

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

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

In the year 2050....

1. The world will have more people.

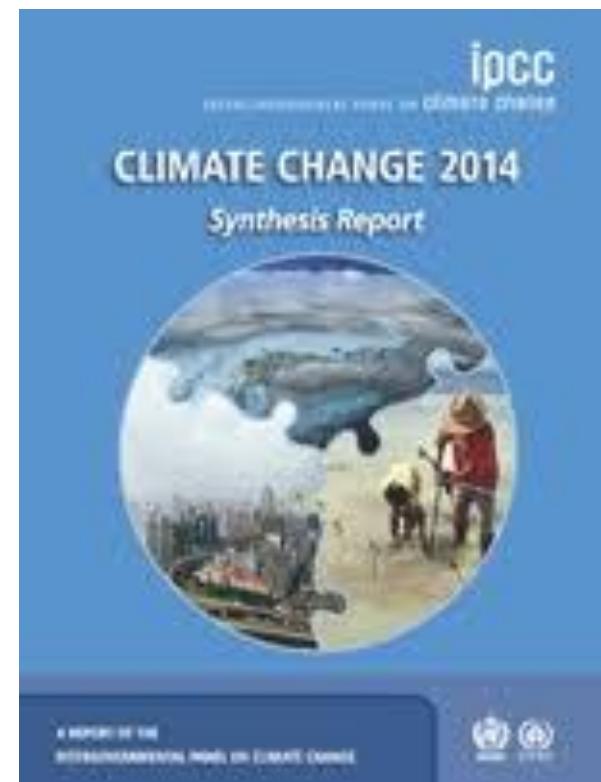
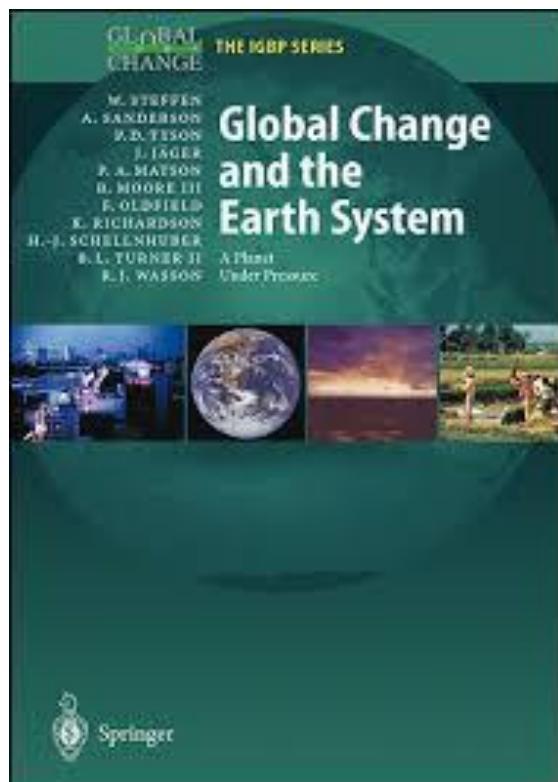
5. People will be poorer.

2. The world will be more polluted.

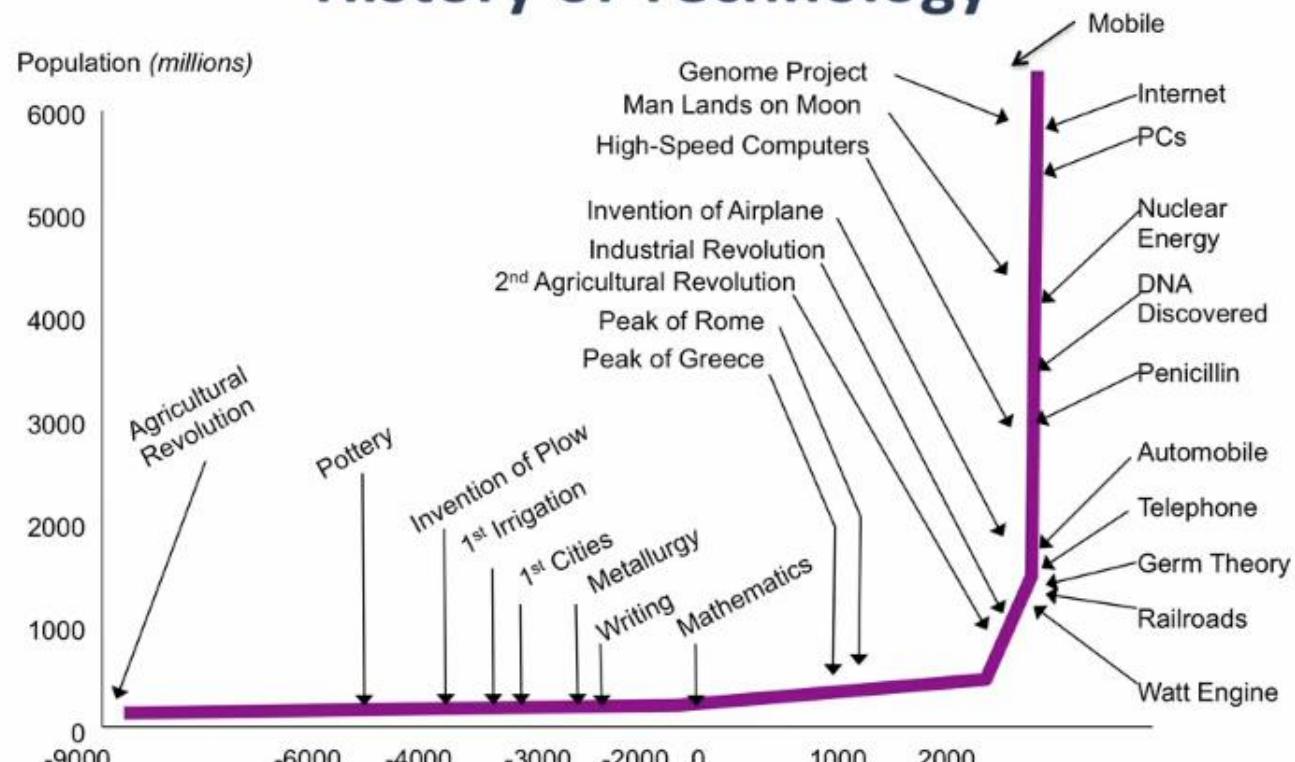
6. Regional water shortages will be severe.

