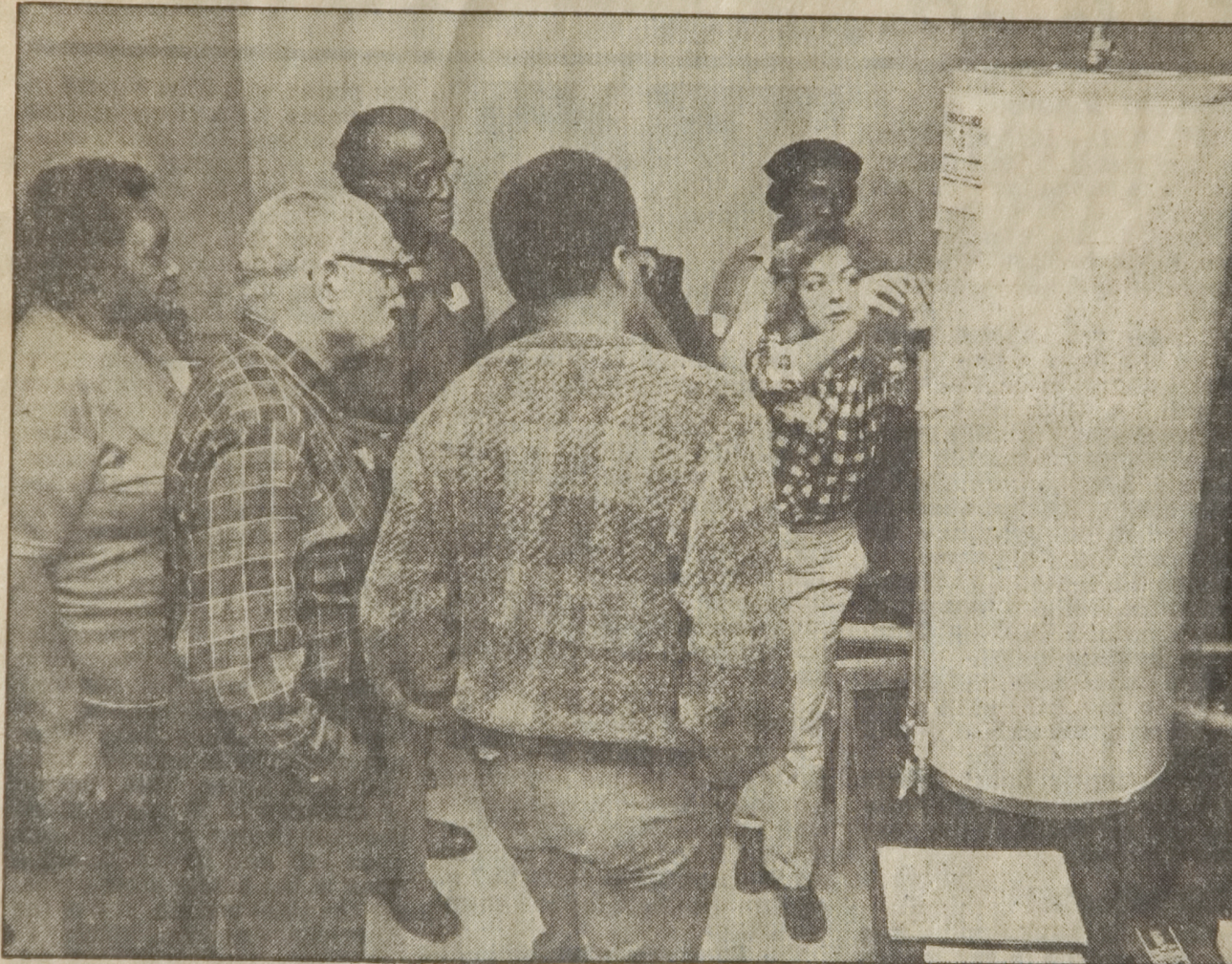


Science for action, and the need to speak clearly and speak up

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Durham Morning Herald/Kevin Kelster

Energy Workshop

Sue Hassol shows residents of the Campus Hills and Rosewood Street neighborhoods how a simple adjustment on a hot water heater can save energy. She was conducting her demonstration at one of a series of neighborhood workshops,

which are being sponsored by Sun Shares in Durham. Sun Shares, a non-profit organization dedicated to promoting energy efficiency, is providing free training and materials. For more information call 688-9529.

