://www.businesswire.com/news/home/20190919005567/en/Global-Cement-Concrete-Market-Report-2019-Key-Opportunities-Strategies-to-2022---ResearchAndMarkets.com>.

<sup>27</sup> Chris Bataille, “Low and zero emissions in the steel and cement industries,” OECD, November 26, 2019, 5-6, [https://www.oecd.org/greengrowth/GGSD2019\\_IssuePaper\\_CementSteel.pdf](https://www.oecd.org/greengrowth/GGSD2019_IssuePaper_CementSteel.pdf) (my italics).

<sup>28</sup> Meenu Gautam, et al., Chapter 8 – Carbon Footprint of Aluminum Production: Emissions and Mitigation, Environmental Carbon Footprints, *Environmental Carbon Footprints* (Elsevier, 2018), 197-228, <https://doi.org/10.1016/B978-0-12-812849-7.00008-8>.

<sup>29</sup> Liebrich, “Part one”; “Outlook on the worldwide alumina and aluminum production and processing to 2030,” *Businesswire*, May 13, 2020, <https://www.businesswire.com/news/home/20200513005301/en/Outlook-on-the-Worldwide-Alumina-and-Aluminum-Production-and-Processing-Industry-to-2030---Benchmark-Performance-Against-Key-Competitors---ResearchAndMarkets.com>; Andy Home, “The aluminum giant that’s still growing,” *Reuters*, July 20, 2015, <https://www.reuters.com/article/us-aluminium-production-ahome/china-the-aluminum-giant-thats-still-growing-andy-home-idUSKCN0PU21C20150720>.

only feasible means of drastically suppressing this sector's emissions in the near term is to drastically suppress production.

Same with **aviation**. In 2018 China's aircraft emissions accounted for 13% of global aviation emissions though they accounted for just 0.7% of the nation's total CO<sub>2</sub> emissions.<sup>30</sup> However, China's commercial air-travel industry is the fastest growing in the world. From virtually nothing in 1980 it's grown by an average of 13% per year and is now second only to the US. In line with the 12<sup>th</sup> Five Year Plan's stated goal that China should strive to become a "major aerospace and air-travel power,"<sup>31</sup> the government has been spending lavishly to grow this industry, "firmly supporting" leisure air-travel "to enhance people's happiness".<sup>32</sup> Xi Jinping earmarked aerospace and aviation as one of ten strategic industries targeted in his Made in China 2025 initiative and China is also striving to build its own domestic jet airliners to free it from dependence on Boeing and Europe's Airbus Industries and to provide another economic growth driver.<sup>33</sup> At current growth rates China's commercial aviation could quadruple by 2050 in which case its aviation CO<sub>2</sub> emissions could approach 400 million metric tons annually, as compared to 182 million metric tons from the US aviation sector in 2018.<sup>34</sup>

The Aviation Environment Federation warns that growth of the scale expected in China "won't be compatible with achieving net-zero emissions or limiting global warming to 1.5° or 2°C."<sup>35</sup> With aviation, there's just no alternative to kerosene jet fuel. Replacing jet fuel with biofuels as the industry Air Transport Action Group TC proposes<sup>36</sup> would just hasten the obliteration of what's left of the world's tropical forests to grow palm oil for jet fuel while also pitting food production against fuel production.<sup>37</sup> Electric airliners are scheduled to take off only in the pages of sci-fi magazines for decades if not forever. Jet fuel contains 43 times more energy pound for pound than the best current batteries. Battery efficiency is improving but nowhere near fast enough to power commercial airliners in any time frame that matters for climate change.<sup>38</sup>

Thus, the *Guardian's* George Monbiot writes,

"there is no technofix. The growth in aviation and the need to address climate change cannot be reconciled... a 90 percent cut in emissions requires not only that growth stops, but that most of the planes which are flying today are

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<sup>30</sup> International Council on Clean Transportation (ICCT), "CO<sub>2</sub> emissions from commercial aviation, 2018," Fact sheet, September 19, 2019, <https://theicct.org/publications/co2-emissions-commercial-aviation-2018>.

<sup>31</sup> See discussion of this in Smith, *China's Engine*, p. 31.

<sup>32</sup> "Growth of China's tourism sector adds a lot to people's happiness," *People's Daily*, September 26, 2019, <http://en.people.cn/n3/2019/0926/c90000-9618243.html>; "China's international aviation market set to take off," *People's Daily*, October 28, 2019; <http://en.people.cn/n3/2019/1028/c90000-9626915.html>.

<sup>33</sup> China Power, "How is commercial aviation propelling China's economic development?" September 26, 2018, <https://chinapower.csis.org/china-commercial-aviation/>.

<sup>34</sup> Jinglie Yu et al., "China's aircraft-related CO<sub>2</sub> emissions: decomposition analysis, decoupling status, and future trends," *Energy Policy*, 138, March 2020, <https://www.sciencedirect.com/science/article/abs/pii/S0301421519307979>;

<sup>35</sup> Josh Gabbatiss, "Emissions from Chinese aviation 'could quadruple by 2050,'" *Carbon Brief*, January 21, 2020, <https://www.carbonbrief.org/emissions-from-chinese-aviation-could-quadruple-by-2050>.

<sup>36</sup> ATAG, Waypoint 2050 (September 2020), [https://aviationbenefits.org/media/167116/w2050\\_full.pdf](https://aviationbenefits.org/media/167116/w2050_full.pdf).

<sup>37</sup> Maria Mellor, "Biofuels are meant to clean up flying's carbon crisis. They won't," *Wired*, February 12, 2020, <https://www.wired.co.uk/article/biofuels-aviation-carbon-emissions>.

<sup>38</sup> Andrew J. Hawkins, "Electric flight is coming, but the batteries aren't ready," *The Verge*, August 14, 2018, <https://www.theverge.com/2018/8/14/17686706/electric-airplane-flying-car-battery-weight-green-energy-travel>.

grounded. I recognize that this will not be a popular message. But it is hard to see how a different conclusion could be extracted from the available evidence.”<sup>39</sup>

**Shipping** faces similar constraints. Shipping emissions account for about 3% of global CO<sub>2</sub> emissions, about the equivalent of Germany, and shipping to and from China accounts for about 25% of global shipping.<sup>40</sup> There are no battery-powered tankers or container ships on any naval architect’s drawing boards. It’s been proposed that ships be powered by biodiesel as a transitional replacement for bunker fuel until something better, like hydrogen, becomes feasible.<sup>41</sup> But biodiesel is no more an environmentally acceptable substitute for ships than for aircraft. Hydrogen-powered ships might be technically feasible some day but producing enough “green” hydrogen to power the world’s fleets is a long way off, if ever. Looking to 2050, the *Economist* Environmental Editor concludes: “there are no obvious solutions for how to run a global shipping fleet without relying on fossil fuels”.<sup>42</sup> Thus again, the only way to radically suppress those emissions in the here and now is to radically suppress shipping and global trade and haul out the cruise ships.

**Textiles production**, heavily concentrated in China, “is one of the most polluting industries, producing 1.2 billion tonnes of CO<sub>2</sub> equivalent (CO<sub>2</sub>e) per year, which is more emissions than international flights and maritime shipping.”<sup>43</sup> They account for 4% of China’s manufacturing CO<sub>2</sub> emissions.<sup>44</sup> Textile mills also account for a fifth of the world’s industrial water pollution and use some 20,000 chemicals, many of them carcinogenic, and most end up dumped into the environment. Considerable efforts are being made to reduce the pollution and carbon footprint of textiles by promoting more use of natural fibers, less polluting processes of washing, dyeing, finishing, and so on. But the industry is inherently polluting and dominated by petroleum-based synthetics like polyester. Fiercely competitive “fast fashion” manufacturers dominate the industry and this works against costly mitigation and limits organic cottons and such to niche markets. Industry critics say that the only way to reduce pollution from textiles is to “decelerate production”: abolish the needless waste of “trashion

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<sup>39</sup> UN IPCC, “Aviation and the global atmosphere: A special report of the Intergovernmental Panel on Climate Change” (1999); George Monbiot, *Heat: How We Can Stop the Planet Burning* (Cambridge, UK: Penguin, 2007), 174.

