

Adam J. Rondinone, Ph.D.

R&D staff, Center for Nanophase Materials Sciences

Former Legislative Fellow, U.S. Senator Lamar Alexander

Nuclear Power and Climate Change

Women in Nuclear Policy Panel

This talk does not represent the policies or opinions of ORNL or Senator Alexander

- This talk will be about nuclear power, but not yet.
- The problem of climate change is not understanding climate change.
- Problem: agreeing on a solution
 - Concern about further damage to economy – voters wary
 - Challenges to current proposals and strategies
 - Cost – Financial and Jobs
 - Wall St. derivatives repeat?
 - Differences between states and regions
 - Lack of international cooperation and commitment
 - Opposition to non-carbon alternatives by NGOs

The United States is still a democracy

In the Senate last Congress - 68 potential "yes" votes meant that the problem was understood.

Not sure where we stand this year, but less than 68.

SENATE CLIMATE DEBATE: THE 60-VOTE CLIMB

E&E Daily analyzed the positions of the 100 senators who will be debating the next comprehensive climate bill. Projections are for either a vote on cloture to end debate, or on final passage. Positions outlined here are based on interviews with key senators, plus dozens of Democratic and Republican sources, industry and environmental groups. It also factors in Senate floor votes from 2003, 2005 and 2008, as well as cosponsors on other climate bills. E&E will update this breakdown as the debate unfolds. (Last updated May 12, 2010)



Barbara Boxer

YES (26)

Daniel Akaka (Hawaii)
Barbara Boxer (Calif.)
Ben Cardin (Md.)
Tom Carper (Del.)
Chris Dodd (Conn.)
Dick Durbin (Ill.)
Dianne Feinstein (Calif.)
Kirsten Gillibrand (N.Y.)
Daniel Inouye (Hawaii)
Ted Kaufman (Del.)

John Kerry (Mass.)
Amy Klobuchar (Minn.)
Herbert Kohl (Wis.)
Patrick Leahy (Vt.)
Joe Lieberman (Conn.)
Jeff Merkley (Ore.)
Barbara Mikulski (Md.)
Patty Murray (Wash.)
Jack Reed (R.I.)
Harry Reid (Nev.)

Charles Schumer (N.Y.)
Jeanne Shaheen (N.H.)
Mark Udall (Colo.)
Tom Udall (N.M.)
Sheldon Whitehouse (R.I.)
Ron Wyden (Ore.)

PROBABLY YES (11)

Roland Burris (Ill.)
Michael Bennet (Colo.)
Jeff Bingaman (N.M.)
Robert Casey (Pa.)

Russ Feingold (Wis.)
Al Franken (Minn.)
Kay Hagan (N.C.)
Tom Harkin (Iowa)

Tim Johnson (S.D.)
Bernie Sanders (Vt.)
Mark Warner (Va.)



Jeff Bingaman

THE FENCE SITTERS (31)



Lisa Murkowski

Lamar Alexander (Tenn.)
Max Baucus (Mont.)
Mark Begich (Alaska)
Scott Brown (Mass.)
Sherrod Brown (Ohio)
Robert Byrd (W.Va.)
Maria Cantwell (Wash.)
Susan Collins (Maine)
Kent Conrad (N.D.)
Bob Corker (Tenn.)
Byron Dorgan (N.D.)

Lindsey Graham (S.C.)
Judd Gregg (N.H.)
Mary Landrieu (La.)
Frank Lautenberg (N.J.)
George LeMieux (Fla.)
Carl Levin (Mich.)
Richard Lugar (Ind.)
Claire McCaskill (Mo.)
Robert Menendez (N.J.)
Lisa Murkowski (Alaska)
Ben Nelson (Neb.)

Bill Nelson (Fla.)
Mark Pryor (Ark.)
Jay Rockefeller (W.Va.)
Olympia Snowe (Maine)
Arlen Specter (Pa.)
Debbie Stabenow (Mich.)
Jon Tester (Mont.)
George Voinovich (Ohio)
Jim Webb (Va.)

PROBABLY NO (10)

Evan Bayh (Ind.)
Sam Brownback (Kan.)
Thad Cochran (Miss.)

Michael Crapo (Idaho)
Charles Grassley (Iowa)
Johnny Isakson (Ga.)
Blanche Lincoln (Ark.)

John McCain (Ariz.)
Jim Risch (Idaho)
John Thune (S.D.)



Sam Brownback

NO (22)



James Inhofe

John Barrasso (Wyo.)
Bob Bennett (Utah)
Kix Bond (Mo.)
Jim Bunning (Ky.)
Richard Burr (N.C.)
Saxby Chambliss (Ga.)
Tom Coburn (Okla.)
John Cornyn (Texas)

Jim DeMint (S.C.)
John Ensign (Nev.)
Michael Enzi (Wyo.)
Orrin Hatch (Utah)
Kay Bailey Hutchison (Texas)
James Inhofe (Okla.)
Mike Johanns (Neb.)
Jon Kyl (Ariz.)

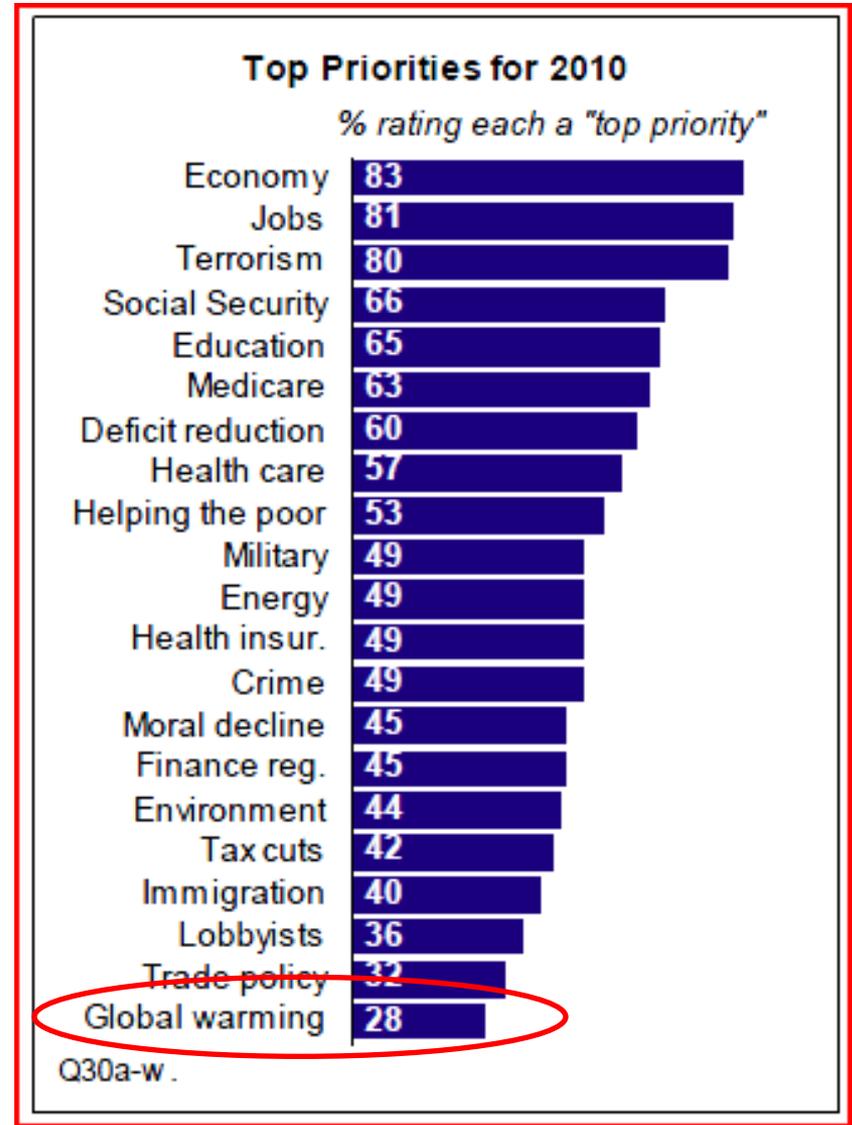
Mitch McConnell (Ky.)
Pat Roberts (Kan.)
Jeff Sessions (Ala.)
Richard Shelby (Ala.)
David Vitter (La.)
Roger Wicker (Miss.)