IRT SUPPLEMENT

A STRATEGIC NEWSBRIEF FOR THE ELECTRIC UTILITY INDUSTRY

IRT Quarterly Supplement, July 1988

Global Warming: Policy Options

by Susan Hassol, Associate Editor

Whether or not the current drought is linked to the "greenhouse effect," it is drawing attention to the fact that humans are altering the Earth's climate with emissions of carbon dioxide (CO₂) and other greenhouse gases. The greenhouse effect functions in this way: Certain gases, notably CO₂, act like the glass in a greenhouse, trapping heat in the earth's atmosphere. (Were it not for the natural functioning of these gases, the earth would be very much colder). The problem of global warming has arisen because of human interference with natural levels of these gases.¹ Ever increasing quantities of these gases in the atmosphere, due to CO₂-producing fossil fuel combustion, chlorofluorocarbon (cfc) producing industrial processes, and deforestation (forests absorb CO₂, moderating buildup), are causing a rise in the earth's temperature. Electricity generation accounts for 32% of CO₂ emitted into the atmosphere. Other major sources are transportation 29%, manufacturing 23%, and heating 14%.²

Evidence of global warming is substantial. Between 1861 and 1984, the world experienced "a long time scale warming trend, with the three warmest years being 1980, 1981, and 1983, and five of the nine warmest years in entire 134-year record occurring after 1978."³ The issue is currently receiving increased attention in the popular press reflected in feature articles in *Fortune*, *Newsweek*, and *Time* magazines. The *Fortune* article (July 4, 1988), calls the signs of a warming trend "ominous," explaining, "measured by the global mean temperature, last year [1987] was the warmest year on record; the 1980s are the warmest decade in a century. A rise in the earth's temperature of at least 2 or 3 degrees Fahrenheit seems inevitable by the mid-21st century, when the concentration of CO₂ in the atmosphere is likely to be some 60% greater than today and double the level that prevailed before the Industrial Revolution. A temperature increase of more than 8 degrees F is possible."⁴

Dr. James Hansen of NASA's Goddard Institute for Space Studies testified before the Senate Committee on Energy and Natural Resources on June 29, 1988 that not only was 1987 the warmest year on record, but early 1988 has been warmer still -- by .75 degree F. Normal "random" year-to-year fluctuations in weather conditions would

¹ A. Ramirez, "A Warming World: What It Will Mean," *Fortune*, pp. 102-107, July 4 1988.

² Brookhaven National Laboratory, cited in *Fortune* magazine, July 4, 1988, p.105.

³ P.D. Jones, T. Wigley, and P. Wright, "Global Temperature Variations Between 1861 and 1984," *Nature*, p. 430, July 31 1986.

⁴ Ramirez *ibid*.

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IRT Issues Review and Tracking

THE ENERGY NEWSBRIEF

IRT Volume 5, Issue # 2

January 25, 1990

ALASKAN NATURAL GAS PIPELINE PLAN: The Department of Energy has approved a proposal to build an 800-mile natural gas pipeline paralleling the existing TAPS (Trans-Alaska Pipeline System) oil pipeline from Prudhoe Bay to Valdez and a liquefaction facility at Valdez. The proposal, from Yukon Pacific Pipeline, includes the export of 660 billion cubic feet per year of gas from North Slope fields as LNG (liquefied natural gas) to Japan, South Korea, and Taiwan. The proposed Trans-Alaska Gas System (TAGS), which would ultimately move 16.5 trillion cubic feet of the estimated 26 tcf of North Slope reserves, is estimated to cost \$11 billion. Additional approvals are required from the state of Alaska and various federal agencies. The DOE permit requires the FERC (Federal Energy Regulatory Commission) to consider the safety and environmental aspects of the export site and facilities, including the Valdez liquefaction plant, the marine terminal, the LNG tankers and their routes through U.S. waters. Sponsors of the project say that gas could be moving through TAGS as early as 1996.

