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Loudina Erasmus, Climate Economist

Tel.: +31 6 2535 5796 / loudina.erasmus@nl.abnamro.com

Global implications of Biden's climate promise

- **The US commitment shaves 0,1°C off global warming by 2100, representing 20% of the difference between a 1.5°C and a 2 °C warming world.**
- **Biden's win is good news for global carbon emissions targets, bringing the Paris Agreement within reach by tipping the global balance such that more than 2/3rds of the world economy would have net-zero GHG emissions targets by 2050.**
- **The run-off election for 2 senate seats from Georgia will have significant bearing on Biden's ability to implement his plans. With the next 10 years pivotal to remain within a 1.5°C trajectory, the upcoming senate election represents an additional uphill in the road to Paris.**

During the first week of November more than 75 million American's voted for Joe Biden, the Democrat candidate for president. With that, they also voted to re-join the Paris Climate Agreement, reinstate emissions rules, and to invest USD 2 trillion to confront the "grave threat" of climate change. The other 70 million votes went to Trump (and against the Paris agreement). The political polarization in the US is relevant to climate discussions, since the implications for global climate change with a Biden presidency is a 180 degree turn to address the issue from the current US administration. The US Federal Reserve also called out climate change risk for the first time in its biannual financial stability report shortly after the election results were in. Biden's climate plan outlines strategies to achieve 100% clean electricity by 2035 and net-zero emissions by 2050. This promise raises two central questions:

1. **What does Biden's promise imply for global emissions and global temperature trajectory?**
2. **Where can the most cost effective and efficient CO2 emissions reduction within the US be made?**

This article addresses the first question: impact on global emissions and the temperature trajectory. The remaining question is to be addressed in a follow-up publication.

We will look at the global impact of the US in terms of its individual contribution to emission reduction targets. In addition the implication of the US joining the global coalition is considered, as this incentivises global commitment outside the US.

Biden's promise

The national geographic compiled a list of Biden's promises and plans for the environment. In addition to re-joining the Paris agreement and investing USD 2 trillion toward climate mitigation and adaptation Biden has made specific mention to:

- Achieve 100% clean electricity by 2035 and net-zero emissions by 2050
- Support small-scale nuclear reactors
- And acknowledged that renewable energy has eliminated US demand for new coal plants
- Stop the Keystone XL fossil fuel pipeline project
- Consider ending fossil fuel subsidies
- Ban offshore drilling and new fracking permits on federal lands
- Support rapid innovations on renewable energy markets and use it as a major jobs creator, seeking to invest USD 400 billion over 10 years in clean energy and climate research using tax policy and other mechanisms to incentivise toward rapid deployment.
- Set new energy efficiency standards as part of the upgrade of 4 million buildings
- Expand rail services and to shrink rail travel times
- Introduce strict fuel-efficiency standards in an attempt to make purchases of all new cars and light trucks electric

and on global front to:

- Host a global climate summit during his first 100 days in office
- Persuade other countries to set more ambitious and enforceable targets for reducing greenhouse gas emissions, and use tariffs and trade to ensure goods imported from overseas bear the full cost of climate pollution.

In addition to climate specific commitments he plans to address plastic pollution, land and water conservation and the disproportionate impact of pollution on low-income communities.

The US and climate broader perspective

Historically the US has been the largest CO2 emitter, and on annual basis currently the second largest emitter following China. The USA has cumulatively emitted 420 Gigaton CO2 from 1850 to 2015. This implies around 28% of the current 1 degree global temperature forcing is attributable to the USA[1]. The EU follows in a close second with 25%.

Table 1: Cumulative and 2017 CO2 emissions share per country

	1850 – 2015		2017	
	Cumulative Gton	%	Gton	%
Unites States	420	28%	5,1	14%
EU	377	25%	3,6	10%
China	160	11%	10,9	30%
Russia	105	7%	1,8	5%
Japan	70	5%	1,3	4%
India	43	3%	2,4	6%
Rest	341	22%	11,7	32%
Total CO2	**1.516**		**36,7**	

Source: The Lancet Global Health; EDGAR – Emissions Database for Global Atmospheric Research; ABN AMRO group economics

[1] Using the premise as used in the IPCC that the temperature forcing is linear to the cumulative amount of CO2 in the atmosphere and ignoring climate tipping points.

What does Biden's promise imply for global emissions and temperature trajectory?

With the USA as one of the largest global emitters, and the only of the five largest emitters to have left the Paris climate Agreement, Biden's promise has implication for the global climate trajectory on three levels.

1. As direct emitter reducing its own emissions. Biden's promise moves toward filling the vacancy for the US around responsibility for accumulated emissions and reduction of its current emissions.
2. As a team player, following commitments from the EU, China and most recently Japan, the US commitment also sets the global economy further on course to reaching the Paris climate goal, and quoting Biden – "creates a fist".
3. As influential trading partner to emerging economies – for example India, with high growth ambitions and associated emissions.