<sup>40</sup> Hualong Yang et al., “Trends in CO<sub>2</sub> emissions from China-oriented international marine transportation activities and policy implications,” *Energies*, July 12, 2017, <https://www.mdpi.com/1996-1073/10/7/980>.

<sup>41</sup> ETC, *Mission Possible*, 36.

<sup>42</sup> “Shipping faces uncertain route to zero-carbon future,” *Economist*, September 18, 2019, <https://www.woi.economist.com/shipping-faces-uncertain-route-to-zero-carbon-future/>; Editorial, “The climate issue,” *Economist*, October 19, 2020, <https://view.e.economist.com/?qs=e16eb9fcef65dd0624628cdeab901ad6207ef4ae78adecb4bbfe97c80ba5708ec27e5ffc2da17d15d82a98eee7797088b012f9ee91967a5aee4b686be08ae3f698adf30d58439097aeb248c1a84fb104>; Hualong Yang et al., “Trends in CO<sub>2</sub> emissions from China-oriented international marine transportation activities and policy implications,” *Energies*, July 12, 2017.

<sup>43</sup> Editorial, “The price of fast fashion,” *Nature Climate Change*, January 2, 2018, <https://www.nature.com/articles/s41558-017-0058-9>; Sohail Rana et al. “Carbon Footprint of Textile and Clothing Products,” *Handbook of Sustainable Apparel Production*, S. Muthu ed. (CRC Press, 2015), 141-166, [https://www.researchgate.net/publication/276193965\\_Carbon\\_Footprint\\_of\\_Textile\\_and\\_Clothing\\_Products](https://www.researchgate.net/publication/276193965_Carbon_Footprint_of_Textile_and_Clothing_Products).

<sup>44</sup> Hong Lu and Lynn Price, “China’s industrial carbon dioxide emissions in manufacturing subsectors and selected provinces,” Lawrence Berkeley National Laboratory, September 11, 2014, 8, <https://china.lbl.gov/sites/all/files/lbl-5575e-industrial-co2-emissionsjune-2012.pdf>.

fashion” disposable clothes, and “return to slow fashion, with higher quality garments with longer product life and utilization.”<sup>45</sup>

**Electronics production** accounts for a tiny fraction of global greenhouse gas emissions, less than 1%. But those emissions include high global warming potential molecules (High GWP gasses) that resist mitigation.<sup>46</sup> Electronics emissions result from factory electricity consumption and from industrial processes. Renewable power could conceivably eliminate the former. The latter is the main difficulty. Manufacturers use fluorinated compounds (mostly PFCs), nitrous oxide, and sulfur hexafluoride in producing semiconductor devices, microelectromechanical systems (MEMS), photovoltaic (PV) devices, and displays, which in turn consist of thin-film-transistors (TFTs) for displays and organic light emitting diodes (OLEDs).<sup>47</sup> The amounts are tiny per unit of output but they have a big impact on the climate. Nitrous oxide is nearly 300 times as powerful a greenhouse gas as CO<sub>2</sub> and remains in the atmosphere for more than a hundred years. PFCs and sulfur hexafluoride molecules trap thousands to tens of thousands of times more heat than CO<sub>2</sub> and can remain in the atmosphere for thousands to tens of thousands of years (versus 300-1,000 years for CO<sub>2</sub>).<sup>48</sup>

Though some reductions have been achieved, engineers say that PFCs are “difficult to either remove from the process or abate from the fab [microchip fabricators] emissions stream.”<sup>49</sup> They remain irreplaceable for many uses and abatement progress is slow.<sup>50</sup> In a 2018 study of US electronics manufacturers, the EPA reported that mitigation efforts reduced emissions from 2011-2017 by just 1.9% per year.<sup>51</sup> This in an industry that’s expected to grow by 4.8% per year from 2020 to 2025.<sup>52</sup> Electronics products also contribute massively to the global waste crisis and generate toxic pollution from manufacture to disposal. The Institute of Electronics Engineers reports that “Recycling semiconductor materials at device end-of-life continues to prove difficult, as does the need to produce semiconductor devices using more

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<sup>45</sup> Kirsi Ninimäki et al., “The environmental price of fast fashion,” *Nature Reviews*, April 7, 2020, <https://www.nature.com/articles/s43017-020-0039-9>; Editorial, “The price of fast fashion,” *Nature Climate Change*, January 2, 2018,; <https://www.nature.com/articles/s41558-017-0058-9>; Elizabeth Cline, *The Shockingly High Cost of Cheap Fashions* (New York: Penguin, 2012); Mark Angelo, *Riverblue* (2018), riverbluethemovie.eco; Smith, *China’s Engine*, 11-13 and the sources cited therein; Alex Scott, “Cutting out textile pollution,” *Chemistry & Engineering*, 93.41, October 19, 2015, <https://cen.acs.org/articles/93/i41/Cutting-Textile-Pollution.html>; “Carbon footprint considerations,” Two Sisters Ecotextiles, <https://www.twosistersecotextiles.com/pages/carbon-footprint-considerations>; Suzanne Kapner, “In gifts: old clothes are the newest trend,” *Wall Street Journal*, December 23, 2019.

<sup>46</sup> EPA, Overview of Greenhouse Gases, <https://www.epa.gov/ghgemissions/overview-greenhouse-gases>.

<sup>47</sup> IPCC, 2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories, 6.7, [https://www.ipcc-nggip.iges.or.jp/public/2019rf/pdf/3\\_Volume3/19R\\_V3\\_Ch06\\_Electronics.pdf](https://www.ipcc-nggip.iges.or.jp/public/2019rf/pdf/3_Volume3/19R_V3_Ch06_Electronics.pdf); EPA, “Electronics,” <https://www.epa.gov/climateleadership/center-corporate-climate-leadership-sector-spotlight-electronics>.

<sup>48</sup> EPA, “Understanding global warming potentials,” <https://www.epa.gov/ghgemissions/understanding-global-warming-potentials>; Katherine Derbyshire, “More than just carbon dioxide,” *Semiconductor Engineering*, December 14, 2016, <https://semiengineering.com/more-than-just-carbon-dioxide/>.

<sup>49</sup> Derbyshire, “More than carbon dioxide.”

<sup>50</sup> Derbyshire, “More than carbon dioxide”; Francesca Illuzzi and Harry Thewissen, “Perfluorocompounds emission reduction in semiconductor industry,” *Journal of Environmental Sciences*, 7.1 (August 18, 2010), <https://www.tandfonline.com/doi/full/10.1080/19438151003621417>.

<sup>51</sup> From 7MMT CO<sub>2</sub>e to 6.1 MMT CO<sub>2</sub>e. EPA, 2011-2017 Greenhouse Gas Reporting Program Industrial Profile: Electronics Manufacturing Sector, 6, figure 4, [https://www.epa.gov/sites/production/files/2018-10/documents/electronics\\_manufacturing\\_2017\\_industrial\\_profile.pdf](https://www.epa.gov/sites/production/files/2018-10/documents/electronics_manufacturing_2017_industrial_profile.pdf).

<sup>52</sup> “What is the growth rate of the electronics sector?” *Investopedia*, February 5, 2020, <https://www.investopedia.com/ask/answers/052515/what-growth-rate-electronics-sector.asp>.



sustainable processes to reduce the emissions of toxic pollutants during manufacturing process.”<sup>53</sup>

**“Foldable phones have arrived. But why?”<sup>54</sup>**

Given these trends, here too, the only way to drastically reduce GHG and other pollutants from this industry in the near term is to stop making so many electronic devices, gadgets, and microchips: Start by abolishing designed-in obsolescence and repetitive consumption of iPhones 10,11,12, and abolishing the incessant invention and production of new tech products and services we don't really need including iWatches, VR headsets, Alexa, foldable phones, dashboard displays (unsafe at any speed!), drone deliveries, robot vacuum cleaners, “smart suitcases” that follow you around the airport, self-driving cars, air taxis, space tourism, etc.<sup>55</sup> As Greta Thunberg might put it: “The cost of that new iPhone is your children.”