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

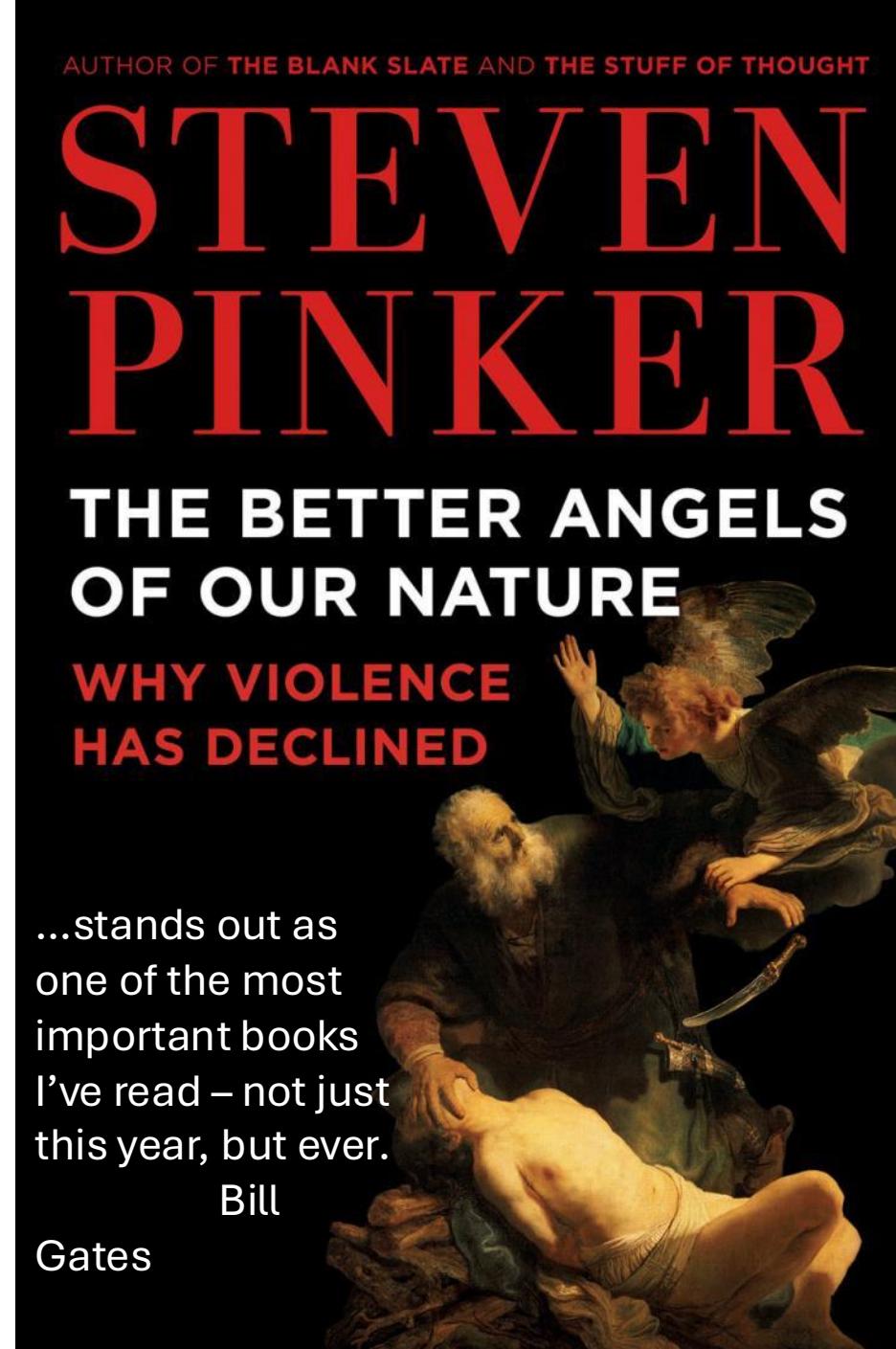
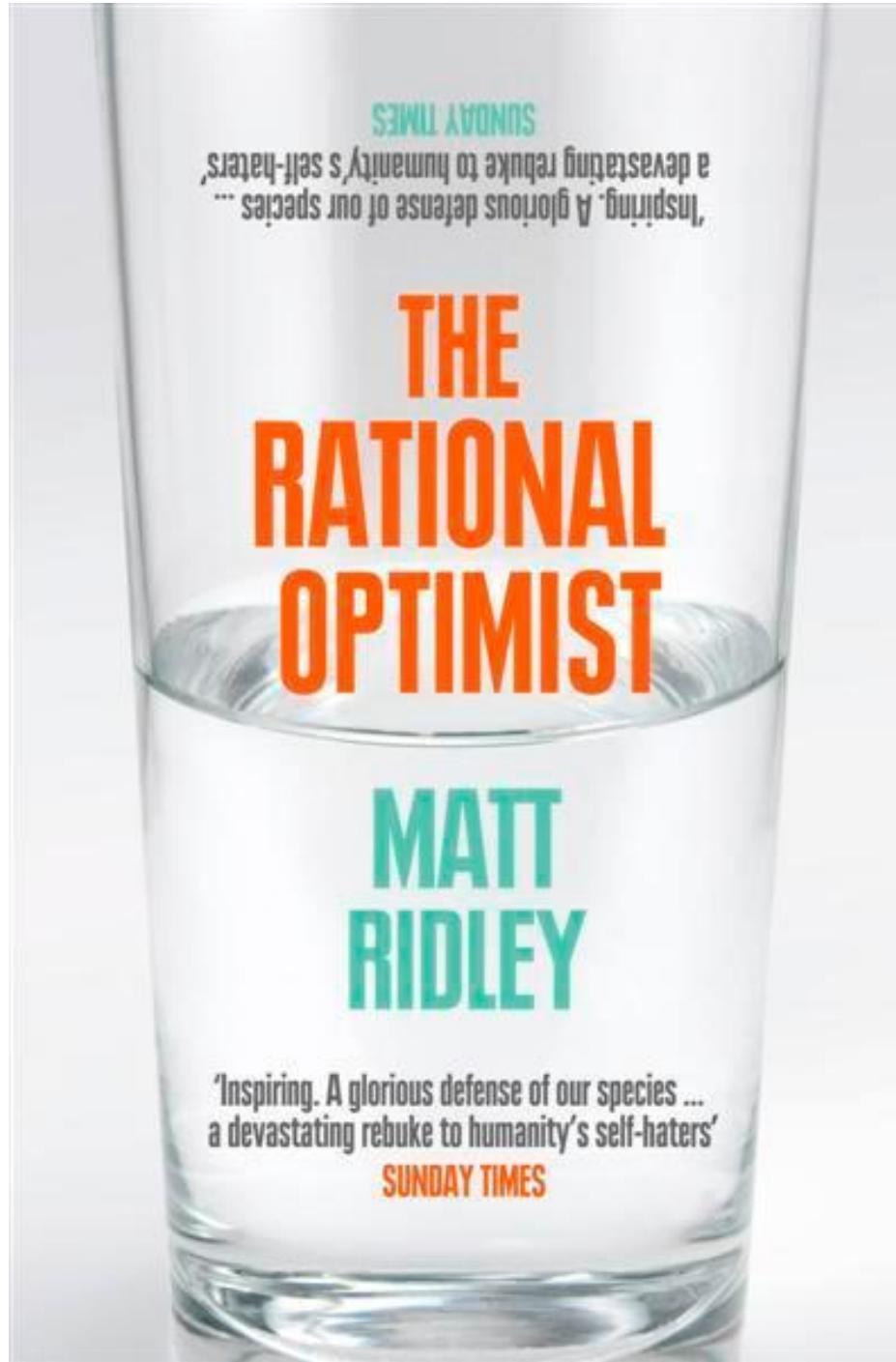
7. Atmospheric concentration of CO₂ will increase and affect climate.

