

**CLIMATE
LEADERSHIP
COUNCIL**

UNLOCKING THE CLIMATE PUZZLE

**Why we are failing to reduce emissions in time.
How a carbon dividends plan could overcome the
psychological, economic and political barriers.**

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About the Author



Ted Halstead is the founder, President and CEO of the Climate Leadership Council. Previously, he was founding President and CEO of New America from 1999 to 2007, and continues to serve on New America's Board of Directors.

At the age of 25, Halstead founded and directed Redefining Progress, an environmental economics think tank that organized the 1997 Economists' Statement on Climate Change. It includes 18 Nobel laureates as signatories, and remains the largest public statement in the history of the economics profession.

He is co-author with Michael Lind of *The Radical Center: The Future of American Politics* (Doubleday, 2001), and editor of *The Real State of the Union* (Basic Books, 2004). He was selected as a Young Global Leader by the World Economic Forum in Switzerland.

Mr. Halstead is a frequent public speaker and media commentator, having appeared as a guest on Nightline, ABC's World News Tonight, CNN, CNBC, C-SPAN, and PBS. His articles have appeared in *The New York Times*, *The Washington Post*, *The Financial Times*, *The Atlantic*, *Los Angeles Times*, and *The Harvard Business Review*.

Halstead graduated Phi Beta Kappa from Dartmouth College, and received his Master's degree from Harvard's Kennedy School of Government, where he was a Montgomery Fellow.

About the Climate Leadership Council

The Climate Leadership Council is an international research and advocacy organization whose mission is to mobilize global opinion leaders around the most effective, popular and equitable climate solutions. As a central part of this mission, the Council develops and promotes new policy frameworks based on carbon dividends for each of the largest greenhouse gas emitting regions. Currently active in Washington and London, the Council will expand to Berlin, Beijing and New Delhi next.

Find out more at www.clcouncil.org.

INTRODUCTION

Today's climate debate, and with it much of the promise of our collective future, is ensnared in a Gordian knot. The risks of a warming planet continue to mount while the inadequacy of current responses becomes more apparent. We seem trapped by multiple psychological, economic and political obstacles, just as our window for changing course is closing.

Echoing scientific consensus, every leading head of state now in office, with the notable exception of President Trump, has publicly agreed that we must prevent global temperatures from rising more than two degrees Celsius above pre-industrial levels if we are to avoid the most serious consequences of climate change. On our present trajectory, we will significantly overshoot this redline.

According to the UN's Intergovernmental Panel on Climate Change, staying below 2°C requires us to cut greenhouse gas emissions by up to 70 percent by 2050, and eliminate them entirely by the end of the century.¹ In the past two years, worldwide carbon emissions were essentially flat. The difference between zero and 70 percent is the size of our climate reality gap over the next 33 years.

The mainstream opinion among climatologists is that, barring major policy changes, the world is heading towards 4°C of warming by 2100, or double the agreed-upon limit. The World Bank issued a report on the likely impacts of a 4°C increase.² The list is by now well known, but still quite jarring if you consider that it could redefine the lives of those already born: the flooding of coastal cities, deadly

heat waves, risks to food production, massive involuntary migration, higher malnutrition, water scarcity in many regions, loss of biodiversity and a disproportionate impact on poor countries.

We face a known global threat of enormous consequence that is within our technological capability to solve. Yet not a single major power is implementing adequate solutions

The early impacts are difficult to miss: from record-breaking temperatures each month, to melting polar icecaps, to dying coral reefs, to regular flooding in Miami Beach. The worst-case scenario, according to the latest research, is a sea level rise of between 1 to 5 meters (3 to 15 feet) this century. As former NASA climatologist James Hansen, lead author of one recent study, explains: "That would mean the loss of all coastal cities, most of the world's major cities and all of their history."³

The Paris climate summit will hardly save the day. Leaders from 171 nations signed this agreement in April 2016, based on individualized country plans to reduce emissions. Yet the best estimates suggest that even if all countries honor their Paris commitments—a doubtful proposition, as these are non-binding—global temperatures are still projected to rise far in excess of 2°C this century.

Nor will the falling prices of solar and wind power solve the problem on their own. Certainly, the increasing cost competitiveness of renewables is good news, but their full potential will remain hamstrung as long as fossil fuel prices stay low. Absent fundamental policy changes, wind, solar, nuclear and other promising technologies are no match to the twin challenges of upgrading the world's entire industrial and transportation infrastructure, and meeting the energy needs of the 2.6 billion people projected to join our global population by mid-century.

Ours is an unprecedented juncture in human history. We face a known global threat of enormous consequence that is within our technological capability to solve. Yet not a single major power is implementing adequate solutions. And headwinds seem to be coming from all directions: from global economic forces, sociological trends and psychological barriers standing in the way, to daunting political obstacles, both domestically

and globally. A new wave of populism is spreading alongside mounting inequality, nationalism is on the rise, the global economy remains weak, and great power rivalries are resurfacing.

The United States offers a perfect illustration. In Paris, we committed to reduce emissions by up to 28 percent by 2025, but the Trump administration now seems intent on dismantling most of President Obama's climate legacy, including the Clean Power Plan, its centerpiece. This casts doubt not only on America's ability to meet its Paris pledge, but also on that of other nations, many of whom are counting on US leadership. Even if all stars align and the United States somehow meets its Paris commitment, this is but a modest first step.

Many disparate factors have conspired to create the mother of all political problems. There is an elegant way to unlock each part of this puzzle, but first we need a deeper understanding of how we got here.

