

Human Impacts – Mitigation and Adaptation



Answer the following questions as a percent (units of 10%) likeliness to be true.

0 - not true

1-4 - true to some degree

5 - true

In the year 2050....

1. The world will have more people.

2. The world will be more polluted.

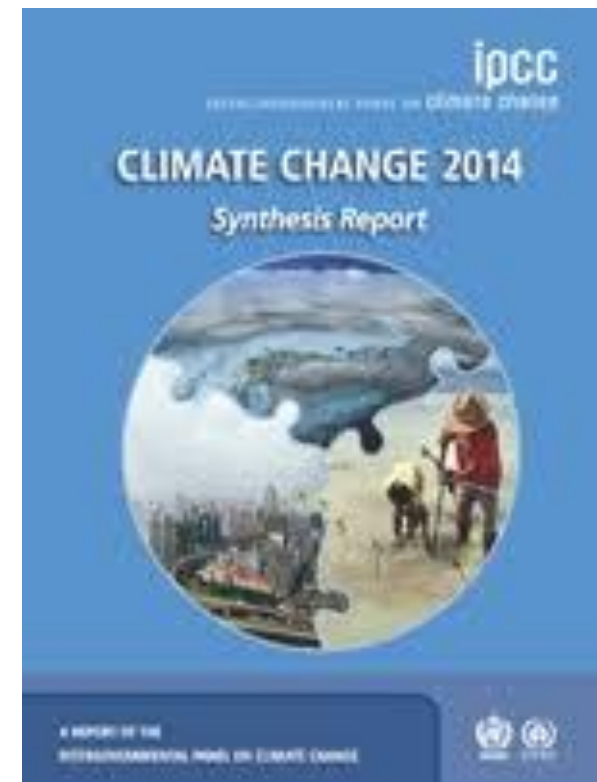
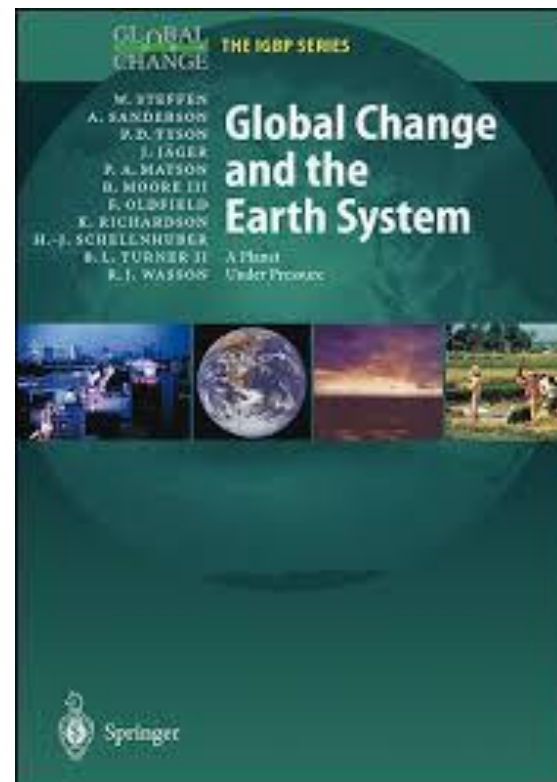
3. Food production will not keep up with population growth.

