ipcc

INTERGOVERNMENTAL PANEL ON climate change

Climate Change 2021

The Physical Science Basis

commented by

PEGG

PLANETARY ENGINEERING GROUP

INTERGOVERNMENTAL PANEL ON climate change

Climate Change 2021

The Physical Science Basis

3949 pages diagnosis without therapy suggestion

Page 6: The basis for the

A.1.1 Observed increases in well-mixed greenhouse gas (GHG) concentrations since around 1750 are unequivocally caused by human activities. Since 2011 (measurements reported in AR5), concentrations have continued to increase in the atmosphere, reaching annual averages of 410 ppm for carbon dioxide (CO_2), 1866 ppb for methane (CH_4), and 332 ppb for nitrous oxide (N_2O) in 2019[6]. Land and ocean have taken up a near-constant proportion (globally about 56% per year) of CO_2 emissions from human activities over the past six decades, with regional differences (*high confidence*)[7]. {2.2, 5.2, 7.3, TS.2.2, Box TS.5}

net-zero emissions fairy tale

Page 27: We don't even know

B.4.3 The magnitude of feedbacks between climate change and the carbon cycle becomes larger but also more uncertain in high CO_2 emissions scenarios (*very high confidence*). However, climate model projections show that the uncertainties in atmospheric CO_2 concentrations by 2100 are dominated by the differences between emissions scenarios (*high confidence*). Additional ecosystem responses to warming not yet fully included in climate models, such as CO_2 and CH_4 fluxes from wetlands, permafrost thaw and wildfires, would further increase concentrations of these gases in the atmosphere (*high confidence*). {5.4, Box TS.5, TS.3.2}

crucial components yet

We know, that we don't know,

B.4.3 The magnitude of feedbacks between climate change and the carbon cycle becomes larger but also more uncertain in high CO_2 emissions scenarios (*very high confidence*). However, climate model projections show that the uncertainties in atmospheric CO_2 concentrations by 2100 are dominated by the differences between emissions scenarios (*high confidence*). Additional ecosystem responses to warming not yet fully included in climate models, such as CO_2 and CH_4 fluxes from wetlands, permafrost thaw and wildfires, would further increase concentrations of these gases in the atmosphere (*high confidence*).
{5.4, Box TS.5, TS.3.2}

but net zero emissions is the guideline!

Page 86: We don't even know

In permafrost regions, increases in ground temperatures in the upper 30 m over the past three to four decades have been widespread (*high confidence*). For each additional 1°C of warming (up to 4°C above the 1850–1900 level), the global volume of perennially frozen ground to 3 m below the surface is projected to decrease by about 25% relative to the present volume (*medium confidence*). However, these decreases may be underestimated due to an incomplete representation of relevant physical processes in ESMs (*low confidence*). Seasonal snow cover is treated in TS.2.6. {2.3.2, 9.5.2, 12.4.9}

crucial components yet

Page 103-104: We don't even know

Thawing terrestrial permafrost will lead to carbon release (*high confidence*), but there is *low confidence* in the timing, magnitude and the relative roles of CO_2 versus CH_4 as feedback processes. An ensemble of models projects CO_2 release from permafrost to be 3–41 PgC per 1ºC of global warming by 2100, leading to warming strong enough that it must be included in estimates of the remaining carbon budget but weaker than the warming from fossil fuel burning. However, the incomplete representation of important processes, such as abrupt thaw, combined with weak observational constraints, only allow *low confidence* in both the magnitude of these estimates and in how linearly proportional this feedback is to the amount of global warming. There is emerging evidence that permafrost thaw and thermokarst give rise to increased CH_4 and N_2O emissions, which leads to the combined radiative forcing from permafrost thaw being larger than from CO_2 emissions only. However, the quantitative understanding of these additional feedbacks is low, particularly for N_2O. These feedbacks, as well as potential additional carbon losses due to climate-induced fire feedback are not routinely included in Earth System models. {Box 5.1, 5.4.3, 5.4.7, 5.4.8, Box TS.9}

crucial components yet

41 PgC Peta Gramm Carbon per Grad

Thawing terrestrial permafrost will lead to carbon release (*high confidence*), but there is *low confidence* in the timing, magnitude and the relative roles of CO_2 versus CH_4 as feedback processes. An ensemble of models projects CO_2 release from permafrost to be 3–41 PgC per 1ºC of global warming by 2100, leading to warming strong enough that it must be included in estimates of the remaining carbon budget but weaker than the warming from fossil fuel burning. However, the incomplete representation of important processes, such as abrupt thaw, combined with weak observational constraints, only allow *low confidence* in both the magnitude of these estimates and in how linearly proportional this feedback is to the amount of global warming. There is emerging evidence that permafrost thaw and thermokarst give rise to increased CH_4 and N_2O emissions, which leads to the combined radiative forcing from permafrost thaw being larger than from CO_2 emissions only. However, the quantitative understanding of these additional feedbacks is low, particularly for N_2O. These feedbacks, as well as potential additional carbon losses due to climate-induced fire feedback are not routinely included in Earth System models. {Box 5.1, 5.4.3, 5.4.7, 5.4.8, Box TS.9}

are 150 Gt CO2 per Grad, 750 Gt at 5°

Page 107: We don't even know

Permafrost thaw is included in estimates together with other feedbacks that are often not captured by models. Limitations in modelling studies combined with weak observational constraints only allow *low confidence* in the magnitude of these estimates (TS.3.2.2). Despite the large uncertainties surrounding the quantification of the effect of additional Earth system feedback processes, such as emissions from wetlands and permafrost thaw, these feedbacks represent identified additional risk factors that scale with additional warming and mostly increase the challenge of limiting warming to specific temperature levels. These uncertainties do not change the basic conclusion that global CO_2 emissions would need to decline to net zero to halt global warming. {Box 5.1, 5.4.8, 5.5.2}

