BY MATT LUNDY

RENEWABLE ENERGY GOALS IN THE FACE OF CLIMATE CHANGE

To address the looming threat of climate change along with other environmental and political problems surrounding energy, the world is beginning to turn towards clean and renewable energy sources. Most seem to agree that the transition from depletable fossil fuels to renewable energy should eventually be made; the only question is that of immediacy.[1] Europe tends toward an answer of "Now!" with its Renewable Energy Directive.[2] The US gives a more reluctant answer with its recent surge in oil and natural gas development, paired with a vocal hesitation to be held to higher standards than large emerging economies like China.[3, 4] But the question of whether or not the US should commit to clean energy while other countries do not assumes a lethargy on part of the latter, and such an assumption is not clearly justified without a comprehensive look. So, let's take a look at China and find out where it really stands both in terms of current emissions and in adoption of clean energy sources.

The starting point to this undertaking is a look at the statistics of China's energy usage and carbon emissions and how they compare to those of the US. Since 2000, China has roughly tripled its energy consumption, accompanied by a similarly meteoric increase in GDP. This has put China's current energy consumption slightly above the USA's with a CO_2 emission rate of almost double that of the USA (Fig. 1). While this data appears to favor the USA in terms of the ratio of carbon emission to energy consumption, it leaves out that the fact that China has a population roughly quadruple that of the US. Some consider the per capita metric to be a key to the ethical case for global emissions policy. China's per capita CO_2 emission rate (in terms of tonnes per person) is 6.59 (similar to the rate of the EU) whereas the US per capita emission rate is a whopping 15.53, well over double that of China.[3] This means that the world would be in a much lower emission state if all nations emitted at a rate similar to China, and not the US.

Another contextualizing piece of evidence in the discussion of carbon emissions is one of legacy, the historical trends in national emissions. Looking at cumulative carbon emissions over time (through 2016), the US sits at almost 400 billion tonnes and China at almost 200 billion tonnes.[5] The long-term perspective shows the massive gap between the two nations with the US at just about double China's total emissions. Given its poor track record, it seems

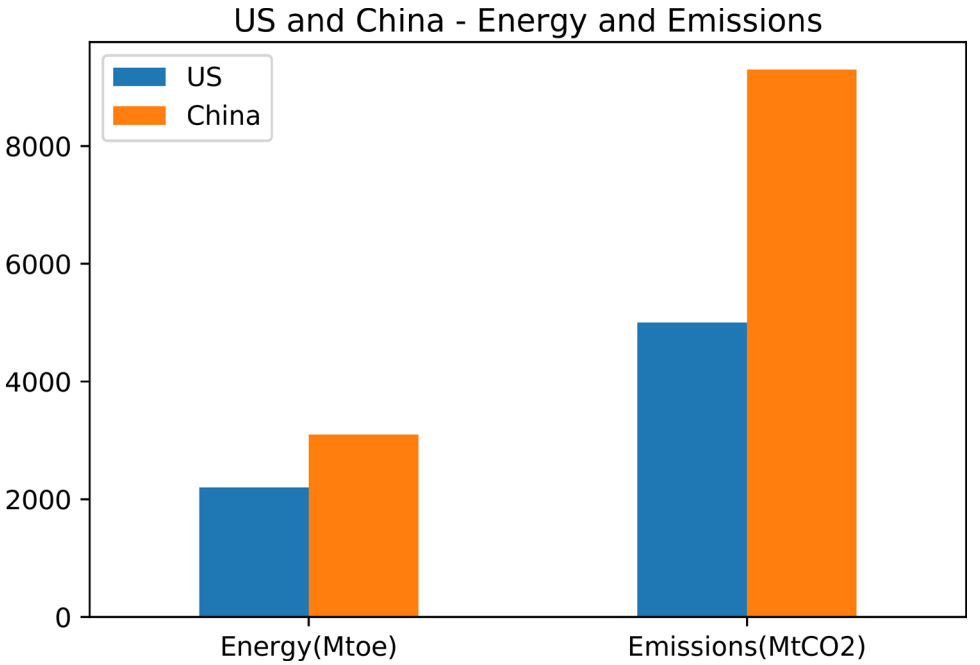

Figure 1: US vs. China: Total Energy Consumption and CO_2 Emissions. *China's current energy consumption is around 3,100 Mtoe (million tonnes of oil equivalent) with a CO_2 emission rate of almost 9,300 $MtCO_2$ (million metric tons of CO_2) per year. In comparison, the US currently consumes roughly 2,200 Mtoe of energy and emits around 5,000 MtCO.*[2,3]

clear that the US should be trying much harder to curb additional emissions.

