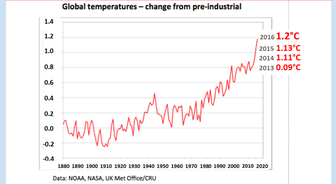
CLIMATE EMERGENCY INSTITUTE
The health and human rights approach to climate change

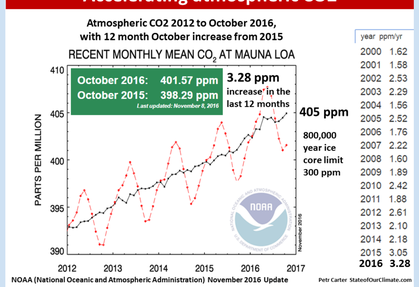
Climate Golden Age or Greenhouse Gas Dark Age Legacy? Climate Emergency Institute

TODAY 1.2°C

Big spike in global surface temperature increase 2016 +1.2°C (WMO)



Accelerating atmospheric CO2



year	ppm/yr
2000	1.62
2001	1.58
2002	2.53
2003	2.29
2004	1.56
2005	2.52
2006	1.76
2007	2.22
2008	1.60
2009	1.89
2010	2.42
2011	1.88
2012	2.61
2013	2.10
2014	2.18
2015	3.05
2016	3.28

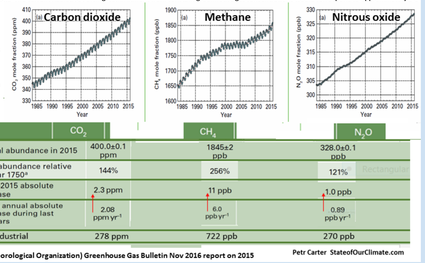
Accelerating atmospheric greenhouse gases 2°C commitment

2015 Atmospheric GHGs WMO Nov 2016

- **All three main GHGs are accelerating.**
- **Their combined atmospheric concentration is a commitment to 2°C**

'The total radiative forcing by all LLGHGs in 2015 corresponds to a CO2-equivalent mole fraction of 485 ppm' This is a commitment to about 2°C.

IPCC AR5 WG1 12.5.4.2 The current Radiative Forcing commitment from constant greenhouse gas concentrations would correspond to approximately 2°C



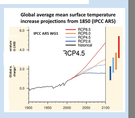
Concentrations of all three GHGs in 2015 are higher than the last 10 year average

	CO_2	CH_4	N_2O
Global abundance in 2015	400.0±0.1 ppm	1845±2 ppb	328.0±0.1 ppb
2015 abundance relative to year 1750*	144%	256%	121%
2014–2015 absolute increase	2.3 ppm	11 ppb	1.0 ppb
Mean annual absolute increase during last 10 years	2.08 ppm yr⁻¹	6.0 ppb yr⁻¹	0.89 ppb yr⁻¹
Pre-industrial	278 ppm	722 ppb	270 ppb

WMO (World Meteorological Organization) Greenhouse Gas Bulletin Nov 2016 report on 2015
Petr Carter StateofOurClimate.com

Method

Reports from IPCC (AR5), WMO, NOAA and the UN Climate Secretariat are the sources used. Temperature increases are by the IPCC AR5 projections graph (from 1850).



Conclusion

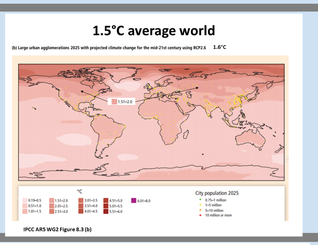
- Surface warming has jumped to 1.2°C with no El Niño effect (WMO 2016).
- Atmospheric CO2 has spiked to 405 ppm, accelerating at an unprecedented rate (>3 ppm a year).
- Already committed global climate change (2°C), with no emergency response even being thought of, excludes a bright future this century, and has the world headed to a dark age of decline.
- UN filed INDCs (intended national emissions targets, May 2016) commit the world to 3°C by 2100, which is >5°C after 2100 – and will be much higher due to many large sources of carbon feedback emissions not included in the temperature projections. All energy projections are much higher (IEA Nov 2016).
- These commitments make the survival of civilization most unlikely, with the global climate emergency being ignored, and particularly with committed food production declines affecting all main food-producing regions, especially considering increased extreme heat and drought affecting these regions and combined adverse effects (not captured by the models).
- Negative emissions (CO2 removal) at scale is unfeasible and at best will make little to no difference in these catastrophic climate change projections.
- The US Trump fossil fuel energy scenario will collapse civilization, and the human population.

