

Part of a series on

**CAP
2.0**

Policy Brief



A Clean Energy Bargain: More Jobs, Less Global Warming Pollution, and Greater Security for Less Than the Cost of a Postage Stamp a Day

The United States moved toward economic recovery, environmental protection, and energy security when the House of Representatives passed the American Clean Energy and Security Act (ACES). According to new economic analysis, this important legislation will protect the planet for less than the cost of a postage stamp a day per household, and represents a great investment in America's future. Now it's up to the Senate to turn this bill into a law.

ACES Is an Investment in Our Clean Energy Future

ACES is a win-win for the economy and the environment. By capping global warming pollution while also investing in clean energy and energy efficiency, ACES will help avert the most catastrophic effects of climate change. It will also encourage the use of emerging clean technologies, make us more energy efficient, reduce our reliance on foreign oil, and lessen our exposure to oil price volatility.

In a new climate policy analysis, NRDC used two well-known national energy models to examine the impact of ACES on the economy. Key findings of our analysis include:

- **ACES will boost our economy:** ACES will redirect \$300 billion of investments (through 2030) from dirty and unsustainable power toward clean energy, creating hundreds of thousands of jobs in the process.
- **ACES is affordable:** The cost of ACES to American households will be less than a postage stamp per day.
- **ACES will make America more secure:** ACES can reduce oil imports by as much as 5 million barrels per day, improve our energy security, and reduce the risk of fuel price shocks. At today's price of \$70 per barrel, that means more than \$2 trillion (through 2050) will not be sent overseas for imported oil.

For more information, please contact

Jacqueline Wong
(212) 727-2700 or

Laurie Johnson
(202) 289-6868

To see more detailed results and assumptions, visit www.nrdc.org/cap2.0



September 2009

© Natural Resources Defense Council

A Clean Energy Bargain: More Jobs, Less Global Warming Pollution, and Greater Security for Less Than the Cost of a Postage Stamp a Day

Model Overview

NRDC, working with consultants at OnLocation Inc. and International Resources Group, used versions of the National Energy Modeling System (NEMS-NRDC) and the Market Allocation (MARKAL) models to explore the impact that ACES will have on our energy system and economy. NEMS-NRDC and MARKAL both simulate energy markets from the “bottom-up,” but they differ in scope and how they model choices. NEMS-NRDC is a forecasting model that uses observed historical behavior to estimate how individual market participants will act in response to changing market conditions and specific constraints through 2030. It combines detailed energy markets with a macroeconomic model to estimate the impacts that changes in the energy system have on the economy as a whole. In contrast, MARKAL is a long-term, cost-optimization model, which uses perfect foresight to minimize total energy system costs through 2050. To read the detailed report of our findings, see www.nrdc.org/cap2.0.

ACES WILL BOOST OUR ECONOMY ACES will redirect approximately \$300 billion from dirty power sources toward clean energy

Renewables account for approximately 10 percent of electricity generation in the United States, with hydropower taking the largest share. Under business-as-usual (BAU), the Energy Information Administration (EIA) estimates that renewables will increase their market share to approximately 15 percent by 2020 and remain at that level through 2030.¹ Under ACES, NEMS-NRDC and MARKAL show that renewables could account for 17 to 22 percent of electricity generation in 2020 and 19 to 34 percent in 2030. Furthermore, NEMS-NRDC estimates that \$300 billion of investments will be redirected from fossil-fuel generation toward low- or no-emissions electricity generation technologies and more efficient residential and commercial equipment between 2012 and 2030.

