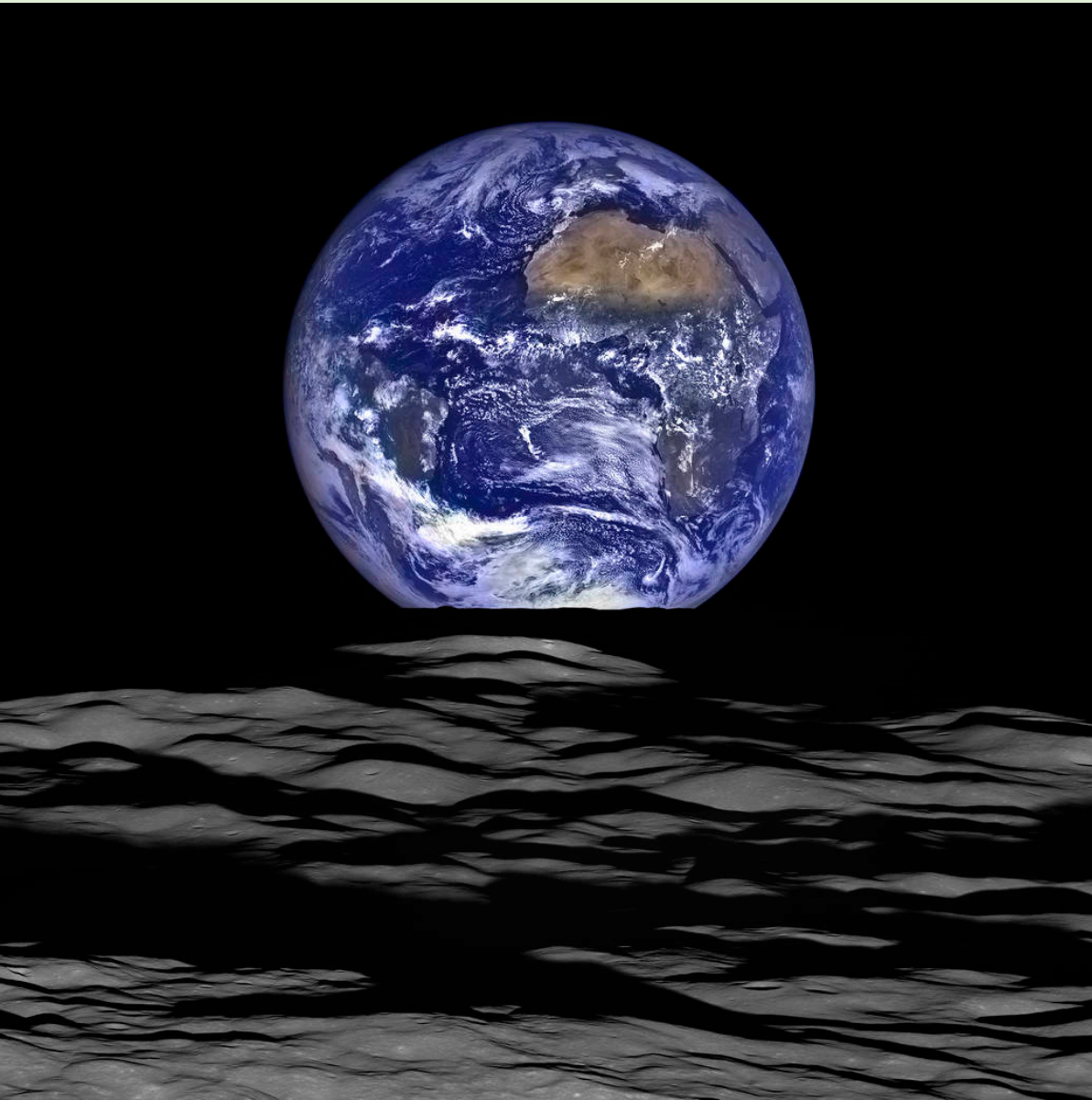


BALANCING ECONOMICS WITH ETHICS TO SAVE GOD'S CREATION.

PAUL H. CARR, AF Research Laboratory Emeritus, IEEE Life Fellow.



**Earthrise
on the
Moon**

**SAVE EPA
& OUR
EARTH!
It's the
only one
with
chocolate**

-ETHICS GOLDEN RULE:

Do unto others as you would have them do unto you.

-ECONOMICS GOLDEN RULE:

Whoever has the gold makes the rules.



200 Page Encyclical
***Laudato Si:
On Care for our
Common Home.***

June 2015

Prophetic Pope Francis

Market capitalism drives our global economy. Pope Francis' encyclical questions the *ethics* of this system, whose symptoms are:

- (1) climate change and
- (2) an increasing gap between the rich and the poor.

***“Any economic system should serve people,
not the other way around.”***

ECONOMIC IMBALNCE

- Belief in:
- **“Invisible Hand,”** Adam Smith (1776), which guided the pursuit of individual gain towards the public interest.
*“The self-correcting power of the free market.”
(Alan Greenspan’s Laissez Faire Economics)*

Ignoring:

- **“Tragedy of the Commons,”** William Forster Lloyd (1833), in which the pursuit of individual gain leads to negation of the common good.

Tragedy of the Commons

William Forster Lloyd (1833), Garrett Hardin (1968). The pursuit of individual gain leads to negation of the common good.

Lloyd was familiar with herdsman who all grazed their cattle on a **commons**. Each individual gained by adding more cows to his own herd. As each pursued his individual gain, the commons became overgrazed, resulting in the tragedy of malnourished cows.



Coal burning pollutes our **common atmosphere for free.**

This is *short term* economic benefit for utility companies and customers.

The negative effects of pollution are shared by all.

THE *LONG-TERM* TOTAL COST OF BURING FOSSIL FUELS IS NOT INCLUDED IN WHAT WE NOW PAY.

THE CO2 EMISSIONS WILL BE IN OUR ATOMPHERE FOR OVER 100 YEARS.



Unjust Cost of Coal Burning

1. Fine particle pollution from U.S. power plants cuts short the lives of over 30,000 people/ year.
 - Asthma attacks, cardiac problems and upper and lower respiratory problems associated with fine particles from power plants.
2. Deaths of many coal miners
 - None from nuclear reactors in the US.