THE PSYCHOLOGY AND GEOPOLITICS OF INACTION

Daniel Kahneman, though a Princeton psychologist, won the 2002 Nobel Prize in economics for his research on how cognitive biases challenge the utility theory of economics, which posits that decision-making is rational. Based on his research, Kahneman laments: "I really see no path to success on climate change." Harvard psychologist Daniel Gilbert concurs, claiming that the issue "really has everything going against it. A psychologist could barely dream up a better scenario for paralysis."

From the perspective of behavioral psychology, one of the main difficulties with climate change is its lack of immediacy or salience. In contrast to, say, a car heading straight towards you, the threat of global warming seems remote, complicated, and disconnected from our everyday lives. Ironically, one of its earliest consequences even seems pleasant: warmer winters. Another impediment is disinformation. As Kahneman explains, "people will score it as a draw, even if there is a National

Academy on one side and some cranks on the other.”

The greatest cognitive barrier distorting our climate-related decisions, however, is the lack of short-term benefits, combined with Kahneman’s theory of “loss aversion,”⁴ which refers to people’s strong preference for minimizing losses over acquiring gains. This dynamic plays itself out at all levels in the climate equation: from the personal to the political to the geopolitical.

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On the personal level, it is inherently difficult to convince people to endure costs now for benefits that accrue to others 30 years hence. Reducing individual greenhouse gas emissions requires concrete sacrifices, be it flying less, reducing the proportion of meat in your diet or purchasing carbon offsets. Because the state of our climate depends on the cumulative emissions added over time, the benefits of reductions today will not be felt for decades. And even then, such “benefits” will manifest in the form of the situation getting less worse, rather than an outright improvement.

From the perspective of Kahneman’s loss aversion theory, personal emissions reductions are a triple-blow: first because the loss is immediate and significant; second because the gain is distant in both time and relation to self; and third because the so-called gain is really more of a draw than an advance.

This suggests that today’s green-left movement, which deserves much credit for sounding the climate alarm, also deserves blame for framing it in a manner that alienates much of the public. Take Naomi Klein, one of the movement’s celebrity authors, whose book *This Changes Everything: Capitalism vs. the Climate* advocates de-growth,

reduced consumption, and an overthrow of the global economic order. Based on Kahneman’s insights, this is precisely the wrong message to motivate people. These prescriptions are so profoundly at odds with the worldview of those on the opposite end of the political spectrum that it is little wonder why they are tempted to dismiss climate science altogether.

In theory, elected officials should be better positioned to weigh evidence, costs and benefits and promote the long-term well-being of their constituents. In practice, however, the unique characteristics of climate change, combined with the power of special interests, often collude to undermine that broader public interest. For one thing, the relevant time frame for most politicians is the next electoral cycle, as opposed to the next half-century. For another, it is difficult for leaders—even those most committed to climate mitigation—to get too far ahead of the sacrifices that their constituents are willing to bear.

Complicating matters significantly for political leaders the world over is the fact that because the climate is a global commons, most of the benefits of greenhouse gas abatement programs undertaken by a country occur outside its borders. This, presumably, is what Sen. Marco Rubio (R-Fla.) was referring to during one of the early Republican primary debates of 2016 when, asked about climate change, he answered: “America is not a planet.”

This geopolitical challenge has bedeviled all past efforts to reach international climate agreements. Yale University’s William Nordhaus, a pioneer in climate economics, argues: “the fundamental reason for the lack of progress is the strong incentives for free-riding in current international climate agreements.”⁵ Free riding, in this case, refers to one country receiving benefits for which it does not bear the costs. Nordhaus continues: “If countries act rationally in their own self-interest, they will have a strong incentive to free-ride on the emissions reductions of others.”

Allegations of international free riding have become a topic du jour in spheres ranging from national

security to trade agreements, but they permeate almost every facet of climate negotiations. Nordhaus's analysis explains why the results of the Paris climate conference leave so much to be desired. In the background are escalating tensions between rich and developing nations over climate justice, with advocates for the poor tirelessly pointing out that those who will suffer the most are the least responsible for the problem in the first place, and their governments arguing that they deserve a larger share of the world's fast diminishing carbon budget. Meanwhile, Republicans are fond of arguing that it is futile for the US to lead if China and India do not act in lockstep.

This cauldron of complexity surrounding climate change inevitably feeds on itself, leading to inaction. Stanford psychologist Jon Krosnick found that the public often stops paying attention to this subject when they realize there are no easy answers. This blend of cognitive barriers, complexity and lack of easy solutions, in turn, leads to various forms of psychological coping mechanisms, among both the general public and elected officials.

Clive Hamilton, a professor at Australia's Centre for Applied Philosophy and Public Ethics, and Tim Kasser, professor of psychology at Knox College, have categorized these coping mechanisms into three types.⁶ The first, "denial strategies," range from true "climate skeptics" who actively reject climate science, to a more "casual" form of denial, whereby adherents seek to reduce the associated anxiety by, for example, skipping news stories about climate change or avoiding conversations on it. Those in this group also employ "inner narratives" to ignore discomfiting facts, such as "scientists must be exaggerating."

A majority of the population in developed countries, according to Hamilton and Kasser, fall into the second group, which they call "maladaptive coping strategies." Here, people accept the facts about climate change up to a point, but rely on a variety of tactics to blunt the heavy burden of these facts and their attending emotions. Examples of such tactics include "reinterpreting the

threat" through "distancing" by assuming, for instance, that there will be time to find a solution because the effects are a long ways off; "diversionary strategies" such as engaging in new pursuits or minor behavior modifications; "blame shifting" by telling oneself "my carbon footprint is smaller than others"; and "wishful thinking" such as assuming that wind and solar power alone will solve the problem.

