CLEAN ENERGY | MAY 2010

# Putting a Price on Success: The Case for Pricing Carbon

By Josh Freed and Sam Hodas

Opponents of clean energy describe a price on carbon as economic Armageddon, crippling an economy already weakened by the Great Recession. But sober economic analyses tell a very different economic story. After reviewing more than two dozen academic, private sector, financial and government studies spanning the last three years (Appendix 1), we found that while some sections of the economy will decline, the net impact of a carbon price on the American economy will be positive (Appendix 2).[1] Our conclusion is based on the four findings below, which were repeatedly validated by the research.

We recognize there is a broad range of studies spanning the ideological spectrum that examine the impact of a carbon price. The reports from groups on the left and right contain serious findings that have gained wide recognition.[2] Because they take strong positions on a price on carbon, such reports have often garnered more attention than studies from the middle that are more cautious in their conclusions. While there is real value in clearly divergent points of view on this issue. We have found a consensus in the middle that has not received enough attention and is critical to focus on in determining the United States' policy on pricing carbon.

Based on the reports we studied, we came to the following four findings. A carbon price would:

- Spur the creation of new jobs in clean energy industries and supporting sectors;
- Be a catalyst for investment;
- Keep US dollars at home; and
- Save companies and consumers billions of dollars in reduced energy bills through encouragement of efficiency

Moreover, there was near-unanimity among the reports in our analysis that, despite increased costs and expected losses in the traditional energy sectors, a carbon price would have no negative impact on overall economic growth in the next 20 years. The gains to be made in energy savings and expansion of new sectors of our economy will balance the losses in older energy sectors. In short, a carbon price simply will not have a major impact on the growth of an economy as big and diverse as ours.

## FINDING 1:

### A carbon price will spur the creation of new jobs in clean energy industries and supporting sectors

Unemployment in the United States has risen sharply since 2008,[3] with 149,000 jobs lost in the manufacturing sector alone last year.[4] The recession has placed a premium on job growth as a key outcome of almost any policy proposal that has an impact on the economy. As a result, determining the impact of a carbon price on employment was a central question to our research.

The data we reviewed shows that *carbon pricing will result in net job growth*. Of course, job growth will not be everywhere—like past changes in our economy, the transition to clean energy will inevitably cause job losses in old industries.

Indeed, this transition is not unique—industries die and are born all of the time, as new technologies usurp the old. For example, the ice delivery industry once had 2,000 commercial ice plants nationwide, but the industry was driven to extinction by the refrigerator.[5] By 1985, 1.1 billion typewriters were sold in the United States. That number has fallen to virtually zero only two decades later thanks to the rise of the personal computer.[6] The once thriving telegraph industry carried 69 million messages as recently as 1970,[7] but inexpensive long distance phone calls, the fax, and now email have reduced the number of telegraph messages to only 20,000 today.[8]

This is a story that is repeated whenever new innovation, whether in transportation, communication, medicine or any other sector, comes to market and displaces existing technology. It is the keystone of a thriving economy. And yet, our growing economy has more than replaced the jobs that were lost, because the United States is regularly the first mover on new technologies that displace established industries and create jobs.

According to researchers at the Pew Charitable Trusts, over the past decade, jobs in clean energy industries grew almost three times faster than traditional industries,[9] with the benefits spread across all regions. Colorado gained more than 2,500 jobs; Ohio saw similar growth; the Southeastern United States gained 15,198 clean energy jobs.[10]

The Pew findings were echoed by the Congressional Budget Office, which found that a carbon price would help accelerate new job growth in industries that make, install, and service clean energy and energy efficient technologies,[11] and an Environmental Protection Agency analysis, which found that a price on carbon would "play a critical role in the American economic recovery and job growth."[12]

Estimates of the net job impact of carbon pricing vary widely, but a relatively conservative assessment by the University of California at Berkeley, the University of Illinois and Yale University determined that between 918,000 and 1.9 million jobs will be produced by 2020.[13] The University of Massachusetts and Center for American Progress found that 800,000 jobs will be lost,[14] resulting in a net increase of 118,000 to 1.1 million jobs. This range reflects the overall findings of most studies that we examined.