HEALTH COSTS OF COAL BURNING

Aerosol pollution from coal burning in Beijing

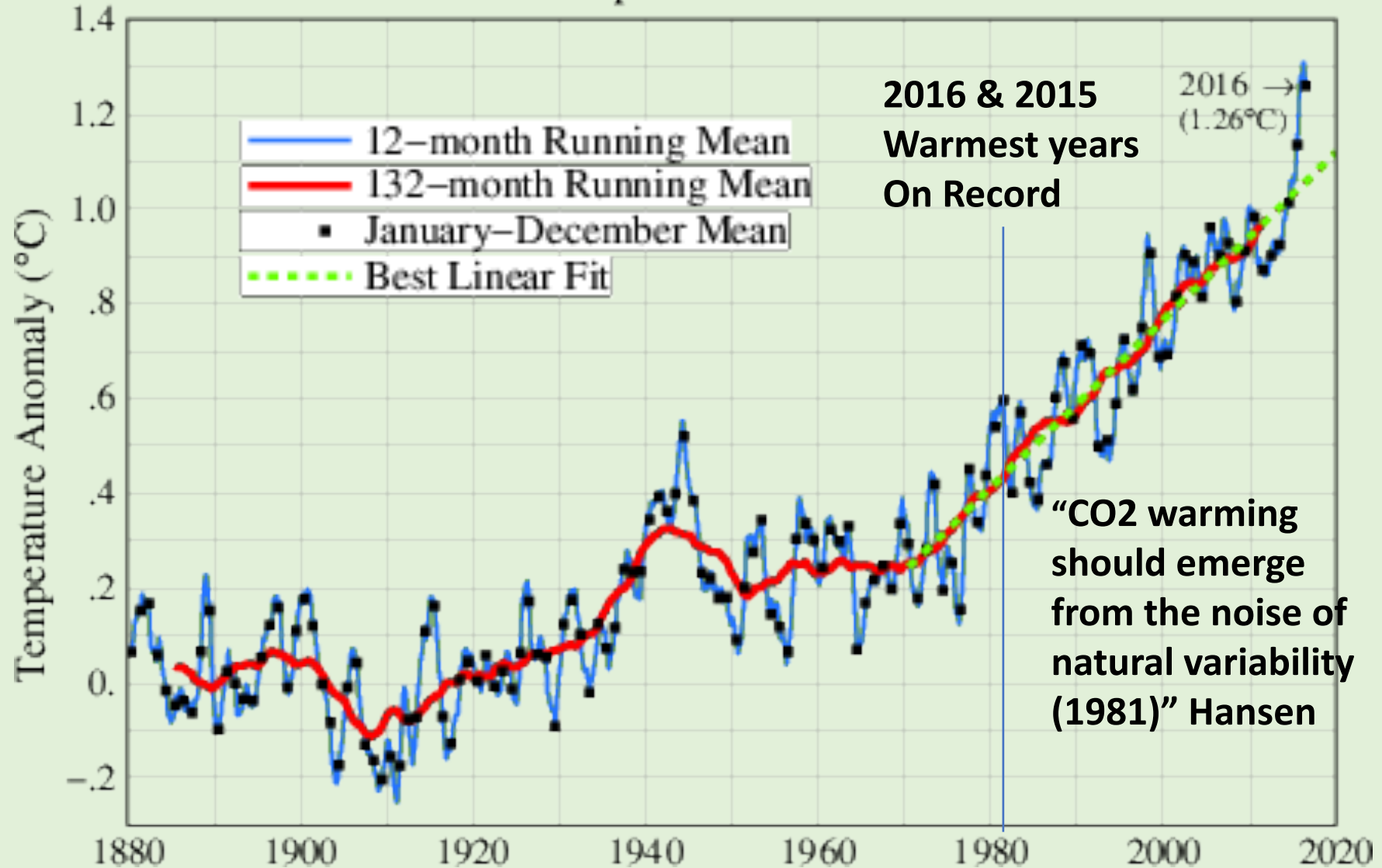
Schools must sometimes be closed.

World Health Organization safe level: 25 mg/m^3

Aerosol level in Beijing: 505 mg/m^3

One million deaths per year globally.

Global Surface Temperature: 1880–1920 Base Period



This global temperature chart is updated at Columbia University. Data is based on GISTEMP analysis (mostly NOAA data sources) as described by Hansen et al.

Atmos. Chem. Phys., 16, 3761–3812, **Mar 2016** www.atmos-chem-phys.net/16/3761/2016/ doi:10.5194/acp-16-3761-2016 © Author(s) 2016. CC Attribution 3.0 License.

Ice melt, sea level rise and superstorms: evidence from paleoclimate data, climate modeling, and modern observations that 2 C global warming could be dangerous

James Hansen¹, Makiko Sato¹, Paul Hearty², Reto Ruedy^{3,4}, Maxwell Kelley^{3,4}, Valerie Masson-Delmotte⁵, Gary Russell⁴, George Tselioudis⁴, Junji Cao⁶, Eric Rignot^{7,8}, Isabella Velicogna^{7,8}, Blair Tormey⁹, Bailey Donovan¹⁰, Evgeniya Kandiano¹¹, Karina von Schuckmann¹²,....