TS.3.3.2 Carbon Dioxide Removal

crucial components yet

There are great uncertainties, but we do not want

Permafrost thaw is included in estimates together with other feedbacks that are often not captured by models. Limitations in modelling studies combined with weak observational constraints only allow *low confidence* in the magnitude of these estimates (TS.3.2.2). Despite the large uncertainties surrounding the quantification of the effect of additional Earth system feedback processes, such as emissions from wetlands and permafrost thaw, these feedbacks represent identified additional risk factors that scale with additional warming and mostly increase the challenge of limiting warming to specific temperature levels. These uncertainties do not change the basic conclusion that global CO_2 emissions would need to decline to net zero to halt global warming. {Box 5.1, 5.4.8, 5.5.2}

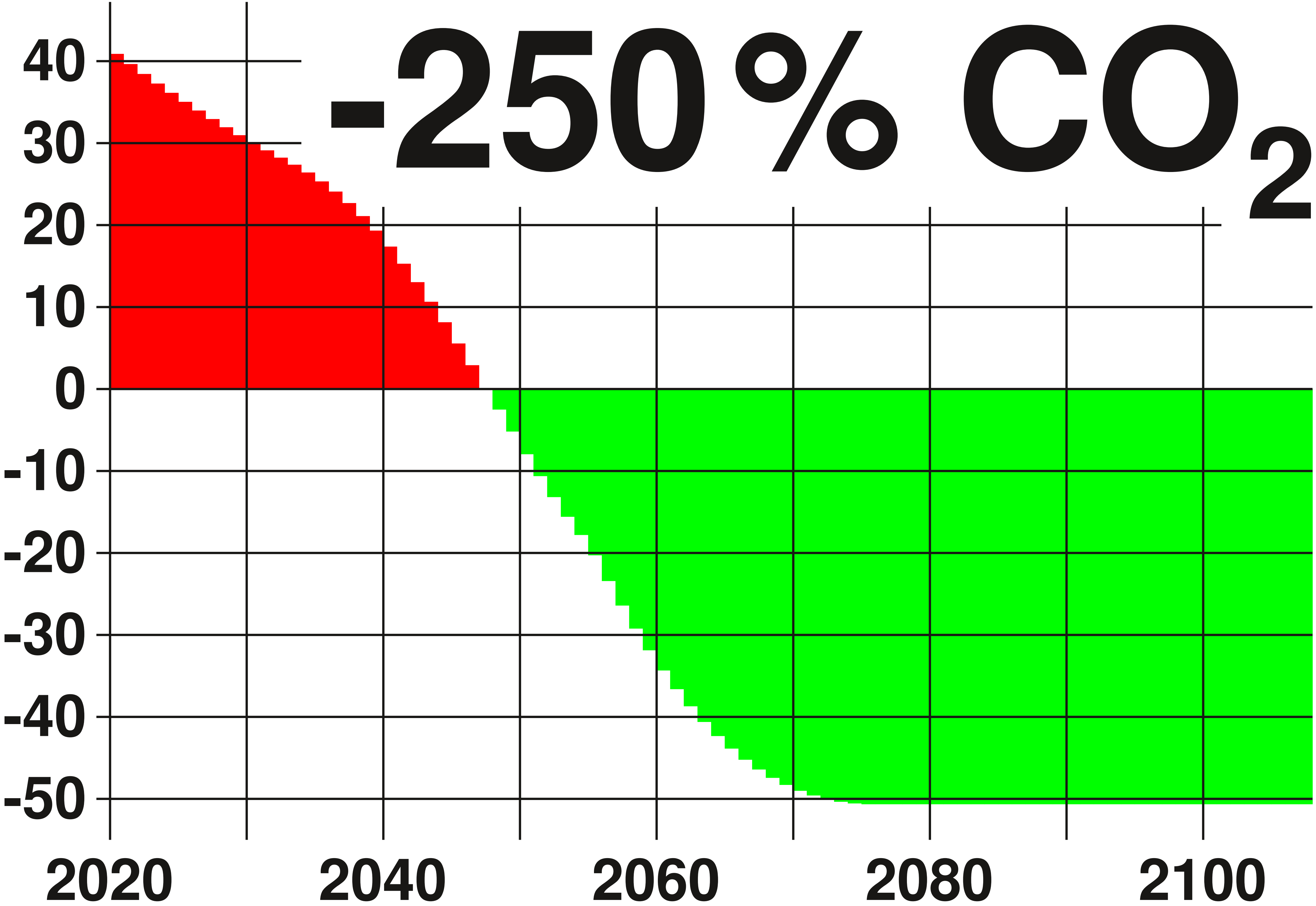
TS.3.3.2 Carbon Dioxide Removal

to give up the belief in net-zero emissions!

Page 221: Really? Or is it just that

The SROCC found that the carbon content of Arctic and boreal permafrost is almost twice that of the atmosphere (*medium confidence)*, and assessed *medium evidence* with *low agreement* that thawing northern permafrost regions are currently releasing additional net methane and CO_2.

what cannot be is not allowed to be?