4. The inflation-adjusted costs of resources (e.g., energy, minerals, water, etc...) will be higher.

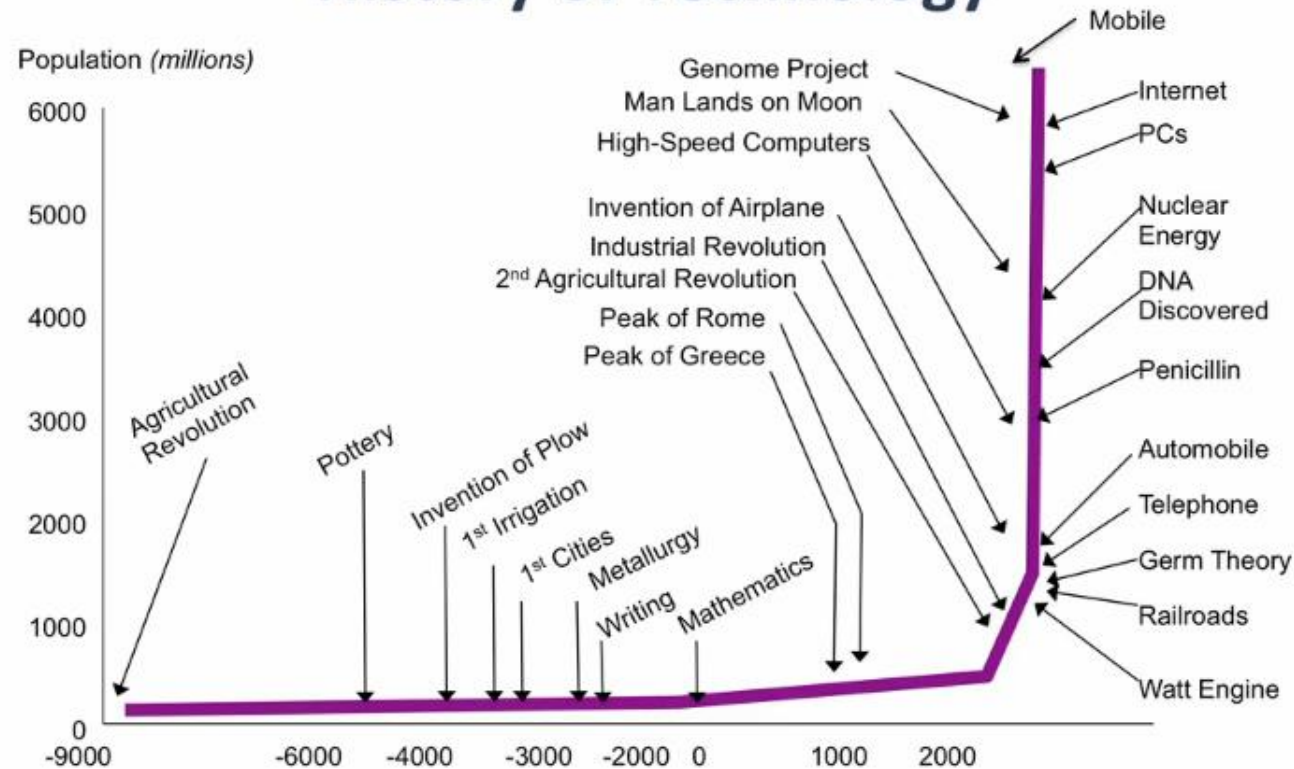
5. People will be poorer.

6. Regional water shortages will be severe.

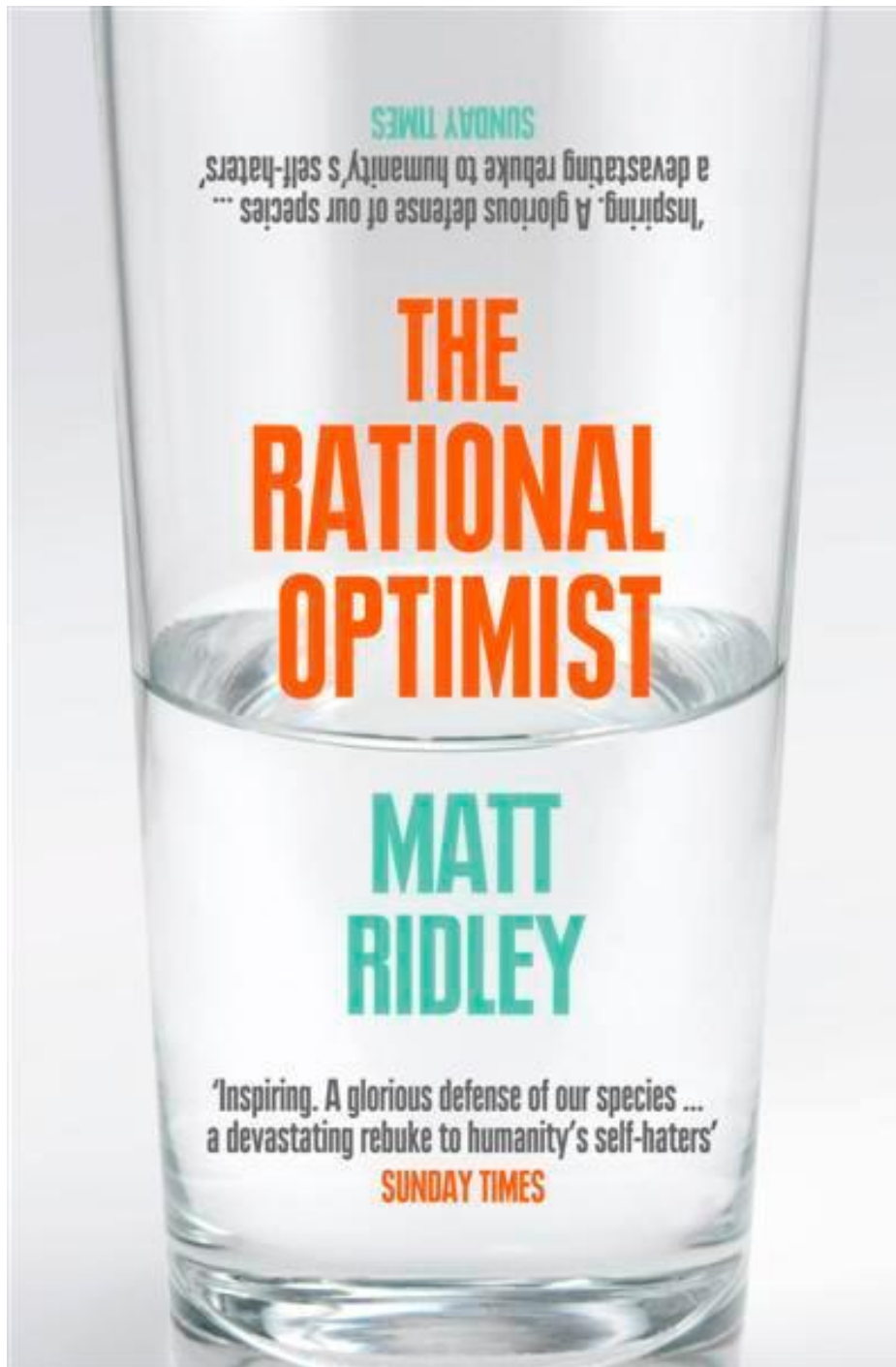
7. Atmospheric concentration of CO₂ will increase and affect climate.