LEGEND:

Red: Republican | Blue: Democrat | Purple: Independent
Italics: Faces re-election in 2010 | Bold: Retiring

Public Opinion

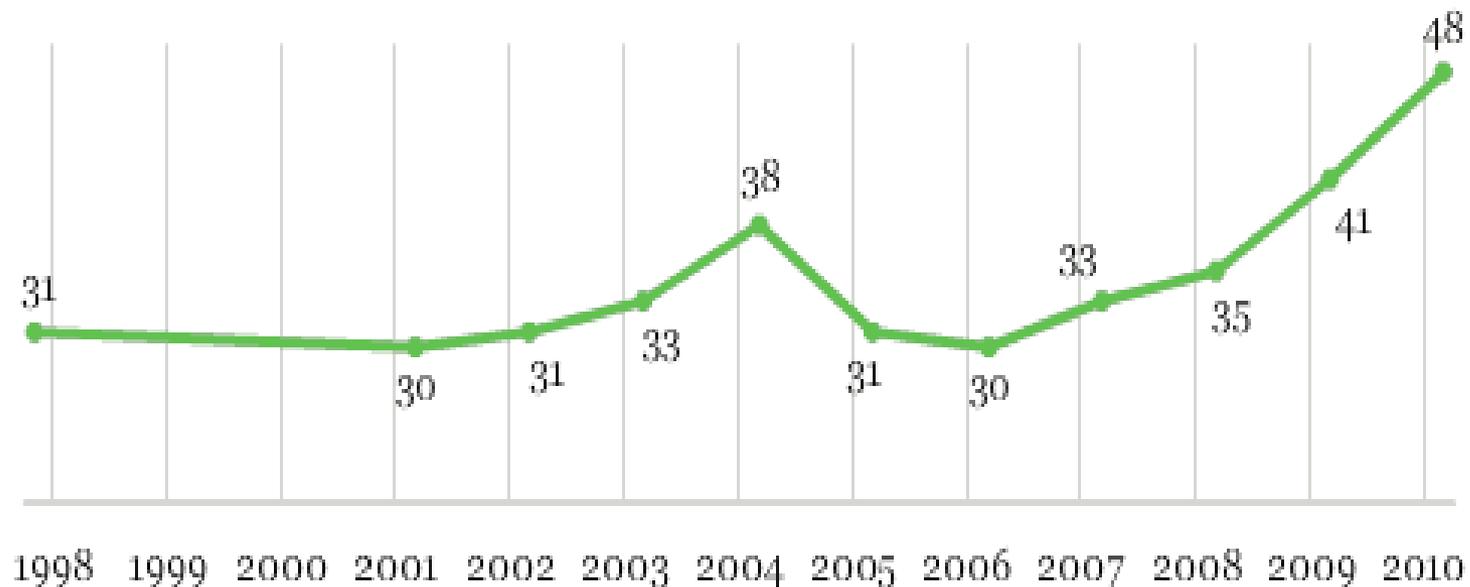
- 3 major bills, all involved cap and trade
- Increased cost is guaranteed and immediate (decade)
- Benefit is not guaranteed and not immediate.
- Voters not on board.



Pew Research Center, "Public's Priorities for 2010"

Thinking about what is said in the news, in your view is the seriousness of global warming -- [ROTATED: generally exaggerated, generally correct, or is it generally underestimated]?

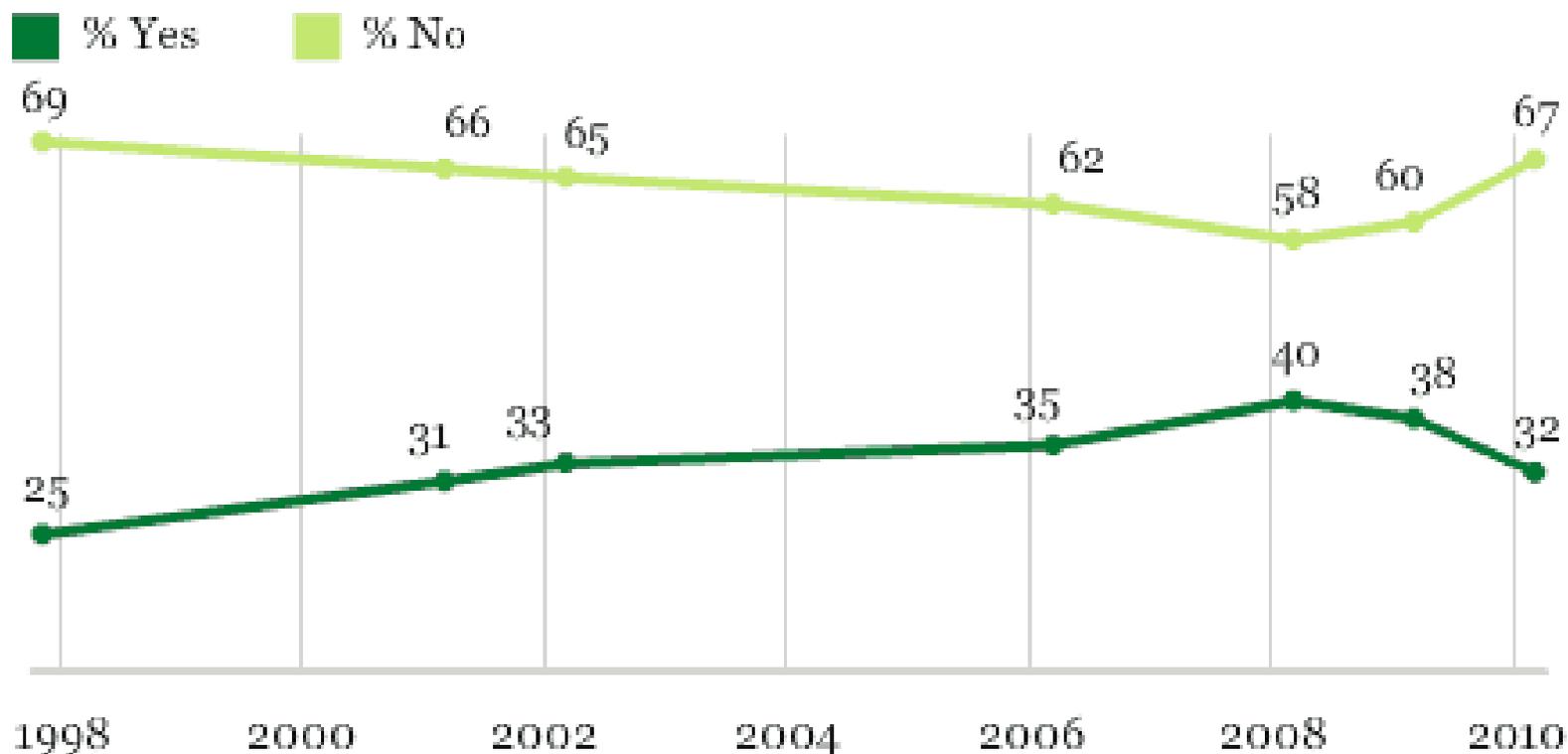
■ % Generally exaggerated



GALLUP

Gallup, March 11 2010

Do you think that global warming will pose a serious threat to you or your way of life in your lifetime?