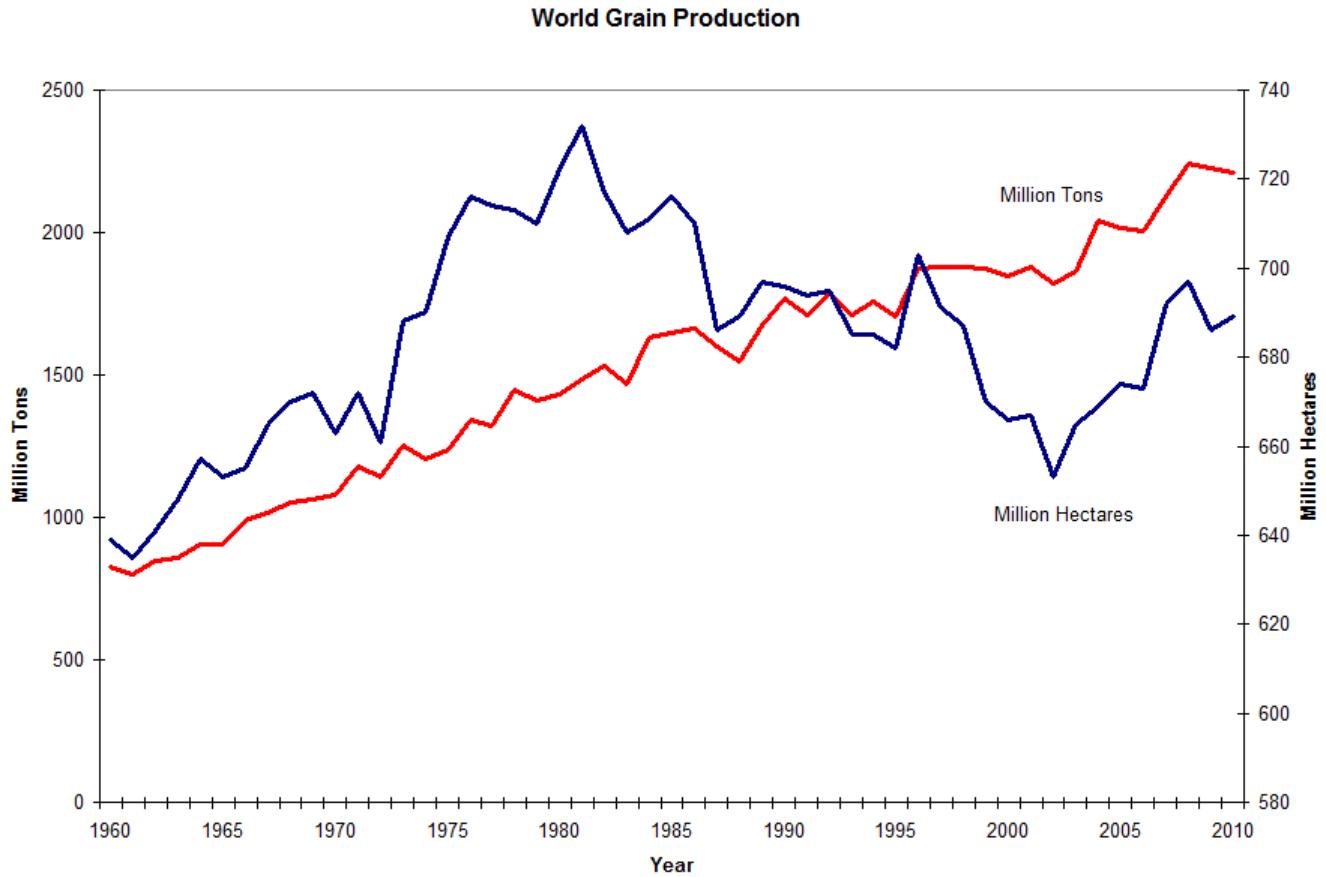


Growth of World Population and the History of Technology