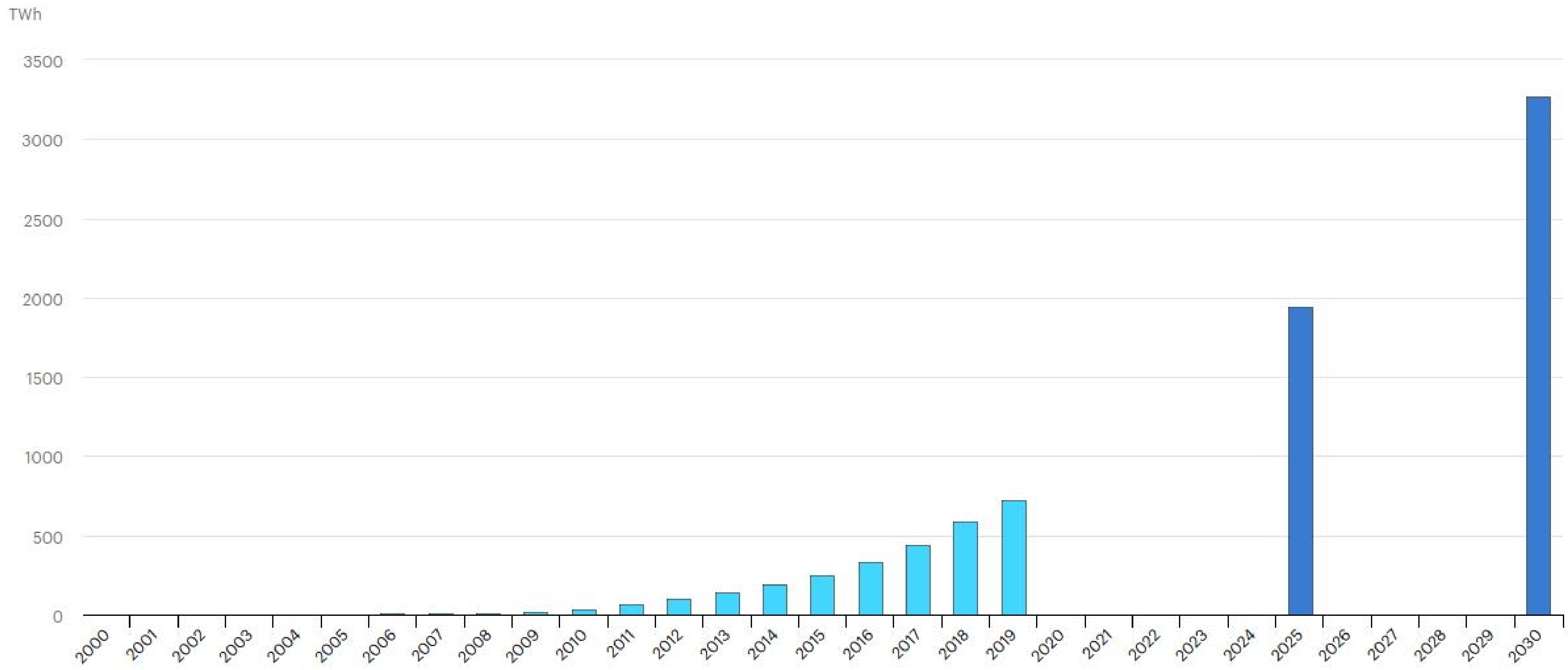
-250% CO_2
40
30
20
10
0
-10
-20
-30
-40
-50
2020
2040
2060
2080
2100

Solar PV power generation in the Sustainable Development Scenario, 2000-2030

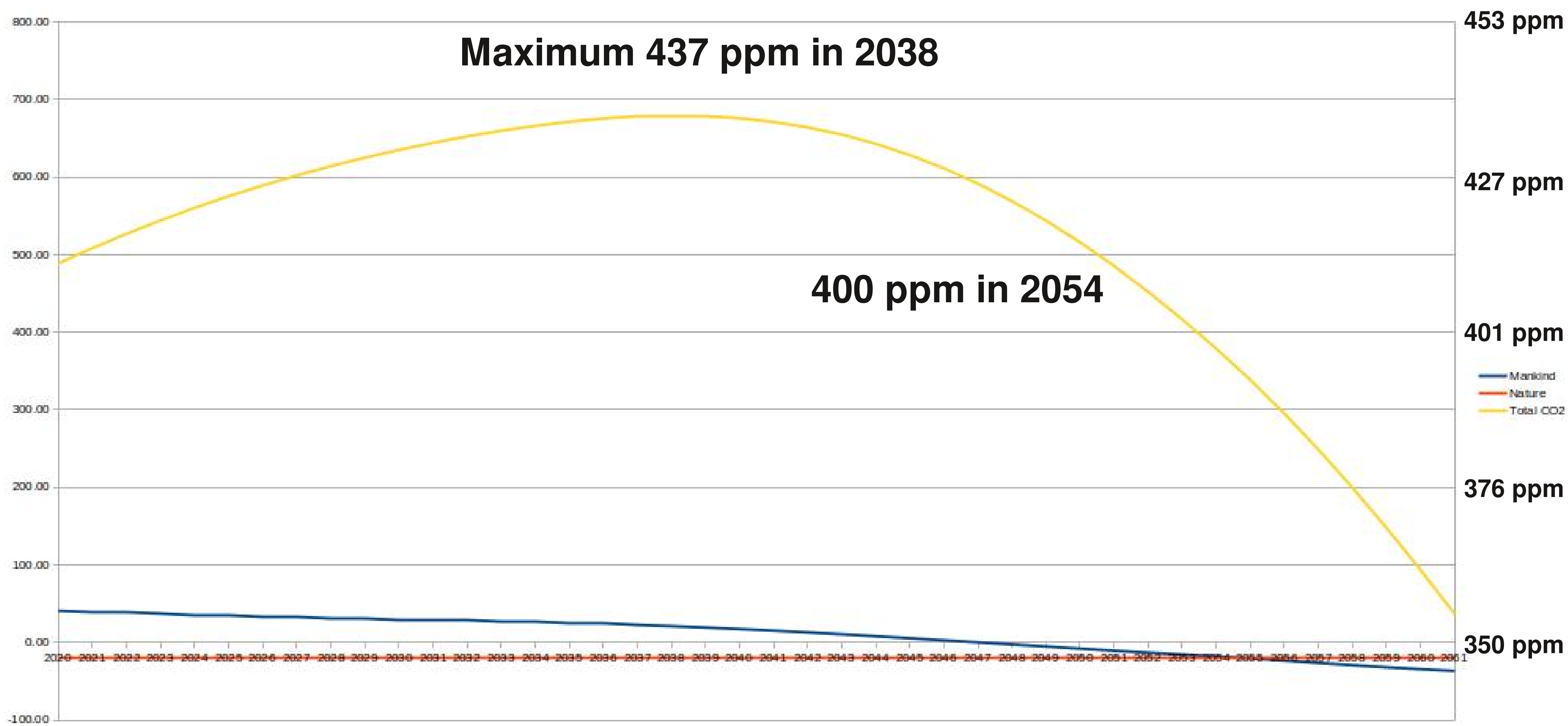
Last updated 2 Jun 2020

Download chart ↓

Cite Share



Solar PV generation increased 22% (+131 TWh) in 2019 and represented the second-largest absolute generation growth of all renewable technologies, slightly behind wind and ahead of hydropower. Despite decelerating growth due to recent policy changes and uncertainties in China (the largest PV market globally), 2019 was a year of record global growth in PV capacity. As competitiveness continues to improve, solar PV is still on track to reach the levels envisioned in the SDS, which will require average annual growth of 15% between 2019 and 2030.