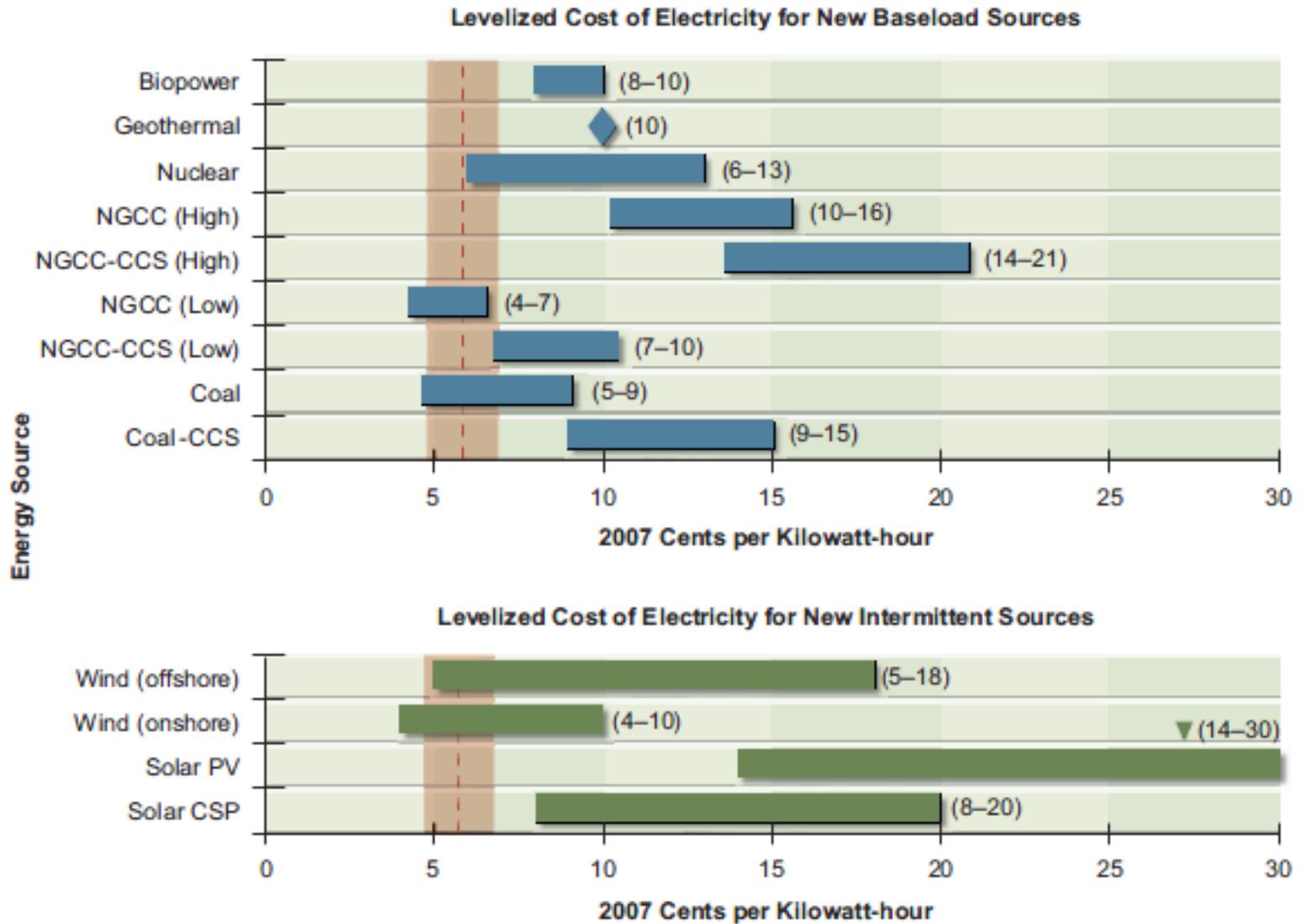
GALLUP®

Gallup, March 11 2010

Where are we?

- Three major bills last Congress:
 - Waxman-Markey (House – passed)
 - Kerry-Boxer (Senate – stalled)
 - Kerry-Lieberman (Senate – introduced)
- Also an array of smaller, targeted bills:
 - Nuclear, electric cars, Clean Air Act amendments, general energy development
- Several bills in past Congresses, none got as far as this Congress.
- The nuclear industry has banked on the success of climate-change legislation.

3 proposals ignored nuclear, didn't attempt to keep costs low.



National Academy of Sciences, "America's Energy Future"

NGOs and Alternatives to Coal

- Until recently (SOTU) proposals did not focus on providing viable alternatives to coal, simply capped emissions and hoped for best.
 - General strategy: raise cost of coal so that everything else looks cheap.
 - We should be focused instead on lowering the cost of clean energy.
- Cannot rely on environmental NGOs to not oppose new nuclear and CCS, and even renewable projects.

Other Choices

- The country can move forward with many steps to prepare for carbon constraints and greater efficiency without a climate bill.
 - Push for new nuclear, demo CCS and continue to expand renewables as appropriate
 - Deploy electric cars
 - Conservation and efficiency
 - Lower the cost of solar power and electricity storage.
- The NRC must move more quickly on certification and site licenses.

NRC timelines

- We are told that climate change is the biggest threat to ever face mankind.
- The NRC licensing process does not reflect this urgency.
 - Also, closing Yucca does not help with uncertainties.
- Why would members of Congress agree to capping emissions when the permitting and loan processes for alternatives takes so long?
 - Cape Wind: 9 years. Other industry estimates: 7-9 years
 - BOEMRE recently tried to streamline, met with resistance.

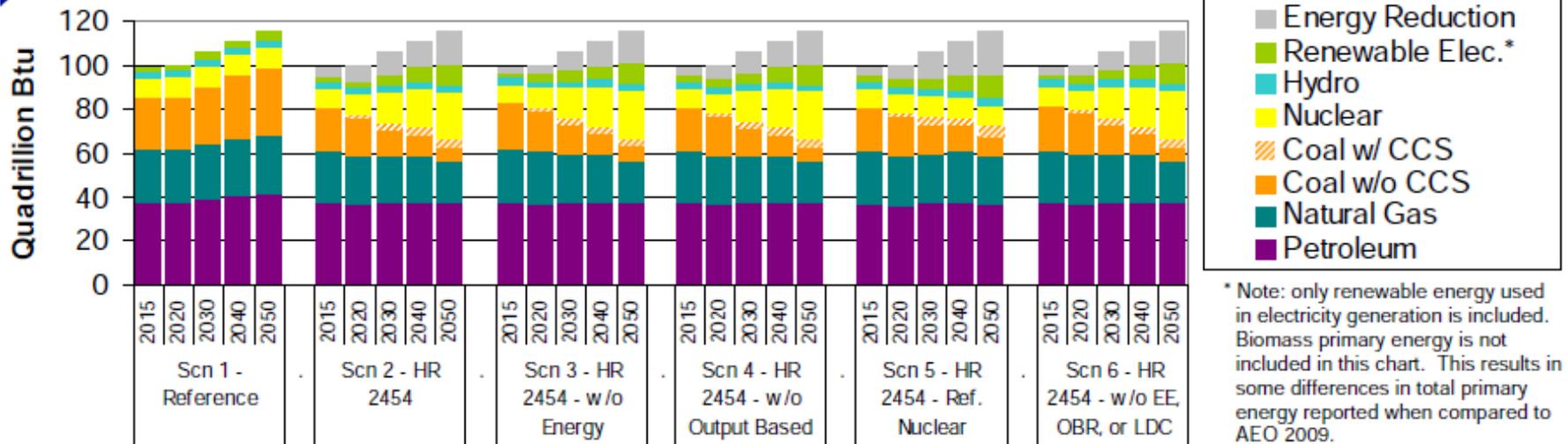
More recent developments

- President and Democrats have within the last year moved towards nuclear as a viable solution.
- SOTU: clear Presidential support.
 - Infuriated anti-nuclear NGOs.
- Balanced approach to climate change could attract more support in Congress.
- Unspoken truth is finally spoken about nuclear.