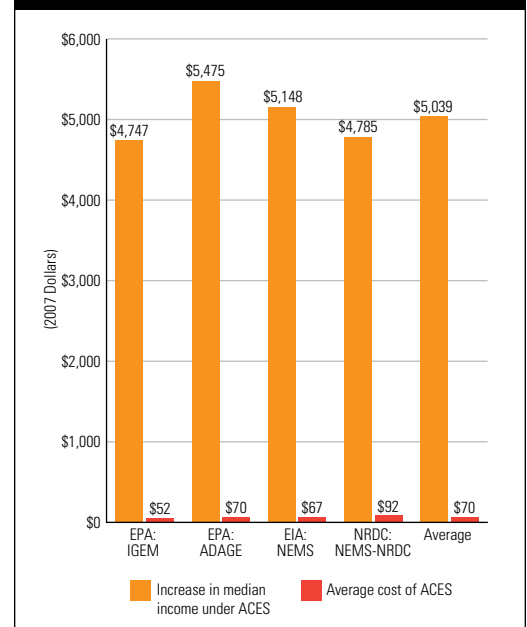
ACES will create clean energy jobs for Americans

Clean energy investments create more jobs across all skill and education levels than comparable investments in fossil-fuel energy sources because clean energy employs U.S. workers to capture domestic energy efficiency and renewable energy opportunities. The Political Economy Research Institute (PERI), an independent unit of the University of Massachusetts, found that clean energy investments create 3.2 times as many jobs as fossil fuel investments.² Clean energy investments also create 5.5 times as many jobs for workers with few educational credentials or work experience, and 75 percent of these jobs provide opportunities for advancement.

ACES IS AFFORDABLE ACES will cost American households less than a postage stamp a day

The Congressional Budget Office (CBO), the Environmental Protection Agency (EPA), and the Department of Energy’s EIA have each released assessments of how much ACES will cost American households. The CBO estimates the average annual household cost will be \$175 in 2020.³ The other analyses, including NEMS-NRDC, provide annual estimates through 2030, allowing for direct comparisons between them. Comparing EPA, EIA, and NEMS-NRDC results, the estimates for average annual household cost range from \$52 to \$92, as shown in Figure 1.⁴ This translates to \$0.14 to \$0.25 per household per day. Meanwhile, median annual income levels per household over 2012-2030 are expected to be, on average, \$4,700 to \$5,500 higher than 2009 levels.⁵

Figure 1. Increase in average 2012-2030 median annual income per household from 2009 levels, and average annual cost per household vs. BAU over 2012-2030.



ACES will lower electric bills for American households

Another important finding is that electricity rates will increase only slightly (after accounting for rebates that will flow back to consumers through emission allowances allocated to their local distribution companies), while energy efficiency and behavioral responses to price changes will lower electricity consumption. The combined effect is that most households will save money on their electricity bills (an average of \$6 per month over 2012–2020). On a state-by-state basis, households in almost every part of the country will see monthly savings on their electric bills under ACES relative to BAU, as shown in Figure 2.

Although bills in four states (Minnesota, North Dakota, Nebraska, and South Dakota) are projected to be a little higher under ACES than under BAU, bills in these states are still expected to be lower than they were in 2007.

ACES WILL MAKE AMERICA MORE SECURE

ACES can reduce oil imports by 5 million barrels per day

Another benefit of ACES is it will boost domestic oil production by capturing CO₂ from power plants and other industrial sources (known as carbon capture and storage or CCS), which can be used to enhance oil production in depleted oil fields.

The Department of Energy (DOE) estimates that over 60 percent of the oil discovered in the United States is considered “stranded” and uneconomical to recover conventionally. CO₂-enhanced oil recovery (CO₂-EOR) can yield up to 20 percent more of the original oil in place, extending the productive life of existing oil fields by 20 to 30 years. Oil field operators in western Texas, Mississippi, and Wyoming have been using this method for more than 30 years; they are currently producing more than 270 thousand barrels of oil per day. The DOE estimates that with ample supplies of CO₂, between 45 and 64 billion barrels of domestic oil could be economically recovered.