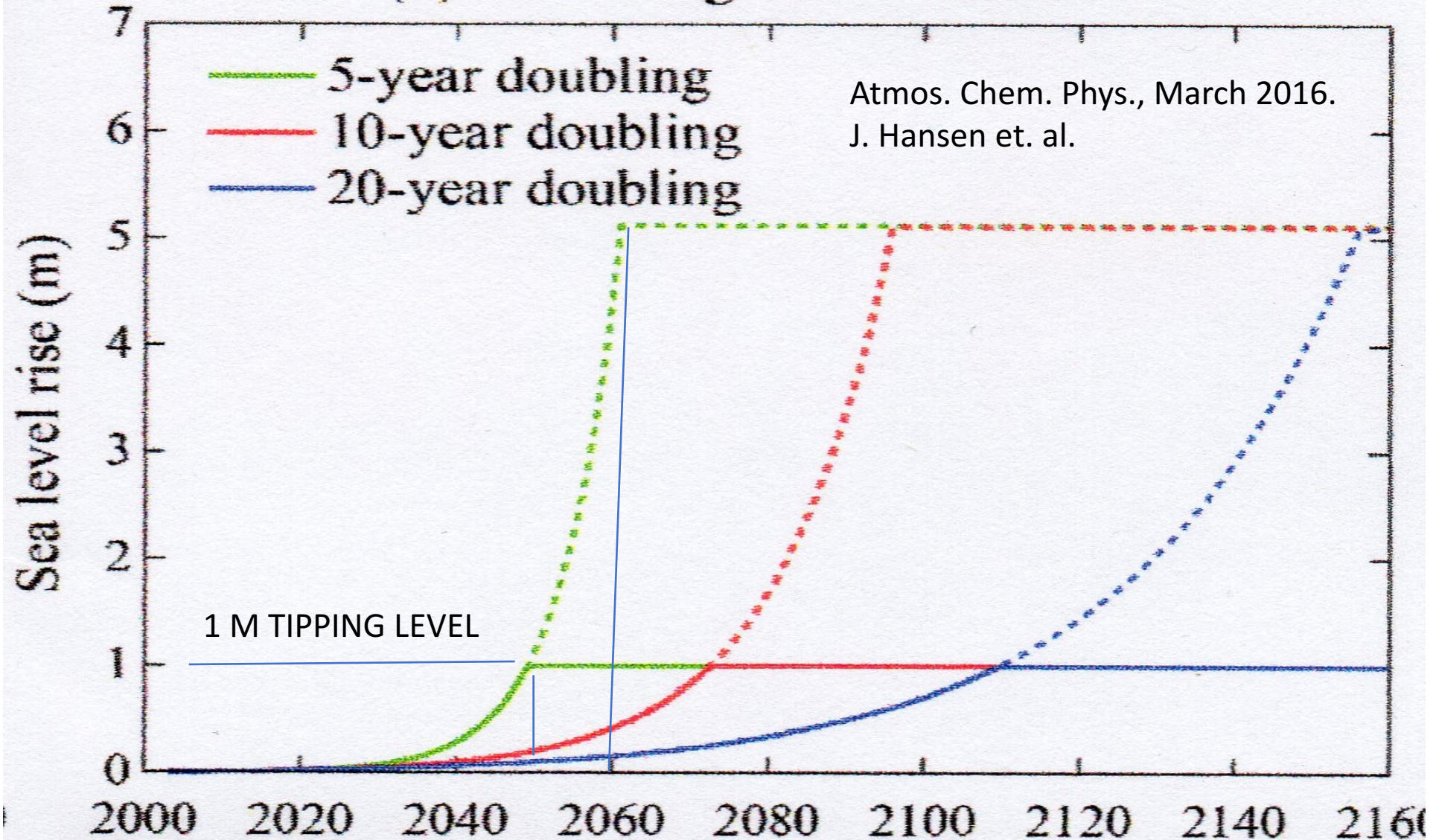
1Climate Science, Awareness and Solutions, Columbia University Earth Institute, New York, NY 10115, USA

2Department of Environmental Studies, University of North Carolina at Wilmington, NC 28403, USA **3**Trinnovium LLC, New York, NY 10025, USA **4**NASA Goddard Institute for Space Studies, 2880 Broadway, New York, NY 10025, USA

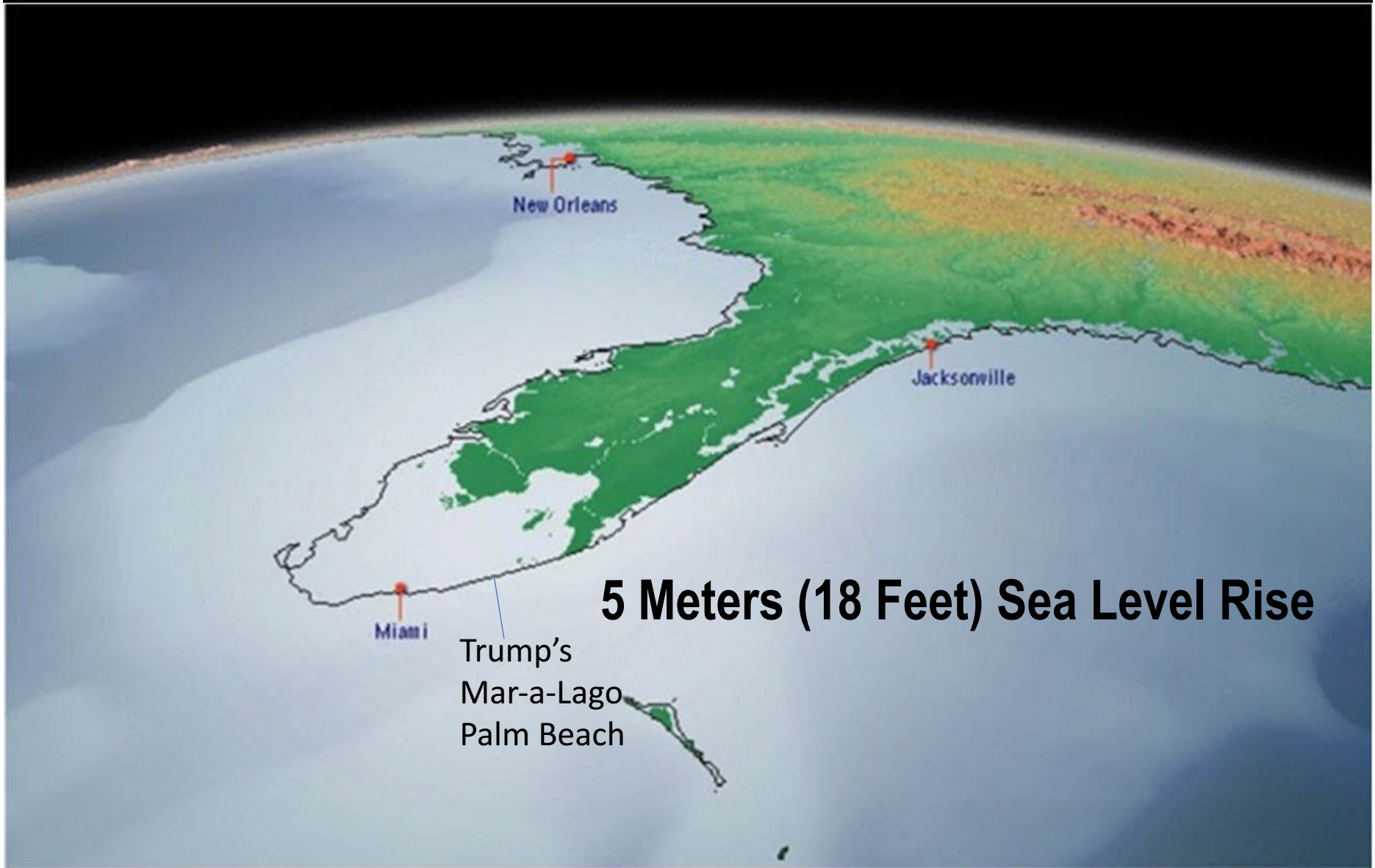
5Institut Pierre Simon Laplace, Laboratoire des Sciences du Climat et de l'Environnement (CEA-CNRS-UVSQ), Gif-sur-Yvette, France **6Key Lab of Aerosol Chemistry & Physics, Institute of Earth Environment, Chinese Academy of Sciences, Xi'an 710075, China** **7**Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA 91109, USA **8**Department of Earth System Science, University of California, Irvine, CA 92697, USA **9**Program for the Study of Developed Shorelines, Western Carolina University, Cullowhee, NC 28723, USA **10**Department of Geological Sciences, East Carolina University, Greenville, NC 27858, USA **11**GEOMAR, Helmholtz Centre for Ocean Research, Wischhofstrasse 1–3, Kiel 24148, Germany **12**Mediterranean Institute of Oceanography, University of Toulon, La Garde, France **13**Department of Applied Physics and Applied Mathematics, Columbia University, New York, NY 10027, USA

