

Grow Green China Inc.

*How China's epic push for cleaner energy
creates economic opportunity for the West*

Jeffrey Ball

INDEPENDENCE

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EXECUTIVE SUMMARY

A view gaining ground in the West holds that China's determined dominance of a range of low-carbon industries, from more-efficient coal combustion to solar and wind power to electric vehicles, threatens the national security of developed nations and the fortunes of their firms. That view is outdated, ill-advised, and overdue for a rethink. China's clean-energy juggernaut—call it Green China Inc.—is growing up. The West, for its own economic good, should grow up too in its approach to Green China Inc.

Green China Inc. is maturing both because the Chinese economy is maturing and because the global push for cleaner energy is as well. The upshot is a global shift to greener growth, with China leading the way. This shift defines a new era in the business of energy and thus in geopolitics. It ought, too, to define a new era in the West's approach to Green China Inc.—one that, for the long haul, actually serves the West's economic self-interest, to say nothing of the planet's health.

Crucial to a new approach should be a rejection of what traditionally have been dubbed “protectionist” policies, billed as propping up domestic players by keeping foreign competitors at bay. Those policies have had spotty records throughout the economy, but they are particularly ill-suited to the clean-energy sector.

To be sure, the geostrategic kernel of the Western worry about Green China Inc. contains grains of legitimacy. But the West's anxiety about Green China Inc. is prompting a variety of wrongheaded responses. One is a trade war in which the United States imposes tariffs on imported Chinese clean-energy products and China retaliates with tariffs against U.S. goods. As of this writing, in mid-2019, the tariff fight between the two countries is intensifying.

The Western attempt to quash Green China Inc. is problematic for at least three reasons: It's environmentally

dangerous, geopolitically moot, and, even when viewed purely through the lens of Western self-interest, economically counterproductive. Indeed, the West is in a strong position to profit from the maturation of Green China Inc., largely because of the West's long-standing leadership in technological innovation.

Green China Inc.'s maturation presents myriad opportunities for Western players. Four stand out: China's current opening of its electric vehicle market, the world's largest, to international companies; foreign investment in big Chinese clean-energy projects; a market in China for increasingly sophisticated technologies and business models to combat air pollution; and, amid the Belt and Road Initiative, a massive program of Chinese investment in infrastructure in approximately 65 countries, a desire by many of those countries to balance the money and technology they're getting from China with money and technology from the West.

It is important to be clear: A transition to a smarter Western approach to Green China Inc. won't be easy or smooth; it will be hard and rough.

But now is a crucial moment for the West to grasp its economic self-interest and modernize its approach to Green China Inc. It is possible that the trade talks between the United States and China that have faltered as of this writing still may be resuscitated. That would offer a potential framework for a less-antagonistic economic relationship between the two countries. But whatever happens with trade negotiations, an overarching reality remains: China has launched a potentially massive transformation of its green enterprise, one intended to improve the economic efficiency of a Green China Inc. that has, in fundamental ways, grown soft. That is an opportunity for Western capitalists as much as for Chinese ones—to say nothing of the planet.

Grow Green China Inc.

How China's epic push for cleaner energy creates economic opportunity for the West

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I: The need to rethink Green China Inc.

Global from the get-go

Everything is big in China. That's true of the traditional part of the economy, which is brown, and of the newer part, which increasingly is green. Rightfully, the dirty part of Chinese growth—the smog, the water pollution, the infrastructure locking in massive greenhouse gas emissions for decades—prompts nearly universal concern. Yet even the breakneck growth of the clean part of China's industrial juggernaut—call it Green China Inc.—unsettles powerful constituencies in the West. According to a view gaining ground in much of official Washington, Brussels, and beyond, China's determined dominance of industries ranging from more-efficient coal combustion to solar and wind power to electric vehicles threatens the national security of developed nations and the fortunes of their firms. Some critics go even further, arguing that the rise of Green China Inc. imperils the planet itself. They contend that China is flooding the world with subpar green technology, delaying by decades the market's adoption of the truly innovative next-generation wares that will be necessary

to meaningfully combat climate change. Implicit in much of this criticism is the notion that the West is better than China at unleashing those technological advances.

This view of Green China Inc. is outdated, ill-advised, and overdue for a rethink. Green China Inc. is maturing, and the West's approach to it should grow up too. At the time of this writing, in mid-2019, trade tensions between the two countries appear to be escalating. But that could change quickly, because both countries have distinct economic interests in more-open trade. And even if a truce in the broad trade war falls through, the West has compelling reasons to recalibrate its approach to Green China Inc.

Green China Inc. is maturing both because the Chinese economy is maturing and because the global push for cleaner energy is too. China remains, in many sectors, extraordinarily economically inefficient. But its leaders are acknowledging many of the inefficiencies and are scrambling to try to fix the ones they regard as most strategically threatening. Clean energy is at the top of that list. Beyond China, the international push for

lower-carbon energy also is growing up, as an early stage of profligate and poorly designed subsidies around the world gives way to a new stage in which cleaner energy technologies are expected to compete—indeed, increasingly are competing—economically with incumbent fossil fuels.¹

The upshot of these twin maturations is profound: the beginning of a global shift to greener growth, with China leading the way. The shift is in its early stages, it is provoking backlashes from powerful interests, and it will, for many years, suffer setbacks. But the shift has advanced to a point where political fights—in the United States, in Europe, in China, and among all three—are unlikely to stop it. It also is gaining broader political support, as firms that previously regarded it as a threat start to see it as an inevitability that they must learn how to exploit.

This shift defines a new era in the business of energy and thus in geopolitics. It ought, too, to define a new era in the West's approach to Green China Inc.—one that, for the long haul, actually serves the West's economic self-interest, to say nothing of the planet's health. Crucial to that new approach is a rejection of what traditionally have been dubbed “protectionist” policies, billed as propping up domestic players by keeping foreign competitors at bay. Those policies have had spotty records throughout the economy, but they are particularly ill-suited to the clean-energy sector.

Unlike major economic sectors such as automobiles, steel, and cement, which grew in the 20th century as regional industries and globalized only later in their development, the clean-energy sector, which for all intents and purposes emerged only in the first decade of the 21st century, has been global essentially from the start. This intrinsic globalism explains why the so-called protectionist policies that have been applied to the clean-energy sector have generally failed to achieve their boosters' aims: They have tended to hurt domestic firms and help foreign competitors. Meanwhile, as protectionist measures often do, they have tended to

raise the price of products and thus hurt consumers the world over.

Given the foundational globalism of the clean-energy sector, Western policymakers should encourage domestic industries that are designed to leverage, rather than defeat, Green China Inc., for the simple reason that industries structured that way are likelier to succeed. And Western businesses should capitalize on China's slowly opening markets, including the ability to manufacture in China in certain industries without joint ventures and the ability to invest in an increasing range of Chinese assets, including clean-energy projects. China, for its part, should continue to open its green sector to investment, manufacturing, and sales by foreign players.

It is important to be clear: This transition to a smarter Western approach to Green China Inc. won't be easy or smooth; it will be hard and rough. Yet a new approach is necessary. This paper seeks to begin to sketch it.

