

**Science & Environment in the White House:
What Did Obama Do? What Is Trump Doing?
What Should We Do?**

John P. Holdren

Professor of Environmental Science and Policy
HARVARD UNIVERSITY

Director Emeritus and Senior Advisor to the Director
THE WOODS HOLE RESEARCH CENTER

Assistant to President Obama for Science & Technology
and Director, White House Office of Science & Technology Policy
(January 2009 – January 2017)

**Inaugural Address for the
Center of Biological Risk
University of Connecticut • 9 October 2017**

Outline of the presentation

- Science & technology and the national interest
- S&T in Federal policy-making
- S&T advice in the White House: the need & the history
- Putting “science in its rightful place” under Obama
- Obama initiatives on energy and environment
- Obama’s Climate Action Plan
 - The underlying scientific realities
 - Ingredients of the plan
 - Contrarian confusions about climate change & the CAP
- What Trump is doing (and not doing)
- What we should do

S&T and the national interest

S&T are central to meeting the practical, often overlapping challenges of

- economic prosperity
- national & homeland security
- biomedicine & health-care delivery
- competing uses of land, water, & NPP
- clean, safe, reliable, & affordable energy
- climate-change mitigation and adaptation
- terrestrial & marine biodiversity & ecosystem services

Plus the role of S&T in lifting the human spirit through the excitement of exploration, discovery, and invention

The Federal government's role in S&T

- Most basic research in natural & social sciences is done in universities, with funding provided mainly by the Federal gov't.
- Most applied R&D is funded & performed by private firms, but Federal and state & local gov't have important roles in shaping the policies that encourage or discourage private-sector R&D.
- It's also government's role to devise & implement programs to bring S&T to bear on public goods not adequately addressed in the market-place—security, health, environment, justice...

The Federal gov't role in S&T (continued)

- The crucial task of STEM-education at the K-12 levels is part of the overall education responsibilities that reside mainly with states and local school boards, but
 - Federal programs & incentives play a role, and
 - Federal/corporate/civil-society partnerships with states and school districts have been playing increasing roles in K-12 STEM-education.
- The federal gov't, colleges, & corporations increasingly are working together to improve college-level STEM education and worker training.

Who makes Federal S&T policy?

- S&T policy is a shared responsibility of the Congress and the Executive Branch.
- Overarching Congressional S&T authority is in House Science, Space, & Technology; Senate Commerce, Science & Transportation; and relevant appropriations committees & subcommittees.
- But many other committees also have S&T roles...
 - HOUSE: Agriculture; Armed Services; Energy & Commerce; Natural Resources; Transportation & Infrastructure
 - SENATE: Agriculture, Nutrition, & Forestry; Armed Services; Energy & Natural Resources; Environment & Public Works; Health, Education, Labor, & Pensions

Key executive branch S&T actors

- Dept of Defense (DDR&E, DARPA, NSA)
- Dept of HHS (NIH, CDC, FDA)
- Dept of Energy (NNSA, Office of Science, ARPA-E)
- NASA
- National Science Foundation
- Dept of Agriculture (ARS, NIFA)
- Dept of Commerce (NOAA, NIST, PTO)
- Dept of Interior (USGS)
- Environmental Protection Agency
- Dept of Homeland Security
- Dept of State (OES)

The need for S&T advice in the White House

Given the wide range of S&T competencies in gov't agencies and the ability of the President to call on cabinet secretaries & other agency heads for any S&T information he wants, why does the President need a separate S&T advisor and supporting office inside the White House?

- Absent a capable scientist/technologist on the President's senior staff, he & his other senior advisors in the White House might not recognize the relevance of S&T to the choices before the President, thus might not know when he needs to ask an S&T question of an agency...or what question to ask.
- Specialized knowledge of the S&T missions & competencies in the agencies is needed to know whom he should ask, i.e., what expertise from what agencies to consult on which policy issue.
- It is often helpful for the President to have a trusted source of S&T that's independent of the agendas of particular agencies.

