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MEMORANDUM

TO: The World Wildlife Fund

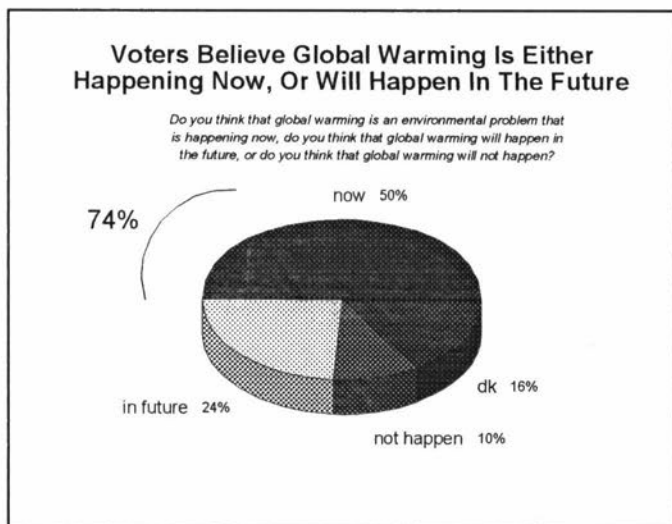
FROM: The Mellman Group, Inc.

RE: Summary of Public Opinion Research Findings

DATE: September 17, 1997

This analysis reports the findings from a national survey of 800 registered voters. Telephone interviewing was conducted August 11 to 14, 1997. The statistical margin of error for the sample as a whole is plus or minus 3.5 percentage points at the 95% confidence level. The margin of error for subgroups is larger.

The Mellman Group also conducted ten focus groups in June and July of 1996 that are referred to herein. The focus groups were held in Miami, FL; Boston, MA; St. Louis, MO; and Pasadena, CA. There were five groups of swing voters who were not environmentally active, two groups of environmental activists, and three groups of World Wildlife Fund members. Participants were selected to represent a range of demographic and geographic backgrounds.



Voters Believe Global Warming Is A Reality

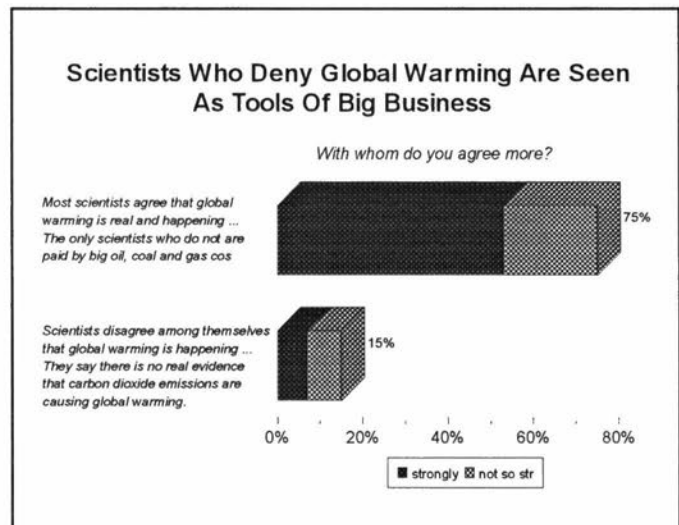
Despite conventional wisdom that only radical environmentalists and science fiction fanatics are concerned about global warming, our recent survey reveals that the American public believes global warming is real and represents a serious threat. An overwhelming majority of voters (74%) believe that global warming is an environmental problem that is either happening now (50%) or will happen in the future (24%). Only one in ten voters (10%) doubt that global warming will happen. Voters not only assert that global

warming is a reality, but also contend that it has serious consequences. Two thirds (66%) see it as a serious threat now (24% very serious, 42% somewhat serious), and believe the problem is likely

to get worse in the future (38% very serious problem 20 years from now, 23% somewhat serious). In addition, after respondents are given a neutral definition of global warming, an even greater number predict serious problems in the future (72% serious).

The Public Doubts Scientific Naysayers

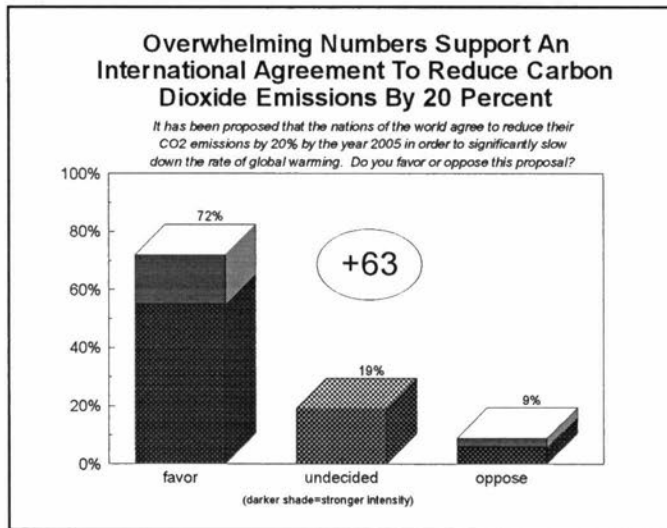
Voters reject the claims of scientists who deny the reality of global warming, likening them to the “tobacco industry scientists” whose conclusions have been bought and paid for by the industry. Three quarters (75%) believe that “most scientists agree that global warming is real and happening ... The only scientists who do not are paid by big, oil, coal and gas companies.” Only 15% take the position that “scientists disagree among themselves that global warming is happening ... [and there] is no real evidence that carbon dioxide emissions are causing global warming.” Interestingly, even those whose livelihood depends on the auto, oil or chemical industries do not believe their industries’ own scientists. By almost seven to one, these “experts” concur that most scientists agree that global warming is happening (79%).



In focus groups, participants, on their own, jumped to compare these scientists to those who work for the tobacco industry, saying “you have to look at the tobacco industry and see how they’ve distorted ... the data is out there about smoking and cancer. All you have to do is extrapolate that in any industry and understand that you can’t trust their scientists.” (St. Louis male) “I think the people who are saying it [global warming] isn’t really a problem are usually working for some big company that’s polluting the place,” agreed a woman in Pasadena.

There Is Broad Support For An International Agreement To Curb Carbon Dioxide Emissions

Voters express great enthusiasm for international efforts to address global warming. Overwhelming numbers (72%) support an international agreement to reduce carbon dioxide emissions by 20 percent by the year 2005 (55% strongly favor such an agreement). Support for a treaty cuts across demographic, partisan and ideological lines. Although Democrats (82%) are most supportive, Republicans (68%) and independents (65%) also support a treaty in great numbers. Even two thirds (65%) of self-proclaimed “conservative” Republicans favor such an international agreement.

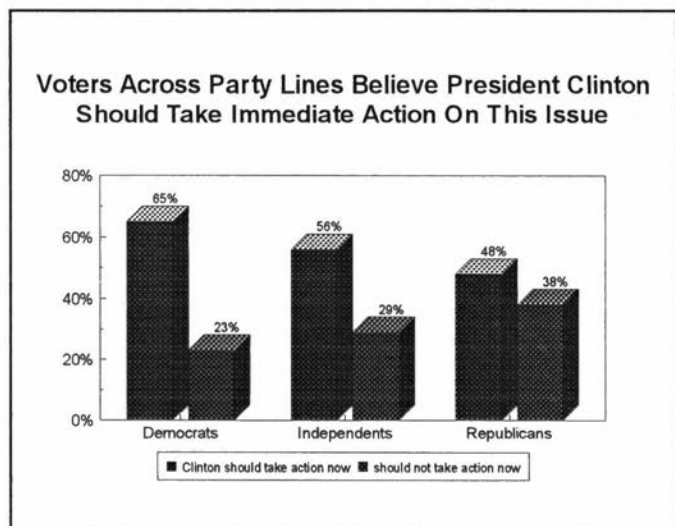


Americans reject the view that reducing carbon emissions will disrupt the economy. At a general level, voters are divided as to whether reductions should be achieved by relying on free market solutions like incentives (32%) or relying on government regulations (37%). However, by a three to one margin, voters reject the view that such regulations will hurt the economy and cost jobs (18%). Sixty percent (60%) see no serious economic dislocation. In focus groups, participants explain that the economy is highly adaptable. "Jobs disappear and new jobs appear," reasoned one man in St.

Louis. "I think there are also going to be solution industries. That always happens," agreed a young woman in Boston.

Americans Want Action To Address Global Warming

Americans want political leaders to act immediately on this issue. A majority (56%) feel this issue should be a priority for President Clinton, to be addressed at once, compared to 30% who feel he should not take action "because there are too many real problems that need attention now." This sentiment, too, cuts across party lines. While majorities of Democrats (65%) and independents (56%) want immediate action, even a plurality of Republicans (48%) agree.



A Politician Who Speaks Out On This Issue Is Seen As Forward-Thinking

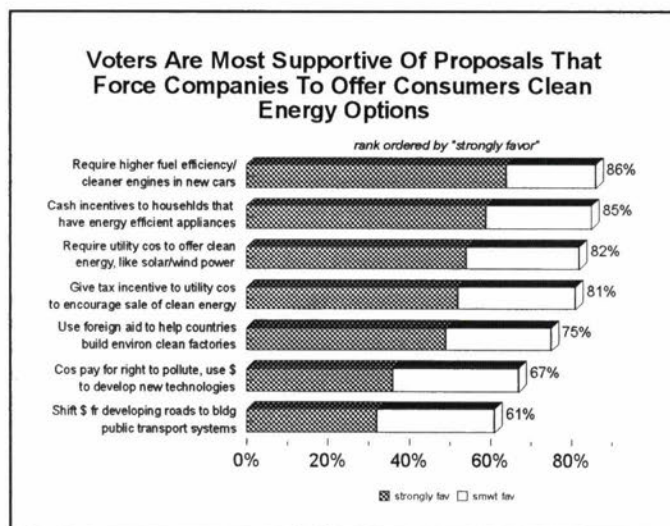
In focus groups, respondents described a politician who addressed this issue as brave and not politically motivated. As one California man said, "I think a politician who talks about this is more sincere, because it's not an election issue that's going to get him a lot of votes." Another explained how public sentiment has shifted on this issue. "Years ago I think we would have thought he was nutcase ... today it's different. We truly would listen," said a swing voter in Boston. In the survey

60% agreed that if a candidate for political office spoke out in support of reducing the threat of global warming they would see him as “forward thinking and speaking to a real problem” compared to 26% who would feel as though he was “too interested in environmental issues and ignoring bigger problems.” Republicans (57%), Democrats (67%) and independents (55%) alike share this view.

Consumers Look To Corporate America For Technological Solutions

What we have elsewhere labeled “techno-optimism” is evident in public consideration of this issue. A majority (52%) think the technology already exists to combat global warming, but big business is preventing it from reaching consumers. Only one in three (29%) feel as though developing these new technologies will cost too much money. Consumers look to corporate America to provide technological solutions. As one Pasadena man said, “I think a great number of these problems can be solved by application of technology. And somehow the technology has to be made financially attractive for people to do it.”

There Is Support For A Variety Of Regulatory Mechanisms To Reduce Carbon Emissions, As Well As For Positive Incentives



When asked to evaluate a variety of proposals aimed at reducing carbon dioxide emissions, respondents give strongest support to those that force or incentivize companies to offer consumers clean energy options. Most popular among the proposals are those that require higher fuel efficiency and cleaner engines in new cars (86% favor, 11% oppose); require utility companies to offer clean energy options like solar and wind power (82% favor, 12% oppose); and give tax incentives to utility companies to encourage the sale of clean energy (81% favor, 15% oppose). Also popular are proposals that incentivize consumers, like

giving financial breaks to households that have energy efficient appliances (85% favor, 12% oppose). These same proposals are also seen as the most effective means of addressing global warming.

Voters are not adverse to paying a modestly higher price for clean energy alternatives, like solar and wind power. When asked how willing they would be to pay more per month to buy environmentally clean energy, 80% say they would be willing to pay \$5 more per month (44% very willing). Not surprisingly, willingness diminishes as the price increases (38% very willing to pay \$10 more per month, 25% very willing to pay \$20 more per month).

Although these voters will pay more for cleaner energy, they will not countenance a gas tax

hike. Among the proposals tested, increasing the gas tax by 50 to 70 cents was the least popular (29% favor, 62% oppose). Voters are also less enthusiastic about auction plans and those which allow companies and/or countries to buy and sell pollution rights

Voters Are Most Concerned About The Impacts Of Global Warming On Public Health And Animal Habitats

When probed about the consequences of global warming, voters express the most concern about the impact on public health and animal habitats. Americans are worried that global warming may lead to the spread of infectious diseases (70% concerned); crop failures, food shortages and famine (68%); increased incidences of respiratory problems (62%); and the destruction of natural habitats like oceans and national parks (63%). But while infectious diseases generated concern, it was not judged as a particularly likely outcome of global warming. Climatic effects like extreme weather (54% likely to happen); more heat waves (49%); crop failure (49%); and the melting of the polar ice caps (49%) are considered most likely. Some less likely, but still real for people, are destruction of habitats (48%); respiratory problems (48%); disruption of the “web of life” (47%); and animal extinction (46%). Thus, the effects that people judge both likely and serious involved crop failures and famine, respiratory problems and the destruction of natural habitats.

In sum, voters think that global warming is a reality that is either happening now or will happen in the near future. Overwhelming numbers support an international agreement to curb carbon dioxide emissions. They look to the President for leadership on this issue, but also see corporate America playing a key role in developing the technologies to solve this problem. Americans support a variety of proposals to force or encourage companies to offer consumers alternative energy options, in addition to incentives to stimulate consumers to use these clean energy sources. In fact, they are willing to pay a modestly higher amount of money for clean energy, though not through higher gas taxes.

Presentation and Analysis of Findings

for World Wildlife Fund

**September 1997
by The Mellman Group, Inc.**



World Wildlife Fund

SUMMARY OF FINDINGS

Voters Believe Global Warming Is A Reality

Most Americans say they have some knowledge of global warming

Voters believe global warming is either happening now or will happen in the future

Two thirds see global warming as a serious threat now

It is seen as likely to get worse

The more people know about the problem, the more serious they think it is

They reject the claims of scientists who deny that this problem is happening, likening them to “tobacco scientists” who are bought off by industry

There Is Broad Support For An International Agreement To Curb Carbon Dioxide Emissions

Overwhelming numbers support such an agreement to reduce emissions by 20 percent by 2005

Voters are split between free market solutions and government solutions

But they reject the notion that stricter regulations will harm the economy

Even those who favor market mechanisms reject the view that regulation will harm the economy

Americans Want Action To Address This Problem

A majority think that President Clinton should act immediately on this issue before the problem becomes dire

A candidate who takes a stand on global warming is seen as “forward thinking” and “speaking to a real problem,” rather than as ignoring more important issues

Almost one fifth say they would be “very likely” to vote against a candidate solely based on votes against efforts to reduce the threat of global warming

Americans See Technology As The Solution To Climate Change

Voters believe the technology exists to curb global warming, but big business will not allow it to reach the market

Voters Support A Variety Of Regulatory Mechanisms And Positive Incentives To Reduce Carbon Emissions

Support is highest for proposals that force or incentivize companies to offer consumers clean energy options

Incentivizing consumers is also strongly supported

Requiring cleaner engines in new cars, giving households cash incentives to use energy efficient appliances, requiring utility companies to offer clean energy, and giving them tax incentives to do so are the most effective and popular means to address this problem

The price curve indicates that voters are willing to pay slightly more for clean energy

Voters are least enthusiastic about companies bidding at auction for the rights to pollute, UN established carbon dioxide limits, and a large gas tax increase

The Impacts On Specific Aspects Of Public Health And Animal Habitats Are Most Compelling

Voters are most concerned about the impact of global warming on public health and habitats

Extreme weather is a greater concern in the South

Famine, respiratory problems and habitat destruction are the most effective exemplars

Methodology

■ Focus Groups: July 1996

- Groups were held in Miami, FL; Boston, MA; St. Louis MO; and Pasadena, CA
- five groups of swing voters who are not environmentally active (Miami, Boston, St. Louis, Pasadena)
- two groups of environmental activists not currently engaged on this issue (Boston, St. Louis)
- three groups of World Wildlife Fund members (Miami, St. Louis, Pasadena)

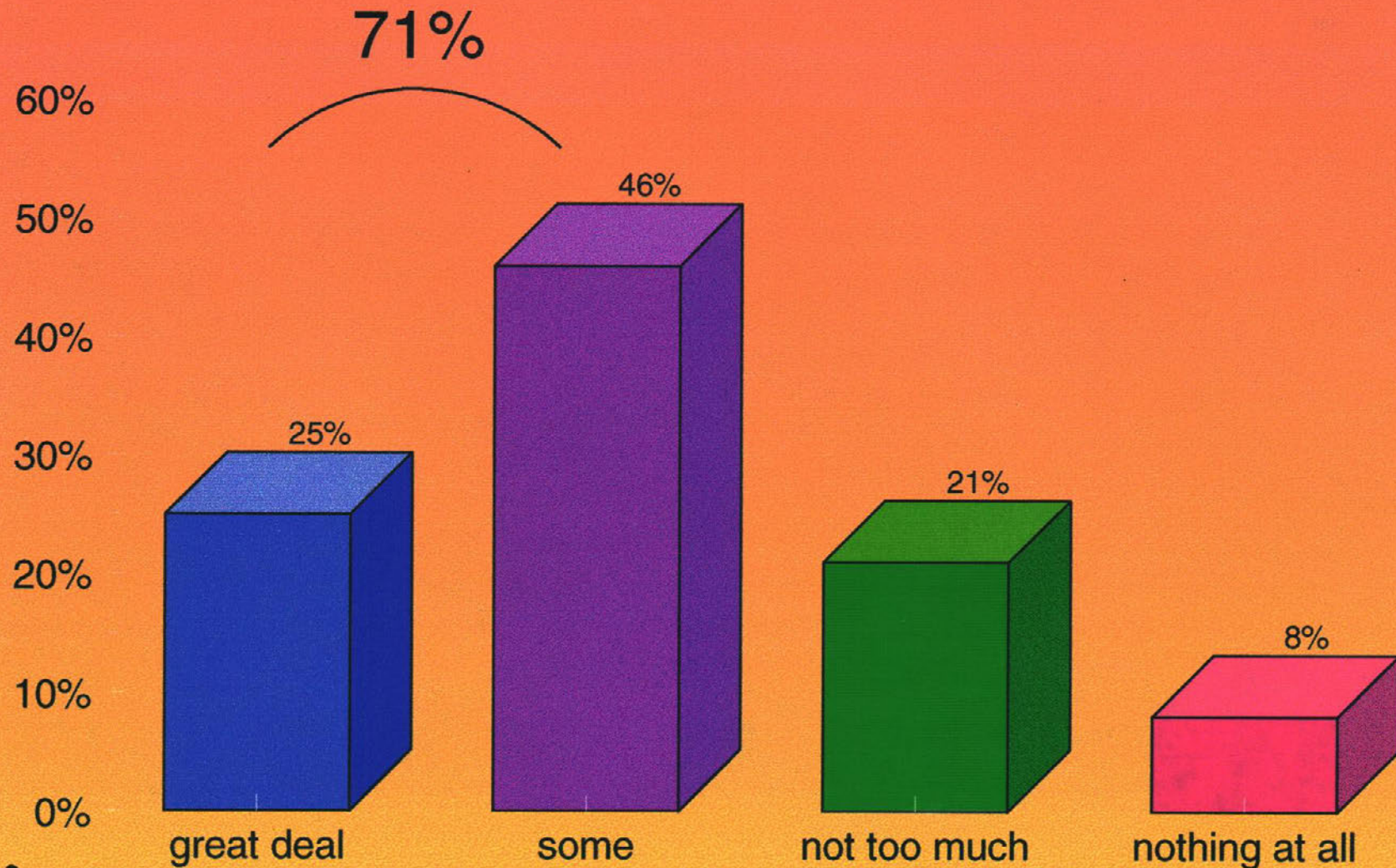
■ Survey: August 1997

- 800 adults nationwide, 18 years or older, who are registered to vote
- interviews were conducted between August 11 and 14, 1997
- margin of error for sample as a whole is +/- 3.5 percentage points



Most Voters Say They Have Some Knowledge Of Global Warming

How much have you heard or read about the issue of global warming?