A crucial moment

The geostrategic kernel of the Western worry about Green China Inc. contains grains of legitimacy. China, the world's second-largest economy, has made the global expansion of its clean-energy sector a central plank in the country's campaign for, and stimulus of, long-term macroeconomic growth. To cite just one timely example, electric vehicles are a key priority of the country's “Made in China 2025” program, an initiative intended to cement China's dominance by that year in 10 high-tech industries.² This degree of strategic focus and economic opportunism stands in stark contrast to the more-tepid way that essentially every other nation has pursued its green aspirations. So other countries are right to fret that, in the global green race, they have fallen behind. They also are justified in their frustration that China, with its command-and-control economy, is running this race with a distinct home-track advantage: detailed five-year economic plans, extensive consumer and research-and-development subsidies for industries

¹ Jeffrey Ball, “The New Age of Renewable Energy,” *Cairo Review of Global Affairs*, Winter 2018, <https://www.thecairoreview.com/essays/the-new-age-of-renewable-energy/>.

² James McBride, “Is ‘Made in China 2025’ a Threat to Global Trade?” *Council on Foreign Relations*, Aug. 2, 2018, <https://www.cfr.org/backgrounder/made-china-2025-threat-global-trade>.

it deems key, and a web of state-owned policy banks to patiently finance what the government decrees is the national mission. As the International Renewable Energy Agency declared in a January 2019 report: “China’s concerted efforts to research, develop and invest in renewable energy and clean transport offer its industry the opportunity to overtake U.S. and European companies, which have been dominant in sectors such as cars and energy machinery.”³ It all goes far beyond anything common in the West.

But the West’s anxiety about Green China Inc. is prompting a variety of wrongheaded responses that boil down to blunt belligerence. One example is a trade war, which now appears to be expanding, in which the United States imposes tariffs on imported Chinese clean-energy products and China retaliates with tariffs against U.S. goods, prompting a downward spiral. As of this writing, in mid-2019, the tariff fight between the two countries is only intensifying. Another example is a heightened push by the United States to block Chinese investment in U.S. clean-energy firms.

This Western attempt to quash Green China Inc. is problematic for at least three reasons. It’s environmentally dangerous. It’s geopolitically moot. And, even when viewed purely through the lens of Western self-interest, it’s economically counterproductive. This last point—that the Western backlash against Green China Inc. is likely to hurt rather than help Western companies and investors—may seem the strangest. In fact, as this paper will argue, it’s the most compelling.

Now is a crucial moment for the West to grasp its economic self-interest and modernize its approach to Green China Inc. The trade talks between the United States and China that are faltering may be resuscitated, offering a potential framework for a less-antagonistic economic relationship between the two countries. But the main reason the West should shift its approach to Green China Inc. is that, though little noticed around the world, China has launched a potentially massive

transformation of its green enterprise. The transformation is intended to improve the economic efficiency of a Green China Inc. that has, in fundamental ways, grown soft. To cite just one example of the flabbiness, massive quantities of wind and solar power in China are being thrown away because governments subsidized the production of far more wind and solar power than China’s transmission lines could ferry to market. Such growing pains mark a reality check for those in the West who like to portray China as an infallibly effective nemesis. Now, Chinese leaders are acknowledging those missteps and are trying to address them. The reform is still fitful, but it’s good for savvy Western players, because they have more opportunity to profit from strong a Green China Inc. than they do from a weak one.

Red, brown, and green

Brown China remains strong. It burned half of all the coal consumed globally in 2017—more than four times as much as the second-biggest coal user, India, and more than five times as much as the United States.⁴ That helps explain why China coughed out 9.2 billion metric tons of carbon dioxide that year—a bit more than one-quarter of the world total and nearly twice as much as the number-two emitter, the United States.⁵

Green China is smaller, but it is growing faster. It has become the largest producer of renewable energy, the largest builder of nuclear-power plants, and the leading manufacturer and exporter of a variety of technologies necessary to harness cleaner electricity, from batteries to ultra-high-voltage-power-transmission equipment to electric cars. China installed an extraordinary 53 gigawatts of solar-power capacity in 2017, slightly more than half the solar capacity added globally that year and 13 percent of all the solar capacity that has been installed on Earth since the beginning of time.⁶ Indeed, of the \$279.8 billion spent globally on new renewable energy in 2017, 45 percent of it, or \$126.1 billion, was spent in China. Though the majority of that Chinese

³ “A New World: The Geopolitics of the Energy Transformation,” (Abu Dhabi: International Renewable Energy Agency, January 2019), http://geopoliticsofrenewables.org/assets/geopolitics/Reports/wp-content/uploads/2019/01/Global_commission_renewable_energy_2019.pdf.

⁴ “BP Statistical Review of World Energy 2018,” (BP: London, June 2018), <https://www.bp.com/en/global/corporate/energy-economics/statistical-review-of-world-energy/downloads.html>.

⁵ Ibid.

⁶ “Renewables 2018: Global Status Report,” (Paris: Renewable Energy Policy Network for the 21st Century, 2018), 90, <http://www.ren21.net/gsr-2018/>.

sum—\$86.5 billion, or 68 percent of it—went into solar, the same pattern prevailed in any number of clean-energy sectors. In the electric-vehicle market, where 2017 sales soared 57 percent, to 1.1 million cars, half of them occurred in China.⁷ And these numbers describe what happened just on the Chinese mainland. China also is the biggest exporter of these goods around the world.

It was not preordained that China would lead the global renewable-energy revolution. Early on, it didn't. Japan first, and then European countries more significantly, paved the way for the modern renewable-energy race. Or, rather, they *paid* the way, deciding as a matter of national policy to throw big subsidies at solar and wind power, spurring the technological and business-market innovation that began slashing the costs of these energy sources. China merely—and massively—accelerated the trend. It threw the full muscle of its centrally-planned economy behind the European-grown technologies, bulking them up with an unprecedented mix of mandate and money. Those injections have led other countries, notably the United States and several in Europe, to cry foul, alleging that China's support for its renewable-energy industry violated international trade rules.⁸ That legal question continues to be debated. Either way, renewable energy would not now be the cost-competitive option it has become had it not been bankrolled first in the 1990s with yen and euros, and then, starting in the mid-2000s, with renminbi.

A fraught fight

The first problem with the West's attempt to quash Green China Inc. is that it's perilous for the planet. It raises the price of today's clean-energy technologies and inhibits the cross-border investment that will be necessary to develop tomorrow's.

Scientists say global emissions will have to plummet essentially to zero by mid-century in order to avoid the worst consequences of climate change.⁹ But, in 2017, global carbon emissions went up, not down. In 2018, they are expected to have risen even more.¹⁰ If China, the world's largest carbon emitter, does not meaningfully slash both the emissions it produces at home and those it finances abroad—not just slow their growth, as it has pledged to do, but slash them in absolute terms—then the world will not sufficiently curb climate change. Nothing that other countries do will be enough.

A crucial predicate for serious emissions cuts, in China and beyond, is to shift private investment in a greener direction. The International Energy Agency estimates some \$2.2 trillion will need to be spent globally on energy supply every year through 2025, much of it from private sources.¹¹ The Chinese government estimates China's demand for what it calls "green investment"—a category broader than clean energy—will be between \$430 billion and \$575 billion annually over the next five years, and that more than 85 percent of that will have to come from private sources.¹²

The second problem with the Western resistance to Green China Inc. is that it's increasingly moot. Implicit in the vilification of Green China Inc. is a belief that the West, if it tried hard enough, could defeat China in the increasingly high-stakes green-energy race. That view underestimates China's motives in building up its clean-energy prowess—motives that, in stark contrast to those in the United States and many other Western countries, are existential, immediate, and largely unrelated to global warming.¹³

For international audiences, China has framed its clean-energy aspirations as largely about climate change. In an announcement that won global green accolades, Chinese President Xi Jinping promised in

⁷ "Global Trends in Renewable Energy Investment 2018," (Frankfurt: Frankfurt School of Finance & Management, 2018), 32, <https://europa.eu/capacity4dev/unep/documents/global-trends-renewable-energy-investment-2018>.