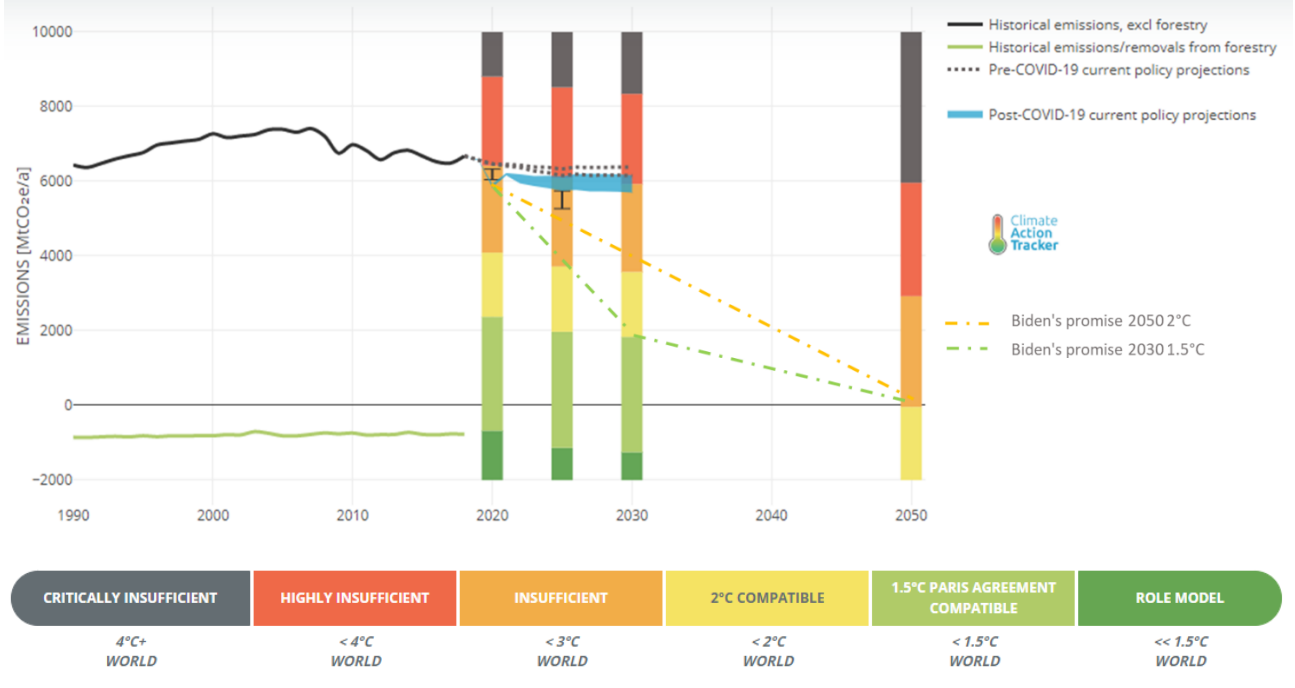
Looking at these three levels in turn:

How does Biden's promise relate to global temperature directly?

Climate action tracker estimates that the US commitment shaves 0,1°C off global warming by 2100. This is based on cumulative US emissions reductions of 75 Gigaton CO2 equivalent between 2020 and 2050. While 0,1°C does not sound high, it represents 20% of the difference between a 1.5°C and a 2 °C warming world.

In the latest 2020 Carbon Action tracker projection (on total GHG, CO2 equivalent emissions) prior to the US election, they were classified as "critically insufficient" with policy and targets associated climate pathway of a +4°C warming world. We can see the small reduction in emissions following the COVID 19 pandemic, but then levelling off toward 2030, rather than reducing. Superimposing a linear line with Biden's Promise to 2050 on their graph. A 2050 zero emissions target would make the USA 2°C world compatible.

Figure 1: US emissions path projections



The UN Environment Programme (UNEP) emissions gap report released toward the end of 2019 warned that unless global greenhouse gas emissions fall by 7.6 percent each year between 2020 and 2030, the world will miss the opportunity to get on track towards the 1.5°C temperature goal of the Paris Agreement. The next 10 years are crucial to keep global temperature increase below 2°C (3.6 degrees Fahrenheit) this century and ultimately to 1.5°C.

Superimposing a second line on the carbon tracker graph to make the US 1.5°C world compatible means a reduction of 70% in total GHG emissions. The speed at which Biden will be able to implement his promise, in particular around domestic policy, will be influenced by the balance between Republican and Democrat seats in the Senate. Following the November elections, the Democrats have 48 seats, and the Republicans 52, with the 2 Republican candidates from Georgia up for a second round run-off election in January. A balanced US senate essentially gives Democrats a slender majority, as the Vice President (Kamala Harris) would cast the deciding vote in a tie-break. While Biden would be able to do many things without control of the Senate, including re-joining the Paris Agreement and restoring environmental regulations diluted by the Trump administration, he would need control of the Senate to push through his planned massive investment in renewable energy.