**Chemicals:** China is the world's largest manufacturer of chemicals and their production accounts for 16% of China's CO<sub>2</sub> emissions from manufacturing.<sup>56</sup> Chemicals are the worst polluting industry in China, responsible for horrific poisoning of farm soils, fresh water sources, and foods, in addition to their GHG emissions.<sup>57</sup> One study concludes that “by using the best technology... in the most favourable scenario, the potential for decreasing carbon intensity varies between 21% and 42%.<sup>58</sup> Not nothing. But in an industry where growth rates have averaged between 13% and 36% per year in China, even a 42% improvement would be easily outstripped by growth. Here again, the only way to radically suppress emissions from chemicals production in the next few decades is to radically reduce their production, abolish production of toxic pesticides, fabric treatments, flame retardants, many solvents and plastics, hormone disrupters, etc.<sup>59</sup> replace them where possible with non-toxics and non GHG emitters, ration and severely restrict the use of those chemicals we can't do without, or learn to live without them.<sup>60</sup>

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<sup>53</sup> IEEE, International Roadmap for Devices and Systems, 2020, <https://irds.ieee.org/topics/new-challenges-facing-semiconductors>.

<sup>54</sup> Brian X. Chen, “Foldable phones have arrived. But why?,” *New York Times*, February 2, 2020.

<sup>55</sup> Kellen Browning, “Amazon drone films inside of your home. Is this good?” *New York Times*; Neal Pollack, “Your dashboard display is going to kill you,” *The Drive*, July 10, 2018, <https://www.thedrive.com/tech/22034/your-dashboard-display-is-going-to-kill-you>; Bill Read, “Flying taxis in the dark,” Royal Aeronautical Society, May 24, 2019, <https://www.aerosociety.com/news/flying-taxis-in-the-dark/>; Brian Garrett-Glaser, “It's time to consider the broader socioeconomic impact of air taxis,” *Aviation Today*, June 11, 2020, <https://www.aviationtoday.com/2020/06/11/time-consider-broader-socioeconomic-impact-air-taxis/>. On the other hand: Helene Fouquet, “French consumers encouraged to stop spending on new smartphones,” *Bloomberg*, October 9, 2020, <https://www.bloomberg.com/news/articles/2020-10-09/french-consumers-encouraged-to-stop-spending-on-new-smartphones?sref=4KuSK5Q1>.

<sup>56</sup> Lu and Price, “China's industrial carbon dioxide emissions”.

<sup>57</sup> Elizabeth C. Economy, *The River Runs Black* (Ithaca: Cornell Univ. Press, 2004); Yanzhong Huang, *Toxic Politics* (Cambridge: CUP, 2020); Anna Lora-Wainright, *Fighting for Breath* (Honolulu: Univ. of Hawaii Press, 2013); William J. Kelly and Chip Jacobs, *The People's Republic of Chemicals* (Los Angeles: Vireo, 2014); Smith, *China's Engine*, chapter 3.

<sup>58</sup> Bing Zhu, et al., “CO<sub>2</sub> emissions and reduction potential in China's chemical industry,” *Energy*, 35, 2010, 4663-4670, DOI: 10.1016/j.energy.2010.09.038, [https://www.researchgate.net/publication/232394498\\_CO2\\_emissions\\_and\\_reduction\\_potential\\_in\\_China%27s\\_chemical\\_industry](https://www.researchgate.net/publication/232394498_CO2_emissions_and_reduction_potential_in_China%27s_chemical_industry).

<sup>59</sup> NRDC, Toxic Chemicals, <https://www.nrdc.org/issues/toxic-chemicals>.

<sup>60</sup> For more on safer chemicals and alternatives see my *Green Capitalism: The God That Failed* (World Economic Association Press, 2016), 37-40 and the sources cited therein.

**Plastics** are a pollution nightmare. They pollute the planet, even plasticizing the oceans, wiping out marine life around the world.<sup>61</sup> We eat plastics, drink them, breathe them. They release CO<sub>2</sub> emissions at every stage of their life cycle from drilling oil and fracking natural gas to provide feedstocks, to manufacturing, to disposal. China is the world's biggest producer and consumer, the biggest incinerator, and the biggest dumper of plastics into the ocean. The Yangtze alone carries more plastic trash out to the Pacific Ocean than all the rivers of India and Africa combined.<sup>62</sup> China's government has banned imports of plastic trash and recently announced that it will reduce disposable plastic in e-commerce and express food deliveries, and to increase recycling. But these efforts barely touch the problem. The government can't stop the deluge of plastics when it's simultaneously promoting every imaginable form of mindless consumerism. It's not just the plastic bags and wrappers. As often as not what's inside them is plastic too: polyester-plastic garments, plastic toys, purses, belts, shoes, phones and electronic gadgets, etc. Homes are filled with plastic furniture, cabinets, trim, synthetic upholstery fabrics, plastic carpets, short-lived plastic appliances, plastic decorations and gizmos of every sort. Cars are increasingly made of plastic, even the fuselages of Boeing 787 airliners, not to mention the interiors. Plastic is *everywhere* in China and here too. Recycling is a global failure. Since there's just no way to make plastics without producing massive quantities of GHG emissions, the only solution is to just stop making so much plastic: abolish single-use plastics except for critical medical etc. uses, abolish disposable products across the economy, abolish production of plastic junk we don't need, produce what we need to be durable, repairable and completely recyclable, and so on. We got along fine without plastic everything in the 1940s and '50s and we weren't living in caves. But our children *will* be living in caves if we don't stop plasticizing the planet.

Metals, cement, aviation, shipping, long-haul road transportation, railroads, electronics, textiles, chemicals, plastics – the hard-to-abate industries are likely to remain hard to abate for decades to come if not for some, virtually forever. There are no magic bullets. Of course we can't rule the possibility that some unforeseen tech breakthroughs could permit continued growth of one or more of those industries without growing GHG emissions. But as no such miracles of dematerialization or decarbonization have appeared so far, barring such a *deus ex machina*, I contend that the only way China (and the industrialized West) can meet the urgent climate emergency we face is to immediately begin shutting down fossil fuel production and phasing out fossil fuel-dependent industries across the economy. Industrial shutdowns are coming one way or another. Either we organize this ourselves or Mother Nature is going to do it for us in a much less pleasant manner.<sup>63</sup>

### ***Industry think tanks envision “degrowth”***

Even *industry* think tank scenarios for decarbonizing industries begin with suppressing output as the first and usually the biggest step. The IEA's “Material efficiency in clean economy

<sup>61</sup> Eg. Simon Reddy, “Plastic pollution affects sea life throughout the ocean,” PEW, September 24, 2018, <https://www.pewtrusts.org/en/research-and-analysis/articles/2018/09/24/plastic-pollution-affects-sea-life-throughout-the-ocean>.

<sup>62</sup> Center for International Environmental Law (CIEL), *Plastic & Planet: The Hidden Cost of a Plastic Planet* (May 2019), <https://www.ciel.org/reports/plastic-health-the-hidden-costs-of-a-plastic-planet-may-2019/>; Sarah-Jeane Royer et al., “Production of methane and ethylene from plastic in the environment,” *Plos One*, August 1, 2018, <https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0200574>; Andrea Leonte, “China is burning away its ecological future,” *Foreign Policy*, March 26, 2019, <https://foreignpolicy.com/2019/03/26/china-is-burning-away-its-ecological-future/>; “Plastic ocean input from top rivers, 2015, Our World in Data, <https://ourworldindata.org/plastic-pollution>.

<sup>63</sup> David Wallace-Wells, *The Uninhabitable Earth* (New York: Random House, 2019); Smith, *China's Engine*, chapter 8.

transitions” calls for reducing demand for steel by 24% and cement by 15%.<sup>64</sup> The Energy Transition Commission, commissioned by a group of European industries and NGOs including CEOs and VPs from Saint-Gobain, BP, ENGIE, Royal Dutch Shell, and World Resources Institute, has put forward the most comprehensive scenario for decarbonizing the “hard-to-abate” industries: **Mission Possible** (MP). The MP CO<sub>2</sub> mitigation “roadmap” sets out “three main routes” to decarbonizing hard-to-abate European industries by 2050: “1) reducing demand for carbon-intensive products and services, 2) improving energy efficiency, and 3) deploying decarbonization technologies across all sectors” – in that order.<sup>65</sup> Of these, suppressing demand (viz. production) accounts for the largest share of GHG emissions reductions in most industries considered in this scenario. MP calls for reducing demand in industries by an average of 40-45%, including steel by 38%, aluminum by 40%, cement by 34%, heavy road transportation by 35%, and plastics/chemicals by 56%.<sup>66</sup> It also calls for a surprisingly small 15% reduction in aviation and a mere 5% reduction in shipping, but that’s only because MP proposes substituting biofuels for jet fuel and biodiesel as a transitional fuel for shipping to be replaced by electric battery or hydrogen fuel when those technologies become available. As noted above, there are no legitimate scientific grounds for labeling biofuels “sustainable”. Thus, in truth, the only way to suppress emissions from those sectors in the next decades is, again, to ground most planes and dock most ships.

