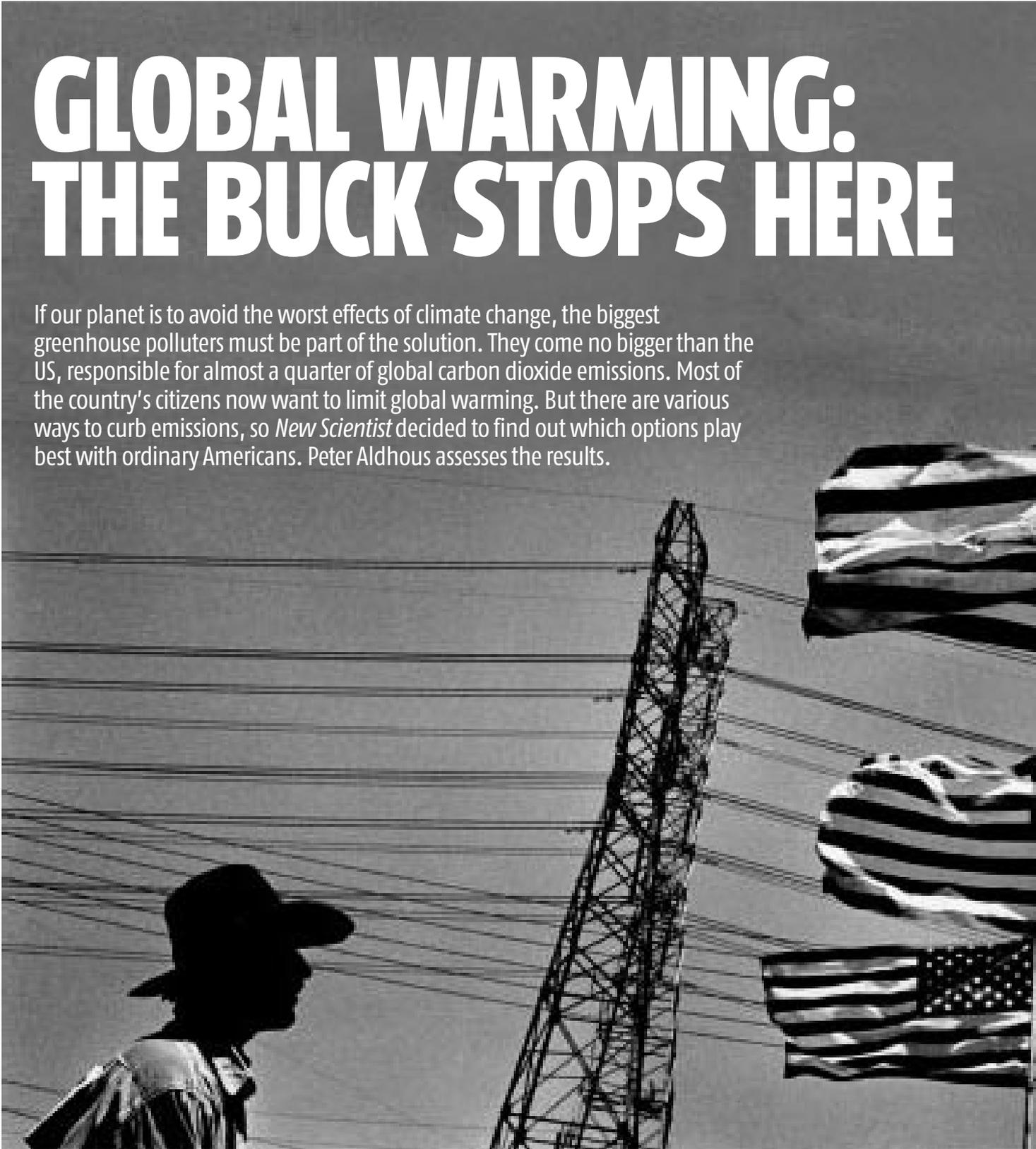


GLOBAL WARMING: THE BUCK STOPS HERE

If our planet is to avoid the worst effects of climate change, the biggest greenhouse polluters must be part of the solution. They come no bigger than the US, responsible for almost a quarter of global carbon dioxide emissions. Most of the country's citizens now want to limit global warming. But there are various ways to curb emissions, so *New Scientist* decided to find out which options play best with ordinary Americans. Peter Aldhous assesses the results.



THOMAS MICHAEL ALLEN/PHOTONICA



WAS it Al Gore's movie? Or is it the legacy of hurricane Katrina and a growing realisation that the US is as vulnerable as anyone to extremes of weather and climate? Whatever the explanation, Americans are growing more worried about global warming. According to a recent poll, climate change now looms larger than any other environmental threat in the mind of the American public. Asked in April to name the world's biggest environmental problem, a third of Americans cited global warming – double the figure from just a year before. Air pollution trailed a distant second at 13 per cent.