History of S&T advice in the White House

- Office of Scientific R&D (OSRD, 1941-47)
Headed by Vannevar Bush, reporting directly to FDR and now considered the first official “Science Advisor to the President”.
- Ad hoc advisory boards based in DoD (1947-57)
Army & Navy R&D Board; then Science Advisory Committee (SAC) to the Office of Defense Mobilization; the directors were closest thing to science advisors to Truman & Eisenhower in these years.
- President’s Science Advisory Committee (PSAC, 1957-73)
Eisenhower converted SAC to PSAC, moved it to the White House, and in 1959 created a new White House Office of S&T (OST) to support it. The OST Director served as PSAC Chair & was known as “the President’s Science Advisor”.
This model was kept by Kennedy, Johnson, & Nixon (until 1973).

History of White House S&T advice (continued)

- OST & PSAC dissolved (1973-76)
Nixon fired his science advisor & dissolved both OST & PSAC in 1973, transferring functions to NSF & the Nat’l Security Council.
- Office of Science & Technology Policy (OSTP, 1976--)
Ford got Congress to create OSTP by statute, gaining stability but entailing Senate confirmation of the Director & Assoc Directors.
- No equivalent to PSAC until 1990
Neither Ford nor Carter appointed a PSAC, relying just on their science advisor, OSTP, and ad hoc panels.
Reagan’s 1st science advisor created a Science Advisory Council reporting to him, not the President, in 1981.
The equivalent of PSAC was not restored until George H. W. Bush created the President’s Council of Advisors on S&T (PCAST) in 1990 by Executive Order.

History of White House S&T advice (continued)

- Strong OSTP & PCAST (1990-2000)

George H. W. Bush (Bush 41) was interested in S&T, appointed a strong science advisor (Alan Bromley) supported by a well staffed OSTP and a strong PCAST, and consulted them regularly.

Bill Clinton likewise appointed strong science advisors (John H. Gibbons 1992-1998, Neal Lane 1998-2000) and a strong PCAST, consulted them extensively, and built up OSTP staff.

- Minimizing S&T in the White House (2001-2008)

George W. Bush (Bush 43) was uninterested in S&T advice, and his OSTP Director (John Marburger) was not confirmed until Oct 2001. He was not made Ass't to the President for S&T, thus lacked direct access. Two Assoc Dir positions were eliminated.

Political types, not scientists, played dominant roles in messaging about science and its policy implications.

President Obama announces a course change

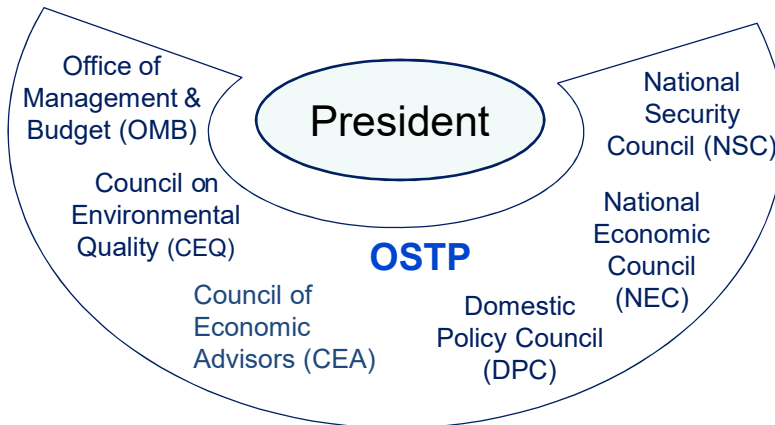
“We will restore science to its rightful place...”