Primary Energy

H.R. 2454 Scenario Comparison (ADAGE)



About 150 new nuclear plants by 2050, plus another 100 to replace current plants.

Table 3.2. Comparison of projected requirement (red) and technical potential for deployment (blue) for various key energy technology options, for the 167 and 203 GtCO₂-eq budget scenarios. AEF estimated technical potential out to 2020 and 2035, and so these years are used as benchmarks for the comparisons with EMF22 estimates.

Energy Efficiency (% reduction from ref. case)	2020	2035
Requirement (EMF) for 167 GtCO ₂ -eq	2-21	5-33
Requirement (EMF) for 203 GtCO ₂ -eq	2-17	4-24
Potential (AEF)	15	30

Nuclear (Twh/y)	2020	2035
Requirement (EMF) for 167 GtCO ₂ -eq	868-1034	1292-2092
Requirement (EMF) for 203 GtCO ₂ -eq	869-1014	947-1629
Potential (AEF)	968	1453

NAS “America’s Climate Choices – Limiting the Magnitude of Future Climate Change”

For comparison, right now we have about 800 Twh/y of nuclear generation. 167 Gt / yr represents 83% below 2005.



Dot Earth

ANDREW REVKIN

January 24, 2011, 2:43 PM

NASA's Hansen Presses Obama for a Carbon Cost and Nuclear Push

By ANDREW C. REVKIN

A host of thinkers and doers focused on energy and climate [have contributed statements](#) they'd give if President Obama used his State of the Union message [to announce a listening tour](#) on how to shape a sustained American energy quest.

They include [Nate Lewis](#), the head of one of the "innovation hubs" created by the Department of Energy, the author and entrepreneur [Paul Hawken](#), [Shirley Ann Jackson](#), the president of Rensselaer Polytechnic Institute, and [Gal Luft](#), an expert on energy security.

Here's another, from [@James Hansen](#), the [NASA climate scientist, author](#) and [anti-coal campaigner](#). (There are more coming later today.)

In 2001, Hansen was among [a variety of climate scientists who were brought in](#) to brief the full Bush cabinet, including Vice President Cheney.



[Oscar Hidalgo](#) for The New York Times
[James Hansen in 2008.](#)

No where is the lame middle-of-the-road go-slow compromise approach clearer than in the case of nuclear power. The Administration has been reluctant to admit that the Carter and Clinton/Gore administrations made a huge mistake in pulling the U.S. back from development of advanced nuclear technology.

a purblind foolish approach. We need someone with the courage to stand up to the special interests who have hamstrung U.S. policy, including the minority of anti-nukes who have controlled the energy policy of the Democratic party.

Recap

- Climate change legislation looked more and more likely to pass Congress.
- Nuclear industry hopped on the wagon even though it was largely ignored in the legislation.
- Cap and trade goes down in flames.
- Nuclear industry risks being collateral damage.

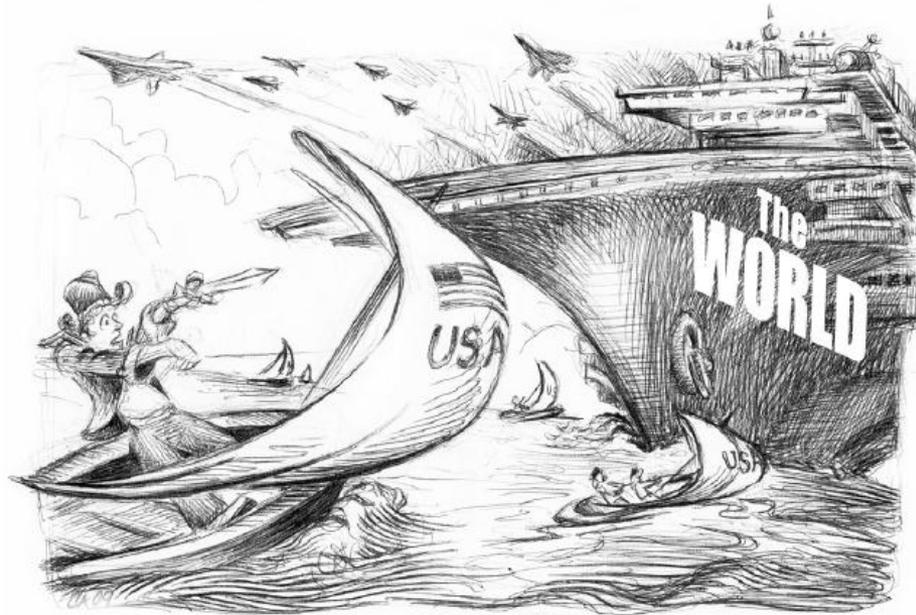
Possible Paths Forward

- Path 1: Decouple nuclear from climate
- Develop the argument that nuclear power is justified without a price on coal.
- This will require lowering the price of nuclear and minimizing uncertainty.
- Path 2: Keep nuclear coupled, but
- Keep climate argument focused on near-term benefits
 - Nuclear + Nissan Leaf = less oil
- Don't rely on scaring people.
- Also work to lower costs.

It only took 13 years to repeal the 18th Amendment (prohibition).

If the voters feel like they've been bamboozled, repeal will follow.

Going to War in Sailboats

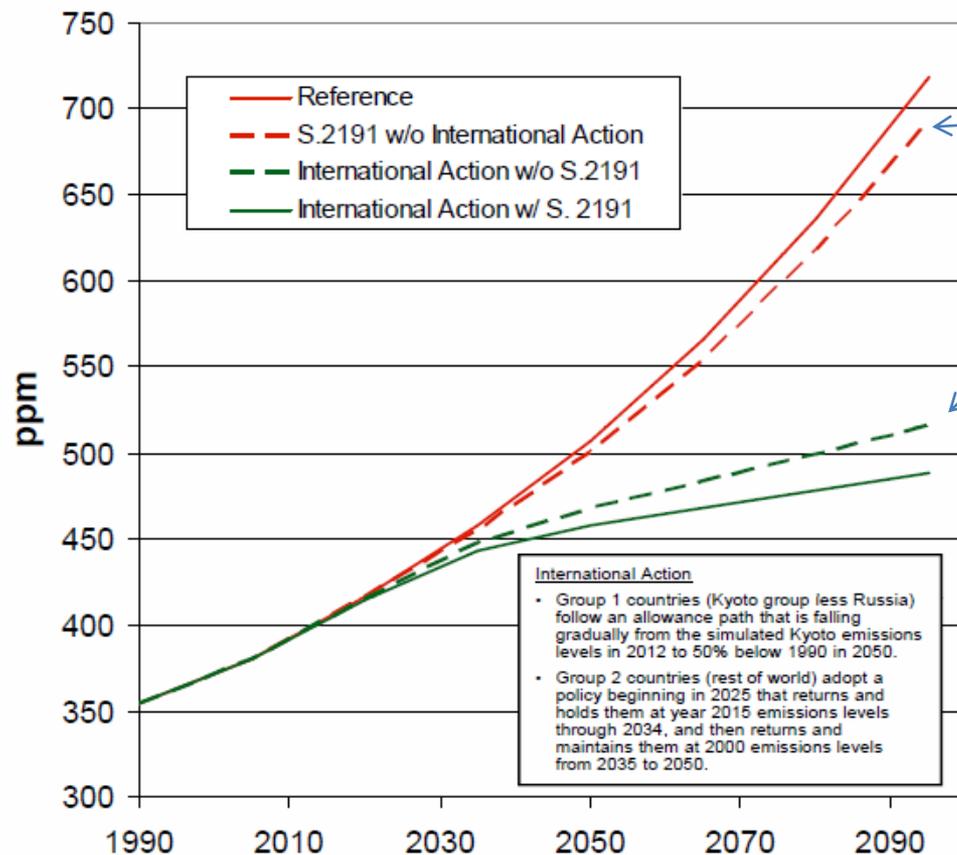


*Why Nuclear Power Beats Windmills
for America's Green Energy Future*

By U.S. Senator Lamar Alexander

Extra slides

Can we rely on other countries to participate?