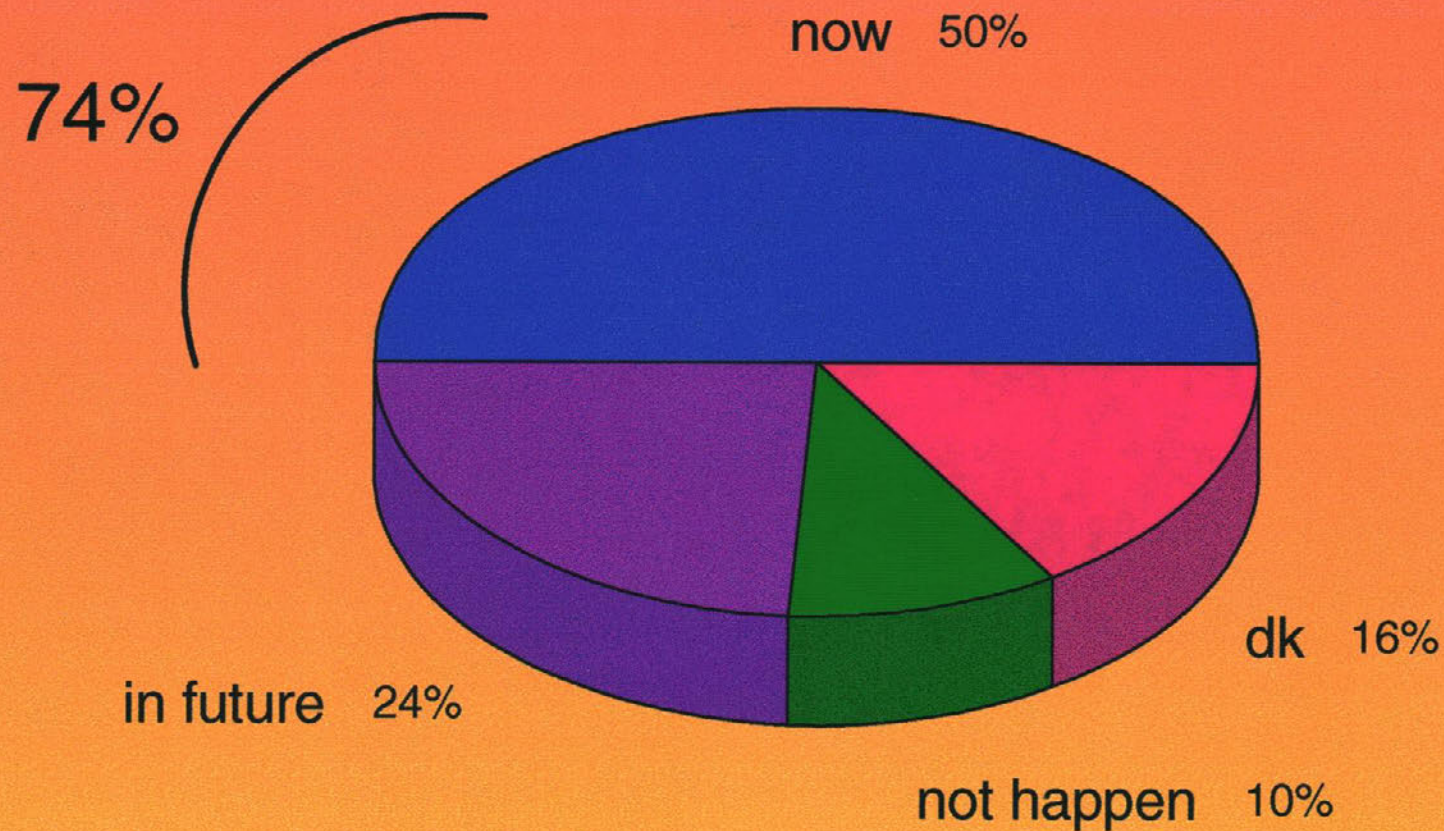


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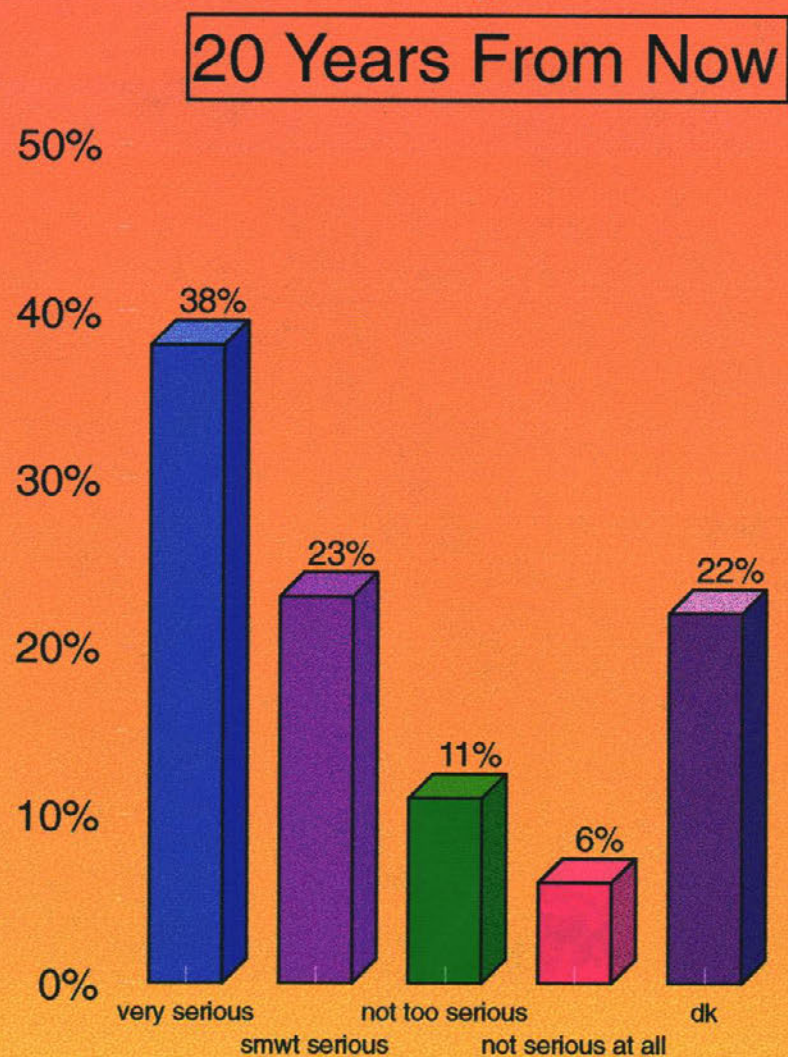
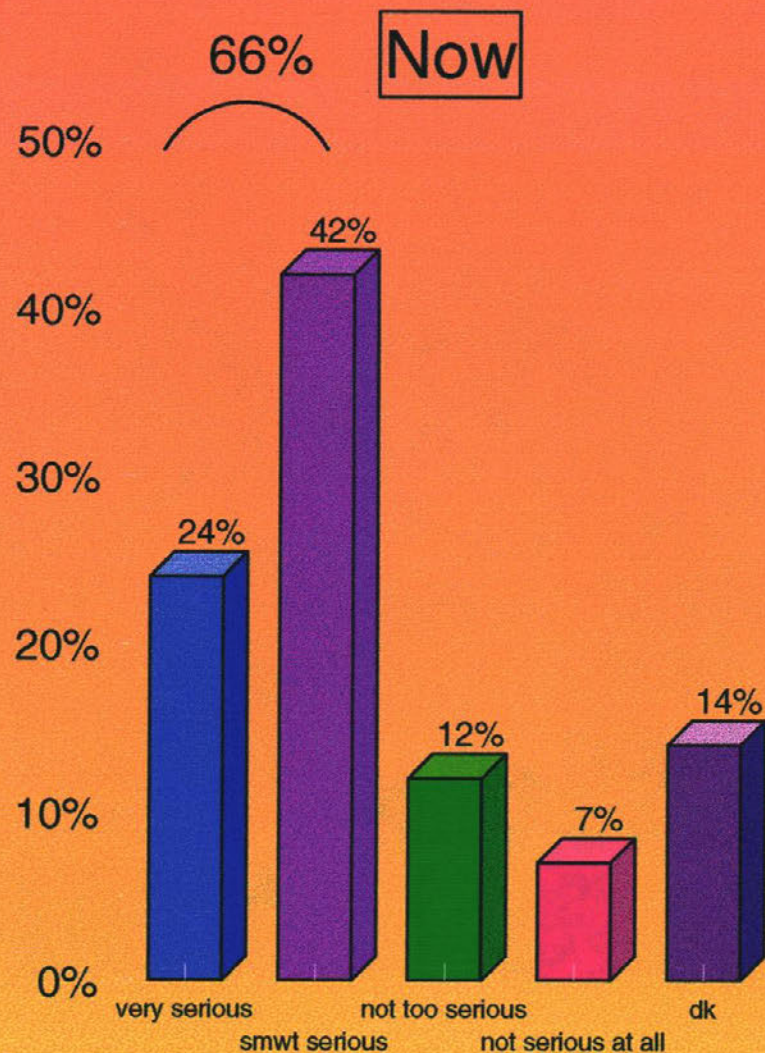
Voters Believe Global Warming Is Either Happening Now, Or Will Happen In The Future

Do you think that global warming is an environmental problem that is happening now, do you think that global warming will happen in the future, or do you think that global warming will not happen?



Two Thirds See Global Warming As A Serious Threat Now, And They Believe The Problem Is Likely To Get Worse

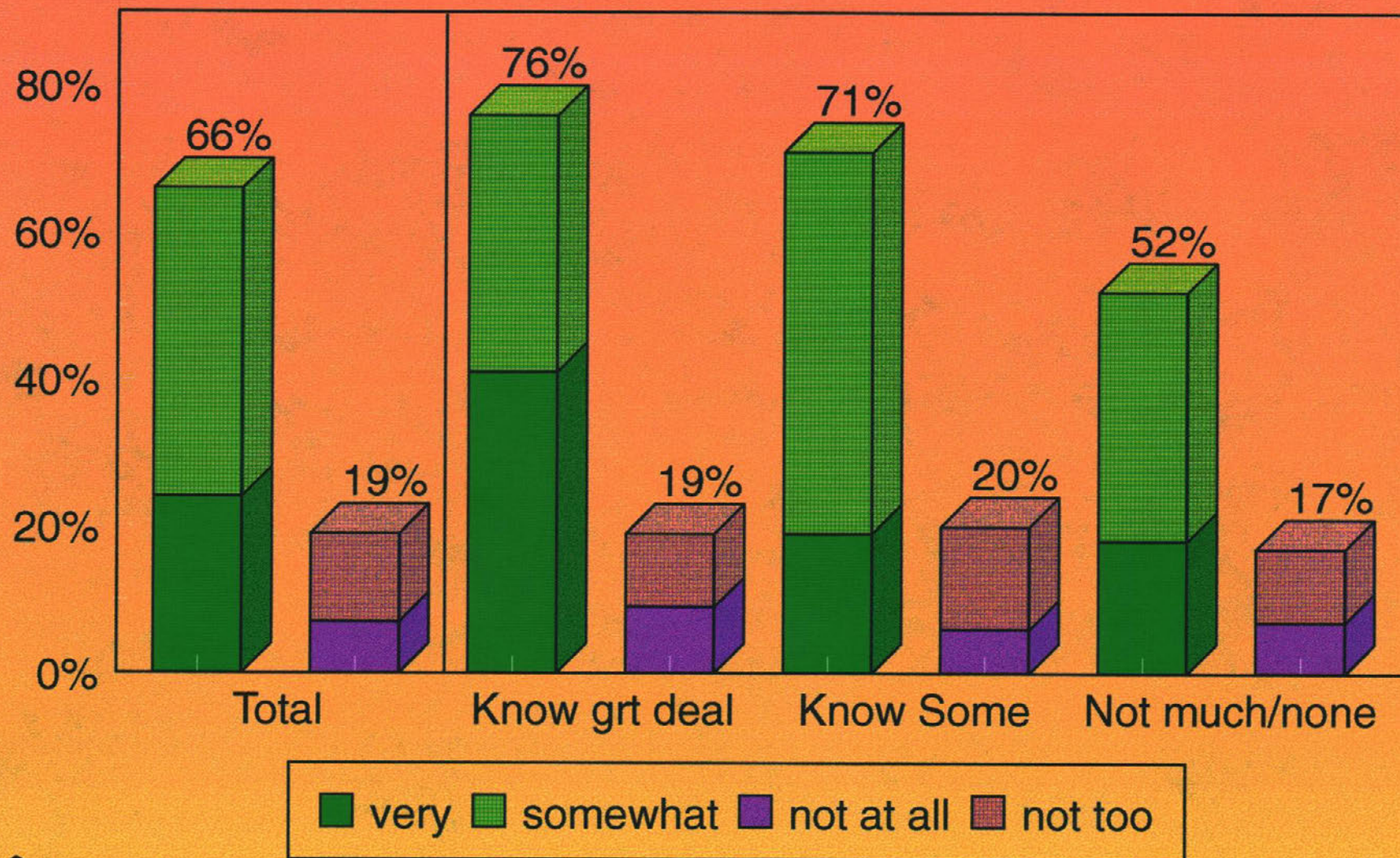
How serious a threat do you think global warming is?



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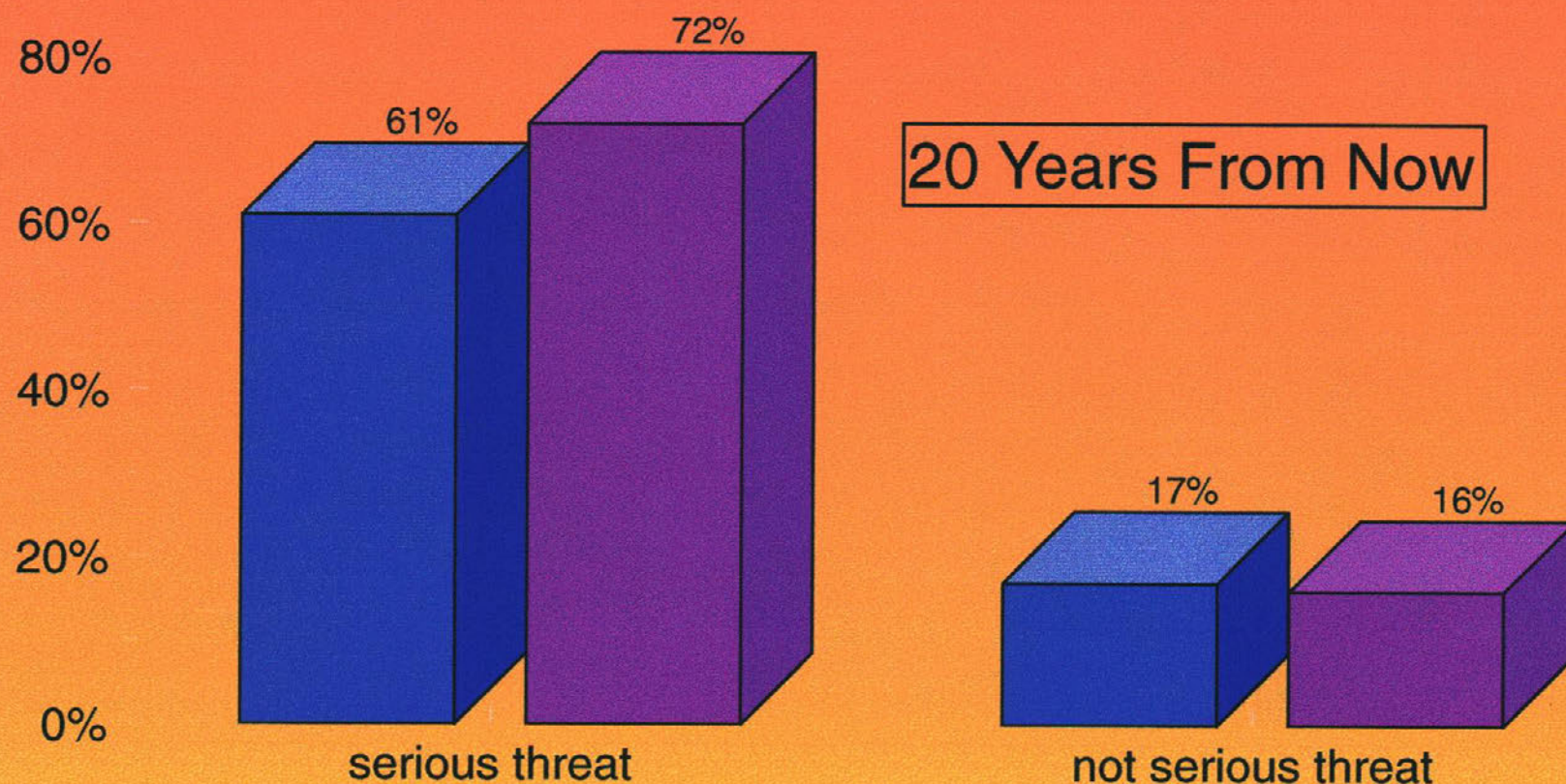
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The More People Know About The Problem, The More Serious They Think It Is