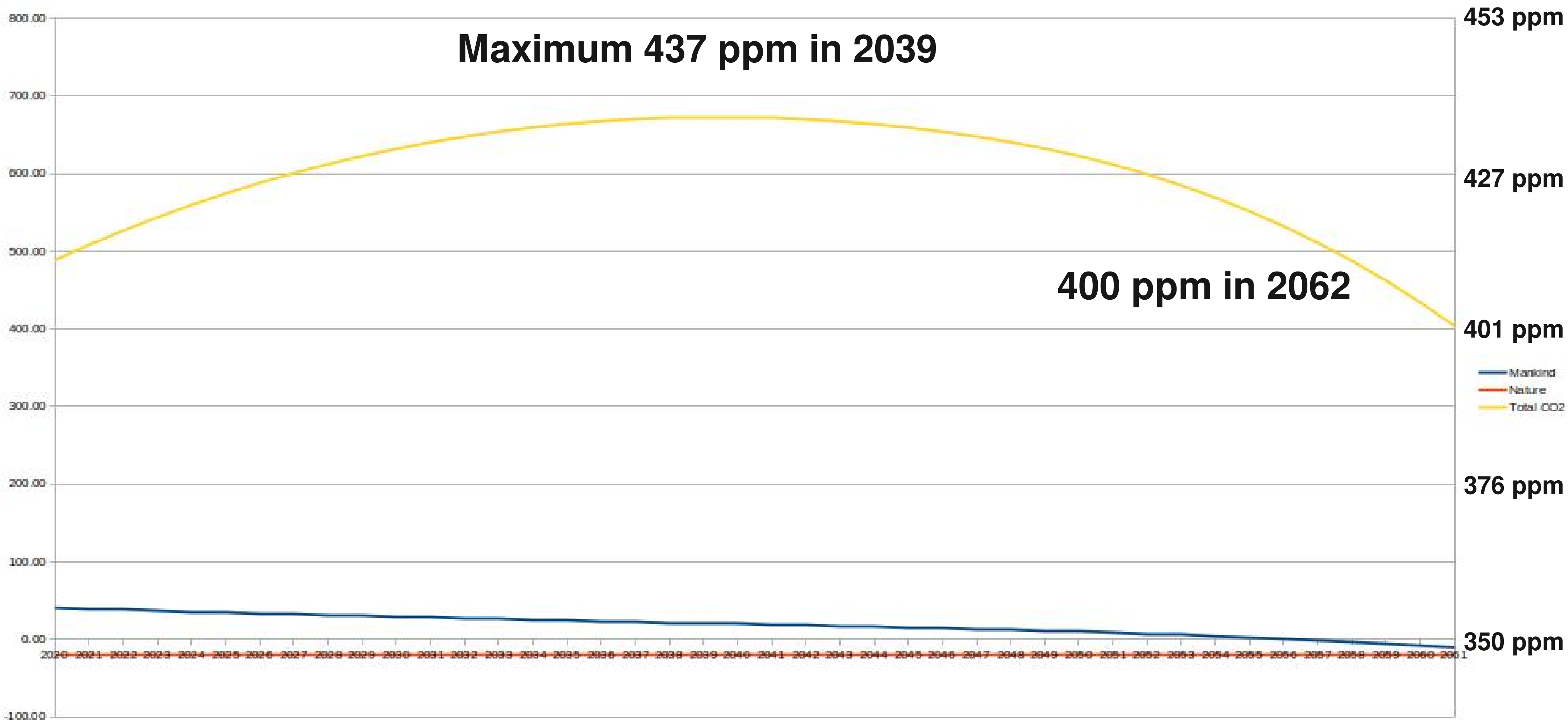


Naïve scenario until 2061: nature continues to absorb 20 Gt CO2 per year

Gt CO2 emission of civilization
Gt CO2 emission of nature
Gt CO2 more in the atmosphere than at 350 ppm

