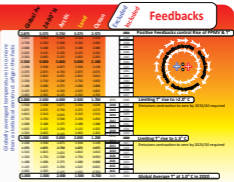
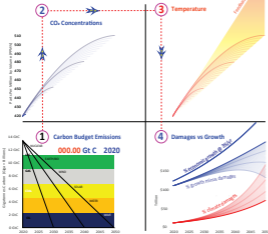


Zero emissions globally 2030-2040-2050

① cause → knock-on effects ② ③ ④

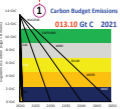
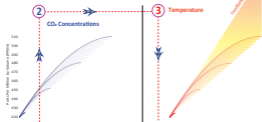


Rising risks in this chain of causation ...

- ① Budget - Weight; Contraction-Rate; Zero-Date (needs to be 2030-2040)
- ② CO₂ Concentrations - Accumulates Increasing Fraction of Budget
- ③ Rising Temperature Response to Rising PPMV & Rising Risks without/with Feedback
- ④ Damages vs Growth Minus Damages - Insured-Uninsured Losses starts @ 6%/annum 2020 temperatures from GISS http://www.giss.org.uk/images/temperature_unmasked.png
More information re animation http://www.giss.org.uk/Sliding_Scale.html

Zero emissions globally 2030-2040-2050

① cause → knock-on effects ② ③ ④



Global Avg
2A-20p * 20
Arctic
Low
Ocean

Feedbacks
Reinforcing

Feedbacks

Year	Global Avg	2A-20p * 20	Arctic	Low	Ocean	Feedbacks
2020	1.02	1.02	1.02	1.02	1.02	Positive feedbacks control rise of PPMV & T
2030	1.20	1.20	1.20	1.20	1.20	
2040	1.40	1.40	1.40	1.40	1.40	
2050	1.60	1.60	1.60	1.60	1.60	
2060	1.80	1.80	1.80	1.80	1.80	
2070	2.00	2.00	2.00	2.00	2.00	
2080	2.20	2.20	2.20	2.20	2.20	
2090	2.40	2.40	2.40	2.40	2.40	
2100	2.60	2.60	2.60	2.60	2.60	
2110	2.80	2.80	2.80	2.80	2.80	
2120	3.00	3.00	3.00	3.00	3.00	
2130	3.20	3.20	3.20	3.20	3.20	
2140	3.40	3.40	3.40	3.40	3.40	
2150	3.60	3.60	3.60	3.60	3.60	
2160	3.80	3.80	3.80	3.80	3.80	
2170	4.00	4.00	4.00	4.00	4.00	
2180	4.20	4.20	4.20	4.20	4.20	
2190	4.40	4.40	4.40	4.40	4.40	
2200	4.60	4.60	4.60	4.60	4.60	
2210	4.80	4.80	4.80	4.80	4.80	
2220	5.00	5.00	5.00	5.00	5.00	
2230	5.20	5.20	5.20	5.20	5.20	
2240	5.40	5.40	5.40	5.40	5.40	
2250	5.60	5.60	5.60	5.60	5.60	
2260	5.80	5.80	5.80	5.80	5.80	
2270	6.00	6.00	6.00	6.00	6.00	
2280	6.20	6.20	6.20	6.20	6.20	
2290	6.40	6.40	6.40	6.40	6.40	
2300	6.60	6.60	6.60	6.60	6.60	
2310	6.80	6.80	6.80	6.80	6.80	
2320	7.00	7.00	7.00	7.00	7.00	
2330	7.20	7.20	7.20	7.20	7.20	
2340	7.40	7.40	7.40	7.40	7.40	
2350	7.60	7.60	7.60	7.60	7.60	
2360	7.80	7.80	7.80	7.80	7.80	
2370	8.00	8.00	8.00	8.00	8.00	
2380	8.20	8.20	8.20	8.20	8.20	
2390	8.40	8.40	8.40	8.40	8.40	
2400	8.60	8.60	8.60	8.60	8.60	
2410	8.80	8.80	8.80	8.80	8.80	
2420	9.00	9.00	9.00	9.00	9.00	
2430	9.20	9.20	9.20	9.20	9.20	
2440	9.40	9.40	9.40	9.40	9.40	
2450	9.60	9.60	9.60	9.60	9.60	
2460	9.80	9.80	9.80	9.80	9.80	
2470	10.00	10.00	10.00	10.00	10.00	
2480	10.20	10.20	10.20	10.20	10.20	
2490	10.40	10.40	10.40	10.40	10.40	
2500	10.60	10.60	10.60	10.60	10.60	

Globally averaged temperature increases more than a static local construal affixes the facts

Limiting T° rise to 1.5°C

Limiting T° rise to 2.0°C

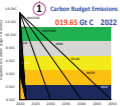
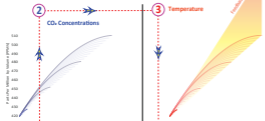
Global Average T° at 1.0°C in 2020

Rising risks in this chain of causation . . .

- ① Budget - Weight; Contraction-Rate; Zero-Date (needs to be 2030-2040)
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More information re animation http://www.giss.org.uk/Sliding_Scale.html

Zero emissions globally 2030-2040-2050

① cause → knock-on effects ② ③ ④



Global Avg 2A 200+ 20 Arctic Low High

Feedbacks

Positive feedbacks control rate of PPMV & T

Limiting T^{max} rise to 2.0°C

Limiting T^{max} rise to 1.5°C

Limiting T^{max} rise to 2.0°C

Limiting T^{max} rise to 1.5°C

Global Average T^{max} at 2.0°C in 2050

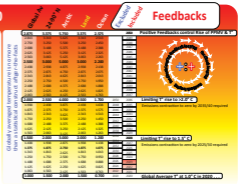
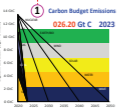
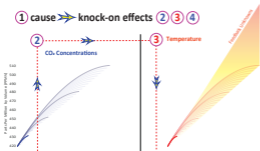
Globally averaged temperature increases more than a static local constr. affg r-the-facts

Rising risks in this chain of causation . . .