When Given Information About Global Warming, Voters Are More Likely To Predict Serious Problems In The Future

When cars, electric utilities and some other industries burn oil, coal and gasoline, they release carbon dioxide ... into the atmosphere ... They say this makes the world hotter and increases the chances of all kinds of extreme weather



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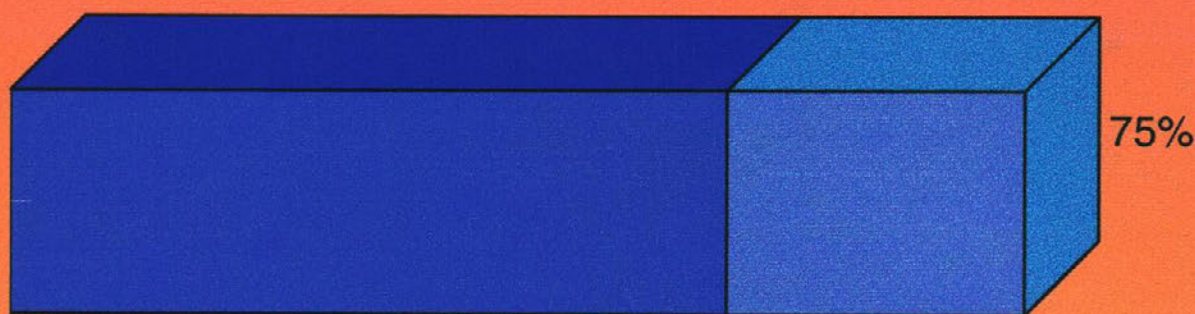
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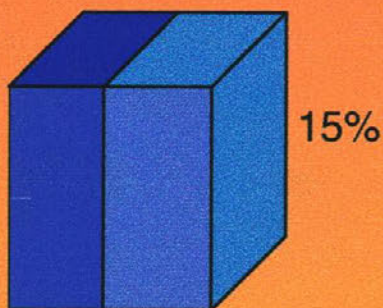
They Believe That Scientists Who Deny Global Warming Are Tools Of Big Business

With whom do you agree more?

*Most scientists agree that global warming is real and happening ...
The only scientists who do not are paid by big oil, coal and gas cos*



*Scientists disagree among themselves that global warming is happening ...
They say there is no real evidence that carbon dioxide emissions are causing global warming.*



0% 20% 40% 60% 80%

■ strongly ■ not so str



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Focus Group Respondents Liked Them To "Tobacco Industry Scientists" Who Are Bought Off By Industry

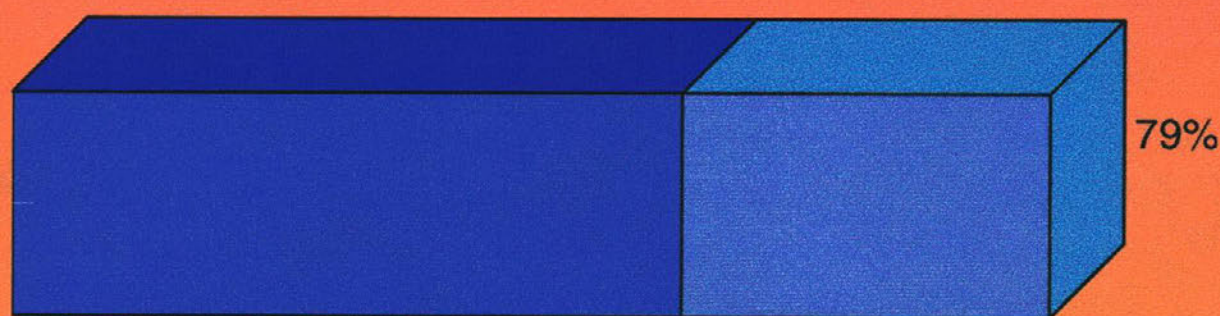
- ✗ Whether or not industry scientists are trusted or not, you have to look at the tobacco industry and see how they've distorted -- the simple but wrong arguments distorted. Because the data is out there about smoking and cancer. All you have to do is extrapolate that in any industry and understand that you can't trust their scientists. (St. Louis male WWF member)
- ✗ I think when you target a scientist, that's such a big word, that you'd have to kind of take a look at what sort of scientist we're talking about. And in many cases sometimes the other side -- the adverse opinion is represented by scientists who have some association with industry. (St. Louis male member)
- ✗ I don't think this is exaggerated at all. I think the people who are saying it isn't really a problem are usually working for some big company that's polluting the place. When you take [regular scientists], they believe in global warming. They believe that there's a change and I think regular scientists are saying this and I think we should heed it. (Pasadena swing female)
- ✗ Like the tobacco scientists. (St. Louis swing male)



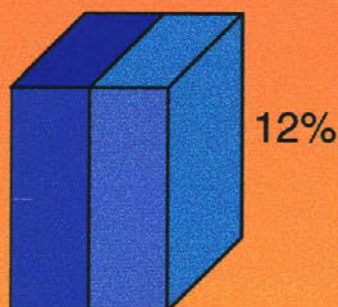
Even Those Who Work In Oil, Chemical And Gas Industries Do Not Believe Scientists Employed By Their Industry

among those whose income depends on auto/oil/chemical industry

*Most scientists agree that global warming is real and happening ...
The only scientists who do not are paid by big oil, coal and gas co's*



*Scientists disagree among themselves that global warming is happening ...
They say there is no real evidence that carbon dioxide emissions are causing global warming.*



0% 20% 40% 60% 80%

■ strongly ■ not so str

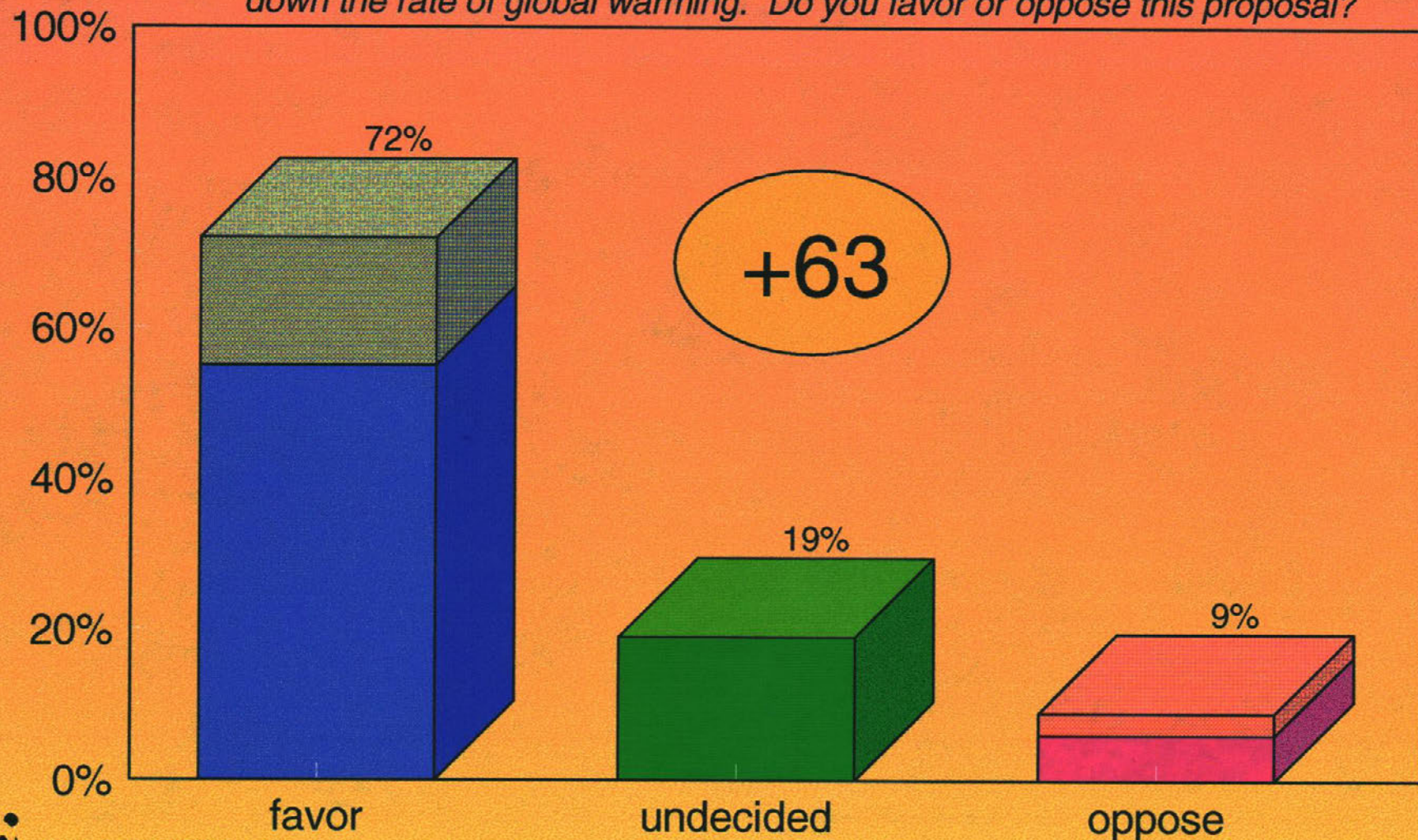


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Overwhelming Numbers Support An International Agreement To Reduce Carbon Dioxide Emissions By 20 Percent By 2005

It has been proposed that the nations of the world agree to reduce their CO2 emissions by 20% by the year 2005 in order to significantly slow down the rate of global warming. Do you favor or oppose this proposal?



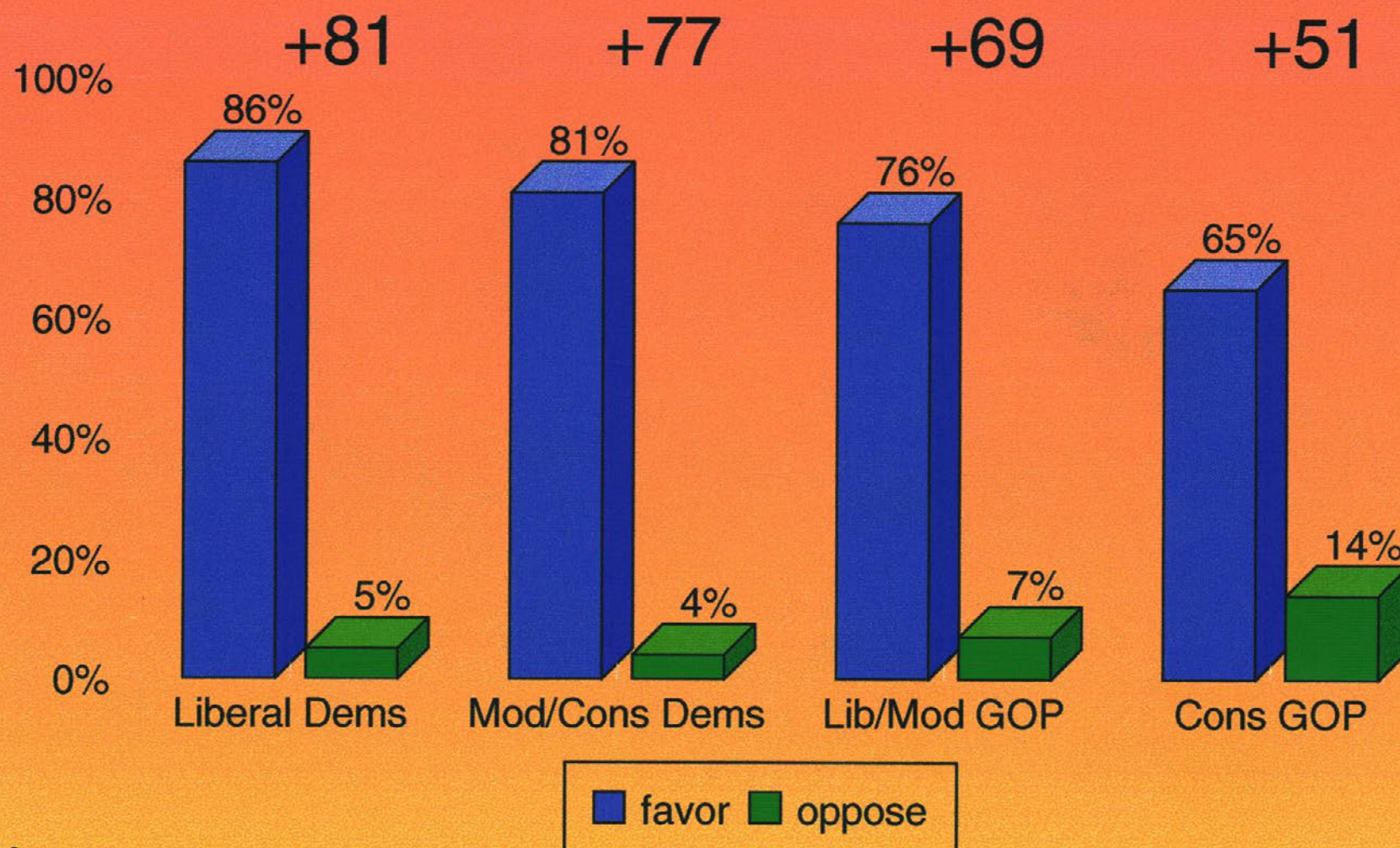
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(darker shade=stronger intensity)

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Support For Such An Agreement Cuts Across Partisan And Ideological Lines

Two Thirds Of Conservative Republicans Support This Proposal

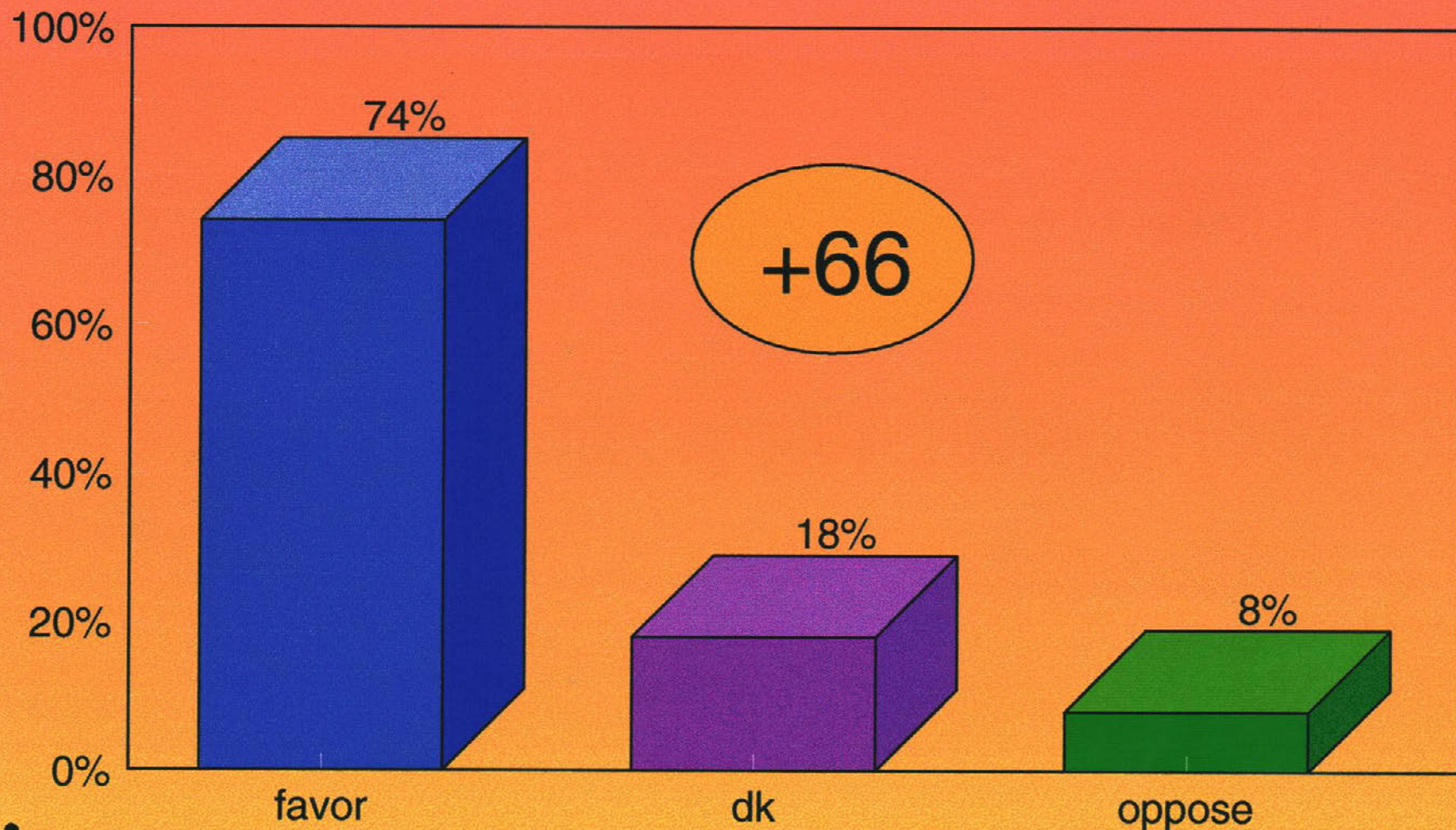


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Even Employees Of Affected Businesses Support International Reductions