Barack Obama, January 20, 2009



The place of S&T in the Obama White House

...was again centered in OSTP, whose Director was restored to the rank of Assistant to the President for S&T

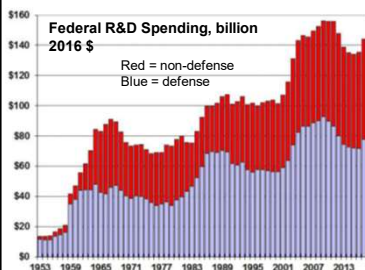


EOP also includes Offices of: Vice President, Chief of Staff, Cabinet Affairs, Communications, Intergovernmental Relations, Public Engagement, Social Secretary, US Trade Representative, and more. The Office of Energy & Climate Change sits in DPC.

The 3 responsibilities of the OSTP Director / Science Advisor under Obama



1. Science and technology for policy
Independent advice for the President & heads of other White House offices, providing whatever facts/insights about S&T may be germane to the policy issues with which they are concerned.

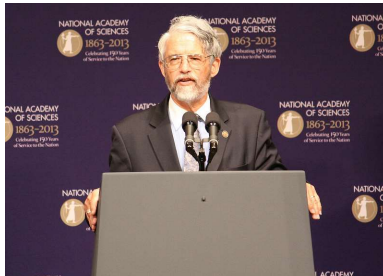


2. Policy for science and technology
Analysis, recommendations, and coordination with OMB and other White House offices on: R&D budgets & related policies; S&T education and workforce issues; interagency S&T initiatives; scientific integrity & transparency; S&T to improve gov't operations.

Three responsibilities (continued)

3. Serving as the President's S&T emissary to...

- Exec Branch agencies with S&T roles
- Congress
- the nongovernmental S&T community nationally & internationally
- foreign govt officials



What else Obama did to keep his pledge

- Placed early priority on...
 - scientific integrity
 - open data & public access
 - STEM education & inclusion
 - clean energy & climate change
 - advancing biomedicine & public health
 - strengthening international cooperation in S&T
 - tech innovation for economic recovery & growth
 - rebalancing NASA to boost science, advanced tech
 - exploiting modern IT & private-sector innovation talent to improve the responsiveness & effectiveness of gov't

Keeping the pledge (continued)

- Used bully pulpit & WH venue to promote S&T
 - Both inaugural addresses & every State of the Union, two addresses to NAS annual meetings; multiple major speeches on S&T around the country (on space, energy, manufacturing...)
 - 6 White House Science Fairs, 2 WH Astronomy Nights for Kids, East Wing ceremonies & Oval Office welcomes for Medalists of Science and Technology & Innovation, US Nobelists & Kavli Prize winners, Intel finalists, middle-school mathletes, outstanding teachers...
- Re-invigorated and fully engaged PCAST
- Used advice from OSTP & PCAST to shape S&T initiatives using public-private-academic partnerships to make progress on national & global challenges

The re-invigorated President's Council of Advisors on Science and Technology (PCAST) under Obama

- PCAST's function was again to provide an additional high-caliber source of independent S&T advice for the President, drawing on the expertise of the national S&T community.
- All but one of the ~20 members were leading scientists, engineers, and innovators appointed by the President to advise him on a part-time, pro bono basis from their positions in academia, government, and civil society.
- As before, the only PCAST member who was a full-time member of the President's staff was the OSTP Director, who co-chaired the group with 1-2 of the outside members and whose OSTP staff supported PCAST's work.
- Obama's appointments to PCAST included 3 Nobel Laureates, 2 research-university presidents, the VPs of both the NAS & the NAE, and the Executive Chairman of Google.



President Obama (and VP Biden) enjoyed meeting with PCAST.

Over President Obama's two terms, his PCAST produced 38 studies of S&T topics on which he wanted the advice of the Nation's S&T community

- 13 were about applications of infotech, big data, nanotech, robotics, 3-D printing, etc., to strengthen the U.S. economy;
- 8 were on how to advance biomedicine & public health;
- 7 were on energy & environment, including climate change;
- 4 were on improving science and math education;
- 3 were on S&T issues in national & homeland security; and
- 3 were on other roles of S&T in society (e.g., forensic science in the courtroom)

Many of the recommendations were embraced by President Obama and became the basis of robustly funded initiatives in his administration.

President Trump has not yet appointed a PCAST.