Allegations of international free riding have become a topic du jour in spheres ranging from national security to trade agreements, but they permeate almost every facet of climate negotiations

Finally come what Hamilton and Kasser call "adaptive coping strategies," when people accept both the facts and emotions surrounding climate change, and attempt to act on the basis of both. Despite its pleasant sounding name, those in this group carry the heavy emotional burden of trying to make peace with the anger, sadness and despair accompanying the potential losses related to a warming globe. If people are able to transcend this, the authors argue, they can channel their energies by becoming more informed on the issue and working towards solutions, whether as community activists, scientists, corporate CEOs or elected officials.

In my experience, trying to reach this stage can be lonely and torturous. Grappling with the potential yet avoidable harm to your descendants and much of humanity can seem harder than facing your own demise. It is a recipe for cognitive dissonance. When you focus on the problem and look around at your friends and neighbors happily ignoring it, you wonder whether it is you who knows something they don't, or vice versa.

One can also drift back and forth between adaptive and maladaptive strategies. Upon graduating from college I felt a strong passion for climate change, so I went on to launch an environmental

economics think tank and help organize the largest public statement in the history of the economics profession to promote market-based climate solutions.⁷ But then I moved on, frustrated by the slow progress. I devoted my next 20 years to other policy issues and the “diversionary strategy” of sailing around the world. It was the birth of my daughter in 2015 that jolted me back into the climate fold.

Our collective ability to avoid the worst consequences of climate change hinges on

finding a way to short-circuit this coping process. We need to make it easier and more appealing for individuals and governments to coalesce around a solution, one that doesn’t threaten their fundamental worldviews, that seems simple and modest, yet is ultimately far-reaching. It must be able to overcome both Kahneman’s loss aversion barrier and Nordhaus’s free-rider problem, while responding to the socioeconomic and political trends that define our era.

UNLOCKING THE ECONOMIC PUZZLE

For as long as there has been trade and money, the supply of goods and services has been mediated by prices. Price signals provide the essential information on which all economic transactions depend, enabling producers, consumers and investors the world over to trade everything from soybeans to silicon chips to corporate shares. But this system suffers from a well-known flaw: market prices do not reflect the social and environmental cost of economic activity. This, more than any other single factor, is to blame for our climate predicament.

English economists Henry Sedgwick and Alfred Marshall first recognized this market failure in the nineteenth century. But it was Marshall’s pupil Arthur Cecil Pigou who popularized the concept of “externalities” in his 1920 book, *The Economics of Welfare*. The term refers to those costs (or benefits) that are not internalized into market prices. In Pigou’s day, these unintended side effects

of economic activity were still relatively minor in relation to a far smaller global economy. That is no longer the case, leading another British economist, Nicholas Stern, to describe climate change as “the greatest market failure the world has ever seen.”⁸

In 2015, researchers at the IMF estimated that the cost to society for underpricing fossil fuels is \$5.3 trillion per year, or 6.5 percent of global GDP.⁹ That includes direct energy subsidies by governments, and undercharging for the environmental and health damage caused by local air pollution and related factors. But the researchers did not attempt to capture the long-term costs of climate change, so as eye-popping as their figure is, it doesn’t come close to approximating the true social and environmental costs of greenhouse gas emissions.

There is also a second, less widely recognized market failure that distorts prices and influences emissions: the boom and bust cycle in energy-

related commodities. Unlike most products or services, the prices of oil, coal and natural gas do not increase or decrease slowly and consistently. Rather, they are subject to longer lasting cycles: a period of low prices leads to underinvestment in extraction capacity, which then leads to shortages, much higher prices and eventual overinvestment, which then repeats the cycle in the opposite direction.

Carbon tax advocates have yet to find a winning policy and political formula, so most politicians go to great lengths to avoid them

Oil hit a high of \$145 a barrel in 2008, then declined to a January 2016 low of \$29. Coal has followed a similar trajectory. These wild fluctuations wreak havoc on energy and transportation markets, which must make long-term investments: Power plants have an investment life of over 30 years, and the typical fleet life of vehicles is 12 years. Where we are in the cycle will profoundly affect decisions. Falling fossil fuel prices make investments in clean energy less attractive, which helps explain the recent troubles afflicting companies such as Sun Edison and Solar City. Lower gas prices have also boosted US sales of gas-guzzling pick-ups and SUVs, which shot up 10 percent in 2015, while the sale of fuel-efficient cars declined.

These twin market failures, then, imply that all economic decisions relating to greenhouse gas emissions are based on incorrect or incomplete information.

Pigou not only introduced the problem of market externalities, but also put forth what remains the best solution: Pigouvian or corrective taxes levied on the market activities that generate negative externalities. This solution, incidentally, would also smooth out the boom and bust cycle in fossil fuel markets. Pigou's remedy has since become conventional wisdom in the field; economists of all

stripes now agree that carbon taxes are the most effective solution to climate change.

A carbon tax may sound technical, but changing market prices actually changes everything. It is pricing, first and foremost, that dictates whether utilities and governments build a coal power plant or a wind farm, whether factories install the latest energy efficient technology or whether companies choose video conferencing over flying. For individuals, prices determine the kind of car you buy, how much you insulate your home, and whether you purchase local or imported produce. Multiply this dynamic by 7 billion people across the globe making daily choices, and the full force of this solution becomes apparent.

Prominent supporters of carbon taxes currently range from Michael Bloomberg to Bill Gates, from Christine Lagarde to James Baker, from Alan Greenspan to Paul Volcker, from Henry Paulson to Robert Rubin, from Elon Musk to Rex Tillerson, from Gregory Mankiw to Larry Summers, and from David Brooks to Paul Krugman. A number of these are members of the Pigou Club, the brainchild of Mankiw, former chairman of the Council of Economic Advisers under President George W. Bush.