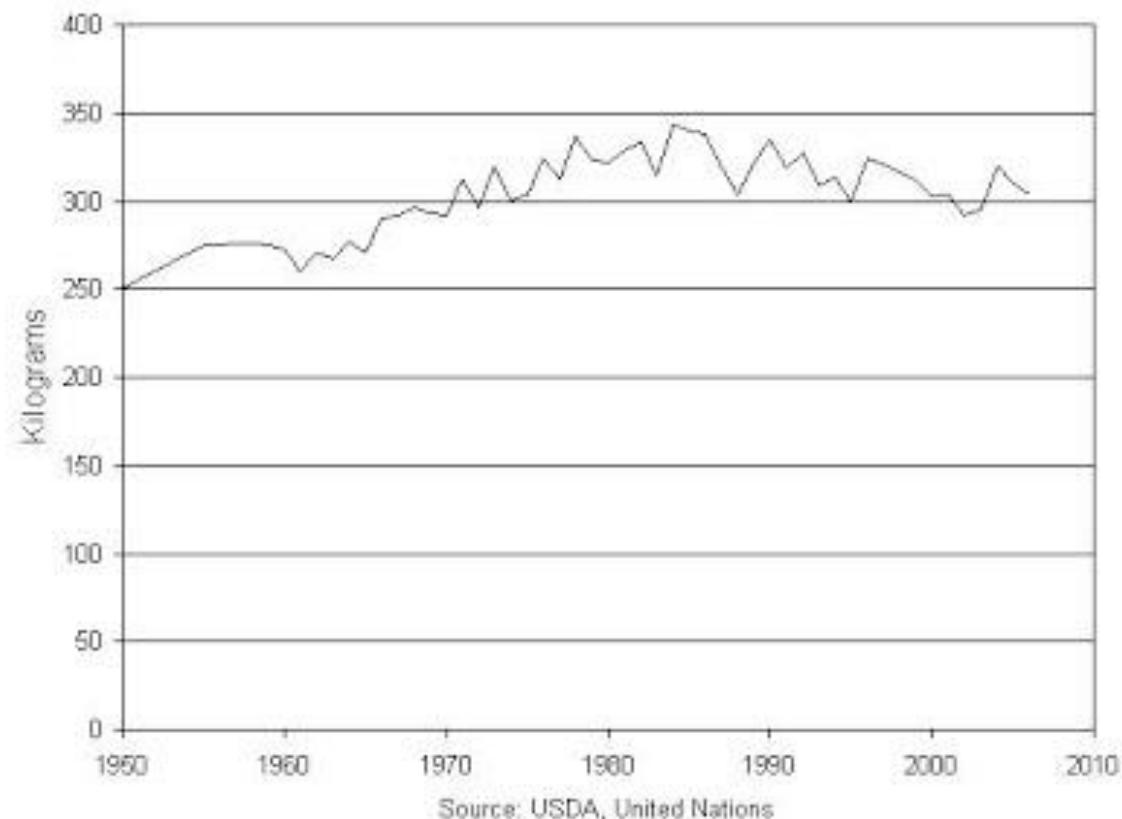


Source: Milken Institute, Robert Fogel/University of Chicago

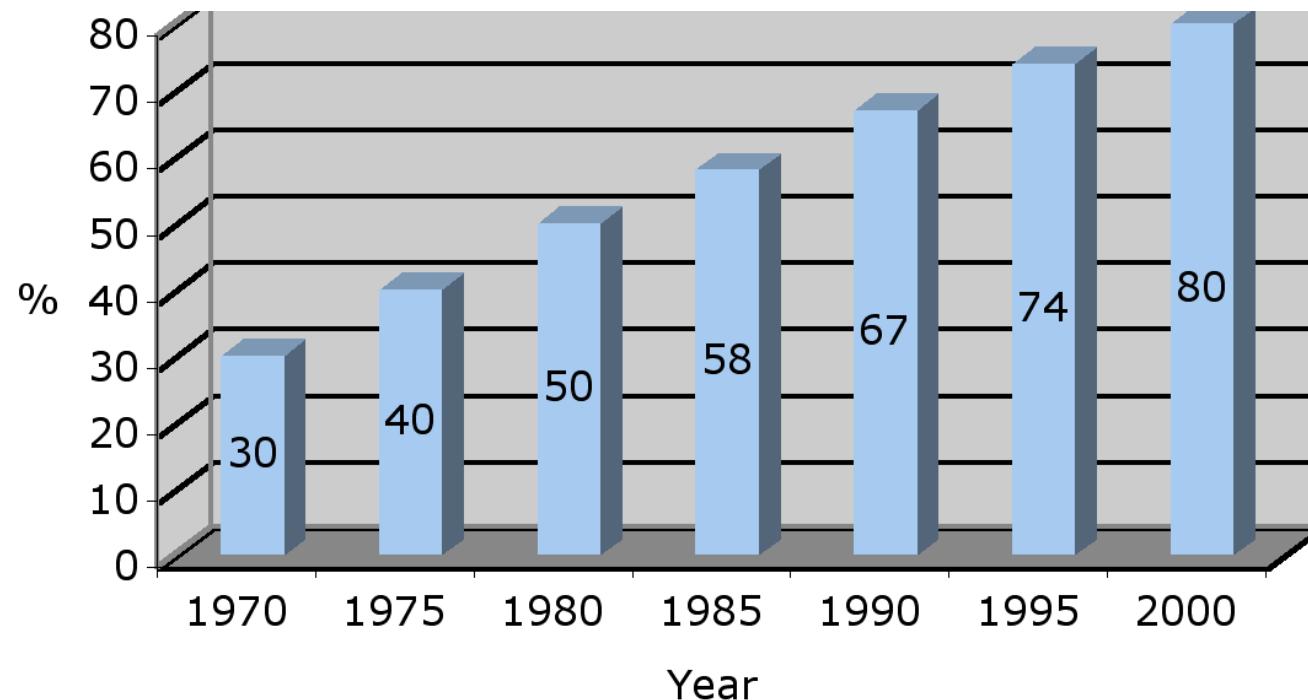