Growth of World Population and the History of Technology



Source: Milken Institute, Robert Fogel/University of Chicago



AUTHOR OF **THE BLANK SLATE** AND **THE STUFF OF THOUGHT**

STEVEN PINKER

**THE BETTER ANGELS
OF OUR NATURE**

**WHY VIOLENCE
HAS DECLINED**

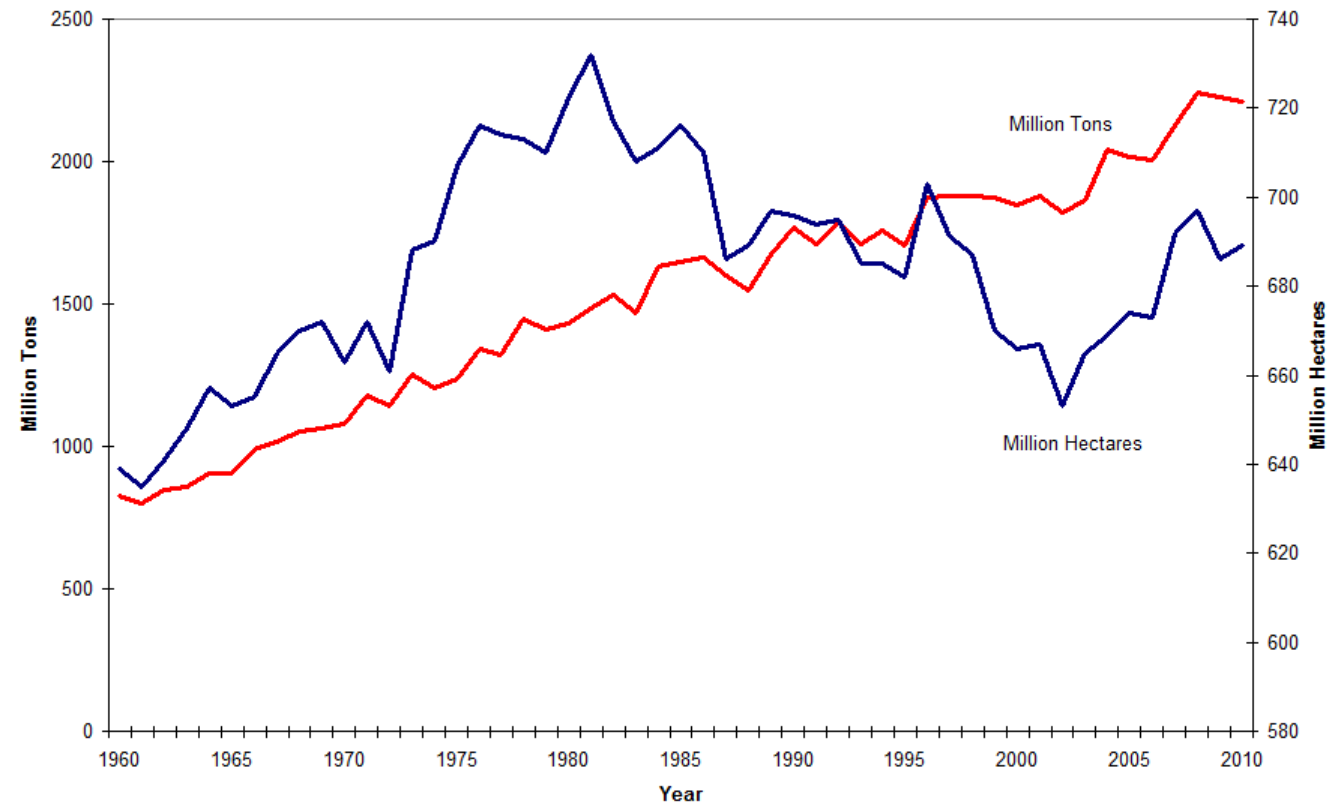
...stands out as
one of the most
important books
I've read – not just
this year, but ever.