U.S. alone

Rest of world

Environmental protection is a privilege of the wealthy.

Developing nations have flat-out refused to lower their emissions.

Lowering intensity is not the same as lowering output.

* This slide was added 5/5/08.

EPA Analysis of S. 2191

Flow of information – Ideal

Congressional Staff
don't need to be
experts – only need to
be able to understand
the experts.

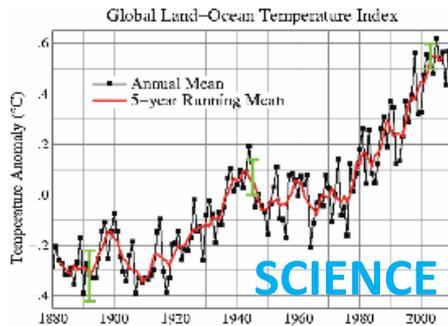


National Academies
For climate: IPCC

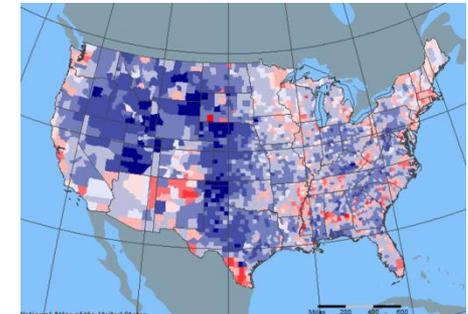
Leadership



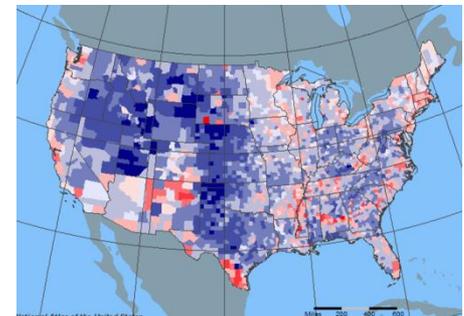
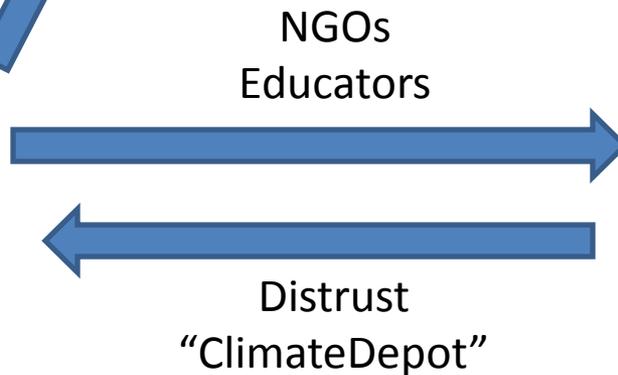
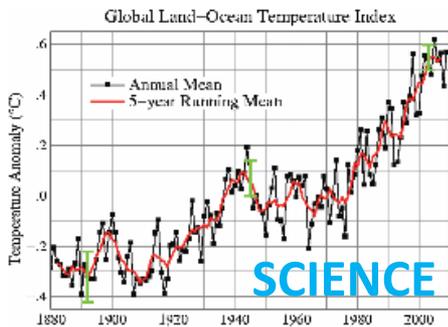
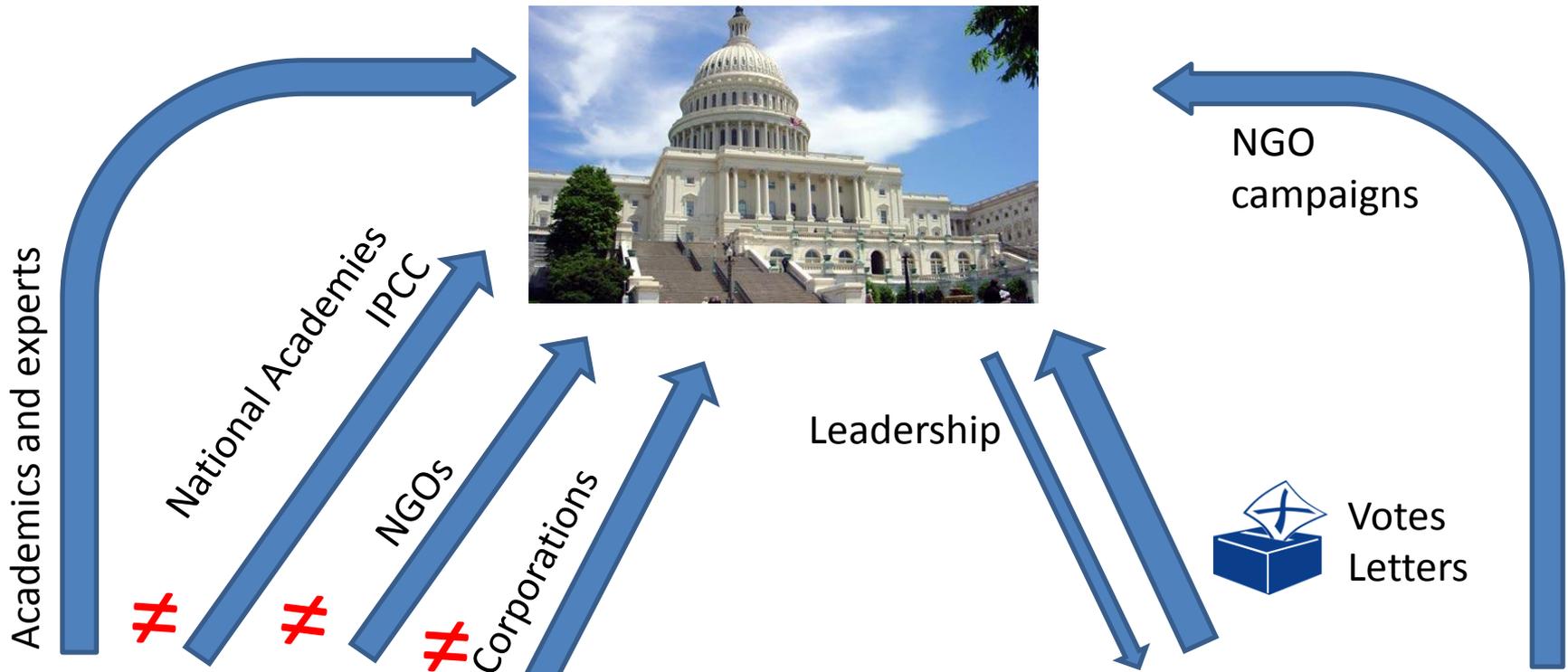
Votes
Letters



NGOs
Educators



Flow of information - Actual



Administration Warns of 'Command-and-Control' Regulation Over Emissions

Published December 09, 2009 | FOXNews.com

Print Email Share Comments (333) Recommend

Text Size



EPA Administrator Lisa Jackson gestures during a briefing in the U.S. center at the Climate Conference in Copenhagen Dec. 9. (AP Photo)

The Obama administration is warning Congress that if it doesn't move to regulate greenhouse gases, the Environmental Protection Agency will take a "command-and-control" role over the process in a way that could hurt business.

