



# The Economic Imperative for Clean Energy

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## Executive summary

The United States faces an economic imperative to develop reliable, affordable, clean sources of energy and use them more efficiently. In the face of deep economic challenges and a rising federal budget deficit, some may suggest that the United States should postpone its investments in a clean energy supply. But the opposite is true. Sustained budget deficits can be problematic, but there is widespread agreement that running a deficit to pay for an economic stimulus and recovery plan is necessary now. Investing in clean energy creates jobs in the short-run, helps combat global warming, spurs long-term growth, and ultimately helps restore fiscal balance by improving our economic circumstances.

Our dependence on oil leaves us vulnerable to higher and higher prices in the coming decades, continued price volatility and shocks, and the demands of hostile and unstable countries. Oil prices jumped from roughly \$70 a barrel in July 2007 to more than \$140 a barrel in July 2008, before swiftly dropping back to between \$50 and \$60 a barrel in November 2008.<sup>1</sup> According to the International Energy Agency, “pronounced short-term swings in prices are likely to remain the norm” in the coming decades, and price shocks will be even more painful as average oil prices are projected to steadily rise.<sup>2</sup>

Climate change caused by reliance on fossil fuels is already underway. If left unchecked, this will lead to stronger hurricanes and other storms, floods caused by rising sea levels and massive precipitation, droughts, and heat waves that will ultimately cost trillions of dollars a year.

These are the reasons why we need action on clean energy, and it should proceed in two stages. First, we should act immediately to invest in a green stimulus and recovery plan, creating desperately needed jobs and beginning the transition to a clean and more efficient energy future. Second, in 2009 we must begin putting in place an economy-wide greenhouse gas cap-and-trade program—the best long-term solution to catastrophic climate change—as a central component of a comprehensive clean energy strategy.

Our nation faces great economic challenges. Immediate government investments will help put us on a path to recovery while also speeding the arrival of an economy powered with clean, sustainable, and secure sources of energy. We cannot be confident of sustainable economic growth in the future unless we also move ahead with the important structural transformation to a low-carbon economy.

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## The consequences of dependence on oil

Our nation's heavy reliance on oil is a threat to our economic prosperity, leaving us vulnerable to higher and more volatile prices. Prices are expected to rise in coming years as China, India, and other nations develop and increase their energy use, and the most accessible oil resources are depleted.<sup>3</sup> In 1980, China and India combined accounted for 8 percent of worldwide energy consumption, but by 2030 they will account for a quarter of worldwide consumption, according to Energy Information Administration projections.<sup>4</sup>

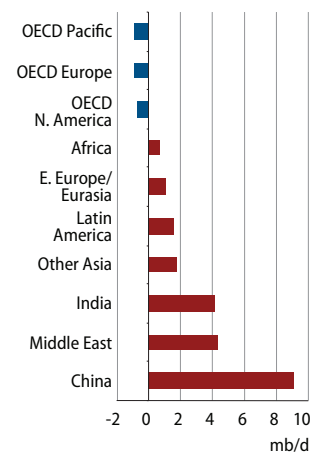
Worldwide, the International Energy Agency projects that (assuming no changes in policy) overall energy demand will increase 45 percent by 2030. This increase in demand is driven by developing countries; nations other than the more economically advanced members of the Organization for Economic Cooperation and Development account for 87 percent of the growth in demand.<sup>5</sup>

If the world stays on its current path, we will all face much higher energy prices. According to a recent IEA report, “current global trends in energy supply and consumption are patently unsustainable.” Indeed, we must not be lulled into inaction by temporary reductions in the price of oil. The report concludes that, “while market imbalances could temporarily cause prices to fall back, it is becoming increasingly apparent that the era of cheap oil is over.”

The IEA estimates that the price of oil will increase to more than \$120 per barrel in 2007 dollars by 2030.<sup>6</sup> And the IEA projection is based on the assumption that 64 million barrels per day of additional gross capacity—almost six times what Saudi Arabia produces today—will be brought on line between 2007 and 2030. The IEA concedes that there “remains a real risk that under-investment will create an oil-supply crunch in that timeframe.”<sup>7</sup>

A per barrel price of \$120 is just the baseline. Temporary spikes are likely to send the price soaring much higher. The IEA concludes that, “pronounced short-term swings in prices are likely to remain the norm and temporary price spikes or sharp falls cannot be ruled out.”<sup>8</sup> The price of oil doubled between July 2007 and July 2008.<sup>9</sup> A spike like that in 2030 would send prices well above \$200 a barrel.