In the short term, transitioning to clean energy will require workers for energy efficiency retrofits at homes and factories, the construction of new nuclear and natural gas plants, and building a modern electric grid. This will require the skills of engineers, architects, construction workers, electricians, machinists, and other workers along production and supply lines.[15] Of course, the jobs created by a carbon price will extend beyond manufacturing.[16] The transition to clean energy will also help farmers. The United States Department of Agriculture determined, "that the agricultural sector will have modest costs in the short-term and net benefits—perhaps significant net benefits—over the long-term."[17]

There will certainly be regional disparities in the economic impact of a carbon price.[18] Areas of the country that are more reliant on conventional energy will see job losses in those sectors ranging from dozens to a thousand or more.[19] However, every region of the country will see net job growth as a result of the investment spurred by a carbon price.[20] This finding is reinforced by the researchers from Berkeley, the University of Illinois and Yale University, who found, "All 50 states can gain economically from strong federal energy and climate policy."[21]

## Job Growth by 2020

| State | Jobs |
|---|---|
| United States | 1,894,000 |
| Alabama | 39,000 |
| Alaska | 9,000 |
| Arizona | 24,000 |
| Arkansas | 25,000 |
| California | 226,000 |
| Colorado | 30,000 |
| Connecticut | 16,000 |
| Delaware | 7,000 |
| Florida | 78,000 |
| Georgia | 70,000 |
| Hawaii | 10,000 |
| Idaho | 14,000 |
| Illinois | 68,000 |
| Indiana | 45,000 |
| Iowa | 27,000 |
| Kansas | 22,000 |
| Kentucky | 30,000 |
| Louisiana | 22,000 |
| Maine | 12,000 |
| Maryland | 71,000 |
| Massachusetts | 40,000 |
| Michigan | 37,000 |
| Minnesota | 38,000 |
| Mississippi | 19,000 |
| Missouri | 29,000 |
| Montana | 13,000 |
| Nebraska | 38,000 |
| Nevada | 17,000 |
| New Hampshire | 7,000 |
| New Jersey | 11,000 |
| New Mexico | 15,000 |
| New York | 126,000 |
| North Carolina | 65,000 |
| North Dakota | 11,000 |
| Ohio | 61,000 |
| Oklahoma | 20,000 |
| Oregon | 26,000 |
| Pennsylvania | 78,000 |
| Rhode Island | 8,000 |
| South Carolina | 36,000 |
| South Dakota | 10,000 |
| Tennessee | 20,000 |
| Texas | 165,000 |
| Utah | 21,000 |
| Vermont | 8,000 |
| Virginia | 50,000 |
| Washington | 13,000 |
| West Virginia | 31,000 |
| Wisconsin | 28,000 |
| Wyoming | 20,000 |

## FINDING 2:

### A carbon price will save companies and consumers billions of dollars in reduced energy bills through encouragement of efficiency

The impact of job creation spurred by carbon pricing will only touch those employed, directly or indirectly, in the clean energy sector. Our research found that a price on carbon will also have much broader positive impact for Americans through financial savings gained by energy efficiency improvements. The studies we reviewed found that a short-term increase in energy costs from a carbon price will create strong incentives for home and business owners to become more energy efficient. This will result in long-term reductions in energy consumption that will save an average of $350 per household per year.[22]

In fact, a 2009 McKinsey study discovered that opportunities to reduce energy consumption could save our economy $1.2 trillion by 2020.[23] This money stays in the hands of American homeowners, industry and businesses. While not as optimistic, the American Council for an Energy-Efficient Economy found that energy efficiency improvements prompted by a carbon price would save $215 billion by 2030, including $50 billion in consumer cost savings.[24]

The challenge in achieving these savings lies in the upfront costs often associated with increasing energy efficiency. Energy users are often reluctant to make costly investments that will save energy and money because the savings are spread out over many years.[25] Placing a price on carbon will provide needed incentives to both energy users and utilities to make valuable investments in energy efficiency.

