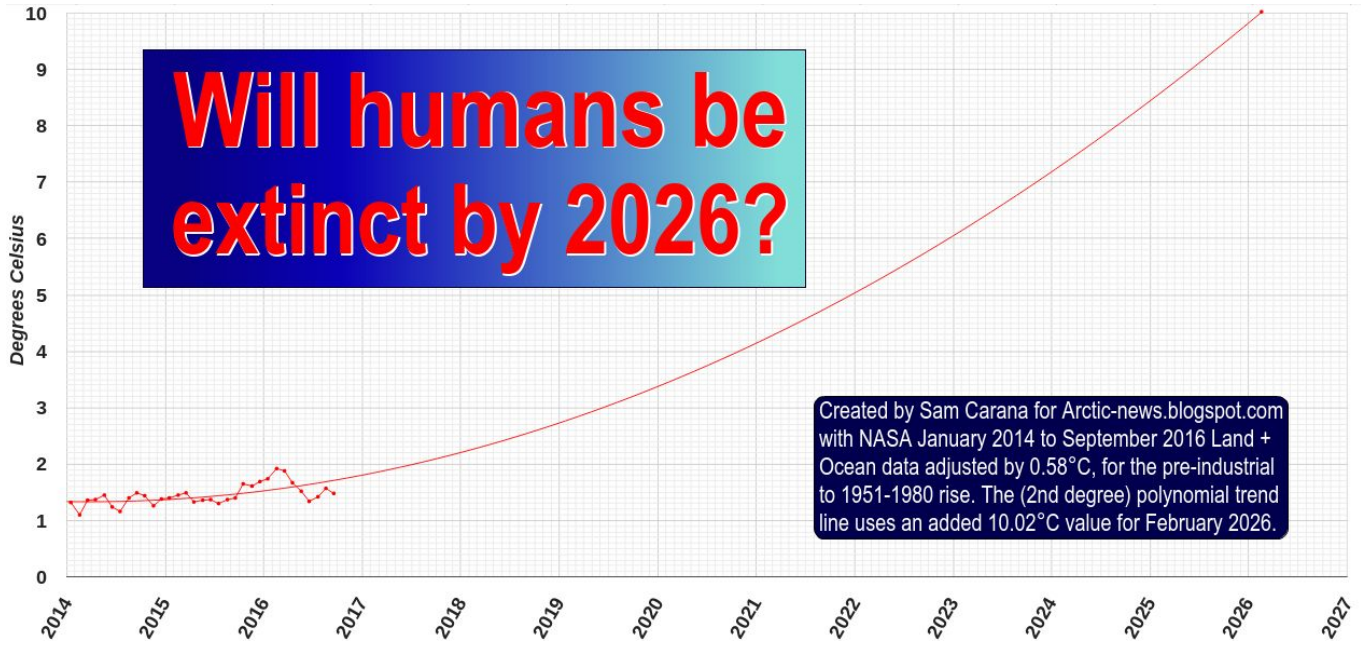
Will humans be extinct by 2026?

An exploration of the potential, by Sam Carana, editor of Arctic-news.blogspot.com

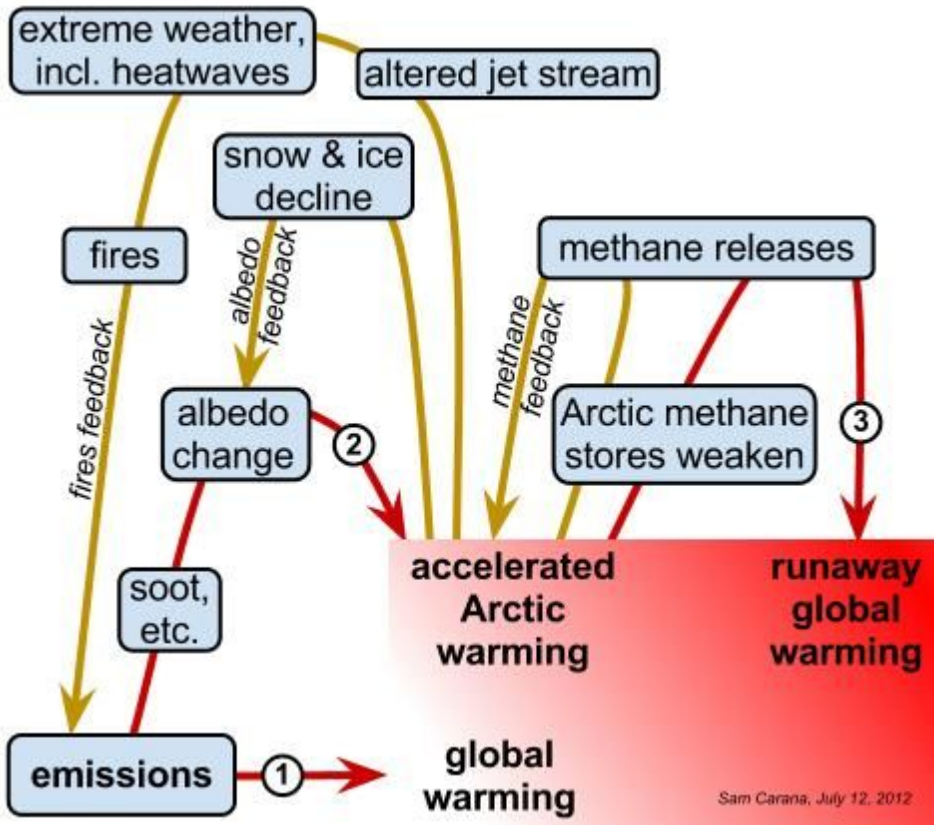


In the Arctic, vast amounts of carbon are stored in soils that are now still largely frozen. As temperatures continue to rise and soils thaw, much of this carbon will be converted by microbes into carbon dioxide or methane, adding further greenhouse gases to the atmosphere.

In addition, vast amounts of methane are stored in sediments under the Arctic Ocean seafloor, in the form of methane hydrates and free gas. As temperatures rise, these sediments can get destabilized, resulting in eruptions of huge amounts of methane from the seafloor. Due to the abrupt character of such releases and the fact that many seas in the Arctic Ocean are shallow, much of the methane will then enter the atmosphere without getting broken down in the water.

What makes the situation so dangerous is that huge eruptions from the seafloor of the Arctic Ocean can happen at any time. We can just count ourselves lucky that it hasn't happened as yet. As temperatures continue to rise, the risk that this will happen keeps growing.

This dangerous situation has developed because emissions by people have made the temperature of the water in the Arctic Ocean rise, and these waters keep warming much more rapidly than the rest of the world due to a number of self-reinforcing feedback loops.