USA

(b) Resulting sea level rise



Sea levels could rise by 1 m (3 ft) by 2050. Could we take action to prevent a 5 m (18 ft) rise by 2058? The lifetime of CO₂ is 100 years.



5 Meters (18 Feet) Sea Level Rise

Miami

Trump's
Mar-a-Lago
Palm Beach

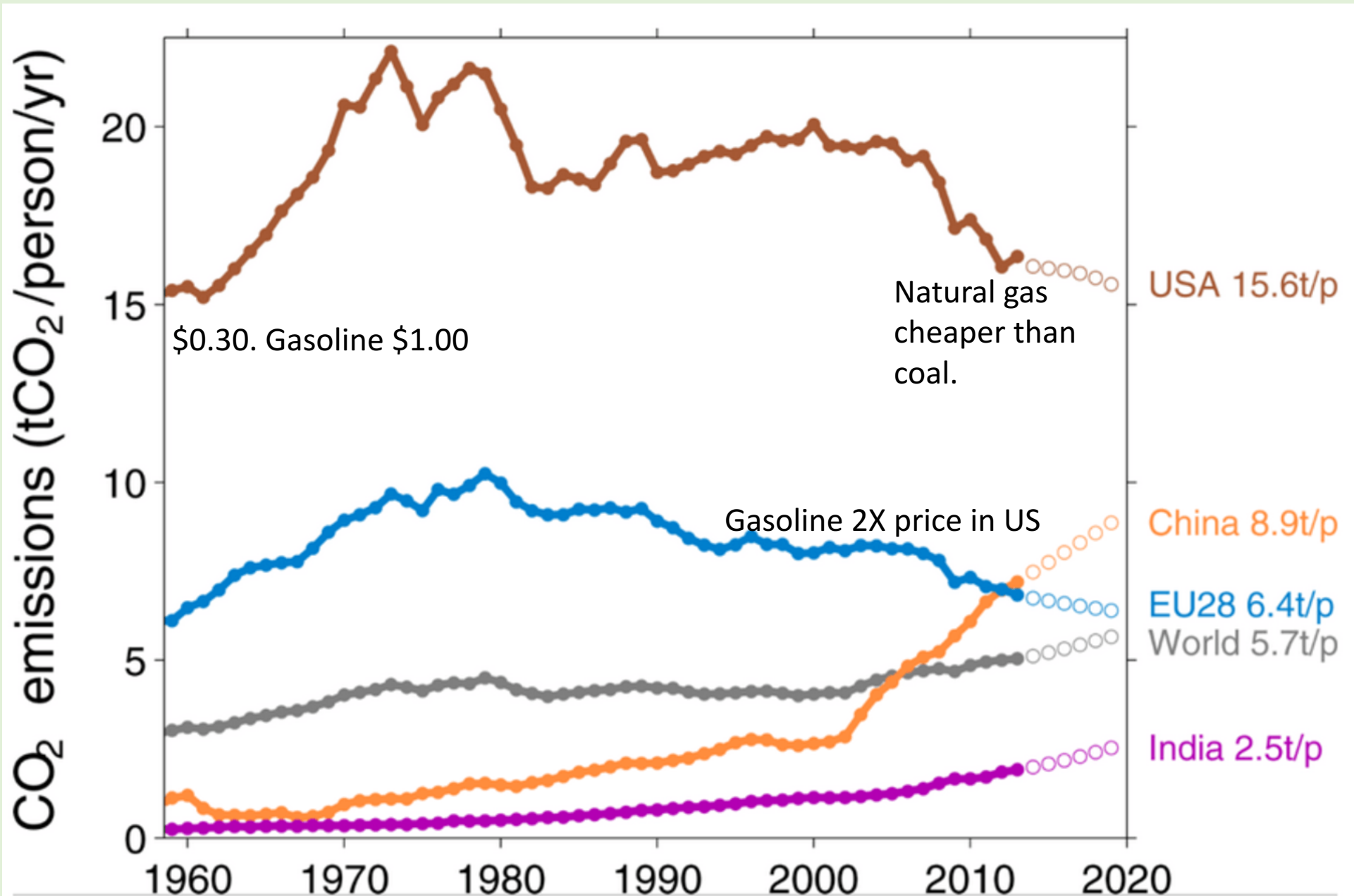
New Orleans

Jacksonville



March for
Science,
Earth Day,
April 22,
2017
Poster.
Concord,
NH

Adam Smith's "hidden hand" of economics can reduce carbon emissions.



