

Science and Technology Policy Priorities and Opportunities in the Obama Administration

John P. Holdren

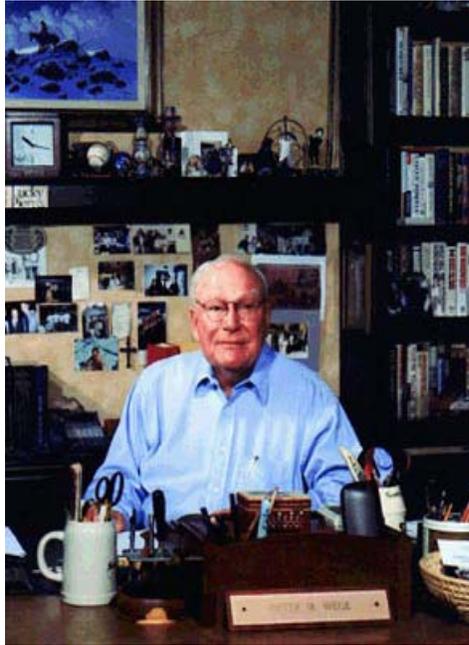
**Assistant to the President for Science and Technology
and Director, Office of Science and Technology Policy
Executive Office of the President of the United States**



**School of Natural Resources and Environment
9th Annual Peter M. Wege Lecture on Sustainability
University of Michigan**

Coverage of these remarks

1. Some acknowledgements
2. National and global challenges linked to S&T
3. President Obama's views on these challenges
 - the "sustainability" dimension
 - the centrality of S&T; what we need from S&T
 - the need for partnerships
 - cross-cutting foundations of success with S&T
4. S&T opportunities and initiatives
 - the big picture
 - an American innovation strategy
 - meeting the energy-climate challenge
 - initiatives in STEM education
 - What does it mean for Michigan?



Peter M. Wege

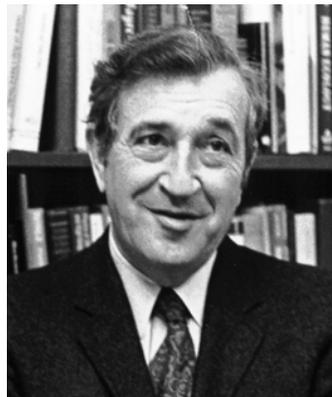
Environmentalist

Businessman

Philanthropist

Author

Thank you for all that
you've done and do!



Jerome B. Wiesner

1915-1994

U of Mich College of Engineering: BS 37, MS 38, PhD 50

Science Advisor to President John F. Kennedy

President of MIT

Mentor in science & technology policy to me & many more

Michigan grads among my colleagues in the Obama Administration



Ken Salazar
Secretary of Interior



Valerie Jarrett
Senior Advisor to the President



Raj Shah
Administrator, USAID



Melody Barnes
Director, Domestic Policy Council



Cecilia Muñoz
Director, Intergovernmental Affairs

More Michigan grads in the Obama Administration: a sustainable flow of leaders



Jocelyn Frye
Deputy Assistant to the President and
Director of Policy &
Projects for the
First Lady



Roberto Rodriguez
Special Assistant to the President
for Education Policy



Rand Beers
Undersecretary, Dept of Homeland Security



Zach Lemnios
Director, Defense
Research and
Engineering, DoD

Wolverines in the White House Office of Science and Technology Policy (OSTP)



Dr Sridhar Kota
Professor of Mechanical Engineering, on leave as OSTP Assistant Director of Advanced Manufacturing and ASME Fellow



Dr Rosina M Bierbaum
Professor and Dean, SNRE, Member of President Obama's Council of Advisors on Science and Technology, Former OSTP Associate Director for Environment, Former Acting Director of OSTP



Dr Jag Pamulapati
3 UM degrees, Senior Policy Analyst, National Security and International Affairs