The warning, from a top White House [economic](#) official who spoke Tuesday on condition of anonymity, came on the eve of

Foxnews

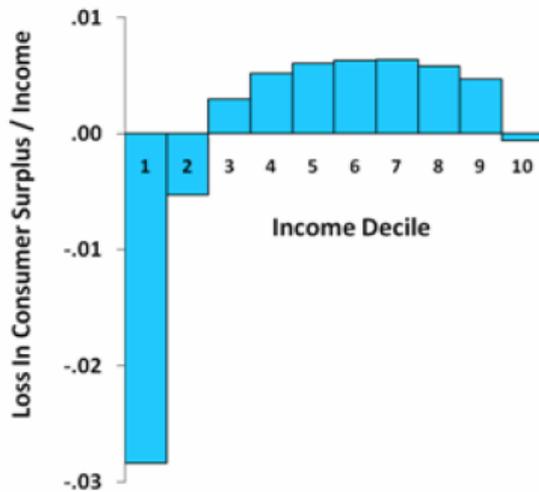
"If you don't pass this legislation, then ... the EPA is going to have to regulate in this area," the official said. "And it is not going to be able to regulate on a market-based way, so it's going to have to regulate in a command-and-control way, which will probably generate even more uncertainty."



Near Term Incidence Analysis

Scenario 6: Reference Nuclear & Biomass/Delayed CCS

Consumer Surplus Loss as a Percent of Income in 2016



Income Decile	Average Income (2005\$)	Loss in Consumer Surplus Per Household in 2016 (2005\$)
1 (lowest)	\$6,900	-\$196
2	\$14,900	-\$79
3	\$22,200	\$66
4	\$29,700	\$155
5	\$37,900	\$230
6	\$47,500	\$299
7	\$58,900	\$375
8	\$74,000	\$432
9	\$97,200	\$456
10 (highest)	\$174,500	-\$103
Average	\$56,400	\$163

The above graphs and table present the estimated distribution of the cost of the ADA in 2016 under the assumptions of Scenario 6.

Kerry-Lieberman cost analysis: these numbers reflect the cost after rebates.

Problems with Current Proposals and Strategies

- Cost is immediate and large
 - Cap and TRADE: Little ambition to put Wall St. in charge of more of our economy
- Regional differences
 - Current proposals pick winners and losers. Some areas are not appropriate for broad use of renewable sources as narrowly-defined.
- Effectiveness if other countries don't participate.
 - Fostering international good will is not a strategy.
- Opposition to alternatives to coal.
 - If climate change is such a pressing problem, all non-carbon alternatives need to be on the table.
 - The first two major proposals ignored nuclear power.

Cost is immediate and large

TABLE 2. ESTIMATED BUDGETARY IMPACT OF H.R. 2454

	By Fiscal Year, in Billions of Dollars											
	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2010-2014	2010-2019
CHANGES IN REVENUES												
Total Estimated Revenues	0.9	39.1	59.1	63.5	90.6	104.0	112.3	117.6	126.1	132.3	253.2	845.6
CHANGES IN DIRECT SPENDING												
Estimated Budget Authority	1.0	33.4	51.9	67.5	88.7	102.1	110.0	116.1	122.9	128.8	242.6	822.6
Estimated Outlays	0.3	32.9	51.6	67.7	88.8	102.2	110.0	116.1	122.9	128.8	241.3	821.2

Congressional Budget Office

- This assumes the price of carbon emission permits stays below \$26/ton.
- The goal is GHG abatement AND low cost energy.

Jobs and Economic Growth

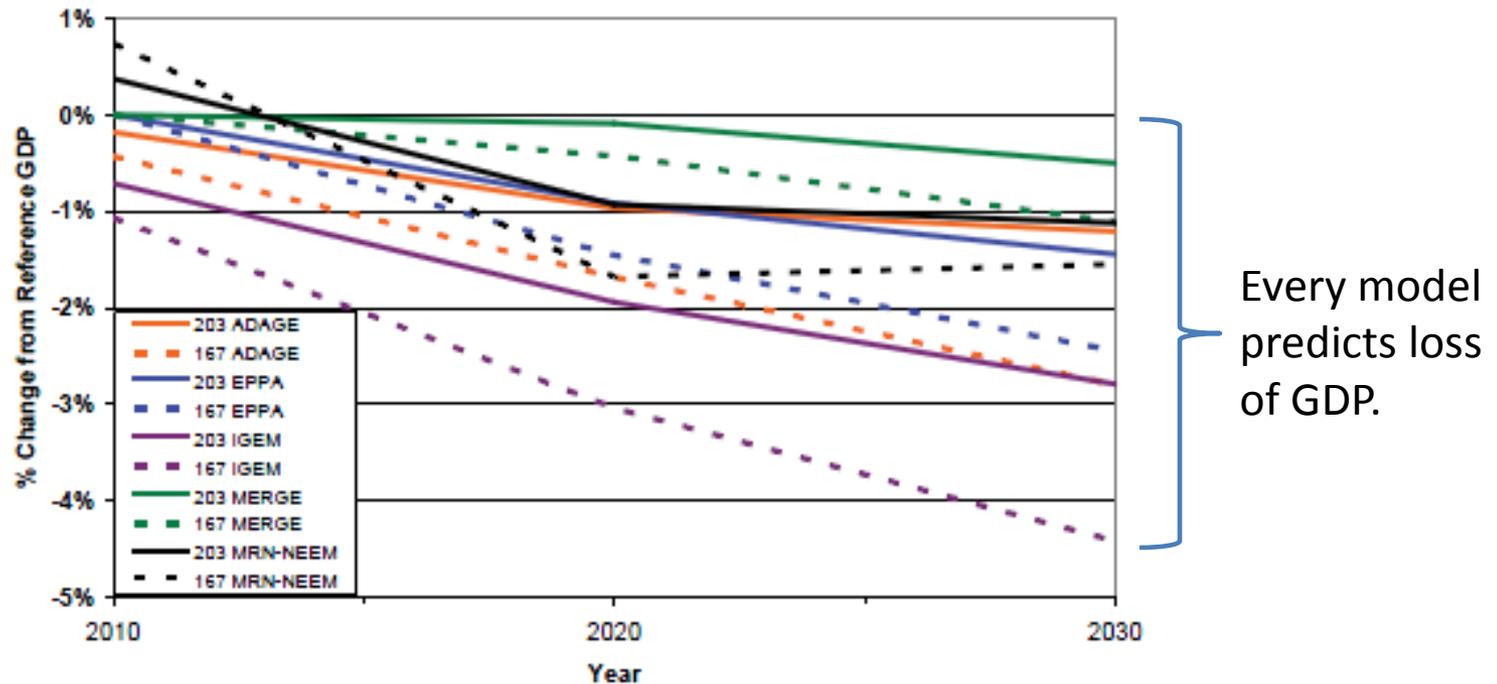
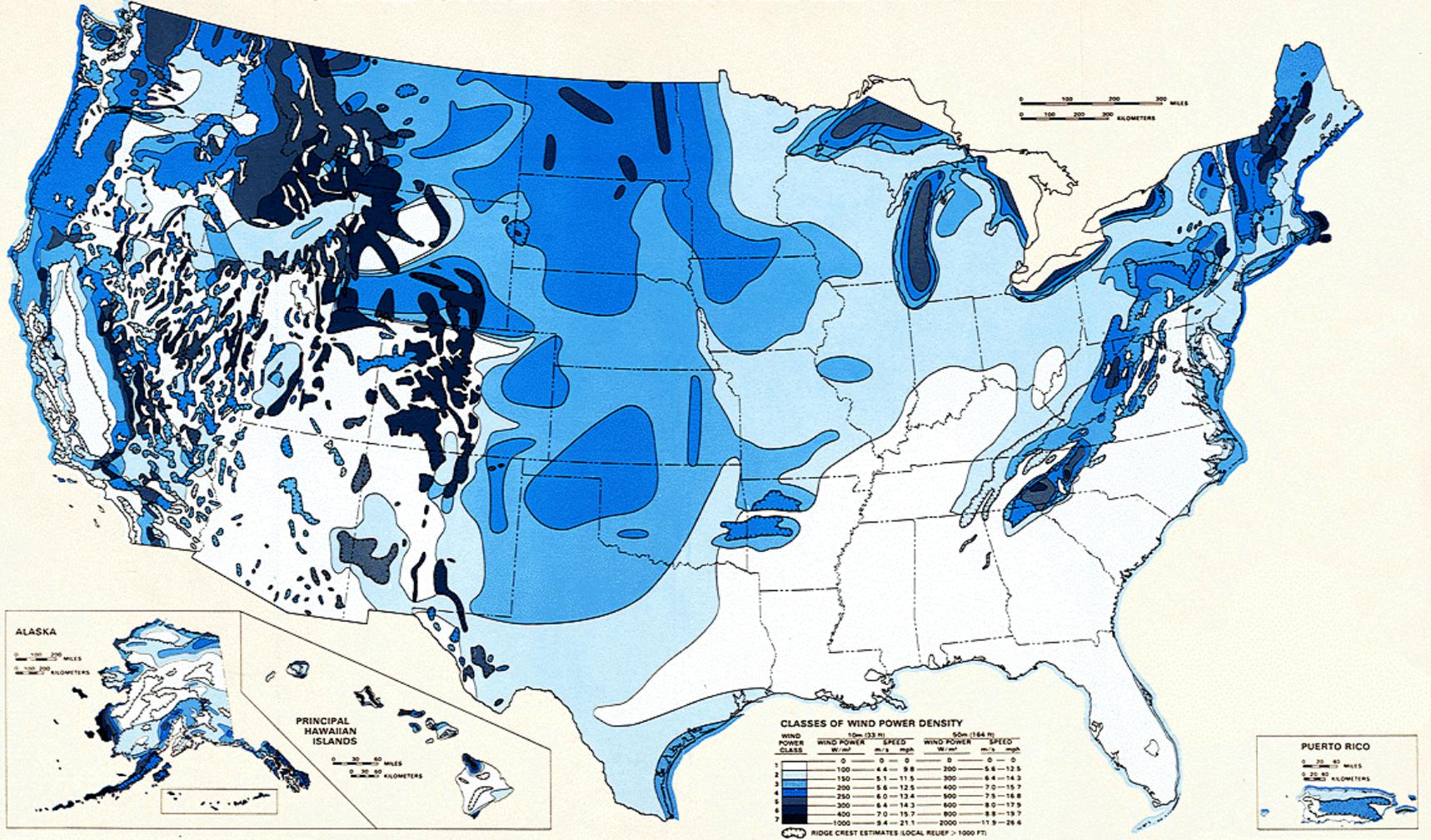