With such context in mind, China's current high emission rate is more sympathetic and cannot be so facilely used to condemn those in the US that wish to limit our own emissions. "China emits more than the US, so why should the US curb any of its own emissions?" becomes a much less defensible position. Despite what has been said, we still desperately want to avoid significant amounts of continued emission, regardless of its source. So enters a possible follow-up: "Even if the US curbs its emissions, it won't matter because China will keep on emitting." While much could and should be said about the fallacious nature of such a position—if someone else is doing something wrong or damaging, that does not justify one's own doing of the same thing; and, even if another nation engages in something like pollution, a shrinkage in pollution by other nations could be enough to mitigate the major damage of said pollution—this claim again makes the assumption that China will necessarily not do better in regards to emissions. But much evidence points to the contrary: arguably, China is taking a stronger stance against carbon emissions and in support of the need to combat climate change, than the US.

The justification for this argument starts with a discussion of the Paris Agreement concerning climate change: an agreement made by the United Nations Framework Convention on Climate Change (UNFCCC) to prevent a global average temperature increase of 2°C by curbing greenhouse gas emissions. As of the beginning of 2019, 195 UNFCCC members have signed the agreement.[1] The United States' current president Donald Trump has made it clear that his administration is against the current iteration of the agreement and plan to formally exit as early as the agreement allows, which would be November 4, 2020.[6] The agreement does not have any mechanism to enforce that a participating state follow any specific plan for the future. However, participation in the agreement does signal to the world a state's commitment to a future of clean energy and fighting climate change. While the US plans to pull out of the agreement, China does not.

As stated, the Paris Agreement does not have enforcement mechanisms, but it does have a way to set and keep track of goals: through Nationally Determined Contributions (NDCs).[7] NDCs are emission-related goals determined by each member state that are supposed to fall in line with what the agreement defines as "ambitious… with the view of achieving the purpose of this Agreement."[1] China's NDCs for 2030 include the following: peaking total CO_2 emissions around 2030 or earlier, lowering CO_2 emissions per unit of GDP by 60-65% of the 2005 level, increasing the non-fossil fuel share of energy consumption to roughly 20%, and increasing their total forest volume by 4.5 billion cubic meters more than their 2005 level.[7] This entire discussion of NDCs is juxtaposed with the case of the United States. The NDC Partnership website still states a singular goal set by the US to reduce "its greenhouse gas emissions by 26-28% below its 2005 level in 2025" but no continued commitment to such a goal has been stated or shown since the USA's announcement to leave the Paris Agreement.[7]

As the US is in the process of abandoning its explicit, globally-stated goals of limiting greenhouse gas emissions, its future direction, desired or realized, is ambiguous. On the other hand, China's goals can be compared with its actions to assess its commitment. While it is difficult to quantify how successful China will be in meeting the above goals, as they have not yet begun decreasing their yearly rate of carbon emission, if they do achieve their goal of peaking emission by 2030, then they will almost surely keep their emission per capita drastically lower than the US. More concretely, the forestry claims laid out in the NDCs are quite plausible because China has previously proven its commitment to that specific task. In the 1950s, China had a forest coverage of 8.6% which they increased to 21.93% by the end of 2016.[8] Obviously, the future is always uncertain, especially when it comes to executing governmental plans. That said, a clear commitment to a cleaner future, from setting specific energy goals to researching the best ways to implement renewable energy, are a promising start.[9]

Given the relative positions of the US and China, the US has ample opportunities to strengthen and reaffirm its commitments to a cleaner future, which, if taken advantage of, can mitigate the worries of climate change. Despite initiatives from California and a few regional groupings, the US currently does not have many national goals in mind when it comes to limiting carbon emissions

and transitioning to clean energy sources.[10] With the planned exit of the Paris Agreement, the US would have no NDCs. No explicit plans have been made by the current presidential administration to deal with the problem of greenhouse gas emissions and their impact on climate change, although this is not for a lack of plans or ideas available.[11, 12] Going further than simply choosing non-action on the issue of climate change, the current administration is turning backwards. Under former Administrator Scott Pruitt, the EPA put into motion a repeal of the Clean Power Plan, which was meant to help curb the effects of climate change by reducing carbon emissions from electrical power generation.[13] By abdicating its previous goals to fight emissions and actively removing previous legislature that did tangibly fight them, the US is currently not just greatly reluctant but completely antagonistic toward the idea of modernizing energy production and consumption to cleaner alternatives that would help stop climate change.