The same poll, conducted by *The Washington Post*, ABC News and Stanford University in California, found that 7 out of 10 Americans want the federal government to take more action on global warming. But what form should that action take? And does support for action hold firm if people understand that it may hurt them financially?

We suspected that if we explained various options and their probable costs, people would express clear policy preferences. So to find out, we joined forces with the Stanford polling team, led by political psychologist Jon Krosnick, and Resources for the Future (RFF), an environment and energy think tank in Washington DC.

The results of our poll challenge some common preconceptions. They show clearly that policies to combat global warming can command majority public support in the US, as long as they don't hit people's pockets too hard. Americans turn out to be suspicious of policies that use market forces to help bring down emissions, and are much more likely to support prescriptive regulations that tell companies exactly how they must achieve cuts. What's more, given the probable costs, action seems more likely to win public support if it targets electricity generation rather than private vehicles.

For politicians who are seeking voters' backing for the fight against global warming, our poll provides some comfort – not least that 85 per cent of Americans believe global warming is happening, a figure consistent with previous polls. There are, though, some significant

“The results of our poll show clearly that policies to combat global warming can win majority public support”

challenges ahead. For instance, the policy options preferred by the public are likely to be more expensive than others that command less support.

We investigated three ways of reducing greenhouse pollution. First, the government could impose regulations known as “standards” or “mandates” telling companies exactly what emissions-reducing measures they must put in place. Second, it could levy taxes on greenhouse gas emissions. And third, the government could set up a “cap-and-trade” scheme, requiring emissions cuts but allowing companies to trade in permits to emit greenhouse gases (for more detail, see “Policy options for reducing emissions”, below).

The aim of our poll was to test the relative attractiveness of these three options. We told a representative sample of 1491 adults how each option – a standard, an emissions tax, or a cap-and-trade scheme – could work in each of two sectors: vehicle fuel and electricity. We chose these sectors because they are each responsible for a substantial proportion of US emissions, and because the costs of cutting these emissions are likely to be passed on to consumers. That gave a total of six possible policies, each of which we told respondents would

Public attitudes to climate change have shifted radically in the US in recent months

Policy options for reducing emissions

1) STANDARDS (ALSO KNOWN AS MANDATES)

The government tells companies exactly what they must do to reduce emissions. For vehicle fuel, we told respondents that oil companies would be required to meet a sales target for low-emission fuels, such as gasoline mixed with ethanol. For electricity, we said that power companies would be set a binding target for the amount of electricity produced from plants that emit no greenhouse gases.

2) EMISSIONS TAX

The government imposes a tax on greenhouse gas emissions, giving companies a financial incentive to achieve cuts. For the purposes of the poll we told respondents that

companies would be taxed according to the amount of greenhouse gases they emit while generating electricity, or from the vehicle fuel they sell.

3) CAP-AND-TRADE

The government imposes an overall cut in greenhouse gas emissions and issues companies with tradeable permits allowing them to emit a certain quantity of greenhouse gases. The total allowed by the permits adds up to the cap. Companies that do not use all their permits can sell their spares to others. For the poll we told respondents that the government would issue permits to sell vehicle fuel or generate electricity responsible for a fixed amount of greenhouse emissions.

Special report Climate poll

reduce projected total US greenhouse emissions in 2020 by 5 per cent.

We explained to the respondents that each of the six policies would come at a cost, reflected in higher electricity bills and vehicle fuel prices. Estimating these costs was the hardest part. "No one knows with any degree of certainty what they will be," explains Ray Kopp, an environmental economist with RFF. But based on available analyses, Kopp settled on ranges he believed were likely to encompass the true costs of achieving a 5 per cent cut in emissions.

Kopp estimated that the price of a gallon of vehicle fuel would rise to between \$4 and \$15 per gallon by 2020, compared with a national average of \$2.88 for regular gasoline at the time the survey was conducted. For electricity, he estimated that a typical monthly bill would rise to between \$87 and \$155 by 2020, from a baseline of \$85, the approximate national average in 2005 – the most recent year for which figures were available.

For or against?

To test these price ranges, we split the sample into three groups. One was told that the vehicle fuel policies would result in the price of a gallon rising to \$4. The second group was told that a gallon would rise to \$7 and the third \$15. We did the same for electricity, telling the groups that a typical monthly bill would rise from \$85 to either \$87, \$95 or \$155. Then we presented all the respondents with the six policies and for each asked: "If an election were being held today, would you vote in favour of this policy or would you vote against it?" (For details of how the questions were phrased see <http://tinyurl.com/23b5ja>).

