



The Economic Benefits of Investing in Clean Energy

How the economic stimulus program and new legislation can boost U.S. economic growth and employment

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Introduction and summary

The United States in the 21st century faces an enormous challenge—successfully managing the transformation from a predominantly carbon-intensive economy to becoming a predominantly clean energy-based economy. The reality of global climate change due to rising carbon emissions makes it imperative that the U.S. economy dramatically cut its consumption of traditional fossil fuels, the primary source of carbon dioxide (CO₂) delivered into our atmosphere by human activity. Rising levels of CO₂ in the atmosphere is in turn the primary cause of global warming.

This economic transformation will engage a huge range of people and activities. But there are only three interrelated objectives that will define the entire enterprise:

- Dramatically increasing energy efficiency.
- Dramatically lowering the cost of supplying energy from such renewable sources of energy as solar, wind and biomass.
- Mandating limits and then establishing a price on pollution from the burning of oil, coal, and natural gas.

It is crucial for economic policymakers and the American people to understand the likely effects of these three overarching objectives as much as possible. Specifically, we need to gauge our success in curbing CO₂ emissions alongside the broader effects on the U.S. economy, particularly on employment opportunities, economic growth and people's incomes.

This paper examines these broader economic considerations—jobs, incomes, and economic growth—through the lens of two government initiatives this year by the Obama administration and Congress. The first is the set of clean-energy provisions incorporated within the American Recovery and Reinvestment Act, initiated by the Obama administration and passed into law by Congress in February. The second is the proposed American Clean Energy and Security Act, co-sponsored by Rep. Henry Waxman (D-CA) and Rep. Edward Markey (D-MA), which is now before Congress.

Our analysis in this paper shows that these two measures operating together can generate roughly \$150 billion per year in new clean-energy investments in the United States over the next decade. This estimated \$150 billion in new spending annually includes government funding but is notably dominated by private-sector investments. We estimate this

sustained expansion in clean-energy investments triggered by the economic stimulus program and the forthcoming American Clean Energy and Security Act can generate a net increase of about 1.7 million jobs. This expansion in job opportunities can continue as long as the economy maintains a commitment to clean-energy investments in the \$150 billion per year range. If clean-energy investments expand still faster, overall job creation will increase correspondingly.

These job gains would be enough—on their own—to reduce the unemployment rate in today’s economy by about one full percentage point, to 8.4 percent from current 9.4-percent levels—even after taking into full account the inevitable job losses in conventional fossil fuel sectors of the U.S. economy as they contract. Our detailed analysis, based on robust economic-modeling methodologies that are explained in detail in the paper and in Appendix 1, beginning on page 48, calculates that roughly 2.5 million new jobs will be created overall by spending \$150 billion on clean-energy investments, while close to 800,000 jobs would be lost if conventional fossil fuel spending were to decline by an equivalent amount. It is not likely that all \$150 billion in new clean-energy investment spending would come at the expense of reductions in the fossil fuel industry. However, we present this scenario to establish a high-end estimate for reductions in conventional fossil fuel spending, and the net gains in employment that will still result through spending \$150 billion per year on clean-energy investments. In appendix 2, we also present these figures on net job creation broken down on a state-by-state basis for all 50 states and the District of Columbia.

The stimulus program enacted in February to help the economy recover from a deep recession already in its 18th month includes a range of measures to begin building a clean-energy economy. These measures include:

- \$24.4 billion in federal government spending to promote energy efficiency.
- \$23 billion for transportation investments.
- \$25.3 billion for renewable energy.

Some of this funding will be in 2010, but a significant amount will also spark new economic activity between 2011 and 2014.

Congress still must pass the American Clean Energy and Security Act, or ACESA, and the president must still sign it. But the legislation contains three broad categories of initiatives that are unlikely to change in substance:

- Regulations aimed at promoting clean energy.
- A mandated cap on carbon emissions that will be phased in through 2050.
- Measures designed to assist businesses, communities and individuals successfully manage the transition to a clean-energy economy.

The general thrust of this forthcoming legislation and the clean-energy provisions within the economic stimulus program is to promote energy efficiency and renewable energy. Yet as an economic stimulus program, ARRA operates through direct government spending and financial incentives to promote private investments in clean energy. In contrast, ACESA will boost clean-energy investments mostly by private businesses, investors and households through new regulations that encourage the clean and efficient use of energy and discourage the use of high-carbon fuels. Many of the regulatory initiatives proposed within the ACESA are not fully fleshed out within the legislation itself. As such, it is more difficult to estimate their effects on overall clean-energy investments than is true with the spending initiatives advanced by the ARRA.

In the following pages, this paper first examines the basic clean-energy features of the economic stimulus program and the proposed ACESA. Specifically, we will detail the distinct features of both measures and the ways in which they would operate in concert to encourage investments in clean energy and energy efficiency as well as discourage spending on conventional high-carbon fuels.

We will then explain how ARRA and ACESA operating in tandem would create new employment opportunities across the United States by spurring \$150 billion a year over the next decade in new clean-energy investments. Understanding how we calculated these investment levels over 10 years requires an understanding of the different economic models available to analysts and why we chose a simple but reliable method for estimating employment effects based on data generated by the U.S. Commerce Department's industrial census. We explain the reasons for our analytical decisions on pages 15–20, beginning with how we estimated the effects on jobs of shifting spending in the U.S. economy away from high-carbon fuels and toward clean-energy investments. We will show why our simple approach offers a robust framework for understanding how a shift in spending from conventional fossil fuels to clean energy generates a net expansion of employment that will be sustained as long as the U.S. economy maintains its commitment to clean-energy investments.

We then present our detailed employment estimates. Our key finding is that clean-energy investments generate roughly three times more jobs than an equivalent amount of money spent on carbon-based fuels. We consider some of the implications of this result, including how a large-scale shift from conventional fossil fuels to clean-energy investments—on the order of \$150 billion a year—would affect conditions in the U.S. labor market.

Our paper then turns to the various economic models used to estimate the impact of a carbon cap on the long-run growth trajectory of the U.S. economy. Our key finding: All of the models, without exception, forecast that a carbon cap, such as that proposed in ACESA, would have, at worst, a minimally negative impact on the U.S. economy's long-term growth path. Moreover, these models generate this basic finding without considering some of the major ways in which clean-energy policies can stimulate economic growth.

These include the expansion of employment opportunities itself, a reduction in the trade deficit, promoting technological improvements and thus falling prices in renewable energy sources, and reducing the negative impacts on economic activity of greenhouse gas emissions and unmitigated global warming.

To be sure, any economic modeling effort that estimates changes in employment growth, economic growth, and income growth will result in forecasts that are problematic by nature. We make this clear in our paper wherever we rely on our own economic models and those employed by others. But we also take pains to examine the relative strengths and weaknesses of all the modeling approaches—including our own. This enables us to cross check our own conclusions with those of other researchers to reach the most reliable possible understanding of the overall impact of advancing a clean-energy agenda within the U.S. economy.

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