FYI, here's George P. Shultz's "A Reagan approach to climate change" oped washingtonpost.com/opinions/a-rea...



A Reagan approach to climate change

The United States should take out an insurance policy, as Reagan did with ozone depletion.

washingtonpost.com

**True social cost of burning fossil fuels.
Harness Greed towards Green**

www.CitizensClimateLobby.org

- Revenue neutral carbon fee with dividend. (RNCFD)

-Dividend would be returned to everyone.
\$2000 / family.

-Stimulating economy & creating 2 million jobs.

- Stimulate Green Energy Innovation.

SUPER- FUEL



THORIUM, THE GREEN ENERGY
SOURCE FOR THE FUTURE

RICHARD MARTIN

Alvin Weinberg demonstrated a **Thorium** molten-salt nuclear reactor at Oak Ridge in 1970. Its fission byproducts had **no weapons value** during the Cold War's nuclear arms race and zero chance of a meltdown.

Thorium reactors lost to Navy Admiral Rickover's **Uranium** water-cooled for nuclear submarines and aircraft carriers. Present uranium civilian reactors, which generate 20% of our electricity without carbon emissions, are a spinoff from Rickover's navy technology.

Bill Gates is funding a solution to the nuclear waste problem. <http://www.businessinsider.com/bill-gates-talks-private-nuclear-fission-plant-terrapower-2016-4>

Gates said that TerraPower's nuclear pilot plant will be built with the **China** National Nuclear Corp. The economics, safety, waste, and all the key parameters are dramatically improved.

The traveling wave reactor converts depleted uranium, a byproduct of the nuclear-fission process, into usable fuel.

How fear of nuclear power is hurting the environment

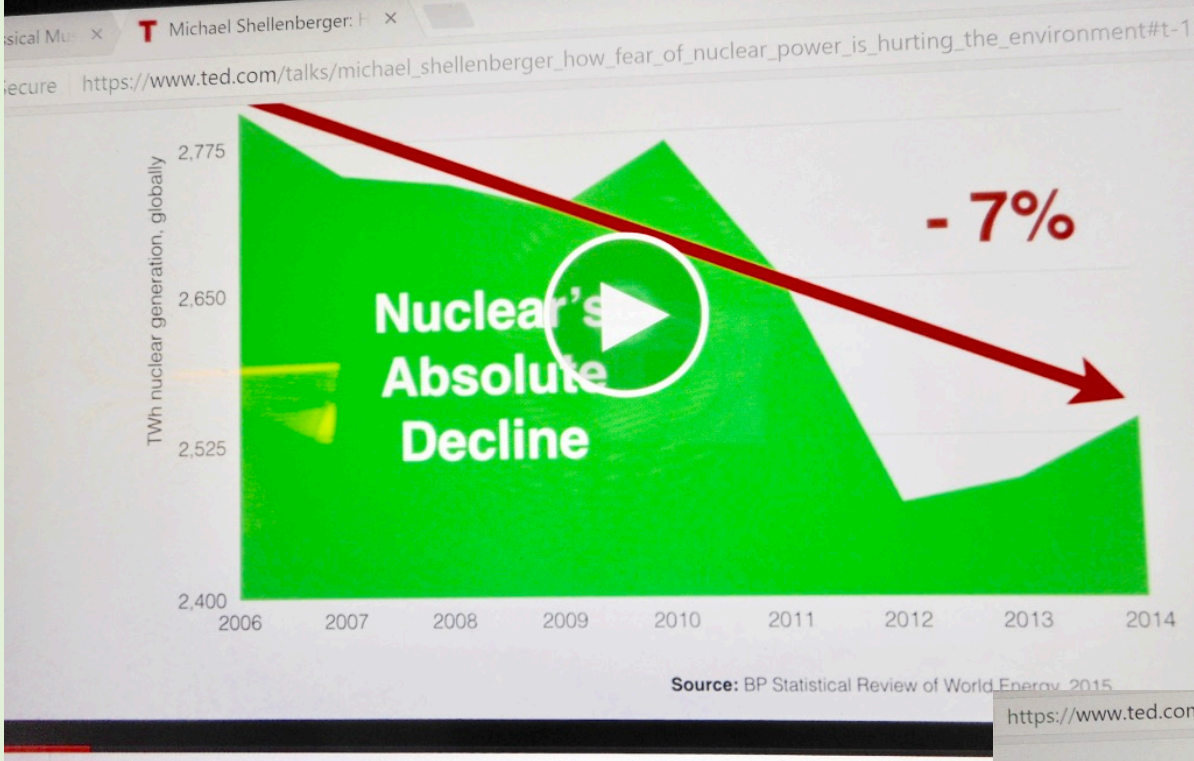
| YouTube 2016 TED Talk by Michael Shellenberger

BACKGROUND:

- SOLAR ENERGY IS NUCLEAR.

The energy that enables life on earth comes from the nuclear fusion of hydrogen into helium in our sun.