COMPLETE HOME SOLAR POWER PLANT: Bomin Solar of West Germany has developed a solar-powered system that provides electricity, heat, refrigeration, and air conditioning for home or community use. The system utilizes sun-tracking reflectors and thermochemical storage based on the release and reabsorption of hydrogen gas. Using a 107-square-foot reflector, in one day the power plant produces 11 kilowatt-hours of electricity, 13 kwh of heat for cooking, and 10 kwh of energy for water heating and cooling, according to the company. "In contrast," a Bomin spokesperson says, "the same size photovoltaic panel with silicon cells would produce only 7 kwh of electricity, and has an energy conversion efficiency of around 10%. We're already getting an overall solar-to-electricity efficiency of 29%." He predicts 36% efficiency in the near future and says that the "home-energy center could be on the market in three years." (continued p. 2)

ONTARIO HYDRO TO INCREASE CAPACITY: Ontario Hydro has announced plans to spend \$53 billion over the next 25 years to increase its generating capacity by half. The plan includes building nuclear, gas, and hydroelectric plants, and refurbishing coal plants. Ontario is Canada's economic hub and its most populous province, with nearly 10 million residents. Ontario Hydro's president says generating capacity must rise to 40,000 mw even though its aggressive conservation effort is expected to reduce demand by 25%. Capacity is now 29,000 mw, but 30% of that is from plants that must be retired by 2014. The utility depends heavily on nuclear power, and its expansion plans emphasize more of the same. When the company's new Darlington plant begins operation, the province will be getting 70% of its electricity from three large nuclear plants. The utility plans to begin construction on two new multi-unit nuclear stations soon and on a third after 2000, but major objections are expected from environmental and consumer groups. The expansion plan also includes \$6 billion in purchases from Manitoba Hydro, part of which will launch construction of a new dam and transmission line. The plan does not include purchases of future James Bay power from Hydro Quebec, as Ontario Hydro says the asking price is excessive.

EUROPEAN ACID RAIN PLAN: Implications of the June 1988 European Community agreement to limit emissions from large combustion plants are beginning to be realized. The agreement set limits on all new plants over 50 mw and called for reductions from existing plants as well. Each country in the European Community has agreed to reduce its sulfur dioxide and nitrogen oxide emissions by various percentages of their 1980 emissions levels. For the United Kingdom, the reductions are set at 20% by 1993, 40% by 1998, and 60% by 2003. To meet this goal, Britain will require flue gas desulfurization (fgd) on all new plants and will retrofit 6000 mw of existing plants with fgd. For a technical description of the limestone/gypsum process Britain will employ, see *Power Engineering*, Jan. 1990, pp. 39-40.

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101 Practical Tips for Home and Work