As the single largest emitters of CO_2 by far, and together comprising nearly half of the entire world's CO_2 emissions, there are no nations more important than the US and China when it comes to understanding the current and future state of carbon emissions and their consequences. Whereas China has made explicit commitments to limiting emissions and growing non-fossil fuel energy sources, the US has declined to step up in similar ways and has instead regressed. As a world leader in numerous facets, the US could be using its unique position on the global stage to facilitate and accelerate the world's transition to cleaner, safer fuels, but it must first decide for itself that such a transition is worth it. The US cannot justifiably use China as an excuse for self-imposed inaction and ignorance of its consequences.

As it is clear that China is not a legitimate excuse or reason for American inaction, what is motivating those that make such a claim? What groups would benefit from the US continuing to significantly rely on fossil fuels, but have to lie about the motivations and reasons that the US should do so? It is certainly not the clean energy companies.

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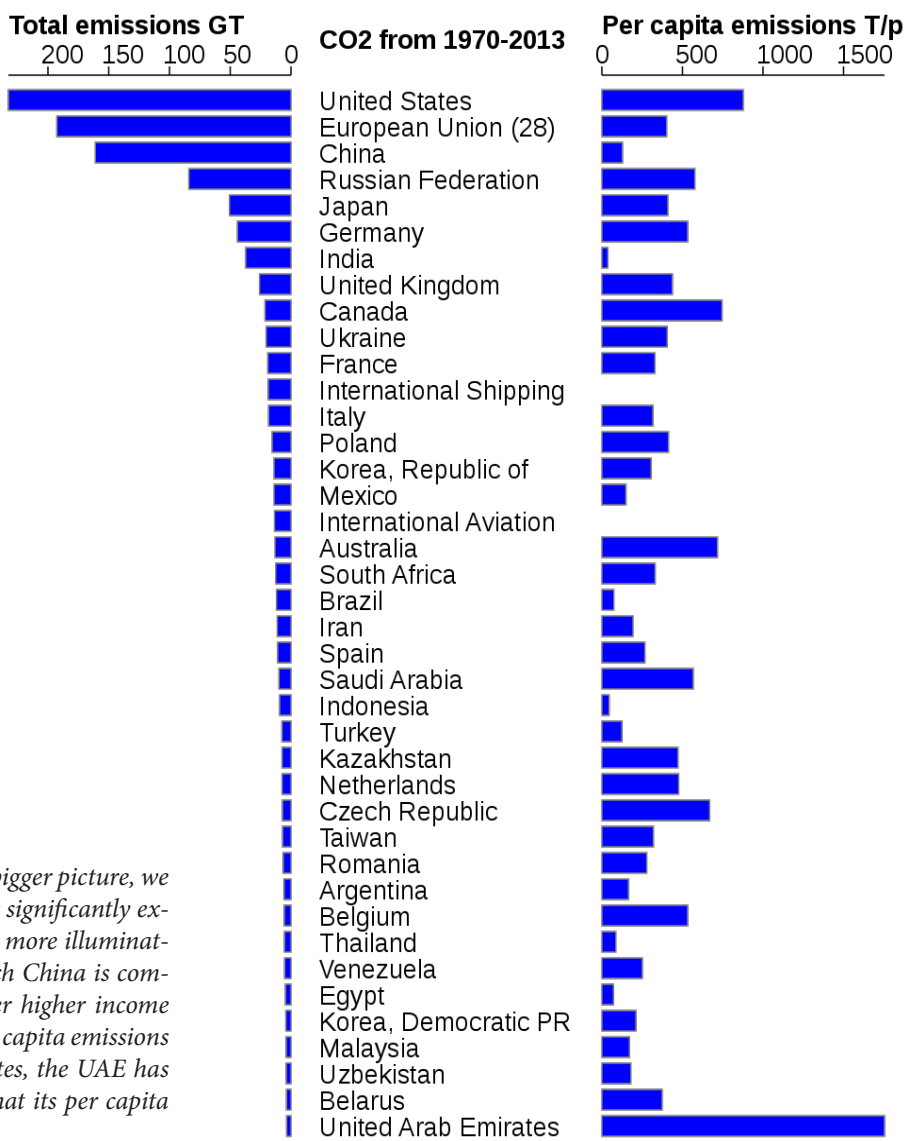

Figure 2: Cumulative CO_2 Emissions*. Looking at the bigger picture, we can see that since 1970, the US and the EU together significantly exceed China in terms of total carbon emissions. Even more illuminating is the difference in per capita emissions, in which China is completely dwarfed by the US, the EU, and many other higher income economies. While nearly every other country has per capita emissions that come nowhere close to the United Arab Emirates, the UAE has produced such a low total emission since the 70's that its per capita rate is not too worrying.*

Figure 3: Mulan Wind Farm. *This Mulan Wind Farm is "one of the first wind farms in China, raising the profile of renewable power and acting as a flagship for replication of the technology across the country." It generates roughly 25 GWh of energy each year.*

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