Biden's promise combined with more ambitious 2050 commitments if linearly applied results in a roughly 1/3rd reduction in 2030 emissions. This would still be insufficient to ensure a 1.5°C future without ambitious 2030 targets.

What does this temperature difference mean?

The impact difference between 1.5°C and 2 °C warming has been summarised by the New York times and Carbon Brief based on the IPCC report highlighting it.

One of several Northern Europe weather indicators is 45% more frequent rainfall extremes under a 2°C scenario versus 21% more under a under a 1.5°C scenario. Directly relating the difference between 1.5°C and 2°C warming to the Netherlands. Increasing temperature forcing means more unpredictable rainfall, more sea level rise and larger intensity extremes. The impact and chances of a flood increases, in turn increasing the cost of adaptation of primary (to sea and river level rise) and regional (to larger extreme in temperature and rainfall) flood defences.

While the direct impact on temperature from US emissions reduction is not negligible, the more powerful impact of Biden's promise is the unity it creates for a global response to a common problem.

As a team player with the largest emitters

CO2 emissions is a textbook example of an externality that is caused by a the tragedy of the commons. The tragedy of the commons is a problem in economics that occurs when individual agents neglect the well-being of society (global in the case of CO2 emissions) in the pursuit of individual gain. This leads to over-consumption and ultimately depletion of the common resource, to everybody's detriment. For a tragedy of the commons to occur a resource must be scarce, rivalrous in consumption, and non-excludable. Solutions to the tragedy of the commons include the imposition of private property rights, government regulation, or the development of a collective action arrangement.

The US commitment tips the scale such that more than 50% of global GHG emissions and 2/3rds of the world economy would have net-zero GHG emissions targets by 2050 – creating the conditions needed for global collective action to work. Global collective action has to date delivered emission reduction targets, however these targets have been insufficient to reach the Paris targets.

Combining statistics from various source, Table 2 summarises emissions from the largest global emitters with their latest publicly stated targets.

Table 2: Reduction from 1990 and targets on total emissions per country

	1990 Gton	2017 Gton	Change from 1990 to 2017	Target 2030	Target 2050 or later
Unites States	5,1	5,1	0%		Net zero
EU	4,4	3,6	-20%	-55%	Net zero
China	2,4	10,9	353%	Peak emissions	Net zero (2060)
Russia	2,4	1,8	-26%	-25/30%	
Japan	1,2	1,3	15%		Net zero
India	0,6	2,4	295%		
Rest	6,6	11,7	76%		
Total CO2	**22,7**	**36,7**	62%		

Source: EDGAR – Emissions Database for Global Atmospheric Research; Carbon Action tracker; ABN AMRO group economics

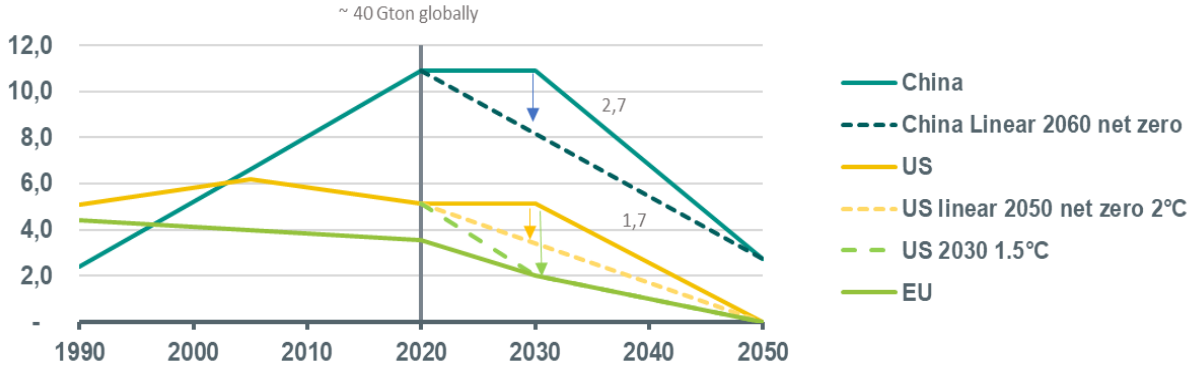
After peaking around 2005, 2017 emissions from the US have declined to around the same level as 1990, while the EU is already 20% lower and China has more than quadrupled their emissions. The net effect is a 65% increase in total emissions from these 3 economic areas – 55% of global increase since 1990. Part of this shift in emissions is due to export of polluting industries to China, combined with Chinese growth targets. The problem with the tragedy of the commons remains that any party can take resources left by signatories for individual gain, resulting in the same detrimental outcome. The US, EU and China combined annually emit 58% of total global CO2, and combined have a zero emission targets from 2050 to 2060.