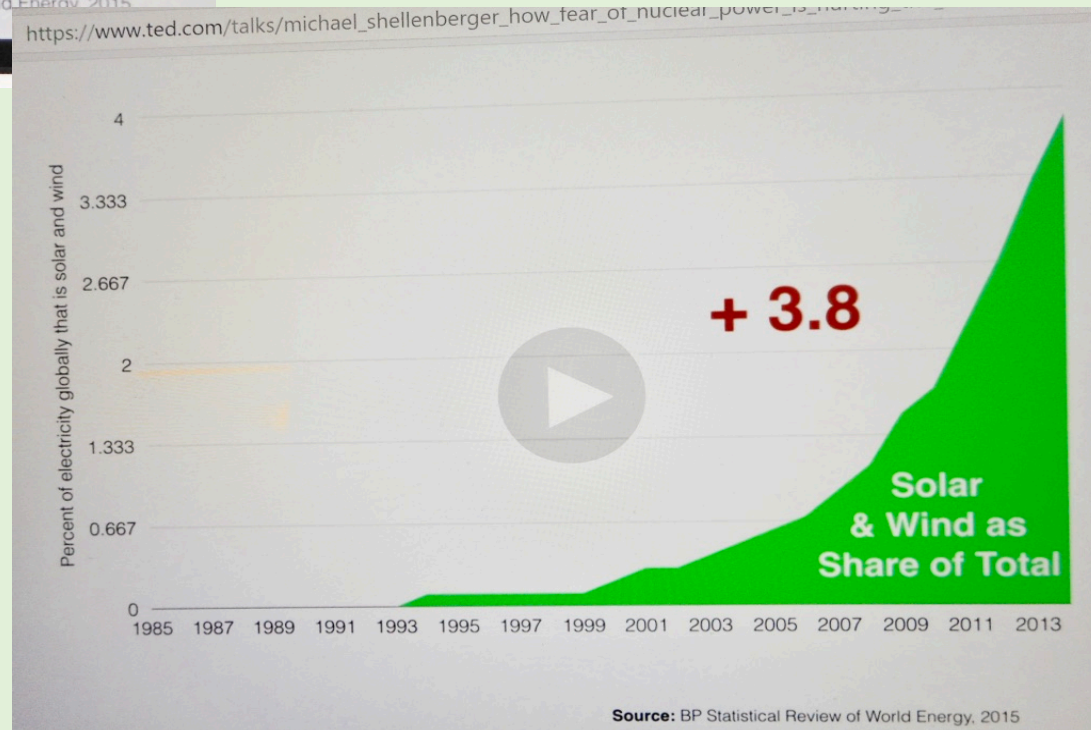
- Solar energy is available 26% of the time,
wind 33% of the time,
and nuclear 24/7

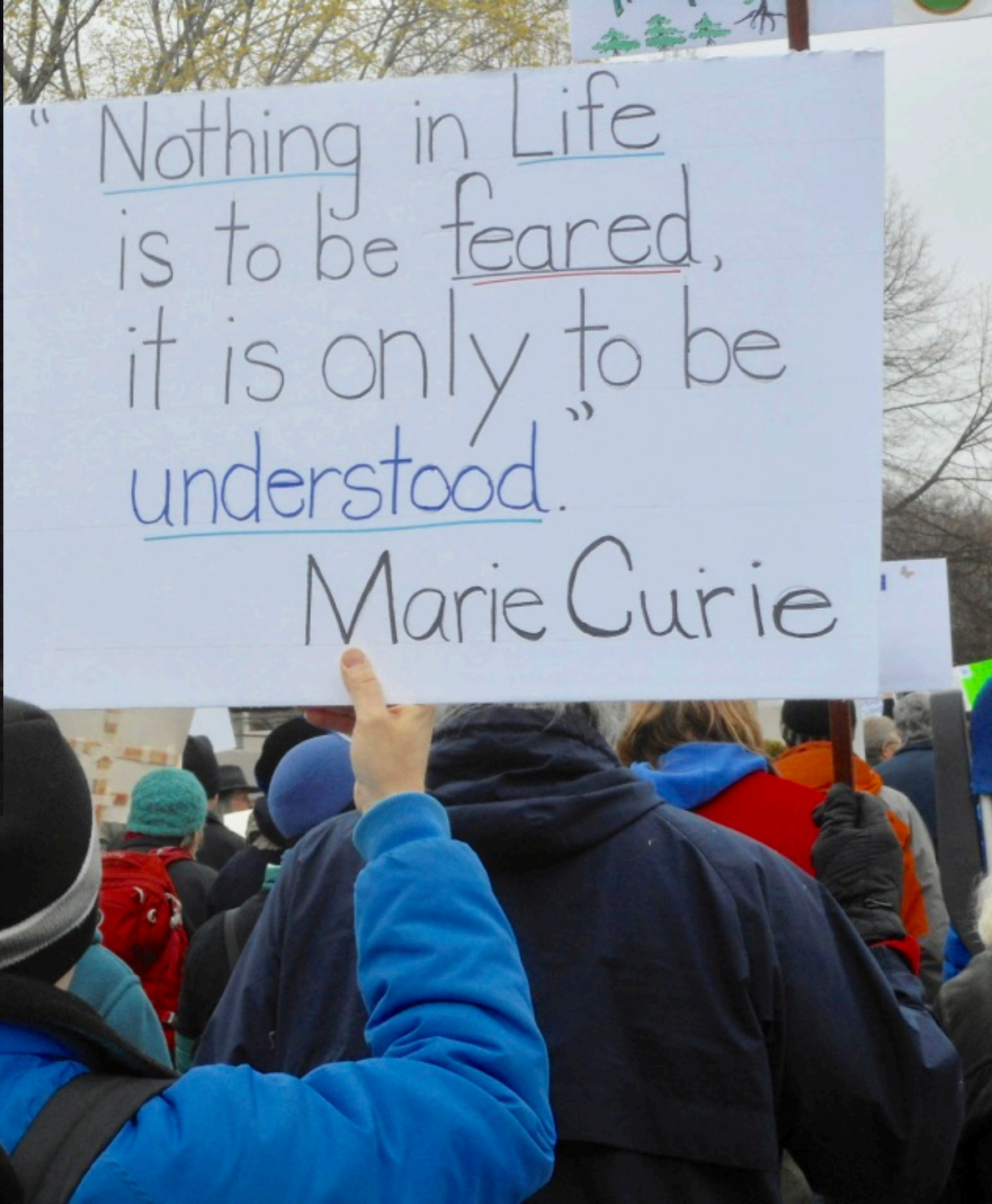


GLOBALLY: The 7% decrease in Nuclear generated electricity is greater than the +3.8% increase in Solar & Wind.