Some Obama S&T initiatives

INNOVATION FOR THE ECONOMY

- American Innovation Strategy
- Startup America
- Advanced Materials Initiative
- Data.gov
- Challenge.gov
- Advanced Mfg Partnership / Nat'l Network for Mfg Innovation

STEM EDUCATION

- Educate to Innovate
- STEM Master Teacher Corps
- 100kin10
- STEM Inclusion Initiative
- Computer Science for All

INFOTECH / COMPUTING

- ConnectED
- Big Data Initiative
- Nat'l Strategic Computing Initiative

BIOMEDICINE & HEALTH

- Neuroscience / BRAIN Initiative
- Combating Antimicrobial Resistance
- Precision Medicine Initiative (PMI)
- Cancer Moonshot

NAT'L SECURITY / INTERNAT'L S&T

- Cybersecurity Initiative
- Space-Weather Strategy
- Science Envoys (economic development)
- Mission Innovation (clean energy)

ENERGY & ENVIRONMENT

- New fuel-economy/CO₂ standards
- ARPA-E, Energy Innovation Hubs
- Climate Action Plan & COP21
- National Ocean Policy
- Arctic Initiative / AESC
- Pollinator Initiative
- Valuation of ecosystem services

Initiatives on energy & environment: 1st-term

- \$80 billion for clean & efficient energy in the Recovery Act
- \$100s of millions for Advanced Research Projects Agency-Energy (ARPA-E) and 5 new Energy Innovation Hubs
- first-ever fuel-economy/CO₂ tailpipe standards for light-duty vehicles, plus fuel-economy standards for trucks
- multiple building & appliance energy-efficiency stds
- interagency task force led by OSTP, CEQ, NOAA to coordinate govt's climate-adaptation activities
- re-invigoration of USGCRP; launch of new NCA
- 1st govt calculation & use of Social Cost of Carbon
- 1st National Oceans Policy & National Oceans Council

President Obama signing the National Oceans Policy Executive Order (19 July 2010)



Energy-environment initiatives: 2nd-term

- Unprecedented nat'l & internat'l coordination on Arctic science, conservation, energy, indigenous people's issues
- The Pollinator Initiative
- National Ocean Policy implementation
 - development of 1st two of eight Regional Marine Plans
 - offshore drilling banned in much of U.S. Atlantic coastal waters as well as much of U.S. Arctic waters
 - US marine protected areas (MPAs) hugely expanded in both Atlantic and Pacific
- International "Our Oceans" conferences (3) with progress on illegal fishing, marine pollution, ocean acidification, and marine protected areas

2nd-term progress: Expanded ocean protection

On Sept 15, 2016, President Obama created the Northeast Canyons & Seamounts Marine National Monument, covering 4,900 mi², under the Antiquities Act. On Dec 20, he withdrew 6,000 mi² off the U.S. East Coast (the Atlantic Canyons Withdrawal) from oil drilling under the Continental Outer Shelf Lands Act.



Legend
 Atlantic Canyon Withdrawal
 Northeast Canyons and Seamounts Marine National Monument

BOEM
 Bureau of Ocean Energy Management
 Date: 12/2/2016
 GCS: NAD 83 - Alaska Albers Proj.

On Aug 29, 2016, the President, shown at right touring the Papahānaumokuākea National Marine Monument, expanded it by 442,781 mi², a 4x increase. Earlier, in Sept 2014, he had expanded the Pacific Remote Islands National Marine Monument by 308,000 mi².



2nd-term ocean progress: expanded protection

The area of the Chukchi and Beaufort Seas that President Obama with-drew from oil drilling on Dec 20, 2016, totals 180,000 mi². By agreement, Canada extended the withdrawal into Canadian waters at the same time.



Legend
 Area Available for Future Leasing
 Arctic Withdrawal

BOEM
 Bureau of Ocean Energy Management
 Date: 12/2/2016
 GCS: NAD 83 - Alaska Albers Proj.