According to fellow club member and former Secretary of Treasury Larry Summers: "The case for carbon taxes has long been compelling. With the recent fall in oil prices and associated declines in other energy prices, it has become overwhelming." Despite the impeccable economic logic of carbon taxes, the broad-based intellectual support for them, the urgency to reduce carbon emissions, and the recent fall in fossil fuel prices, this solution has essentially gone nowhere. Why? Because a carbon tax does not "play well" with the public, as Australia discovered by introducing and subsequently repealing one (carbon emissions went up 5.5 percent since repeal). In essence: carbon tax advocates have yet to find a winning policy and political formula.

Coming across as all sticks and no carrots, carbon taxes run right into the wall of Kahneman's loss

aversion theory. So most politicians go to great lengths to avoid them. Even regions and nations most committed to emissions reductions have tended to pursue an “anything but carbon tax” strategy, often favoring its more benign-sounding cousin, the cap and trade model.

In theory, a cap and trade system should be as effective as a carbon tax; both are market-based policies, after all. In practice, cap and trade has been a major climate disappointment. Such a system, which the US Congress considered but rejected during President Obama’s first term, functions by limiting the total number of carbon permits and allowing firms to trade them among themselves.

The biggest test case, by far, is Europe’s Emissions Trading System, the world’s largest carbon market. Over the past 12 years, it has crashed twice, and failed to meet most of its objectives. Its many travails include: lacking investor confidence, significant fraud (including faked Russian carbon offsets), over-allocation of permits, a \$27 billion windfall to industry, and, ultimately, lower than expected carbon prices. No question, the simpler and more effective way to put a price on carbon is by taxing it.

For a carbon tax to achieve significant emissions reductions, the tax rate must continually increase until that target is met

British Columbia provides the best example to date of a real-world carbon tax, yielding several important lessons. In 2008, the province’s right of center government introduced a revenue-neutral carbon tax, with the proceeds earmarked to lower existing corporate and individual income taxes.¹⁰ The tax rate was initially set at 10 Canadian dollars per ton of carbon, and increased gradually to 30 dollars by 2012, or approximately \$23 US dollars at today’s exchange rate. The initial results were quite encouraging: BC’s carbon emissions fell by up to

15 percent, while its economy out-performed other Canadian provinces.

This first major takeaway is that the policy performed exactly as hoped, proving that emissions reductions and economic dynamism can go hand in hand. This is a big deal, and a powerful rebuke to those who claim that tackling climate change will lead to economic ruin. The second lesson is that a revenue neutral approach that recycles money generated by a carbon tax directly into the economy—rather than filling government coffers—is essential to both the policy’s economic and political success.

More recently, however, carbon emissions in British Columbia started rising again after the province froze its carbon tax rate in 2012. This suggests two additional lessons. The first is that for a carbon tax to achieve significant emissions reductions, the tax rate must continually increase until that target is met. A tax that remains at \$20 or even \$40 a ton—roughly an extra 20 cents or 40 cents per gallon of gas—will not suffice. For example, a rate of between \$50 to \$100 per ton is needed to make it profitable for utilities to fit carbon capture technology on new and existing fossil fuel power plants, a major step forward. Another study shows that for the United States to reduce its carbon emissions by 50 percent, the tax must gradually increase to \$200, or an extra \$2 per gallon of gas.

British Columbia froze its carbon tax rate in 2012 because it lacked political consensus for further increases; it recently ruled out any increase until 2018. This points to a final lesson, one that particularly hit home for me. Over the past 25 years, I have written and spoken frequently about the benefits of an environmental tax shift of the type that British Columbia implemented (and Washington state is now considering). But BC’s recent experience convinced me that building popular support for a continually increasing carbon tax will ultimately require a countervailing incentive more powerful and visceral, and less prone to future political reversals, than tax cuts.

A CARBON DIVIDENDS PLAN

A more popular, direct and transparent way to return carbon tax proceeds to the public is through carbon dividends. The idea is simple: all money raised from a carbon tax is divided by the number of citizens in the taxing jurisdiction, and returned to them on an equal basis through monthly dividend checks automatically deposited into their bank accounts.

The most revolutionary aspect of this idea is its ability to tackle Kahneman’s loss aversion theory head on by putting money directly in the hands of all adult citizens, with the amount growing in direct proportion to increases in the carbon tax rate. This fundamentally alters the cost-benefit time horizon of climate mitigation, conferring benefits in the here and now.

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A partial precedent is the Alaska Permanent Fund,¹¹ established in 1976 by Republican Governor Jay Hammond, which now provides over \$2,000 per year to each Alaskan resident, financed by state oil revenues. Not surprisingly, the program remains highly popular. Whereas this policy promotes greater fossil fuel production and consumption, a carbon dividends plan would encourage the reverse.

Another important difference is that carbon dividends are not giveaways. Rather, they result from new incentives that make intuitive sense: the more you pollute, the more you pay; the less you pollute, the more you come out ahead. Under such a system, individuals are both empowered to make their own choices and rewarded for good behavior. Insulating your home, switching to a more fuel efficient or electric car, or putting solar panels on your roof suddenly becomes more attractive.

The carbon tax would be collected at the refinery or at the first point that fossil fuels enter the economy—typically the mine, well or port—and then passed on to consumers in the form of, for instance, higher gasoline prices, airfare, and electricity bills (depending on your source of power). If your carbon footprint were precisely at the nation’s median, you would get back in dividends essentially the same amount as your costs increase. But since the wealthy have larger carbon footprints on account of their more lavish lifestyles, the majority would come out ahead, even before they start altering their behavior.