Bill

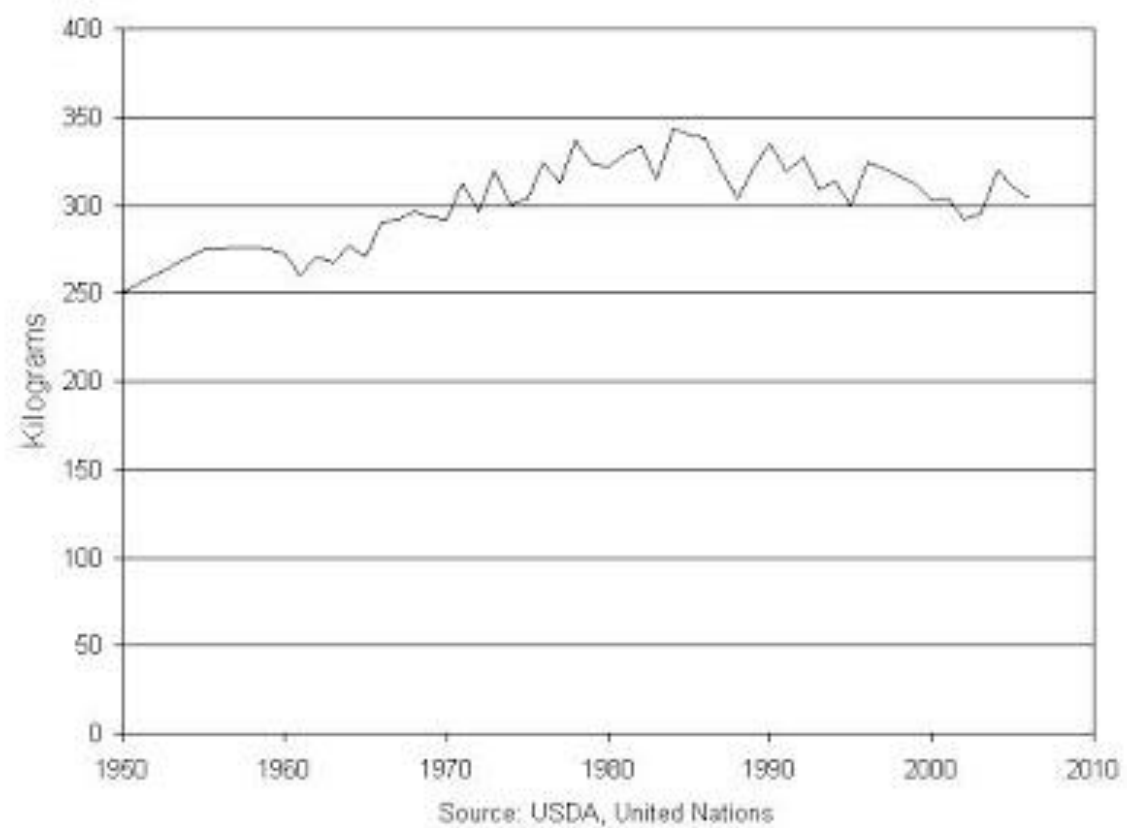
Gates



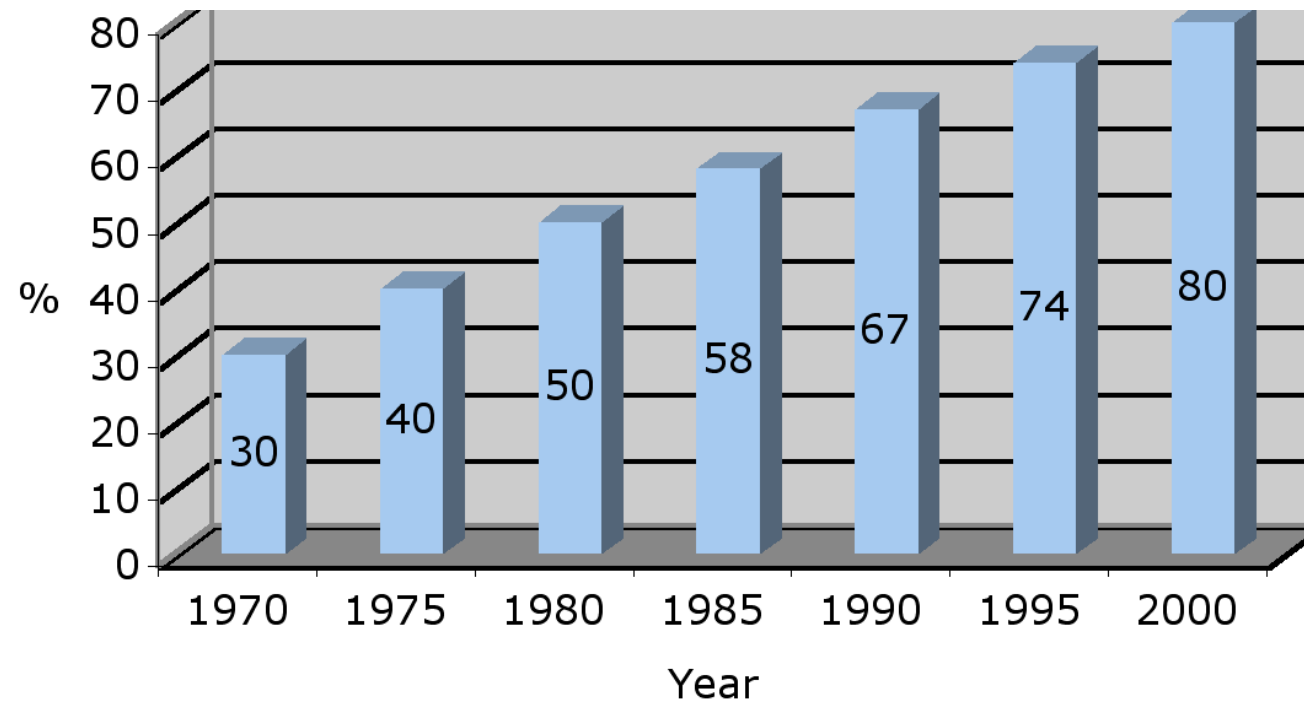