2nd-term progress: Public lands

- The President augmented 1st-term additions to reach a total of 34 new or expanded National Monuments.

Additions exceed 550 million acres.

Most of the area is in the new or expanded ocean monuments, but about 6 million acres were added in California, Oregon, Nevada, Utah, and New Mexico.



Gold Butte, NV, 300,000 acres

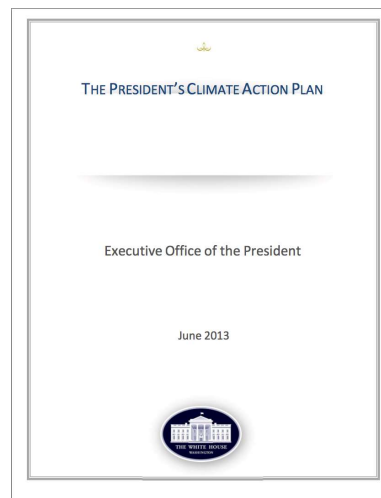


Mojave Trails, CA, 700,000 acres

2nd term: Obama's Climate Action Plan



- Cutting carbon pollution in America (mitigation)
- Preparing the United States for the impacts of climate change (adaptation)
- Leading international efforts to address climate change



The CAP is based on 6 climate-science realities

1. The Earth is warming at a pace and in a pattern not explained by natural influences.
 - Under natural influences, the Earth was mostly cooling for the 7,000 years preceding the Industrial Revolution...and would be cooling still if humans had not intervened
2. The observed pace & pattern are essentially completely explained by the observed & unquestionably human-caused changes in the composition of the atmosphere.
 - The use of fossil fuels & spread of industrialized agriculture caused a rapid increase in concentrations of the heat-trapping gases CO₂, CH₄, and N₂O, later augmented by industrial fluorocarbons.
 - Within measurement & modeling uncertainties, and accounting for human-caused changes in atmospheric concentrations of particles that reflect sunlight, the conspicuous global warming of the last 70 years was all due to the human-caused “greenhouse gas” buildup.

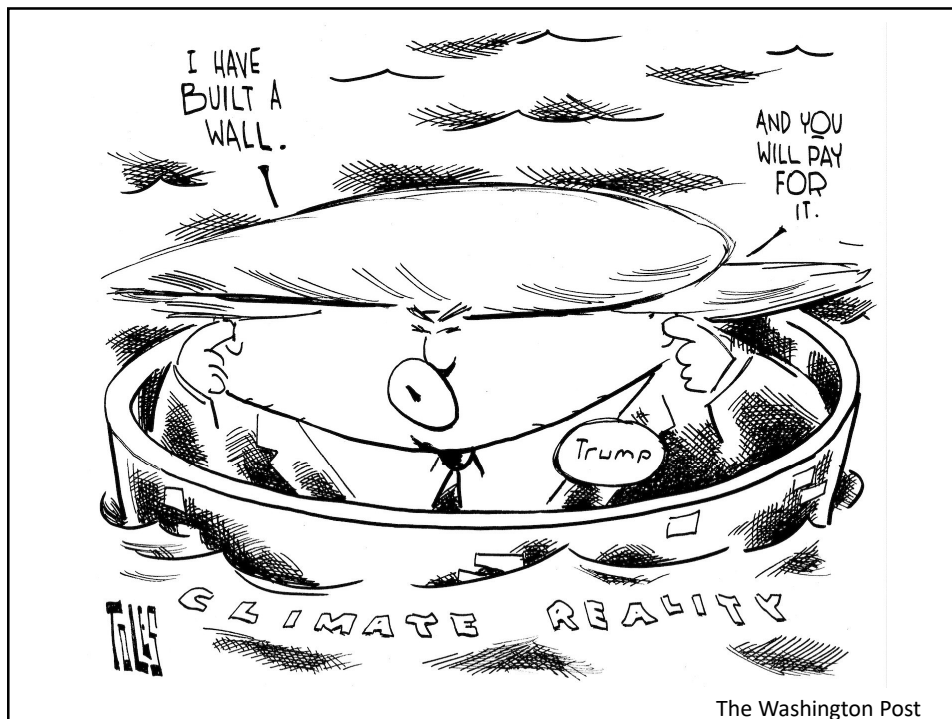
Six climate-science realities (continued)

