

# Addressing the Problem of Global Warming

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## Introduction

Since 1880, the overall temperature on the planet has risen by about 0.8 degrees Celsius (or about 1.4 degrees Fahrenheit), and without any further action the temperature is on track to rise by a total of 3 to 5 degrees Celsius (or 5.4 to 9 degrees Fahrenheit) by 2100. Not only will this lead to higher peak temperatures in the summer, but also to more extreme weather events like droughts and floods, as well as to more severe hurricanes, increased risk of forest fires, and rising sea levels. Even if these harms might not be truly apocalyptic (no, I do not think the human race is at risk of going extinct), they are real, they are measurable, and they are significant.

Economic analysis suggests that it is worth making significant policy changes to slow the onset and mitigate the impact of global warming, and with new technological advancements this might actually have only a modest impact on overall economic growth. Taking these steps becomes especially obvious once you realize that eventually the world will have to fully convert away from carbon based forms of energy anyway (they are a finite resource after all), so why not speed up the technological advancement, make the transition early, and save us a bit of global temperature rise at the same time. The costs of making that transition were going to be incurred no matter what we do, so there are no additional costs to doing it sooner, and more rapid technological advancement may help us in other ways economically.

Clearly, a lot of changes are going to be needed in order to make this transition to a carbon free society, and it does not make sense to talk about all of them in detail here. This policy memo discusses two potential policy changes that would reduce the amount in carbon emissions emitted into the atmosphere. One, instituting a price on carbon, is already well known, and this memo offers some strategies to make sure it is effective and efficient, while also addressing the political economy problems that currently prevent it from being enacted. The other is a completely new and novel idea that I came up with myself, which would let people voluntarily sign up to have electricity providers double their electricity bill and divert all of that extra money into an Individual Retirement Account. Since people systematically undervalue benefits that accrue far in the future, the gains in retirement would be heavily discounted and the extra costs of electricity would be felt more strongly, and this increased perceived price of electricity would encourage people to reduce their electricity use over the short term. This would cost the taxpayers little money beyond the tax breaks people get from their contributions to the IRA, and could be instituted by the electricity providers on their own without any change in law at the state or federal level.

## First Proposal: Creating an Effective and Efficient Price on Carbon

When economists talk about pollution, they like to talk about externalities, which are simply the impacts felt by other people in society as a result of actions taken by certain individuals. In order for markets to work efficiently, the people making the decision to pollute need to feel the cost of the harm imposed on other people by their behavior, and this can be done by creating a price on carbon emissions. There are two approaches to creating a price on carbon, and both of them have similar economic effects since each of them would address the problem of the pollution externality. One approach, called cap and trade, would create a system of permits that allow companies to emit a certain amount of carbon, and then these permits would be bought and sold on the open market. In order to reduce the total amount of carbon emissions, the number of permits could be gradually reduced over time and this would drive up the market price of buying those permits, which would force carbon emitting companies to pay a price in order to continue emitting carbon dioxide. Currently, the European Union and a collection of northeastern states have created an emissions trading system like this. The second approach is to impose a carbon tax that creates a price on carbon by charging each company a fee on the amount of carbon they emit. Since companies would experience an economic loss for each amount of carbon emitted if a carbon tax were enacted, this would encourage companies to reduce their overall carbon emissions over time. Virtually every country does this in some form by imposing taxes on gasoline, and creating a carbon tax would simply do a similar thing for every activity that releases some carbon into the atmosphere.

Economists generally agree that the overall impact on the economy would be quite similar under each approach, but there are of course some differences. A cap and trade system has the government set the overall level of emissions, and then the market determines the price, while a carbon tax has the government set the price of carbon emissions and lets the market determine the amount of emissions. The main practical difference between these two approaches is that carbon emissions naturally decline during recessions, so setting a fixed amount of carbon emissions through a permitting system is only likely going to be binding during periods of economic expansion, while a carbon tax creates incentives to reduce emissions throughout the entire business cycle. Intuitively, the carbon tax does better on this score, where it seems like business should be working to reduce carbon emissions all the time, and not just some of the time when the economy is doing particularly well. As a result, I generally prefer the carbon tax, though realistically there is no reason countries might not try both approaches at the same time.