⁸ For more on this point, see, later in this paper, "The solar stampede."

⁹ "Global Warming of 1.5° C," (Geneva: Intergovernmental Panel on Climate Change, October 2018), <https://www.ipcc.ch/sr15/>.

¹⁰ "World Energy Outlook 2018," (Paris: International Energy Agency, 2018), 23, <https://www.iea.org/weo2018>.

¹¹ Ibid.

¹² "China Green Finance Progress Report," (Beijing: Government of China, 2017), 35-36. Report cites a range of 3 trillion renminbi to 4 trillion renminbi, or roughly \$430 billion to \$575 billion as of November 18, 2018.

¹³ For more on this point, see, later in this paper, "Bad air and good jobs."

2014 that the country's carbon emissions would peak "around" 2030.¹⁴

But China has built its clean-energy juggernaut mostly for two reasons it sees as far more pressing than rising global temperatures. One is urban air pollution so noxious that it has become a threat not just to the lungs of the country's citizens but to the hegemony of its leaders. The other is the specter of decisive Chinese leadership in a range of emerging clean-energy industries—leadership that brings domestic job growth and global influence. "Green mountains and clear water are as good as mountains of gold and silver," Xi likes to say.¹⁵ Green, gold, and silver all are the colors of money.

The third flaw in the West's attempt to quash Green China Inc. is the most geopolitically relevant: It runs counter to the West's own economic interests. China already sits at the center of the fastest-growing clean-energy subsectors—solar panels, wind turbines, batteries, electric cars, and more. Western firms, including a long list of suppliers to Chinese manufacturers, have factored that into their businesses. As a result, the bottom lines of Western firms already are far more dependent on than they are threatened by China's role as a leading manufacturer of, and market for, clean-energy technology. Mounting evidence suggests that tit-for-tat tariffs and the building of barriers to foreign investment are hurting the United States' clean-energy industry more than China's.¹⁶ Evidence also suggests that the focus on China as the global green bogeyman is distracting the United States and other countries from the hard domestic-policy choices that might boost their own long-term competitiveness in the global green race.

Tapping the transformation

Here's the takeaway: Western companies—and, by extension, Western countries—have more to gain by leveraging Green China Inc. than they do by trying to defeat it.

Counterintuitive as that may seem, understanding it is particularly important now. That's because Green China Inc. is at a crucial point of transition—one that presents particular opportunities for savvy foreign governments and firms, not to mention for the global climate.

The maturation of Green China Inc. involves two parallel shifts.

One is a reform within China itself, as the government tightens up often-wasteful subsidies that it threw in recent years at the clean-energy sector and as it opens certain green subsectors to unfettered foreign competition. This reform is in line with broad priorities Xi has set out to recalibrate the Chinese economy. "We are keenly aware that many sectors of China's economy are not strong or competitive enough despite their big sizes," he said in a September 2016 speech. In the same talk, he said: "We have the resolve to make painful self-adjustments and tackle problems that have built up over many years, particularly underlying issues and entrenched interests and carry reform through to the end."¹⁷

The other foundational shift now underway is an aggressive state-sponsored campaign to expand Green China Inc. globally, in particular through the Belt and Road Initiative, a massive program of Chinese investment in infrastructure in approximately 65 countries that, according to the World Bank, constitute more than 62 percent of the global population, 30 percent of global economic value, and 75 percent of known energy reserves.¹⁸

Through these twin shifts, China is trying to usher in a second and pivotal stage of its world-leading green growth. Having promised it will build a "circular economy"—growth that is environmentally responsible—it is embarking on the converse too: the most audacious attempt the world has ever seen to make environmental progress economically sustainable. How far the

¹⁴ "US-China Joint Announcement on Climate Change," The White House, November 11, 2014, <https://obamawhitehouse.archives.gov/the-press-office/2014/11/11/us-china-joint-announcement-climate-change>.

¹⁵ Xi Jinping, "A New Starting Point for China's Development; A New Blueprint for Global Growth," (speech, B-20 summit, September 3, 2016), https://www.fmprc.gov.cn/mfa_eng/wjdt_665385/zyjh_665391/t1396112.shtml.

¹⁶ For more on this point, see, later in this paper, "The solar stampede."

¹⁷ Ibid.

¹⁸ "Belt and Road Initiative," The World Bank, March 29, 2018, <https://www.worldbank.org/en/topic/regional-integration/brief/belt-and-road-initiative>.

rationalization will go is unclear, in large part because it is offending powerful Chinese constituencies, from provincial governments to important energy firms. What it means for countries and companies outside China—whether it shakes out for them as a threat or as an opportunity—will depend to a large extent on how those foreign actors respond.

The West is in a strong position to profit from the maturation of Green China Inc. largely because of the West's long-standing leadership in technological innovation. That leadership, though, is neither absolute nor assured. Chinese firms, backed by increasingly strategic government research-and-development programs, are fast gaining technological chops, and in some cases they appear to be surpassing their Western rivals.¹⁹ Nevertheless, within China, the West still is widely seen—including by high-ranking government officials and business executives, many of whom have studied and worked in the West and interact with their Western counterparts regularly—as a desirable partner because of its long history of technological innovation.

Among the opportunities that today's transition in Green China Inc. presents for Western players, four stand out:²⁰

- China's current opening of its electric-vehicle market, the world's largest, to international companies without any requirement that the foreign companies ink joint-venture agreements with Chinese firms;
- foreign investment in big Chinese clean-energy projects, ranging from solar and wind farms to natural-gas terminals;
- a market in China for increasingly sophisticated technologies and business models to combat the noxious air pollution that still fouls the country's big cities;

- a desire by many Belt-and-Road countries, in part for geostrategic reasons, to balance the money and technology they're getting from China with money and technology from the West.

II: Understanding Green China Inc.: Rise, fall, and reform

Rise and fall: The roller coaster of solar

Understanding how to leverage China's drive to improve the efficiency of its green enterprise requires understanding what caused the inefficiencies in the first place. The too-hot rise of China's solar-power-equipment industry, and the painful attempt at reform, is especially illustrative. It's the boom-bust saga that China is trying not to repeat in newer clean-energy sectors, such as electric cars.

The history of the modern Chinese solar industry dates to the early 2000s, when European governments, particularly Germany's, rolled out generous solar subsidies, causing solar installations within their borders to soar. Those subsidies caught the attention of some savvy Chinese entrepreneurs who had been educated abroad in solar technology. They knew that their homeland had the manufacturing infrastructure—the supply chains, transport networks, and labor pools, all of them backed by government support—to scale up production of most products less expensively than the West.²¹

The entrepreneurs approached officials of a couple of Chinese provinces that were particularly experienced in technology manufacturing—namely Jiangsu and Zhejiang, neighboring provinces a short ride west of Shanghai. Officials of those provinces, and then of others, agreed to provide tax breaks and other aid to help the solar entrepreneurs set up factories to crank out solar panels in much the same way the provinces had done

¹⁹ For an extensive discussion of the China's progress in innovating in clean-energy technologies, particularly in solar energy, see: Jeffrey Ball, Dan Reicher, Xiaoping Sun, and Caitlin Pollock, "The New Solar System: China's Evolving Solar Industry and its Implications for Competitive Solar Power in the United States and the World" (Stanford, CA: Stanford University Steyer-Taylor Center for Energy Policy and Finance), <https://law.stanford.edu/publications/the-new-solar-system/>.