Of course, these industry brain trusts are not looking to put companies out of business. They’re not calling – as I do – for wholesale nationalization of coal and oil companies, petrochemical firms, plastic junk makers, petrochemical companies, auto companies and others in order to rapidly phase out some and downsize others. The MP envisions “demand reduction” by means of improved efficiencies, reduced waste, and recycling. That’s a hopeless chimera in my view, but at least they’ve grasped the need to slash production to save the planet

### ***No carbon industries, no Made in China 2025 industrial supremacy, no Silk Road empire***

Yet these industries have been indispensable to China’s rise and underpin Xi Jinping’s ambitious growth plans to Make China Great Again. Xi has no intention of suppressing any of them and cannot do so because he wants to double China’s GDP in the next 15 years to make China “a mid-level advanced country” by 2035 – to the ever-lasting glory of Chinese Communist Party.<sup>67</sup>

China’s economy stands on two legs: manufacturing and construction. Construction is accounts for around 7.5% of China’s GDP and around 30% of its carbon emissions (including embodied emissions from energy inputs).<sup>68</sup> Manufacturing accounts for 27% of GDP and 58%

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<sup>64</sup> In OECD, “Low and zero emissions in the steel and cement industries,” 15-18.

<sup>65</sup> ETC, Mission Possible, 6.

<sup>66</sup> ETC, Mission Possible, 9,12, 32-38.

<sup>67</sup> Frank Tang and Zhou Xin, “China GDP: Xi Jinping says ‘completely possible’ to double size of economy by 2035, despite foreign hostility,” *South China Morning Post*, November 8, 2020, <https://www.scmp.com/economy/china-economy/article/3108767/china-gdp-xi-jinping-says-completely-possible-double-size>; Xie Jun, “China to accelerate infrastructure investment to rev up GDP,” *Global Times*, February 27, 2020, <https://www.globaltimes.cn/content/1180975.shtml>.

<sup>68</sup> CEIC, China GDP:SI: Construction (2020), <https://www.ceicdata.com/en/china/gross-domestic-product-quarterly/gdp-si-construction>; Chuai X., Huang X., Zhang M., Lu Q., Zhao R., Lu J. “Spatiotemporal changes of built-up land expansion and carbon emissions caused by the Chinese construction industry,” *Environmental Science and Technology*, September 30, 2015, <https://pubs.acs.org/doi/abs/10.1021/acs.est.5b01732>; Qiang Du et al. “Carbon emissions in China’s

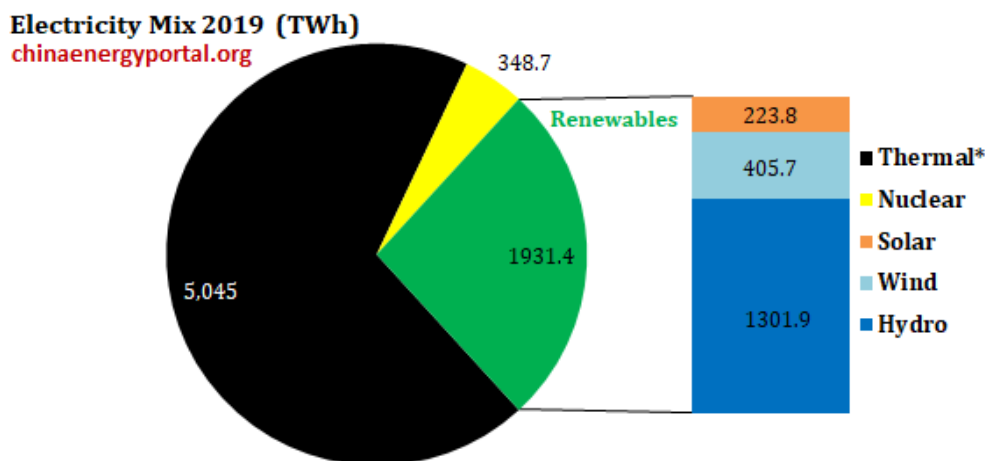
of CO<sub>2</sub> emissions (including embodied energy emissions).<sup>69</sup> Xi Jinping's **Made in China 2025 initiative** aims to enable China to dominate global high tech manufacturing across ten fields: IT, high-end machinery and robotics, aerospace, marine equipment and ships, advanced rail transport, new-energy vehicles, electric power, agricultural machinery, new materials, and bio-medical industries – every one of which requires steel and many other carbon-based inputs.<sup>70</sup> Xi's infrastructure-heavy **Belt and Road initiative (aka New Silk Road)** is binge pouring cement over tons of steel framing damming rivers and paving over forests from Southeast Asia to South America.

So this is the first roadblock Xi faces. Even if all of China's factories were powered with solar and wind, his entire economy, his high-tech industrial supremacy drive, and his global imperial ambitions would all remain massively and inextricably dependent on fossil fuels, and China's mighty exports would still ship out on bunker fuel and kerosene.

## II. Abandoning the transition to renewables

The second roadblock is decarbonizing power generation itself. In theory, this is the one sector where Xi ought to be able to suppress emissions without great difficulty. After all, China is the world's leading producer of PV panels, wind turbines and electric cars. Yet this is not happening either. As can be seen in Figure 1 below, for all of China's investments in renewable energy in recent decades, the vast majority of electricity is still produced with coal. In 2019 thermal produced 5,045 Terawatt hours of electricity (TWh) as compared with hydropower 1,309 TWh, wind 405.7 TWh, nuclear 348.7 TWh, and solar 223.8 TWh.

**Figure 1**



[\*: 'Thermal' power generation includes coal, gas, oil, and biomass]

Source: NBS, 2019 List of basic annual electricity statistics, China Energy Portal, <https://chinaenergyportal.org/en/2019-electricity-other-energy-statistics-preliminary/>.

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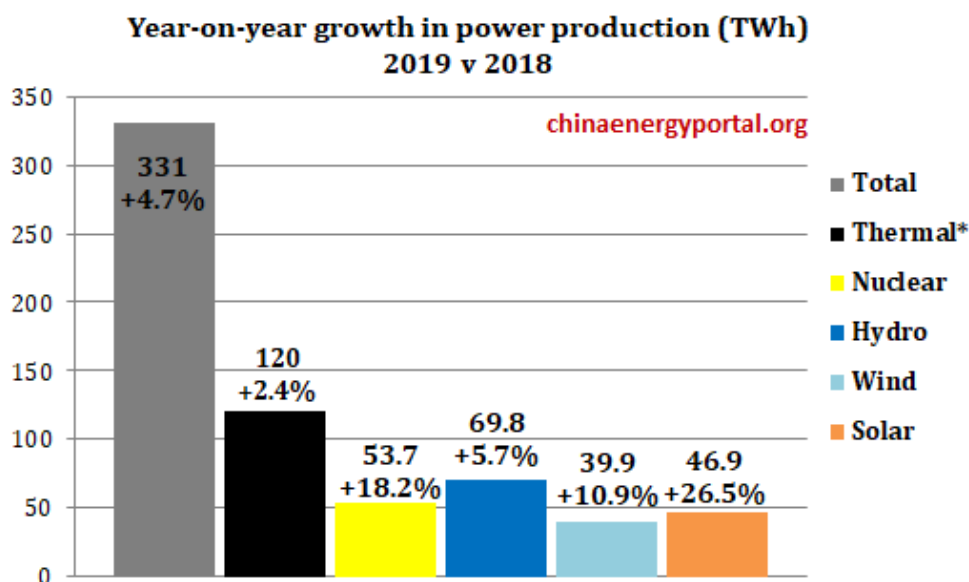
construction industry: calculations, factors and regions," *International Journal of Environmental Research and Public Health*, June 10, 2018, 15(6): 1220, <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6025463/>.