Accelerating warming in the Arctic

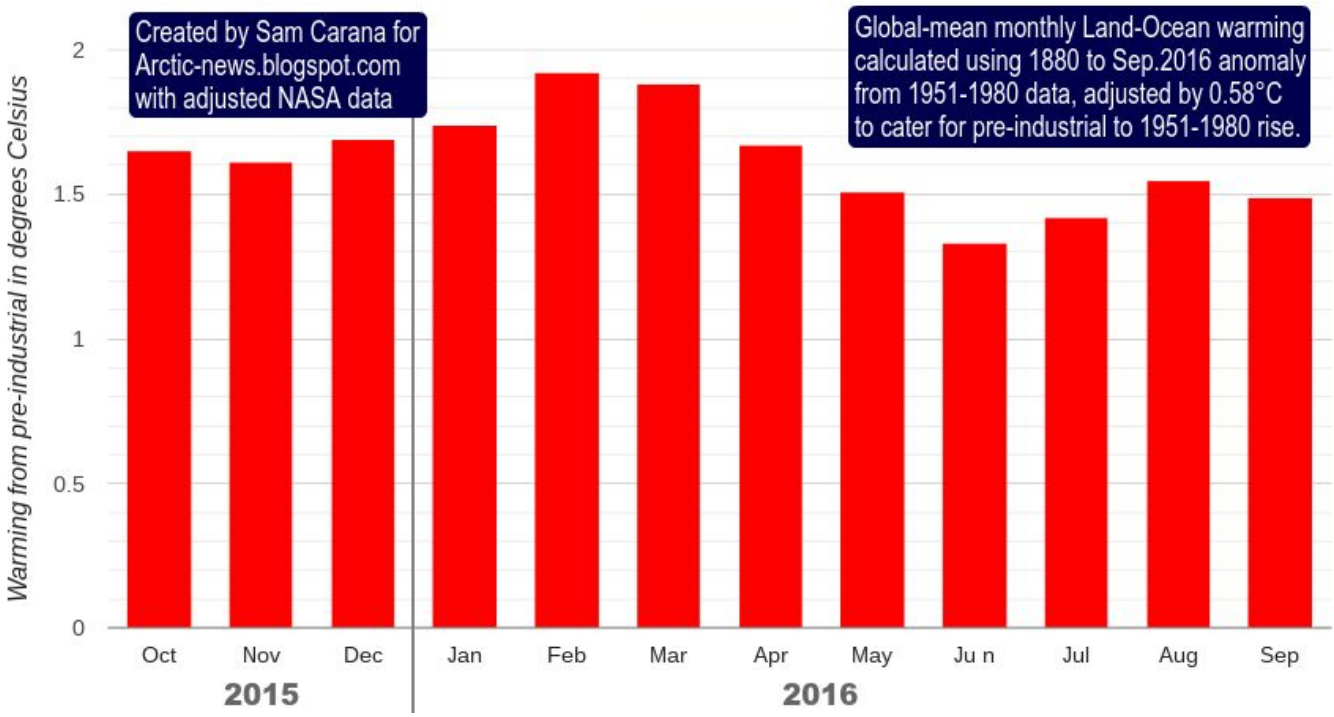
One such self-reinforcing feedback loops is the retreat of the Arctic sea ice, which in turn makes the Arctic Ocean heat up even more, as much sunlight that was previously reflected back into space by the sea ice, instead gets absorbed by the water when the sea ice is gone.

Without sea ice, storms can also develop more easily. Storms can mix warm surface waters all the way down to the bottom of shallow seas, reaching cracks in sediments filled with ice. Ice in sediments has until now acted as a glue, holding the sediment together. As the ice melts, sediments can become destabilized, even by small differences in temperature and pressure that can be triggered by earthquakes, undersea landslides or changes in ocean currents.

As a result, huge amounts of methane can erupt from the seafloor of the Arctic Ocean and once this occurs, it will further raise temperatures, especially over the Arctic, thus acting as another self-reinforcing feedback loop that again makes the situation even worse in the Arctic, with higher temperatures causing even further methane releases, in a vicious cycle leading to runaway global warming.

Such a temperature rise in the Arctic will not stay within the borders of the Arctic. It will trigger huge firestorms in forests and peatlands in North America and Russia, adding further emissions including soot that can settle on mountains, speeding up the melting of glaciers and threatening to stop the flow of rivers that people depend on for their livelihood.

These developments can take place at such a speed that adaptation will be futile. More extreme weather events can hit the same area with a succession of droughts, cold snaps, floods, heat waves and wildfires that follow each other up rapidly. Within just one decade, the combined impact of extreme weather, falls in soil quality and air quality, habitat loss and shortages of food, water, shelter and just about all the basic things needed to sustain life, can threaten most if not all life on Earth with extinction.



From the October 2016 post 'Pursuing efforts?'

A global temperature rise of more than 10°C/18°F by 2026?

How much have temperatures risen and how much additional warming could eventuate over the next decade? The image on the right shows a potential global temperature rise from pre-industrial levels of more than 10°C or 18°F by 2026. This rise contains a number of colored elements, as discussed below from the top down.

February 2016 rise from 1900 (1.62°C)

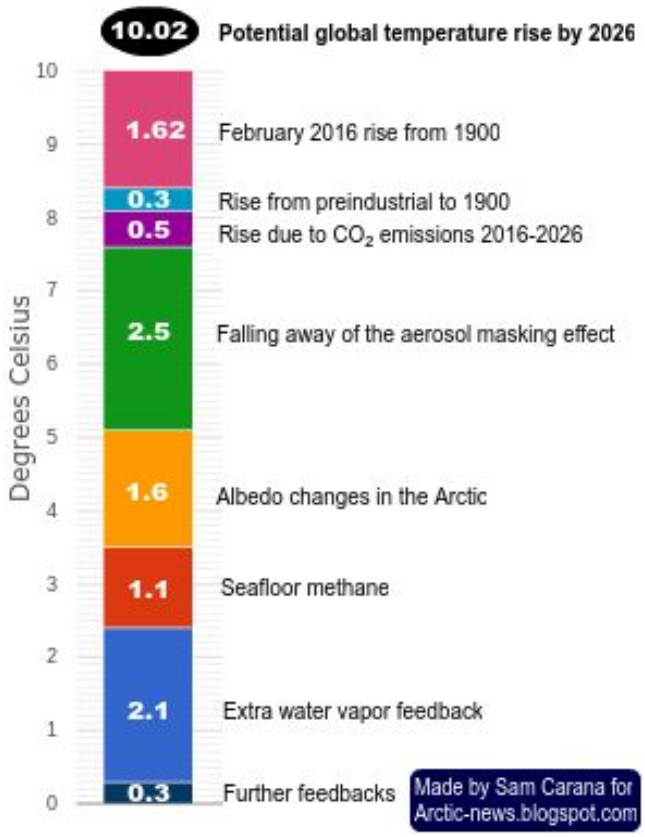
The magenta-colored element at the top reflects the temperature rise since 1900. In February 2016, it was 1.62°C warmer compared to the year 1900, so that's a rise that has already manifested itself.

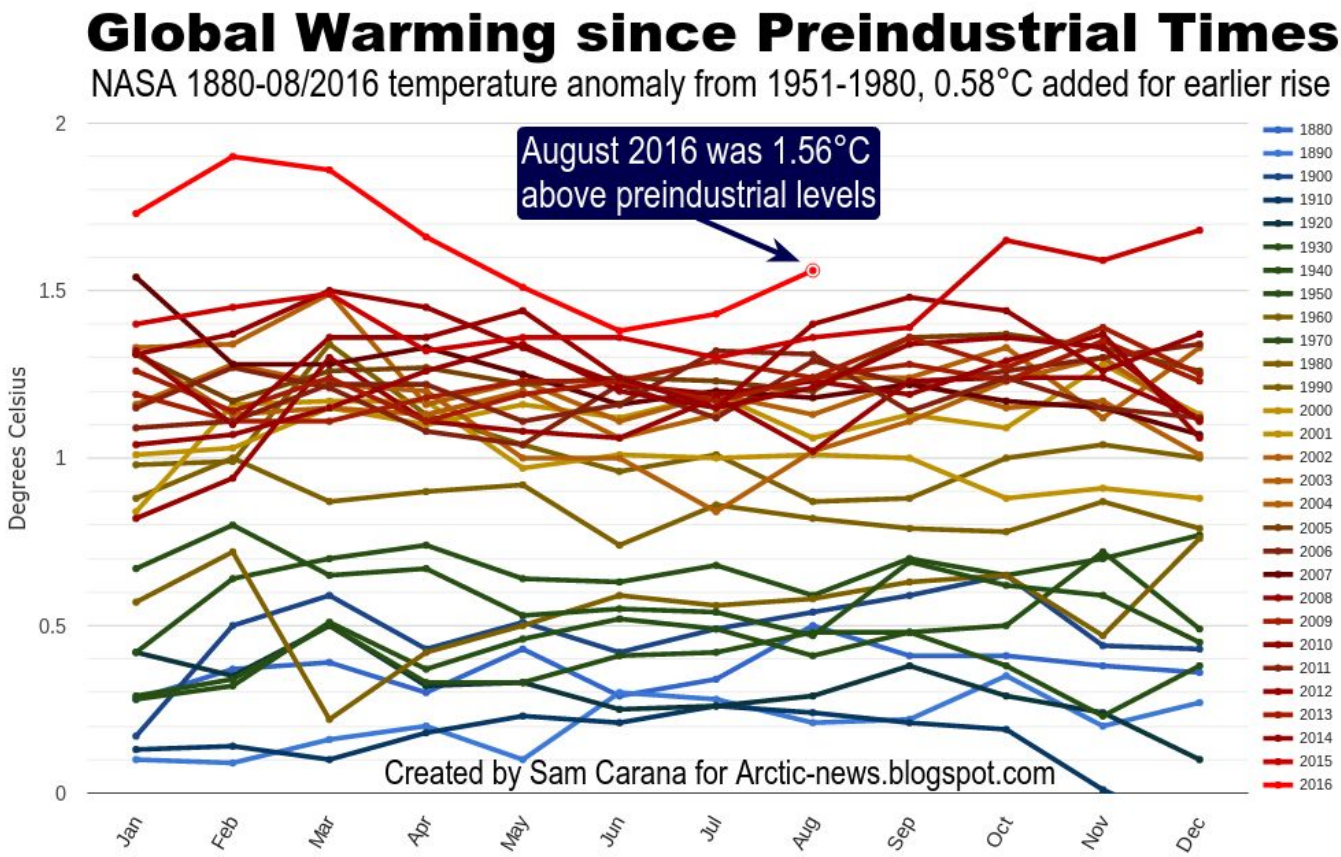
Rise from pre-industrial levels to 1900 (0.3°C)