Challenges linked to S&T: US national

- economic recovery & growth: S&T as drivers (infotech, biotech, nanotech, greentech...?)
- health care: better outcomes for all at lower cost
- energy: reduced oil imports and conventional & heat-trapping pollution
- other resources & environment: water, agriculture, toxics, climate-change adaptation
- national & homeland security: scientific intelligence, cyber- & power-grid security, reducing risks from nuclear & biological weapons

Challenges linked to S&T: Global

- deploying S&T to help with poverty eradication and development
- combating preventable and pandemic disease
- transforming the global energy system and land-use practices to avoid catastrophic climate change
- maintaining the ecological integrity and productivity of the oceans
- reducing risks from nuclear & biological weapons

President Obama's views on these challenges

- They are all about aspects of “sustainability”.
- The challenges are interdisciplinary and interlinked.
- S&T are not just germane to success but central.
- Success requires attention not just to “applied” goals but also to cross-cutting foundations of strength in S&T.
- Centrality means moving S&T back to the center of what the federal government thinks, says, and does about these challenges – “Science in its rightful place.”
- Interdisciplinarity & interconnectedness mean solutions require partnerships – across federal agencies; branches & levels of government; public, private, & philanthropic sectors; and nations – “All hands on deck.”

The sustainability dimension

ASSOCIATION AFFAIRS

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Science and Technology for Sustainable Well-Being

John P. Holdren

The American Association for the Advancement of Science (AAAS) is not about the advancement of science just for science's sake. Rather, as indicated by the Association's motto, "Advancing Science, Serving Society," it is about advancing science in the context of a desire to improve the human condition. This mission necessarily entails attention to the social as well as natural sciences; attention to the embodiment of science in technology through engineering; and attention to the processes by which understandings from the natural sciences, the social sciences, and engineering influence—or fail to influence—public policy. All of these long-standing preoccupations of the AAAS are integral to the theme of the 2007 Annual Meeting and of this essay, "Science and Technology for Sustainable Well-Being."

of all three of which constitute the core responsibilities of society:

• *Economic conditions and processes*, such as production, employment, income, wealth, markets, trade, and the technologies that facilitate all of these;

• *Sociopolitical conditions and processes*, such as national and personal security, liberty, justice, the rule of law, education, health care, the pursuit of science and the arts, and other aspects of civil society and culture; and

• *Environmental conditions and processes*, including our planet's air, water, soils, mineral resources, biota, and climate, and all of the natural and anthropogenic processes that affect them.

Arguments about which of the three pillars is "most important" are pointless, in part

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Foundations of sustainable well-being

Human well-being rests on three pillars, the care & sustainability of which are the core responsibilities of society:

- economic conditions and processes
such as employment, income, wealth, markets, trade, productive technologies...
- sociopolitical conditions and processes
such as law & order, national & homeland security, governance, justice, education, health care, science, culture & the arts, liberty, privacy...
- environmental conditions and processes
such as air, water, soils, mineral resources, the biota, nutrient cycles, climatic processes...

Government must provide for some of these & establish the rules under which other sectors provide for the rest.

Sustainable well-being (continued)

- All of the pillars are indispensable, and they interact both for good & for ill.

The economic system cannot function without inputs from the environmental system, nor can it function without elements of societal stability provided by the sociopolitical system. Societal stability itself cannot be maintained in the face of environmental disaster (Haiti, Katrina).

- Sustainability requires improvements in human well-being be sought by means and to end-points consistent with maintaining the improvements indefinitely.

Satisfying this criterion requires taking into account the interactions among the pillars.

The centrality of S&T: What do we need?

- The Economy: innovation that yields better manufacturing techniques, new and better products & services for high-quality, sustainable jobs...
- Health: new IT tools for medical records, doctor-doctor & doctor-patient interaction; better, cheaper diagnostics; faster vaccine development & production; cancer therapies that target only cancer cells...
- Energy: better batteries, cheaper photovoltaic cells, lower-impact biofuels, CO₂ capture & sequestration, safer nuclear fuel cycles, fusion...