- ① Budget - Weight; Contraction-Rate; Zero-Date (needs to be 2030-2040)
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Zero emissions globally 2030-2040-2050

① cause → knock-on effects ② ③ ④

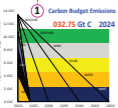
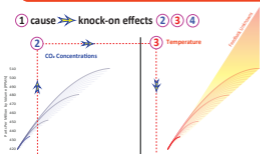


Rising risks in this chain of causation . . .

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Zero emissions globally 2030-2040-2050

① cause → knock-on effects ② ③ ④



Global Avg 2A 200+ 20 Arctic Low High

Feedbacks

Positive feedbacks control rate of PPMV & T

Year	1.00%	1.50%	2.00%	2.50%	3.00%
2020	1.00	1.50	2.00	2.50	3.00
2030	1.05	1.55	2.05	2.55	3.05
2040	1.10	1.60	2.10	2.60	3.10
2050	1.15	1.65	2.15	2.65	3.15
2060	1.20	1.70	2.20	2.70	3.20
2070	1.25	1.75	2.25	2.75	3.25
2080	1.30	1.80	2.30	2.80	3.30
2090	1.35	1.85	2.35	2.85	3.35
2100	1.40	1.90	2.40	2.90	3.40

Limiting T^{max} rise to 2.0°C

Year	1.00%	1.50%	2.00%	2.50%	3.00%
2020	1.00	1.50	2.00	2.50	3.00
2030	1.05	1.55	2.05	2.55	3.05
2040	1.10	1.60	2.10	2.60	3.10
2050	1.15	1.65	2.15	2.65	3.15
2060	1.20	1.70	2.20	2.70	3.20
2070	1.25	1.75	2.25	2.75	3.25
2080	1.30	1.80	2.30	2.80	3.30
2090	1.35	1.85	2.35	2.85	3.35
2100	1.40	1.90	2.40	2.90	3.40

Limiting T^{max} rise to 1.5°C

Year	1.00%	1.50%	2.00%	2.50%	3.00%
2020	1.00	1.50	2.00	2.50	3.00
2030	1.05	1.55	2.05	2.55	3.05
2040	1.10	1.60	2.10	2.60	3.10
2050	1.15	1.65	2.15	2.65	3.15
2060	1.20	1.70	2.20	2.70	3.20
2070	1.25	1.75	2.25	2.75	3.25
2080	1.30	1.80	2.30	2.80	3.30
2090	1.35	1.85	2.35	2.85	3.35
2100	1.40	1.90	2.40	2.90	3.40

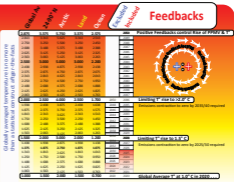
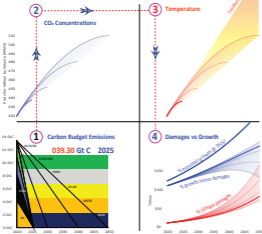
Global Average T^{max} at 1.0°C in 2020

Rising risks in this chain of causation . . .

- ① Budget - Weight; Contraction-Rate; Zero-Date (needs to be 2030-2040)
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Zero emissions globally 2030-2040-2050

① cause → knock-on effects ② ③ ④

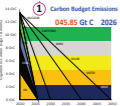
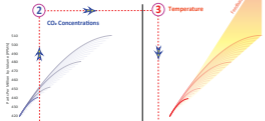


Rising risks in this chain of causation ...

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Zero emissions globally 2030-2040-2050

① cause → knock-on effects ② ③ ④



Global Avg 2A 200° 20 Arctic Lowp Ocean

Feedbacks Feedbacks

Feedbacks

Positive feedbacks control rise of PPMV & T

Globaly averaged temperature increases more than a static local construal: affge r-the-facts