## FINDING 3:

### A carbon price will be a catalyst for investment

In order to support job growth and energy efficiency, it is critical to draw capital into the United States for clean energy businesses to grow. In a global economy, with money flowing easily across borders, policies that can trigger investments are vital to economic growth. That raised the question: how will a carbon price influence the flow of investment dollars into, or out of, the United States?

Our research found a direct correlation between pricing carbon and spurring investments in the United States. Over the next 20 years, the private sector will invest more than $600 billion globally in clean energy technologies, manufacturing and system upgrades.[26] The United States is in an international race to see which country can lead in attracting this investment. For the winners, it means new companies generating revenues, creating jobs, purchasing goods and services and helping communities. For everyone else, it means importing more technologies and goods, jobs overseas and revenue lost.

The key question, of course, is where these investments will go and what the United States must to do to attract as much of this investment as possible?[27] A recent study by Deutsche Bank has one answer. It identified a U.S. carbon price as the critical success factor in attracting investment in clean energy. Without such changes to U.S. policy, it warned, the overwhelming majority of available investment funding would go overseas, where there are long-term commitments to ensure that clean energy is cost-competitive with conventional energy sources.[28]

This goes beyond just solar and wind technology. According to a report by the Organization for Economic Co-operation and Development, the development and commercialization of a number of new technologies including carbon capture and storage and nuclear power is directly tied to a price on carbon.[29]

Other analysts, from McKinsey Global Institute (the non-profit arm of the McKinsey consulting firm) to Goldman Sachs, have come to the same conclusion, reporting that investors are ready to spend capital on clean energy in the United States today, if the right price signal is put in place.[30] As the Goldman report warns: "Without the right price signals and adequate incentives, we will not see the investment, innovation, and scale required to make conservation, renewable energy, and other low-carbon technologies a major part of the solution to our energy and climate challenges."[31]

Many leaders in the business community share this view. GE CEO Jeff Immelt and venture capitalist John Doerr stated in blunt terms the risk if we fail to impose a price on carbon: "No long-term signal means no serious innovation at scale, which means fewer American success stories."[32]

Ford Vice President Sue Cischke said: "Without a cohesive national energy and climate policy that places a price on carbon, we could be caught in a cycle of starting and stopping technology development. That is simply not good policy or good business."[33] And Bloomberg New Energy Finance Chief Executive Michael Liebreich noted: "The facts speak for themselves. 2009 clean energy investment in China totaled $34.6 billion, while in the United States it totaled $18.6 billion. China is now clearly the world leader in attracting new capital and making new investments in this area."[34]

China's direct government investment—the equivalent of a carbon price in terms of providing a market signal to the private sector—has propelled it into the lead in clean energy investment. It is also on its way to becoming the global manufacturer of clean energy technologies. China has doubled its wind power capacity annually since 2006, is the world's largest supplier of solar cells, and is installing the most energy efficient grid in the world.[35] That's not to say the United

States should imitate China's massive government spending. But, without a price on carbon, it will be much more difficult for investors to put money into clean energy here when we are competing with the likes of China.

## FINDING 4:

### A carbon price will keep US dollars at home

One persistent fact of American energy policy is the exodus of U.S. dollar overseas to purchase foreign oil. Each day, the U.S. consumes almost 20 million barrels of oil costing over $1 billion.[36] We send $150 billion per year to countries that the State Department deems dangerous or unstable, and some ultimately falls into the hands of enemies of the U.S.[37] This reliance on imported oil also contributes significantly to our trade deficit.