26 % yearly PV production growth until 2032

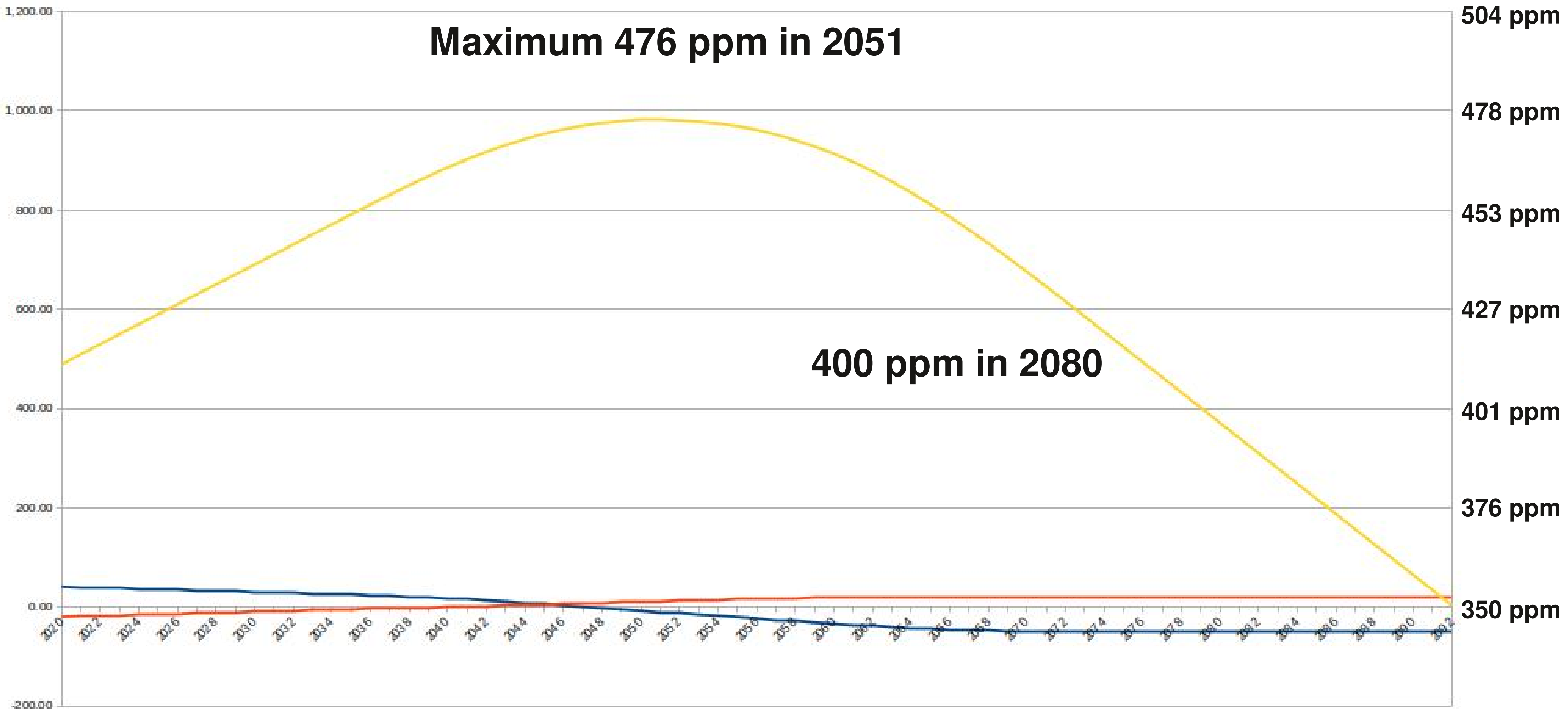
18 TW/a reached 2055



Naïve scenario until 2061: nature continues to absorb 20 Gt CO2 per year

Gt CO2 emission of civilization
Gt CO2 emission of nature
Gt CO2 more in the atmosphere than at 350 ppm