What we need from S&T (continued)

- Climate Change: better monitoring in-situ & from space; better models on faster computers; regional disaggregation of impacts to support adaptation, better scientific communication for public understanding...
- National & Homeland Security: better defenses against cyber-threats; better detection of conventional & nuclear explosives and of clandestine weapons facilities; faster identification of and response to bio-threats...

The need for partnerships



Pres Obama meeting with his Council of Advisors on Science & Technology 3-12-10

Cross-cutting S&T foundations of success

- the institutions that do most of our basic research (research universities, national & private labs)
- other key infrastructure: IT/broadband, energy, transportation
- science, technology, engineering, & math (STEM) education: pre- to grad-school and lifelong
- capabilities in space: communications, Earth observation, geopositioning, science, exploration
- effective institutional processes & guidelines (IP, export controls, integrity, openness, visas)

Overview of President Obama's Initiatives

Putting S&T in the center with appointments

- A Nobel Laureate in physics as Energy Secretary
- A world-class marine biologist as NOAA head
- 30+ appointees are members of the NAS, NAE, Institute of Medicine, or American Academy of Arts and Sciences

Highlighting S&T with speeches & ceremonies

- Speeches: campaign, inauguration, NAS Annual Meeting, Cairo, Troy (American Innovation Strategy), MIT, SOTU...
- Ceremonies: National Medals of ST&I, middle school math & science winners, Presidential Awards for Science Teaching and Mentoring, Presidential Early Career Awards in Science and Engineering...

The President with the PECASE winners



U of Michigan Ass't Prof of ECE Anthony Grbic is 4th from left in 2nd row

Overview of Initiatives (continued)

Investments in S&T

- Science got a huge boost in the stimulus/recovery pkg (ARRA) and the FY2009 / FY2010 budgets (NIH, NIST, NOAA, DoD basic research, DOE-science,...), giving 2009-10 the highest federal research spending ever.
- Total ARRA funds for S&T, including IT & transportation infrastructure, applied energy technology, space exploration, approach \$100 billion.
- Investment goals announced last year: double budgets of NSF, DOE science, NIST labs in 10 yr; make Research & Experimentation Tax Credit permanent: lift public + private investment in R&D to $\geq 3\%$ of GDP.

Overview of Initiatives (continued)

The President's FY2011 S&T budget proposals

- All federal R&D reaches \$147.7 billion.
- Nondefense R&D = \$66.0 billion, up 4.8% in real terms.
- All research (basic + applied) grows 4.5% real.
- Basic research = \$33.0 billion, up 3.3% real.
- DOD basic research reaches \$2.0 billion, up 8.0% real.
- NSF, DOE Office of Science, and NIST labs, with a total of \$13.3 billion, on track to double by 2017.
- NASA R&D = \$11.0 billion, up 17% real.

The President's American Innovation Strategy

- Invest in the building blocks of innovation
 - restore leadership in fundamental research
 - boost STEM education
 - strengthen physical infrastructure
 - develop an advanced IT “ecosystem”
- Promote competitive markets to spur innovation
 - support capital markets that fund innovation
 - encourage innovation-based entrepreneurship
 - boost public-sector & community innovation
 - promote American exports

The American Innovation Strategy (continued)

- Catalyze breakthroughs for national priorities
 - unleash a clean-energy revolution
 - support advanced-vehicle technology
 - drive breakthroughs in health IT
 - address other “grand challenges” of the 21st century

Initiatives on principles & procedures

- Stem-cell guidelines
 - expanding stem-cell lines that can be used with federal support while respecting ethical boundaries
- Scientific integrity principles
 - ensuring openness, transparency, reliance on peer-reviewed science across Federal agencies
- Visa MANTIS procedures
 - streamlining procedures for the MANTIS system that applies to visas for scientist & technologists, reducing backlogs and delays while preserving security

A new initiative on “procedures”: streamlining reporting on Federal research grants

- Progress reports on grants rank as the top administrative burden on faculty researchers.
- The National Science and Technology Council, managed by OSTP, has been pursuing remedies.
- We’ve got one: OSTP and OMB have just agreed on a simplified uniform grant progress-report form – following posting of a draft version in the Federal Register and receiving extensive comments from the academic community – which will be finalized and communicated to all Federal agencies by April 15.