If the US does decide to do a carbon tax, the next critical question is how high do you set the carbon tax. Ideally, the taxes imposed on carbon would perfectly reflect the costs imposed on the rest of the society as a result of the carbon emissions (also known as the social cost of carbon), but unfortunately, coming up with a precise estimate for this value is a difficult task. Early in his presidency, Obama created an interagency working group to estimate this social cost of carbon, and came up with a value around \$21 dollars a ton back in 2010, which would reflect a value of about \$40 dollars a ton now. Trump reversed this decision and let individual agencies set their own value for the social cost of carbon, and currently the Environmental Protection Agency uses a value between \$1 and \$6 dollars a ton.

Unfortunately, even the higher value might dramatically understate the social cost of carbon because there is a lot of disagreement about how to compare the relative costs of additional global warming that occur decades or centuries into the future with the short term costs of mitigating carbon emissions that cause it right now. This is generally done through the discount rate, which determines the relative weight that long term costs and benefits have relative to short term costs and benefits, and works much the same way an interest rate would. A high discount rate puts more weight on short term costs and benefits and a low discount rate puts more weight on long term costs and benefits. When calculating their social cost of carbon, Obama's interagency working group used a discount rate of 3% to weight the costs and benefits far into the future, but British economist Nicholas Stern argues that lower discount rates should be used, and when he produced his own report in the UK in 2006 on the economics of climate change policy, he used a 1.4% discount rate that resulted in a social cost of carbon around \$85 a ton. In general, it takes about 100 gallons of gasoline to emit one ton of carbon, so a carbon tax that reflects a social cost of carbon around \$40 a ton would raise the cost of gasoline by an additional 36 cents, and a carbon tax that reflects a social cost of carbon around \$85 a ton would increase the cost of gasoline by an extra 77 cents. That means if a carbon tax wants to fully offset the externalities of carbon emissions, it should impose taxes on all forms of carbon emissions that are equivalent to about 36 to 77 cents a gallon of gasoline, depending on which discount rate you want to use, but imposing taxes above that level will cause more economic damage than it gains from reducing carbon emissions.

In general, however, the biggest problem with a carbon tax is not its likely economic effects, but the political obstacles it creates that currently prevents its passage. All the way back in 1993, Al Gore got a broad based energy consumption tax included in Bill Clinton's budget proposals, which is similar to what a carbon tax might do, but it ended up getting turned into a simple gasoline tax at the last minute due to political opposition within their own party, and this continued resistance has kept a broad based carbon tax from getting passed ever since. The basic problem is that virtually everyone uses some sort of carbon emitting technology, so imposing a tax on that activity will raise taxes on just about everyone in the country, whether you are rich or poor, Democrat or Republican, and the benefits will not be felt for decades or even centuries into the future.

In recent years, there has been a policy innovation that could help overcome these political obstacles. The basic idea is that the government would take all the revenue collected from a carbon tax and distribute it all back to the public in the form of an equal dividend paid to every person in the country. This overcomes some concerns among conservatives that the new revenue raised by the carbon tax would just go to fund more government programs and overcomes some concerns among liberals that the tax is regressive and would make low income people worse off. If each person got an equal dividend, then this means about 70% of public would get more from the dividend than they would pay in carbon tax, which means in theory this would lead to broader public support for a carbon tax since most people would receive direct short term financial benefits that offset the direct short term economic costs. In 2017, three prominent former Treasury Secretaries from Republican administrations (James Baker, George Shultz, and Henry Paulson) came out in favor of this idea, indicating there is at least some prospect for bipartisan support.

If the tax were to start small, at say \$25 a ton, then this would raise about \$100 billion in revenue, which if passed out to every adult in the country would generate about \$300 per person per year or \$25 per person per month. If the tax grew to around \$40 a ton, this would raise about \$160 billion a year in revenue and increase the benefit to about \$500 per person per year, or about \$40 per person per month. A carbon tax worth \$85 a ton would raise about \$340 billion per year, and would increase the benefit to about \$1,000 per person per year or \$85 per person per month.<sup>(1)</sup> Clearly, even if a carbon tax would raise the price on goods that emit carbon in their production process, there would be commensurate financial benefits to offset that cost, and once those benefits are felt, much of the political opposition to higher carbon taxes might subside as well.