According to an upcoming study from Rice University, a carbon price would reduce the flow of dollars overseas, keeping more money in the pockets of consumers and American businesses. Amy Myers at the James A Baker III Institute for Public Policy found that, U.S. energy policies have the potential to reduce our oil consumption by as much as 40 percent (7-8 million barrels per day) after 2020.[38] That is more oil than we import from Saudi Arabia, Nigeria, Venezuela, Iraq, Russia, Kuwait and Mexico combined.[39]

**Crude Oil Imports**

(Top 15 Countries; Thousand Barrels per Day)

| Country | YTD 2010 |
|---|---:|
| Canada | 1,882 |
| Mexico | 1,033 |
| Nigeria | 996 |
| Saudi Arabia | 958 |
| Venezuela | 827 |
| Iraq | 506 |
| Algeria | 327 |
| Colombia | 293 |
| Brazil | 271 |
| Angola | 268 |
| Ecuador | 215 |
| Russia | 137 |
| United Kingdom | 137 |
| Kuwait | 66 |
| Gabon | 62 |

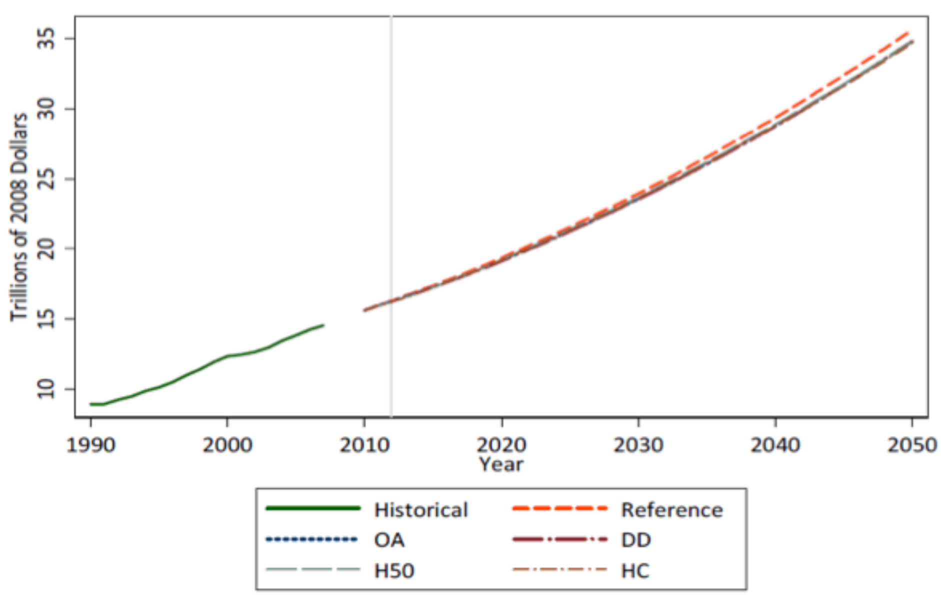
## The impact of a carbon price on GDP

Any review of a carbon price and the economy ultimately leads to an examination of the potential positive or negative impact on gross domestic product. The studies we reviewed showed that there is a consensus that a price on carbon, regardless of whether it's as low as $15/metric ton or as high as $158/metric ton, would have no negative impact on broader economic growth. Indeed, the United States has such a large and dynamic economy that placing a price on carbon is not likely to have a major net positive or negative impact on overall GDP over the next 20 years.

Almost all the reports we reviewed expect that U.S. GDP will grow at least 70 percent over the next 20 years, *with or without a price on carbon.* Analyses by the University of Cambridge,[40] Brookings,[41] and the Energy Information Administration,[42] all found that a price on carbon had a marginal impact on U.S. GDP.

For example, a very conservative forecast by economists at the University of Massachusetts predicted that the U.S.'s GDP would grow by 75 percent between 2007 and 2030 with a price on carbon, from $13 trillion to $24 trillion in 2030.[43] The study found that even the price of $271/metric ton in 2030 (wildly higher than anyone projects it will be)[44] would only slow GDP growth by 0.1 percent.[45]

**U.S. GDP under Four Policy Scenarios**




It may appear contradictory to say that a price on carbon would increase jobs and unleash investment between today and 2030, but would *not* have a significant impact on GDP. The energy sector in the U.S. today is $1.1 trillion. That's only 8.8 percent of the United States' GDP.[46] The reality is, particularly early on in the transition to clean energy, GDP is not going to move significantly because of changes in this one sector.