<sup>69</sup> World Bank (2019), <https://data.worldbank.org/indicator/NV.IND.MANF.ZS?locations=CN>. CEIC, "China GDP:SI: Construction"(2020); Jian Liu, "Analysis of CO<sub>2</sub> emissions in China's manufacturing industry based on extended logarithmic mean division index decomposition," *Sustainability*, January 4, 2019, 11, 226; doi:10.3390/su11010226.

<sup>70</sup> Made in China 2025, Mercator Institute for China Studies (August 12, 2016), <https://merics.org/en/report/made-china-2025>.

Expressed as percentages, solar and wind accounted for just 8.6% of electricity generation in 2019. Including hydropower, renewables accounted for just 26.4% of generation – though there are good grounds for booting China’s hydropower out of the “sustainable” energy category.<sup>71</sup>

Figure 2



Source: NBS, 2019 List of basic data of annual electricity statistics, China Energy Portal, <https://chinaenergyportal.org/en/2019-electricity-other-energy-statistics-preliminary/>.

In Figure 2 we see that thermal generated electricity grew by just 2.4% from 2018 to 2019. Yet because this was from such a large base, the increase still amounted to 120 TWh – 36% of total growth in electricity output that year and 20% more than the combined increases for solar and wind (86.8 TWh). Fossil fuels still produced 69% of China’s electricity in 2019 (5,045 TWh of the total 7,325 TWh produced), down from 70% from 2018 and 73% in 2015.

At this rate, coal-powered electricity generation won’t be phased out till the end of the century.

Xi told the United Nations that “humankind should launch a green revolution and move faster to create a green way of development and life, preserve the environment and make Mother Earth a better place for all.” His climate scientists at the Institute of Climate Change and Sustainable Development at Tsinghua University, the government’s climate change think tank, calculated that for non-fossil fuel energy sources to make up 90% of China’s electricity production by 2050, the government would need to increase wind and solar power to about three times current *global* existing capacity of wind power, and four times global existing capacity of solar. The bill: around \$135 trillion.<sup>72</sup>

<sup>71</sup> That’s because in China, dam building causes so much environmental destruction, imperiling the livelihoods of hundreds of millions across South and Southeast Asia. What’s more, dam building in China has actually *increased* the number of coal-fired power plants built as backups and to compensate for diminishing river flows from the Himalayas due to global warming. See Brian Eyster, “Science shows Chinese dams are devastating the Mekong,” *Foreign Policy*, April 22, 2020, <https://foreignpolicy.com/2020/04/22/science-shows-chinese-dams-devastating-mekong-river/>; and Smith, *China’s Engine*, pp. 82-86 and sources cited therein.

<sup>72</sup> He Jiankun, Full slide from Professor He Jiankun’s presentation,” October 19, 2020, <https://mp.weixin.qq.com/s/8ajdq963YL7X3sRJSWGg>; Christian Shepherd et al., “Climate change:

Yet instead of speeding up his own green revolution by reviving solar and wind power that has slumped since state subsidies were discontinued in 2018, Xi appears to be abandoning the transition to renewables. His government ended state subsidies for solar and wind while sharply increasing funding new coal-power plants and for what it calls “new energy” extraction which includes fracking shale gas and extracting coal-bed methane.<sup>73</sup> From January 1 to June 15 of this year, central planners permitted an additional 17 GW of new coal-fired capacity for construction, more than the amount permitted in all of 2018 and 2019 combined (12 GW). The amount of capacity under development just in this year (249.6 GW) is larger than the coal fleets of the United States (246.2 GW) or India (229.0 GW). China already has an estimated 400 gigawatts of excess coal-fired capacity.<sup>74</sup>

By contrast, investments in new wind and solar power have dropped sharply since 2018 as state priorities shifted back to coal. New wind power installations peaked in 2018, then plummeted by 55% in 2019 and dropped a further 13% in the first half of 2020. New wind power installations grew steadily to 2019, then dropped 13% in the first half of this year to their lowest level since 2014.<sup>75</sup>

At the provincial level, China’s main energy consuming and producing provinces are investing three times as much in new fossil fuel projects as in renewables.<sup>76</sup> Beijing even dropped its planned reduction of CO<sub>2</sub> per unit of GDP (commitment #2 of its 2015 Paris NDC pledge)<sup>77</sup> in order to power its economic reboot with coal. “Dropping the target shows that economic considerations clearly trumped all other issues,” said Li Shuo at Greenpeace Beijing.<sup>78</sup> On top of this, Xi’s Belt and Road Initiative is also building at least 240 coal-fired power projects in 25 countries, belching greenhouse gasses across three continents.<sup>79</sup>

Furthermore, Xi’s government is not only boosting coal-fired electric generation, it’s also ramping up oil and natural gas exploration and production, developing coal-to-liquid “syngas” plants, developing fracking to reach deeper reserves, increasing oil and gas imports, and bidding to become the world’s top oil refiner, displacing the United States – again, hardly the sorts of investments one would expect from a leader who says he wants to “move faster to

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China’s coal addiction clashes with Xi’s bold promise,” *Financial Times*, November 3, 2020, <https://www.ft.com/content/9656e36c-ba59-43e9-bf1c-c0f105813436>.

<sup>73</sup> Michael Standaert, “Why China’s renewable energy transition is losing momentum,” *Yale Environment 360*, September 26, 2019, <https://e360.yale.edu/features/why-chinas-renewable-energy-transition-is-losing-momentum>.

<sup>74</sup> Lauri Myllyvirta, “A new coal boom in China,” CREA, June 2020, [https://globalenergymonitor.org/wp-content/uploads/2020/06/A-New-Coal-Boom-in-China\\_English.pdf](https://globalenergymonitor.org/wp-content/uploads/2020/06/A-New-Coal-Boom-in-China_English.pdf).

<sup>75</sup> Yuki Yu, “China’s wind & solar market 2020 half-year review,” *Renewable Energy World*, October 8, 2020, <https://www.renewableenergyworld.com/2020/08/10/chinas-wind-solar-market-2020-half-year-review/#gref>.

<sup>76</sup> Guest authors, “Analysis: China’s Covid stimulus plans for fossil fuels three times larger than low-carbon,” *Carbon Brief*, September, 23, 2020, <https://www.carbonbrief.org/analysis-chinas-covid-stimulus-plans-for-fossil-fuels-three-times-larger-than-low-carbon>.

<sup>77</sup> See my discussion of China’s Paris commitments in *China’s Engine*, pp. xiv-xvii.

<sup>78</sup> Bloomberg, “China drops key environmental targets as Coronavirus hits growth,” May 22, 2020, <https://www.bloomberg.com/news/articles/2020-05-22/china-drops-key-environmental-target-as-coronavirus-hits-growth?sref=4KuSK5Q1>; Bloomberg, “China seen adding new wave of coal plants after lifting curbs,” June 10, 2020, <https://www.bloomberg.com/news/articles/2020-06-10/china-seen-adding-new-wave-of-coal-plants-after-lifting-curbs?sref=4KuSK5Q1>.

<sup>79</sup> Isabel Hilton, “How China’s big overseas initiative threatens global climate progress,” *Yale Environment 360*, January 3, 2019, <https://e360.yale.edu/features/how-chinas-big-overseas-initiative-threatens-climate-progress>. Huileng Tan, “China is massively betting on coal outside its borders – even as investment falls globally,” *CNBC*, April 6, 2018, <https://www.cnbc.com/2018/04/06/china-is-massively-betting-on-coal-outside-its-shores--even-as-investment-falls-globally.html>.

create a green way of development and life.”<sup>80</sup> The net result of all these policies is that fossil fuels supplied fully 86% of China’s primary energy consumption in 2019 (coal 58%, petroleum 20%, natural gas 8%).<sup>81</sup> And Xi wants to keep adding more fossil fuels till 2030?

China’s government is still building new solar and wind farms along with new coal power plants. But it has effectively abandoned *transitioning* to renewables.