Year	1.500	1.750	2.000	2.250	2.500
2020	1.500	1.520	1.540	1.560	1.580
2030	1.550	1.580	1.610	1.640	1.670
2040	1.600	1.640	1.680	1.720	1.760
2050	1.650	1.700	1.750	1.800	1.850
2060	1.700	1.760	1.820	1.880	1.940
2070	1.750	1.820	1.890	1.960	2.030
2080	1.800	1.880	1.960	2.040	2.120
2090	1.850	1.940	2.030	2.120	2.210
2100	1.900	1.990	2.090	2.190	2.290
2110	1.950	2.050	2.160	2.270	2.380
2120	2.000	2.110	2.220	2.340	2.460
2130	2.050	2.170	2.290	2.420	2.550
2140	2.100	2.230	2.360	2.500	2.640
2150	2.150	2.290	2.430	2.580	2.730
2160	2.200	2.350	2.500	2.640	2.790
2170	2.250	2.410	2.570	2.720	2.850
2180	2.300	2.470	2.640	2.780	2.920
2190	2.350	2.530	2.710	2.850	2.990
2200	2.400	2.590	2.780	2.920	3.060
2210	2.450	2.650	2.850	2.990	3.130
2220	2.500	2.710	2.920	3.060	3.200
2230	2.550	2.770	2.990	3.130	3.270
2240	2.600	2.830	3.060	3.200	3.340
2250	2.650	2.890	3.130	3.270	3.410
2260	2.700	2.950	3.200	3.340	3.480
2270	2.750	3.010	3.270	3.410	3.550
2280	2.800	3.070	3.340	3.480	3.620
2290	2.850	3.130	3.410	3.550	3.690
2300	2.900	3.190	3.480	3.620	3.760
2310	2.950	3.250	3.550	3.690	3.830
2320	3.000	3.310	3.620	3.760	3.900
2330	3.050	3.370	3.690	3.830	3.970
2340	3.100	3.430	3.760	3.900	4.040
2350	3.150	3.490	3.830	3.970	4.110
2360	3.200	3.550	3.900	4.040	4.180
2370	3.250	3.610	3.970	4.110	4.250
2380	3.300	3.670	4.040	4.180	4.320
2390	3.350	3.730	4.110	4.250	4.390
2400	3.400	3.790	4.180	4.320	4.460
2410	3.450	3.850	4.250	4.390	4.530
2420	3.500	3.910	4.320	4.460	4.600
2430	3.550	3.970	4.390	4.530	4.670
2440	3.600	4.030	4.460	4.600	4.740
2450	3.650	4.090	4.530	4.670	4.810
2460	3.700	4.150	4.600	4.740	4.880
2470	3.750	4.210	4.670	4.810	4.950
2480	3.800	4.270	4.740	4.880	5.020
2490	3.850	4.330	4.810	4.950	5.090
2500	3.900	4.390	4.880	5.020	5.160
2510	3.950	4.450	4.950	5.090	5.230
2520	4.000	4.510	5.020	5.160	5.300
2530	4.050	4.570	5.090	5.230	5.370
2540	4.100	4.630	5.160	5.300	5.440
2550	4.150	4.690	5.230	5.370	5.510
2560	4.200	4.750	5.300	5.440	5.580
2570	4.250	4.810	5.370	5.510	5.650
2580	4.300	4.870	5.440	5.580	5.720
2590	4.350	4.930	5.510	5.650	5.790
2600	4.400	4.990	5.580	5.720	5.860
2610	4.450	5.050	5.650	5.790	5.930
2620	4.500	5.110	5.720	5.860	6.000
2630	4.550	5.170	5.790	5.930	6.070
2640	4.600	5.230	5.860	6.000	6.140
2650	4.650	5.290	5.930	6.070	6.210
2660	4.700	5.350	6.000	6.140	6.280
2670	4.750	5.410	6.070	6.210	6.350
2680	4.800	5.470	6.140	6.280	6.420
2690	4.850	5.530	6.210	6.350	6.490
2700	4.900	5.590	6.280	6.420	6.560
2710	4.950	5.650	6.350	6.490	6.630
2720	5.000	5.710	6.420	6.560	6.700
2730	5.050	5.770	6.490	6.630	6.770
2740	5.100	5.830	6.560	6.700	6.840
2750	5.150	5.890	6.630	6.770	6.910
2760	5.200	5.950	6.700	6.840	6.980
2770	5.250	6.010	6.770	6.910	7.050
2780	5.300	6.070	6.840	6.980	7.120
2790	5.350	6.130	6.910	7.050	7.190
2800	5.400	6.190	6.980	7.120	7.260
2810	5.450	6.250	7.050	7.190	7.330
2820	5.500	6.310	7.120	7.260	7.400
2830	5.550	6.370	7.190	7.330	7.470
2840	5.600	6.430	7.260	7.400	7.540
2850	5.650	6.490	7.330	7.470	7.610
2860	5.700	6.550	7.400	7.540	7.680
2870	5.750	6.610	7.470	7.610	7.750
2880	5.800	6.670	7.540	7.680	7.820
2890	5.850	6.730	7.610	7.750	7.890
2900	5.900	6.790	7.680	7.820	7.960
2910	5.950	6.850	7.750	7.890	8.030
2920	6.000	6.910	7.820	7.960	8.100
2930	6.050	6.970	7.890	8.030	8.170
2940	6.100	7.030	7.960	8.100	8.240
2950	6.150	7.090	8.030	8.170	8.310
2960	6.200	7.150	8.100	8.240	8.380
2970	6.250	7.210	8.170	8.310	8.450
2980	6.300	7.270	8.240	8.380	8.520
2990	6.350	7.330	8.310	8.450	8.590
3000	6.400	7.390	8.380	8.520	8.660

Limiting T° rise to 1.5°C

Limiting T° rise to 2.0°C

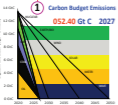
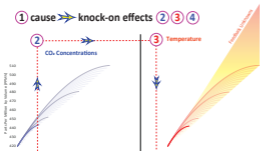
Global Average T° at 1.0°C in 2020

Rising risks in this chain of causation . . .

- ① Budget - Weight; Contraction-Rate; Zero-Date (needs to be 2030-2040)
- ② CO₂ Concentrations - Accumulates Increasing Fraction of Budget
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Zero emissions globally 2030-2040-2050

① cause → knock-on effects ② ③ ④



Globally averaged temperature increases more than a static local construal: affluence effects

	Global Avg	24 deg °N	Arctic	Lower	Upper	Feedback	Feedback
2020	15.00	15.00	15.00	15.00	15.00	0.00	0.00
2030	15.50	15.50	15.50	15.50	15.50	0.50	0.50
2040	16.00	16.00	16.00	16.00	16.00	1.00	1.00
2050	16.50	16.50	16.50	16.50	16.50	1.50	1.50
2060	17.00	17.00	17.00	17.00	17.00	2.00	2.00
2070	17.50	17.50	17.50	17.50	17.50	2.50	2.50
2080	18.00	18.00	18.00	18.00	18.00	3.00	3.00
2090	18.50	18.50	18.50	18.50	18.50	3.50	3.50
2100	19.00	19.00	19.00	19.00	19.00	4.00	4.00

Positive feedbacks control rate of PPMV & T

Limiting T^{max} rise to 2.0°C

Emissions contribution to zero by 2030/50 required

Limiting T^{max} rise to 3.0°C

Emissions contribution to zero by 2030/50 required

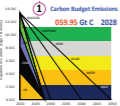
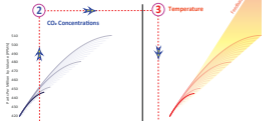
Global Average T^{max} at 3.0°C in 2030

Rising risks in this chain of causation . . .