among those whose income depends on auto/oil/chemical industry

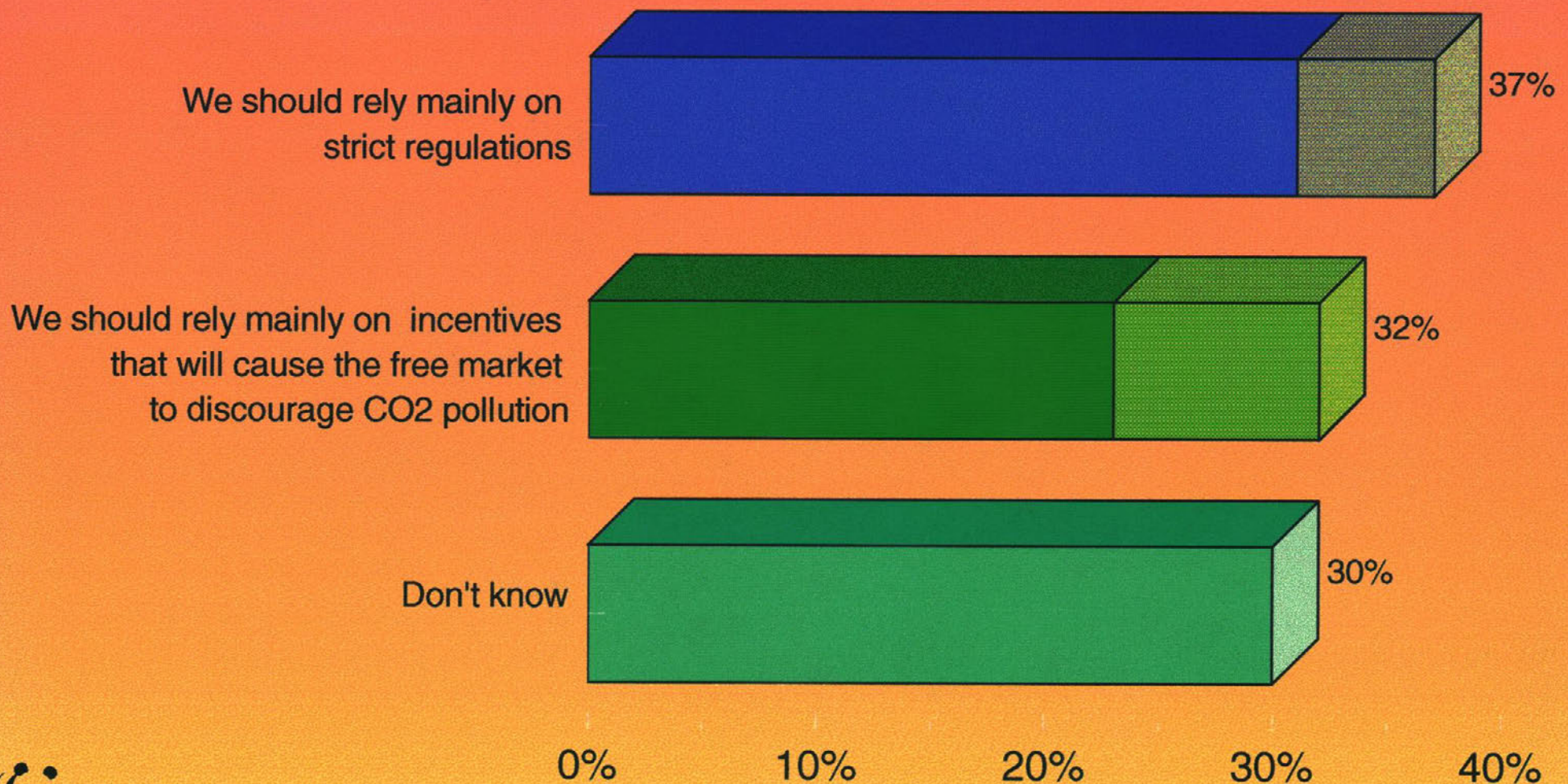


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Voters Are Split On Whether Reductions Should Be Achieved Through Regulation Or Market Mechanisms

Which comes closest to your own view?



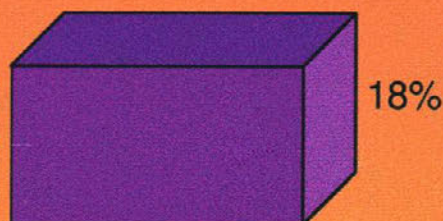
They Reject The Notion That Placing Stricter Regulations On CO2 Emissions Will Harm The Economy

Which of the following statements comes closest to your point of view?

Stricter regs on the emission of CO2 will help stop global warming, protect health/safety, create new jobs through new techs and are worth the cost



Stricter regs on the emission of CO2 from the use of oil, coal and gas would go too far and hurt the economy, cost jobs



Don't know



0% 10% 20% 30% 40% 50% 60% 70%



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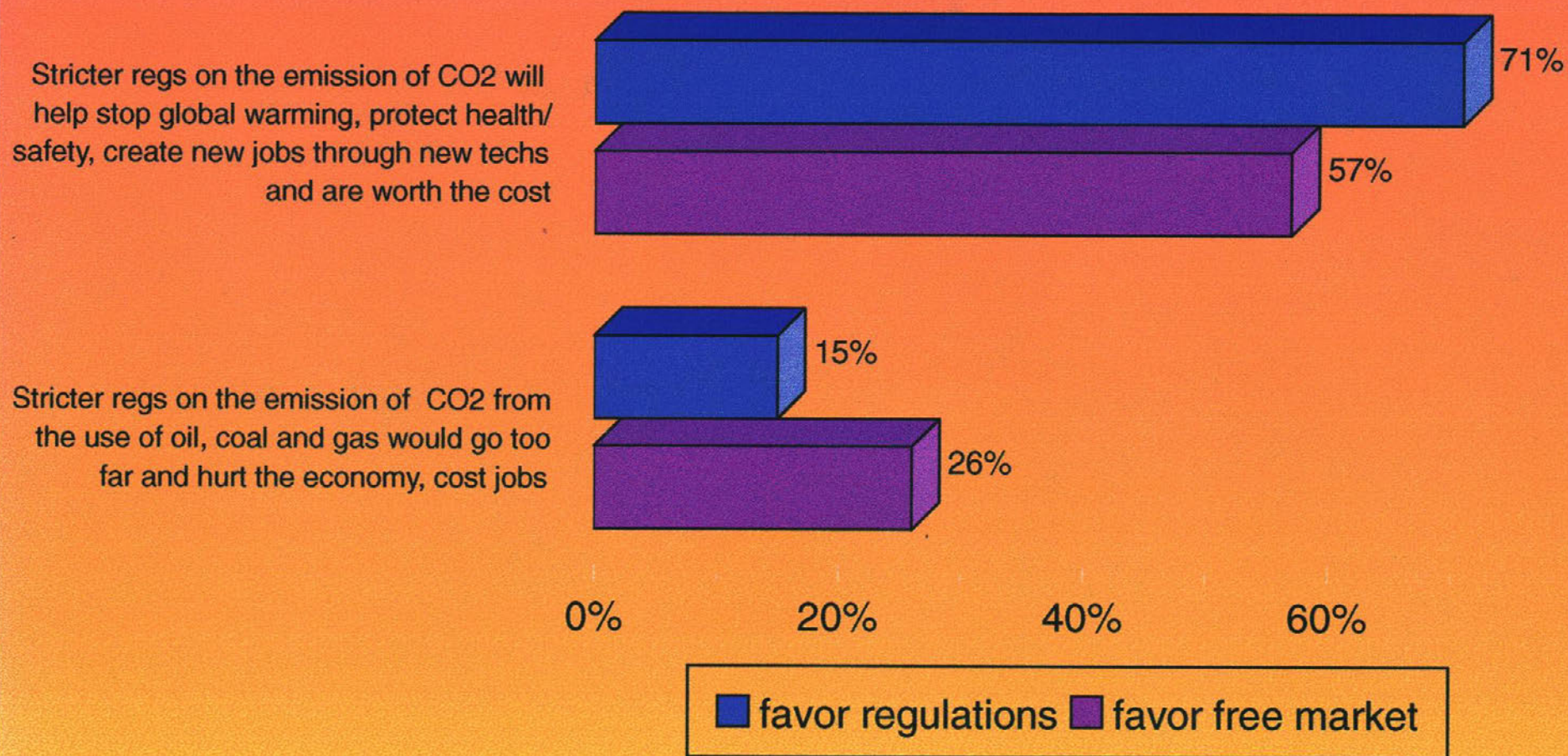
Participants Describe The Economy As Highly Adaptable

- Sure there will be jobs lost in mining coal and doing all the other things, but there will be new jobs created because we are not going to freeze to death ... (St. Louis swing male)
- I just want to make one more comment on the economy. Obviously the greenhouse effect will help people in the mildew removing business quite a bit, because there will be a lot more mildew. Seriously, we have things that we have to take care of, and there will be new economic issues out there for us to develop things to take care of. (Miami swing male)
- But we talked about a minute ago, the adaptation, jobs disappear and new jobs appear. (St. Louis male activist)
- To me it's like whatever jobs get taken away are usually created somewhere else. I mean the jobs are being lost, [but] you have to find other alternative energy sources. So it isn't really a compelling argument for me. (Boston young male activist)
- I think there are also going to be solution industries. That always happens. (Boston young female activist)



Even Those Who Favor Free Market Incentives Over Regulations Believe Regulations Will Not Adversely Impact The Economy

Which of the following statements comes closest to your point of view?



A Majority Feel Global Warming Should Be A Priority For President Clinton And That He Should Act Immediately

With comes closest to your own view?

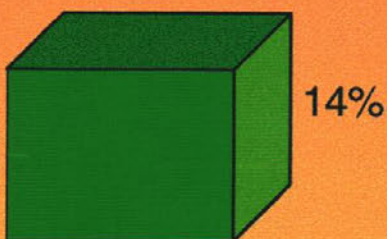
Clinton should take action on global warming now cause the problem is only getting worse and we cannot afford to take wait and see approach



Clinton should not take action on global warming cause there are too many real problems that need attention now



Don't know



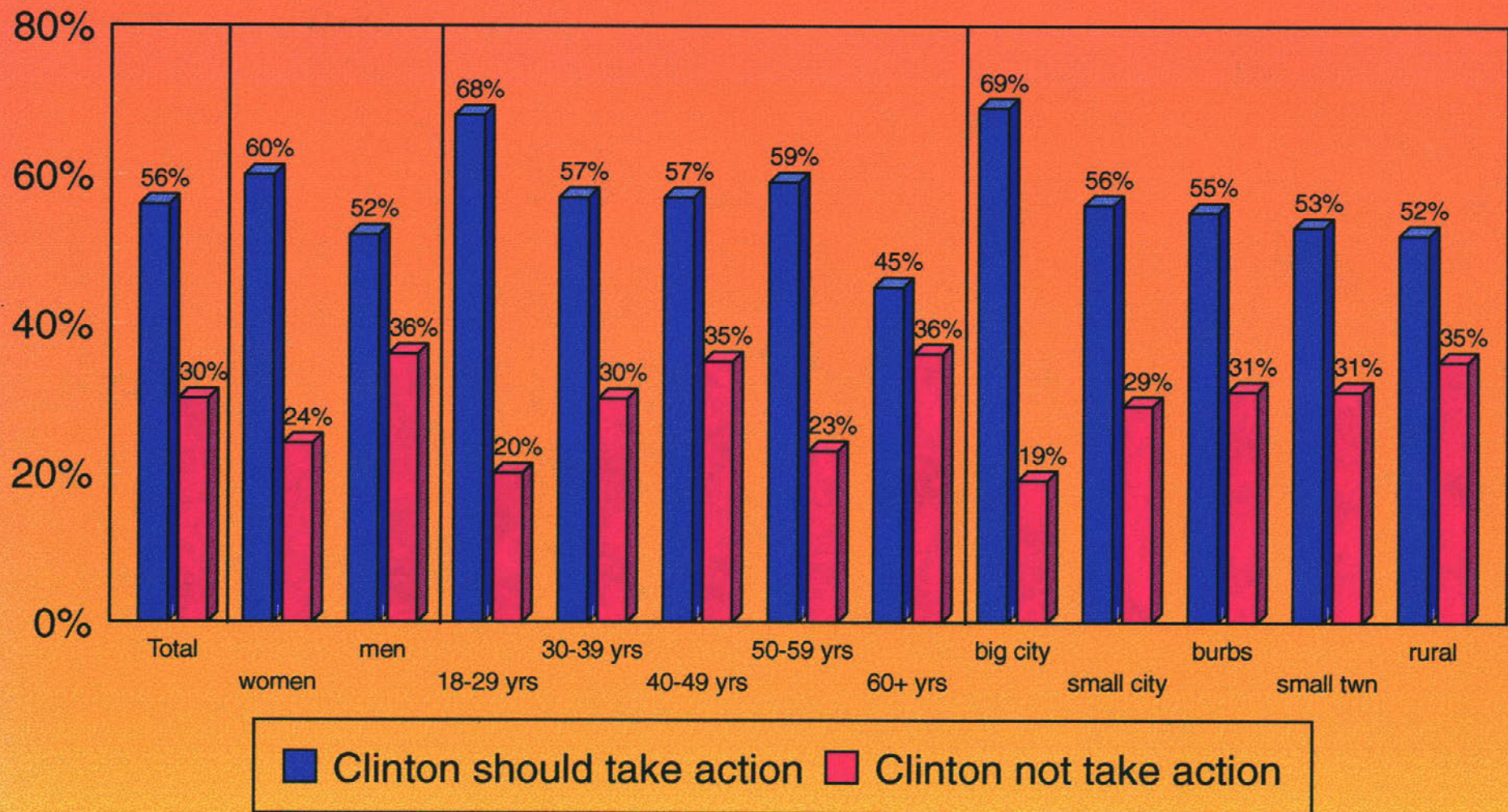
0% 10% 20% 30% 40% 50% 60% 70%



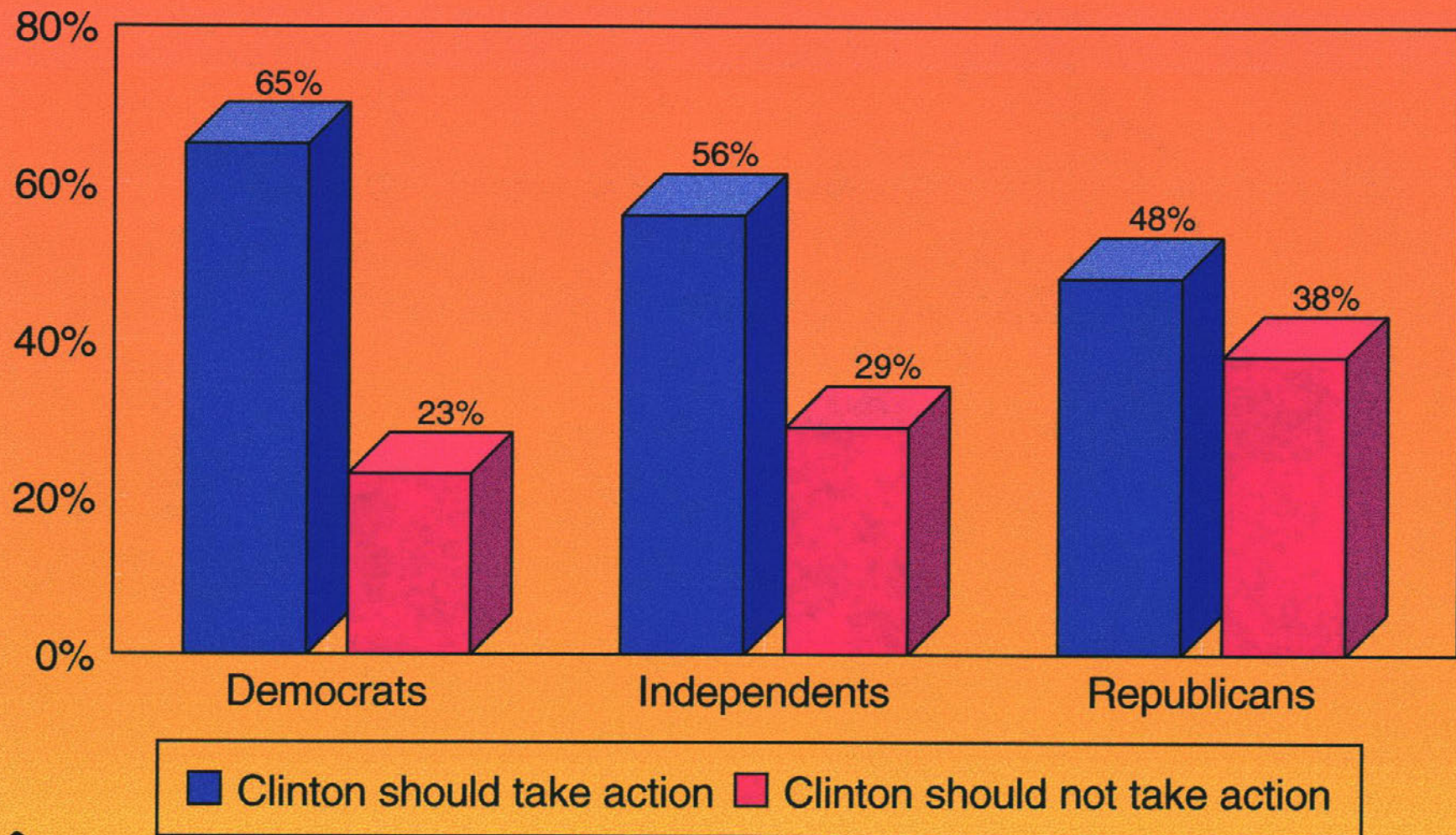
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Women, Younger Voters And Big City Dwellers Are More Likely To See This As A Priority For The Administration