To make up for the difference, we are burning more fossil fuels, which increase our carbon dioxide emissions .

This is particularly true in Germany. Electricity cost is twice that in the US.





CONCLUSIONS

- **Economics can be balanced with ethics** by requiring carbon emitters to pay for the true human cost.
 - **Revenue neutral carbon fee and dividend** for all to stimulate our economy.
 - **Cap emissions and trade** for permits.
- **A GREEN RED HERRING** editorial in the *Economist*, June 15, 2017
 - The goal should be to curb global warming, not 100% renewable energy.
 - Putting too much emphasis on wind and solar may block off better carbon-reduction paths.
 - After decades of investment, it's wrong to leave nuclear off the table.

1981

SCIENCE MAGAZINE

28 August 1981, Volume 213, Number 4511

SCIENCE

Climate Impact of Increasing Atmospheric Carbon Dioxide

J. Hansen, D. Johnson, A. Lacis, S. Lebedeff
P. Lee, D. Rind, G. Russell

Atmospheric CO₂ increased from 280 to 300 parts per million in 1880 to 335 to 340 ppm in 1980 (1, 2), mainly due to burning of fossil fuels. Deforestation and changes in biosphere growth may also

The major difficulty in accepting this theory has been the absence of observed warming coincident with the historic CO₂ increase. In fact, the temperature in the Northern Hemisphere decreased by

Summary. The global temperature rose by 0.2°C between the middle 1960's and 1980, yielding a warming of 0.4°C in the past century. This temperature increase is consistent with the calculated greenhouse effect due to measured increases of atmospheric carbon dioxide. Variations of volcanic aerosols and possibly solar luminosity appear to be primary causes of observed fluctuations about the mean trend of increasing temperature. It is shown that the anthropogenic carbon dioxide warming should emerge from the noise level of natural climate variability by the end of the century, and there is a high probability of warming in the 1980's. Potential effects on climate in the 21st century include the creation of drought-prone regions in North America and central Asia as part of a shifting of climatic zones, erosion of the West Antarctic ice sheet with a consequent worldwide rise in sea level, and opening of the fabled Northwest Passage.

have contributed, but their net effect is probably limited in magnitude (2, 3). The CO₂ abundance is expected to reach 600 ppm in the next century, even if growth of fossil fuel use is slow (4).

Carbon dioxide absorbs in the atmospheric "window"

about 0.5°C between 1940 and 1970 (9), a time of rapid CO₂ buildup. In addition, recent claims that climate models overestimate the impact of radiative perturbations by an order of

Greenhouse Effect

The effective radiating temperature of the earth, T_e , is determined by the need for infrared emission from the planet to balance absorbed solar radiation:

$$\pi R^2(1 - A)S_0 = 4\pi R^2\sigma T_e^4 \quad (1)$$

or

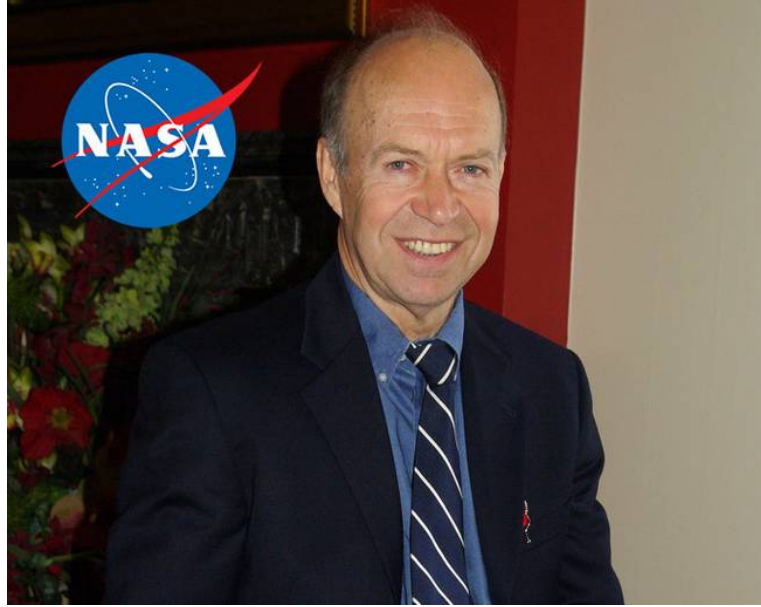
$$T_e = [S_0(1 - A)/4\sigma]^{1/4} \quad (2)$$

where R is the radius of the earth, A the albedo of the earth, S_0 the flux of solar radiation, and σ the Stefan-Boltzmann constant. For $A \sim 0.3$ and $S_0 = 1367$ watts per square meter, this yields $T_e \sim 255$ K.

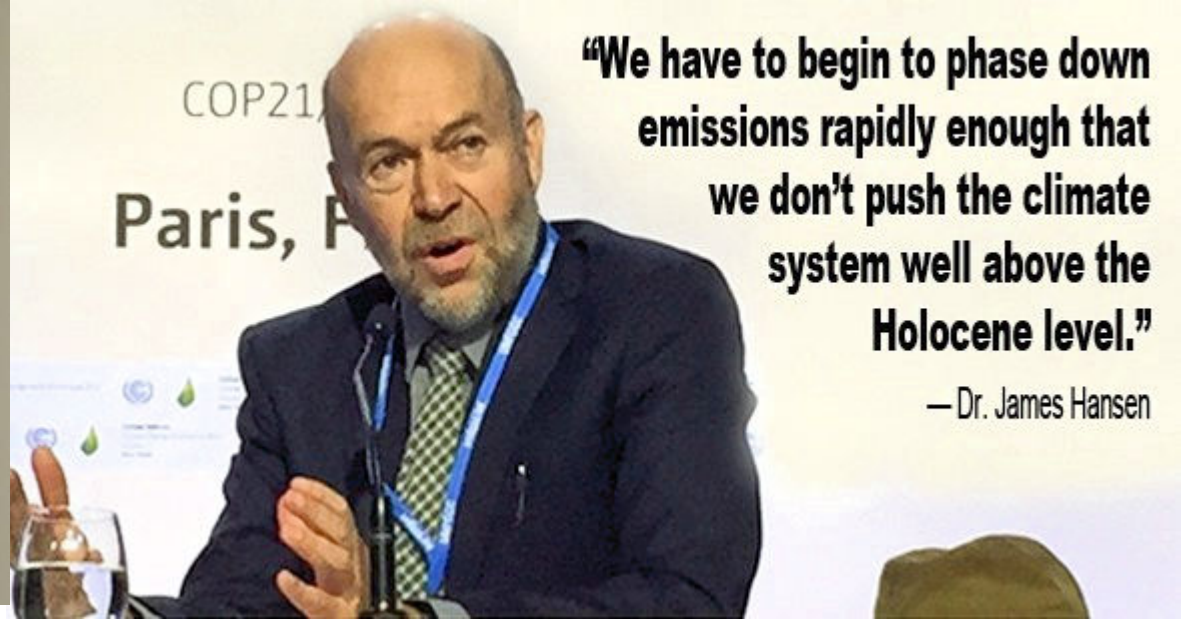
The mean surface temperature is $T_s \sim 288$ K. The excess, $T_s - T_e$, is the greenhouse effect of gases and clouds, which cause the mean radiating level to be above the surface. An estimate of the greenhouse warming is