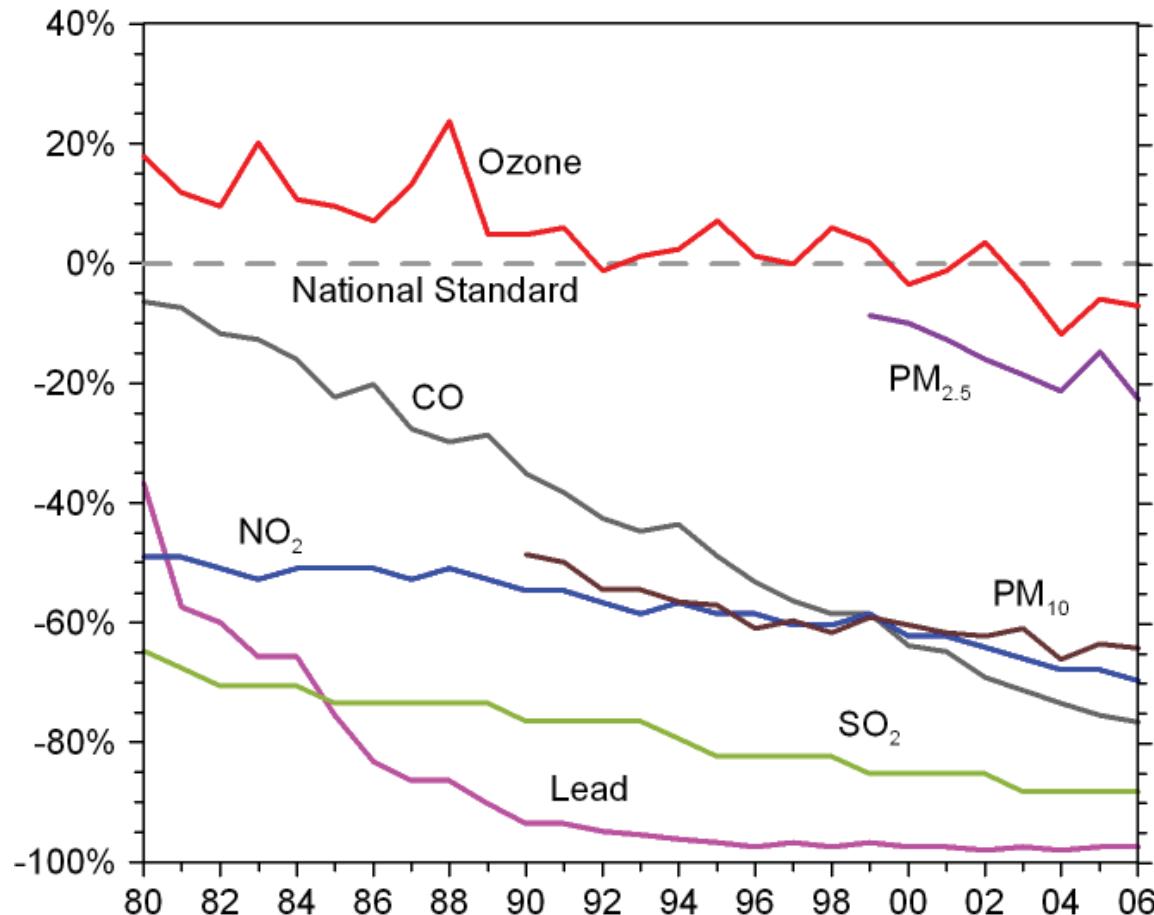
World Grain Production Per Person, 1950-2006