Figure 2.14 Impact of 167 and 203 GtCO₂-eq budget targets as a percent of reference GDP across five models used in the EMF22 study. Negative GDP losses (projected increases) in the near-term are due to households increasing expenditures in the near-term, in expectation of higher prices in the future. Source: F. de la Chesnaye, EPRI

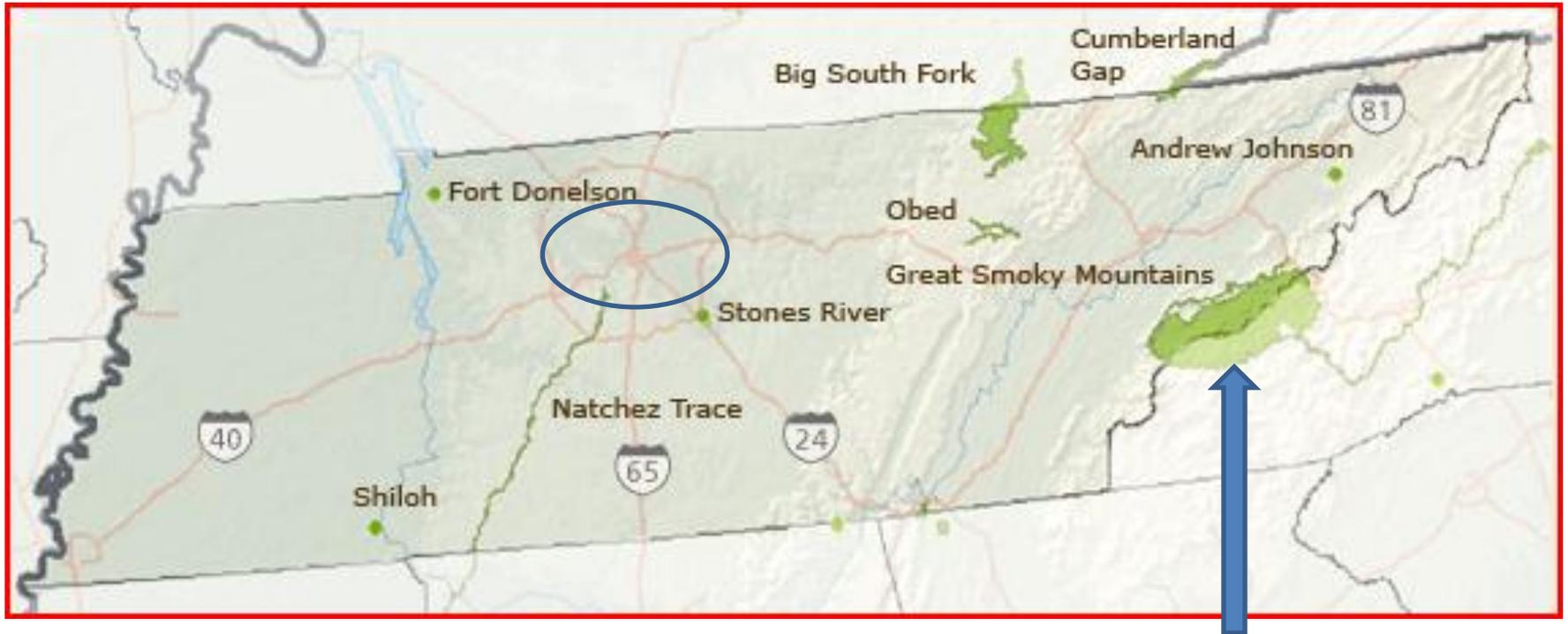
Regional differences

-Southern states have less access to renewable resources

UNITED STATES ANNUAL AVERAGE WIND POWER



We're told that the Southern states can use biomass

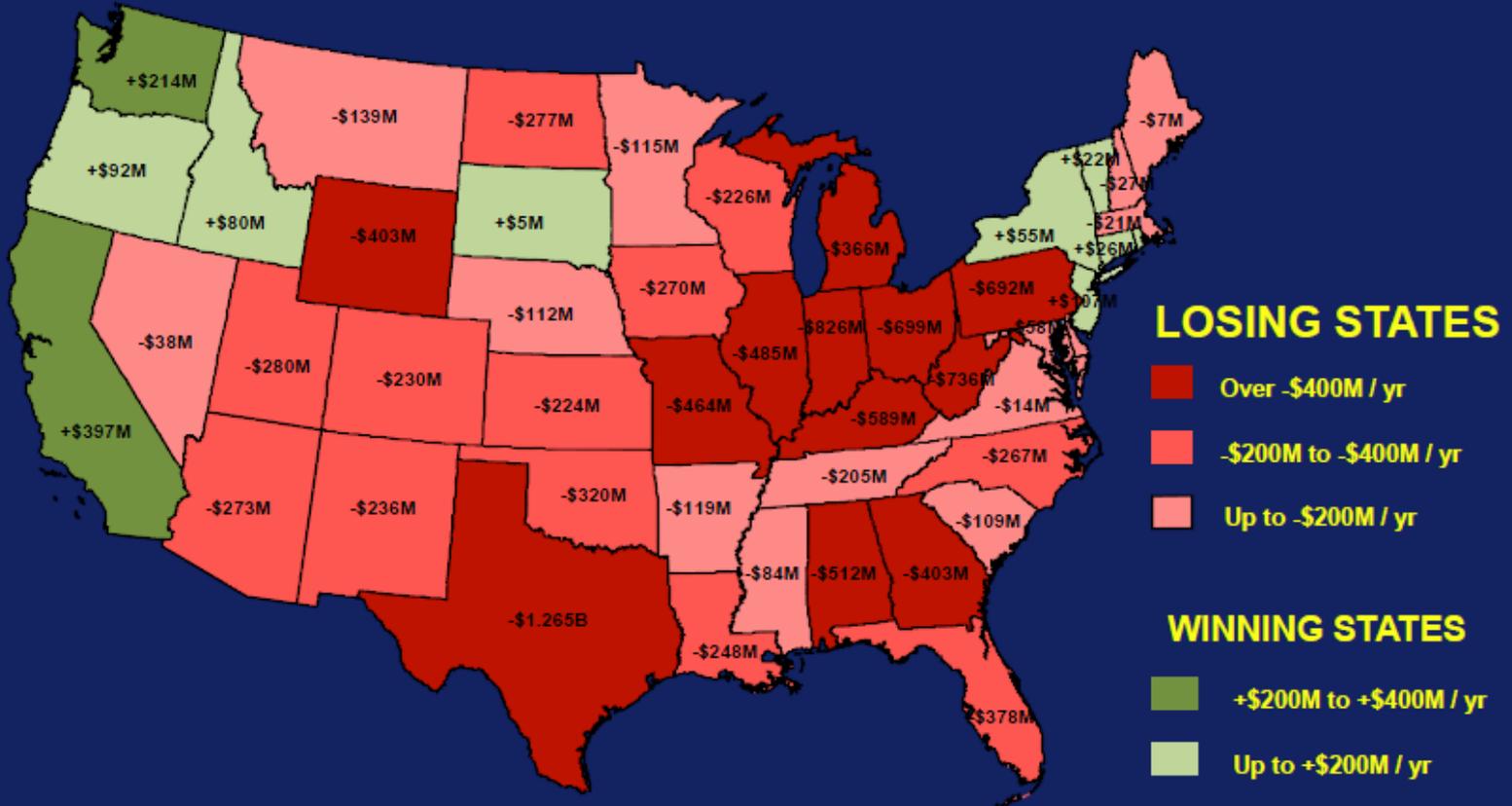


To replace 1 unit of the Watts Bar Nuclear Station (1,200 MW) with switchgrass (steam cycle) would require an area 20% larger than the Great Smoky Mountains National Park (1,000 square miles).

Renewable Electricity Standard - biomass could work for transportation (high value) but won't replace coal.

WAXMAN-MARKEY NOT JUST A RURAL CO-OP PROBLEM

Hurts Midwest & Southern States Most – CA Biggest Winner



Estimation of Annual Statewide Cost or Windfall from H.R. 2454 Allocation Formula in 2012
 Emissions and Sales Data from EIA per House Agriculture Committee Majority Request and Carbon Allowance Price of \$16 per ton from CBO, 6/5/09

JOINT RESOLUTION

Disapproving a rule submitted by the Environmental Protection Agency relating to the endangerment finding and the cause or contribute findings for greenhouse gases under section 202(a) of the Clean Air Act.

1 *Resolved by the Senate and House of Representatives*
2 *of the United States of America in Congress assembled,*
3 That Congress disapproves the rule submitted by the En-
4 vironmental Protection Agency relating to the

2

1 endangerment finding and the cause or contribute findings
2 for greenhouse gases under section 202(a) of the Clean
3 Air Act (published at 74 Fed. Reg. 66496 (December 15,
4 2009)), and such rule shall have no force or effect.

○

Tennessee

- Electric cars – Nissan Leaf, FedEx electric delivery trucks
 - DOE helping fund statewide deployment of charging stations (2200 overnight, 50 fast)
- Smart Grid – demonstration in Chattanooga.
- Nuclear – TVA is the only utility in the country building new nuclear.
 - Southern (Vogtle) recently broke ground but no COL permit yet.
- CCS – Alstom (Knoxville) demonstrating CCS in other states.

“Climategate” was a massive PR hit for C&T proponents, at a critical time

National Journal

WEDNESDAY, MAY 19, 2010 9:47 PM

Act On Energy, But Not Necessarily Climate Change

By David Morris