**Change in Oil Demand by Region, 2007-2030**



Source: International Energy Agency

Our need to purchase hundreds of billions of dollars worth of oil leaves our economy and family budgets vulnerable to price shocks. Sharp changes in oil prices impede business investment by raising uncertainty about future energy prices and induce costly resource reallocation from more highly affected to less highly affected sectors.<sup>10</sup> Volatility also makes it impossible for American families to accurately plan for future energy expenses.<sup>11</sup>

Our dependence on foreign oil has increased during the Bush administration, and much of the world's oil supply is held by unstable or even hostile regimes.<sup>12</sup> Fear of price shocks influences our foreign policy decisions and the international balance of power. The international community, for example, would surely be more likely to press Iran to forego its nuclear ambitions if not for fear that if Iran subsequently withheld its oil supplies, world oil prices would soar.<sup>13</sup>

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## The consequences of climate change

Our reliance on oil, coal, and other fossil fuels is also driving catastrophic climate change, which will cause heavy economic damage without corrective action. The costs of developing a new energy economy, even in the face of rising deficits, are dwarfed by the potential costs of inaction. Nicholas Stern, a former World Bank economist and expert on the economics of climate change, recently argued that a “business-as-usual” approach to climate change will “choke off growth” so we must “take the opportunity of the coincidence of the [financial] crisis and the deepening awareness of the great danger of unmanaged climate change” to invest in laying the foundation for a world of low-carbon growth.<sup>14</sup>

While analysts debate the optimal methodology for quantifying the impact of climate change, there is no question that the costs will be immense. The list of economic damages from global warming is long. Sea levels are projected to rise 23 inches by 2060 and 45 inches by 2100. This would be devastating to coastal real estate. According to a Tufts University report commissioned by the Natural Resources Defense Council, with no change in current emissions trends, real estate losses attributable to rising sea levels in the United States could total \$80 billion a year (in 2006 dollars) by 2050 and \$360 billion a year by 2100.<sup>15</sup>

Higher temperatures will result in stronger hurricanes.<sup>16</sup> And higher sea levels will lead to more damage from storm surges, flooding, and erosion from each hurricane. Hurricane Katrina alone cost more than \$200 billion dollars.<sup>17</sup> There is more than \$7 trillion of insured residential and commercial property in states exposed to North Atlantic hurricanes, including 79 percent of the property in Florida and 63 percent of the property in New York.<sup>18</sup> With no change in current emissions trends, average annual hurricane damages will grow by an inflation-adjusted \$43 billion by 2050 and \$422 billion by 2100.<sup>19</sup>

Staggering costs will result from more frequent and severe droughts in the American West and Southeast. Less precipitation means less water for homes, businesses, and farms. In California's Central Valley alone, drought conditions may cause an estimated economy-wide loss of around \$6 billion in particularly dry years.<sup>20</sup> By 2100, providing water to the driest parts of the United States could cost \$950 billion more per year.<sup>21</sup>

Rising temperatures will lead to exploding demand for air-conditioning and refrigeration. The corresponding decline in demand for heating will only offset a fraction of the energy costs associated with cooling. Annual energy costs in the United States could be as much as \$47 billion higher by 2050 and \$141 billion higher by 2100.<sup>22</sup> According to a recent University of Maryland study, “[g]iven the long lead times of capacity expansion in the energy sector, little time remains to act on anticipated warming trends.”<sup>23</sup>

The Tufts study estimates that the added costs attributable to energy, water, hurricanes, and real estate losses will total 1.5 percent of U.S. GDP by 2050 and 1.8 percent by 2100.<sup>24</sup> But these costs are only the beginning. In the West and Northwest, climate change will increase the risk of forest fires by altering precipitation patterns. Fighting forest fires is enormously expensive, and they can cause massive property damage. In addition to droughts, more frequent floods will plague the Great Plains and Midwest, which will damage crops and property.<sup>25</sup>

Climate change is also likely to have substantial indirect economic effects. According to the University of Maryland study:

Such effects may be present in the form of higher prices for products, because the prices of raw materials and energy, transport, insurance and taxes increase. As the costs for doing business increase, competitiveness of individual firms, entire sectors or regions may decline. With this decline may come a loss of employment and overall economic security. As climate change affects jobs and household income in the United States, and as resources are increasingly diverted to help maintain safety and adequate supply of goods and services, national security may be weakened.<sup>26</sup>

And the effects of global warming in the United States and especially in developing countries could be destabilizing, leading to higher national security, foreign assistance, and defense costs.