Additional warming was caused by humans before 1900.

Accordingly, the next (light blue) element from the top down uses 0.3°C warming to reflect anthropogenic warming from pre-industrial levels to the year 1900.

When also taking this warming into account, it was 1.92°C (3.46°F) warmer in February 2016 than in pre-industrial times, as is also illustrated on the image below. Warming from the other elements (described below) comes on top of the warming that was already achieved in February 2016.





From the September 2016 post August 2016 another month above Paris Agreement guardrail

Rise due to carbon dioxide emissions from 2016 to 2026 (0.5°C)

The purple element reflects warming due to the amount of carbon dioxide in the atmosphere by 2026. While the IEA reported that energy-related carbon dioxide emissions had not risen over the past few years, carbon dioxide levels in the atmosphere have continued to rise, due to feedbacks that are kicking in, such as wildfires and reduced carbon sinks. Furthermore, maximum warming occurs about one decade after a carbon dioxide emission, so the full warming wrath of the carbon dioxide emissions over the past ten years is still to come. In conclusion, an extra 0.5°C warming by 2026 seems possible as long as carbon dioxide levels in the atmosphere and oceans remain high and as temperatures keep rising.

Falling away of the aerosols masking effect (2.5°C)

With dramatic cuts in emissions, there will also be a dramatic fall in aerosols that currently mask the full warming of greenhouse gases. From 1850 to 2010, anthropogenic aerosols brought about a decrease of ~2.53 K, says a recent paper. While on the one hand not all of the aerosols masking effect may be removed over the next ten years, there now are a lot more aerosols than in 2010. A 2.5°C warming due to removal of part of the aerosols masking effect therefore seems well possible by the year 2026.

Albedo changes in the Arctic (1.6°C)

Warming due to Arctic snow and ice loss may well exceed 2 W per square meter, i.e. it could more than double the net warming now caused by all emissions by people of the world, calculated Professor Peter Wadhams in 2012. A 1.6°C warming due to albedo changes (i.e. decline of both Arctic sea ice and snow and ice cover on land) therefore seems well possible by the year 2026.

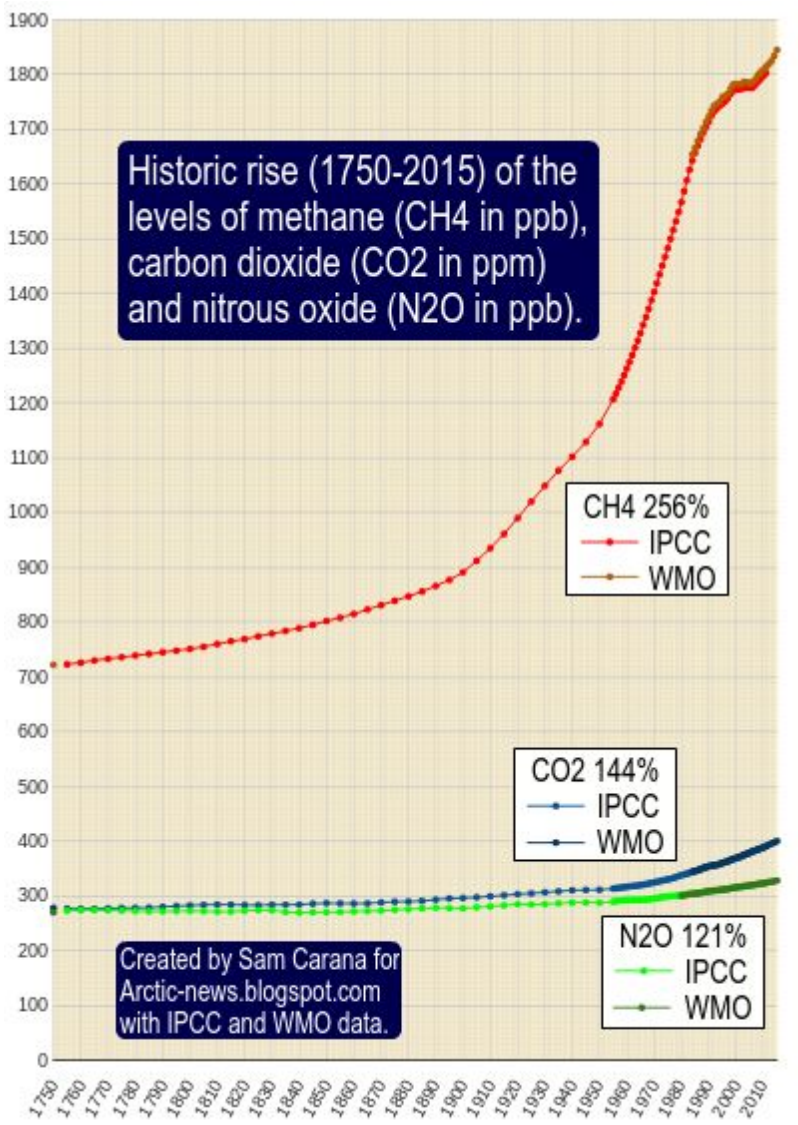
Methane eruptions from the seafloor (1.1°C)

Dr. Natalia Shakhova et al. wrote in a paper presented at EGU General Assembly 2008 that "we consider release of up to 50 Gt of predicted amount of hydrate storage as highly possible for abrupt release at any time." Authors calculated that such a release would cause 1.3°C warming by 2100.

This 1.3°C warming (by 2100) from an extra 50 Gt of methane seems conservative when considering that there now is only some 5 Gt of methane in the atmosphere, and over the next ten years this 5 Gt is already responsible for more warming than all the carbon dioxide emitted by people since the start of the industrial revolution.

Professor Peter Wadhams co-authored a study that calculated that methane release from the seafloor of the Arctic Ocean could yield 0.6°C warming of the planet in 5 years (see video at earlier post).

In conclusion, as temperatures keep rising, a 1.1°C warming due to methane releases from clathrates at the seafloor of the world's oceans seems well possible by the year 2026 and even more warming seems possible beyond that.

