This is the print version of the Skeptical Science article 'It's too hard', which can be found at http://sks.to/toohard.

Can we fix global warming?

What The Science Says:
The argument that solving the global warming problem by reducing human greenhouse gas emissions is "too hard" generally stems from the belief that (i) our technology is not sufficiently advanced to achieve significant emissions reductions, and/or (ii) that doing so would cripple the global economy. However, studies have determined that current technology is sufficient to reduce greenhouse gas emissions the necessary amount, and that we can do so without significant impact on the economy.

Climate Myth: It's too hard
"The fact is that there is no one in the world who can explain how we could cut our emissions by four fifths without shutting down virtually all our existing economy. What carries this even further into the higher realms of lunacy is that such a Quixotic gesture would do nothing to halt the world's fast-rising CO2 emissions, already up 40 per cent since 1990. There is no way for us to prevent the world's CO2 emissions from doubling by 2100" (Christopher Booker)

Technology

Pacala and Socolow (2004) (PS04) investigated our capability to reduce greenhouse gas (GHG) emissions by examining the various technologies available to reduce GHG emissions. Every technology they examined "has passed beyond the laboratory bench and demonstration project; many are already implemented somewhere at full industrial scale." PS04 examined what would be required to stabilize atmospheric carbon dioxide concentrations at 500 parts per million (ppm), which would require that GHG emissions be held near the present level of 7 billion tons of carbon per year (GtC/year) for the next 50 years.

PS04 used the concept of a "stabilization wedge", in which "a wedge represents an activity that reduces emissions to the atmosphere that starts at zero today and increases linearly until it accounts for 1 GtC/year of reduced carbon emissions in 50 years." Implementing seven such wedges would achieve sufficient GHG emissions reductions to stabilize atmospheric carbon dioxide at 500 ppm by 2050, and emissions would have to decrease linearly during the second half of the 21st century. PS04 identifies 15 current options which could be scaled up to produce at least one wedge:

1. **Improved fuel economy**
2. **Reduced reliance on cars**
3. **More efficient buildings**
4. **Improved power plant efficiency**
5. **Substituting natural gas for coal**
6. **Storage of carbon captured in power plants**
7. **Storage of carbon captured in hydrogen plants**
8. **Storage of carbon captured in synthetic fuels plants**

9. **Nuclear power**
10. **Wind power**
11. **Solar photovoltaic power**
12. **Renewable hydrogen**
13. **Biofuels**
14. **Forest management**
15. **Agricultural soils management**

PS04 concludes "None of the options is a pipe dream or an unproven idea....Every one of these options is already implemented at an industrial scale and could be scaled up further over 50 years to provide at least one wedge." While the study has identified 15 possible wedges, PS04 argues that only seven would be necessary to stabilize atmospheric CO_2 at 500 ppm by mid-century. The list in the study is also not exhaustive, for example omitting concentrated solar thermal power and other renewable energy technologies besides wind and solar PV.

However, Dr. Joseph Romm (Acting Assistant Secretary of Energy for Energy Efficiency and Renewable Energy during the Clinton Administration) argues that at least 14 wedges would be necessary to stabilize atmospheric CO_2 at 450 ppm. Romm has proposed what he believes to be the most plausible way to achieve 16 wedges.

The bottom line is that while achieving the necessary GHG emissions reductions and stabilization wedges will be difficult, it is possible. And there are many solutions and combinations of wedges to choose from.

Economics

Working Group III of the IPCC Fourth Assessment Report focused on climate change mitigation, and a substantial portion of the report focused on the economic impacts of mitigation efforts. The key finding of the report is as follows.

The report found that stabilizing between 445 and 535 ppm CO_2-equivalent (350–440 ppm CO_2) will slow the average annual global GDP growth rate by less than 0.12%. Additionally, this slowed GDP growth rate is in comparison to the unrealistic business-as-usual (BAU) scenario where climate change has no impact on the economy. By 2030, the IPCC found that global GDP would decrease by a total of no more than 3% compared to the unrealistic BAU scenario, depending on the magnitude of the emissions reductions.

The report also found that health benefits from reduced air pollution as a result of actions to reduce GHG emissions can be substantial and may offset a substantial fraction of mitigation costs. Some other key findings:

"Energy efficiency options for new and existing buildings could considerably reduce CO_2 emissions with net economic benefit."

"Forest-related mitigation activities can considerably reduce emissions from sources and increase CO_2 removals by sinks at low costs"

"Policies that provide a real or implicit price of carbon could create incentives for producers and consumers to significantly invest in low-GHG products, technologies and processes. Such policies could include economic instruments, government funding and regulation"

In short, there are numerous opportunities to reduce GHG emissions at low cost, some of which result in a net economic gain. Overall, emissions can be reduced at a cost which will not cripple the global economy. Moreover, these emissions reductions would have a significant positive economic impact by slowing global warming.

We have the necessary technology. The net costs to implement them will not be crippling. The question remains - do we have the will to put forth the effort and initial investment to solve the problem?

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Skeptical Science explains the science of global warming and examines climate misinformation through the lens of peer-reviewed research. The website won the Australian Museum 2011 Eureka Prize for the Advancement of Climate Change Knowledge. Members of the Skeptical Science team have authored peer-reviewed papers, a college textbook on climate change and the book Climate Change Denial: Heads in the Sand. Skeptical Science content has been used in university courses, textbooks, government reports on climate change, television documentaries and numerous books.

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