Meeting the energy-climate challenge

- The Administration remains committed to comprehensive energy-climate legislation to help us:
 - **reduce dependence on foreign oil;**
 - **improve air & water quality;**
 - **cut back the carbon pollution that is changing the climate;**
 - **create new American jobs around the clean, domestic energy sources that will get all this done.**
- The climate-change component of this challenge is real and urgent.
 - **This is a fact-based Administration; we’re not fooled by the campaign to inflate a few mistakes & missteps by climate scientists into doubt about the core findings of decades of peer-reviewed climate science. You shouldn’t be, either.**

The energy-climate challenge (continued)

THE ADMINISTRATION'S ACTIONS TO DATE

- \$80 billion for clean & efficient energy in ARRA
- creation of ARPA-E (\$400M in 2009-10, \$300M proposed for 2011), energy-innovation hubs
- first-ever fuel-economy/CO2 tailpipe standards
- strengthened bilateral partnerships on energy & climate change w China, India, Brazil, Russia...
- US Global Change Research Program increased to \$2.56 billion for FY2011 (19.4% real increase).
- FY11 budget also restructures NPOESS for success, funds Orbiting Carbon Observatory replacement.

The energy-climate challenge (continued)

MORE ADMINISTRATION ACTIONS

- Restructuring of NOAA to consolidate "climate services" germane to climate-change adaptation
- Inter-agency task force led by OSTP, CEQ, NOAA on coordination of government's adaptation activities; "Adaptation Summit" in late May will be co-chaired by Dean Bierbaum
- PCAST review of the effectiveness of the US energy-innovation system (Moniz-Savitz)

The STEM-education initiative

- Joint effort of the White House (Domestic Policy Council, OSTP) and Dept of Education
- New national goals: moving American kids from middle to top of international rankings on science & math tests, increasing American proportion of college graduates to first in the world by 2020.
- \$4.4 billion “Race to the Top” in the stimulus includes priority for STEM education.
- “Educate to Innovate: gov’t-business-philanthropic partnerships to improve K-12 education in and out of school (\$510M so far in non-gov’t in-kind & monetary contributions from Time Warner Cable, Discovery Channel, IBM, Gates & MacArthur foundations, & more)

Respecting achievement in STEM-education: middle-school math champs in the Oval Office



What do these priorities & projects mean for Michigan?

ENERGY:

- \$243 million to support the weatherization of homes
- \$82 million more to the State Energy Program
- \$77 million more for block grants for energy efficiency
- \$18.5 million for UM Solar & Thermal Energy Conversion program
- \$2.4 million for Delphi Corp to develop & test fuel-cell technology
- A123 Systems using ARRA funds to expand capacity to make advanced lithium-ion batteries in MI.

Projects in Michigan (continued)

EDUCATION & RESEARCH:

- \$1.1 billion (including Title I funds, Pell grants)
- \$239 million for UM research
- Woodrow Wilson Michigan Teaching Fellowship Program (UM + 5 other MI universities, Kellogg Foundation) under “Educate to Innovate” – training and placing middle- and high-school teachers
- 8,000+ new MI jobs from federal funding for expanded stem-cell research (including in U of Mich consortium)
- 2 new Great Lakes research vessels from Stimulus funds (Lake Ontario & Lake Erie)

Projects in Michigan (continued)

TRANSPORTION & COMMUNICATION INFRASTRUCTURE:

- \$847 million in highway funds to help build & repair roads and bridges
- \$135 million to build & repair public transportation infrastructure
- Merit Network, led by MI public universities, using ARRA funds to build 955-mi fiber-optic network providing broadband to rural and underserved communities in 32 counties.

The best news for the future of S&T and sustainability: We have a President with vision.



“Astronomy for Kids on the White House Lawn”, October 7, 2009