EVERYDAY CHEMICALS

By Beth Richman and Susan Hassol


 A Windstar EarthPulse Handbook

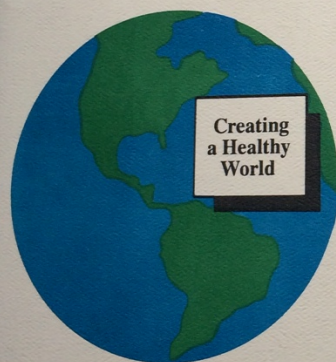


101 Practical Tips for Home and Work

RECYCLING

By Susan Hassol and Beth Richman


 A Windstar EarthPulse Handbook



101 Practical Tips for Home and Work

ENERGY

By Susan Hassol and Beth Richman

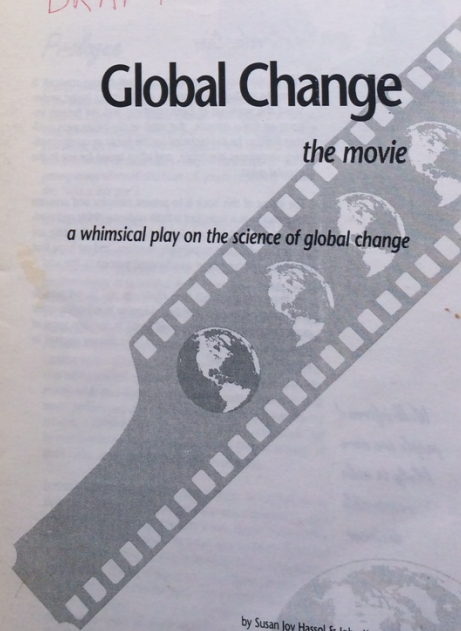
 A Windstar EarthPulse Handbook

DRAFT

AGCI-260 John K

Global Change the movie

a whimsical play on the science of global change

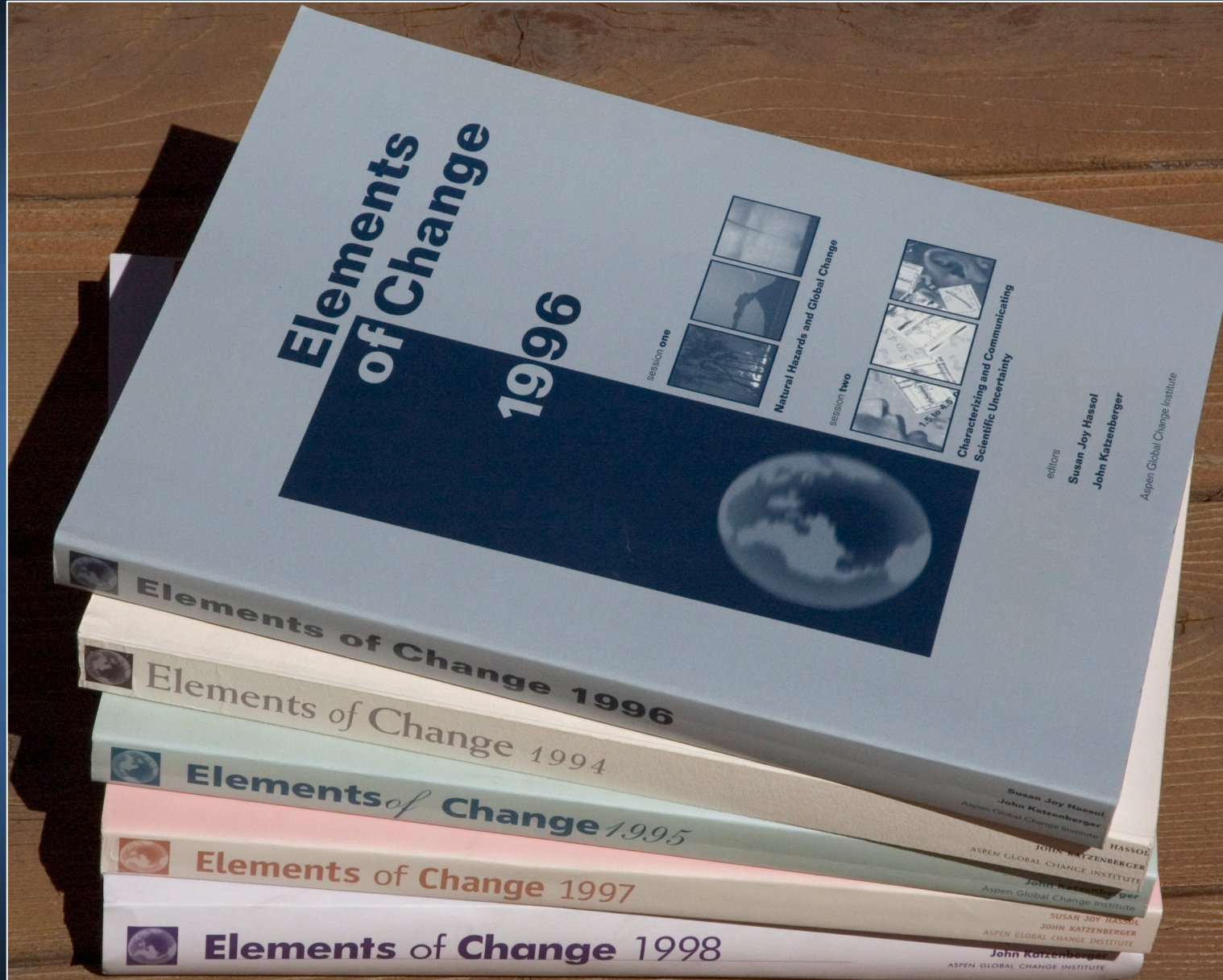


by Susan Joy Hassol & John Katzenberger

Aspen Global Change Institute
Aspen Colorado



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*“Science is not
finished until it’s
communicated.”*

- Sir Mark Walport,
UK’s Chief Scientific Advisor

**IF YOU SEE
SOMETHING,
SAY
SOMETHING.**

BE SUSPICIOUS OF ANYTHING UNATTENDED.
Tell a cop, an MTA employee or call 1-888-NYC-SAFE.



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If You See Something, Say Something

By MICHAEL E. MANN JAN. 17, 2014



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SAVE



MORE

STATE COLLEGE, Pa. — THE overwhelming consensus among climate scientists is that human-caused climate change is happening. Yet a fringe minority of our populace clings to an irrational rejection of well-established science. This virulent strain of anti-science infects the halls of Congress, the pages of leading newspapers and what we see on TV, leading to the appearance of a debate where none should exist.