World Grain Production



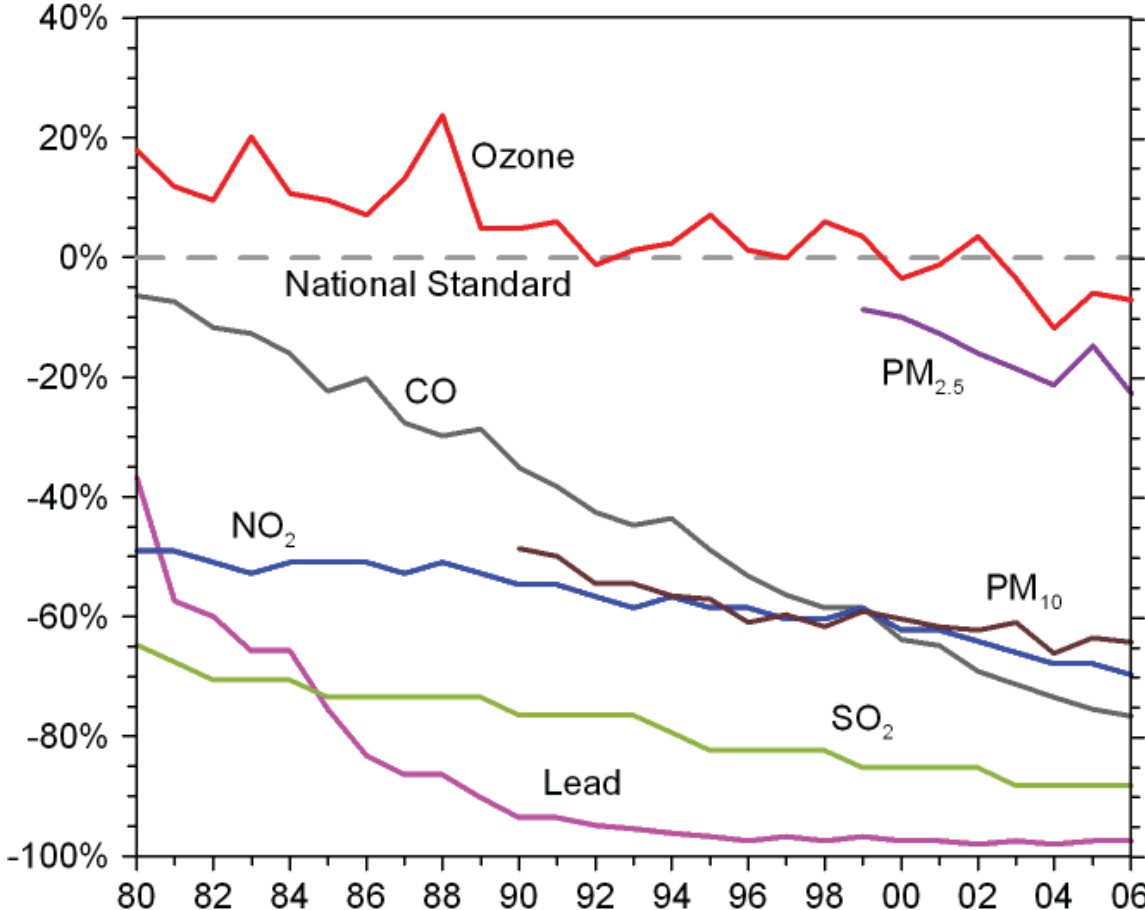
World Grain Production Per Person, 1950-2006