Moreover, since the Industrial Revolution, the United States economy has been powered by conventional fuels, and the transformation to clean energy will not happen overnight. It is an ongoing process that can begin today with a carbon price, and that will continue beyond the next 20 years. It is fitting then, as the market drives clean energy growth that there will be few ripples in an economic indicator as broad as GDP. As an assessment by the University of Cambridge noted, "the year-to-year effects of policies are likely to be so small as to be lost in the overall fluctuations in the growth of GDP, because well-designed policies will operate slowly and gradually."[47]

## Conclusions on a Carbon Price

After reviewing a cross section of literature looking at the effect of a carbon price, we found that while some sectors of the economy will decline, the net impact of a carbon price on the American economy will be positive. Time and again, the studies point to a carbon price as the key to unlocking billions of dollars in investments and creating new jobs. There is also little evidence to suggest that pricing carbon will harm the economy, let alone impede robust economic growth. These views are not limited to economists alone. America's business leaders view a carbon price as not only beneficial, but critical, to the United States' future prosperity.

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# APPENDIX 2

| Impact of a Carbon Price on Job Creation | |
|---|---|
| **FACT** | **SOURCE** |
| **Clean energy job growth in US, 1998-2007:** 9.1% | *The Clean Energy Economy: Repowering Jobs, Businesses and Investments Across America.* Report. The Pew Charitable Trusts, June 2009. Web. 26 Apr. 2010. Available at: http://www.pewcenteronthestates.org/uploadedFiles/Clean_Economy_Report_Web.pdf. |
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| Impact of a Carbon Price on Energy Efficiency | |
|---|---|
| **FACT** | **SOURCE** |
| **Energy cost savings from American Clean Energy and Security Act:** Approximately $750 per household by 2020 and $3,900 per household by 2030 | American Council for an Energy-Efficient Economy (ACEEE). *H.R. 2454 Would Save $3,900 Per Household by 2030, Energy Efficiency Provisions Will Create 650,000 Jobs by 2030.* Press Release. 23 June 2009. Web. 10 May 2010. Available at: http://www.aceee.org/press/0906waxman.htm. |
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| **Impact on household income from energy efficiency savings:** Increase of between $488 to $1,176 by 2020 | Roland-Holst, David, Fredrich Kahrl, Madhu Khanna, and Jennifer Baka. *Clean Energy and Climate Policy for U.S. Growth and Job Creation An Economic Assessment of the American Clean Energy and Security Act and the Clean Energy Jobs and American Power Act.* University of California, Berkeley and Yale University, 25 Oct. 2009. Web. 26 Apr. 2010. Available at: http://are.berkeley.edu/~dwrh/CERES_Web/Docs/ES_DRHFK091024.pdf. |
| **Value of gross energy savings in U.S.:** More than $1.2 trillion | Choi Granade, Hannah, Jon Creyts, Anton Derkach, Phillip Farese, Scott Nyquist and Ken Ostrowski *Unlocking Energy Efficiency in the U.S. Economy.* Report. McKinsey Global Energy and Materials, July 2009. Web. 26 Apr. 2010. Available at: http://www.mckinsey.com/clientservice/electricpowernaturalgas/downloads/us_energy_efficiency_full_report.pdf. |