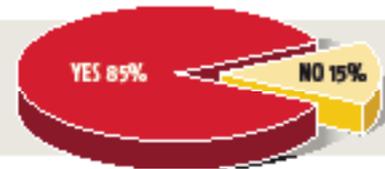
So what did we find? One striking result was that, at the costs we quoted, the US public has a clear preference for action in the electricity sector rather than vehicle fuel. Even the least popular electricity policy – cap-and-trade – won more support at all three prices than the most popular vehicle fuel policy.

Cost was clearly a factor here. Our vehicle fuel price hikes were significantly higher than those for electricity, reflecting the fact that curtailing emissions in the electricity

GLOBAL WARMING: WHAT THE US PUBLIC THINKS

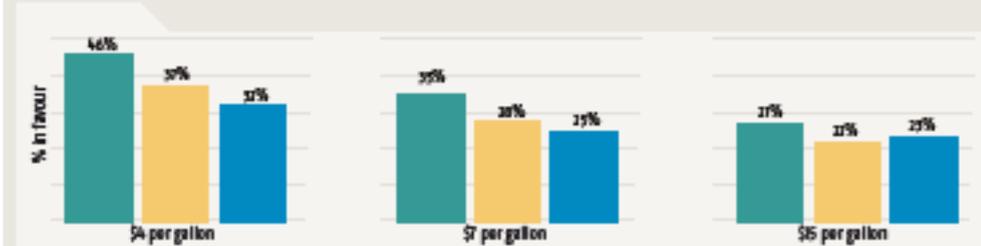
Over almost a decade, experts at Stanford University and elsewhere for the Future tested the popularity of six possible options for reducing US greenhouse gas emissions.

Do you believe that global warming has probably been happening?*

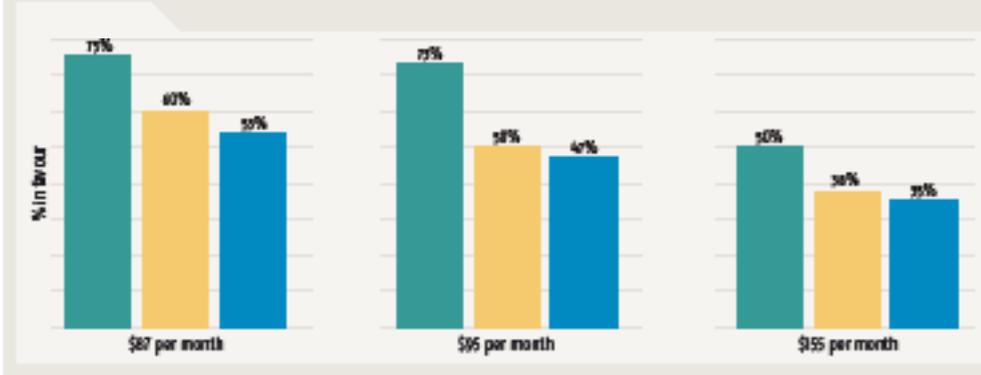


LOW-CARBON STANDARD FOR ELECTRICITY GENERATORS
 EMISSIONS TAX ON ALL COMPANIES
 CAP-AND-TRADE SCHEME

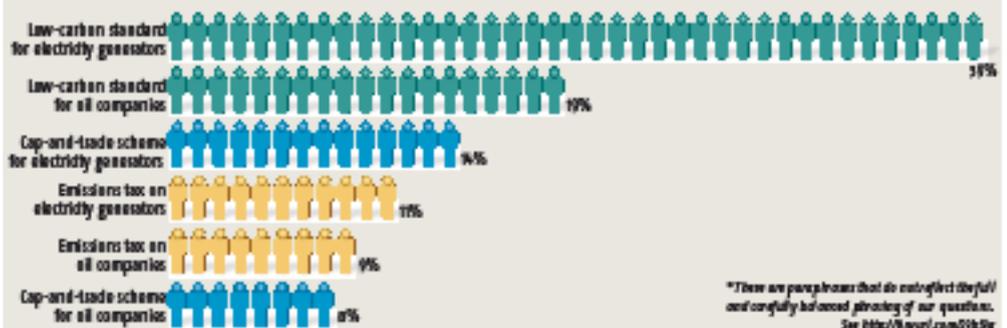
If an election were held today, would you vote in favour of this policy if it raised the cost of vehicle fuel to the level shown?*



If an election were held today, would you vote in favour of this policy if it raised the cost of an average home's electricity bill to the level shown?*



If only one of the plans had to be carried out, which one would you like it to be?*



sector will probably be more cost-effective. Even the lowest fuel price of \$4 a gallon was almost 40 per cent higher than the national average at the time of the survey. In comparison, the lowest electricity price represented only a 2.5 per cent increase on the \$85 average bill. In light of this difference, it is not surprising that the vehicle fuel policies were less popular overall. In fact, none achieved majority support even at the lowest price.

More evidence that cost accounts for most of the difference in support between the fuel and electricity policies came when we asked what respondents were actually spending on electricity and vehicle fuel. This revealed that the cheapest fuel policies would hit people's wallets about as hard as the most expensive electricity policies. At these price points, the policies were similarly popular.