- ① Budget - Weight; Contraction-Rate; Zero-Date (needs to be 2030-2040)
- ② CO₂ Concentrations - Accumulates Increasing Fraction of Budget
- ③ Rising Temperature Response to Rising PPMV & Rising Risks without/with Feedback
- ④ Damages vs Growth Minus Damages - Insured-Uninsured Losses starts @ 6%/annum 2020 temperatures from GISS http://www.giss.org.uk/images/Temperature_Unmasked.png
More information re animation http://www.giss.org.uk/Sliding_Scale.html

Zero emissions globally 2030-2040-2050

① cause → knock-on effects ② ③ ④



Global Avg

24 deg C

Arctic

Low

Urban

Feedbacks

Positive feedbacks control rate of PPMV & T

Year	1.00%	1.50%	2.00%	2.50%	3.00%	Global Average T° at 1.0°C in 2020
2020	1.00%	1.50%	2.00%	2.50%	3.00%	1.00%
2030	1.05%	1.55%	2.05%	2.55%	3.05%	1.05%
2040	1.10%	1.60%	2.10%	2.60%	3.10%	1.10%
2050	1.15%	1.65%	2.15%	2.65%	3.15%	1.15%

Year	1.00%	1.50%	2.00%	2.50%	3.00%	Global Average T° at 1.0°C in 2020
2020	1.00%	1.50%	2.00%	2.50%	3.00%	1.00%
2030	1.05%	1.55%	2.05%	2.55%	3.05%	1.05%
2040	1.10%	1.60%	2.10%	2.60%	3.10%	1.10%
2050	1.15%	1.65%	2.15%	2.65%	3.15%	1.15%

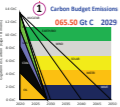
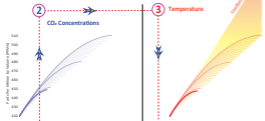
Year	1.00%	1.50%	2.00%	2.50%	3.00%	Global Average T° at 1.0°C in 2020
2020	1.00%	1.50%	2.00%	2.50%	3.00%	1.00%
2030	1.05%	1.55%	2.05%	2.55%	3.05%	1.05%
2040	1.10%	1.60%	2.10%	2.60%	3.10%	1.10%
2050	1.15%	1.65%	2.15%	2.65%	3.15%	1.15%

Rising risks in this chain of causation . . .

- ① Budget - Weight; Contraction-Rate; Zero-Date (needs to be 2030-2040)
- ② CO₂ Concentrations - Accumulates Increasing Fraction of Budget
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More information re animation http://www.giss.org.uk/Sliding_Scale.html

Zero emissions globally 2030-2040-2050

① cause → knock-on effects ② ③ ④



Global Avg

24 deg °C

Arctic

Low

Urban

Feedbacks

Positive feedbacks control rise of PPMV & T

Year	1.5°C	2.0°C	2.5°C	3.0°C	3.5°C
2020	1.50	1.50	1.50	1.50	1.50
2030	1.55	1.55	1.55	1.55	1.55
2040	1.60	1.60	1.60	1.60	1.60
2050	1.65	1.65	1.65	1.65	1.65
2060	1.70	1.70	1.70	1.70	1.70
2070	1.75	1.75	1.75	1.75	1.75
2080	1.80	1.80	1.80	1.80	1.80
2090	1.85	1.85	1.85	1.85	1.85
2100	1.90	1.90	1.90	1.90	1.90

Globally averaged temperature increases more than a static local construal: affix r-the-facts

Year	1.5°C	2.0°C	2.5°C	3.0°C	3.5°C
2020	1.50	1.50	1.50	1.50	1.50
2030	1.55	1.55	1.55	1.55	1.55
2040	1.60	1.60	1.60	1.60	1.60
2050	1.65	1.65	1.65	1.65	1.65
2060	1.70	1.70	1.70	1.70	1.70
2070	1.75	1.75	1.75	1.75	1.75
2080	1.80	1.80	1.80	1.80	1.80
2090	1.85	1.85	1.85	1.85	1.85
2100	1.90	1.90	1.90	1.90	1.90

Limiting T° rise to 2.0°C

Year	1.5°C	2.0°C	2.5°C	3.0°C	3.5°C
2020	1.50	1.50	1.50	1.50	1.50
2030	1.55	1.55	1.55	1.55	1.55
2040	1.60	1.60	1.60	1.60	1.60
2050	1.65	1.65	1.65	1.65	1.65
2060	1.70	1.70	1.70	1.70	1.70
2070	1.75	1.75	1.75	1.75	1.75
2080	1.80	1.80	1.80	1.80	1.80
2090	1.85	1.85	1.85	1.85	1.85
2100	1.90	1.90	1.90	1.90	1.90

Limiting T° rise to 2.5°C

Year	1.5°C	2.0°C	2.5°C	3.0°C	3.5°C
2020	1.50	1.50	1.50	1.50	1.50
2030	1.55	1.55	1.55	1.55	1.55
2040	1.60	1.60	1.60	1.60	1.60
2050	1.65	1.65	1.65	1.65	1.65
2060	1.70	1.70	1.70	1.70	1.70
2070	1.75	1.75	1.75	1.75	1.75
2080	1.80	1.80	1.80	1.80	1.80
2090	1.85	1.85	1.85	1.85	1.85
2100	1.90	1.90	1.90	1.90	1.90

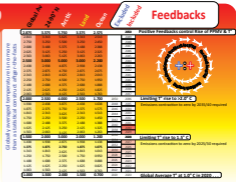
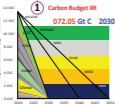
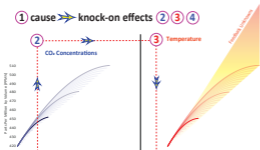
Global Average T° at 2.0°C in 2029

Rising risks in this chain of causation . . .

- ① Budget - Weight; Contraction-Rate; Zero-Date (needs to be 2030-2040)
- ② CO₂ Concentrations - Accumulates Increasing Fraction of Budget
- ③ Rising Temperature Response to Rising PPMV & Rising Risks without/with Feedback
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More information re animation http://www.giss.org.uk/Sliding_Scale.html

Zero emissions globally 2030-2040-2050

① cause → knock-on effects ② ③ ④

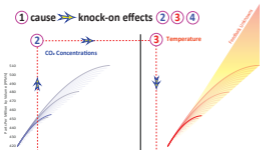


Rising risks in this chain of causation ...