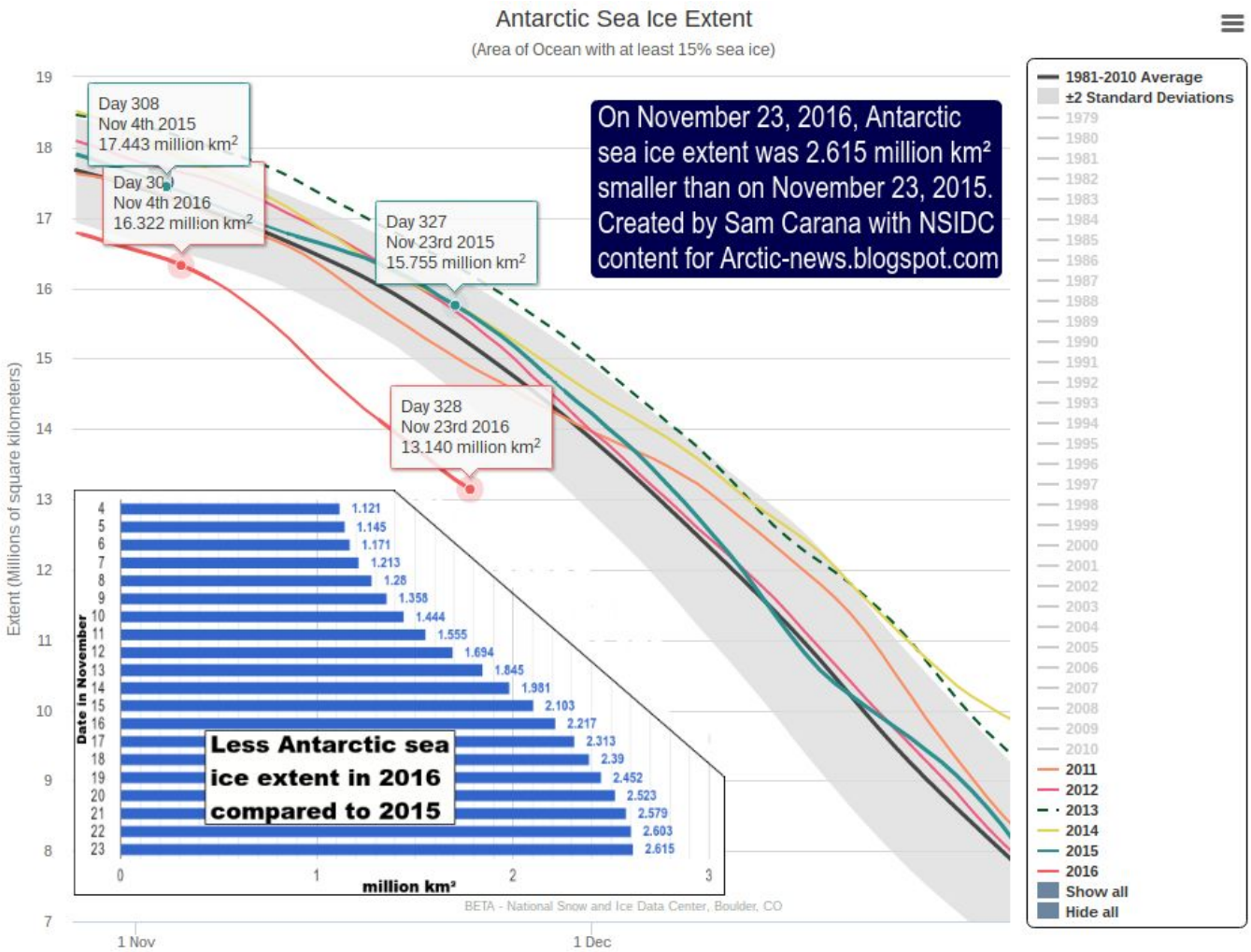


Extra water vapor feedback (2.1°C)

Rising temperatures will result in more water vapor in the atmosphere (7% more water vapor for every 1°C warming), further amplifying warming, since water vapor is a potent greenhouse gas. Extra water vapor will result from warming due to the above-mentioned albedo changes in the Arctic and methane releases from the seafloor that could strike within years and could result in huge warming in addition to the warming that is already there now. As the IPCC says: "Water vapour feedback acting alone approximately doubles the warming from what it would be for fixed water vapour. Furthermore, water vapour feedback acts to amplify other feedbacks in models, such as cloud feedback and ice albedo feedback. If cloud feedback is strongly positive, the water vapour feedback can lead to 3.5 times as much warming as would be the case if water vapour concentration were held fixed", according to the IPCC. Given a possible additional warming of 2.7°C due to just two elements, i.e. Arctic albedo changes and seafloor methane, an additional warming over the next decade of 2.1°C due to extra water vapor in the atmosphere therefore does seem well possible by the year 2026.

Further feedbacks (0.3°C)

Further feedbacks will result from interactions between the above elements. Additional water vapor in the atmosphere and extra energy trapped in the atmosphere will result in more intense storms and precipitation, flooding and lightning. Flooding can cause rapid decomposition of vegetation, resulting in strong methane releases. Furthermore, plumes above the anvils of severe storms can bring water vapor up into the stratosphere, contributing to the formation of cirrus clouds that trap a lot of heat that would otherwise be radiated away, from Earth into space. The number of lightning strikes can be expected to increase by about 12% for every 1°C of rise in global average air temperature. At 3-8 miles height, during the summer months, lightning activity increases NOx by as much as 90% and ozone by more than 30%. The combination of higher temperatures and more lightning will also cause more wildfires, resulting in emissions such as of methane and carbon monoxide. Ozone acts as a direct greenhouse gas, while ozone and carbon monoxide can both act to extend the lifetime of methane.



From: Sea ice is shrinking

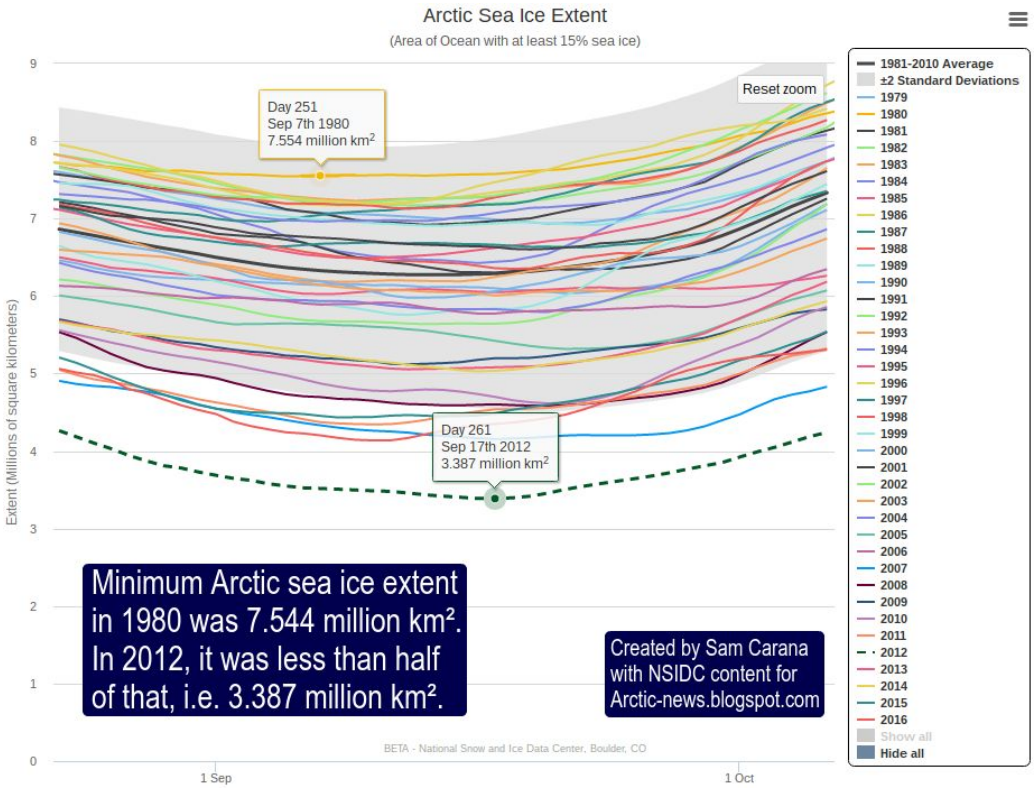
Additional warming can also result from feedbacks that are currently holding back warming, such as increased uptake of carbon by vegetation, which a recent study attributes to higher CO_2 levels in the atmosphere. This land sink now appears to turn into a source of carbon emissions, due to deforestation and soil degradation caused by agricultural practices and more extreme weather, as discussed in this post.

Similarly, growth of sea ice around Antarctica and associated albedo changes were thought to hold back global warming (somewhat). Recently though, sea ice around Antarctica did reach record low extent for the time of year (above image).