All told, current climate change trends would inflict massive economic damage. According to the Stern Review, commissioned by the British government, if we continue with a “business as usual” approach, globally “climate change will reduce welfare by an amount equivalent to a reduction in consumption per head of between 5 percent and 20 percent.”<sup>27</sup> The Tufts study estimates that under current trends, the total cost of global warming in the United States will be as high as 3.6 percent of GDP, or \$3.8 trillion a year, in 2006 dollars by 2100. Hurricane damage, real estate losses, energy costs, and water costs alone will account for roughly half the cost—almost \$1.9 trillion annually by 2100.<sup>28</sup> (see chart on page 5)

The missed opportunity of clean energy

Investment in clean renewable energy and energy efficiency won't just allow us to avert an economic disaster—it has tremendous upside. Deutsche Bank recently concluded that, “energy efficiency technologies are obviously highly desirable in economies facing recession” because they let countries “climate proof” their economies while responding to the economic downturn.<sup>29</sup> Our competitors have embraced this opportunity, while America has fallen behind.

Case in point: the solar cell. The first solar cell was invented in the United States at Bell Labs in 1954, but between 1997 and 2007 our market share in solar cell production dropped from 44 percent to 10 percent.<sup>30</sup> Meanwhile, Japan, relying on government research and development and consumer subsidies, became the world leader.<sup>31</sup> Germany is also a solar leader; more than 55,000 Germans are employed in the solar industry.<sup>32</sup>

Similarly, European manufacturers control 75 percent of the world market for wind turbines, and wind power accounts for more than 7 percent of electricity in five European Union countries. In Denmark, wind power's share is more than 20 percent, and in Spain it is more than 10 percent.<sup>33</sup> Wind is abundant and well distributed across the United States, yet it supplies just 1 percent of our electricity.<sup>34</sup> This difference is partially the result of erratic U.S. government support for wind power. Renewable power producers in countries with more successful wind power industries benefit from long-term purchase agreements at adequate prices.<sup>35</sup>

Then there is Brazil, which today is the world leader in ethanol production and transformed its automobile fleet to run on such fuel. Brazil dramatically reduced its dependence on oil in the process. In 2004, only 30 percent of new cars sold in Brazil were flexible-fuel vehicles. By the end of 2005, 71 percent of total vehicle sales were flex-fuel vehicles.<sup>36</sup> Brazil built up the refueling infrastructure needed to create a marketplace for flex-fuel vehicles. In contrast, only about 1,700 American filling stations offer E85—a mixture of 85 percent ethanol and 15 percent gasoline—while gasoline is available at more than 160,000 stations.<sup>37</sup>

If the United States does not invest in clean energy now, we will fall even further behind, and there will be devastating effects for future growth. We must become the world leader in clean energy technology. As oil prices rise, countries that have less volatile and expensive sources of energy and that use it the most efficiently will thrive in the global economy. Renewable energy and efficiency are growth industries that can drive U.S. economic leadership well into the 21st century. When we develop the cutting edge energy technologies that will transform our planet, we can then export them to the rest of the world.

The Estimated Annual Global Warming Price Tag in Four Impact Areas

	In billions of 2006 dollars			
	2025	2050	2075	2100
Hurricane Damages	\$10	\$43	\$142	\$422
Real Estate Losses	\$34	\$80	\$173	\$360
Energy-Sector Costs	\$28	\$47	\$82	\$141
Water Costs	\$200	\$336	\$565	\$950
Subtotal for Four Impact*	\$271	\$506	\$961	\$1,873

Natural Resources Defense Council

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## A plan for clean sustainable energy

President-elect Barack Obama and the incoming 111th Congress have no time to waste. Prompt investments in clean energy can be a win-win, helping revitalize the economy and create jobs now while speeding the transition to a clean energy future. We should also immediately accelerate the shift to renewable energy by quickly passing a national renewable electricity standard, while beginning to lay the groundwork for a comprehensive cap-and-trade plan to reduce greenhouse gas emissions.