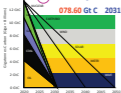
- ① Budget - Weight; Contraction-Rate; Zero-Date (needs to be 2030-2040)
- ② CO₂ Concentrations - Accumulates Increasing Fraction of Budget
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Zero emissions globally 2030-2040-2050

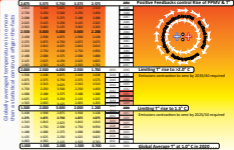
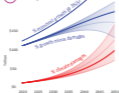
① cause → knock-on effects ② ③ ④



① Carbon Budget Emissions



④ Damages vs Growth

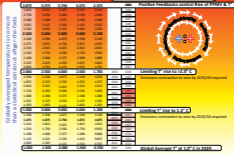
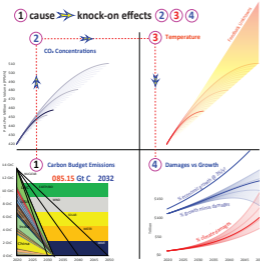


Rising risks in this chain of causation . . .

- ① Budget - Weight; Contraction-Rate; Zero-Date (needs to be 2030-2040)
- ② CO₂ Concentrations - Accumulates Increasing Fraction of Budget
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Zero emissions globally 2030-2040-2050

① cause → knock-on effects ② ③ ④



Rising risks in this chain of causation . . .

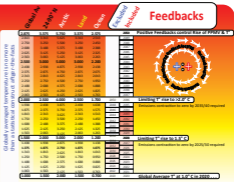
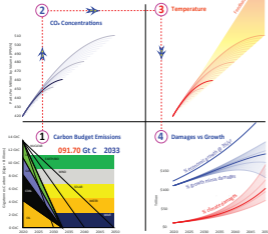
- ① Budget - Weight; Contraction-Rate; Zero-Date (needs to be 2030-2040)
- ② CO₂ Concentrations - Accumulates Increasing Fraction of Budget
- ③ Rising Temperature Response to Rising PPMV & Rising Risks without/with Feedback
- ④ Damages vs Growth Minus Damages - Insured-Uninsured Losses starts @ 6%/annum

2020 temperatures from GISS http://www.giss.org.uk/images/Temperature_Unmasked.png

More information re animation http://www.giss.org.uk/Sliding_Scale.html

Zero emissions globally 2030-2040-2050

① cause → knock-on effects ② ③ ④

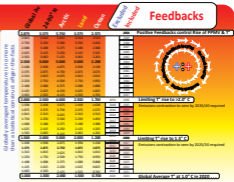
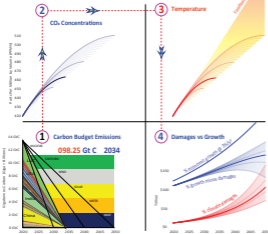


Rising risks in this chain of causation . . .

- ① Budget - Weight; Contraction-Rate; Zero-Date (needs to be 2030-2040)
- ② CO₂ Concentrations - Accumulates Increasing Fraction of Budget
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- ④ Damages vs Growth Minus Damages - Insured-Uninsured Losses starts @ 6%/annum 2020 temperatures from GISS http://www.giss.org.uk/images/Temperature_Unmasked.png
More information re animation http://www.giss.org.uk/Sliding_Scale.html

Zero emissions globally 2030-2040-2050

① cause → knock-on effects ② ③ ④

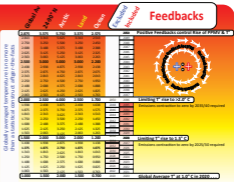
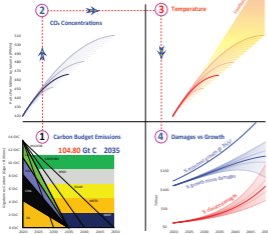


Rising risks in this chain of causation . . .

- ① Budget - Weight; Contraction-Rate; Zero-Date (needs to be 2030-2040)
- ② CO₂ Concentrations - Accumulates Increasing Fraction of Budget
- ③ Rising Temperature Response to Rising PPMV & Rising Risks without/with Feedback
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Zero emissions globally 2030-2040-2050

① cause → knock-on effects ② ③ ④

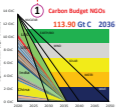
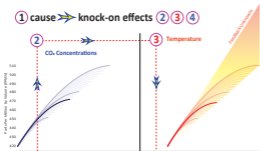


Rising risks in this chain of causation . . .

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 More information re animation http://www.giss.org.uk/Sliding_Scale.html

Zero emissions globally 2030-2040-2050

① cause → knock-on effects ② ③ ④



Global Avg 2A 2B 2C 2D 2E

Feedbacks: Feedback, Feedback

Feedbacks

Positive feedbacks control rate of PPMV & T

Limiting T^{max} rise to 2.0°C

Limiting T^{max} rise to 1.5°C

Limiting T^{max} rise to 2.0°C

Limiting T^{max} rise to 1.5°C

Global Average T^{max} at 2.0°C in 2050

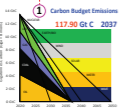
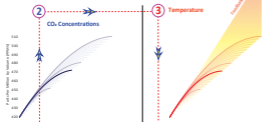
Globally averaged temperature increases more than a static local constraint, after r-the-facts

Rising risks in this chain of causation ...