3. Sea-level rise & changes in average & extreme weather caused by the global-average warming are already causing harm to life, health, property, economies, & ecosystems worldwide.
 - We are seeing, variously, stronger heat waves, downpours, droughts, and wildfires; more of the most powerful storms; more coastal flooding; worse smog; and major impacts on ecosystem dynamics.
4. Because of time lags in the climate system and inertia in society’s energy system, the harm is certain to grow in the years ahead.
 - About 80% of civilization’s growing energy use is still coming from burning coal, oil, & natural gas (with no capture of the resulting CO₂. Transforming the energy system is a multi-decade process.
 - Part of the added CO₂ stays in the atmosphere for centuries, and we do not know how to remove such large quantities affordably.
 - It takes decades to centuries for oceans to “catch up” with changes in the atmosphere, still longer for the land ice sheets.

Six climate-science realities (concluded)

5. The harm to be expected if society takes early & strong remedial action is far smaller than if it doesn't.
 - With concerted action, annual-average mid-continent temperature increases by 2100 could be held to 1.5-2°C (2.7-3.6°F) above today; with little action, the increases could be 5.5-6 °C (9.9-10.8°F).
 - Extreme heat waves, wildfires, torrential rains & hail, floods, and powerful storms would all be far worse under the higher T. So would sea-level rise, ocean acidification, and species shifts.
6. Remedial action sufficient to get to the lower-T result will require big emission reductions by all major emitting countries. And adaptation efforts sufficient to control the damage from even the lower-T outcomes will need to engage everybody.

Trump and his key appointees appear to accept none of these realities.



The Washington Post

Principal ingredients of the CAP: Mitigation

- Reducing carbon pollution from power plants
 - standards for cutting CO₂ from new power plants (Sept 2013)
 - and from existing power plants (June 2014)
- Reducing other greenhouse gases
 - interagency strategy to reduce methane emissions (March 2014)
 - EPA proposal on hydrofluorocarbons (July 2014)
 - 2025 target to reduce methane emissions from the oil and gas sector by 40-45% from 2012 levels along with various actions to reduce methane emissions going forward, including EPA regulation (January 2015)
- Accelerating U.S. leadership on clean energy
- Doubling down on energy end-use efficiency
- Building a 21st-century energy infrastructure

Trump is trying to trash all of this.

Principal ingredients of the CAP: Adaptation

- Directing agencies to support climate preparedness/resilience
 - All agencies to develop & implement plans for integrating climate preparedness/resilience into their missions, policies, programs, investments, and grants. (Plans released 10-14.)
- Establishing internal & external task forces on resilience
 - Interagency Council on Climate-Change Preparedness & Resilience (~30 Federal agencies); established (11-13)
 - State, Local, & Tribal Leaders Task Force on Climate Preparedness & Resilience (26 elected officials from across the country; delivered recommendations to the Administration 11-14.)
- Managing flood, drought, and wildfire risks
 - Drought Resilience Partnership (11-13); USDA Agriculture Hubs (2-14); USDA/DOI Wildland Fire Strategy (4-14); HUD Urban Resilience Competition (6-14); Flood Risk Standard

Trump is trying to trash all of this, too

Ingredients of the CAP: International

- Enhancing bilateral engagement
 - U.S-China Joint Announcement in Nov. 2014 (with national targets, new joint research & demonstration projects)
 - Engagement with Mexico, Brazil, India, Indonesia on their INDCs.
- Enhancing multilateral engagement
 - **G-20**: Agreement to phase out fossil-fuel subsidies and to develop a methodology for a voluntary peer-review process (09-13).
 - **UN**: commitments & partnerships on international assistance for preparedness/resilience (09-14); achievement of strong agreement in at COP-21 in Paris (12-15).
- Mobilizing clean-energy and preparedness finance
 - \$3B US contribution to Green Climate Fund; US-German Global Innovation Lab for Climate Finance; Mission Innovation → 20 countries to double gov't clean-energy R&D over 5 years (12/15).