A Plurality Of Republicans Believe That Clinton Should Take Action



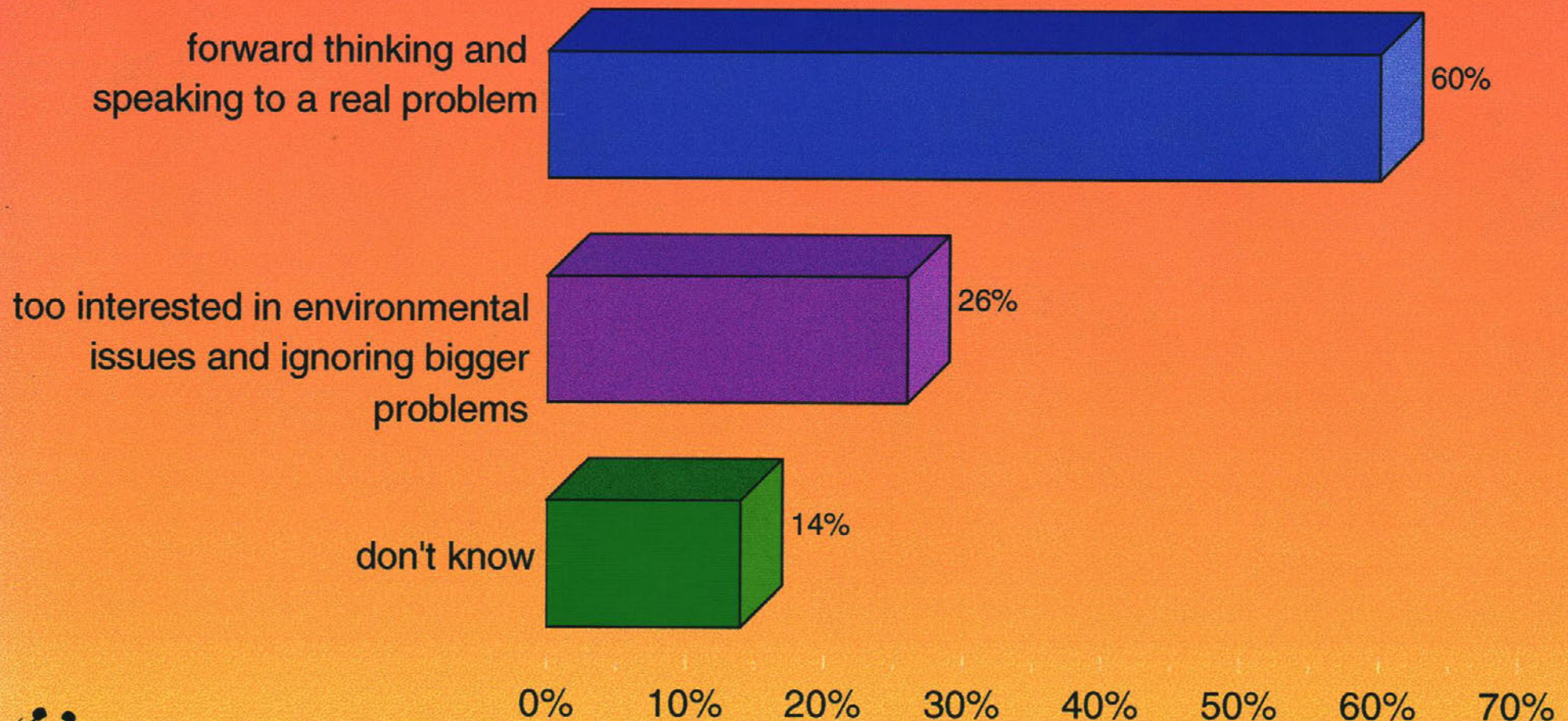
Focus Group Respondents Described Such A Politician As Brave And Not Politically Motivated

- + I don't think it's an election issue. I think a politician who talks about that is more sincere, because it's not an election issue that's going to get him a lot of votes. (California swing male)
- + It would say to me that this is a good politician. He's giving us a warning and informing us. He's doing his job. (California swing female)
- + It would truly be a gutsy move on the part of a politician to do so, and I would definitely give them a lot of credence. (Boston swing male)
- + I'd think he'd be forward thinking ... I like the issue, that he considers going this way rather than go to Corporate America. (Miami swing female)
- + I think he'd be a brave man. (Miami swing female)
- + Actually years ago I think we would have thought he was a nutcase ... today it's different. We truly would listen. (Boston swing male)
- + We already have [had a politician speak out on global warming]. Al Gore wrote a book about it and they laughed at him for doing it. They aren't laughing at him now. (Miami swing female)



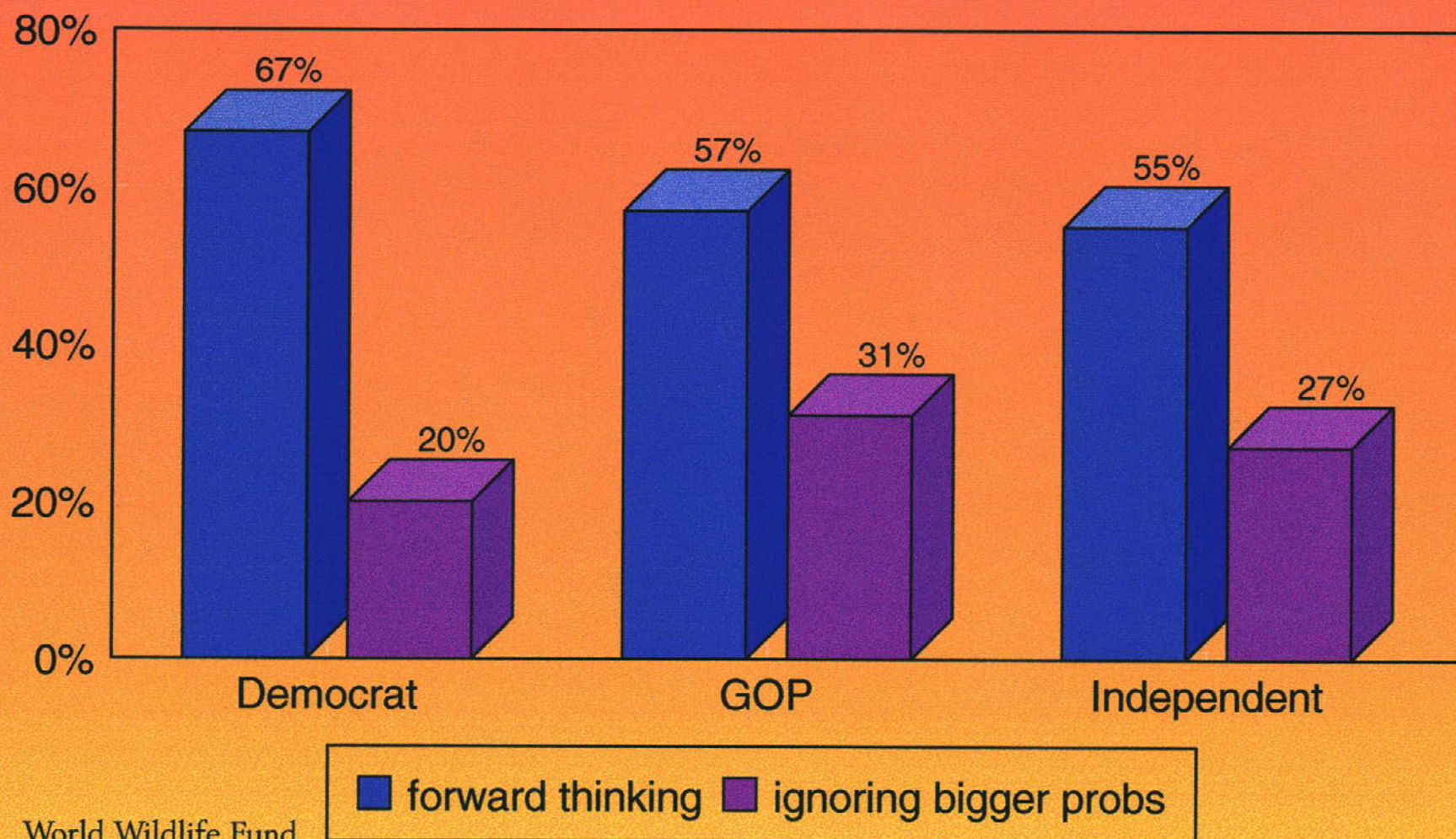
A Candidate Who Takes A Stand On Climate Change Is Viewed As Forward Thinking

If a candidate for political office spoke out in support of reducing the threat of global warming, would you think he was:



Agreement With This Point Of View Cuts Across Party Lines

If a candidate for political office spoke out in support of reducing the threat of global warming, would you think he was forward-thinking/speaking to a real problem, or would you think he was too interested in environmental issues/ignoring bigger problems?

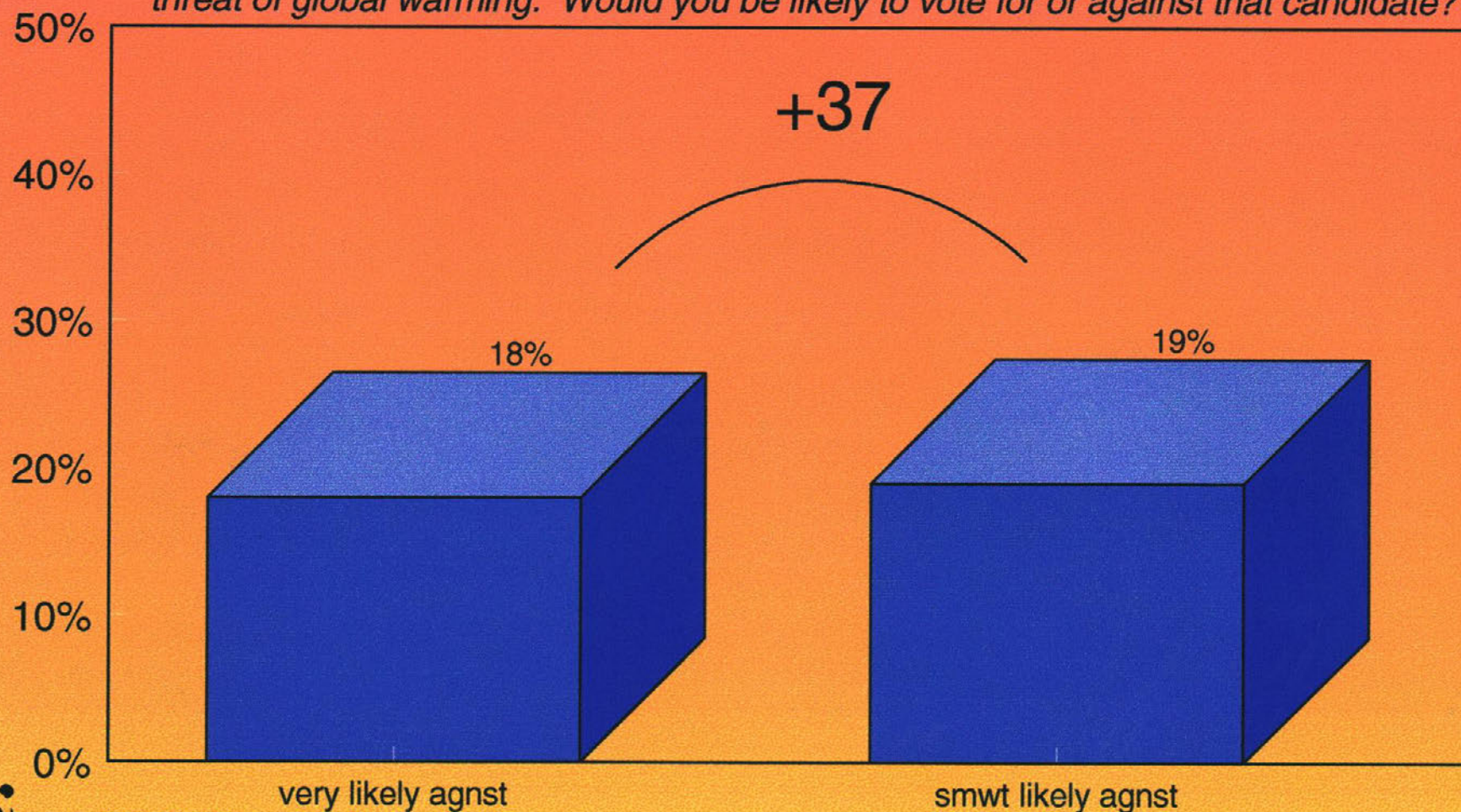


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Almost One Fifth Say They Are "Very Likely" To Vote Against A Candidate Solely On His Opposition To Addressing The Global Warming Problem

Let's say you agreed with a particular candidate on most issues and were of the same political party, however, that candidate voted against efforts to reduce the threat of global warming. Would you be likely to vote for or against that candidate?

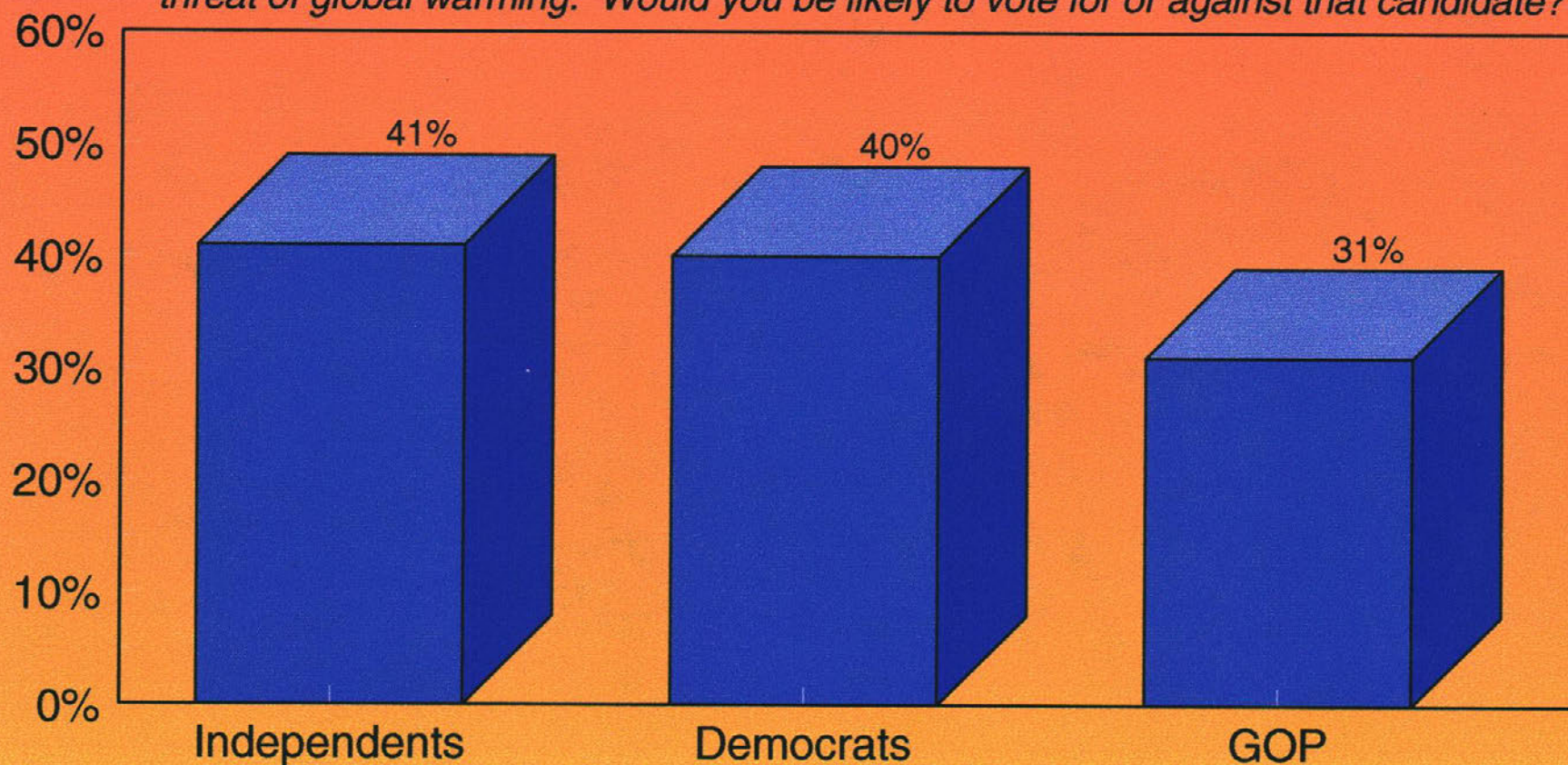


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A Plurality Of Independents And Democrats, Along With A Third Of Republicans, Would Cast Their Vote Against Such A Candidate

Let's say you agreed with a particular candidate on most issues and were of the same political party, however, that candidate voted against efforts to reduce the threat of global warming. Would you be likely to vote for or against that candidate?



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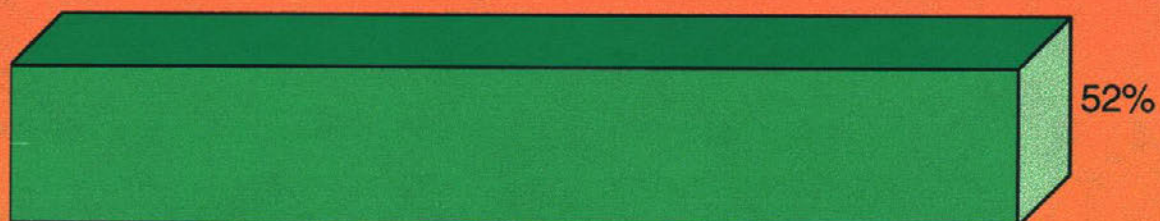
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Voters Think The Technology Already Exists To Address Global Warming, But Believe Big Business Is Preventing It From Reaching Consumers

Which comes closest to your own view?

