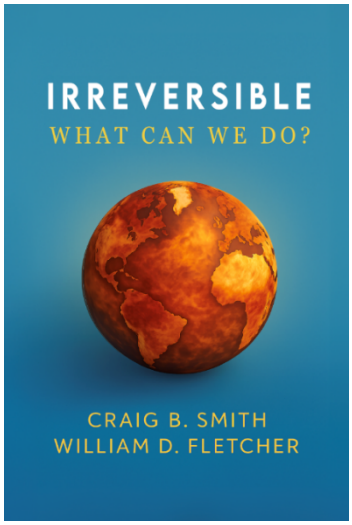
IRREVERSIBLE: What Can We Do?

Craig B. Smith and William D. Fletcher.

Purpose: Global warming is one of the most important and complex public policy and international relations issues in the world today. Most aspects of society are being impacted some way by climate changes caused by global warming.



Global warming is due to increased greenhouse gas emissions caused by human activities. Climate change is a consequence of global warming. Climate change is a broad term that encompasses the more frequent and severe weather events we are experiencing and other effects due to the earth's higher atmospheric and ocean temperatures.

Stopping global warming and adapting to its unavoidable consequences is not just a technical problem. It primarily requires that humans eliminate the use of fossil fuels. For the most part, the science and technology available today are sufficient to accomplish this. For example, solar and wind power are already cheaper than coal and natural gas for electricity generation in most locations. The big challenge is educating the public to support the required changes, getting governments to support a new global energy economy, and other actions requiring international cooperation. We describe the complexities and challenges of actually doing something about global warming. Positive developments are also discussed.

We wrote the book for non-technical readers, to be a comprehensive presentation of the science and technology needed to understand global warming and what can be done about it. The book will interest those in technical disciplines, law, political science, international relations, business, and government service.

Fossil fuels and their emissions free alternatives are discussed, including nuclear power. There is a role for nuclear but not as a substitute for renewable energy. The time, effort, and investment needed to revive nuclear power in the U.S. should not be underestimated.

To the best of our ability, we based the book strictly on facts that we have documented and can be verified. We have tried to keep it free of personal opinions, speculation and political influences. We leave it to readers to reach their own conclusions based upon the facts presented.

Contents: in **Chapter 1**, we cite the scientific facts that prove global warming is real as evidenced by seven major changes in the environment. **Chapter 2** follows to show how, for all practical purposes, global warming is irreversible— it will take a century or more to naturally reduce greenhouse gases in the atmosphere after human-caused emissions are eliminated. **Chapter 3** describes the causes of global warming. **Chapter 4** explains the dangers of global warming and its negative effects on the climate. **Chapter 5** explains how fossil fuels cause global warming. **Chapter 6** describes alternate sources of energy that do not produce greenhouse gases. **Chapter 7** is an overview of why it is so difficult to stop global warming. **Chapter 8** outlines international efforts to date. **Chapter 9** describes what it will take to stop global warming and summarizes a practical action plan that could be implemented immediately. Fortunately, there are some positive developments already occurring, as we describe in **Chapter 10,** but the problem is the world is not moving fast enough or on a large enough scale. This leads into **Chapter 11,** which presents several to answer the question of what might happen if global warming exceeds various limits. Finally, **Chapter 12** lists some suggestions that we can all consider as efforts to reduce greenhouse gas emissions more rapidly. **Chapter 13** includes the authors' final thoughts on dealing with global warming. We have provided appendices and references for readers who want additional details.

Our survival is not at risk due to global warming. However, without action now it will not be in a world we want for our grandchildren or for their children. A dire future is not inevitable. We know what to do to avoid it. But so far, many have chosen to look the other way; to pretend it is not a real problem, to hope that the status quo can go on forever.

Key Findings:

- Global warming is real and based on hard physical facts.
- Global warming is irreversible. We can cause the earth to heat up, but not to cool down.
- Global warming can be ignored, but not avoided. The Earth's temperature will keep rising.
- Global warming is affecting the climate, even if specific impacts are hard to predict.
- It is practical and economical to substantially reduce most human-caused greenhouse gases.
- There have been past failures and wasted efforts that discredit efforts to reduce global warming.
- The U.S. is focused on maintaining energy independence using fossil fuels. China is headed in the opposite direction and leads the world in wind energy, solar energy, electric vehicles, and nuclear power.
- The IPCC goal to limit global warming to less than 2.0 and preferably 1.5°C cannot be met based upon foreseeable trends.

Meet Charlie: We created Charlie Oscar the 2nd, a CO_2 molecule, to help us explain some global warming complexities. Charlie appears at various locations in the book where he can clarify issues or offer insights with his unique viewpoint on subjects as diverse as "Is carbon capture feasible?" or "Could the Sahara Desert provide all the world's electricity?"

Authors:

Craig Smith was an Assistant Professor of Nuclear engineering and Assistant Director of the Nuclear Energy Laboratory at UCLA., later joining DMJM+HN, a subsidiary of AECOM Technology Corporation, an international engineering and construction management firm, where he was broadly involved in the field of energy and power. He retired as president and chairman. He has a BS degree in Electrical Engineering from Stanford University and a PhD in engineering from UCLA.

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Authors Fletcher and Smith at Santa Barbara Museum of Natural History, Earth Day, 2024

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