²⁰ For more on these four opportunities, see, later in this paper, "How to win."

²¹ For an extensive discussion of the history of China's solar industry, see Jeffrey Ball, Dan Reicher, Xiaoping Sun, and Caitlin Pollock, "The New Solar System."

for earlier waves of entrepreneurs who built t-shirt or microwave factories: in volumes and at prices that would dominate a burgeoning global market. Within a few years, China was producing the majority of the world's solar panels, and it was exporting essentially all of them, mostly to Europe.

Trouble emerged for the Chinese solar industry around 2009, when, in the wake of the global financial crisis, the European governments that had so generously incentivized solar installations within their borders began pulling back that support. Faced with a potential cratering of its market, the Chinese industry enlisted Beijing's help. China's central government rolled out a series of domestic deployment subsidies, creating a domestic market for the Chinese solar panels that previously had been all but totally exported.

That domestic solar-subsidy machine, however, was poorly designed, and it quickly spun out of control. It created what amounted to a Frankenstein's monster: a domestic Chinese solar market many times larger than Chinese policymakers had intended. The subsidies, designed with essentially no limit, encouraged Chinese solar manufacturers to add manufacturing capacity as fast as they could, all the better to maximize their share of the subsidy-fueled market.

That torrid growth, in turn, prompted a legal backlash from European and U.S. companies that has since exploded into an all-out trade war. It started in 2011 with a challenge from a German-based solar-panel maker and grew since then to include other clean-energy products. The Western companies, supported by their governments, have contended that China is violating international trade rules both because the Chinese government is subsidizing its firms too significantly and because those firms are discounting the market price of their exports too deeply. China denies it is violating trade laws. First with President Barack Obama and now with President Donald Trump, the United States has slapped tariffs on imported Chinese clean-energy products, and China has responded in kind against imported U.S. products.

The United States appears to be the main loser from the escalating trade war. A case in point is the solar tariffs. In the short term, at least, they have eroded the profits of Chinese solar-panel makers, forcing them to add manufacturing capacity outside China to circumvent the tariffs. But in the long term, the tariffs likely will have strengthened those firms by pushing them to expand their global manufacturing footprints. Meanwhile, China's response to the U.S. tariffs, which included slapping duties on Chinese imports of U.S. polysilicon, a crucial raw material for solar-panels, has decimated the U.S. polysilicon industry, one of the only sectors of solar manufacturing in which the United States ever was globally competitive.²²

Fueling the rise and fall: Subsidies on steroids

The saga of the development of the poorly designed subsidies that accentuated the boom-bust nature of Green China Inc.'s first stage is worth understanding in detail, as China now tries to correct those mistakes and usher in a second, more-efficient stage of Green China Inc.'s growth. How the reform plays out will do much to determine the extent to which outside players profit, and the planet benefits, from Green China Inc.

China's first solar-deployment subsidy, called the Golden Sun Demonstration Program, was launched in 2009. It paid developers a percentage of the money they invested in solar projects, regardless of the amount of electricity those projects produced. Predictably, the subsidy spurred the installation of expensive and inefficient systems. Ultimately, amid concerns about that inefficiency and about outright abuse, the program was disbanded.

China launched its major solar-deployment subsidy, its feed-in tariff, in 2011. As with feed-in tariffs in Europe, the one in China ensured solar developers a set price for their power that was above the government's prevailing power rate. It was financed by a surcharge on electricity bills paid by Chinese consumers. Two significant problems with China's feed-in tariff soon became

²² Ibid.

clear. First, Chinese policymakers weren't able to reduce the tariff quickly enough to keep pace with reductions in solar-manufacturing costs. Second, Chinese policymakers hadn't imposed a ceiling on the capacity of solar-farm construction that would be eligible for the feed-in tariff.

Together, these problems spurred a solar-development stampede that quickly overwhelmed Beijing. Many developers were earning rates of return far in excess of what Chinese policymakers had intended. Spurred by those spoils, Chinese solar deployment grew far more than government planners had envisioned. Starting in 2013, Chinese policymakers tried to fix things by reducing the feed-in-tariff rates. But those incremental tweaks proved insufficient. Moreover, the policymakers reduced the feed-in tariff only for large, so-called utility-scale, solar projects. They kept feed-in-tariff rates high for smaller, so-called distributed-generation, projects, which sit near consumers and thus have the potential to markedly expand solar penetration with less demand for expensive expansions of long-distance power-transmission lines. This proved yet another policy-design mistake.

The policymakers assumed that most of the distributed-generation feed-in-tariff proceeds would go to tiny collections of solar panels on the roofs of businesses or homes. In fact, however, they had written the rules so that even ground-mounted solar systems, up to a particular size, qualified for the higher distributed-generation feed-in tariff. Unsurprisingly in retrospect, but apparently contrary to the policymakers' predictions at the time, solar developers rushed to take the most-profitable route: They built the largest systems that still would qualify for the higher distributed-generation feed-in tariff. In essence, they built small utility-scale systems in such a way that ensured they'd get higher distributed-generation subsidy for them.

It wasn't long before the feed-in-tariff sums that the government had promised to developers exceeded the

sum the government was collecting through the renewable-energy surcharge. That shortfall prompted delays of up to two or three years in the government's disbursement of the feed-in-tariff payments. The delays embarrassed Beijing, which had, with great fanfare, talked up its renewable-energy aspirations to the world, for instance, at the U.N. climate talks in Paris in 2015. The delays also raised renewable-energy costs in China—a perverse result for a policy initiative that had been intended to make clean power cheaper. The delays inflated costs because, by eroding confidence in the Chinese solar-subsidy system that undergirded the market, the delays prompted the Chinese banks that were providing debt to finance the solar projects to demand that solar developers pay higher interest rates for that money.²³

By the end of 2017, Chinese policymakers were flabbergasted to discover that a record 53 gigawatts of solar capacity had been constructed in their country in just that year.²⁴ It turned out that 40 percent of that total came from projects that had been able to get themselves classified as distributed generation, thus intensifying the country's feed-in-tariff woes.²⁵ By the end of 2017, the Chinese government had racked up a shortfall of tens of millions of dollars, and projections were that, by 2020, the shortfall might triple.²⁶

Feed-in-tariff money wasn't the only Chinese resource overwhelmed by the unpredicted surge in solar-project construction. So was the supply of long-distance lines to transmit that solar power to market. The transmission-line shortage resulted from yet another policy miscalculation. Government planners had articulated a "target" of 105 gigawatts of domestic solar-power capacity by 2020. But it wasn't clear whether that target was a ceiling or a floor.²⁷ Solar-project developers, naturally, tended to regard the number as a floor, because that interpretation lent an air of government blessing to the developers' solar-plant-construction frenzy. But government planners tended to regard their target as a ceiling, which is one reason that they failed to induce China's two government-owned grid operators, the

²³ Author's discussions with Chinese energy-policy officials.

²⁴ "Renewables 2018: Global Status Report," 90.

²⁵ Author's discussions with Chinese energy-policy officials.

²⁶ *Ibid.*

²⁷ *Ibid.*

dominant State Grid and the smaller Southern Grid, to build enough new transmission capacity to accommodate as much solar capacity as the developers actually built. The upshot: a lack of lines to bring the clean juice to market.