We should invest immediately in a green stimulus and recovery plan to create desperately needed jobs and begin the transition to a clean energy economy. A recent Center for American Progress study found that a \$100 billion investment, combining tax credits and loan guarantees for private businesses along with direct public investment spending, would create 2 million jobs over two years, many in the struggling construction and manufacturing sectors.<sup>38</sup> Most of these jobs cannot be outsourced. The plan examined in the CAP study focuses on boosting private and public investment in these key areas:

- Retrofitting buildings to improve energy efficiency
- Expanding mass transit and freight rail
- Constructing “smart” electrical grid transmission systems
- Increasing the production of wind power, solar power, and next-generation biofuels<sup>39</sup>

We should pursue these goals by investing in both existing efficiency and green job programs, which would provide immediate stimulus, and new programs that may take a few months to ramp up.<sup>40</sup> This green stimulus and recovery program should be the down payment on a comprehensive, long-term, low-carbon energy strategy.

We can also quickly pass a national renewable electricity standard to require utilities to increase their production of renewable energy including wind, solar, and geothermal power. CAP supports a renewable electricity standard of 25 percent by 2025 as well as distributed electricity mandates. Distributed electricity is the creation of small amounts of energy close to where it is consumed, for example, by solar cells on roofs or hydrogen fuel cells.<sup>41</sup> And we can accelerate efficiency efforts with the adoption of an Energy Efficiency Resource Standard similar to the one enacted in 18 states.<sup>42</sup>

Our long-term strategy must include five critical steps, as described in CAP’s “Capturing the Energy Opportunity: Creating a Low-Carbon Economy.”<sup>43</sup> First, we need to cap and then reduce greenhouse gas emissions across the U.S. economy. Despite concerns about global warming, U.S. greenhouse gas emissions have actually increased during President Bush’s two terms.<sup>44</sup>

The 111th Congress will take up some of the most significant and transformative legislation in decades in many areas of the economy. Our economic future requires that we not let cap-and-trade move to the back of the line. The incoming Obama administration and

new Congress should immediately begin moving forward to work through the complex issues at stake to devise and pass legislation. A central element must remain auctioning the right to emit greenhouse gases, which is important to our energy future and sustainable growth, and will generate resources that we can invest in accelerating the transition to a vibrant low-carbon economy.

The Congressional Budget Office estimates that emissions permits created by a cap on greenhouse gas emissions would produce between \$50 billion and \$300 billion in revenue each year (in 2007 dollars) by 2020.<sup>45</sup> Rep. Ed Markey's (D-MA) iCAP bill would generate an estimated \$200 billion a year from the auction of pollution allowances.<sup>46</sup>

An auction is the most economically efficient and environmentally effective way to distribute permits.<sup>47</sup> Once a cap-and-trade program is in place, some of the revenue can be used to reimburse the Treasury for the cost of the green recovery plan. The revenue also could finance investments in new, clean, and efficient technology; incentives for households to adopt these new technologies; and a new clean energy infrastructure.

While the cost of polluting energy will continue to go up once a price on carbon is established, tax rebates paid for with revenue from the auction of pollution allowances could offset these increases for low- and middle-income families. Eventually, with technological improvements and the rising cost of fossil fuels, all of us will come out ahead.

Second, we must transform our transportation network. We need to increase the fuel economy of our vehicle fleet. We should move up the compliance deadline for vehicles that average 35 miles-per-gallon—2020 is too long to wait—and speed the continuing development of hybrid and electric technologies. We should also push the development and availability of low-carbon, alternative fuels, and improve our public transportation infrastructure and city planning so more Americans can start driving less.

Third, we must overhaul our electricity industry by improving the efficiency of energy production and use, increasing production and consumption of renewable energy, and conducting research on promising but unproven technology to capture carbon dioxide emissions from power plants and store them underground in geologic reservoirs.

Fourth, we should require the federal government, led by a newly created White House National Energy Council, to create policies that promote energy efficient and low-carbon technologies, and then direct the federal government's own purchasing power to spur employment of low-carbon technologies and invest in only low-emitting projects.

Finally, the United States must commit to advancing international global warming policies. American leadership is critical if we are to prevent the most devastating potential effects of climate change.

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## Conclusion

The next Congress and the Obama administration must not use the rising federal budget deficit as a reason to postpone investments in clean energy. If we continue to stick our heads in the sand and do not curtail our reliance on fossil fuels, rising oil prices and the unabated progression of climate change will devastate our economy. Investing in reliable, affordable, and clean sources of energy can help get us through our current economic crisis and will be a key first step in laying the foundation for long-term prosperity.



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