Finally, instead of promoting the “green and low carbon development” Xi preached about to the UN, in March the government launched another huge infrastructure building fiscal stimulus “aimed at building bridges, roads, broadband, and railroads across the country” to boost the domestic economy through 2035.”<sup>82</sup> Since 2010, China has accounted for about half the world’s new construction. Binge building of infrastructure draws resources from SE Asia and Australia to Africa and Latin America, pumping out CO<sub>2</sub> emissions far beyond China. In August, China’s state railway operator announced that China’s already overbuilt railway expansion would continue for another 15 years. The plan calls for building another 125,000 miles of railways, a 41% increase from today, including doubling the size of its high-speed rail network over the next 15 years.<sup>83</sup> China’s high-speed rail system already connects all of China’s sizable cities. World Bank analysts and Chinese rail experts say most lines are underutilized, few make economic sense, and building more lines to reach remote and smaller towns is a waste.<sup>84</sup>

Unsurprisingly, this latest construction binge has worsened air pollution. China’s CO<sub>2</sub> emissions grew by 4-5% in the first half of the year, as we noted, and smog abatement has suffered.<sup>85</sup> Then, in the third quarter July-September, the country’s CO<sub>2</sub> emissions hit an *all-time high*, driven by surging post-Covid demand for steel and cement.”<sup>86</sup>

Ironically, while Xi bids to lead the world fight against climate change, China’s CO<sub>2</sub> emissions are soaring while those of the US, Europe and also Japan, are falling. US emissions have fallen from their peak in 2007 (by 2019 US emissions had dropped by 843 million metric tons

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<sup>80</sup> EIA, Country Analysis Executive Summary: China (September 2020), [https://www.eia.gov/international/content/analysis/countries\\_long/China/china.pdf](https://www.eia.gov/international/content/analysis/countries_long/China/china.pdf); Saket Sundria, “China to take oil-refining crown held by U.S. since 19<sup>th</sup> century,” Bloomberg, November 22, 2020, <https://www.bloomberqqint.com/business/china-is-set-to-eclipse-america-as-world-s-biggest-oil-refiner>.

<sup>81</sup> EIA, China, 2, Figure 1.

<sup>82</sup> Matt Phillips, “Beijing’s infrastructure plan has engines revving and metal prices soaring,” *New York Times*, September 23, 2020.

<sup>83</sup> Zhou Xin, “China’s high-speed railway network to double in length by 2035 under new blueprint,” *South China Morning Post*, August 14, 2020, <https://www.scmp.com/economy/china-economy/article/3097226/china-high-speed-railway-network-double-length-2035-under>.

<sup>84</sup> Martha Lawrence et al., *China’s High-Speed Rail Development* (Washington D.C.: World Bank, 2019), David Fickling, “China doesn’t need another 125,000 miles of track,” *Bloomberg*, August 17, 2020, <https://www.bloomberg.com/opinion/articles/2020-08-17/china-doesn-t-need-another-125-000-miles-of-high-speed-rail?sref=4KuSK5Q1>; Smith, *China’s Engine*, pp. 30-31 and the sources cited therein.

<sup>85</sup> Lauri Myllyvirta, “Air Pollution in China 2019,” CREA, January 1, 2020, <https://energyandcleanair.org/wp/wp-content/uploads/2020/01/CREA-brief-China2019.pdf>; Ju Yiwen, “Dozens of cities issue smog warnings as winter haze descends,” *Caixin*, November 16, 2020, <https://www.caixinglobal.com/2020-11-16/dozens-of-cities-issue-smog-warnings-as-winter-haze-descends-101628883.html>.

<sup>86</sup> Lauri Myllyvirta, “Analysis: Surge in China’s steel production helps fuel record-high CO<sub>2</sub> emissions,” Carbon Brief, December 3, 2020, <https://www.carbonbrief.org/analysis-surge-in-chinas-steel-production-helps-to-fuel-record-high-co2-emissions>. See also: Muyi Yang, “China’s industrial recovery risks rising coal,” EMBER, November 20, 2020, <https://ember-climate.org/commentary/2020/11/20/chinas-industrial-recovery-risks-rising-coal/>; and David Fickling, “China is too rich to splurge on infrastructure,” Bloomberg, May 22, 2020, <https://www.bloomberg.com/opinion/articles/2020-05-23/china-npc-take-any-big-spending-plans-with-a-degree-of-caution?sref=4KuSK5Q1>.

of CO<sub>2</sub>e, roughly equal to Germany's CO<sub>2</sub> emissions in 2005), EU emissions have trended downward for the past three decades, and Japan's 2019 emissions were down 12% from their peak in 2013.<sup>87</sup> US emissions fell by a further 2.1% in 2019 as coal power plants were retired and US coal generation dropped by 18%, the largest annual decline on record – despite president Trump's efforts to save the coal industry.<sup>88</sup> To be sure, *those declines are very far from sufficient to reverse global warming*. They're not even enough to meet their respective commitments to the 2015 Paris Agreement on climate change. But at least they're declines.

*Why is Xi Jinping derailing his own green ambitions and leading China and the world to climate collapse?*

### III. Hypergrowth drivers: the Communist Party's "three must dos"

The answer, as I've argued in my book, is that he has no choice because his first priority, like Mao and Deng Xiaoping before him, must be to maintain the power and security of Communist Party. To do that he relies on three levers to drive his economy. First, as a state-based communist ruling class in a world dominated by more advanced and powerful capitalist powers, Xi, like Mao and Deng before him, understands that China must "catch up and overtake the United States." That's the only guarantee that it will not be overwhelmed by global capitalist imperialism. The way to do that is to build a relatively self-sufficient high-tech superpower economy shielded from Western takeover.<sup>89</sup> In April, Xi called for the indigenous development of "killer technologies" to survive foreign blockades, and reiterated the theme of self-sufficiency at the Central Committee Fifth Plenum meeting in October.<sup>90</sup>

The Soviets' failure to win the economic and arms race with the United States doomed the Soviet Communist Party and Xi is determined to avoid that error. That's the main driver of economic growth in China. Achieving techno-economic and military parity with the US, if not supremacy, is the Communist Party's Holy Grail.

Second, the Party must maximize employment. In capitalist economies, employers have no obligation to the unemployed. But because the CCP was once a workers' party and because it derives its legitimacy from its status as the self-appointed representative of the working class, it cannot completely ignore the workers. That's why Five-Year Plans regularly include job creation targets. Yet keeping China's hundreds of millions of workers working often means producing superfluous steel, needless infrastructure, ghost cities, etc. Maximizing

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<sup>87</sup> Carbon Action Tracker (CAT), September 22, 2020, <https://climateactiontracker.org/countries>.

<sup>88</sup> Scott DiSavino, "U.S. coal-fired power plants closing fast despite Trump's pledge of support for industry," *Reuters*, January 13, 2020; Trevor Houser and Hannah Pitt, "Preliminary US emissions estimates for 2019," Rhodium Group, January 7, 2020, <https://rhg.com/research/preliminary-us-emissions-2019/>; Nicholas Kusnetz, "U.S. emissions dropped in 2019: Here's why in 6 charts," *Inside Climate News*, January 7, 2020, <https://insideclimatenews.org/news/07012020/infographic-united-states-emissions-2019-climate-change-greenhouse-gas-coal-transportation>; Eric Lipton, "The coal industry is back,' Trump proclaimed. It wasn't." *New York Times*, October 5, 2020.

<sup>89</sup> Keith Bradsher and Paul Mozur, "China's plan to build its own high-tech industries worries Western businesses," *New York Times*, March 7, 2017; Bloomberg, "China's got a new plan to overtake the US in tech," May 20, 2020, <https://www.bloomberg.com/news/articles/2020-05-20/china-has-a-new-1-4-trillion-plan-to-overtake-the-u-s-in-tech?sref=4KuSK5Q1>; and again, Smith, *China's Engine*, chapter 5.