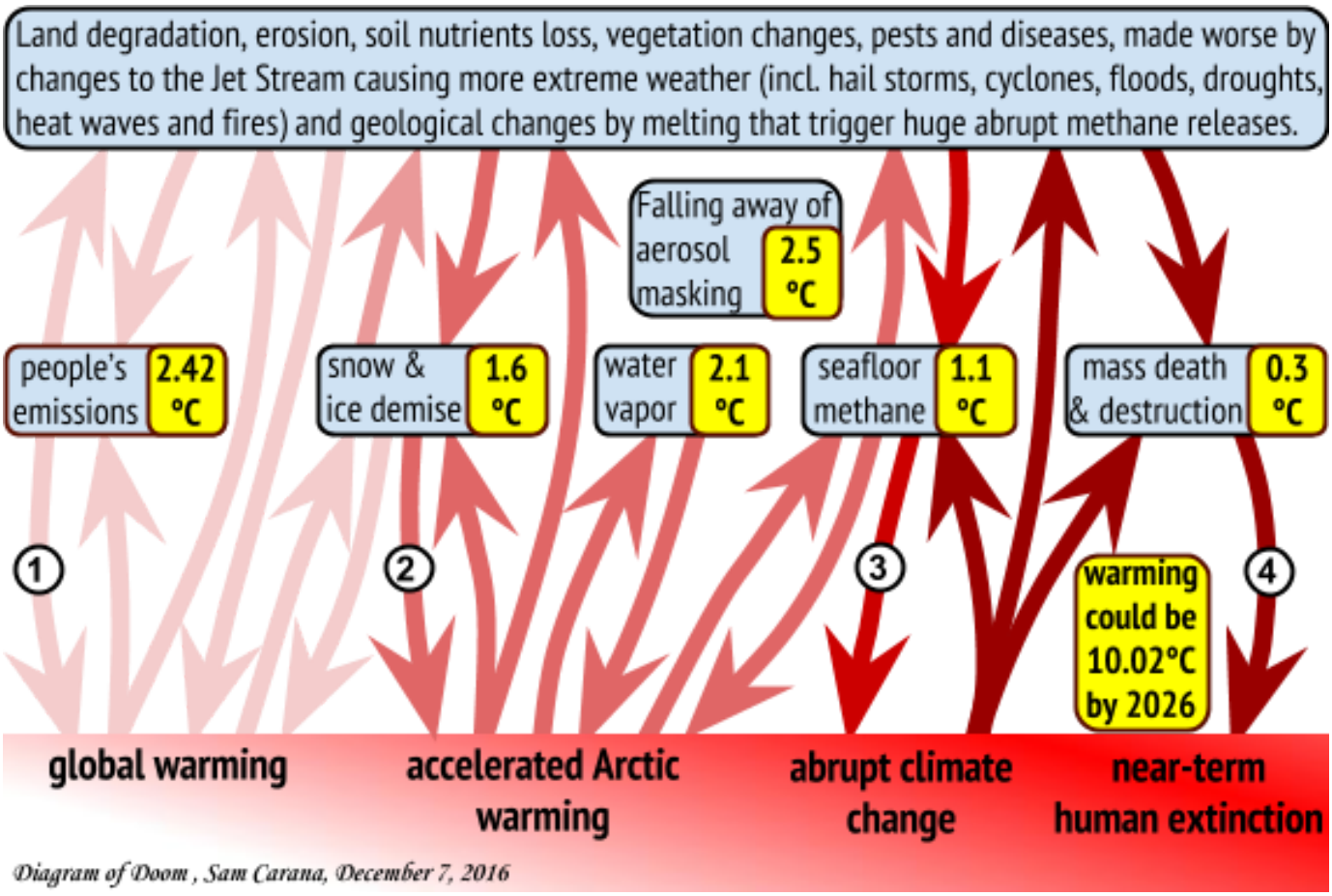
On November 23, 2016, Antarctic sea ice extent was 2.615 million km² smaller than it was on November 23, 2015.

To put this 2.615 million km² into perspective, the minimum Arctic sea ice in 1980 was 7.544 million km², and this minimum in 2012 was 3.387 million km² (image right).

The joint impact from further feedbacks may well amount to an additional 0.3°C warming by 2026, or more than that, cancelling out possible overestimates in other elements.

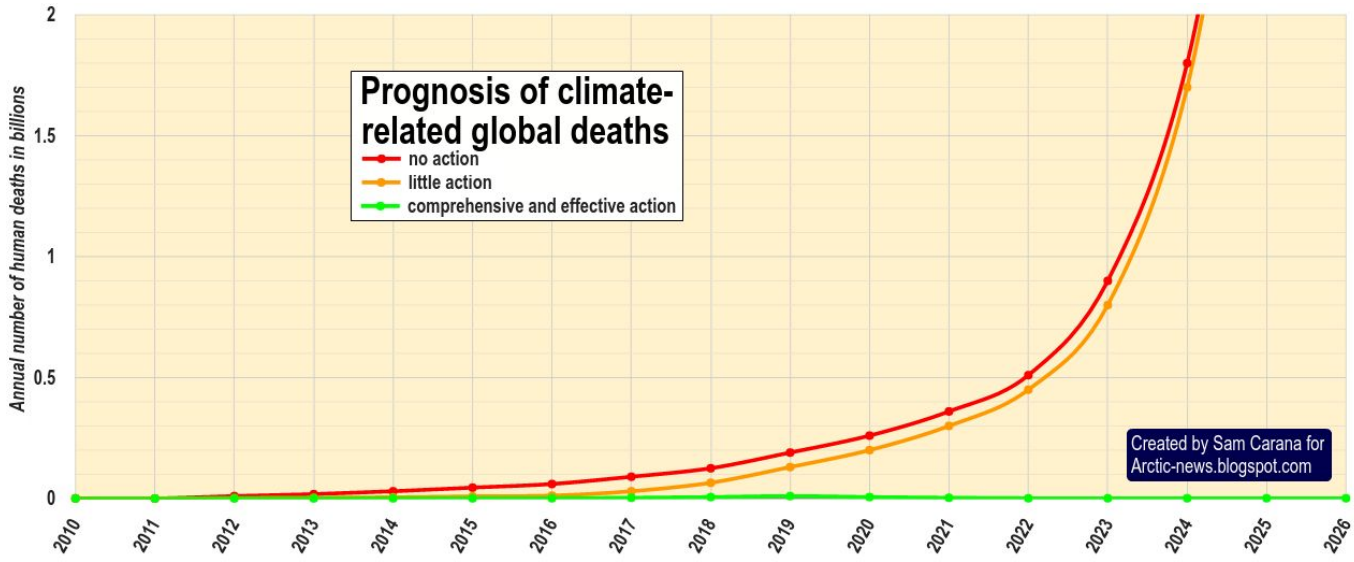


Summary: Total potential global temperature rise by 2026: 10°C/18°F



In summary, adding up all the warming associated with the above elements results in a total potential global temperature rise (land and ocean) of more than 10°C or 18°F within a decade, i.e. by 2026, assuming that no geoengineering will take place over the next decade.

Accordingly, this would lead to numbers of climate-related global deaths in line with the prognosis below.