$$T_s - T_e = \Gamma H \quad (3)$$

where H is the flux-weighted mean altitude of the emission to space and Γ is the mean temperature gradient (lapse rate) between the surface and H . The earth's troposphere is sufficiently opaque in the infrared that the purely radiative vertical temperature gradient is convectively unstable, giving rise to atmospheric motions that contribute to vertical transport of heat and result in $\Gamma \sim 5^\circ$ to 6° C per kilometer. The mean lapse rate is less than the dry adiabatic value because of latent heat release by condensation as moist air rises and cools and because the atmospheric motions that transport heat vertically include large-scale

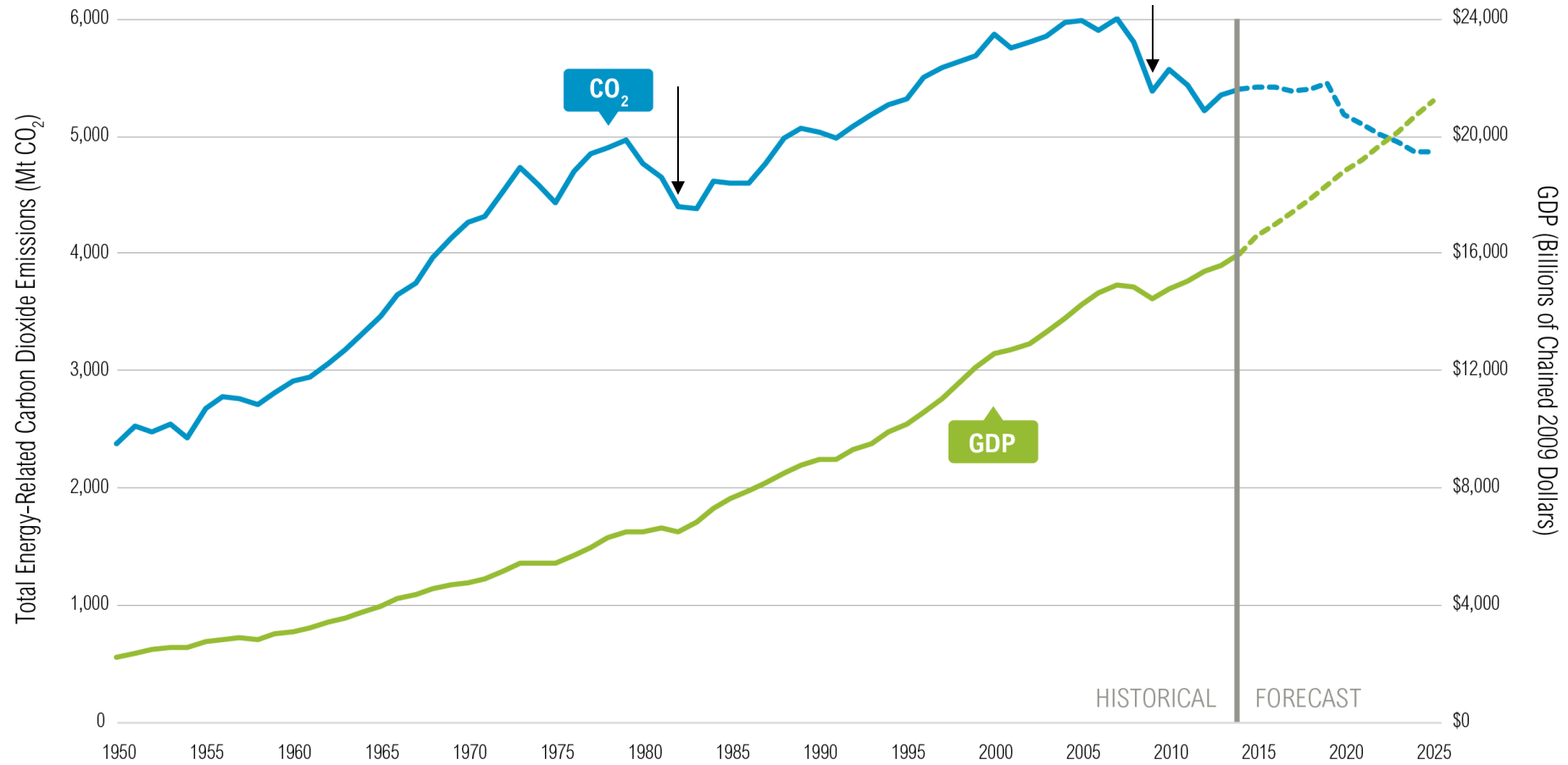


1981



2015

U.S. CO₂ Emissions and GDP, 1950-2025



 WORLD RESOURCES INSTITUTE

Contrary to Trump's claim, reducing CO₂ emissions in 1980 & 2010 did not wreck our economy, i.e. decrease our GDP (Gross Domestic Product)