Two-thirds of Americans say it is “very important” for Congress to pass legislation addressing energy policy, but only one-third put climate change in the same category in a recent poll.

New York Times

Climate Fears Turn to Doubts Among Britons

By ELISABETH ROSENTHAL

Published: May 24, 2010

LONDON — Last month hundreds of environmental activists crammed into an auditorium here to ponder an anguished question: If the scientific consensus on [climate change](#) has not changed, why have so many people turned away from the idea that human activity is warming the planet?

Related

Nowhere has this shift in public opinion been more striking than in

SIGN IN TO RECOMMEND

 TWITTER

SIGN IN TO E-MAIL

 PRINT

 REPRINTS



PurGen Coal Plant



Posts RSS

GO

Updates

McMahon to Christie: Honor Your Campaign Pledge
 Tonight: Environmental groups to host panel on PurGen project
 Volunteers Wanted!!!
 5/24/10 Presentation in Lincroft: PurGen & Ocean Dumping
 Why Linden? why not Rumson? a "Frankenstein" moment

Site Menu

Home
 PurGen Proposal
 Frequently Asked Questions
 Our Concerns
 Media
 Additional Resources
 Public Officials Speak Out
 Get Involved
 About Us
 Volunteer Login

About Us

A strong coalition of community, environmental, religious, sportsmen and public health organizations oppose the PurGen project.

The following 32 organizations are opposed to the PurGen project:

- ◆ Arthur Kill Watershed Alliance
- ◆ Bayshore Regional Watershed Council
- ◆ BlueWaveNJ
- ◆ Clean Ocean Action
- ◆ Cornucopia Network of NJ
- ◆ Edison Wetlands Association
- ◆ Environment New Jersey
- ◆ Environmental Research Foundation
- ◆ Environmental Justice Advisory Council to the DEP
- ◆ Food and Water Watch
- ◆ Green Hearts Environmental Movement, Bloomfield College
- ◆ Green Party of Essex and Passaic Counties, NJ
- ◆ Green Party of Monmouth County
- ◆ Jersey Coast Angler's Association
- ◆ Lakeland Universal Unitarian Church
- ◆ Lawrence Brook Watershed Partnership
- ◆ Linden Society for Sustainable Development
- ◆ NY/NJ Baykeeper
- ◆ NJ Environmental Federation
- ◆ NJ Environmental Lobby
- ◆ NJ Environmental Justice Alliance
- ◆ NJ Friends of Clearwater
- ◆ NJ PEER (Public Employees for Environmental Responsibility)
- ◆ NJ Sportsman Federation
- ◆ Northeast Sustainable Energy Association
- ◆ People's Organization for Progress, Central Jersey
- ◆ Physicians for Social Responsibility
- ◆ Sierra Club
- ◆ Skylands Clean
- ◆ Surfrider
- ◆ Tremley Point Alliance
- ◆ 350.org

Learn more about how you can [get involved](#).

ShareThis

Groups opposing a carbon sequestration demonstration project.

Not limited to local groups.