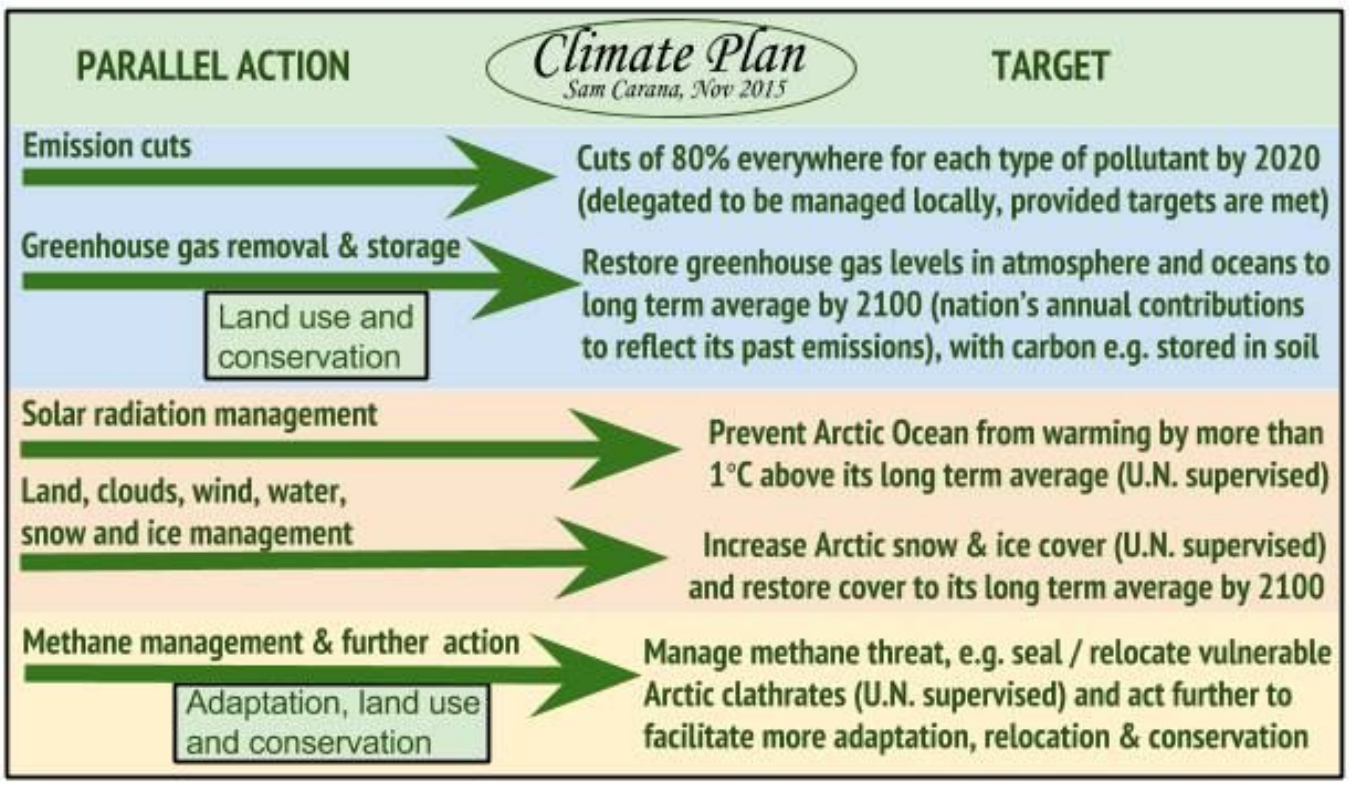


As the chart shows, if little or no action is taken, there will be few if any humans left alive on the planet by the year 2024 when the global temperature rise could exceed 7°C/12.6°F. In conclusion, the situation is dire and calls for comprehensive and effective action as described below in the Climate Plan.

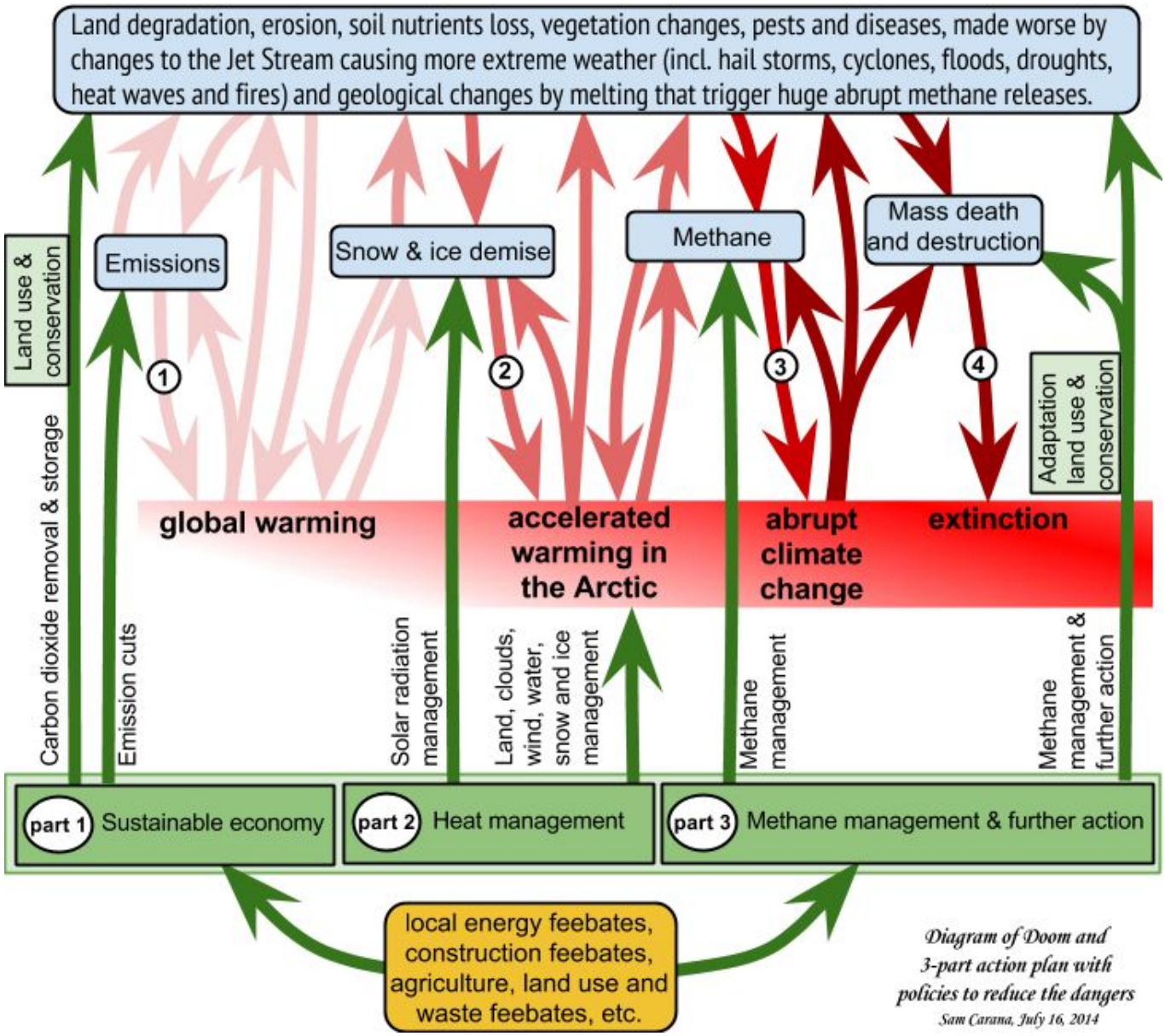
The Climate Plan

Comprehensive and effective action on the danger or runaway warming, by Sam Carana

The Climate Plan, written by Sam Carana, acknowledges the danger of runaway warming (as described above) and constitutes a plan of action that is comprehensive and effective enough to stand a chance of reducing the threat of runaway warming, with obvious benefits for the environment and for the numerous species threatened with extinction.



