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# U.S. Clean Power Plan Provides Opportunity for Significant Cuts in State Budget Deficits

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The 2014 mid-term election that put Republicans in control of Congress reduced any chance of federal legislative action to limit greenhouse gases such as carbon dioxide from electric power plants. However, the executive branch already has authority from the U.S. Supreme Court to limit emissions under the Clean Air Act.[1] In June 2014, the Obama Administration issued its proposed Clean Power Plan, which sets a specific limit on emissions for each state and then allows each state to decide how to meet its target. Comments are invited on this plan, and President Obama can modify the executive order before it is issued in June of 2015.

The U.S. Clean Power Plan uses a formula to determine the target for each state, expressed as a maximum emission rate per unit of electricity, but it provides states with flexibility regarding how to meet that target.[2] It even allows states to convert that emission rate target to an absolute quantity of emissions and then to sell permits for that many tons of carbon dioxide. Any state that chooses to comply with the federal mandate by selling permits can collect revenue for the state, and this revenue can be used for additional spending, to cut other taxes, or to reduce the projected budget deficit. Indeed, many states since the Great Recession are still facing major deficit projections.

This federal mandate provides an opportunity for states like Illinois to address some significant budget problems. In Illinois, for example, projections of the deficit under current law increase from $1 billion in FY2014 to $14 billion in FY2025.[3] Our purpose here is to calculate the fraction of several states' projected future deficits that can be offset by collecting their own permit revenue.

## The U.S. Clean Power Plan

At a cost of $7.4 to $8.8 billion in 2030, the U.S. EPA believes that its proposed Clean Power Plan will achieve "climate and health benefits worth an estimated $55 billion to $93 billion in 2030, including avoiding 2,700 to 6,600 premature deaths and 140,000 to 150,000 asthma attacks in children."[4] This proposed federal mandate would require

[1]See Liptak, Adam. (June 23, 2014). Justices Uphold Emission Limits on Big Industry. The New York Times. Available at http://www.nytimes.com/2014/06/24/us/justices-with-limits-let-epa-curb-power-plant-gases.html

[2]See Davenport, Carol and Peter Baker. (June 2, 2014). Taking a Page from Health Care Act, Obama Climate Plan Relies on States. The New York Times. Available at http://www.nytimes.com/2014/06/03/us/politics/obama-epa-rule-coal-carbon-pollution-power-plants.html

[3]Dye, Richard, Nancy Hudspeth and David Merriman. (2014). Peering Over Illinois' Fiscal Cliff: New Projections from IGPA's Fiscal Futures Model. The Illinois Report, Institute of Government and Public Affairs, pp. 12-21. Available at http://igpa.uillinois.edu/system/files/IR2014D_PeeringOverIllinoisFiscalCliff.pdf

[4]United States Environmental Protection Agency. (Last updated on June 13, 2014). Fact Sheet: Clean Power Plan Overview. Available at http://www2.epa.gov/carbon-pollution-standards/fact-sheet-clean-power-plan-overview

## About the Authors

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each state to come up with their own plan to reduce emission rates (in tons of $CO_2$ per megawatt hour) by an average of 30 percent from 2005 levels, starting in 2020 and hitting that target by 2030. The plan suggests four building blocks for state plans: (1) make coal-fired power plants more efficient; (2) switch from coal to natural gas generation with lower $CO_2$ emissions; (3) expand renewable generating capacity; and (4) reduce electricity demand altogether.

The EPA tries to incorporate current and projected technological developments to determine how much emission rate reduction is possible in each state by each of the four building blocks. It then uses a formula to calculate a different target for each state. It allows more $CO_2$ per megawatt hour for states that currently make heavy use of carbon-intensive coal, but it also requires them to make larger absolute reductions. Other states, such as those in the Pacific Northwest that use more hydro-power, would reduce emissions by a smaller absolute amount but still by a large percentage. But states do not need to follow the formula – each state can make its own choices about how to comply with its overall assigned target for $CO_2$ per megawatt hour ($CO_2$/Mwh).

Despite the future projected health benefits, this federal mandate would require states to incur compliance costs, and would therefore seem to make state budget problems even worse. However, the proposal allows any state to translate its emission rate requirement into a tonnage level and then sell permits under a cap-and-trade program. Firms would need a permit to emit each ton of $CO_2$, so the fixed number of permits is the "cap" on emissions, and firms can "trade" those permits. The price of a permit discourages emissions, just like a tax on emissions. The U.S. plan encourages use of such market mechanisms, which "have demonstrated that compliance with environmental programs can be monetized such that it is factored into power sector economic decision making in ways that reduce the cost of controlling pollution" (U.S. EPA 2014b, p. 24).[5]

The federal government was not able to enact its own carbon tax or permit price to reduce emissions and raise revenue, so it effectively bequeaths that new revenue opportunity to the states.