Figure 2. Average monthly electricity bill savings per household under ACES (relative to BAU), over 2012-2020.⁶

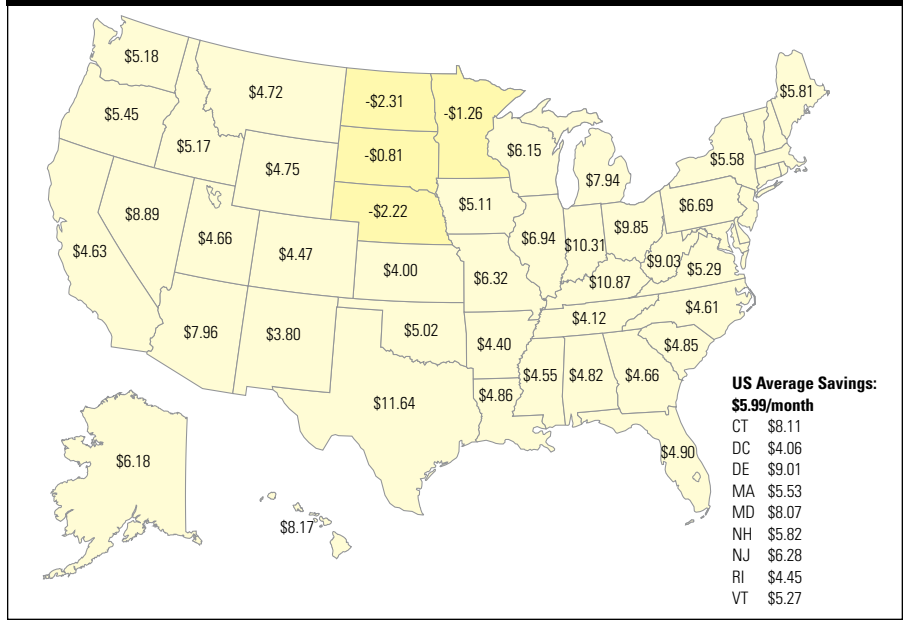


Figure 3. Carbon dioxide captured from electricity generation technologies with CCS in 2020 and 2030.

CAPTURED EMISSIONS FROM CCS ELECTRICITY GENERATION (Million Metric Tons CO ₂)					
	EPA: IGEM	EPA: ADAGE	EIA: NEMS	NRDC: NEMS-NRDC	NRDC: MARKAL
2020	152	152	85	76	124
2030	207	230	409	538	243

The market for CO₂-EOR, however, has been limited by available supplies of CO₂. ACES will provide sufficient incentives to encourage capture of carbon dioxide on as much as 72 gigawatts of power generation capacity. As a result, the CO₂ supply from the electric power sector alone is projected to meet the potential economic demand for CO₂-EOR.⁷

NRDC worked with Advanced Resources International, a specialist in CO₂-EOR, to estimate the impact that carbon dioxide captured in the MARKAL model would have on EOR out to 2050. We estimate that 1.3 million barrels per day (MBD) of additional domestic oil production

A Clean Energy Bargain: More Jobs, Less Global Warming Pollution, and Greater Security for Less Than the Cost of a Postage Stamp a Day

would result from EOR in 2020 under ACES, rising to 2.6 MBD in 2030 and 4.8 MBD in 2050.⁸ With lower fuel demand and more oil produced domestically, we can import far less oil and strengthen our energy security. While the MARKAL model shows that growth in CO₂-EOR partially substitutes for other forms of domestic oil

production, ACES will result in a net reduction in oil imports of 2.1 MBD by 2030 and 5.0 MBD by 2050 (vs. BAU), with the United States eventually importing just 27 percent of the oil it needs (see Figure 4), down from importing more than 60 percent of our oil needs today. At today's oil prices, the cumulative value of these reduced imports through 2050 will be worth more than \$2 trillion, significantly boosting the net benefit of ACES to the U.S. economy.

ACES will lower oil prices and lead to less price volatility

We estimate that the additional oil production from enhanced oil recovery under ACES would be enough to lower global oil prices. It would also leave America less vulnerable to energy price shocks.

THE SENATE MUST ACT NOW

Passage of comprehensive clean energy and climate protection legislation, such as ACES, will help avert catastrophic climate disruption by requiring emission reductions which will redirect our resources toward cleaner, more energy-efficient technologies. As a result, we will lead the global clean energy economy, create hundreds of thousands of quality jobs here at home, and bolster our national security.