Politicians, of course, are most interested in policies likely to enjoy widespread support, and they may find some encouragement in our results for electricity. At the low price, all three policy options for cutting electricity generators' emissions won clear majorities. Even at the high price, which would see a typical monthly bill rise by more than 80 per cent, the standard still won 50 per cent backing.

The enthusiasm for standards over both emissions taxes and cap-and-trade was perhaps the most striking result of the poll. In both the fuel and electricity sectors, standards were significantly more popular than the other two options. Differences between the emissions taxes and the cap-and-trade schemes were not statistically meaningful at any price.

The preference for standards was underlined by the responses to another poll question, in which we summarised the six policies and asked respondents which they would choose if only one was to be enacted. The electricity standard was most popular, followed by a standard requiring oil companies to sell more low-emission fuel – even though support for this option lagged behind all three electricity policies when each was described individually, with the costs made clear.

The relative lack of enthusiasm for emissions taxes should come as a no big surprise: when is a new tax ever popular? But the fact that cap-and-

“The lack of enthusiasm for emissions taxes should come as no surprise – when is a new tax ever popular?”

trade was viewed with similar suspicion gives pause for thought, as such schemes feature in bills to limit greenhouse emissions currently being considered by the US Congress (*New Scientist*, 31 March, p 12).

Cap-and-trade is popular with some policy-makers because it is expected to be more cost-effective than standards. The idea is that it gives companies an incentive to come up with innovative ways to reduce their emissions, rather than imposing solutions that may not turn out to be the cheapest. A clear example that this can work comes from cuts in sulphur dioxide emissions from US power plants under a cap-and-trade scheme introduced in 1990. According to analyses by Denny Ellerman, an environmental economist at the Massachusetts Institute of Technology, the scheme has delivered cuts that would have cost about twice as much through standards including demands that plants fit SO₂ “scrubbers”.

It remains unclear how the cost of a greenhouse gas cap-and-trade scheme would stack up against standards. But our poll suggests that cap-and-trade would have to be significantly cheaper to overcome public scepticism towards the idea. In the electricity sector, for example, our results suggest that cap-and-trade would only command

majority support if a typical household were paying less than an extra \$6 a month by 2020; a standard requiring companies to generate more electricity in ways that don't emit greenhouse gases would enjoy the same popularity even if it caused a typical bill to rise by \$70 a month.

We are not suggesting that these dollar figures should simply be taken at face value: the true test will come when the real costs, as yet unknown, hit home. What our results do provide is a springboard for a debate about how best to tackle global warming. Policies that hit people's wallets hard will be tough to sell to American voters, and those that may prove cheapest seem inherently unpopular. If we are to turn from the path to climate chaos, it seems that environmentalists, economists and politicians have some explaining to do. ●

The polling firm Knowledge Networks completed online interviews with a nationally representative sample of 1491 Americans aged 18 and over between 12 and 18 April 2007. Support for the Stanford team was provided by the university's Woods Institute for the Environment. For full survey details, including statistical analyses, see http://media.newscientist.com/data/images/ns/av/global_warming_poll_stanford.pdf

Who are America's climate warriors?

As well as judging the popularity of different policies to limit global warming, we wanted our opinion poll to tell us who is most likely to support action. So our Stanford collaborators Matthew DeBell and Brent Bannon analysed the poll results in the light of demographic information about the respondents. This analysis revealed several factors that were significantly associated with support for a greater number of the six policies presented, and indicated that people were weighing the policies against their own beliefs and circumstances when deciding how to vote.

Apart from a belief that global warming is happening, the most powerful factor was whether individuals identified themselves as environmentalists. These people supported one more policy on average

than people who said they were not environmentalists.

Other effects were smaller but still statistically significant. Parents with children under 17 and those with higher incomes were more supportive of action. Support was also stronger among those whose finances would be hit less hard, judging from their current spending on gasoline or electricity. These trends make sense: one would expect support for policies to be influenced by the ability to bear the cost, and people who fear that their children are likely to suffer the consequences of global warming have a clear motive for action.

As expected, supporters of the Democratic party were more likely than Republicans to favour government intervention to limit global warming. So were residents

of the western US, though why this should be is less clear. Concern about weather extremes such as drought – currently afflicting the region and expected to get worse with global warming – is a possible explanation.

Our survey raised another intriguing question: who are the people concerned enough to say they are prepared to pay \$15 a gallon to fill their vehicles with fuel? In total, 38 per cent of respondents assigned to this price point backed at least one of the three fuel policies. These people are not noticeably wealthier than the rest of the sample, nor do they live in households with no car, of which there were too few to analyse. But there were some significant associations: they are more likely to be women, support the Democrats, and live in the western US.