Peter Carter, AGU 2016

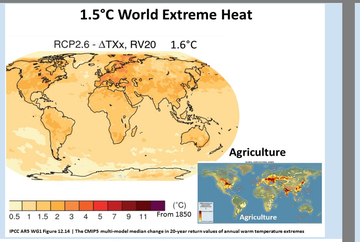
1.5°C 2030-2035

Best-case AR5 scenario RCP2.6 (1.6°C by 2100)
Requires immediate global emissions decline

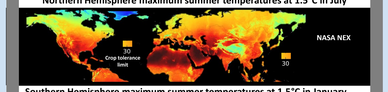
1.5°C average world



1.5°C World Extreme Heat



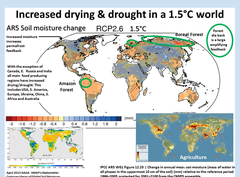
Maximum daily temperatures



NASA Earth Exchange (NEX) Downscaled Climate Projections
Maximum daily temperatures
Climate International

US food production in a 1.5°C world
US drought at 1.5°C

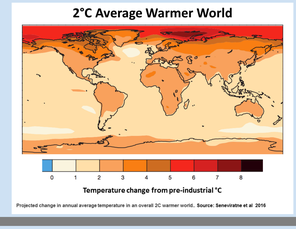
Increased drying & drought in a 1.5°C world



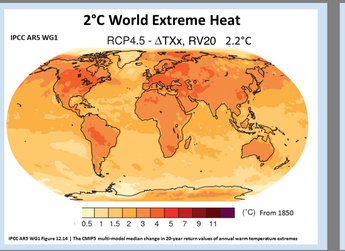
2°C 2040-2055

Policy target is now treated as by 2100 instead of equilibrium

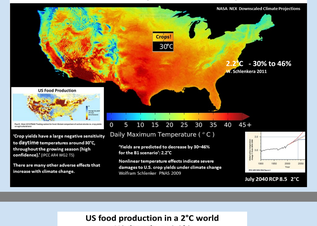
2°C Average Warmer World



2°C World Extreme Heat

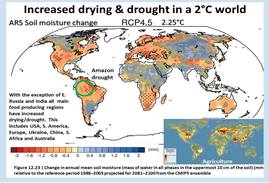


US food production in a 2°C World
USA Maximum daily summer temperature

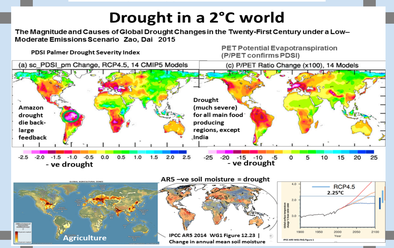


US food production in a 2°C World
US drought at 2.2°C

Increased drying & drought in a 2°C world



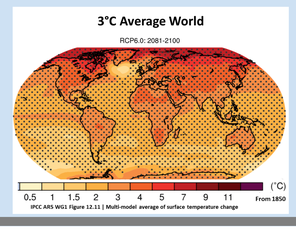
Drought in a 2°C world



3°C (2060 high emissions)

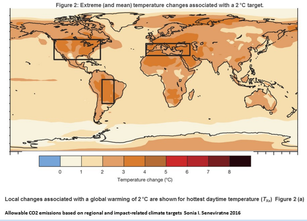
INDC commitment at equilibrium warming
Business as usual "Trump scenario" by 2100

3°C Average World

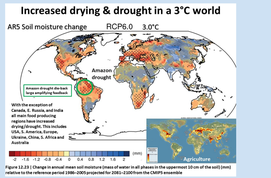


US food production in a 3°C World
US drought at 3°C

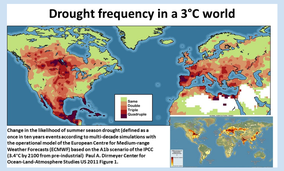
2°C hottest daytime temperature increase



Increased drying & drought in a 3°C world



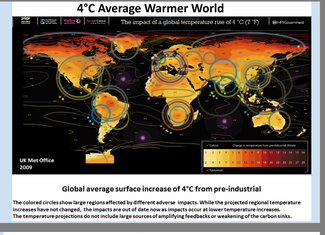
Drought frequency in a 3°C world



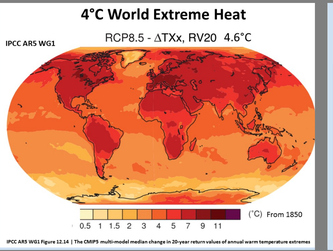
4°C to 5°C

INDC commitment at equilibrium warming
Business as usual "Trump scenario" by 2100