Dropping out of these collaborations is Trump's worst climate move.

Myths underpinning the Trump position

The biggest contrarian confusions

"It's unclear how much of current climate change is due to human activity."

WRONG!

- We know essentially all of it is due to human activity, because...
 - There is no known natural source of current global warming that stands up to scrutiny.
 - The known natural influences on climate, other than relatively short-term fluctuations, would be cooling the Earth now were it not for human activities.
 - The measured warming is consistent in magnitude and pattern with what science predicts as a consequence of the measured (and indisputably human-caused) greenhouse-gas buildup.

Myths underpinning the Trump position

The biggest contrarian confusions (continued)

“Earth’s climate has been changing under natural influences for millions of years. So what’s happening now is nothing to worry about.”

FIRST SENTENCE RIGHT. SECOND WILDLY WRONG.

- During the eons of natural climate change, nature didn’t “care” about the fate of the species that lived here. Now there are 7.5 billion people whose well-being concerns us.
- The pace of current climate change is 10-100 times faster than the mostly gradual climate changes over geologic time—faster than ecosystems & human systems can adapt.
- In the brief past periods when natural change may have approached current rates, the impacts on ecosystems were catastrophic.

Myths underpinning the Trump position

The biggest contrarian confusions (continued)

“Carbon dioxide is a plant nutrient. The main consequence of increasing its concentration will be a greener, lush planet.”

PARTLY RIGHT, BUT MOSTLY WRONG!

- Some kinds of plants do grow faster under increased CO₂, but only if other nutrients (water and nitrogen on land, iron in the ocean, phosphorus in fresh water) are in adequate supply.
- Some parts of the planet (notably the far north) are greening, but the fact that CO₂ concentrations continue to rise tells us the greening effect is insufficient to stop the CO₂ buildup.
- As the CO₂ buildup and resultant warming continue, the CO₂ fertilization effect saturates and the stresses of extreme heat, drought, and pest outbreaks overwhelm it.

Myths underpinning the Trump position

The biggest contrarian confusions (continued)

“The uncertainties about future harm are too big to warrant taking action now.”

PERVERSELY WRONG!

- The largest part of the uncertainty about future harm is uncertainty about what action society takes. Less action or delayed action means more harm.
- The part of the uncertainty due to incompleteness of the science and imperfections in the models is two-sided: future harm is at least as likely to be bigger than the current “best estimate” (for a given emissions future) as smaller.
- The observed, ongoing harm is more than big enough to warrant action.

Myths underpinning the Trump position

The biggest contrarian confusions (continued)

“The Paris Accord infringes U.S. sovereignty and is a ‘bad deal’ for the the U.S. economy.”

WRONG AGAIN!

- The Intended Nationally Determined Contributions (INDCs) on emissions reductions are voluntary and based on what each country’s analyses indicate it can affordably achieve.
- The expected damages to the economy and well-being of this country & the world from failing to control human-caused climate change are far larger than the economic cost of controlling it.
- U.S. withdrawal from cooperation to limit climate change will cost us much or all of our share in a \$30+ trillion global market in clean energy technology from now to 2050.