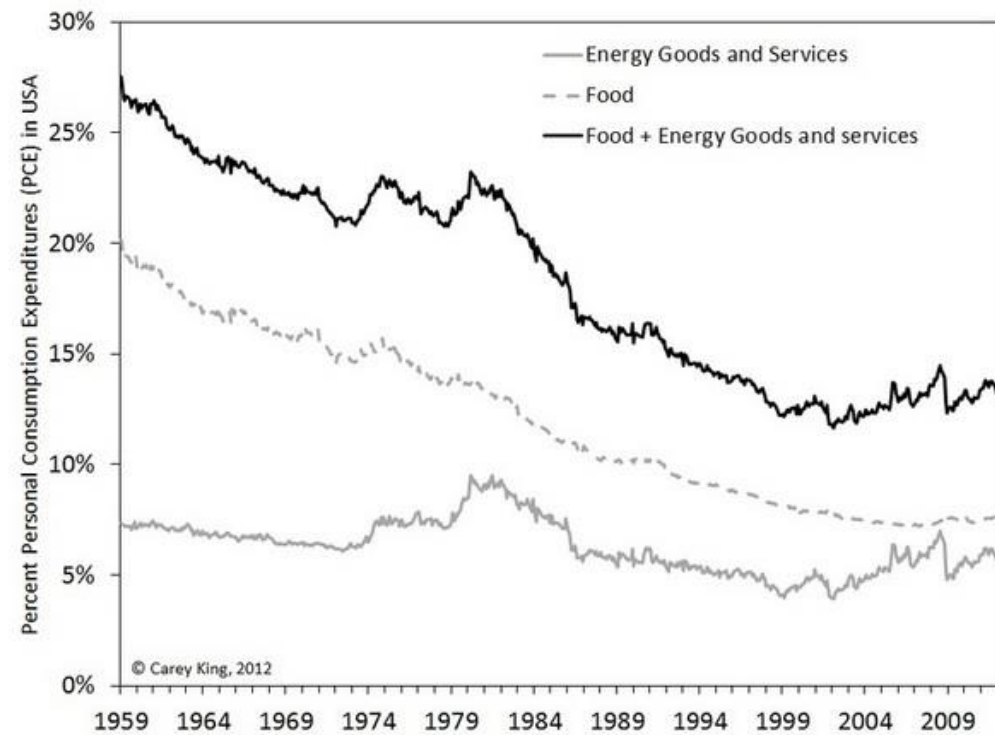
People in Developing World with Access to Clean Water



North America is becoming less polluted



We're spending less of our individual wealth on energy and food



THE GLOBAL GOALS

For Sustainable Development



#GLOBALGOALS

THE GLOBAL GOALS

For Sustainable Development



SDG 1: End poverty in all its forms everywhere.

SDG 2: End hunger, achieve food security and improved nutrition, and promote sustainable agriculture.

SDG 3: Ensure healthy lives and promote well-being for all at all ages.

SDG 4: Ensure inclusive and equitable quality education and promote lifelong learning for all.

SDG 5: Achieve gender equality and empower women and girls.

THE GLOBAL GOALS

For Sustainable Development

SDG 6: Ensure availability and sustainable management of water and sanitation for all.



SDG 7: Ensure access to affordable, reliable, sustainable and modern energy for all.

SDG 8: Promote sustained, inclusive and economic growth, full and productive employment and decent work for all.

SDG 9: Build resilient infrastructure, promote inclusive and sustainable industrialization, and foster innovation.

SDG 10: Reduce income inequality within and among countries

THE GLOBAL GOALS

For Sustainable Development

SDG 11: Make cities and human settlements inclusive, safe, resilient,
and sustainable.

SDG 12: Ensure sustainable consumption and production.

SDG 13: Take urgent action to combat climate change and its impacts
by regulating emissions and promoting developments in renewable energy.



THE GLOBAL GOALS

For Sustainable Development

SDG 14: Conserve and sustainably use the oceans, seas, and marine resources for sustainable development.

SDG 15: Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification,
halt and reverse land degradation, and halt biodiversity loss.



THE GLOBAL GOALS

For Sustainable Development

SDG 16: Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels.

SDG 17: Strengthen the means of implementation and revitalize the global partnership for sustainable development.



THE GLOBAL GOALS

















For Sustainable Development



Nexus approaches to global sustainable development

Jianguo Liu^{1*}, Vanessa Hull², H. Charles J. Godfray^{3,4}, David Tilman⁵, Peter Gleick⁶, Holger Hoff^{7,8}, Claudia Pahl-Wostl⁹, Zhenci Xu¹, Min Gon Chung¹, Jing Sun^{1,10} and Shuxin Li¹

Table 1 | Nexus examples and direct relationships to SDGs

Nexus example	SDGs
Food-energy-water nexus ³²	  
Water-food-energy-climate nexus ¹²⁸	   
Food-energy nexus ¹²⁹	 
Food-water nexus ¹³⁰	 
Energy-water nexus ¹³¹	 
Energy-economic growth-CO ₂ nexus ¹³²	  