What of the free-rider problem Nordhaus highlights? And wouldn’t such a system encourage manufacturing companies and the jobs they provide to move to another jurisdiction? The answer to both is border adjustments, levied on the carbon content of imports from countries with no or lesser carbon pricing. Such border adjustments should be WTO-compliant because they are “non-discriminatory harmonizing tariffs.” As Nobel Laureate economist Joseph Stiglitz explains, this is consistent with precedent, “the WTO sustained the important

principle that global environmental concerns trump narrow commercial interests, as well they should.”

Whereas in Nordhaus’s analysis, countries have an incentive to free ride on the mitigation efforts of others, a significant carbon tax with border adjustments should have the opposite effect. This is all the more likely if carbon dividends are included. Suppose the United States puts such a system in place: any products it imports from Europe or China would be subject to border adjustment taxes, in turn distributed to all Americans via dividends. The European and Chinese publics would soon realize that they are being disadvantaged by such a system, as the dividends that should be going to them are in fact going to Americans. The obvious cure is to push for similar legislation in their own lands.

Could a gradually increasing carbon tax really incentivize all that? Well, yes, thanks in large part to its multiplying effect

Ever since the financial crisis of 2008, the world economy has yet to regain a solid footing or overcome the resulting debt overhang. Despite extraordinary efforts from central banks whose ammunition is now depleted, the global economy remains fragile and in need of new growth strategies. The combination of carbon taxes and dividends offers profound possibilities.

Bill Gates recently suggested that solving climate change requires two main ingredients: massive technological innovation and carbon taxes. He subsequently teamed up with fellow tech titans Jeff Bezos, Jack Ma, Mark Zuckerberg and others to launch the Breakthrough Energy Coalition, whose purpose is to invest billions of dollars per year into clean energy R&D. But the second component in Gates’s recipe could unleash a far greater wave of technological innovation.

A rising carbon tax would spur unprecedented innovation, infrastructure substitution and energy efficiency gains. Consider what it would

take to reduce worldwide carbon emissions by 70 percent within 33 years. There are currently 1.2 billion cars on the road that need to be replaced by electric vehicles. All fossil fuel power plants either need to be retrofitted with carbon capture technology or substituted for by a combination of wind, solar, other renewables, nuclear, or some as yet to be invented source of clean energy. Ailing infrastructures replaced by cleaner alternatives and hyperloops; buildings, homes and their appliances by far more efficient versions.

The opportunities for entrepreneurship and innovation seem endless. Among the most promising technologies in various stages of development are: solar glass, lithium-air batteries, deep geothermal, airplanes running on algae, harvesting kelp and synthetic meat for food, vertical agriculture, osmotic power, building products from graphene and next generation nuclear power running on radioactive waste or thorium.

Could a gradually increasing carbon tax really incentivize all that? Well, yes, thanks in large part to its multiplying effect. Just as central banks use forward guidance to influence future market expectations, if investors know that carbon prices would increase to, say, \$100 per ton over a decade, the full stimulatory effect would be almost immediate for projects such as infrastructure and power plants with 30 to 40 year paybacks. So even if a carbon price starts at \$20, it could pack a far greater punch from the outset.

Carbon dividends could also promote growth by boosting aggregate demand. Dividend checks put money in the hands of end consumers, which has a clear stimulatory effect. Imagine if all Chinese citizens begin receiving monthly dividend checks; what could do more to kick-start consumer-driven economic growth in the world’s most populous economy?

In the legend of the Gordian knot, Alexander the Great solved what had previously seemed an intractable problem by wielding his sword and cutting the knot. In retrospect, the solution seems easy and obvious. Carbon dividends could serve

a similar role today. The idea seems obvious enough, even modest. But its true impact could be revolutionary.

Imagine if all Chinese citizens begin receiving monthly dividend checks. What could do more to kick-start consumer-driven economic growth in the world's most populous economy?

The power of a carbon dividends plan stems from its compatibility with basic human nature. As we have seen, any climate solution that rests on fear, altruism, austerity or deferred benefits is unlikely to succeed. This plan, by contrast, rests squarely on basic human self-interest. As Adam Smith

highlighted back in 1759 through his metaphor of the invisible hand, it is the pursuit of individual interest that enables the marketplace to work its magic and promote social welfare.

Were Adam Smith alive today, surely he would agree that the best solution to the foremost market failure of our time is a carbon tax. That would redirect his invisible hand towards protecting our climate by penalizing polluting activity. Meanwhile, adding carbon dividends would dedicate a second invisible hand to the same cause by rewarding good behavior. There is even a third invisible hand that comes into play, as we have seen, due to the forward expectations of gradually increasing carbon taxes and dividends.

This three-handed, market-based approach could make a carbon dividends plan exceptionally potent. But no amount of policy innovation will matter if it cannot pass the political reality test.

UNLOCKING THE POLITICAL PUZZLE

Twenty years ago, author and entrepreneur Peter Barnes was the first to propose pairing carbon taxes with dividends (at the time, he was a Senior Fellow at Redefining Progress, a green economics think tank that I founded). A decade later, in 2006, real estate broker Marshall Saunders launched a grassroots organization named the Citizens' Climate Lobby to promote the concept. On a shoestring budget and with staff that grew over a decade to 20, they organized grassroots chapters to lobby for their "Carbon Fee and Dividend" plan (Saunders found that "fee" goes over better than "tax").