<sup>90</sup> "China must develop 'killer technologies' to survive foreign blockades: Xi," *Apple Daily*, October 31, 2020, <https://hk.appledaily.com/news/20201101/ZXKTHLO4RAPPFCBH3KN7UVFI/>; Staff reporter, "China's leaders look to boost self-reliance as country turns inward," *Guardian*, October 26, 2020, <https://www.theguardian.com/world/2020/oct/26/chinas-leaders-look-to-boost-self-reliance-as-country-turns-inward>.



employment is a major driver of overproduction, over-construction and profligate waste of energy and resources across the economy.<sup>91</sup>

Third, they must maximize consumption and consumerism. In the wake of the collapse of the Soviet Communist Party in 1991 and the Chinese communists' own near-death experience at Tiananmen Square in 1989, the leadership resolved to create a mass consumer economy and raise incomes to divert people's attention to consumption and away from politics. That's why since the 1990s Five-Year Plans have prioritized consumer industries and the government has promoted one consumer craze after another: cars; condos; shopping malls; package tourism; cruise boats; golf courses; theme parks; online shopping; food delivery and more.<sup>92</sup>

No doubt after centuries of privation and decades of Maoist austerity, China's masses were overdue for some creature comforts. But the promotion of consumerism for the sake of consumerism at the expense of the environment on the model of Western capitalism contradicts Xi's call for "conserving resources" and "protecting nature" and instead contributes mightily to China's growing waste and pollution crises and its suicidal CO<sub>2</sub> emissions.<sup>93</sup>

Given the imperative to maximize growth, employment, and consumerism, China's leaders have no choice but to let the polluters pollute.<sup>94</sup> There's just no way around that. This tendency is further exacerbated because as nationalists, concerned to be self-reliant, the Party wants to rely mainly on its own energy resources which in China's case is chiefly coal.

#### **IV. Technical and political constraints on the transition to renewables**

There are also technical and political constraints on transitioning to solar and wind. The technical problem is the intermittency of solar and wind and the lack of storage. The persistent lack of storage holds back renewable energy everywhere. Both Germany and Japan have revived coal-fired power to back up renewables after shutting down nuclear power plants, while the US backs its renewables mostly with gas-fired plants.<sup>95</sup> Europeans and North Americans work around the intermittency problem as best they can by trading energy across regions and nations via electricity markets. US and Canadian electricity trading "allow[s] for bidirectional flow of power from wind sources on both sides of the border, thus helping to address intermittency issues of renewables."<sup>96</sup> But in China's still largely Stalinist command economy, electricity is not distributed by markets. It's distributed by central planners in the National Energy Administration (NEA) who issue plans, set prices and quotas

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<sup>91</sup> Smith, *China's Engine*, chapter 2.

<sup>92</sup> Sheng Yulei, "Consumption upgrading infuses impetus into China's economic growth," *People's Daily*, July 21, 2020, <http://en.people.cn/n3/2020/0721/c90000-9712803.html>.

<sup>93</sup> Eg. Chen Ronggang, "The mountains of takeout trash choking China's cities," *Sixth Tone*, October 15, 2017, <https://www.sixthtone.com/news/1001003/the-mountains-of-takeout-trash-choking-chinas-cities>;

Niu Yue, "China no. 1 dumper of plastic into ocean," *China Daily*, February 19, 2015, [https://usa.chinadaily.com/world/2015-02/19/content\\_19623390.htm](https://usa.chinadaily.com/world/2015-02/19/content_19623390.htm).

<sup>94</sup> Bloomberg, "Beijing braces for smoggy winter as China prioritizes growth," November 4, 2020, <https://www.bloomberg.com/news/articles/2019-11-04/beijing-braces-for-smoggy-winter-as-china-prioritizes-growth?sref=4KuSK5Q1>; Kang Jia and Matthew Walsh, "China rolls out smog rules for polluted north – that Beijing has already broken," *Caixin*, November 5, 2020, <https://www.caixinglobal.com/2020-11-05/china-rolls-out-smog-rules-for-polluted-north-that-beijing-has-already-broken-101623529.html>.

<sup>95</sup> Ivan Penn, "Renewable Energy's new battle: dependency on natural gas," *New York Times*, July 7, 2020.

<sup>96</sup> Quoted in Smith, *China's Engine*, p. 77.

and regulate coal and renewable utilization priorities.<sup>97</sup> These are negotiated via intra-bureaucratic competition and bargaining in the effort to maintain local employment and profits.

***Command without control: bureaucratic surplus extraction and intra-bureaucratic competition advantage coal***

Thus the political problem: for all the market reforms of the past four decades, China's state-owned economy (about half the economy) remains highly fragmented and compartmentalized with limited market exchange between provinces, cities and localities. This circumstance dates from Mao's promotion of self-reliance as a local and national development strategy in the 1950s and 1960s. He encouraged provinces, municipalities, and counties to become "big and all inclusive" and "small and all inclusive" – build their own power plants, steel mills, farm machinery and vehicle factories, textile and garment factories, etc. In result, Mao's economy was characterized by redundancy, lack of economies of scale, and other inefficiencies.

Deng Xiaoping opened the economy up to foreign investment, revived markets, and incentivized local officials and factory bosses to market over-plan output and sideline production by introducing profit-sharing between the center and the localities.<sup>98</sup> These reforms spurred growth but since the reforms didn't change the original system of surplus extraction, marketization often reinforced or even intensified tendencies toward localism and compartmentalism.<sup>99</sup> That's because provincial, municipal and local governments profit from economic activity under their administrative control. They receive the profits of their state-owned industries (including power plants), and they collect taxes on private and joint-venture businesses. Some receipts they split with the central government, others they keep entirely.<sup>100</sup>

Local officials in China are highly entrepreneurial but their opportunities to extract revenue are limited to the surpluses available within their own jurisdictions. Consequently, every locality tends to see others as competitors in a zero-sum game over locally generated profits, private and foreign investment, and centrally disbursed investment funds. Local officials still strive to be largely self-reliant much as in Mao's day, even erecting "market blockades" to monopolize production and trade within their own bailiwicks to protect their tax receipts and jobs. As one local official put it, "every area acts as though it were a separate country."<sup>101</sup> By the late 1980s, Beijing was complaining that "China today is split into more than 20 independent kingdoms and 2,000 fiefdoms.... With the rapid increase in the scale of capital construction,

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<sup>97</sup> Eg. NRDC (National Development and Reform Commission), NEA, "Notice on the establishment and improvement of a safeguard mechanism for renewable electricity consumption" *China Energy Portal* (May 15, 2020), <https://chinaenergyportal.org/en/notice-on-the-establishment-and-improvement-of-a-safeguard-mechanism-for-renewable-electricity-consumption/>; NEA, "Circular on 2023 risk and early warning for coal power planning and construction," *China Energy Portal* (February 26, 2020), <https://chinaenergyportal.org/en/circular-on-2023-risk-and-early-warning-for-coal-power-planning-and-construction/>.

<sup>98</sup> Shirk, Susan L. 1993. *The Political Logic of Economic Reform in China*. Berkeley, CA: University of California Press; Heilmann, Sebastian. 2008. "From Local Experiments to National Policy: The Origins of China's Distinctive Policy Process." *The China Journal* 59:1–30.

<sup>99</sup> Richard Smith, "The Chinese road to capitalism," *New Left Review*, no. 199 (May-June 1993), 55-99

<sup>100</sup> For the list of taxes and the division of receipts between the center and the localities see the Beijing Local Taxation Bureau, Tax System of the People's Republic of China State Administration of Taxation (2009), <https://web.archive.org/web/20071030172830/http://english.tax861.gov.cn/zgszky/zgszky27.htm>.

<sup>101</sup> Mark A. Deweaver, *Animal Spirits With Chinese Characteristics* (New York, Palgrave Macmillan, 2012), 88.

local governments face growing competition for scarce resources, which in turn, encourages... mercantilist or import-substitutionist strategy[ies] of provincial development.”<sup>102</sup>

And so it remains today. Thus when Xi’s Made in China 2025 initiative (2015) budgeted billions for new energy vehicles, the only way local officials could tap the money on offer was to DIY: build their own factories. That’s how China ended up with 487 electric car manufacturers by 2018 compared with 3 in the US: Tesla, GM, and Nissan.<sup>103</sup> Today, it’s microchip factories. As Trump cut Huawei off from using US-made microchips, Xi is spending tens of billions of dollars to build Chinese microchip factories in a drive to become self-sufficient in chip production. Thus every mayor wants his town to be a Silicon Valley. And in China’s system it can be a good business plan to apply for and get the start-up millions from Beijing even if the start-up never produces chips. So now Beijing is complaining that hundreds of companies with no experience, no technology, and no talent are nevertheless “blindly taking on projects” “that require great technical sophistication” with the result that “stalled projects and vacant manufacturing plants have wasted huge amounts of resources.”<sup>104</sup>

We see such localist, compartmentalist tendencies in electricity generation too. In China, producer prices are inflexible, fixed by the NEA. As one grid analyst explained:

“Grid operators set generation and transmission schedules up to one month in advance, and they program coal power plants to operate continuously for a week or longer. This limits their ability to accommodate hourly or daily fluctuations in renewable output. Flexibility is further limited by utilization quotas that guarantee coal plants a certain number of operating hours per year.”