THE WALL STREET JOURNAL.

LETTERS

Check With Climate Scientists for Views on Climate

February 1, 2012

Do you consult your dentist about your heart condition? In science, as in any area, reputations are based on knowledge and expertise in a field and on published, peer-reviewed work. If you need surgery, you want a highly experienced expert in the field who has done a large number of the proposed operations.

You published "[No Need to Panic About Global Warming](#)" (op-ed, Jan. 27) on climate change by the climate-science equivalent of dentists practicing cardiology. While accomplished in their own fields, most of these authors have no expertise in climate science. The few authors who have such expertise are known to have extreme views that are out of step with nearly every other climate expert. This happens in nearly every field of science. For example, there is a retrovirus expert who does not accept that HIV causes AIDS. And it is instructive to recall that a few scientists continued to state that smoking did not cause cancer, long after that was settled science.

Smartening Up Communication

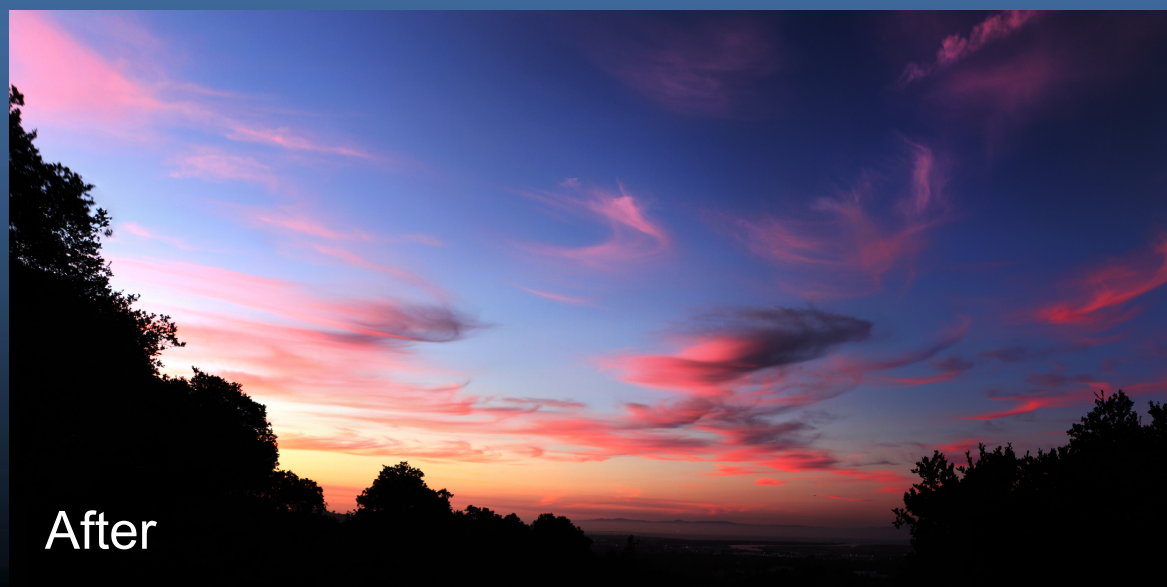
- Consider your audience's values & concerns
- Craft a few simple messages
- Avoid jargon and too much detail
- Use imagery, metaphor, story
- Lead with what you know
- Describe both threat and opportunity