- ① Budget - Weight; Contraction-Rate; Zero-Date (needs to be 2030-2040)
- ② CO₂ Concentrations - Accumulates Increasing Fraction of Budget
- ③ Rising Temperature Response to Rising PPMV & Rising Risks without/with Feedback
- ④ Damages vs Growth Minus Damages - Insured-Uninsured Losses starts @ 6%/annum 2020 temperatures from GISS http://www.giss.org.uk/images/Temperature_Unmasked.png
More information re animation http://www.giss.org.uk/Sliding_Scale.html

Zero emissions globally 2030-2040-2050

① cause → knock-on effects ② ③ ④



Global Avg 2A 2Bp 2c Arctic Lowp Ocean

Feedbacks Amplifying Reducing

Feedbacks

Positive feedbacks control rise of PPMV & T

Limiting T^{max} rise to 2.0°C

Limiting T^{max} rise to 1.5°C

Limiting T^{max} rise to 2.0°C

Limiting T^{max} rise to 1.5°C

Global Average T^{max} at 2.0°C in 2050

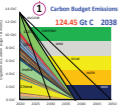
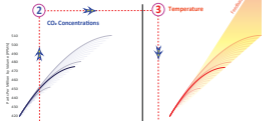
Globally averaged temperature increases more than a static local constr. affg r-the-facts

Rising risks in this chain of causation . . .

- 1** Budget - Weight; Contraction-Rate; Zero-Date (needs to be 2030-2040)
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- 4** Damages vs Growth Minus Damages - Insured-Uninsured Losses starts @ 6%/annum 2020 temperatures from GISS http://www.giss.org.uk/images/Temperature_Unmasked.png
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Zero emissions globally 2030-2040-2050

① cause → knock-on effects ② ③ ④



Global A₂ 2A 2B₁ 2B₂ 2C₁ 2C₂

Feedbacks

Positive feedbacks control rate of PPMV & T

Year	2020	2030	2040	2050	2060
Global A ₂	1.000	1.000	1.000	1.000	1.000
2A	1.000	1.000	1.000	1.000	1.000
2B ₁	1.000	1.000	1.000	1.000	1.000
2B ₂	1.000	1.000	1.000	1.000	1.000
2C ₁	1.000	1.000	1.000	1.000	1.000
2C ₂	1.000	1.000	1.000	1.000	1.000

Limiting T_{max} rise to 2.0°C

Year	2020	2030	2040	2050	2060
Global A ₂	1.000	1.000	1.000	1.000	1.000
2A	1.000	1.000	1.000	1.000	1.000
2B ₁	1.000	1.000	1.000	1.000	1.000
2B ₂	1.000	1.000	1.000	1.000	1.000
2C ₁	1.000	1.000	1.000	1.000	1.000
2C ₂	1.000	1.000	1.000	1.000	1.000

Limiting T_{max} rise to 3.0°C

Year	2020	2030	2040	2050	2060
Global A ₂	1.000	1.000	1.000	1.000	1.000
2A	1.000	1.000	1.000	1.000	1.000
2B ₁	1.000	1.000	1.000	1.000	1.000
2B ₂	1.000	1.000	1.000	1.000	1.000
2C ₁	1.000	1.000	1.000	1.000	1.000
2C ₂	1.000	1.000	1.000	1.000	1.000

Global Average T_{max} at 3.0°C in 2050

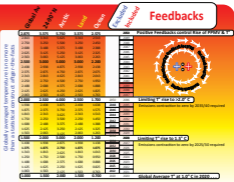
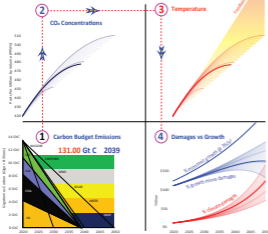
Globally averaged temperature increases more than a static local constr. affg r-the-facts

Rising risks in this chain of causation ...

- 1** Budget - Weight; Contraction-Rate; Zero-Date (needs to be 2030-2040)
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- 4** Damages vs Growth Minus Damages - Insured-Uninsured Losses starts @ 6%/annum 2020 temperatures from GISS http://www.giss.org.uk/images/Temperature_Unmasked.png
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Zero emissions globally 2030-2040-2050

① cause → knock-on effects ② ③ ④

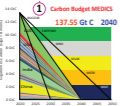
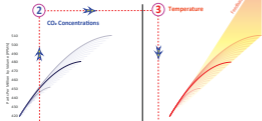


Rising risks in this chain of causation . . .

- ① Budget - Weight; Contraction-Rate; Zero-Date (needs to be 2030-2040)
- ② CO₂ Concentrations - Accumulates Increasing Fraction of Budget
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- ④ Damages vs Growth Minus Damages - Insured-Uninsured Losses starts @ 6%/annum 2020 temperatures from GISS http://www.giss.org.uk/images/Temperature_Unmasked.png
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Zero emissions globally 2030-2040-2050

① cause → knock-on effects ② ③ ④



Global Average
2A-20g* 2b
Arctic
Land
Ocean

Feedbacks
Reinforcing
Stabilizing

Feedbacks

Year	Global Avg	2A-20g* 2b	Arctic	Land	Ocean	Feedbacks
2020	1.00	1.00	1.00	1.00	1.00	Positive feedbacks control rise of PPMV & T
2030	1.20	1.20	1.20	1.20	1.20	
2040	1.40	1.40	1.40	1.40	1.40	
2050	1.60	1.60	1.60	1.60	1.60	
2060	1.80	1.80	1.80	1.80	1.80	
2070	2.00	2.00	2.00	2.00	2.00	
2080	2.20	2.20	2.20	2.20	2.20	
2090	2.40	2.40	2.40	2.40	2.40	
2100	2.60	2.60	2.60	2.60	2.60	

Year	Global Avg	2A-20g* 2b	Arctic	Land	Ocean	Feedbacks
2020	1.00	1.00	1.00	1.00	1.00	Limiting T* rise to 2.0°C
2030	1.20	1.20	1.20	1.20	1.20	
2040	1.40	1.40	1.40	1.40	1.40	
2050	1.60	1.60	1.60	1.60	1.60	
2060	1.80	1.80	1.80	1.80	1.80	
2070	2.00	2.00	2.00	2.00	2.00	
2080	2.20	2.20	2.20	2.20	2.20	
2090	2.40	2.40	2.40	2.40	2.40	
2100	2.60	2.60	2.60	2.60	2.60	

Globally averaged temperature increases more than a static local construal of the facts

Limiting T* rise to 2.0°C

Limiting T* rise to 2.0°C

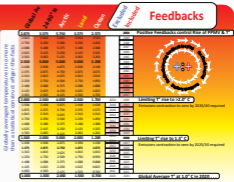
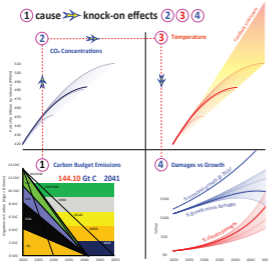
Global Average T* at 2.0°C in 2020

Rising risks in this chain of causation . . .