The technology already exists to solve many global warming problems, but big business is preventing them from reaching consumers because it causes more profitable



Solving the problems that cause global warming will mean developing new technology to reduce our use of oil, coal & gas, costing billions of dollars



Don't know



0% 10% 20% 30% 40% 50% 60%

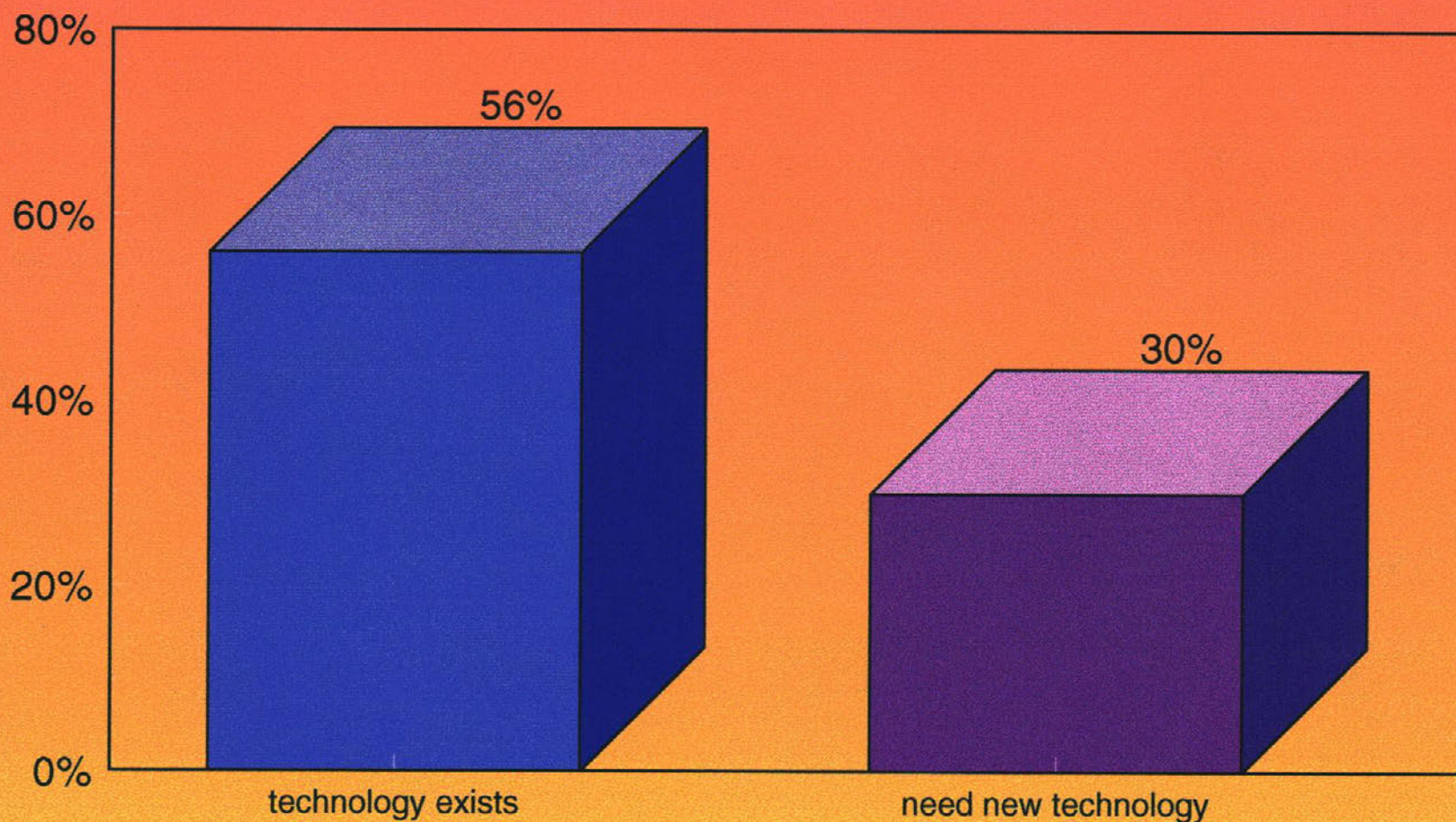


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Those Working In Affected Industries Agree

among those whose income depends on auto/oil/chemical industry



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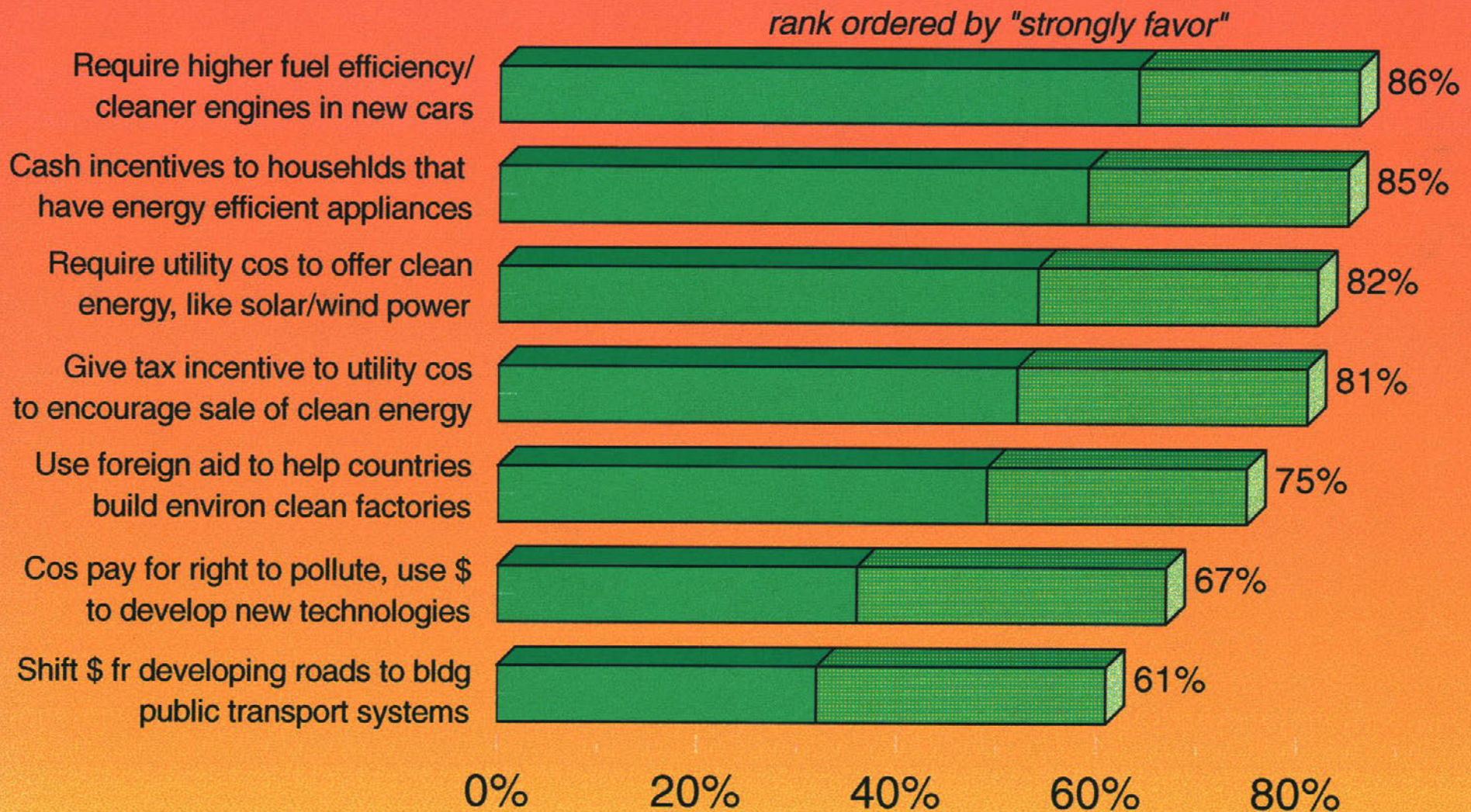
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Discussants Look To Industry To Provide Technological Solutions To Consumers

- I think a great number of these problems can be solved by application of technology. And somehow the technology has to be made financially attractive for people to do it. (Pasadena swing male)
- I think technology can solve all of these problems easily if there's just some way to make them do it. (Pasadena swing male)
- The technology is there for autos to either run on solar or batteries, but they don't prefer to develop it because big companies like Shell or Amoco, they don't want it to happen. It would devastate their ... (St. Louis swing male)
- ... There are patents for cars that don't use gas, and the major car manufacturers have bought those patents and they're sitting on them. You know, so it's like any sort of technological advance that is brought to the table is being thwarted again by major corporations. So how do you fix that problem? That's one of the major things. (Boston young male activist)



Voters Are Most Supportive Of Proposals That Force Companies To Offer Consumers Clean Energy Options

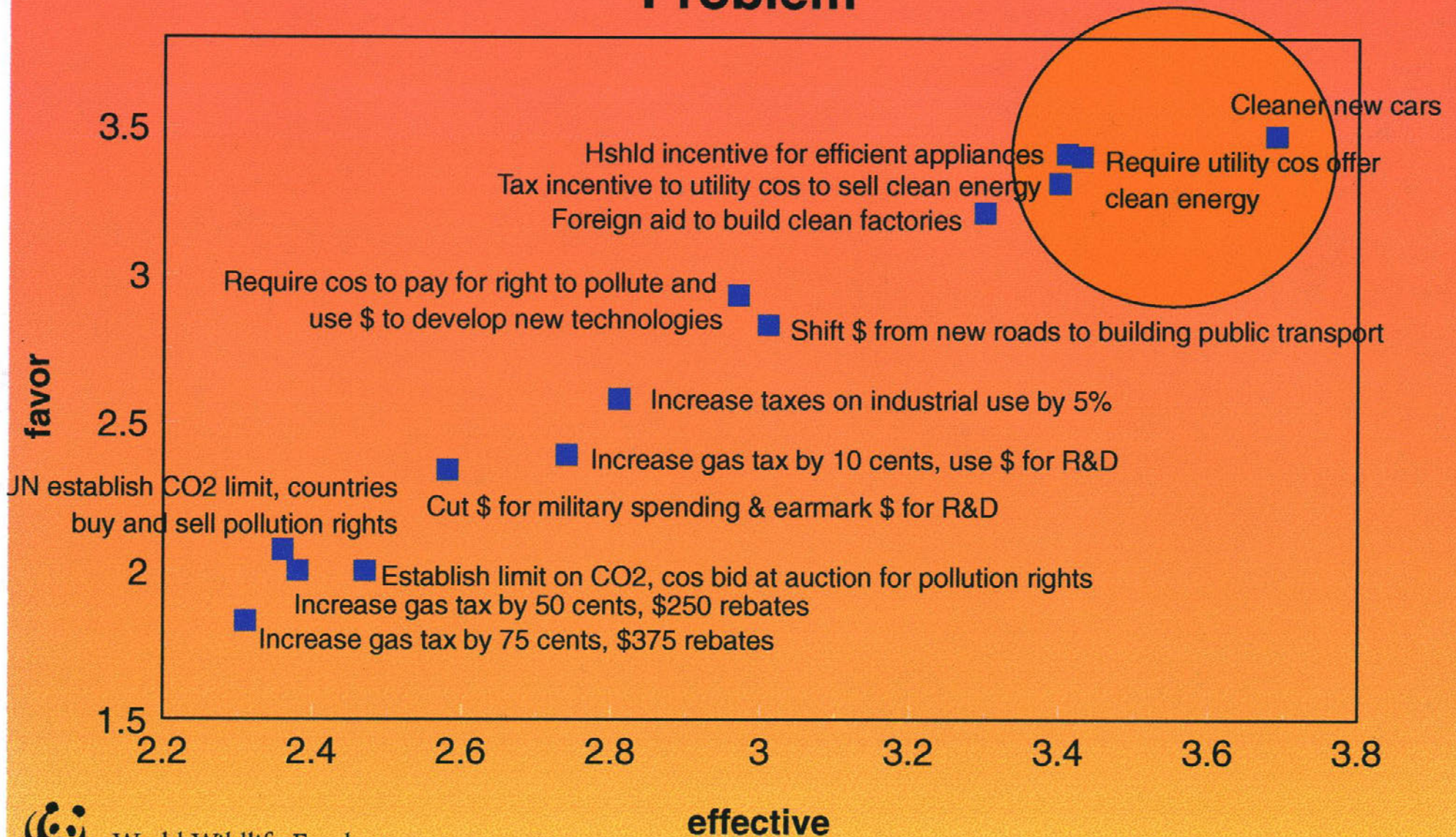


World Wildlife Fund

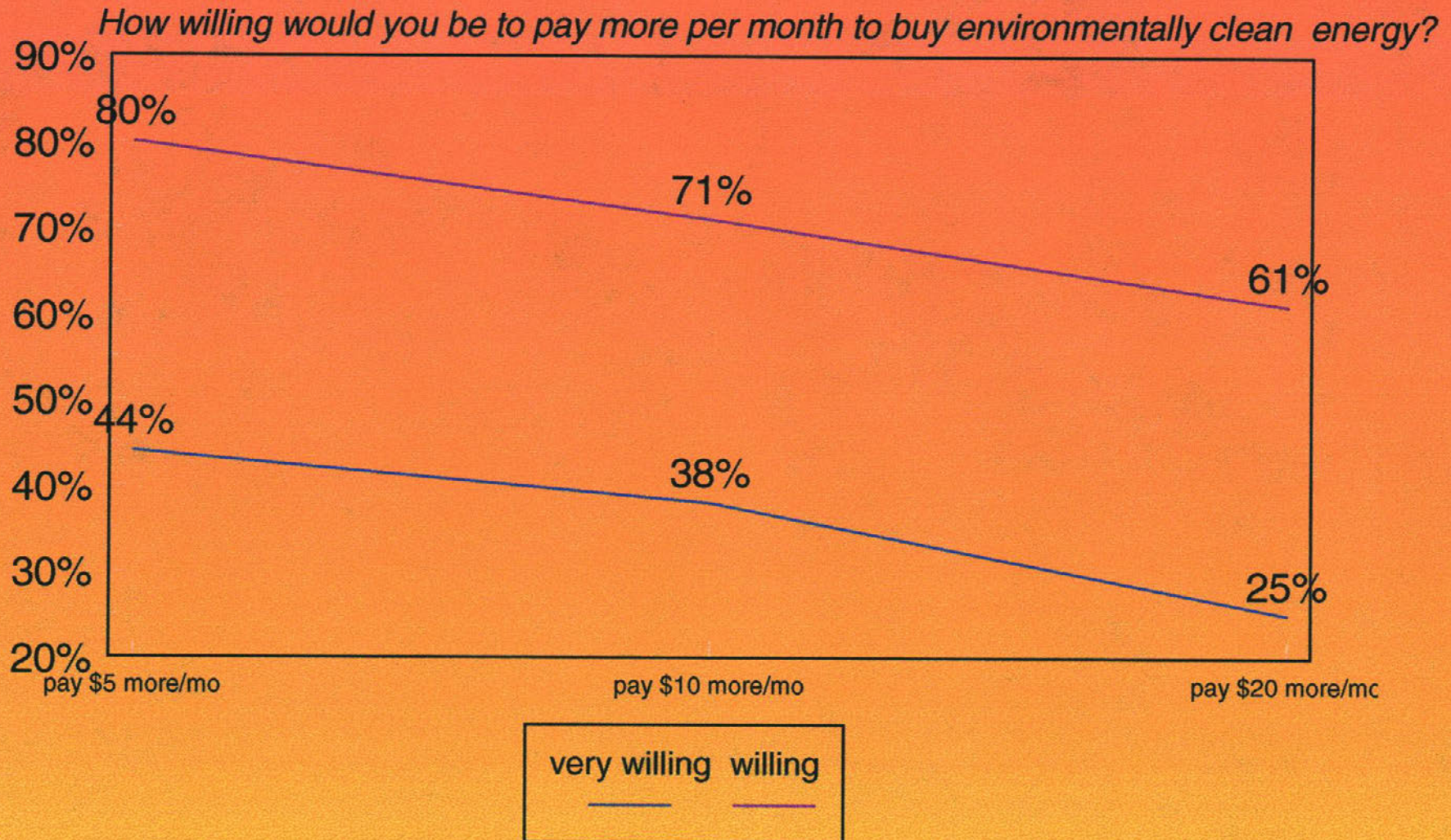
strongly fav somewhat fav

The Mellman Group, Inc. 9/97

Proposals That Give Consumers Clean Energy Alternatives Are The Most Popular And Seen As The Most Effective Means Of Addressing This Problem

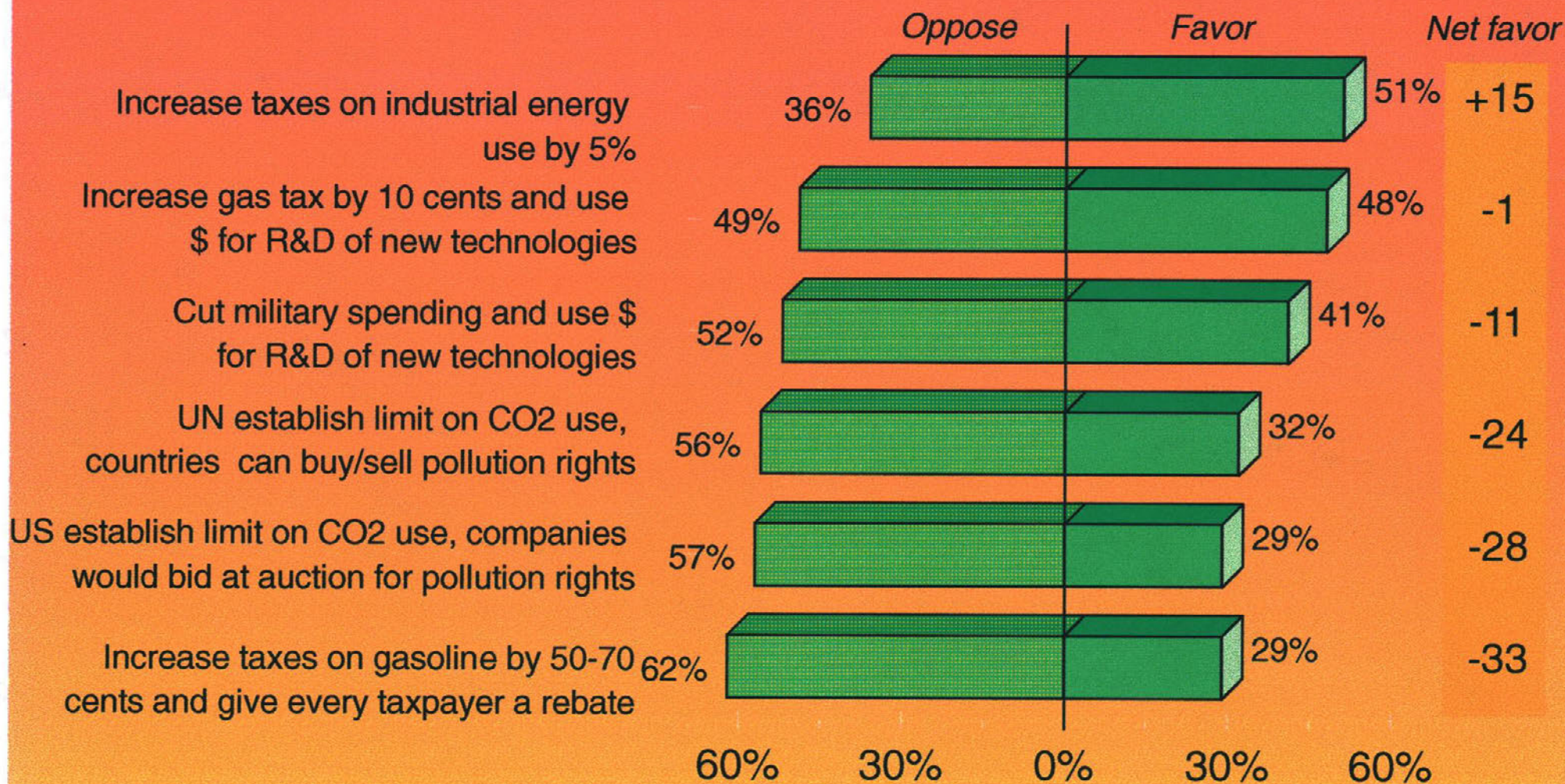


The Price Curve Indicates That Voters Are Willing To Pay For Clean Energy



World Wildlife Fund

Voters Are Least Enthusiastic About Companies Bidding At Auction For The Right To Pollute, UN Established CO2 Limits, And A Large Gas Tax Increase



