China's Coal Fleet Continues to Grow

April 21, 2021

We wrote a blog several months ago that included information on coal-fired power plants in China, as well as coal-fired power plants that China was helping to finance in other countries. One of the takeaways was that China's coal fleet — already as large as the coal fleets of all other countries combined — was growing, and Chinese financial institutions and businesses were financing more than 100 gigawatts (GW) (or 100,000 megawatts (MW)) of coal-fired generation in other countries.[i]

Our primary source for the information last year was a report published by Global Energy Monitor (GEM), a research organization whose data are used by the International Energy Agency (IEA), the OECD Environment Directorate, UN Environment Programme, U.S. Treasury Department, and the World Bank.

With the expected Earth Day announcements by other countries to possibly strengthen their pledges to reduce greenhouse gas (GHG) emissions under the Paris Agreement, we wanted to highlight new information published recently by GEM.[ii]

BACKGROUND

Global anthropogenic GHG emissions are estimated to be 52.4 billion metric tons (tonnes) CO2e in 2019.[iii] China is the world's largest emitter at 14.4 billion tonnes, and, therefore, represents 28 percent of global emissions.[iv] The U.S. was responsible for about 6.56 billion tonnes in 2019, which is slightly less than 13 percent of global emissions.[v] The next largest emitters are the European Union (4.2 billion tonnes), India (3.7 billion tonnes), The Russian Federation (2.6 billion tonnes), and Japan (1.6 billion tonnes).[vi]

According to EPA, U.S. GHG emissions have declined from 7.43 billion tonnes in 2005 to 6.56 billion tonnes in 2019, a drop of almost 12 percent.[vii] Electric sector emissions have declined from 2.4 billion tonnes to 1.61 billion tonnes, a reduction of 33 percent over the same period.

China has pledged to stop increasing its CO2 emissions (reach peak emissions) "around" 2030, or earlier if possible.[viii] In addition, President Xi Jinping announced last September that China would be carbon neutral "before" 2060. As of today, the Biden administration is expected to commit the U.S. to reducing GHG

emissions by 50 percent below 2005 levels by 2030. This means that China would stop increasing emissions by about the same time the U.S. will have cut its emissions by half.

CHINA

GEM released its updated report on China in February. These are some of the highlights from the update, as well as information from other sources.

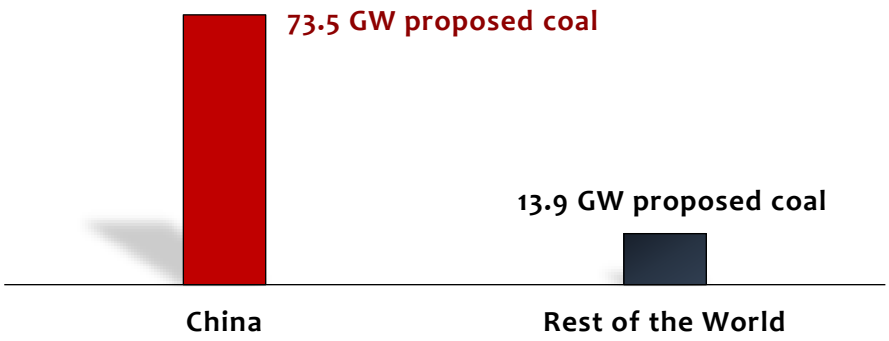
China has the world's largest coal fleet and half of the world's entire coal-fired electric generating capacity.

China's coal fleet totals 1,095 GW of electric generating capacity.[ix] This represents half of the world's coal-fired generating capacity (2,059 GW) and is approximately the same size as the entire U.S. electricity supply (natural gas, coal, oil, nuclear, and renewables), which totals some 1,100 GW.[x] The U.S. coal fleet totals 234 GW and, therefore, about one-fifth the size of China's coal fleet.[xi]

China's coal fleet continues to grow, despite President Xi Jinping's pledge to become carbon neutral before 2060.

Overall, China's coal-fired generating capacity has been increasing steadily to support its economic growth. (China's GDP is projected to grow by 8.5 percent this year, compared to U.S. growth of 5.5 percent.[xii]) China has 247 GW of coal-fired generating capacity (460 generating units) under construction or proposed.[xiii] This is an increase of 41 GW over the amount China had under construction or proposed at the end of 2019 and an increase of almost 56 GW over the amount proposed in 2018. (Forty-one GW is roughly the size of New York's entire electricity supply.[xiv]) This amount of new Chinese capacity (247 GW) is larger than the existing U.S. coal fleet (234 GW). The chart below compares the coal-fired generating capacity of China and the U.S. Eliminating the entire U.S. coal fleet would be more than offset simply by the increase in new coal capacity by China.

Last year, China *commissioned* more than three times as much new coal-fired generating capacity (38.4 GW) as all other countries in the world combined (11.9 GW).[xv] China was also responsible for 85 percent of *proposed* new coal-fired capacity worldwide last year (73.5 GW out of 87.4 GW).[xvi] See chart below.



The 73.5 GW of proposed coal capacity represents an increase of 12 GW over the amount proposed in 2019 and an increase of almost 56 GW over the amount proposed in 2018. Moreover, China's upcoming Five Year Plan could potentially include as much as 200 GW of new coal-fired generating capacity.[xvii]

The next largest additions (announced, pre-permit, permitted, and under construction) of coal-fired capacity after China are India (65.9 GW), Indonesia (32.9 GW), Vietnam (28.7 GW), Turkey (20.4 GW), and Japan (9.8 GW).[xviii] Worldwide, additions of coal-fired generation total 503 GW as of January 2021, roughly twice the size of the existing U.S. coal fleet.[xix] These additions would equate to more than 1,000 new coal-fired generating units worldwide. However, it is unlikely that all of this capacity will actually be built.