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Zero emissions globally 2030-2040-2050

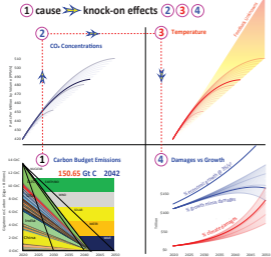
① cause → knock-on effects ② ③ ④



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Zero emissions globally 2030-2040-2050



	Global A ₁	2A (pp. 2)	Acidic	Low	China	Feedbacks	Feedbacks
Positive feedbacks control rate of PPMV & T							
2025	1.021	1.028	1.031	1.031	1.031		
2050	1.200	1.200	1.200	1.200	1.200		
2075	1.400	1.400	1.400	1.400	1.400		
2100	1.600	1.600	1.600	1.600	1.600		
2125	1.800	1.800	1.800	1.800	1.800		
2150	2.000	2.000	2.000	2.000	2.000		
2175	2.200	2.200	2.200	2.200	2.200		
2200	2.400	2.400	2.400	2.400	2.400		
2225	2.600	2.600	2.600	2.600	2.600		
Limiting T _{max} rise to 2.0°C							
2025	1.021	1.021	1.021	1.021	1.021		
2050	1.400	1.400	1.400	1.400	1.400		
2075	1.600	1.600	1.600	1.600	1.600		
2100	1.700	1.700	1.700	1.700	1.700		
2125	1.800	1.800	1.800	1.800	1.800		
2150	1.900	1.900	1.900	1.900	1.900		
2175	2.000	2.000	2.000	2.000	2.000		
2200	2.000	2.000	2.000	2.000	2.000		
Limiting T _{max} rise to 3.0°C							
2025	1.021	1.021	1.021	1.021	1.021		
2050	1.400	1.400	1.400	1.400	1.400		
2075	1.600	1.600	1.600	1.600	1.600		
2100	1.700	1.700	1.700	1.700	1.700		
2125	1.800	1.800	1.800	1.800	1.800		
2150	1.900	1.900	1.900	1.900	1.900		
2175	2.000	2.000	2.000	2.000	2.000		
2200	2.000	2.000	2.000	2.000	2.000		
Global Average T _{max} at 3.0°C in 2025							

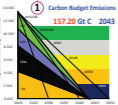
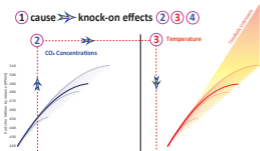
Globally averaged temperature is more than a stable local contrast after r-the-facts

Rising risks in this chain of causation ...

- 1** Budget - Weight; Contraction-Rate; Zero-Date (needs to be 2030-2040)
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Zero emissions globally 2030-2040-2050

① cause → knock-on effects ② ③ ④



	Global Av	24 deg °C	Arctic	Low	China	Feedback	Feedback
2020	1.020	1.020	1.020	1.020	1.020	0.000	0.000
2030	1.020	1.020	1.020	1.020	1.020	0.000	0.000
2040	1.020	1.020	1.020	1.020	1.020	0.000	0.000
2050	1.020	1.020	1.020	1.020	1.020	0.000	0.000
2060	1.020	1.020	1.020	1.020	1.020	0.000	0.000
2070	1.020	1.020	1.020	1.020	1.020	0.000	0.000
2080	1.020	1.020	1.020	1.020	1.020	0.000	0.000
2090	1.020	1.020	1.020	1.020	1.020	0.000	0.000
2100	1.020	1.020	1.020	1.020	1.020	0.000	0.000
2110	1.020	1.020	1.020	1.020	1.020	0.000	0.000
2120	1.020	1.020	1.020	1.020	1.020	0.000	0.000
2130	1.020	1.020	1.020	1.020	1.020	0.000	0.000
2140	1.020	1.020	1.020	1.020	1.020	0.000	0.000
2150	1.020	1.020	1.020	1.020	1.020	0.000	0.000
2160	1.020	1.020	1.020	1.020	1.020	0.000	0.000
2170	1.020	1.020	1.020	1.020	1.020	0.000	0.000
2180	1.020	1.020	1.020	1.020	1.020	0.000	0.000
2190	1.020	1.020	1.020	1.020	1.020	0.000	0.000
2200	1.020	1.020	1.020	1.020	1.020	0.000	0.000
2210	1.020	1.020	1.020	1.020	1.020	0.000	0.000
2220	1.020	1.020	1.020	1.020	1.020	0.000	0.000
2230	1.020	1.020	1.020	1.020	1.020	0.000	0.000
2240	1.020	1.020	1.020	1.020	1.020	0.000	0.000
2250	1.020	1.020	1.020	1.020	1.020	0.000	0.000
2260	1.020	1.020	1.020	1.020	1.020	0.000	0.000
2270	1.020	1.020	1.020	1.020	1.020	0.000	0.000
2280	1.020	1.020	1.020	1.020	1.020	0.000	0.000
2290	1.020	1.020	1.020	1.020	1.020	0.000	0.000
2300	1.020	1.020	1.020	1.020	1.020	0.000	0.000
2310	1.020	1.020	1.020	1.020	1.020	0.000	0.000
2320	1.020	1.020	1.020	1.020	1.020	0.000	0.000
2330	1.020	1.020	1.020	1.020	1.020	0.000	0.000
2340	1.020	1.020	1.020	1.020	1.020	0.000	0.000
2350	1.020	1.020	1.020	1.020	1.020	0.000	0.000
2360	1.020	1.020	1.020	1.020	1.020	0.000	0.000
2370	1.020	1.020	1.020	1.020	1.020	0.000	0.000
2380	1.020	1.020	1.020	1.020	1.020	0.000	0.000
2390	1.020	1.020	1.020	1.020	1.020	0.000	0.000
2400	1.020	1.020	1.020	1.020	1.020	0.000	0.000
2410	1.020	1.020	1.020	1.020	1.020	0.000	0.000
2420	1.020	1.020	1.020	1.020	1.020	0.000	0.000
2430	1.020	1.020	1.020	1.020	1.020	0.000	0.000
2440	1.020	1.020	1.020	1.020	1.020	0.000	0.000
2450	1.020	1.020	1.020	1.020	1.020	0.000	0.000
2460	1.020	1.020	1.020	1.020	1.020	0.000	0.000
2470	1.020	1.020	1.020	1.020	1.020	0.000	0.000
2480	1.020	1.020	1.020	1.020	1.020	0.000	0.000
2490	1.020	1.020	1.020	1.020	1.020	0.000	0.000
2500	1.020	1.020	1.020	1.020	1.020	0.000	0.000