As a result,

“cross-province electricity trading and transmission face obstacle[s]... The provincial electricity market... is characterized by the self-contained system and self-balance, making the relatively closed provincial market not conducive to optimizing national electricity system planning, power source structural adjustment, cross-province power grid operation, and electricity trading.”<sup>105</sup>

The business magazine *Caixin* reports that “local governments are undermining the central government’s efforts to develop greener sources of electricity by squeezing production quotas for renewables and slapping extra levies on wind companies to prop up ailing coal-fired plants in their region.” These tendencies have been reinforced by the economic slowdown since 2014. Southeastern provinces report that they “have little incentive to buy power from the

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<sup>102</sup> Cheng Li and David Bachman, “Localism, elitism, and immobilism: elite formation and social change in Post-Mao China,” *World Politics*, 42.1 (October 1989), 85.

<sup>103</sup> Smith, *China’s Engine*, 1-2-104.

<sup>104</sup> Luo Guoping, “Beijing to inexperienced companies: stay out of chipmaking,” *Caixin*, October 2120, <https://www.caixinglobal.com/2020-10-21/beijing-to-inexperienced-companies-stay-out-of-chipmaking-101617267.html>.

<sup>105</sup> Peter Fairly, “Wind battles coal for access to China’s grid,” *IEEE Spectrum*, September 20, 2016, <https://spectrum.ieee.org/energy/renewables/wind-battles-coal-for-access-to-chinas-grid>. See further discussion of this problem in Smith, *China’s Engine*, 76-79.

north when they have... their own generation to keep local power facilities in business in the economic downturn and avoid potential losses of jobs and tax revenue.”<sup>106</sup>

This is why China’s coastal industrial zones prefer to build their own captive (*zibei*, or “self-provided”) coal-fired power plants, even if they’re small scale, inefficient, and excessively polluting. Since coal is readily available, cheap, and burns 24/7, they prefer coal to relying on uncertain supplies of wind and solar power from distant power plants, most of which are built out in China’s sunny and windy far west and north (Xinjiang, Qinghai, Gansu, Inner Mongolia, etc.).<sup>107</sup> Local governments across northern China also use coal to heat homes and businesses in the winter. In principle electric boilers could replace those too. But there too, without effective electricity storage and without trans-provincial electricity trading, they could not guarantee consistent heating when wind or solar are insufficient or unavailable. Finally, there’s the jobs issue. Xi may prefer solar and wind but, as noted, keeping workers employed is a higher priority. Coal mining and washing alone employs about 3.5 million people and more work in related industries.<sup>108</sup> Replacing coal with solar and wind would eliminate millions of jobs at a time when unemployment is already high because of the economic slowdown, the trade war, and the coronavirus.

### ***CCP nationalist vanity and Stalinist necessity advantage fossil fuels***

In theory, despite the protectionist biases of local officials, ultra-authoritarian Xi Jinping ought to be able to ram through his transition to renewables, as professor Tooze suggests. After all, Xi commands the most powerful police state in history, one that’s taken down and locked up thousands of officials high and low. But as I explained in my book, first, for or all his nominal authority Xi cannot *systematically* enforce his will against theoretically subordinate officials because he can’t fire them. They’re not employees like in capitalism but party members like himself. He’s is not an absolute dictator but rather the primus inter pares in a multi-million collective ruling class in which power is widely dispersed such that local officials can, and regularly do, defy Beijing with impunity when it suits their economic interests.<sup>109</sup>

Second, Xi himself is disinclined to phase out fossil fuels and force through the transition to renewables because this would disrupt and undermine his higher priorities. Xi is an ultra-nationalist and a Stalinist. If he’s going to Make China Great Again and overtake the United States, he has no choice but to grow those fossil-fuel based industries and power them, if need be, with coal, oil and methane, to build China into a largely self-sufficient techno-industrial superpower (and let the polluters pollute).

In sum, technical barriers, bureaucratic resistance, and Xi’s own overriding concern to maximize growth, all advantage fossil fuels. In my view, these pose formidable if not insurmountable barriers to transitioning to solar and wind renewable energy in China.

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<sup>106</sup> Zhang Yan, “Coal addiction spells trouble for wind power producers,” April, 29, 2016, <https://www.caixinglobal.com/2016-04-29/coal-addiction-spells-trouble-for-wind-power-producers-101011708.html>.

<sup>107</sup> “China’s geographical mismatch between resources and load centers,” in Yiyi Zhou and Sophie Lu, *China’s Renewables Curtailment and Coal Assets Risk Map* (Bloomberg October 25, 2017), 10-11, [https://data.bloomberglp.com/bnef/sites/14/2017/10/Chinas-Renewable-Curtailment-and-Coal-Assets-Risk-Map-FINAL\\_2.pdf](https://data.bloomberglp.com/bnef/sites/14/2017/10/Chinas-Renewable-Curtailment-and-Coal-Assets-Risk-Map-FINAL_2.pdf); Javier C. Hernandez, “It can power a small nation. But this wind farm in China is mostly idle,” *New York Times*, January 15, 2017, <https://www.nytimes.com/2017/01/15/world/asia/china-gansu-wind-farm.html>.

<sup>108</sup> Bloomberg, “China wants to be carbon neutral by 2060. Is that possible?” September 23, 2020, [https://www.foodandwaterwatch.org/sites/default/files/rpt\\_1609\\_carbontax\\_web17011.pdf](https://www.foodandwaterwatch.org/sites/default/files/rpt_1609_carbontax_web17011.pdf).

<sup>109</sup> Smith, *China’s Engine*, chapter 5.

#### IV. Managed partial deindustrialization or extinction?

Yet even if Xi were able to entirely replace fossil fuels with solar and wind, if he were to simply waste renewable energy producing more disposable products, needless consumerism, pointless overproduction and overconstruction, “blingrastructure” to glorify the CCP, ghost cities, damned-up rivers and paved-over forests, then the result would be the same: runaway global warming to climate collapse.

There is just no way that Xi can “peak China’s emissions before 2030 and achieve carbon neutrality before 2060” while also maximizing growth. He can “pursue development at the expense of protection” or he can “transition to green and low-carbon development... [and] take the minimum steps to protect the Earth, our shared homeland.” He can’t do both.

In October 2019 climate scientists published research showing that on present trends, global warming is going to “all but erase” Shanghai, Shenzhen, and “most of the world’s great coastal cities before 2050.”<sup>110</sup> If this proves correct, Xi’s economy will be “carbon neutral” sooner than he intended, though hardly in the manner he desired. There won’t be any “great rejuvenation” and glory for the Communist Party when Shanghai and Shenzhen are under water, when China’s glaciers melt and its rivers dry up, when farming collapses across the North China Plain. There will be famine, collapse, and untold human suffering.<sup>111</sup>

This essay is dedicated to Ou Hongyi and her generation.<sup>112</sup>

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<sup>110</sup> Denise Lu and Christopher Flavelle, “Erased by rising seas by 2050,” *New York Times*, October 30, 2019; Damian Carrington, “Climate crisis: 11,000 scientists warn of ‘untold suffering,’” *Guardian*, November 5, 2019, <https://www.theguardian.com/environment/2019/nov/05/climate-crisis-11000-scientists-warn-of-untold-suffering>.

<sup>111</sup> David L. Chandler, “China could face deadly heat waves due to climate change,” *MIT News*, July 31, 2018, <http://news.mit.edu/2018/china-could-face-deadly-heat-waves-due-climate-change-0731>.

<sup>112</sup> Steven Lee Myers, “Teenager in China wages a lonesome crusade for climate action,” *New York Times*, December 5, 2020, <https://www.nytimes.com/2020/12/04/world/asia/ou-hongyi-china-climate.html>.