Words that mean different things

Aerosol



Enhance



Positive Feedback



Terms that have different meanings for scientists and the public

Scientific term	Public meaning	Better choice
enhance	improve	intensify, increase
aerosol	spray can	tiny atmospheric particle
positive trend	good trend	upward trend
positive feedback	good response, praise	vicious cycle, self-reinforcing cycle
theory	hunch, speculation	scientific understanding
uncertainty	ignorance	range
error	mistake, wrong, incorrect	difference from exact true number
bias	distortion, political motive	offset from an observation
sign	indication, astrological sign	plus or minus sign
values	ethics, monetary value	numbers, quantity
manipulation	illicit tampering	scientific data processing
scheme	devious plot	systematic plan
anomaly	abnormal occurrence	change from long-term average

Somerville and Hassol, Physics Today, Oct. 2011

Words that mean different things

Aerosol

Enhance

Positive

Negative

Feedback

Radiation

Theory

Error

Ozone

Model

Sensitivity

Reservoir

Ecology

Settlement

Uncertainty

Risk

Bias

Exotic

Agent

Species

Organic

Enrichment

Nutrient

Commitment

Fix

Transient

Idealized

Driver

Anomaly

Disruptive

Extra

Proposal

Sequestration

Literature

Regime

Sign

User

Mean

Discipline

Manipulation

Scheme

Trick

“The balance of evidence suggests that it is ‘very *likely*’ (probability greater than 90%) that the British are coming. I am not advocating any particular mitigation or adaptation response.”

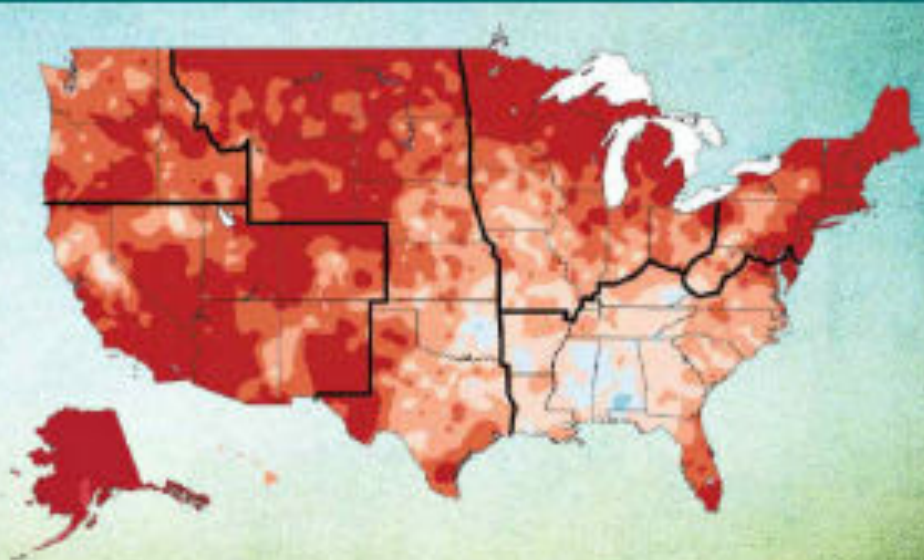
- Paul Revere, if he had been a climate scientist