The combination of unbridled renewable-energy-project construction and insufficient transmission-line construction has worsened a bottleneck known as curtailment: the forced reduction in output by renewable-energy projects because the system can't accommodate all the power the plants can produce. Typically, curtailment results from a one-two punch: Local consumers don't need all the power that local renewable-energy projects can generate, and the transmission grid hasn't been enlarged enough to be able to send that excess electricity to other places that could use it.

According to China's National Energy Administration (NEA), the country's curtailment problem is easing. During the first half of 2018, the portion of potential solar generation that failed to find a market because of inadequate transmission capacity was 3.6 percent, about half the previous year's rate, and the portion of curtailed wind power was 8.7 percent, about two-thirds the previous year's rate, according to NEA figures.²⁸

But lost wind and solar generation isn't the only curtailment problem in China caused by runaway construction of wind and solar farms. Chinese policy compels grid operators to accept wind and solar power onto the transmission system before they accept other types of generation, a policy intended to hasten the shift to renewables from fossil fuels, particularly coal. But in some parts of China, that policy has penalized other sources of renewable energy—perversely, already-existing, non-intermittent, carbon-free power. In 2017, in Sichuan Province, a river-rich part of central China that generates some 80 percent of its electricity from dams, including the massive Three Gorges Dam, 5 percent of the province's potential hydroelectric generation was curtailed because newly constructed wind and solar

projects effectively squeezed the existing river power off the grid.²⁹ Five percent of Sichuan's 2017 potential hydroelectric generation amounts to 10 billion kilowatt-hours of power—roughly enough to power North Korea, Guatemala, or Kenya for a year.³⁰

The mounting evidence of these costly inefficiencies has spurred an increasingly bold and serious response among Chinese policymakers, particularly over the past year. Two responses are particularly noteworthy, particularly for Western players looking to leverage Green China Inc.

Reform I: Smarter subsidies

The first is a series of reforms to China's clean-energy subsidies that are designed to force technological improvement in Chinese-made clean-energy equipment. For solar energy, the reforms involve a significant reduction in the feed-in tariff, in particular for the least-sophisticated solar panels. For electric vehicles, they involve both a shift in subsidies to more-efficient, longer-range models and an opening of the sector to unfettered foreign competition.

China is slashing its feed-in tariff subsidies, particularly for solar. In June 2018, China cut the feed-in-tariff rate for utility-scale solar projects by about 20 percent. And it stopped providing subsidies to developers of distributed-generation solar projects that were under construction but had not been connected to the grid—even though the developers of those projects had been planning them on the assumption that they would be eligible for the higher feed-in-tariff rates. The feed-in tariff for wind has, thus far, not been slashed like the one for solar. But an existing government policy document envisions cutting the wind tariff by the end of 2019, and policymakers are discussing those details.³¹

As it dials down its feed-in tariffs, China is ramping up auctions in an effort to harness market competition to

²⁸ David Stanway, "China's Renewable Power Waste Falls, But Warns of Challenges," *Reuters*, July 30, 2018, <https://www.reuters.com/article/us-china-renewables-waste/chinas-renewable-power-waste-falls-but-warns-of-challenges-idUSKBN1KL005>.

²⁹ Author's discussions with Sichuan officials.

³⁰ "Electricity consumption," *CIA World Factbook*, <https://www.cia.gov/library/publications/the-world-factbook/rankorder/2233rank.html>.

³¹ Author's discussions with Chinese energy-policy officials.

cut renewable-energy prices. In an auction, a government typically awards the right to develop a renewable-energy project to the developer who agrees to sell electricity from that project at the lowest price. As in other parts of the world, including the United States, Europe, and Latin America, China's early renewable-energy auctions are dramatically cutting costs. A recent auction for a large 200-megawatt solar project in north-east China's Jilin Province produced a winning bid of roughly half the prevailing feed-in-tariff rate. Similarly, China has announced plans for a massive 6-gigawatt wind farm in the country's blustery Inner Mongolia region, to be awarded through an auction and with no feed-in tariff.³²

Incrementally but deliberately, Chinese policymakers also are working to replace their feed-in tariffs with a new structure of more-market-oriented renewable-energy support mechanisms. One is a financial instrument called a green certificate. China is constructing a market in these certificates modeled on the market for so-called renewable-energy certificates in the United States. In this market, a renewable-energy project spins off one certificate for every megawatt-hour of electricity it produces. The project sells both the underlying electricity, at the conventional-power price, and the certificates. China's government is beginning to require large coal-fired power producers to buy renewable-energy certificates to offset the coal-fired power they generate. That expectation already is increasing direct investment by coal-fired power producers in renewable-energy projects; the coal-fired power producers wager that they can produce renewable-energy certificates in projects they operate less expensively than by buying the certificates on the open market.

China also is shifting its electric-vehicle-subsidy structure to steer the market toward models that use power more efficiently and that go farther on every charge. Thus far, Chinese brands have accounted for the overwhelming majority of electric-vehicle sales in the country. Not surprisingly, given that Chinese automakers have just begun producing large numbers of electric vehicles, and

given that the Chinese government has sought to stimulate Chinese production, electric-vehicle subsidies in China over the past few years have rewarded relatively cheap models. But that now is changing. China's inducements for auto manufacturers to produce electric cars is shifting from carrot to stick. China is reducing overall electric-vehicle-subsidy spending and restructuring its remaining subsidies to reward more-sophisticated technology. It also is mandating that automakers sell a certain number of electric vehicles each year—a number pegged to their overall sales. That move, combined with the government's opening of the industry, is prompting foreign automakers to dramatically increase their electric-vehicle sales in China.

Reform II: Greener money

China's second response to the inefficiency of Green China Inc. is a package of green-finance measures designed to redirect massive amounts of institutional Chinese capital to bankroll low-carbon growth on a scale that actually might prove material to the global climate. Crucially, the green-finance measures seek to redirect Chinese investment not just in China but, through China's Belt and Road Initiative, across much of the world. Whether these green-finance measures will succeed remains to be seen. But the effort is well-organized, supported by potent Chinese financial players, and extraordinarily ambitious. If it works, it will dwarf any of the attempts underway to scale up low-carbon finance in the West.

This drive to shift China's entire financing system onto a greener path includes carrots, such as reduced interest rates for so-called green bonds and other instruments to finance environmentally-oriented projects, and sticks, such as a requirement that, by 2020, all publicly-traded companies in China disclose their environmental activities and liabilities in annual public reports.³³ China's green-finance campaign is fraught with political landmines, any one of which could blow it up. But if it succeeds, it could mobilize perhaps the most consequential decarbonization in the world.

³² Ibid.

³³ "China Green Finance Progress Report."

China announced the effort in August 2016, issuing a manifesto—“Guidelines for Establishing the Green Financial System”—with the backing of some of the country’s most powerful financial players: the People’s Bank of China (PBOC), the country’s central bank; the National Development and Reform Commission, the country’s economic planning entity; the ministries of finance and of environmental protection; and a trifecta of government watchdogs of the Chinese financial system, the China Banking Regulatory Commission, the China Securities Regulatory Commission, and the China Insurance Regulatory Commission.³⁴ Another notable step came in December 2017, when China joined central banks and financial officials from Austria, Belgium, France, Germany, Mexico, Morocco, the Netherlands, Spain, Sweden, Singapore, and England to establish the Central Banks and Supervisors Network for Greening the Financial System. Also participating in this international effort are multilateral institutions such as the World Bank and the Organization for Economic Cooperation and Development.³⁵ Notably absent from its list of participants: the United States.