15 % yearly PV production growth until 2047
18 TW/a reached 2065



Change from -20 Gt to +20 Gt CO2 emission of nature with 1 Gt/a until 2092

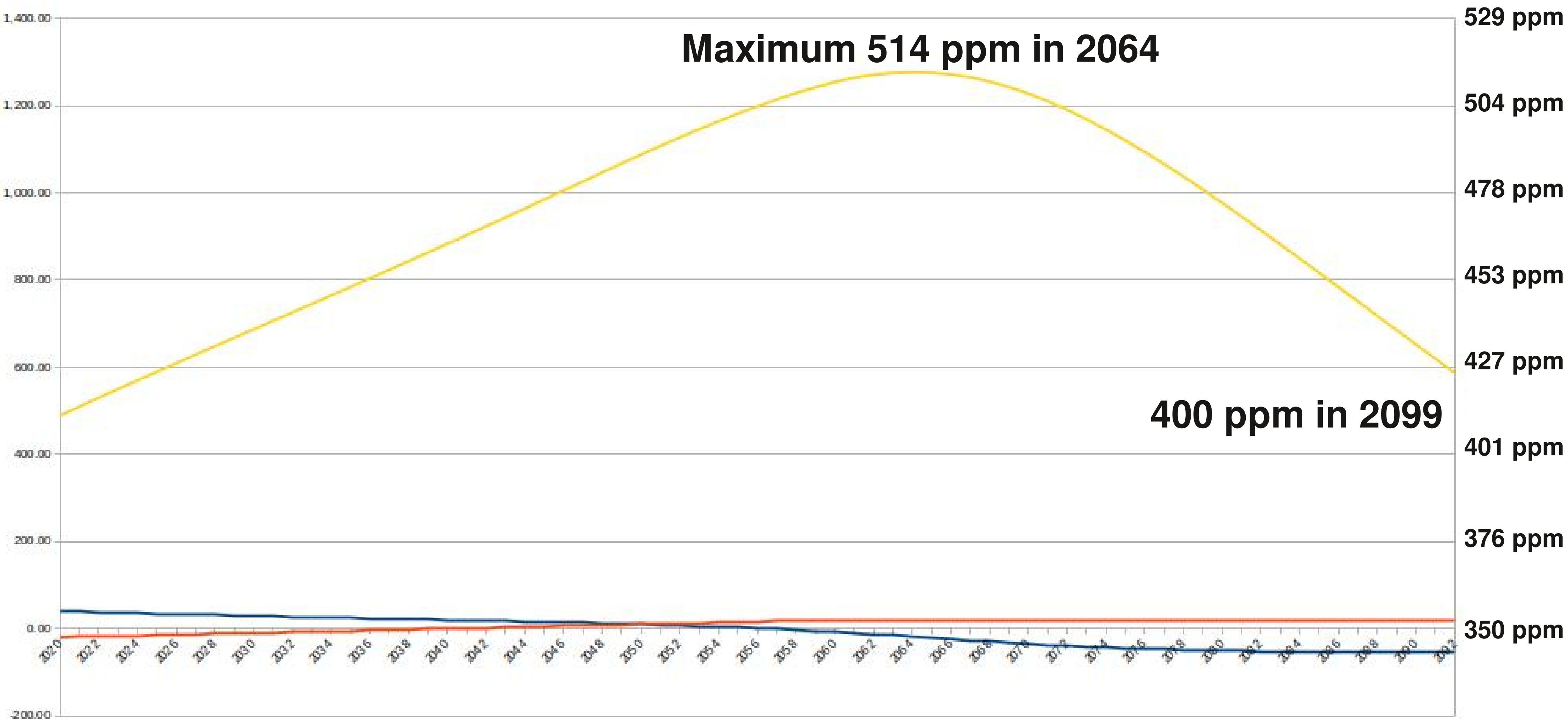
Gt CO2 emission of civilization

Gt CO2 emission of nature

Gt CO2 more in the atmosphere than at 350 ppm

26 % yearly PV production growth until 2032

18 TW/a reached 2055



Change from -20 Gt to +20 Gt CO2 emission of nature with 1 Gt/a until 2092

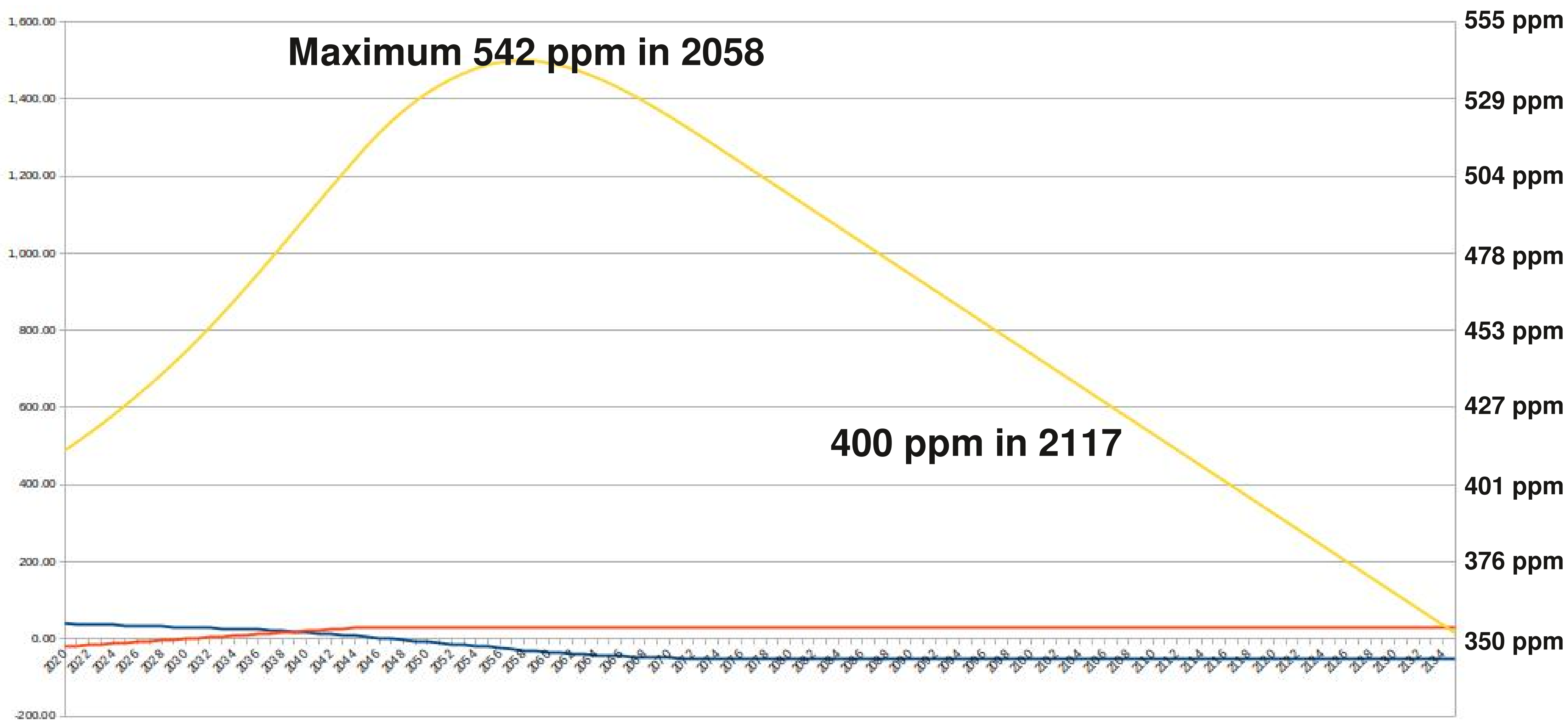
Gt CO2 emission of civilization

Gt CO2 emission of nature

Gt CO2 more in the atmosphere than at 350 ppm