Impressively, the group, now run by Mark Reynolds, has established 266 local chapters across the United States. But the concept of carbon dividends has yet to gain traction among opinion leaders, in popular culture or in other nations. There has been some interest on Capitol Hill: during the cap and trade debate of 2009, Senators Maria Cantwell (D-Washington) and Susan Collins (R-Maine) introduced a "Cap & Dividend" plan, and Representative Chris Van Hollen (D-Maryland) introduced a similar bill in 2014 and 2015, but it did not draw any bipartisan backing.

So it is with politics. The best ideas are rarely new, and often hiding in plain sight. They linger on the sidelines for years until a wave of history comes along and sweeps them to prominence. For a policy reform to really catch on, it must fit the political moment, and draw its power from prevailing trends. The forces remaking today's political and cultural landscape include: worsening economic inequality; a growing populist sentiment; a relatively weak global economy in need of support; the fissuring of traditional political coalitions; and the rise of nationalism. Any successful climate solution must respond to all five. Interestingly, a carbon dividends plan may prove effective enough in this regard that, in certain countries, the strongest argument in favor may not be a climate one.

Let's consider each trend in turn.

Mounting economic inequality is one of the most stubborn problems facing many nations. It is by now well established that a Second Gilded Age has set in across the developed world, eating away at the cherished belief that each generation should be better off than the last. What makes this challenge seem intractable is that its underlying causes—technological progress and globalization—will only continue driving down average real wages and household income for the foreseeable future. The usual policy answers—such as increasing the earned income tax credit in the United States—are showing their limits.

This has led countries on both sides of the Atlantic—from Canada to the UK to France—to start looking into the concept of universal basic income, an updated variant of the negative income tax proposed by conservative economist Milton Friedman in 1962. The idea has also gained a following in the US technology community. But while there are good arguments for supplemental income to counteract growing inequality, there is little consensus on how to pay for this, or overcome its stigma as an expensive giveaway. A carbon dividends program answers both.

A 2017 study by the Department of the Treasury found that the bottom 70% of Americans would

come out ahead under such a system.¹² This is precisely the socio-economic group that has trouble making ends meet in today's economy. Under a fully implemented carbon dividends plan, a family of four would receive roughly \$5,000 in dividend income per year (based on carbon tax of \$200 per ton, and a formula paying families half as much for children as per adults).

Importantly, these dividends represent neither giveaways nor overt redistribution. Rather, carbon dividends are earned based on the good behavior inherent in lowering one's carbon footprint, while the redistribution stems from the simple fact that the wealthier tend to pollute more. This opens up a whole new paradigm for solving inequality.

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The recent rise in populist sentiment, though closely linked to inequality, is worth considering on its own terms because its roots are broader. What voters for Donald Trump, Brexit, Bernie Sanders and Marine Le Pen share in common with recent street protesters from Brazil to Iceland to Russia is a fundamental sense that the system is rigged against them. They see a world run by and for elites, be it the business and financial sectors elites, the governmental elites they bankroll, or the media and academic elites who tell them what to think. Whenever they turn their attention to complex systems like trade, globalization, immigration or the tax code, they can't help but think that the 1 percent is pulling another one over on them. The Panama Papers capture this perfectly.

As history demonstrates, populism can be dangerous. The best response is to disarm its worst instincts and redirect its energies in a socially beneficial direction. But how to accomplish that?

Certainly, it is not by imposing yet another plan on an unwilling public. Better to level the playing field in a manner that helps the little guy, and thus earns popular buy-in. That is a tall order given today's power dynamics, but energy policy may offer an opportunity.

Importantly, these dividends represent neither giveaways nor overt redistribution. This opens up a whole new paradigm for solving inequality

Depending on one's political orientation, when many contemporary Americans think of energy policy, they see a system either dominated by an overly intrusive EPA or one hijacked by the interests of the Koch brothers. In either case, it seems rigged. According to a recent Gallup poll, 64 percent of Americans are worried a great deal or fair amount about climate change. When polled on the idea of a carbon tax with the proceeds returned directly to them, 67 percent are in favor, including 54 percent of conservative Republicans.

These numbers suggest that a carbon dividends plan not only appeals to the general public, but might even restore some faith in public institutions by offering a concrete way for the majority to win from a significant policy change, in this case at the expense of the wealthy and powerful who would pay more. Many of the wealthy, who tend to care about climate change, may willingly oblige for once to such a re-stacking of the deck in favor of the common person.

A third macro-trend is the continued weakness of the global economy in the aftermath of the Great Recession, whose contagion began in the United States, then shifted to Europe and is now afflicting emerging markets. As previously discussed, a carbon dividends plan would encourage a great deal of technological innovation and infrastructure substitution, while boosting global demand. But

there is another way it can promote growth, which may prove pivotal to its political fortunes: by improving the business climate.

One such strategy is increasing predictability for businesses, especially in the energy sector. Here companies are subject not only to a boom and bust commodity cycle, but also to the whims of constantly changing government incentives, and to mounting risks from climate change. Many would accept increased carbon prices in exchange for predictability. ExxonMobil, for example, currently assumes a carbon price of \$60 per ton in analyzing long-term investments, while BP assumes \$40 per ton. Bob Dudley, BP's CEO, has been urging governments to tax carbon. And he is hardly alone.

Suddenly, a surprising number of global firms are calling for greater emissions reductions, and leading by example. Companies ranging from Alcoa to Apple, Cargill, Facebook, GE, Goldman Sachs, Google, Johnson & Johnson, McDonalds and Walmart recently committed themselves to reduce emissions, increase low-carbon investments, and deploy more clean energy. Meanwhile, 400 institutional investors with over \$24 trillion under management—equivalent to 31 percent of global GDP—recently published an open letter urging governments worldwide to implement “carbon pricing that helps redirect investment commensurate with the scale of the climate change challenge.”