Water-energy-land nexus⁶⁷



Energy-water-food-education nexus¹³³



Water-energy-people nexus¹³⁴



Women-water nexus¹³⁵



Energy-poverty-climate nexus¹³⁶



Food, energy, water, and health nexus¹³⁷



Tourism growth-water security nexus¹³⁸

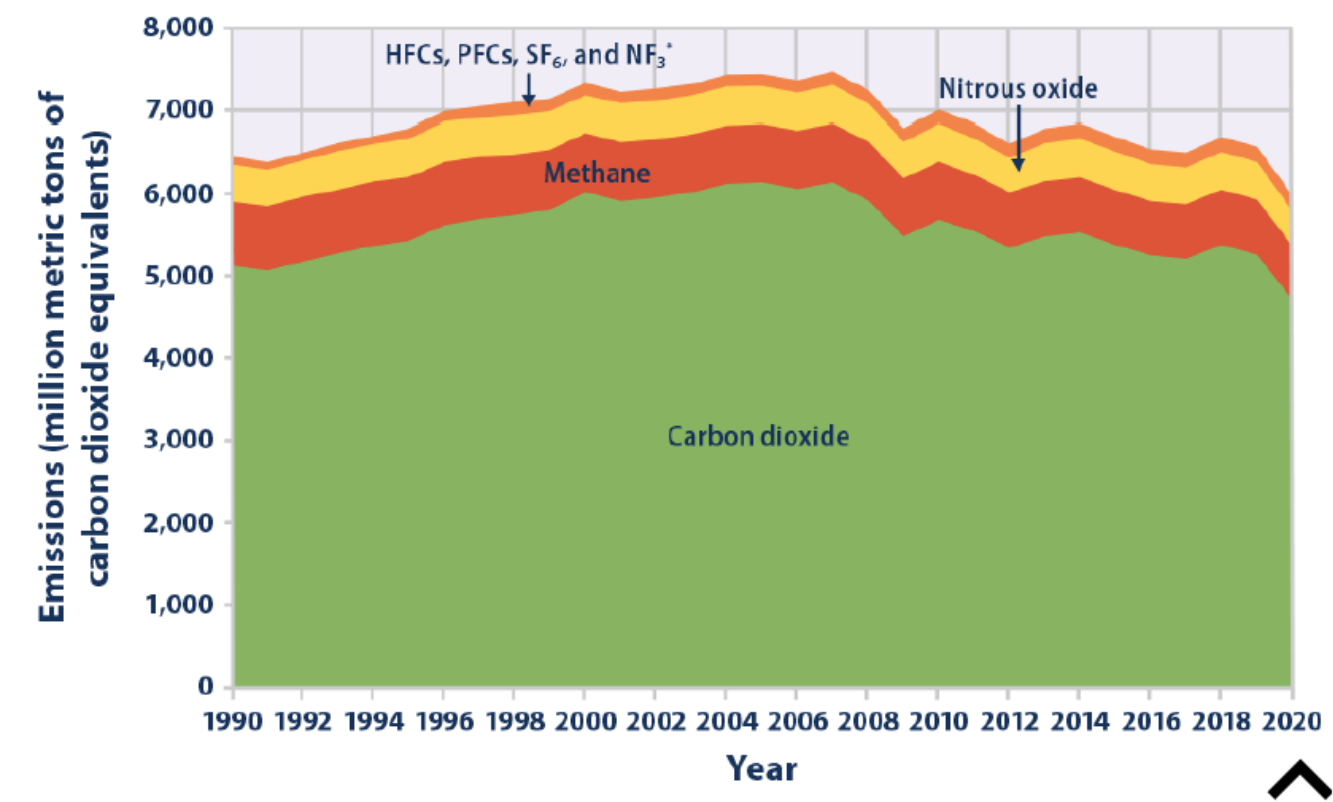


SDG PYRAMID





Figure 1. U.S. Greenhouse Gas Emissions by Gas, 1990–2020

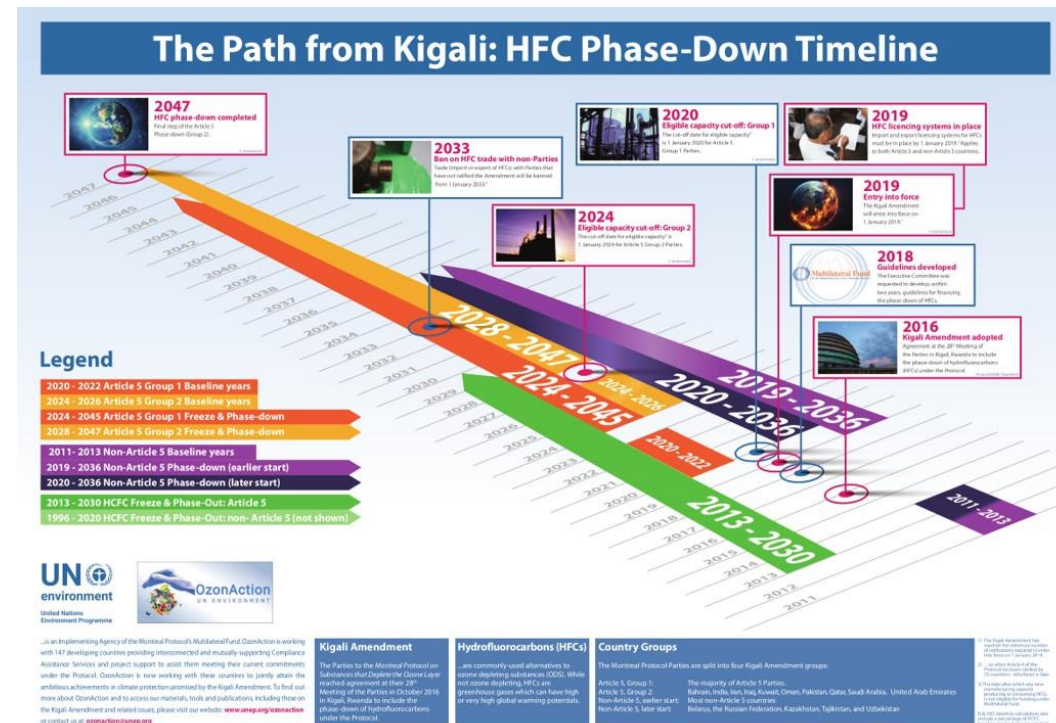
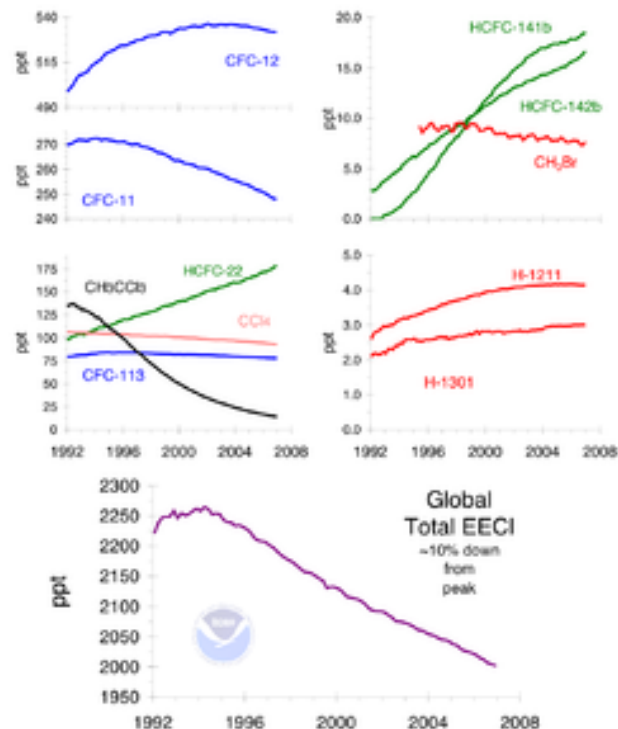