China's coal consumption has continued to increase.

China's coal consumption is projected to be 3.875 billion tonnes this year, an increase of 61 million tonnes over 2020.[xx] China's consumption represents more than half (52 percent) of total worldwide coal consumption (7.432 billion tonnes). U.S. coal consumption is projected to be 487 million tonnes, making China's coal consumption eight times greater than the U.S. China's coal consumption has increased by 82 million tonnes above 2018 levels, whereas U.S. consumption has declined by 132 million tonnes since 2018.

REFLECTIONS

It will be interesting to see what China does about its emissions pledge. GEM suggests that achieving carbon neutrality by 2060 means that China's power sector should decarbonize by 2050.[xxi] Other analysis suggests that achieving its 2060 target

would require China's coal fleet to shrink by almost 40 percent from its existing level of 1,095 GW by 2030.[xxii] Adding another 247 GW of new coal (more than the existing U.S. coal fleet) to the existing Chinese fleet would turn a very difficult challenge into a seemingly impossible task. Will China take the steps necessary to drastically reduce its dependence on coal, especially by 2030? And by the way, don't forget the other 256 GW of coal-fired generating capacity that other countries are considering. One thing is for certain, Secretary Kerry and President Biden have their work cut out for them.

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[i] Global Energy Monitor, Sierra Club, Greenpeace and CREA, "Boom and Bust 2020: Tracking the Global Coal Plant Pipeline," March 2020, Christine Shearer et al. https://energyandcleanair.org/publications/boom-and-bust-2020-tracking-the-global-coal-plant-pipeline/

[ii] "China Dominates 2020 Coal Plant Development – Aggressive Pursuit of Coal Puts 2060 Carbon-Neutral Goal At Risk," Global Energy Monitor, February 2021. ("GEM Update 2021") https://globalenergymonitor.org/wp-content/uploads/2021/02/China-Dominates-2020-Coal-Development.pdf

[iii] "Trends in Global CO_2 and Total Greenhouse Gas Emissions: 2020 Report," PBL Netherlands Environmental Assessment Agency, The Hague, December 21, 2020. ("Netherlands Assessment")

[iv] Rhodium Group, "Preliminary 2020 Greenhouse Gas Emissions Estimates for China," March 4, 2021. https://rhg.com/research/preliminary-2020-greenhouse-gas-emissions-estimates-for-china/#:~:text=China's%20emissions%20continued%20to%20grow%20in%202020&text=The%20most%20recent%20comprehensive%20data,six%20years%20out%20of%20date.&text=Based%20on%20preliminary%20economic%20and,2e%20(Figure%201).

[v] U.S. EPA, "Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2019," April 2021 https://www.epa.gov/ghgemissions/sources-greenhouse-gas-emissions

[vi] Netherlands Assessment.

[vii] U.S. EPA, "Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2019," April 2021 https://www.epa.gov/ghgemissions/sources-greenhouse-gas-emissions

[viii] China's nationally determined contribution under the Paris Agreement pledges the following: (1) "peaking of carbon dioxide emissions around 2030 and making best efforts to peak early;" (2) "lowering carbon dioxide intensity (carbon dioxide emissions per unit of GDP) by 60 to 65 percent from the 2005 level;" (3) "increasing the share of non-fossil fuels in primary energy consumption to around 20 percent;" and (4) "increasing the forest stock volume by around 4.5 billion cubic meters from the 2005 level."

[ix] GEM Update 2021.

[x] EIA AEO 2020 reference case for electric generating capacity.

[xi] Different sources provide different sizes for the existing coal fleet. For example, EIA AEO 2020 projects the U.S. coal fleet will be 224 GW this year. For consistency in this paper, we use 234 GW from the GEM Update 2021.

[xii] *The Economist*, April 17, 2021. Economic and financial indicators, page 76.

[xiii] China has 88.1 GW of coal-fired generating capacity under construction and 158.7 GW proposed for construction. GEM Update 2021.

[xiv] EIA *State Electricity Profiles, Data for 2019, Release Date November 2, 2020*.

[xv] GEM Update 2021. GEM defines commissioned as a plant that has completed its trial operation.

[xvi] *Ibid.*

[xvii] GEM Update 2021 indicates that "... coal and power interests are pushing to increase the country's coal fleet into the 14th Five Year Plan (2021-2025), potentially adding over 200 GW of new coal power at an estimated investment of US$200 billion."

[xviii] "Global Coal Plant Tracker – Coal Plants by Country," January 2021. https://globalenergymonitor.org/projects/global-coal-plant-tracker/

[xix] *Ibid.*

[xx] International Energy Agency, "Coal 2020," December 2020. https://www.iea.org/reports/coal-2020

[xxi] "Political Economy of Climate and Clean Energy in China Opportunities and Limits of International Influence on the Chinese Emissions Pathway," Lauri Myllyvirta, Shuwei Zhang, Xinyi Shen, and Yunqing Bi; published by the Heinrich Böll Foundation, December 2020.

[xxii] *See* "Energy Planning and Climate Policy Special Report - China Nationally Determined Contribution (NDC) and Domestic 14th Power Five-Year-Plan (FYP)," Draworld Environmental Research Center Centre for Research on Energy and Clean Air, 2020 November. " [T]aking into account the CO_2 peaking target [of China] and the reasonable contribution of the power sector, a capacity level of 680 GW would be optimal in 2030." In other words, the optimal way for China to achieve its 2030 peaking target is to shut down at least 415 GW (415,000 MW) of coal-fired capacity by 2030.