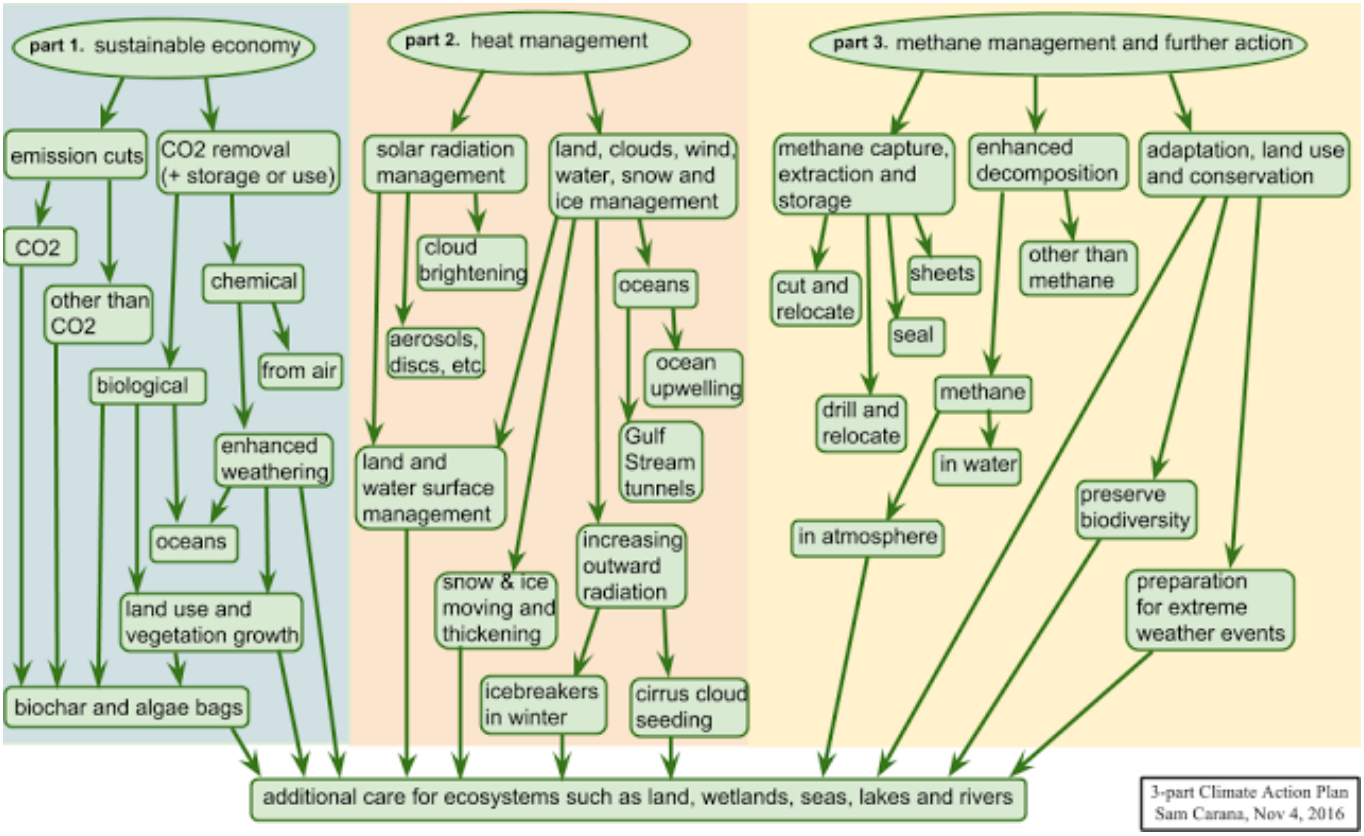
Besides the benefits for the environment, the proposed action will also save people money, will improve people's health and safety, will increase security of food and fresh water supply, will make energy supply and the electric grid more efficient, safe, robust and reliable, will reduce perceived needs for military forces to police fuel supply lines globally, and will create numerous local job and investment opportunities.



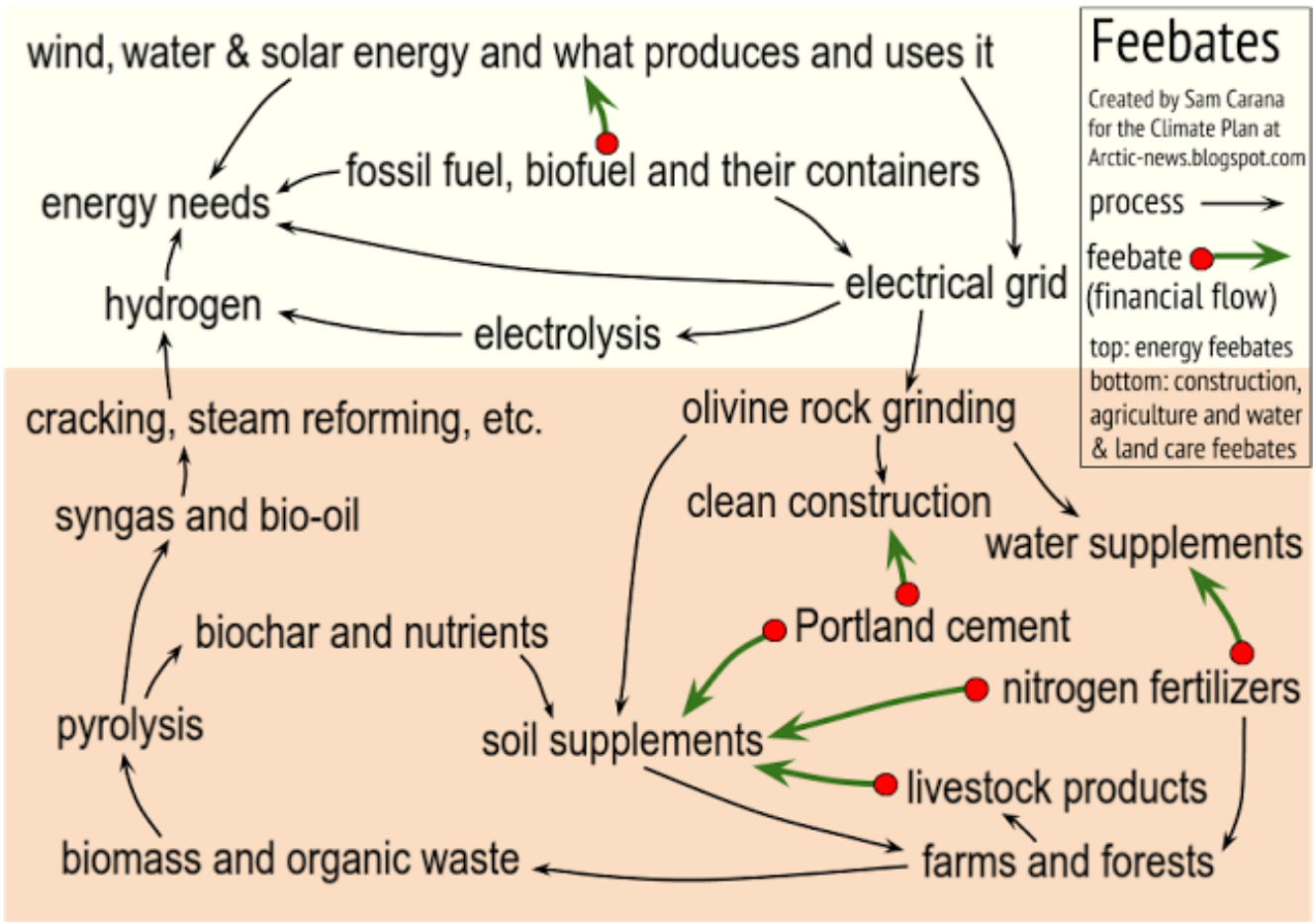
The Climate Action Plan contains three parts that are executed in parallel:

1. Sustainable Economy, i.e. moving toward a more sustainable economy, with dramatic reductions of pollutants on land, in oceans and in the atmosphere
2. Heat management
3. Methane management and further action