(rank ordered by net favor)



World Wildlife Fund

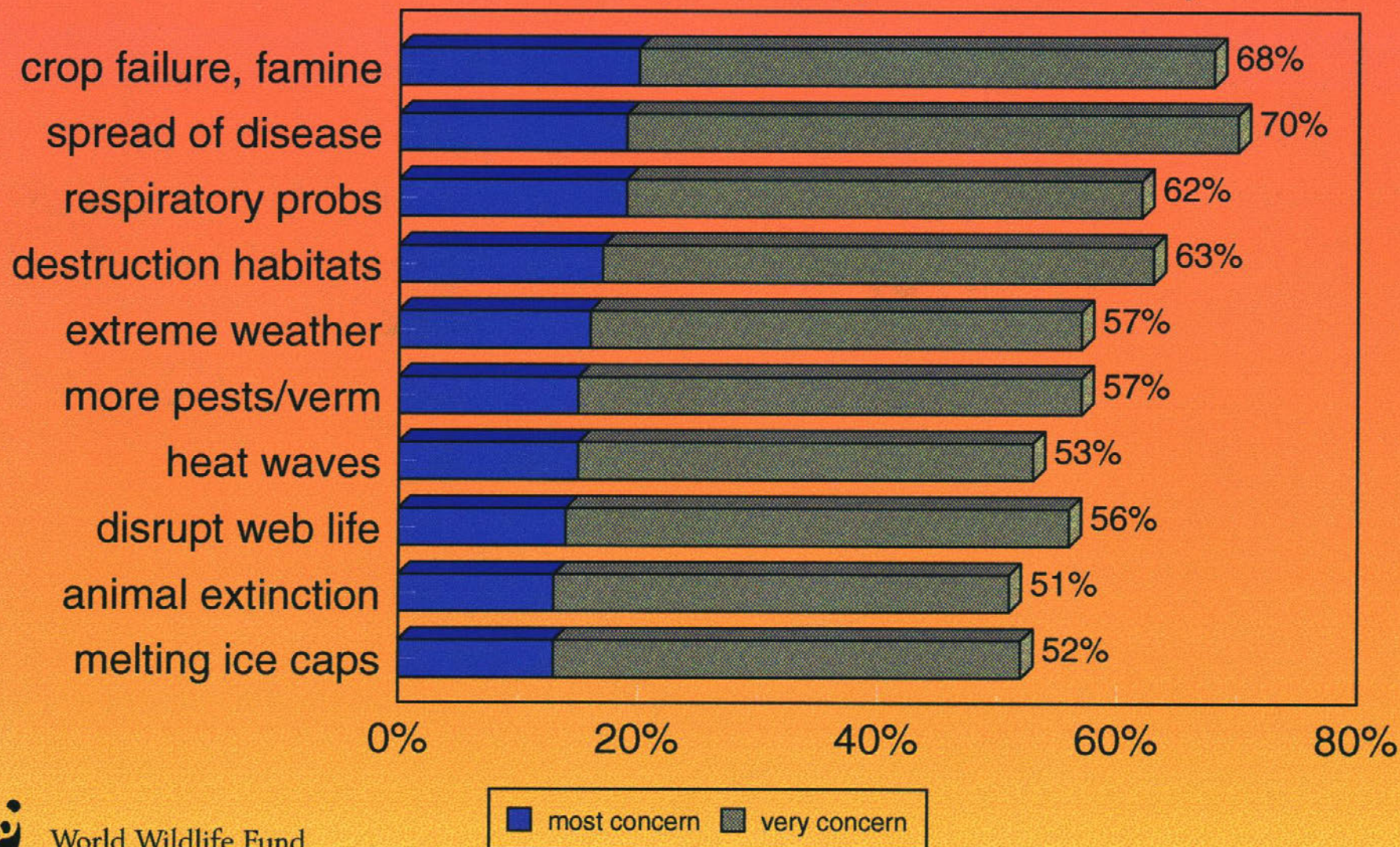
■ favor ■ oppose

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Voters Are Most Concerned About The Impact Of Global Warming On Public Health And Habitats

They Worry About Famine, Increased Respiratory Problems And The Spread Of Disease

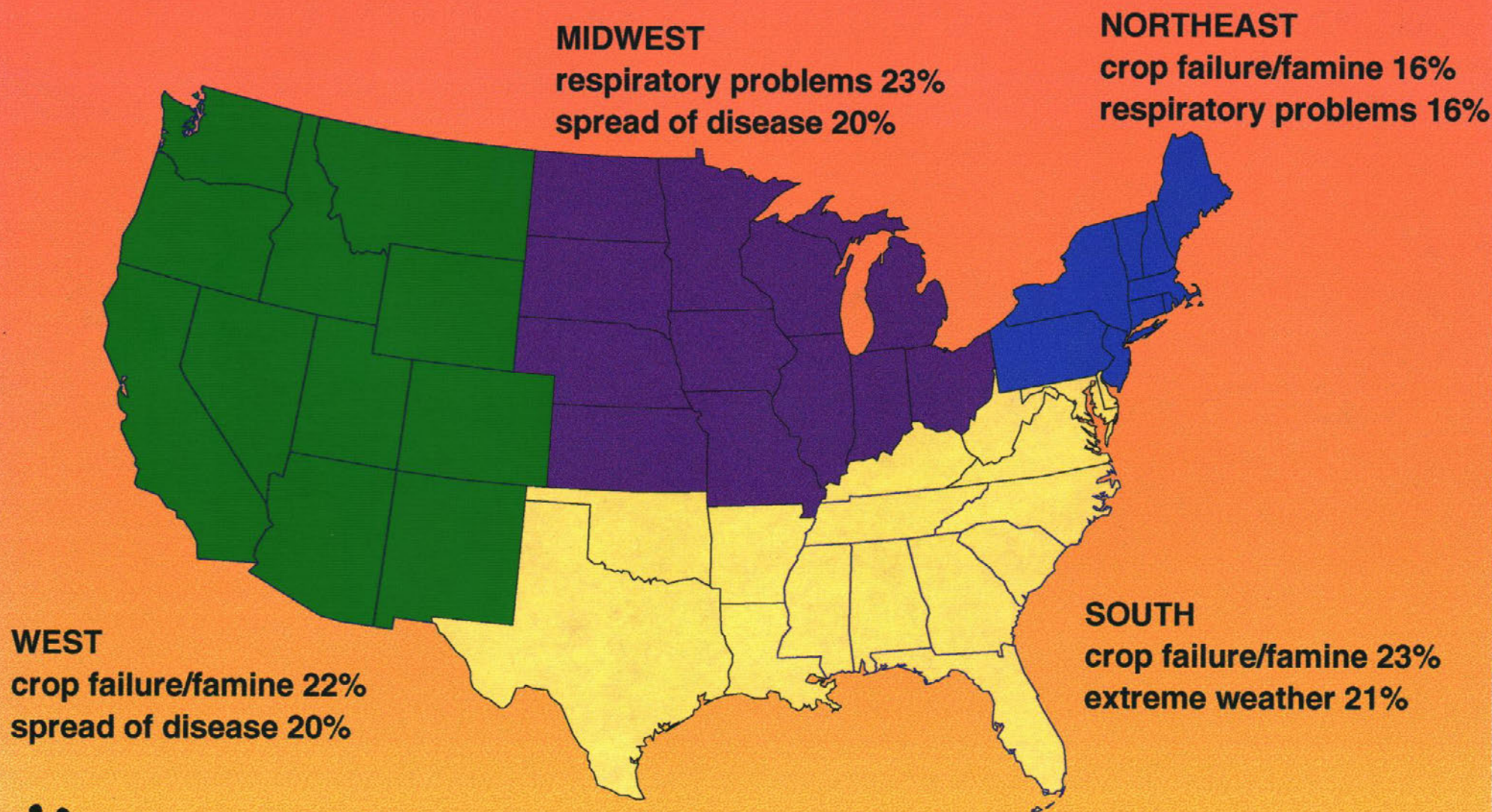
rank ordered by "one of things that would concern you most"



World Wildlife Fund

The Mellman Group, Inc. 9/97

People In The Midwest Are More Concerned About Disease And Respiratory Problems, While Southerners Are Worried About The Weather Concern About Crop Failure And Famine Is Widespread



World Wildlife Fund

% saying one of the things that concerns them most

The Mellman Group, Inc. 9/97

To: Todd Stern, Staff Secretary to the President.

From: Adam Markham, World Wildlife Fund

Date: 11 August 1997

Re: Gaining Business Support for Climate Initiatives.

To follow-up on the discussion we had with Mark Childress the other day, and on today's brief phone conversation, I wanted to outline a proposal for you as to how we might take this initiative forward. The critical issue being the positive involvement of business leaders in supporting an environmentally meaningful agreement in Kyoto.

We propose that during September a meeting be organized between a select group of corporate CEOs and the President, with the aim of developing a constructive relationship on climate change prior to Kyoto. I spoke to Roger Sant, Chairman of World Wildlife Fund, and of the AES Corporation, about this idea last Friday, and he was enthusiastic about moving forward with it. Indeed, he offered to help facilitate making such a meeting happen, and to work with us to create an informal forum of business leaders that would put meat on the bones of any proposals discussed at a White House meeting.

Most of the current initiatives by environmental groups for dialogue with business and industry are aimed at developing post-Kyoto strategies. This meeting and its follow-up would be strongly focused on stimulating businesses to articulate their support for action prior to Kyoto. I believe we could pull together an impressive group of large, multinational companies for a meeting with the President, and that such a meeting could catalyse more assertive and productive policy inputs by those companies in the lead-up to Kyoto.

The objective of the meeting would be to go beyond the debate about science, and instead discuss the conditions under which corporate America could most constructively address the need to reduce carbon emissions. Most of these businesses have their own ideas about measures that could be taken to reduce emissions whilst still keeping the economy growing. Many US companies are at the cutting edge of technology development and are already positioning themselves in the marketplace to become global leaders in a world where carbon has a price. Not enough is being heard about these innovations, many of which are supported through DOE and EPA programs.

Companies that could be approached at short notice include GM, Johnson and Johnson, Hewlett-Packard, SC Johnson, Electrolux, Enron, IBM, AT&T, Honeywell, Gillette, Monsanto, DuPont, BP, 3M, PG&E and SunOil, to name a few that WWF has particularly

good contacts with.

In addition to providing a venue for companies to get their points of view across to the President, I think the meeting could be used to formally request their help. Perhaps the President could ask the CEOs present to put together some proposals for action in time for the White House Conference in October? A tight schedule, I know, but one that could probably be adhered to if we start working on it now. The President could also press for greater voluntary commitments by businesses and public support for action.

I hope that you agree that this proposal could help to solidify business support for effective action at Kyoto. I believe that the involvement of Roger Sant and his willingness to help us put together a winning mix of corporate leaders to help frame the policy debate for Kyoto could make this a powerful initiative. Our team is ready to work with you to take this on and make it a success. I look forward to hearing from you,

Best regards,

A handwritten signature in black ink, appearing to read "Adam Mark", followed by a period.

N.B. For your background, AES is a fast-growing independent power producer (IPP) founded by Roger Sant and Dennis Bakke in 1981. The company owns or operates 75 power plants in 12 countries, including the US and China, and has more than \$5 billion of projects in construction or the late stages of development.



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MEMORANDUM

To: Todd Stern
From: Adam Markham
Date: 17 October 1997
Subject: Policies and Measures to Reduce CO₂ Emissions in the United States

Todd,

I'm attaching summaries of two new studies WWF has undertaken, and which will, I hope, be useful for you in developing a final position for Kyoto. Some additional polling carried out after we briefed you a couple of weeks ago, and a detailed new study on emissions reduction policy options, costs and benefits for the U.S.

New energy study shows potential for significant cuts below 1990 levels by 2010

The "policies and measures" study is a peer-reviewed report prepared by Boston-based consultants, the Tellus Institute. The bottom line is that it provides a blueprint for an innovative and cost-effective set of measures which, if followed, could bring US carbon emissions 21% below 1990 levels by the year 2010. Cumulative net economic benefits are calculated at more than \$278 billion through 2010.

The Climate Protection scenario lays out a series of cost-effective measures including:

- Renewables content standards
- Pollutant emissions cap and trade schemes
- An advanced vehicle initiative
- Investment tax credits
- Regulatory reform
- Market transformation incentives
- Appliance and building standards
- Biomass cofiring expansion

Detailed parameters for these policies and measures were used as inputs to the Energy Information Administration's National Energy Modeling System (NEMS), and additional analysis carried out to compensate for some of the limitations of NEMS.

It is worth noting that to get the 10% reduction by 2005 requires the incremental costs to be \$60/ton of CO₂. If, for example, an 8% reduction is the goal, the marginal costs would be significantly lower. It should also be noted that it would be possible to achieve the same cumulative emission reductions by 2010 without going so deep in 2005, perhaps at lower overall costs and lower marginal costs.

This report is in its final pre-publication stage, and we expect to release it early next week. I wanted you to see at least the summary as soon as possible, and I will courier a full copy of the study over as soon as we have a final draft.

New polling results show strong support for unilateral action by US at Kyoto

The other attached memo, from the Mellman Group, is self-explanatory. It details polling carried out in the first week of October, in which we tried to clarify whether Americans feel that developing countries should be required to commit to emission targets before the US takes action. The answer is clearly no. 71% support action by the developed world alone, and 57% would support unilateral US action. It seems there is a strong feeling in the country that a significant commitment by the US in Kyoto would be a good thing.

I'm also sending these results to Beth Viola, Tim Wirth, Rosina Bierbaum and TJ Glauthier.

10/17/97 draft copy - not for citation

Policies and Measures to Reduce CO₂ Emissions in the United States

An Analysis of Options for 2005 and 2010

Tellus Institute and SEI-Boston

October 17, 1997

Abstract

The Intergovernmental Panel on Climate Change has unequivocally reported that in order to prevent global climate disruption and its attendant ecological, economic, geo-physical, demographic and political consequences, it is necessary to stabilize atmospheric concentrations of greenhouse gases well below the levels that would result if greenhouse gases continued to accumulate along current trends. Thus, to protect global climate, annual greenhouse gas emissions must be reduced by at least 60 percent below present emission rates. As the principal greenhouse gas is carbon dioxide, which is released in the energy production and use at the heart of industrial economies, this daunting objective will require two complementary sustained initiatives. First, the advanced industrial societies must dramatically reduce their carbon emissions from current levels. Second, industrializing nations must economically develop along a path of low carbon-intensity. Arguably, the United States, whose current per capita carbon emissions are roughly five times the present global average, must radically decrease emissions as its contribution to climate protection.

This study finds that the US can reduce its annual carbon emissions to **10 percent** below 1990 levels by 2005 and to **21 percent** below 1990 levels by 2010, at net savings to its economy relative to the present energy-intensive and fossil-based path. The US can achieve this by implementing an ambitious set of targeted policies, beginning in 1998, which would overcome market and institutional barriers and stimulate more rapid introduction of advanced technologies and fuels that are cleaner and more efficient. These near-term carbon reductions, and the technologies and policies that underlay them, establish a trajectory and a basis for the much deeper long-term cuts that are needed for climate protection.

This study was commissioned by the World Wildlife Fund (WWF) as a companion to parallel studies of the European Union (Blok *et al* 1996) and Japan (Morita *et al* 1997), which together with the US are responsible for roughly 40 percent of the world's annual carbon emissions. The study builds and expands upon another study -- *Energy Innovations: A Prosperous Path to a Clean Environment* (EI 1997), which was recently released by five non-profit energy and environmental policy research organizations. This study strengthens, accelerates and adds to the policies identified and analyzed in *Energy Innovations*, to build an augmented policy package that more aggressively captures near-term carbon emissions reductions, in the time frame proposed by the Alliance of Small Island States (AOSIS).

I. Introduction and Summary

Background

At the 1992 Earth Summit in Rio de Janeiro, signatories to the Framework Convention on Climate Change committed themselves to achieving ...stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous interference with the climate system. Since that time, however, emissions of greenhouse gases have continued to rise, even as the community of climate scientists has moved toward the consensus that already human activities are having a discernible impact on global climate (IPCC 1996).

Annual carbon dioxide emissions of the industrialized countries are about 4 billion metric tons (a bit more than 3 tons per capita) including US emissions of about 1.5 billion tons (at 6 tons per capita), while the developing world releases about 2 billion tons (at about 0.5 ton per capita). Adequate response to the threat of global climate change will require stabilizing annual global carbon emissions at least 60 percent below current levels. However, under a business-as-usual future, in which no special attention is paid to the threat of climate change, overall annual emissions would likely *increase* from the current 6 billion tons to about 14 billion tons by 2050, driven by conventional economic development and a near doubling of population. Avoiding this path will require that two trajectories be established and sustained to reach the required global emissions of less than 2.5 billion tons; the industrialized world must reduce its annual carbon dioxide emissions from about 3 tons per capita (for the US, 6 tons per capita) to about one quarter ton per capita, and the industrializing world must be helped to achieve economic growth along a path of low carbon intensity.