15 % yearly PV production growth until 2047

18 TW/a reached 2065



Change from -20 Gt to +30 Gt CO_2 emission of nature with 2 Gt/a until 2135

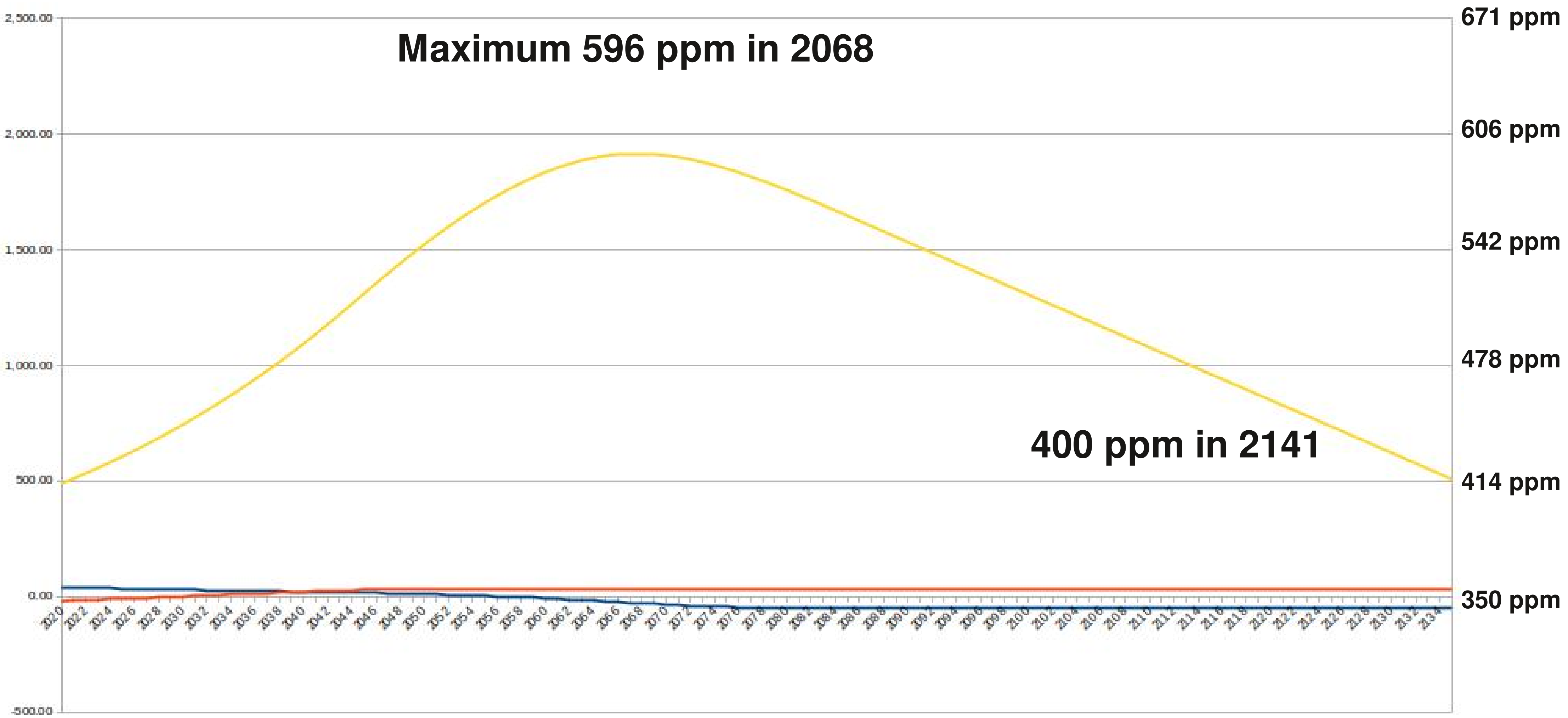
Gt CO_2 emission of civilization

Gt CO_2 emission of nature

Gt CO_2 more in the atmosphere than at 350 ppm

26 % yearly PV production growth until 2032

18 TW/a reached 2055

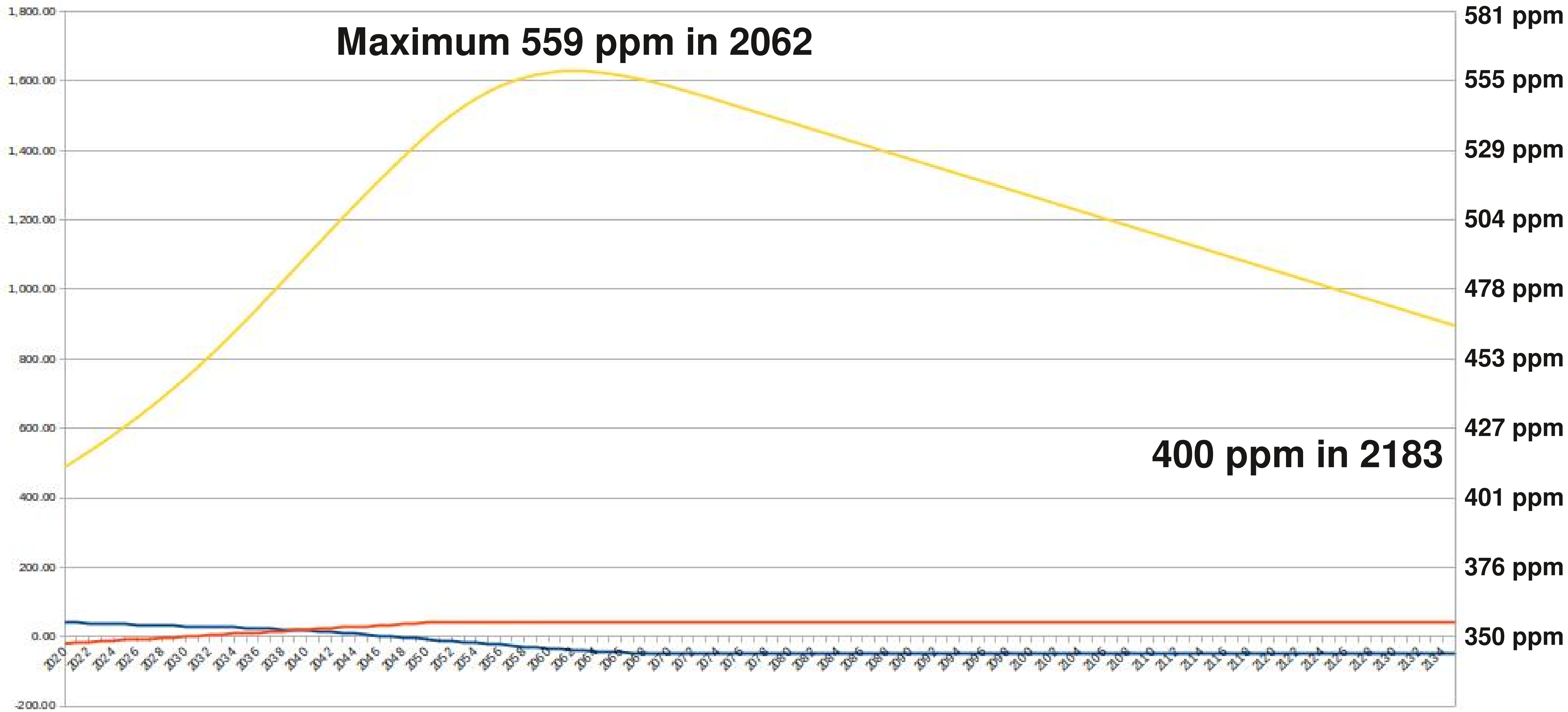


Change from -20 Gt to +30 Gt CO2 emission of nature with 2 Gt/a until 2135

Gt CO2 emission of civilization
Gt CO2 emission of nature
Gt CO2 more in the atmosphere than at 350 ppm