thanks to Mark Boslough PhD, Sandia Lab

Climate Change Impacts in the United States

HIGHLIGHTS



U.S. National Climate Assessment
U.S. Global Change Research Program

“Climate change, once considered an issue for a distant future, has moved firmly into the present.”

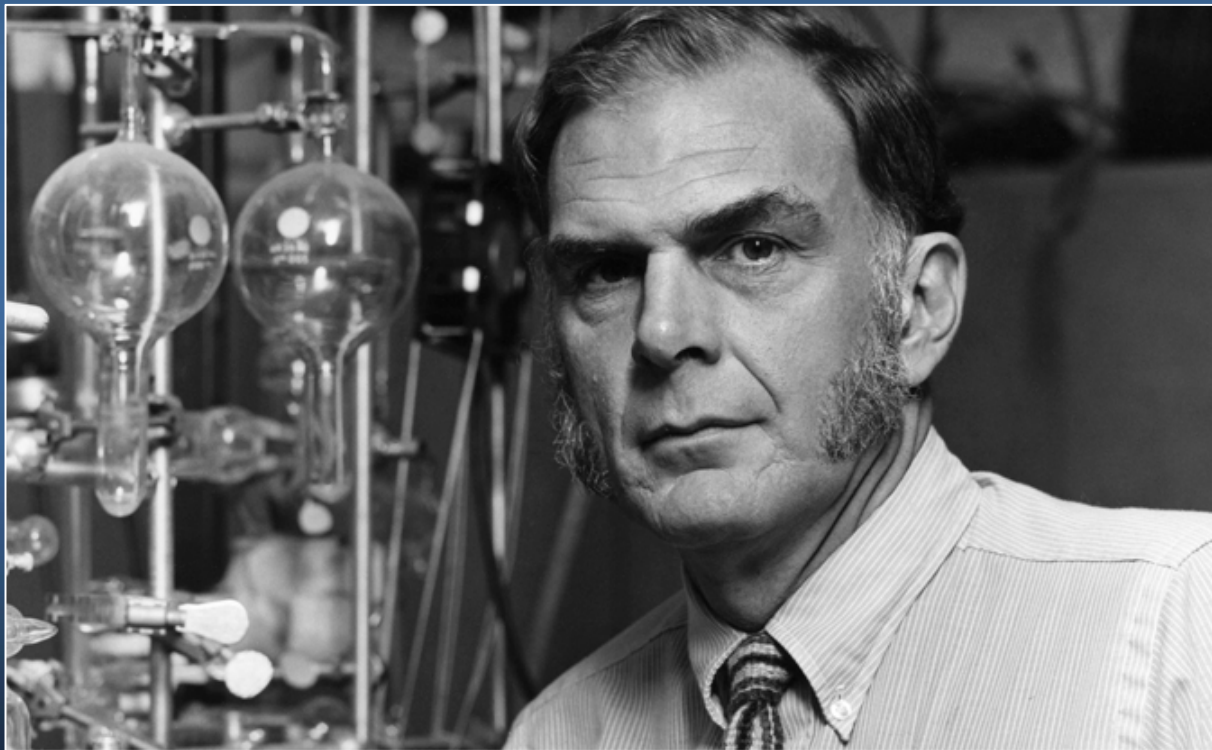
Happening Now

Affecting Americans

Important Opportunities

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“What’s the use of having developed a science well enough to make predictions if, in the end, all we’re willing to do is stand around and wait for them to come true?”



F. Sherwood Rowland



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