Equity considerations aside (such as the current carbon accumulations owing to historic industrial development, which have nearly saturated the atmosphere's capacity to absorb additional carbon without inducing large-scale climate change; and the current imbalance in per capita emissions among nations), it is essential for climate protection that the industrialized countries take vigorous action to drive down their emissions towards the levels identified above, *no matter what action developing countries take*; the chief consideration affected by developing country action is how rapidly this must occur. Indeed, recognition of these facts is implied in the commitment to action by the industrialized world, prior to that of the developing world, in the Berlin Mandate.

The upcoming December, 1997 Conference of Parties to the FCCC in Kyoto offers a pivotal opportunity to make concerted progress toward this goal. Signatory states are obligated to formulate a greenhouse gas reduction regime in Kyoto, including quantified reduction targets and explicit timetables that will be legally binding on industrialized nations. The signatories will be considering the proposal offered by the Alliance of Small Island States (AOSIS), which targets a reduction in greenhouse gas emissions to 20 percent below to 1990 emissions by 2005, a reduction target already adopted by some nations as their individual targets but argued by others to be unrealistic (Rlok *et al* 1996).

The present study, along with parallel studies for the European Union and Japan, has been commissioned by the World Wildlife Fund (WWF) to develop a set of concrete policies and measures for emissions reductions that could realistically approach the AOSIS' proposed 20 percent reduction target by 2005. Although very little time remains to achieve this, especially as current levels of emissions exceed considerably the 1990 benchmark, it is also

clear that tremendous potential exists for emissions reductions below projected business as usual levels.

This study has sought to identify policies and measures that (1) achieve significant carbon emissions reductions quickly, (2) are economical in the aggregate, owing to the energy-cost savings that are induced, even without considering greenhouse gas, pollution and ancillary benefits, and, perhaps most importantly, (3) serve as an effective transitional strategy that establishes a foundation and builds momentum toward the much deeper long-term emissions reductions required for climate protection.

Methodology

The analysis reported here builds and expands upon *Energy Innovations: A Prosperous Path to a Clean Environment* (EI 1997), a collaborative effort recently released by the Alliance to Save Energy, American Council for an Energy-efficient Economy, Natural Resources Defense Council, Tellus Institute, and Union of Concerned Scientists. The aim of *EI* was to formulate and model a set of targeted and complementary policies that would guide the US economy towards lower cost, less polluting, more secure, and more sustainable ways of producing and using energy. The *EI* methodology, which we have adopted and extended for the present study, consisted of translating the selected policies into technical and economic parameters that were then used as inputs to the Energy Information Administration's National Energy Modeling System (NEMS) as the primary analytical tool (EIA 1995). Supplemental analysis was done to compensate for limitations of NEMS, as mentioned in the sections below. Experts on the technologies for the residential, commercial, industrial, transportation and electricity generation sectors reviewed the detailed specifications used in NEMS and refined them as appropriate. This report borrows heavily from the original *EI* study, which was peer-reviewed by many leading US energy analysts.

This analytical approach is based on an integrated model that simultaneously considers the entire set of policies and models the direct impact of each policy along with the interactions among them. As this analytical approach yields results that are comprehensive and integrated, it is necessarily difficult to unambiguously attribute carbon reductions to specific policies or technology measures. Owing to the integrated nature of the analysis, individual measures have impacts that interact with one another, and have non-additive and sequence-dependent effects. In the sectoral descriptions below, we briefly describe the individual policies, give the modeling assumptions into which they translate, and report the resulting carbon reductions as aggregate figures for each sector. To the degree feasible, we also report the separate impacts of individual policies or groups of policies.

The baseline scenario considered in this study is essentially a "business as usual" projection, which was derived from the baseline scenario in *EI* by using updated fuel price projections (EIA, 1997). This projection assumes that there are continued modest improvements in the fuel economy of new vehicles, continued decline in industrial energy intensity, and continued penetration of more efficient equipment in buildings at historical rates. However, the steady increase in demand for energy services more than compensates for these improvements, and by 2005 energy consumption increases 20 percent and carbon emissions 17 percent above 1990 levels, rising further in 2010 to 24 percent and 22 percent,

respectively. (For further details regarding the baseline scenario see the respective sections below and *EI*.)

The policy-driven scenario developed in *EI* (dubbed the *Innovation Path* in that report) projects carbon emissions to fall below the 1990 benchmark by 6 percent in 2005 and 10 percent in 2010, both substantially short of the 20 percent reduction target proposed by AOSIS for 2005. However, owing to the policies of the *Innovation Path*, carbon emissions were projected to continue their decline, reaching the 20 percent reduction level by about 2015, and 45 percent by the 2030 horizon of the study.

It is interesting to note that the policies and measures modeled in the *Innovation Path* are roughly as effective as those developed for the European Union (EU) study commissioned by WWF (Blok 1996) -- each achieving a 19 percent reduction in emissions relative to its own baseline scenario projections for 2005. The lower reductions relative to 1990 found in *EI* reflect a quicker growth of baseline emissions in the US than in the EU, due in part to shifts from coal to gas made feasible by the comparable prices of these fuels in the EU.

The present study strengthens, accelerates and adds to the policies identified and analyzed in *Energy Innovations*, to build an augmented policy package that more aggressively captures near-term carbon emissions reductions. The key changes are acceleration of combined-heat-and-power (CHP) in the industrial sector, more rapid penetration of ethanol in blends with gasoline for transportation, and co-firing of biomass in coal-fired electric generation. The enhanced policy package achieves carbon emissions reductions to 10% below 1990 levels by 2005 and 21% below 1990 levels in 2010.

Policies

The *Climate Protection* scenario developed in this study is an integrated and balanced set of policies that can put the US on a path of technological diffusion and innovation towards an economically and environmentally sustainable future. The sector-specific policies and programs would guide the economy toward more efficient, lower cost, less polluting, more secure, and more sustainable production and consumption of energy. Some of the key policies are:

- *renewables content standards*, which would require increasing proportions of renewable resources for electricity and motor fuels, through credit-trading market mechanisms.
- *pollutant emissions caps*, which would limit SO₂, NO_x, particulates and CO₂ emissions in the electric power sector through allowance trading systems
- *biomass cofiring expansion*, which would quickly establish a significant amount of renewable energy in the electricity supply sector without requiring substantial investment in new power plants
- *an advanced vehicles initiative*, which would introduce stronger fuel economy and emissions standards along with pricing reform, incentives and demand management,

with the objective of encouraging the commercialization of clean and efficient vehicles and more environmentally benign travel patterns

- *investment tax credits*, which would speed the adoption of modern and energy-efficient technologies for new manufacturing equipment, through an incentive that is paid for by fees on energy purchases
- *research, development and technical support*, to ensure that innovation proceeds at a pace that makes improved energy-efficient and low-carbon technologies available more rapidly
- *regulatory reform*, to refine protocols and ensure market access, to fairly represent the economic and environmental benefits of industrial combined-heat-and-power (cogeneration) and, thereby, to speed its adoption by industrial firms
- *market transformation incentives*, including technology demonstrations, manufacture incentives, and consumer education, which would reduce transaction costs, help move products from prototype to commercial production, and lower the key hurdles between potential and realized energy savings
- *appliance and building standards*, which would establish norms for equipment, design and performance that, through purchases and practices, would reduce energy used in providing services in homes and offices

Details on these and additional policies in the *Climate Protection* scenario are provided in the relevant sections below.

Results

Carbon Reductions

The *Climate Protection* scenario developed here builds on the original *Innovation Path* (EI 1997) by implementing additional and strengthened policies in each sector to achieve deeper carbon reductions in the time-frame proposed by AOSIS. The policies and modeling results for each sector are described in the following sections. The combined effect of the more aggressive set of policies calculated in the integrated analyses is a 10 percent carbon reduction in 2005, which still falls short of the AOSIS target. However, reductions reach 21 percent by 2010, with excellent momentum towards deeper long-term reductions.

The carbon emissions of the baseline and *Climate Protection* scenarios are given in Figure 1. This figure reflects the separate and combined impacts of the sectoral policies -- in buildings, industry, transportation and electricity supply -- which induce decreases in energy-intensity through more efficient technologies, processes and practices, in addition to decreases in carbon-intensity through shifts to lower carbon energy sources and associated energy conversion facilities. The upper and lower curves give total carbon emissions for the two scenarios, while the shaded regions show the reductions from policies in each sector in succession. For this presentation, we adopt a convention for allocating electric sector emissions reductions that consists of first obtaining the reductions owing to electric supply

policies, which decrease the carbon-intensity of electric power generation, and then obtaining the further reductions from demand sector policies, which decrease the amount of power required. The latter reductions are allocated to the demand sectors in proportion to their demand reductions.

PRELIMINARY: Figure 1 shows baseline scenario carbon emissions reaching 1567 million metric tons (MTc) by 2005 and 1634 MTc by 2010, increases of 17 percent and 22 percent, respectively over the 1990 carbon emissions of 1338 MTc. The *Climate Protection* scenario projects carbon emissions that decrease to 1203 MTc in 2005 and 1061 MTc in 2010, reductions of 10 percent and 21 percent, respectively below 1990 emissions.

{Figure 1}

PRELIMINARY: *Economic Costs and Benefits*

On balance, the set of policies of the *Climate Protection* are estimated to be cost-effective by a significant margin, as shown in Figure 2, which provides cumulative discounted (present value) of costs, savings and net benefits through 2005 and 2010. Cumulative present value net benefits are almost \$70 billion through 2005 and almost \$200 billion through 2010. This magnitude of net economic benefits could be taken as leeway for yet more aggressive carbon reduction measures that have net incremental costs. However, the rather aggressive set of measures already embodied in the policy scenario of this study have costs per saved carbon-dioxide at the margin of about \$60/ton; identifying realistic additional measures at a reasonable cost in the time-frame of this study is difficult; further improvements in efficiency and greater reliance on alternative energy sources before 2005 are constrained by the slow capital stock turnover in the four sectors. Rather than implementing more aggressive measures that might incur substantial cost, an effective longer-term strategy would involve implementing and sustaining the policies discussed here (or variations upon them) while committing substantial resources to R&D for broad classes of promising technologies that can provide the basis for the deeper long-term carbon emissions reductions needed to prevent global warming.

{Figure 2}

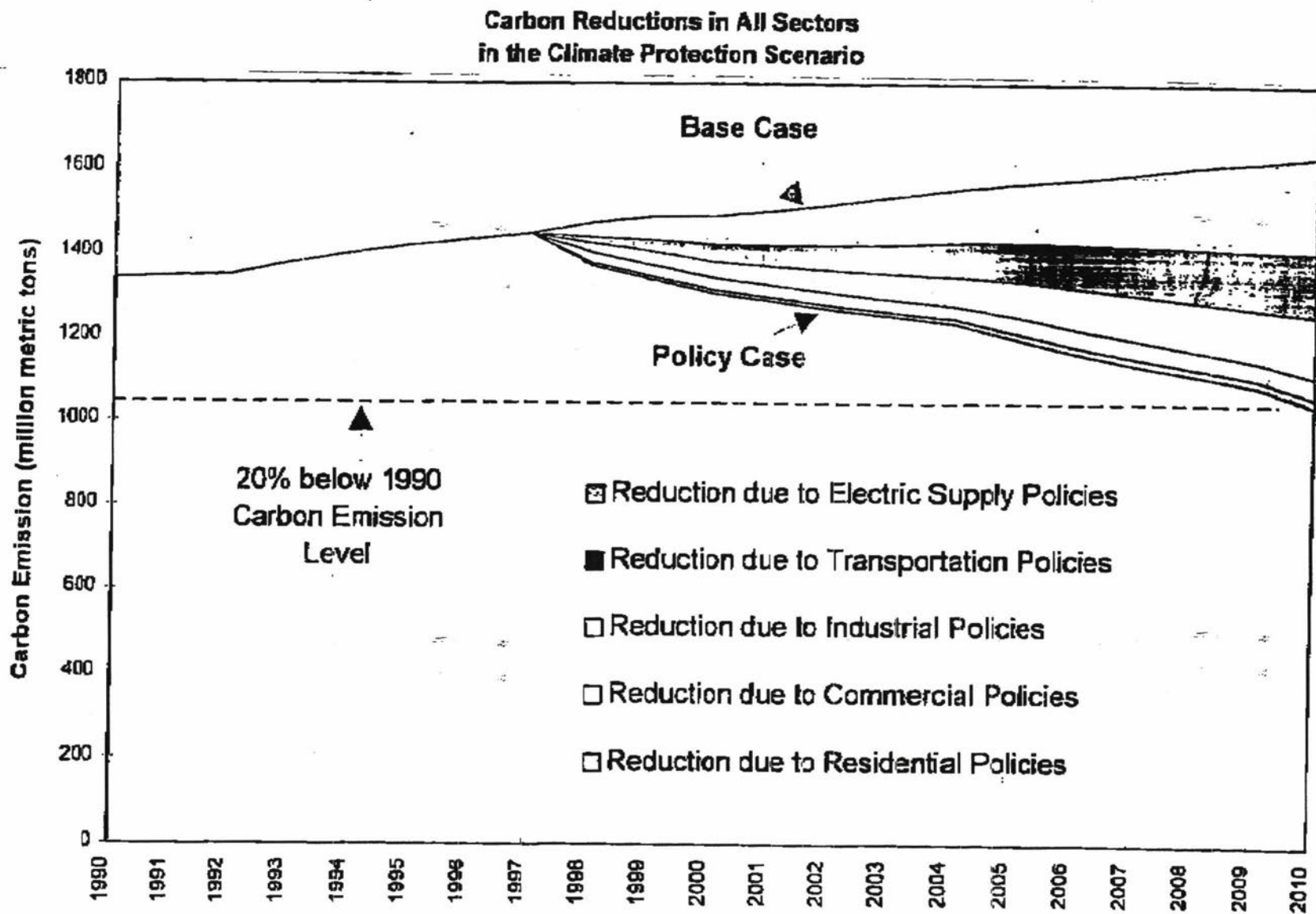


Fig1

The Cumulative Present Value of Economy-Wide Costs, Savings and Net Benefits of the Climate Protection Scenario

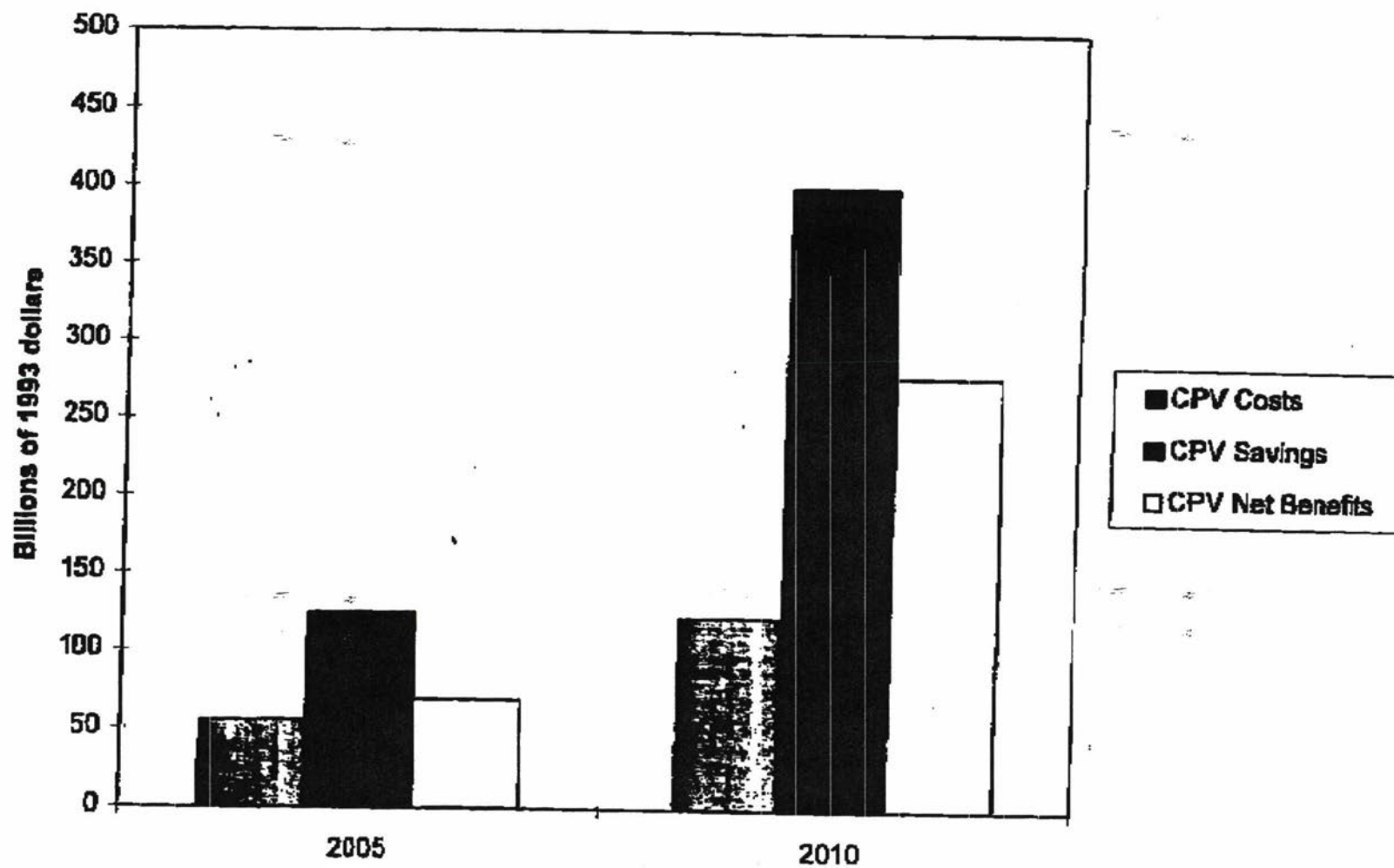


Fig 2
V