15 % yearly PV production growth until 2047

18 TW/a reached 2065



Change from -20 Gt to +40 Gt CO2 emission of nature with 2 Gt/a until 2135

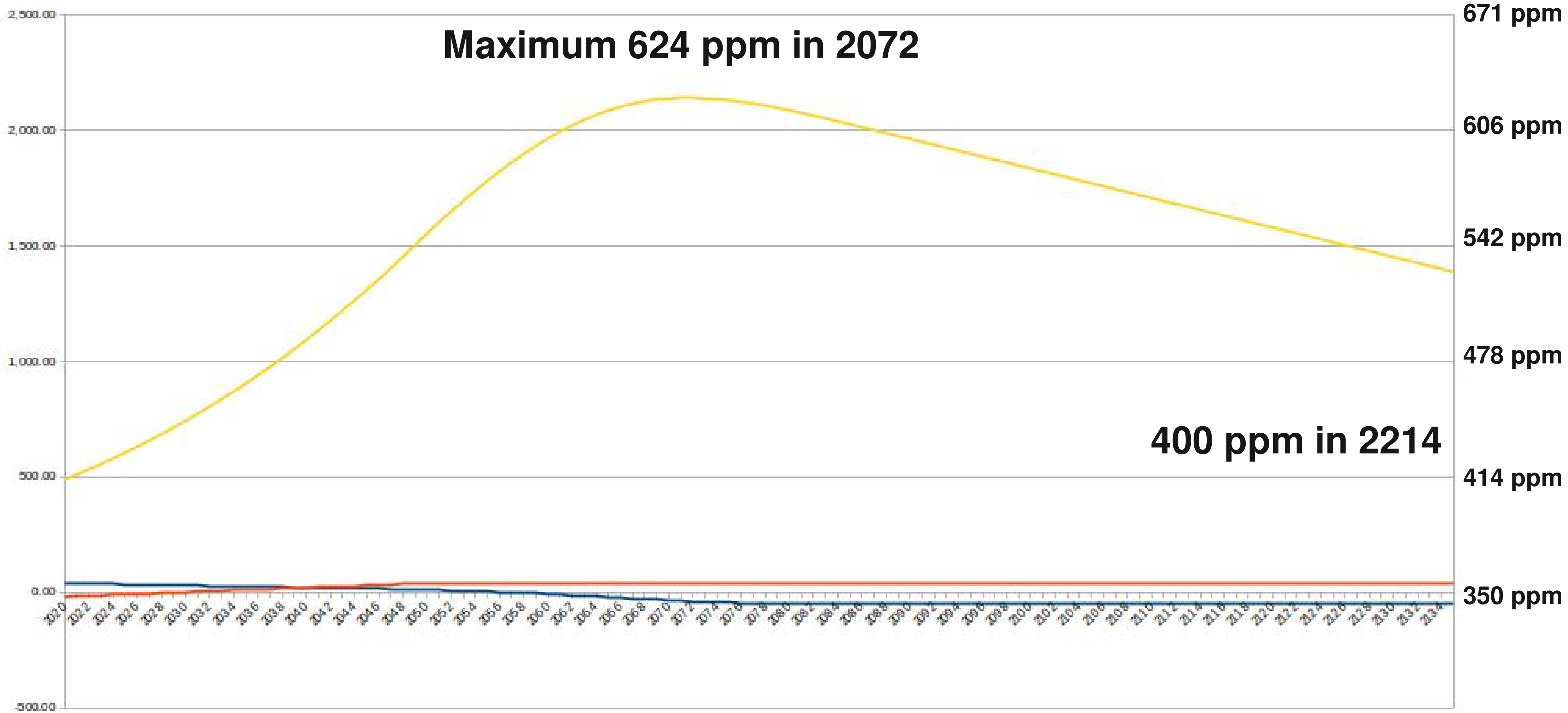
Gt CO2 emission of civilization

Gt CO2 emission of nature

Gt CO2 more in the atmosphere than at 350 ppm

26 % yearly PV production growth until 2032

18 TW/a reached 2055



Change from -20 Gt to +40 Gt CO2 emission of nature with 2 Gt/a until 2135

Gt CO2 emission of civilization

Gt CO2 emission of nature

Gt CO2 more in the atmosphere than at 350 ppm

15 % yearly PV production growth until 2047

18 TW/a reached 2065

General requirements

Climate Protection Superiority House

CPSH	Average	2,000,000,000
Photovoltaic	50 kW	100 TW
Batteries	150 kWh	300 TWh
Electricity yield per year	65 MWh	130 PWh
Food production	Vertical gardening 80 m^2	Vertical g. 160,000 km^2
Living space	100 m^2	200,000 km^2
Area requirement with roads	800 m^2	1,600,000 km^2

130 PWh of electricity, far beyond the energy needs of mankind today (electricity not equal to heat). ClimateProtectionSuperiorityHouse as a central point of the energy turnaround, but the energy turnaround is only a stage goal on the way to the planet renovation.

Real climate protection measures are only possible with an increase in the standard of living, but this must be measured specifically for the poorest 10% of the population.

Synergy energy production, food production, high living comfort and the security in areas which require the option F=Fire or W=Water.

ipcc

INTERGOVERNMENTAL PANEL ON climate change

Climate Change 2021

The Physical Science Basis

commented by PEGG

PLANETARY ENGINEERING GROUP