A significant advantage to conjoining carbon taxes with dividends is that the latter's popularity would ensure the policy's longevity; touching the dividends would soon become a political third rail.

Naturally, the business sector will try to claim a share of carbon tax revenues to lower the corporate income tax. While some deal along these lines is probably necessary in certain countries, it would be a mistake to break the direct link between a carbon tax and dividends, and thereby undermine the program's popularity and longevity. A better approach is to eliminate all fossil fuel and renewables subsidies and earmark the savings to corporate tax reduction and helping the

Figure 1 | Carbon Dividends Polling in the United States

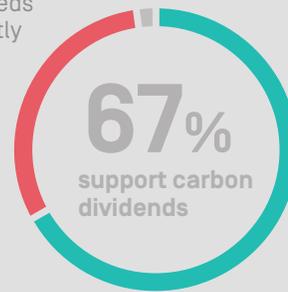
32% worry about global warming only a little or not at all



64% worry about global warming

64% worry about global warming a great deal or fair amount

31% oppose a carbon tax with proceeds returned directly to them



67% support carbon dividends

67% support a carbon tax with proceeds returned directly to them

Sources: Gallup, Resources for the Future / New York Times / Stanford University / SSRS.

communities most dependent on carbon intensive industries. Another option is to establish a parallel tax on shorter-lived but more potent greenhouse gases—such as methane and hydrofluorocarbons—and allocate this to corporate tax relief.

Lowering corporate taxes is not just a means of buying off business support. High corporate taxes lead to perverse consequences in a globalized economy, encouraging companies to relocate based on tax advantage, or employ contentious inversion schemes. From a tax perspective, corporations are like the dragon in a Chinese New Year's parade: there really is no dragon, just people underneath

A carbon dividends plan may provide an opportunity for a grand bargain whereby the climate is protected, a majority of citizens are better off and the business environment is enhanced

playing one. Economists agree that corporate taxes ultimately flow through to shareholders, employees or consumers, who all pay taxes anyway. A carbon dividends plan, then, may provide an opportunity for a grand bargain whereby the climate is

protected, a majority of citizens are better off, and the business environment is enhanced.

A final trend remaking world affairs is political polarization and dealignment, evident in many parts of the globe, but particularly in the United States. Although the US Congress is more polarized than ever, the public is not. One of the most striking indictments of our political status quo is that 42% of Americans reject both leading parties and self-identify as “independents,” while nearly two-thirds agree that “The old way of doing things no longer works and we need radical change.” Clearly, the parties have failed to forge majoritarian coalitions or provide adequate solutions to the nation's problems. The growing fissures reshaping US politics are not just between the two parties, but also within them.

The Republican Party is famously hostile to climate mitigation. This stance is unique among major political parties in OECD countries, and puts the GOP at odds with the scientific, economic, civic, and business mainstream, as well as with the opinions of the majority of Americans and religious leaders including Pope Francis. But it also puts Republicans at odds with their cherished laissez-faire economic philosophy. Given the undeniable existence of market externalities, corrective taxes, according to free market principles, are the most efficient solution. Many within the party know they

are on the wrong side of history, and sooner or later must change course. What most fail to grasp, however, are the multiple strategic advantages in doing so.

The unorthodox campaign and unexpected victory of President Donald Trump drove a deep and, by all appearances, lasting wedge between the party's base, which favors economic protection and relief, and its establishment, which remains committed to free markets and smaller government. Reconciling these two factions will prove very tricky. Counter-intuitive as it may sound, a carbon dividends plan could help heal this rift by granting each wing what it cares most about, even if they remain hostile to climate science.

As we have seen, such a plan can help relieve the economic anxiety of Trump's voters, and speaks to their populist worldview. It is their precise demographic that stands to benefit most. Meanwhile, the plan's pro-growth bona fides and a possible path to lower corporate taxes might help turn the GOP establishment. Another strong argument is that carbon taxes and dividends could ultimately shrink both the size and regulatory reach of government. The sooner we stabilize our climate, the less governments will be called upon to fix a mounting series of extreme weather events. More immediately, once such a policy is firmly in place, there are any number of regulatory programs that can be safely eliminated, from renewables subsidies to President Obama's Clean Power Plan to various EPA regulations governing carbon emissions.

The appeal to Democrats is more straightforward, but here too would require considerable ideological rethinking. No question, a fresh solution to inequality and an ambitious climate solution should appeal to the party's base, and especially voters under 35 who are most concerned about global warming. But this next generation of Democrats, as illustrated by their prolonged flirtation with Bernie Sanders, remains anti-business, anti-nuclear power, and believes the best way to reduce greenhouse gases is through more regulation. A carbon dividends plan would

challenge all three positions.

At the risk of stating the obvious, there is no way to decarbonize the global economy without the active involvement and leadership of the corporate sector, which itself has much to fear from climate change. Likewise, opposing nuclear power is nonsensical from a climate perspective, as it is currently the only major source of zero-carbon energy that is not subject to intermittency and fully scalable, in a way that hydropower is not. Given the urgency of emissions reductions, a strategy based on "renewables-only," much as it sounds appealing, is akin to going into battle with one hand tied behind your back.

Such a plan can help relieve the economic anxiety of Trump's voters, and speaks to their populist worldview

The Democratic Party has also become too wedded to inefficient and heavy-handed regulations. Given Republican opposition, President Obama had little choice but to pursue his climate strategy through regulatory means and executive action. But as Democrats discovered the hard way, this is hardly a path to long-term success. A lasting national commitment to emissions reductions requires bipartisan compromise, and the most fruitful grounds for this remains market-based policies. A likely political price of the latter will be giving up on a number of existing regulations.