Within China, one of the green-finance campaign’s most important planks is to induce Chinese financial institutions to provide lower-cost debt to projects deemed green. The PBOC has begun to include the environmental performance of a Chinese bank’s portfolio among the factors the central bank considers when assigning that Chinese bank its financial-health rating, known as its macro-prudential assessment. That rating from the central bank is important in determining the cost at which a Chinese bank can obtain money. Further demonstrating its seriousness, the PBOC is starting to require Chinese banks to submit quarterly statistics on their green-loans activity.³⁶

Potentially even more environmentally important than China’s effort to decarbonize finance within its borders

is its stated aim to green the Belt and Road Initiative, the massive program of Chinese investment in infrastructure. The China Development Bank, one of the country’s primary policy banks to help the Chinese government carry out strategic policy initiatives, has established a \$36 billion fund to finance Belt and Road Initiative projects deemed green.³⁷ In September 2017, seven industry associations in China launched the Environmental Risk Management Initiative for China’s Overseas Investment, which calls for, among other things, Chinese investors in overseas projects to heed United Nations and other international sustainable-investment guidelines.³⁸

One feature of China’s new green-finance focus that underscores both the potential and the pitfalls of the trend is a surge in Chinese issuance of environmentally-oriented loans that have come to be known internationally as “green bonds.” In 2017, a year when green-bonds issuances jumped globally to a record \$155 billion, the United States ranked first in issuances, at about \$42 billion, and China ranked second, at about \$23 billion.³⁹ Yet green bonds remain a tiny fraction of total debt in China, and so green bonds’ environmental accomplishments remain negligible. In 2017, according to a recent Chinese report on the green-finance effort, the projects financed by Chinese green bonds reduced China’s carbon-dioxide emissions by 106 million tons.⁴⁰ That, according to International Energy Agency figures, amounts to about 1 percent of China’s total carbon emissions.⁴¹

Another important change is the requirement that publicly-traded companies in China disclose their environmental risks, including those related to climate. The China Securities Regulatory Commission, China’s version of the U.S. Securities and Exchange Commission, has required that, starting in 2018, publicly-traded

³⁴ “Guidelines for Establishing the Green Financial System,” People’s Bank of China, August 31, 2016, <http://www.pbc.gov.cn/english/130721/3131759/index.html>.

³⁵ See “About Us,” Central Banks and Supervisors Network for Greening the Financial System, <https://www.banque-france.fr/en/financial-stability/international-role/network-greening-financial-system/about-us>.

³⁶ “China Green Finance Progress Report,” 51.

³⁷ *Ibid.*, 224. Report cites a fund value of 250 billion renminbi, roughly \$36 billion as of November 18, 2018.

³⁸ *Ibid.*, 33.

³⁹ “Green Bond Highlights 2017,” (London: Climate Bonds Initiative, January 2018), <https://www.climatebonds.net/files/reports/cbi-green-bonds-highlights-2017.pdf>.

⁴⁰ “China Green Finance Progress Report,” 260.

⁴¹ “World Energy Outlook 2018,” 581.

companies in China categorized as “key pollution-discharge units”—that is, major polluters—disclose their environmental risks at least annually in public reports. The commission has said that, by the end of 2020, it will require all publicly-traded companies in China to issue such disclosures.⁴²

This is impressive rhetoric. The question is how it will change practice. Chinese officials acknowledge that standards, monitoring, and verification remain weak, creating a danger of so-called green-washing, in which companies claim publicly to be moving money in environmentally-responsible ways, but their claims aren’t sufficiently verified.⁴³ It is all but impossible to get environmental information from what are known in China as zombie companies—old companies that have racked up extensive environmental violations.⁴⁴ China’s Ministry of Finance still is reviewing definitions of what constitutes green finance as it develops China’s National Green Development Fund, but China’s standards remain, in some cases, weaker than those elsewhere. For example, China’s proposed standards allow debt to certain fossil-fuel projects to qualify as green bonds, though international standards on green bonds typically do not.⁴⁵ Indeed, though China claimed to have issued \$36 billion in green bonds in 2017, only about \$23 billion of that amount met international green-bonds standards.⁴⁶ And the Asia Infrastructure Investment Bank, a multilateral bank founded by China in 2016, has a more-permissive policy for funding fossil-fuel projects than does the World Bank. All of these factors justify skepticism about how green the Belt and Road Initiative really will be.

III: Exploiting and expanding Green China Inc.

China’s challenges

Top Chinese officials know well that, to improve the efficiency of Green China Inc., further reform is key in four areas: clean-energy subsidies, debt markets, electricity markets, and the Belt and Road Initiative. Depending on how the reform proceeds, all four could offer possibilities for actors from outside China to play.

China has begun to temper the most egregious excesses of its structure of clean-energy subsidies. Dialing down feed-in-tariff rates and shifting to auctions for solar and wind projects are sensible first steps. And China is in the process of reforming its subsidies for other clean-energy industries, notably batteries and electric cars. It will be good both for China and the world if those Chinese reforms happen more smoothly than the ones for wind and solar. Roller coasters make for good fun but bad policy.

Reducing the cost of financing for clean-energy projects in China also is crucial. To a greater extent than in the West, China’s debt market is dominated by banks that tend to be conservative in the debt structures they offer. The lack of competition from non-bank lenders and a lack of creativity in lending structures from China’s state-owned banks combine to raise the cost of capital in China—particularly for non-state-owned firms, the sort that often innovate most in clean-energy technologies. (A prevailing view in the West that Chinese clean-energy firms have benefited from cheap government-backed debt is not borne out by the facts. To be sure, Chinese firms have received plentiful government-backed debt, notably at times, such as during the global financial crisis, when capital markets in the West had seized up. But those firms typically had to pay higher interest rates than are common in the West.⁴⁷) One helpful reform would be to increase the availability in China of a type of debt common for clean-energy projects in the United

⁴² “China Green Finance Progress Report,” 102.

⁴³ *Ibid.*, 15.

⁴⁴ *Ibid.*, 147.

⁴⁵ *Ibid.*, 153.

⁴⁶ “Green Bond Highlights 2017.”

⁴⁷ For more details, see Jeffrey Ball, Dan Reicher, Xiaoping Sun, and Caitlin Pollock, “The New Solar System,” 51.

States: non-recourse debt, in which, if the borrower defaults, the lender can seize only the underlying project and not the borrower's other assets. Non-recourse debt tends to help new players enter a market—players that haven't yet built significant balance sheets that they can use as collateral. In a market, such as China's, that is dominated by often-lumbering state-owned firms, more non-recourse debt could help open things up.

China has been trying for nearly two decades to deregulate its electricity market. But the government still sets prices. And a lack of market competition continues to inhibit efficiencies, nowhere more importantly than in the transition to lower-carbon energy sources. A new wave of market reform unveiled in China in 2015 seeks to open the retail power market to competition, to let large electricity consumers buy power directly from generators or from retail providers, and to prioritize renewable sources in transmission.⁴⁸ But change is happening slowly. One key area for reform is China's power-transmission system. Expanding ultra-high-voltage transmission will be key to breaking China's renewable-energy-curtailement bottleneck. China has demonstrated that it has little difficulty capturing clean electrons; its real problem is ferrying those clean electrons to the urban centers where they can be used. The big hurdle isn't technology; State Grid, the government-owned colossus that is the largest utility both in China and in the world, is a global innovator in ultra-high-voltage equipment. The big problem is politics. In a variant of the situation in the United States, where energy policy is made largely by states, in China powerful provinces, particularly those in the country's midsection, have successfully blocked efforts at increasing long-distance power transmission. Their concern: More big lines will advantage China's lowest-cost electricity producers, notably those in the western part of the country, thus imperiling the central provinces' higher-priced local power generators. Their concern is justified; their provincialism is sensible. But China must address it through power-market reform if it is to unlock the possibilities of truly large-scale, low-cost clean energy.