<https://epa.gov/system/files/other-files/2022-07/us-ghg-emissions_fig-1.csv>



<<https://epa.gov/system/files/images>>

MONTREAL PROTOCOL CONTRIBUTES TO THE



Nexus of climate change, water and food security, energy and social justice¹⁴²

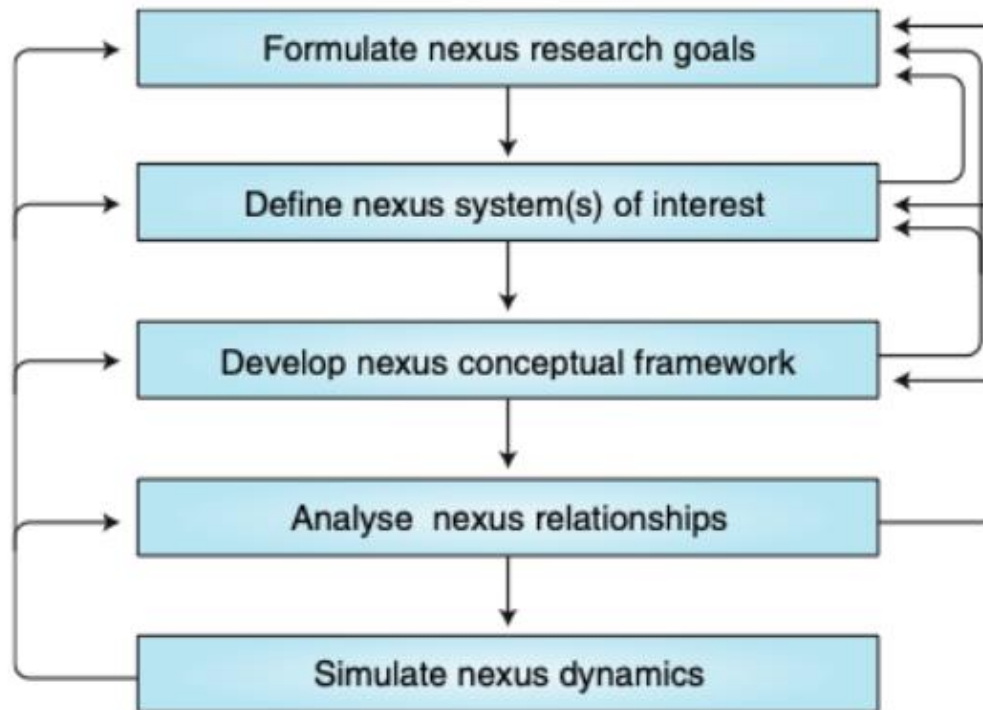


Fig. 2 | Five major steps involved in implementing nexus approaches.
Stakeholders may be engaged throughout all the steps.