Global Average T° at 2.0°C in 2020 ...

Positive feedbacks control rate of PPMV & T°

Limiting T° rise to 2.0°C

Emissions contribution to zero by 2020/50 required

Limiting T° rise to 2.0°C

Emissions contribution to zero by 2020/50 required

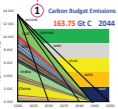
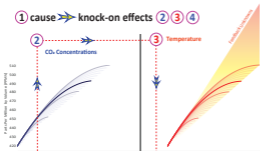
Global Average T° at 2.0°C in 2020 ...

Rising risks in this chain of causation ...

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Zero emissions globally 2030-2040-2050

① cause → knock-on effects ② ③ ④



Global Avg 2A 200+ 20 Arctic Low High

Feedbacks: Feedback, Feedback

Feedbacks

Positive feedbacks control rate of PPMV & T

Year	2020	2030	2040	2050	2060	2070	2080	2090	2100
Global Avg	1.20	1.50	1.70	1.80	1.85	1.90	1.95	2.00	2.05
2A 200+ 20	1.20	1.50	1.70	1.80	1.85	1.90	1.95	2.00	2.05
Arctic	1.20	1.50	1.70	1.80	1.85	1.90	1.95	2.00	2.05
Low	1.20	1.50	1.70	1.80	1.85	1.90	1.95	2.00	2.05
High	1.20	1.50	1.70	1.80	1.85	1.90	1.95	2.00	2.05

Limiting T^{max} rise to 2.0°C

Emissions contribution to zero by 2030/50 required

Limiting T^{max} rise to 2.0°C

Emissions contribution to zero by 2030/50 required

Global Average T^{max} at 2.0°C in 2030

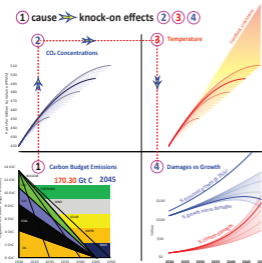
Globally averaged temperature increases more than a static local constraint: affix r-the-facts

Rising risks in this chain of causation . . .

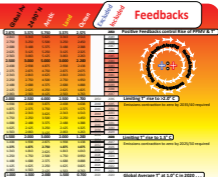
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Zero emissions globally 2030-2040-2050

① cause → knock-on effects ② ③ ④



Globally averaged temperature increases more than a static local construal: affluence effects

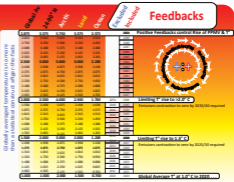
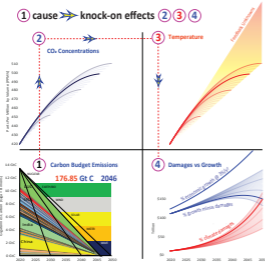


Rising risks in this chain of causation ...

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Zero emissions globally 2030-2040-2050

① cause → knock-on effects ② ③ ④

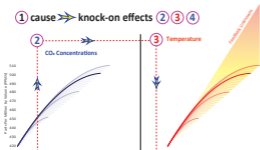


Rising risks in this chain of causation ...

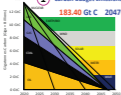
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Zero emissions globally 2030-2040-2050

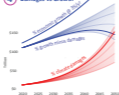
① cause → knock-on effects ② ③ ④



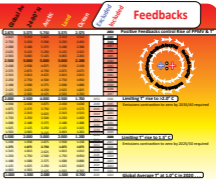
① Carbon Budget Emissions



④ Damages vs Growth



Globally averaged temperature increases more than a static local construal: affix r-the-facts

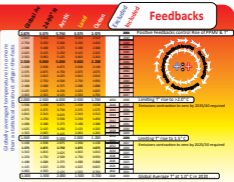
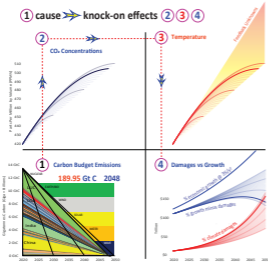


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Zero emissions globally 2030-2040-2050

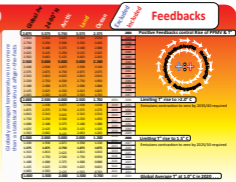
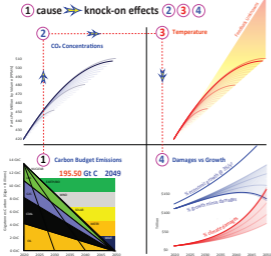
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Zero emissions globally 2030-2040-2050

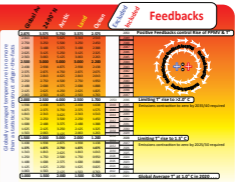
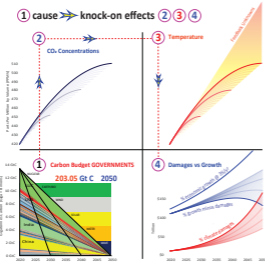


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