Historically, China's environmental impact on the world has come from what it has done within its borders. In the future, it will come increasingly from what China finances abroad. That is why turning words into action in the greening of the Belt and Road Initiative is so vital. China's nascent effort at green finance is impressive in the sophistication of its analysis of the problem, in the breadth of its aspiration to fix it, and in the cast of high-level actors who have lined up to back it. But so far the effort is more talk than action. It is hard to conceive of a change more politically difficult to effect than forcing the most potent players in the Chinese economy—banks, corporations, insurance companies, the country's sovereign wealth fund—to start systematically internalizing environmental externalities into their financial practices, and then to disclose to investors, in a way that is understandable and actionable, their success or failure in doing so. It is particularly hard to envision that shift as these institutions pivot to invest trillions in infrastructure in dozens of countries around the world that have not launched the decarbonization campaign that China has. That, though, is the challenge.

Who wins

Myriad players outside China have an economic interest in seeing this transformation of Green China Inc. succeed. Perhaps the broadest group comprises equity investors around the world, everyone from individuals to institutional giants who own publicly traded shares of firms whose profits follow the rise and fall of China's clean-energy push. Three other foreign groups stand out: manufacturers of clean-energy equipment, developers of clean-energy technology that has yet to reach real manufacturing scale, and financiers of both. All three are playing in the Chinese market to limited extents. But China's imperative to improve the efficiency of its clean-energy enterprise offers the opportunity for them to play far more.

Manufacturers and technology developers have the same main interest in breaking more deeply into China:

⁴⁸ Xiyang Liu and Lingcheng Kong, "A New Chapter in China's Electricity Market Reform," (Singapore: National University of Singapore Energy Studies Institute, March 21, 2016), <https://esi.nus.edu.sg/docs/default-source/esi-policy-briefs/a-new-chapter-in-china-s-electricity-market-reform.pdf>.

sales. For essentially all clean-energy technologies, the domestic Chinese market already is the largest in the world. With the Belt and Road Initiative, the market under Chinese influence is set to hugely expand.

Non-Chinese financiers, too, have a stake in the growth of the Chinese clean-energy sector. Major U.S. and European investment banks, for instance, long have offered transactional services in China, taking Chinese companies public, structuring follow-on capital raises, and facilitating mergers and acquisitions. They also have taken equity stakes in Chinese projects. The prospect of providing debt to Chinese players would, for Western banks, represent a significant new market. Senior Chinese officials are increasingly interested in reducing the cost of debt for clean-energy projects. That could open the door for Western lenders that have tended to offer a wider array of debt instruments than have their Chinese counterparts.

None of this is to minimize the roadblocks standing in the way of deeper Western corporate involvement in China. Outside firms traditionally have had to ink joint ventures in order to enter China rather than being able to go in alone—though China’s opening of its automotive market raises the possibility of broader changes. Outside technologists and manufacturers often worry that, if they enter China, they will lose their intellectual property. As for the specter of foreign institutions selling debt in China, although the Chinese government has said it wants to encourage the practice, impediments remain, including that Chinese laws don’t allow foreign lenders to seize borrowers’ Chinese assets in the event that borrowers default.

The point is not that it will be easy for foreign players to enter China’s clean-energy market. China can, should, and probably will do much more to open its markets. The point is that China’s moves even thus far to improve the efficiency of its clean-energy enterprise offer these players an increased incentive to try to overcome the difficulties.

Who loses

Some players in the West will lose from Green China Inc.’s rise. Western manufacturers of commodified clean-energy equipment will find it increasingly hard to compete with lower-cost production in China, as the bankruptcies of numerous solar-panel makers in the United States and Europe over the past several years show. To be sure, studies suggest the aggregate Western job losses resulting from the rise of China Clean Energy Inc. are outweighed by the aggregate gains. For example, as the decline in solar prices precipitated by inexpensive manufacturing in China has boosted solar installations in the United States, it also has produced a sizeable increase over the past decade in U.S. solar employment, mostly in the form of solar-installation jobs.⁴⁹ But politics, like humanity, tends to be about distributional shifts rather than about aggregate trends. The rise of Green China Inc. significantly hurts some Americans even as it helps the United States.

The answer, however, is not for the West to try to bury Green China Inc. A better solution for the United States and for other Western countries keen for globally-competitive domestic clean-energy-manufacturing sectors is a two-pronged strategy: a focus first on research and development, and second on manufacturing cutting-edge rather than commodified clean-energy goods.⁵⁰

How to win

Today’s transformation of Green China Inc. points up four particularly noteworthy opportunities for Western players.

China’s electric-vehicle market

In April 2018, at the Boao Forum for Asia, President Xi announced that China would open its automotive

⁴⁹ Though the number of U.S. solar jobs was in 2018 was more than double the number in 2010, the number fell in both 2017 and 2018, a trend many in the industry attribute in large part to the tariff fight. See “National Solar Jobs Census 2018,” Solar Foundation, 2018, <https://www.thesolarfoundation.org/national/>.

⁵⁰ For extensive recommendations on how to minimize U.S. clean energy manufacturing job losses as a result of the rise of such jobs in China, see Jeffrey Ball, Dan Reicher, Xiaoping Sun, and Caitlin Pollock, “The New Solar System.”

market to foreign players. It would ditch a requirement that they enter joint ventures with Chinese firms—a requirement, unusual among World Trade Organization (WTO) members, that China negotiated when China entered the WTO in 2001 in an attempt to protect its then-fledgling auto industry. And, Xi said, China would “significantly lower” tariffs it levies on auto imports.⁵¹ Days later, China’s National Development and Reform Commission announced the opening would occur in phases: electric vehicles in 2018, commercial vehicles in 2020, and the passenger-car market by 2022.⁵² The opening was widely interpreted as an attempt to de-escalate trade tensions with the United States; U.S. President Donald Trump had been increasingly critical of China’s auto-market barriers.

Geopolitically, trade tensions between the two countries remain high. Commercially, though, China’s policy shift has begun yielding results. Tesla, the California-based electric-car maker, which already has showrooms in many Chinese cities and sells thousands of imported cars each year to the country’s rich, broke ground in January 2019 on a factory near Shanghai that is expected to produce 500,000 electric vehicles annually, about twice the number Tesla sold globally in 2018.⁵³ (Unlike many other U.S. and European automakers, which years ago inked joint ventures with Chinese firms to tap the Chinese market, Tesla had said it wouldn’t manufacture in China unless it could do so alone, in part for fear it would lose its technology in a joint venture.)

Chinese clean-energy projects

The market for cleaner energy in China, too, is attracting increasing Western investment. Amid surging Chinese demand for natural gas, a fossil fuel cleaner than coal that is burned to generate electricity, ExxonMobil, the U.S.-based oil giant, announced in September 2018

that it would invest in the construction of a terminal in Huizhou, a city in China’s Guangdong Province, to import liquefied natural gas (LNG) to sell in China. The Huizhou LNG terminal would allow ExxonMobil to import into China gas that the company produces in such countries as Mozambique and Papua New Guinea. That infrastructure will allow ExxonMobil to circumvent a 10 percent tariff that China has imposed on U.S.-produced natural gas as part of its ongoing trade war with the United States. ExxonMobil envisions the terminal as part of a broader plan for Huizhou that also includes building a multibillion-dollar chemical complex that “would rely on advanced proprietary technologies,” the company said in a statement.⁵⁴ That point is noteworthy because it suggests that Western companies can get comfortable putting their energy-related intellectual property into China when they judge the potential financial rewards to be big enough.