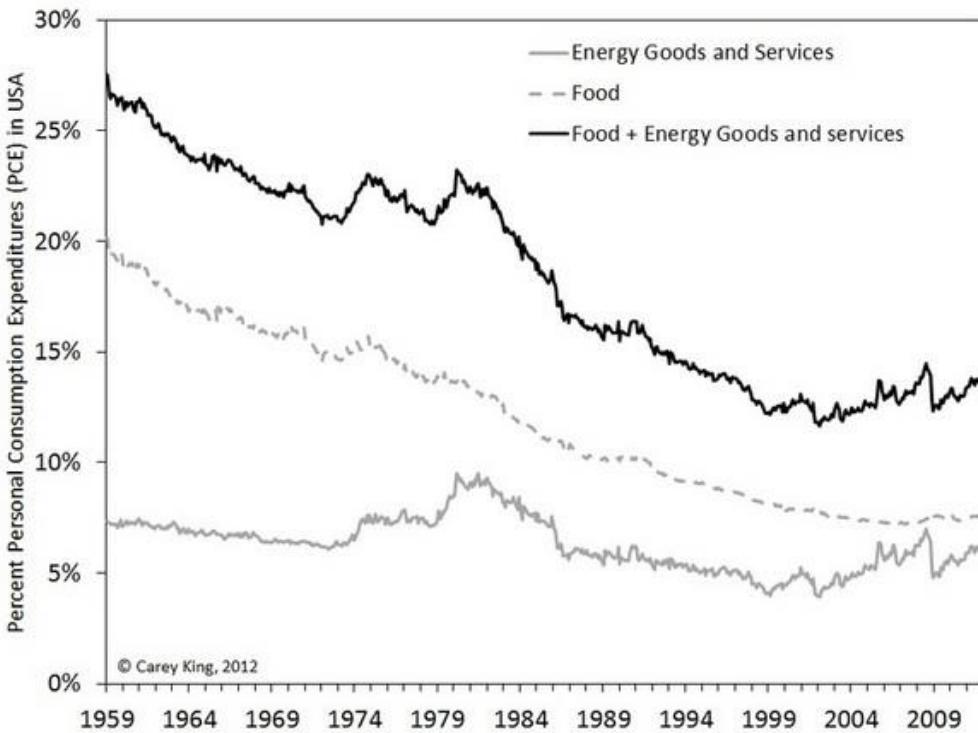
People in Developing World with Access to Clean Water



North America is becoming less polluted



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



THE GLOBAL GOALS

For Sustainable Development



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.

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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

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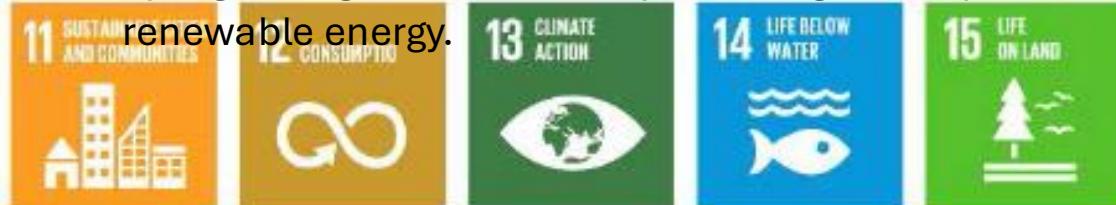
For Sustainable Development

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



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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.



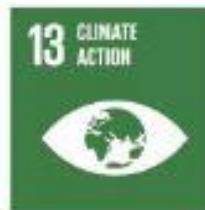
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SDG 16: Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels.