## Second Proposal: Voluntarily Doubling Your Electricity Bill and Diverting It Into an IRA

The second proposal to reduce global warming would have people voluntarily sign up to have their electricity provider double their electricity bill and then put the extra money they collect into an IRA. This is an idea I came up with myself, and the basic idea is that charging people more in the short term for electricity will encourage them to reduce their electricity consumption, but it would still make people better off over the long run since the money goes back to them in the form of future retirement savings. In theory, people should wholeheartedly support this proposal because it encourages them to do something, save for retirement, that they would benefit from doing anyway. In practice however, people systematically undervalue benefits that accrue far into the future because of present bias, which might make them resistant to do so, but this idea exploits that bias and uses it to motivate people to use less electricity. If people know their electricity costs them \$1 and that an additional \$1 is put into their retirement account, if they value that future benefit at less than \$1 right now because of a present bias, then it feels like a price increase on their current electricity bill. Since we already know that people respond to higher prices by reducing consumption when it comes to electricity, then this should lead to less electricity consumption in the near term. This price increase might make people resistant to signing up in the first place, but if a subset of the population values the environmental benefits, then it might inspire them to subject themselves to this commitment device that raises their electricity prices now but also helps them save for retirement.

The beauty of this idea is that it is extremely easy to get started. Electricity providers already have a billing system set up to charge people for the electricity they use, and multiplying that amount by two would be trivial to implement. Financial institutions already have systems to create and administer Individual Retirement Accounts, so the electricity provider would just have to select a financial partner and automatically deposit their money into accounts created specifically for the benefit of their participating customers. Getting this started would only require approval from the electricity provider, and would require no state or federal law to be passed, and since it is voluntary, it would create no downside to those who were not interested in participating, but would be important to those committed to environmental causes. There would be some loss in tax revenue due to the increased amount of contributions to tax favored retirement accounts, but this loss would be minor especially since saving for retirement is something governments are already trying to encourage anyway.

At first, getting people to enroll would be done purely through educational campaigns, and the earliest adopters would likely be those environmental activists who are most strongly committed to reducing global warming. As time goes on, approaches that draw on insights from behavioral economics could be used to encourage more people to sign up. For example, people could sign up to double their electricity bill, but have enrollment delayed until they get their next scheduled pay increase. Giving up part of a future pay bump is less costly than reducing your consumption now because of loss aversion, which observes that people experience losses twice as strongly compared to gains. Eventually, taking advantage of this idea might become much more commonplace, and end up as one of those standard practices people take to reduce their environmental impact, much like recycling is now.

Power companies could even team up with a major financial institution to create Green IRAs, where not only would people save more for retirement, but they could devote the additional funds they do save to investments that provide important environmental benefits. Perhaps the Green IRA could have a limited number of investment options, where would be one option to put your money into an S&P 500 index fund, but there might be other options like a venture capital fund that invests only in new environmental technologies, or a fund that provides interest free loans to those buying electric vehicles. For those most committed, perhaps some of the funds put into a Green IRA could be devoted to carbon offsets to reduce your environmental footprint even further, even if those funds would ultimately be donated for that purpose and not invested in a way that could preserve your capital or make money for you down the road.

## Conclusion

Clearly, each of these ideas could make important contributions to the effort to reduce our carbon emissions in the US, but at the same time would not be enough to solve the problem entirely. In order to get our emissions even closer to zero, other initiatives would have to be implemented to help transform our society in ways that get us closer to that goal. For example, the government should assist in the discovery of new environmentally friendly technologies by spending more on research and development, especially when it comes to creating cheaper forms of energy storage. In addition, the government should be trying to increase the pace of adoption of new environmentally friendly technologies, perhaps by offering more generous subsidies to those buying electric vehicles. Finally, agriculture is another major source of carbon emissions, and reducing our overall level of meat consumption (especially beef), would not only provide significant environmental benefits, but also improve our health and reduce the suffering of animals at the same time. Still, adopting a carbon tax or voluntarily depositing extra electricity charges into an IRA do represent important first steps that will move us along the path of reducing our carbon emissions, and could attenuate the negative repercussions that result from the increased temperatures in our environment. The future costs from global warming are very real and quite significant, and taking these steps now represents a reasonable way to reduce the impact of those disturbing trends over the long term.

## End Note

#1 – In 2016, researchers at the Congressional Budget Office and Joint Committee on Taxation estimated that a \$25 a ton carbon tax that began in 2017 and increased at a rate 2% above inflation would raise about \$1 trillion dollars over 10 years or about \$100 billion dollars in 2020 alone. Since the population of the United States was around 328 million in 2019, dividing the \$100 billion by 328 million gets you value of around \$300 dollars per person or about \$25 per person per month. The other estimates are generated by scaling up the estimates for the revenue raised and dividend distributed proportionally with the rise in the dollar value per ton of carbon.

## Reference

Congressional Budget Office. 2016. "Options for Reducing the Deficit: 2017-2026." Congressional Budget Office Report, December 8<sup>th</sup>, 2016.