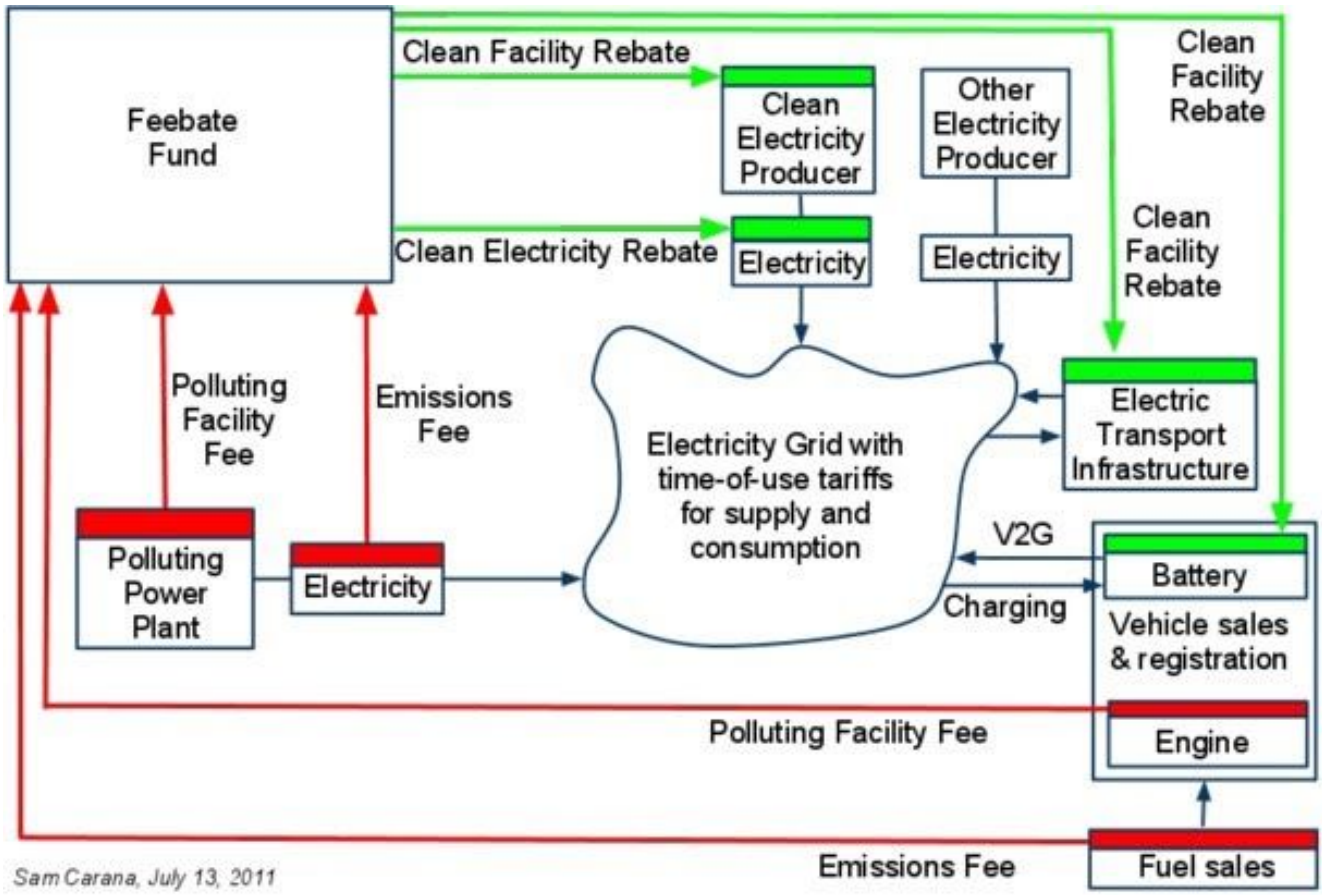
Each of these three parts comes with multiple lines of action to be executed in parallel. Each line of action aims to achieve specific targets, yet one line of action can also help with progress on another line of action. Importantly though, progress on one line should not be used as an excuse to delay action on another line. While lines of action are grouped together in three parts, numbers merely show relationships with the kinds of warming. The green lines of action each need to be implemented in parallel, i.e. progress on one line of action should not be made dependent on progress on another line of action. Besides helping each other, these lines of action will also lead to additional care for ecosystems, such as land, wetlands, lakes and rivers.



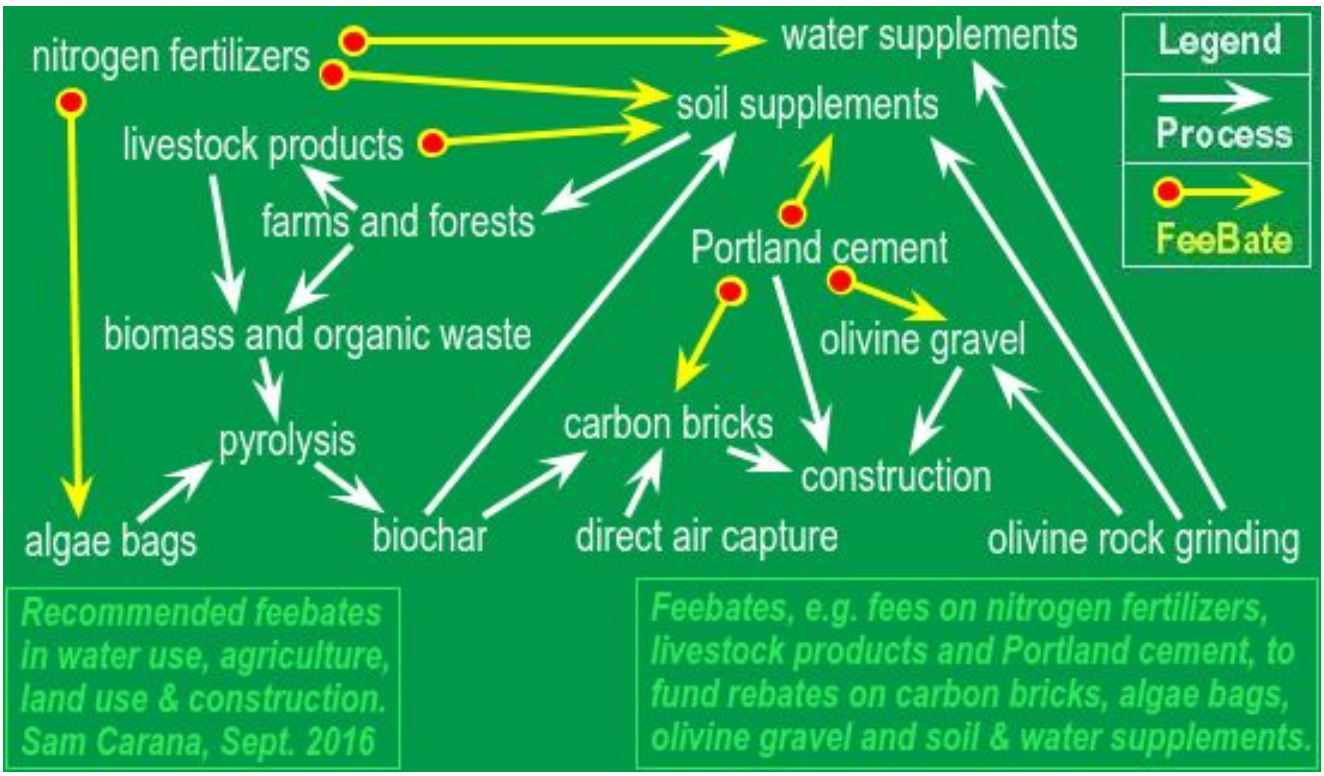
This Climate Action Plan contains many lines of action. The decision how to implement the necessary action (e.g. efforts to reduce pollution levels) is largely delegated to state or provincial level, while states or provinces can similarly delegate decisions to local communities. Generally, feebates are recommended as the most effective policy instruments (image below).



States or provinces can thus implement the policies that they feel will fit their circumstances best, provided they do each achieve their targets. Such targets are set by national government in line with international agreements, and assisted by ongoing monitoring and research as to which ways can best make safe progress and achieve targets most effectively.



Local implementation encourages that revenues from fees on polluting products are used to fund the necessary shift to clean products locally. This will help achieve the shift where it's needed most.



The two images above depict energy feebates and other feebates. Energy feebates can best clean up energy, while other feebates can best raise revenue for carbon dioxide removal and further action. Energy feebates can phase themselves out, completing the necessary shift to clean energy within years, rather than decades. Since carbon dioxide removal (CDR) will need to continue for longer, it makes sense to raise funding for CDR from other sources, such as sales of livestock products, nitrogen fertilizers and Portland cement.

Please support, follow and discuss the Climate Plan at facebook.com/ClimatePlan and at facebook.com/SamCarana

Groups to discuss things further:

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Electric Transport	https://www.facebook.com/groups/ElectricTransport
Renewables	https://www.facebook.com/groups/renewables
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Geoengineering	https://www.facebook.com/groups/geoengineering
Climate Alert	https://www.facebook.com/groups/climatealert

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- Extinction
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- Feedbacks
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- Albedo Change in Arctic
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- Sea ice is shrinking
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- Monthly CO_2 not under 400 ppm in 2016
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- It could be unbearably hot in many places within a few years time
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