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



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Nexus approaches to global sustainable development

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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



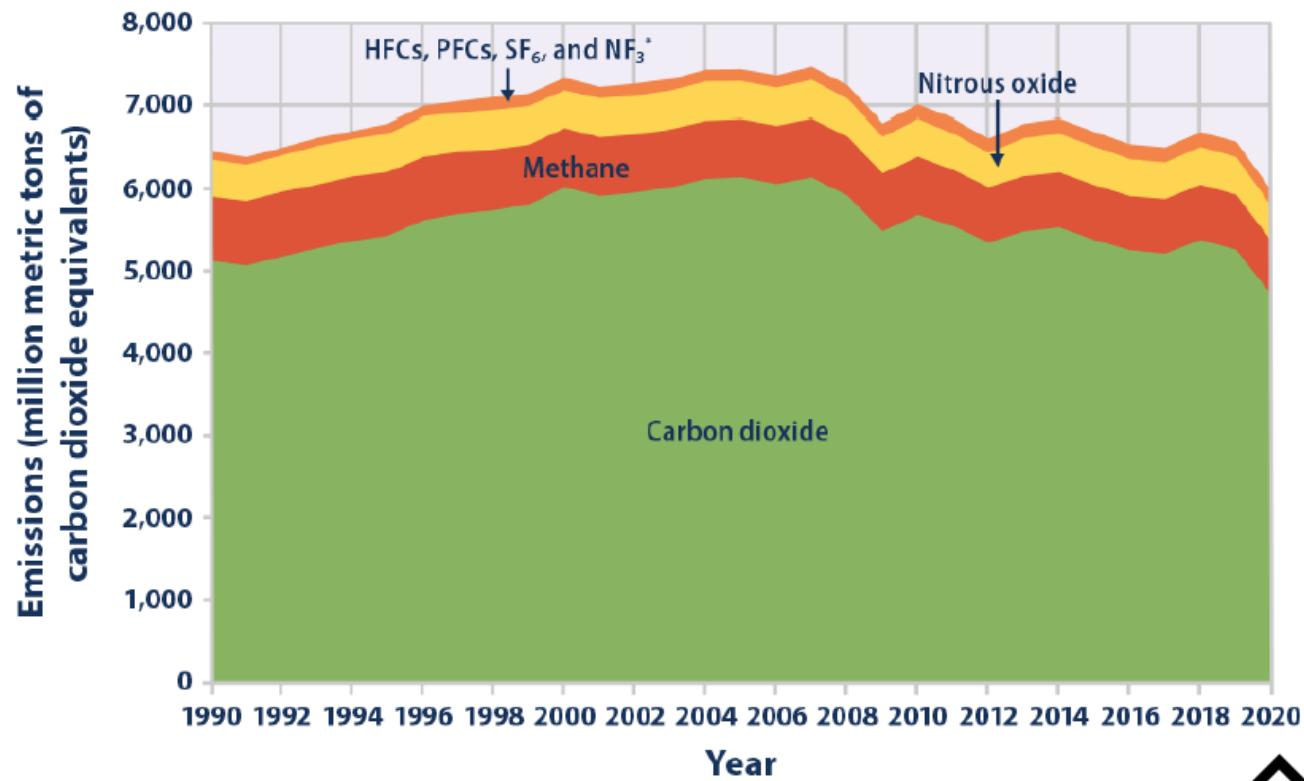
SDG PYRAMID



United in Diversity Creative Campus @ Kura Kura Bali
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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>

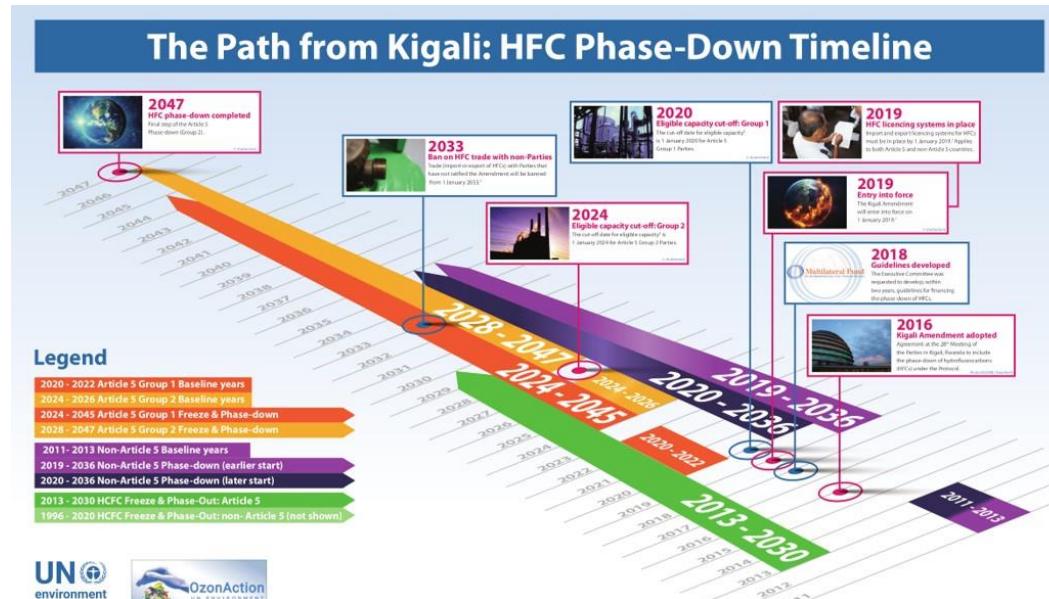
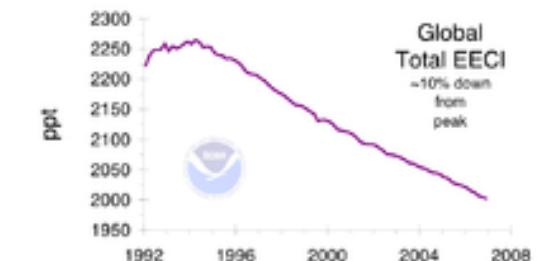
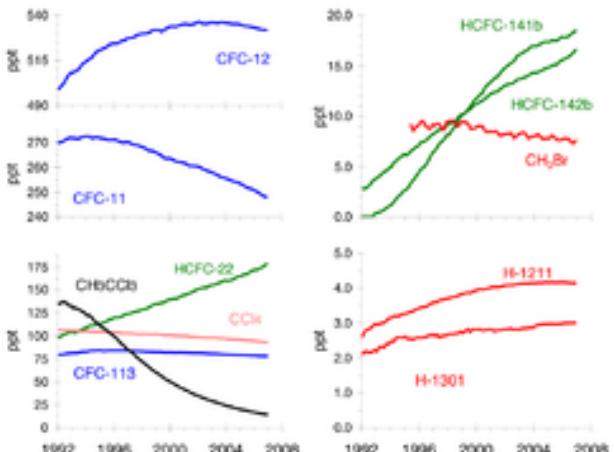