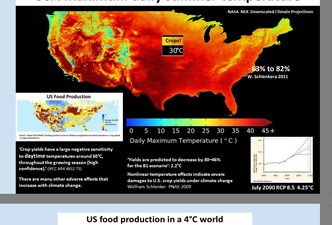
4°C Average Warmer World



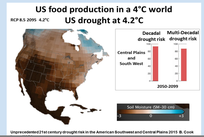
4°C World Extreme Heat



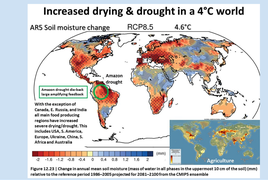
US food production in a 4°C World
USA Maximum daily summer temperature



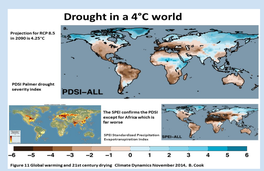
US food production in a 4°C World
US drought at 4.2°C



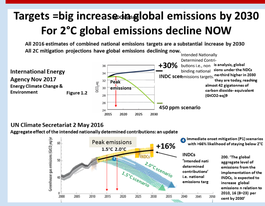
Increased drying & drought in a 4°C world

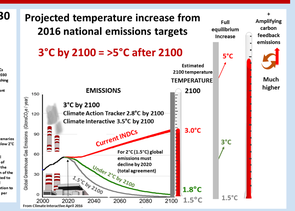


Drought in a 4°C world



'Intended' national emissions targets filed with the UN will lead to 3°C by 2100 = >5°C equilibrium after 2100



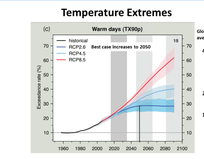


Trump Scenario

Trump-for-President website Positions on Energy

"Unleash America's $50 trillion in untapped, shale, oil, and natural gas reserves, plus hundreds of years in coal reserves." That is the AR5 worst-case RCP8.5, which is 4.6°C by 2100 and a full equilibrium increase long after 2100 of at least 7.8°C (without large sources of amplifying feedback emissions).

Extreme Heat



Max Summer Temperature NASA NEX

Nonlinear temperature effects indicate severe damages to U.S. crop yields under climate change
Wolfram Schlenkera, 2011 PNAS

2100 B1	2.4°C	30%-46%
2100 A1FI	4.5°C	63%-82%

US Drought

Increased Drying & Drought IPCC AR5

Increased World Drought More sources

Dark Age IPCC AR5 quotes

FOOD

"Based on many studies covering a wide range of regions and crops, negative impacts of climate change on crop yields have been more common than positive impacts. The smaller number of studies showing positive impacts relate mainly to high-latitude regions, though it is not yet clear whether the balance of impacts has been negative or positive in these regions." (IPCC AR5 WG2 SPM)

"With or without adaptation, negative impacts on average yields become likely from the 2030s." (IPCC AR5 Table 7.5) **This [2030] is committed/ locked in.** The linear models for the projections do not capture extreme heat and drought, nor weeds, pests, pathogens or adverse combinations.

"Crop yields have a large negative sensitivity to daytime temperatures around 30°C, throughout the growing season (high confidence)." (IPCC AR4 WG2 TS)

GENERAL IMPACTS

"Impacts from recent climate-related extremes, such as heat waves, droughts, floods, cyclones, and wildfires, reveal significant vulnerability and exposure of some ecosystems and many human systems to current climate variability (very high confidence). Impacts of such climate-related extremes include alteration of ecosystems, disruption of food production and water supply, damage to infrastructure and settlements, morbidity and mortality, and consequences for mental health and human well-being."

"It is very likely that heat waves will occur more often and last longer, and that extreme precipitation events will become more intense and frequent in many regions." (IPCC AR5 WG2 SPM)

"Throughout the 21st century, climate-change impacts are projected to slow down economic growth, make poverty reduction more difficult, further erode food security, and prolong existing and create new poverty traps, the latter particularly in urban areas and emerging hotspots of hunger. Climate-change impacts are expected to exacerbate poverty in most developing countries and create new poverty pockets in countries with increasing inequality, in both developed and developing countries." (ibid)

"Climate change can indirectly increase risks of violent conflicts in the form of civil war and intergroup violence by amplifying well-documented drivers of these conflicts such as poverty and economic shocks. Multiple lines of evidence relate climate variability to these forms of conflict." (ibid)

"Continued emission of greenhouse gases will cause further warming and long-lasting changes in all components f the climate system, increasing the likelihood of severe, pervasive and irreversible impacts for people and ecosystems.' …oceans will continue to warm and acidify, and global mean sea level to rise." (ibid)

MITIGATION

"Mitigation… would require substantial emissions reductions over the next few decades and near zero emissions of carbon dioxide and other long-lived greenhouse gases." (IPCC AR5 SYR Headline

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