Western firms are pouring money also into renewable-energy projects in China. Apple, the computer giant, announced in June 2018 that it and 10 suppliers were investing “nearly \$300 million over the next four years” into renewable-energy projects in China.⁵⁵ The projects are intended to provide enough electricity either to power directly or to offset carbon emissions from non-renewable sources that power Apple’s and its suppliers’ operations in China.

Other Western companies are investing in Chinese renewable-energy projects not merely to improve the environmental profile of their Chinese operations but, in a more-profound shift, to profit from China’s broader attempt to clean up its electricity system. EDF Renewables, a unit of France’s EDF Group, is investing in such a fund of Chinese projects. Both the Apple and EDF funds are managed by DWS Group, a German-based asset manager that has nearly 700 billion euros of assets under management and is majority-owned by Deutsche Bank.

⁵¹ Paul Wiseman and Joe McDonald, “China’s president’s conciliatory trade gesture raises optimism,” *Associated Press*, April 10, 2018, <https://www.apnews.com/45e28f10baa2460fb17a0b101c366067>.

⁵² Amanda Lee and Daniel Ren, “China lays out plan for opening auto industry, clearing the way for Tesla’s wholly owned plant,” *South China Morning Post*, April 17, 2018, <https://www.scmp.com/tech/enterprises/article/2142150/tesla-pole-position-china-pledges-remove-all-foreign-auto-ownership>.

⁵³ Rishi Iyenger, “Tesla starts building its huge Shanghai factory to make cars for China,” *CNN Business*, January 7, 2019, <https://www.cnn.com/2019/01/07/business/elon-musk-tesla-gigafactory/index.html>.

⁵⁴ “ExxonMobil Signs Framework Agreement for Proposed Chemical Complex in China,” ExxonMobil, September 5, 2018, <https://news.exxonmobil.com/press-release/exxonmobil-signs-framework-agreement-proposed-chemical-complex-china>.

⁵⁵ “Apple launches new clean energy fund in China,” Apple, June 12, 2018, <https://www.apple.com/newsroom/2018/07/apple-launches-new-clean-energy-fund-in-china/>.

Western firms also are moving to manufacture renewable-energy equipment in China. SunPower, a California-based firm, manufactures particularly high-efficiency solar panels, mostly in Malaysia, Mexico, and the Philippines, for the global market but, under a joint-venture with a Chinese company, SunPower manufactures less-expensive solar panels in China for the Chinese market. Meyer Burger, a Swiss-based manufacturer of equipment used to make solar cells, is in the process of shifting most of its production and executive functions from Europe to China, a recognition of Asia's centrality in the global solar market.

Cleaning up Chinese air pollution

China's urban air pollution is notorious; in some Chinese cities, levels of PM 2.5—particulate matter that is less than 2.5 micrometers in diameter and that thus lodges easily in the lungs—commonly are 10 times or more above the threshold the World Health Organization deems dangerous. As a result, China has made cleaning up its air a top national priority. Over the past few years, that campaign has yielded some major progress—and birthed a robust industry for Western firms selling air-cleaning technology.

One example is IBM. It develops for Chinese authorities software that allows the authorities to manage air quality by, among other things, forecasting the interaction of weather and industrial pollution and identifying violators of air-quality rules so they can be punished.⁵⁶

Another is A.O. Smith, a Milwaukee-based water-heater maker that in recent years has branched out to selling air-purification equipment in China. Bad air in China is prompting many in the country “to not only invest in in-home air purification, but to pay up for high-end products,” one stock analyst wrote in a 2017 report on the company. “A.O. Smith's timely entry into this space

positions the company to benefit from what is developing into an attractive market that combines sustained volume growth and defensible pricing power.”⁵⁷

Counterbalancing Chinese Belt and Road investment

Many of the countries China has targeted for infrastructure investment as part of its Belt and Road Initiative face a dilemma. On the one hand, they need outside infrastructure technology and funding. On the other hand, they are looking for sources other than China, sometimes because they fear becoming too beholden to China and sometimes because they believe that they can find more-advanced technology elsewhere.

In one example, Vietnamese officials rejected a Chinese plan to build two aluminum smelters in Vietnam, deciding the Chinese offerings were too dirty. The Vietnamese officials have pursued Western technology instead.

The Trump administration itself is touting involvement by U.S. companies in China's Belt and Road Initiative. In 2017, at a conference in Beijing, an administration official said U.S. companies have “much to offer” such projects. “U.S. firms have a long and successful track record in global infrastructure development, and are ready to participate in Belt and Road projects,” he added.⁵⁸ Indeed, the administration has formed the American Belt and Road Working Group, in which the U.S. Embassy in Beijing seeks to help U.S. firms exploit opportunities of the Chinese infrastructure program.⁵⁹

Getting real

The story of the rise, fall, and reform of Green China Inc. has a simple lesson: Those outside China have more to gain by helping China improve its clean-energy game than they do by thwarting it.

⁵⁶ “Green Horizon,” IBM, <http://research.ibm.com/labs/china/greenhorizon.html>.

⁵⁷ Ciara Linnane, “A.O. Smith is poised to benefit from demand for home systems that address air quality in China,” *MarketWatch*, January 7, 2017, <https://www.marketwatch.com/story/how-one-us-company-is-addressing-chinas-air-pollution-problem-2017-01-06>.

⁵⁸ Agence France Presse, “U.S. companies ‘ready’ to get on China's One Belt, One Road: White House adviser,” *The Straits Times*, May 14, 2017, <https://www.straitstimes.com/asia/east-asia/us-companies-ready-to-participate-in-chinas-one-belt-one-road-white-house-adviser>.

⁵⁹ Huanxin Zhao, “U.S. Forms Belt, Road Group,” *China Daily*, May 16, 2017, http://www.chinadaily.com.cn/newsrepublic/2017-05/16/content_29374081.htm.

Four specific opportunities for Western players to profit from the rise of Green China Inc. are particularly compelling: China's opening of its electric vehicle market to foreign companies; foreign investment in big Chinese clean-energy projects; a market in China for fixes to its air-pollution woes; and a desire by many countries targeted by the Belt and Road Initiative to balance the money and technology they're getting from China with money and technology from the West.

The notion that it is in the West's interest to leverage rather than lambaste Green China Inc. runs so counter to the prevailing Western political narrative that it runs the risk of being dismissed as a pipedream. But novelty needn't be naïveté. Although trade tensions between the United States and China appear now to be waxing rather than waning, that could shift quickly, creating an opportunity for the sort of measured assessment of mutual economic interest that could make a new approach toward Green China Inc. politically palatable in

the West. Even if the trade war deepens, however, compelling reasons remain for the West to reset its approach to Green China Inc.

One reason is environmental: If China doesn't clean up its act economically, it won't clean up its act environmentally—and if China doesn't clean up its act environmentally, the world has essentially no hope of meeting its carbon-reduction goals.

But the stronger reason—stronger in part because it's a predicate for meaningful environmental action—is financial self-interest. Despite their trade-war chest-thumping, despite their framing of the push for cleaner energy as a nationalistic zero-sum game, Beijing, Brussels, and Washington—or, more specifically, Chinese and Western capitalists—need each other so each can do what they most want in the global clean-energy race: maximize the money they make.

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