Notable from Table 1 are the 2030 pledges from both the US and China. China has pledged to peak emissions around 2030, recently sharpening that to prior to 2030, while Biden's promise does not specifically refer to 2030. This leaves the possibility to simply keep current emissions level or even increasing it, and then counting on technological enhancements for a late sudden transition. Economically such a scenario is undesirable as it creates additional risk for the financial system. It is desirable both from a climate and a transition risk perspective that globally we move toward an immediate gradual reduction pathway.

In addition to a 2050 zero pledge, ideally the US would take a leading role for a global reduction trajectory starting immediately towards 2030.

In considering how the next 10 years could unfold between these three large emitters. The absolute amount of emissions from the US and China are such that their combined role can negate all gains made from the EU's 28 countries. For illustration purposes, graph 1 plots a simplified impact of a linear path to 2050 vs keeping emissions level to 2030 and then a sudden steeper transition path to 2050 for the US and China. The combined impact from the US and China is a difference in emissions of 4,4 Gigaton. This is more than the entire EU economic block emissions of circa 4 Gigaton and represents 10% of total global emissions.

Graph 1: Simplified line plot representing immediate linear vs 2050 goals for the three largest emitting



Source: ABN AMRO interpretation from Table 1. 2017 as proxy for 2020 – 60 year midpoint

Biden plans to make US electricity production carbon free by 2035. This commitment alone already reduces US emissions by 1.7 Gigaton. If reduced emissions from one sector are not shifted to other sectors, it creates a tangible pivot for immediate CO2 emission reductions. He mentions support for small nuclear power plants. Nuclear power plants emit negligible Carbon Dioxide, however creates nuclear waste. This is potentially still a short sighted solution, as it creates energy for the current generation and nuclear waste for future generations. This option may meet opposition from environmental parties.

As important trading partner to emerging economies

In addition to challenging its own high intensity CO2 states, Biden promises to also challenge other nations on the ambition and enforceability of their targets, and to use tariffs and trade to ensure goods imported from overseas bear the full cost of climate pollution.

The US and the EU are the largest importers of goods/products from China, but also from India and other emerging economies, creating significant trade influence. Carbon tariffs would protect US businesses operating under stricter emissions rules from cheaper, high emissions imports, and incentivise emerging market producers to reduce their emissions to meet the US import standard. Without said tariffs production and associated emissions can shift from within US borders to outside US borders, which is economically unfavourable and does not solve the global problem of atmospheric CO2 accumulation. The reduction of EU emissions following 2010 and the extreme increase during the same period in Chinese emissions serves as example.

To give a high level impressions of where tariffs would have an impact, CO2 intensity is a metric to compare emissions per unit of production and can be used to rank trading partners for emission intensity. High level we consider the emissions per unit of GDP. CO2 intensity represents the amount of CO2 emitted to produce a unit of production. It is the metric used by India as primary target, and China as secondary target. Both these countries have CO2 intensities of nearly 900 kgs CO2 per USD 1000 GDP created, compared to an average US intensity of 250 kgs and

Europe around 200 kgs. India's stated goal of 33% reduction targets CO2 intensity which is still more than twice that of the US or the EU. A more challenging target for India as example here would be to bring the production intensity in line with a comparable good produced within a threshold CO2 intensity in the United States. Steel production for example uses coal as energy source and is one of the highest CO2 emitting industries globally. To decarbonize a country's steel industry in isolation risks putting it in an unfavourable competitive position, with cheaper and high CO2 intensity alternatives available from China and India[2].

In terms of funding - USD 2 trillion addresses the immense funding need globally to make the transition possible. It will stimulate research toward and deployment of clean technology in the US, and that technology will filter through to other world economies too.

Conclusion: Biden's promise is GREAT news to limit climate change

Biden's promise puts the Paris Agreement 1.5°C increase on the table again. This is achieved from individual reductions, and more powerfully by re-joining global mitigation efforts as missing party to form a unified response from the three largest emitters – China, the US and the EU – and from the leading role as trading partner to emerging economies.

Coupled with the 2020 communicated targets from China, the EU, Japan and South Korea the US tips the scale such that more than 50% of global GHG emissions and 2/3rds of the world economy would have net-zero GHG emissions targets by 2050.

The possibility of two additional seats in the US Senate to the Democrats would amount to more decisive policy action toward implementation in the crucial 10 years toward 2030.

[2] Considering other Sustainable development goals around poverty reduction however – there is controversy in imposing CO2 targets on a country struggling with extreme poverty.