| Impact of a Carbon Price on Investment | |
|---|---|
| **FACT** | **SOURCE** |
| **Capital market investment in clean energy in 2007:** ~$150 billion | *Investing in Climate Change 2009 Necessity and Opportunity in Turbulent Times.* Executive Summary. DWS Investments, Oct. 2008. Web. 26 Apr. 2010. Available at: https://www.dws-investments.com/EN/docs/products/Climate_Change_White_Paper_ExecSummary_Public.pdf. |
| **Expected annual capital market investment in clean energy by 2027:** $650 billion | *Investing in Climate Change 2009 Necessity and Opportunity in Turbulent Times.* Executive Summary. DWS Investments, Oct. 2008. Web. 26 Apr. 2010. Available at: https://www.dws-investments.com/EN/docs/products/Climate_Change_White_Paper_ExecSummary_Public.pdf. |
| **Cumulative net new investment in U.S. associated with capturing 3 gigatons per year of abatement through to 2030:** $1.1 trillion | Beinhocker, Eric, Jeremy Oppenheim, Ben Irons, Makreeta Lahti, Diana Farrell, Scott Nyquist, Jaana Remes, Tomas Naucler, and Per-Anders Nauclér. *The Carbon Productivity Challenge: Curbing Climate Change and Sustaining Economic Growth.* Rep. McKinsey Global Institute, McKinsey Climate Change Special Initiative, June 2008. Web. 26 Apr. 2010. Available at: http://www.mckinsey.com/mgi/reports/pdfs/Carbon_Productivity/MGI_carbon_productivity_full_report.pdf. |

| Impact of a Carbon Price on Oil Imports | |
|---|---|
| **FACT** | **SOURCE** |
| **U.S. oil consumption with a price on carbon:** -7 to 8 million barrels per day after 2020 | Stanton, Chris, comp. *Oil Demand Threatened by Big Shift to Green Policies.* The National. 2 Mar. 2010. Web. 26 Apr. 2010. Available at: http://www.thenational.ae/apps/pbcs.dll/article?AID=/20100302/BUSINESS/703029865/1050/. |
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| The Question of GDP | |
|---|---|
| **FACT** | **SOURCE** |
| **GDP growth, with a price on carbon, 2009-2030:** +75% (Increase in $10.3 trillion, from $13.7 trillion in 2009 to $24 trillion) | Pollin, Robert, and Ben Zipperer. *Carbon Cap Critics Predict Healthy Economy under Cap-and-Trade. Carbon Cap Critics Predict Healthy Economy under Cap-and-Trade.* Political Economy Research Institute, University of Massachusetts, Amherst. Web. 26 Apr. 2010. Available at: http://www.peri.umass.edu/fileadmin/pdf/other_publication_types/green_economics/fact_sheets/UnitedStates.pdf. |
| **Accumulated impact of a price on carbon on US GDP, 2010-2050:** -2.5% | McKibbin, Warwick, Adele Morris, Peter J. Wilcoxen, and Yiyong Cai. *Consequences of Alternative U.S. Cap-and-Trade Policies: Controlling Both Emissions and Costs.* The Brookings Institution, 24 July 2009. Web. 26 Apr. 2010. Available at: http://www.brookings.edu/~/media/Files/rc/reports/2009/07_cap_and_trade/0727_cost_containment.pdf. |
| **Impact on GDP of a target of reducing emissions to 450 parts per million:** Less than -0.6 percent of GDP | Beinhocker, Eric, Jeremy Oppenheim, Ben Irons, Makreeta Lahti, Diana Farrell, Scott Nyquist, Jaana Remes, Tomas Naucler, and Per-Anders Nauclér. *The Carbon Productivity Challenge: Curbing Climate Change and Sustaining Economic Growth.* Rep. McKinsey Global Institute, McKinsey Climate Change Special Initiative, June 2008. Web. 26 Apr. 2010. Available at: http://www.mckinsey.com/mgi/reports/pdfs/Carbon_Productivity/MGI_carbon_productivity_full_report.pdf. |
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# ENDNOTES

1 Many of the reports we examined do not focus on the mechanism for pricing carbon – i.e, through a market-based system like cap and trade or cap and dividend or a carbon fee. This paper also does not take a position on the most effective way of implementing a price on carbon and instead seeks to determine if the likely impact a price would have on the economy.

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