More on what Trump is doing (or not doing)

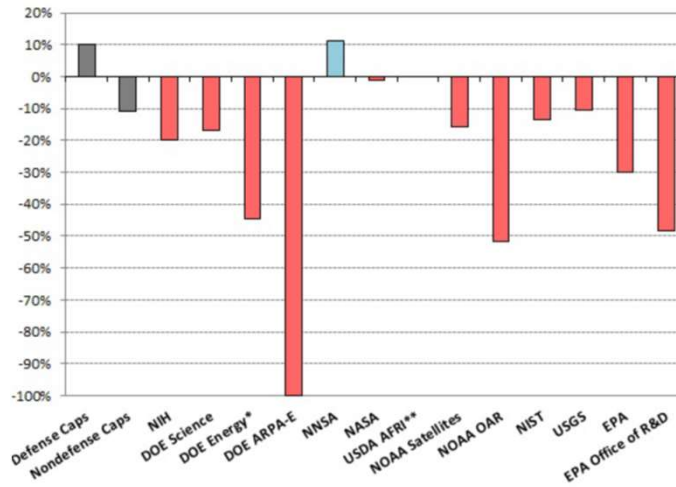
What Trump has done (or proposed) so far

- Appointed fact-averse ideologues to many key posts
 - Mick Mulvaney at OMB; Scott Pruitt at EPA; Ryan Zinke at Interior; Rick Perry at DOE; Tom Price at HHS (one down!)
- Proposed big cuts in non-defense R&D (\$14B≈20%)
 - \$6 billion (20%) at NIH; \$1.6B (11%) at DOE Energy R&D; \$800M (11%) at NSF; \$200M (47%) at EPA S&T
- Proposed big cuts in climate monitoring & analysis
 - Zeroing Earth-observation functions of DISCOVER (NASA)
 - Zeroing OCO-3, PACE, and CLARREO missions (NASA)
 - Cutting ocean grants & programs by \$250M (NOAA)
- Dropped or altered websites w climate information
- Driven out pro-environment public servants

What Trump has done (or proposed) so far

Agency S&T Budgets

Trump proposed FY18 versus FY16 (% change in nominal dollars)



*Includes renewables and efficiency, nuclear, fossil, grid research. **Flat-funded in FY18 request.
 NOTE: FY2016 is used as a baseline given lack of final FY2017 appropriations.
 Based on initial AAAS assessment of the FY2018 budget summary and past agency budget data. March 16, 2017 | AAAS

What Trump has done (or proposed) so far



Khalil Bendib, 13 January 2017, www.nationofchange.org

What he's done (or proposed) so far (continued)

- Roll-back or “re-examination” of Obama environmental Executive Orders
 - Expansion of Federally protected lands & waters
 - Clean Power Plan, coal-plant NSPS, methane strategy
 - Climate-change preparedness EOs: USA and international
 - Social Cost of Carbon, consideration of climate change in NEPA
 - Widespread dismantlement of other environmental regulations
 - Approved the Keystone pipeline
 - Rejected ban on chlorpyrifos pesticide
 - Dropped bans on offshore drilling in Atlantic, Alaska
 - Lifted ban on dumping coal-mine waste into streams
 - Removed Yellowstone grizzly bear from endangered list
- The NYT of October 5 counted 48 Trump environmental rollbacks to date.**

What President Trump has not done

- Nominated an OSTP Director or any of the 4 Senate-confirmed OSTP Associate Directors (or made clear that he intends to do so)
- Nominated a NOAA Administrator, or a DOE Chief Scientist, or a USGS Director, or a US Chief Technology Officer, or most of the Under Secretaries and Assistant Secretaries with S&T responsibilities
- Given any other indication of awareness of government's proper roles in and uses of S&T...or indeed any awareness that facts matter in good government.

Looking Forward: What should we do?

What should states, communities, businesses, philanthropists, scientists, & opinion leaders do?

- States, communities, businesses, & philanthropists should do their best to fill gaps in federal gov't support for R&D, Earth observation, environmental protection, and addressing climate change.
- Scientists should spend more time being better communicators—on how climate & the rest of environment matter to human well-being; on how gov't funding of basic & early-stage applied research, with the best ideas brought to scale by the private sector, has been the key to the last 70 years of economic growth, longer life expectancy, and higher quality of life.
- Opinion leaders should refine their ability to explain how policies that ignore evidence damage the nation and the world.
- All should let Congress & President Trump know that sacrificing the environment to narrow private interests and abandoning U.S. leadership on climate change is folly.

Thanks for your attention!