¹ Energy Information Administration's Annual Energy Outlook 2009 Updated Release, April 2009.

² PERI, "The Economic Benefits of Investing in Clean Energy," americanprogress.org/issues/2009/06/clean_energy.html; "Green Prosperity: How Clean Energy Policies Can Fight Poverty and Raise Living Standards in the United States," nrdc.org/energy/greenjobs/.

³ The CBO's estimate is higher than the other estimates reviewed. This may be because the CBO focused on modeling Title III of the bill (the cap-and-trade mechanism), without fully incorporating the effects of other provisions such as energy efficiency. In contrast, we modeled all major provisions of ACES, including the energy efficiency provisions that result in significant cost reductions.

⁴ Household cost refers to consumption loss per household, which represents the reduction in consumer spending for goods and services due to lower purchasing power. For the apples-to-apples comparison shown, we calculated the net present value of annual consumption loss per household from 2012 to 2030, in 2007\$, with 2009 as the base year and a 5 percent discount rate.

⁵ To calculate income levels, we assumed that the 2007 U.S. median household income of \$50,233 (in 2007\$) grew at the same rate as consumption per household under ACES (also in 2007\$).

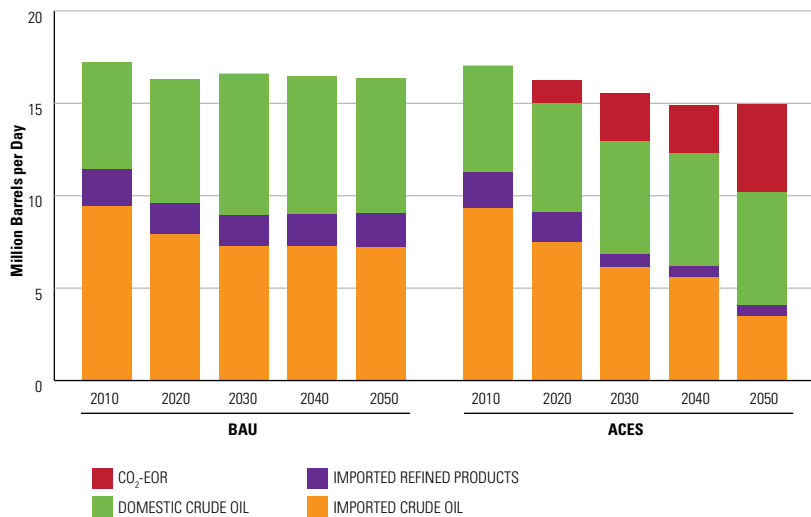
⁶ The numbers in Figure 2 do not reflect the capital costs of more efficient equipment. For more details, see <http://switchboard.nrdc.org/blogs/paltman/media/ACES%20white%20paper1.pdf>.

⁷ Except in Alaska, where CCS is not expected to be deployed.

⁸ Oil production and carbon sequestration potential will be site specific. Responsible operations are essential and sound regulations can help minimize any surface or subsurface risks.

Figure 4. Domestic and imported crude oil and refined products consumption from 2010 to 2050, under MARKAL.

Sources of U.S. Oil Consumption



Acknowledgements

NRDC would like to thank the Doris Duke Charitable Foundation for their generous support. In addition, we are deeply indebted to the group of expert advisors from academia, industry, labor, and non-governmental organizations that contributed valuable insights and guidance to our modeling effort:

- Steve Clemmer, Union of Concerned Scientists
- Steve Corneli, NRG Energy
- David Foster, Blue Green Alliance
- Mark Fulton and Bruce Kahn, DB Climate Change Advisors, Deutsche Bank
- Dan Kammen, University of California, Berkeley
- Clay Nessler, Johnson Controls
- Robert Socolow, Princeton University

Please note that the organizational affiliations are listed for identification purposes only. The results presented here do not necessarily reflect the views of either these individuals or their organizations, and NRDC takes sole responsibility for the conclusions and recommendations drawn from the modeling effort.