<<https://epa.gov/system/files/images>>

MONTREAL PROTOCOL CONTRIBUTES TO THE



SUSTAINABLE DEVELOPMENT GOALS



UN
environment
United Nations Environment Programme

OzonAction
UN ENVIRONMENT

The Kigali Amendment is an implementing Agency of the Montreal Protocol. Multilateral Fund OzoneAction is working with 147 developing countries providing inter-connected and mutually supporting Compliance Assistance Services and project support to assist them meeting their current commitments under the Protocol. OzoneAction is now working with these countries to jointly attain the ambitious achievements in climate protection promised by the Kigali Amendment. To find out more about OzoneAction and to access our materials, tools and publications, including those on the Kigali Amendment and related issues, please visit our website: www.unep.org/ozoneaction or contact us at ozoneaction@unep.org

Kigali Amendment
The Parties to the Montreal Protocol on Substances that Deplete the Ozone Layer have adopted the Kigali Amendment at its 21st Meeting of the Parties in October 2016 in Kigali, Rwanda to include the phase-down of hydrofluorocarbons (HFCs), a group of greenhouse gases which can have high or very high global warming potentials, under the Protocol.

Hydrofluorocarbons (HFCs)
Country Groups
The Montreal Protocol Parties are split into four Kigali Amendment groups:
Article 5: Group 1;
Article 5: Group 2;
Non-Article 5: earlier start;
Non-Article 5: later start.
Belarus, the Russian Federation, Kazakhstan, Tajikistan, and Uzbekistan

1. The Kigali Amendment has been adopted by the Montreal Protocol Parties and is now in effect.
2. As of 1 January 2019, the Kigali Amendment enters into force.
3. This date refers only to Article 5 Parties.
4. This date refers only to non-Parties.
5. This date refers only to Article 5 Group 1 Parties.
6. This date refers only to Article 5 Group 2 Parties.
7. This date refers only to Article 5 Non-Parties.

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

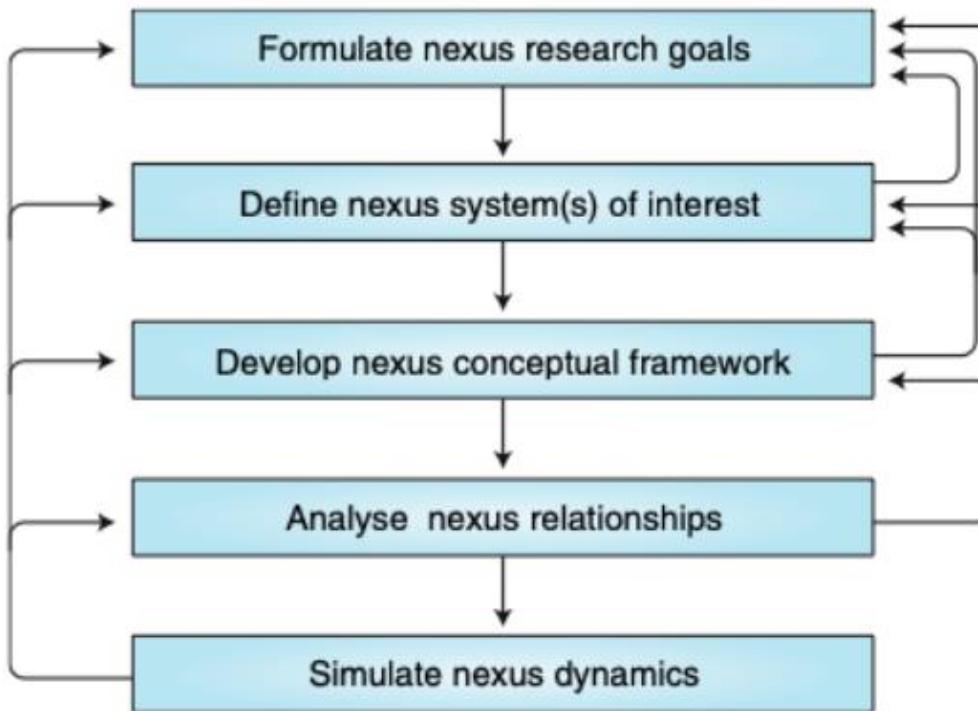


Fig. 2 | Five major steps involved in implementing nexus approaches.
Stakeholders may be engaged throughout all the steps.

Liu et al. (2018) *Nature Sustainability*