As this suggests, passage of a carbon dividends plan in the United States would require some common sense political bargains. But here is the key point: this is that rare plan where all parties could claim an important victory.

A NEW DOMINO THEORY

A final trend, the upsurge in nationalism, is hard to miss: from the recent hostility of American voters towards free trade agreements, to a fraying of the European Union, to a growing rejection of open borders and immigration on both sides of the Atlantic. This rebellion against supranational agreements and institutions stems largely from economic insecurity, fears of terrorism, or the dislike of diktats from Brussels.

But it is also born of a more positive impulse: the preference for local control and innovation. As James Fallows argued in a March 2016 cover story in *The Atlantic*, there is plenty of evidence that reinvention and renewal are thriving in America's laboratories of democracy. A corollary applies globally, whether to democratic or non-democratic nation-states: all can serve as laboratories of innovation.

The obvious implication for climate mitigation is that progress must come from the bottom-up. Organizers of the Paris climate summit recognized as much, basing it on individualized country plans, which yielded relatively weak commitments, but an agreement nonetheless. Those who dream of a global carbon pricing covenant negotiated in top down fashion will remain disappointed.

A better strategy is to design national carbon taxes in a manner that compels other countries to follow suit, and thereby overcomes Nordhaus' free rider problem. As we have seen, a combination of carbon taxes, dividends and border adjustments is uniquely suited to accomplish this, as citizens

in countries that lead the way will benefit at the expense of those of their trading partners, inspiring these aggrieved citizens to pressure their own leaders to adopt a comparable system.

During the Cold War, the domino theory was a frightening concept, positing that if any country in a given region fell under communist influence, surrounding ones would soon follow due to the power and reach of ideas. A quarter century after its end, perhaps the term could be recycled in a more positive light, and applied to the defining challenge of our time. To wit: if any major country establishes a successful and duly ambitious carbon pricing precedent, other nations will not be far behind.

While the United States led the world in winning the Cold War, it remains to be seen if it will rise to this occasion, given Trump's new isolationism and the political dysfunction and partisan paralysis weighing it down. America's ability to surprise should never be underestimated: witness, for example, President George W. Bush's decision to add prescription drug benefits for the elderly, or the sudden progress on gay rights, or the recent bipartisan consensus in favor of criminal justice reform.

Since the end of the Cold War, the world has become multipolar, so climate leadership can now come from many quarters. Europe may be the most likely to pioneer a carbon dividends plan, given the strong environmental commitment of its citizenry and the failure of its Emissions Trading System. But even there, change will most likely start in post-

Brexit UK, Germany or a Nordic country rather than through a pan-European program.

So far, the nations of Europe (like the United States) have preferred to subsidize renewables instead of taxing carbon, leading to a hodge-podge of conflicting and costly incentives. Spain, for instance, shifted overnight from generous solar subsidies to their precise opposite: a sun tax. More broadly, the cost of renewables subsidies increases as more renewables come online, a major design flaw. Another is that renewable subsidies, while encouraging new capacity, fail to discourage people from consuming energy from existing fossil fuel sources.

Germany's *Energiewende*, the world's most ambitious renewables program, is experiencing both problems. Despite spending well over \$100 billion on subsidies, the country is failing to meet its own goals of reducing emissions by 40 percent by 2020 and up to 95 percent in 2050. While the share of electricity from renewables reached an all-time high of 32.5 percent in 2015, Germany's overall emissions nevertheless increased, largely because coal remains its main energy source and its nuclear plants are being phased out. Efforts to reduce reliance on coal plants run into union opposition. A carbon dividends plan offers Germany a more popular and efficient, and far less costly, means to hasten its transition away from coal. This would also set an example in rationalizing Europe's energy policy.

Another early adopter could be China, the world's largest greenhouse gas emitter. The PRC has much to fear from climate change, topping the list of countries most at risk from coastal flooding. Persistent air and water quality issues are also a major concern. This combination inspired China to invest heavily in renewables, and commit to carbon pricing as of 2017. So far it is leaning towards a cap and trade approach, despite Europe's dismal experience and the inherent risks for corruption, another Chinese *bête noir*. But it is China's desire to transition to a consumer-led economy that may ultimately tip the scales. Only a dividends-based approach to carbon pricing enables China

to meet its environmental and economic goals simultaneously.

Other potential first movers might include the United Kingdom, where emissions reductions of 80 percent by 2050 are enshrined into law, and Brexit will enable domestic climate policy innovation. Or Canada, which already has experience with carbon taxes, and whose new prime minister Justin Trudeau is committed to further emissions reductions. Or even India, which recently doubled its taxes on coal, and where a carbon dividends plan could facilitate the transition to cleaner and more reliable energy, while expanding capacity and solving some of the issues plaguing its energy sector, such as a legacy of free electricity to farmers and power theft from the urban poor.

Several of these nations want to stand out as climate leaders, and they are not the only ones. This could set off a healthy global competition for the first country to demonstrate how today's climate deadlock can be broken. The competition might begin by broadcasting the following advertisement:

WANTED

COUNTRY TO PIONEER CARBON DIVIDENDS PLAN

Cost to country: Zero.

Starting Date: As soon as possible.

Qualifications: Minimum population of 5 million; larger preferred.

Advantages: Most effective solution to climate change; Promotes economic equality; Pro-growth and pro-business; Popular and populist while serving the common good.

Additional compensation: Gratitude of current and future generations.

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