States could already enact cap-and-trade to raise revenue, so one might wonder why we say the Clean Power Plan is a "new" revenue opportunity. Indeed, California's cap-and-trade program was enacted in 2006 and is already raising revenue for the state.[6] Perhaps to achieve political buy-in from diverse interests, California found it necessary to hand out 90 percent of the permits to existing polluters in the initial years.[7] In contrast, this new federal plan would *require* each state to enact a plan, which may reduce the need to purchase political acquiescence from polluters. We argue that a federal mandate would shift the political economy of state action, making it easier for a state to hit two birds with one stone: satisfy the federal mandate and at the same time raise revenue at minimum cost that can be used to cut the deficit or to reduce state income taxes.[8]

## Current Budget Problems

This opportunity for state revenue is important, as emphasized by the dire findings in the *Final Report of the State Budget Crisis Task Force* released in January 2014 by Co-Chairs Richard Ravitch (former Lt. Governor of New York) and Paul A. Volcker (former Chairman of the U.S. Federal Reserve Board).[9] The report documents high existing state deficits, underfunded liabilities, and poor budgeting methods.[10] However, it does not make projections of future deficits. Here, we provide further analysis of future deficits for the six large states that feature prominently as case studies in the *Report of the State Budget Crisis Task Force*, namely: California, Illinois, New Jersey, New York, Texas, and Virginia.

No single source provides complete and comparable data on state budget projections. Many state constitutions require

[5]United States Environmental Protection Agency. (June 18, 2014). Carbon Pollution Emission Guidelines for Existing Stationary Sources: Electric Utility Generating Units. Available at https://www.federalregister.gov/articles/2014/06/18/2014-13726/carbon-pollution-emission-guidelines-for-existing-stationary-sources-electric-utility-generating. Much research demonstrates the economic efficiency of using a price on emissions to reduce emissions (for example, Burtraw, Dallas, Josh Linn, Karen Palmer and Anthony Paul. (2014). The Costs and Consequences of Clean Air Act Regulation of $CO_2$ from Power Plants. American Economic Review: Papers and Proceedings, May, 104(5): 557-62.) It efficiently reduces emissions per unit of output, and it reduces output (by raising output price). In contrast, a restriction on $CO_2$ per unit of output provides some incentive to increase output.

[6]Center for Climate and Energy Solutions. California Cap and Trade Brief. Available at http://www.c2es.org/us-states-regions/key-legislation/california-cap-trade. "Although a significant number of emission allowances will be freely allocated in California's program, many will also be sold at auction. The first year of auctions generated over $525 million in revenue for the state [but] auction revenue [will] rise over time."

[7]Environmental Defense Fund. (March 2014). AB 32 Cap-and-Trade Auctions Frequently Asked Questions. Available at http://www.edf.org/sites/default/files/content/cap_and_trade_auction_faq_march_2014_0.pdf. Goulder, Lawrence H. (2013). Markets for Pollution Allowances: What Are the (New) Lessons? Journal of Economic Perspectives, 27(1), Winter: 87–102 indicates that California is "moving toward auctioning more than half of their allowances" (p. 97).

[8]This point relates to a huge literature on the "double dividend," the idea that a pollution tax could both improve the environment and improve the economic efficiency of the tax system. See Goulder, Lawrence H. (1995). Environmental Taxation and the 'Double Dividend': A Reader's Guide. International Tax and Public Finance, 2(2): 157–83.). Also, Fullerton and Metcalf show that permits create profits for firms if handed out for free, so government can capture those profits as revenue without any loss in economic efficiency. See Fullerton, Don, and Gilbert E. Metcalf (2001). Environmental Controls, Scarcity Rents, and Pre-existing Distortions. Journal of Public Economics 80(2): 249–67.

[9]The State Budget Crisis Taskforce. (January 2014). Final Report. Available at http://www.statebudgetcrisis.org/wpcms/wp-content/images/SBCTF_FINALREPORT.pdf

[10]"Medicaid spending growth is crowding out other needs; federal deficit reduction threatens state economies and budgets; underfunded retirement promises create risks for future budgets; narrow, eroding tax bases and volatile tax revenues undermine state finances; local government fiscal stress poses challenges for states; [and] state budget laws and practices hinder fiscal stability and mask imbalances" (State Budget Crisis Task Force, 2014, p.7).

**Table 1: Annual State Operating Surplus (or Negative for Deficit)**

| | FY 2012/13 (historical) | FY 2013/14 (enacted) | FY 2014/15 (projected) | FY 2015/16 (projected) | FY 2016/17 (projected) |
|---|---|---|---|---|---|
| *Total Surplus, or Negative for Deficit (in millions of nominal dollars)* | | | | | |
| **California**[a] | 234.0 | 2,443.0 | 5,624.0 | 5,600.0 | 8,200.0 |
| **Illinois**[b] | 924.0 | 458.0 | -1,901.0 | -4,111.0 | -4,576.0 |
| **New Jersey**[c] | -974.0 | -572.3 | -706.6 | -1,873.0 | n/a |
| **New York**[d] | 80.0 | -134.0 | -2,145.0 | -2,700.0 | -2,743.0 |
| **Texas**[e] | 828.3 | 3,653.1 | 416.1 | 5,283.2 | n/a |
| **Virginia**[f] | -1,219.0 | -6,725.4 | -2,359.7 | -5,028.9 | -4,224.5 |
| *Per Capita Surplus, or Negative for Deficit (in nominal dollars per person)*[g] | | | | | |
| **California** | 6.16 | 63.73 | 143.40 | 139.57 | 202.31 |
| **Illinois** | 71.80 | 35.55 | -146.35 | -313.88 | -348.65 |
| **New Jersey** | -109.83 | -64.31 | -77.85 | -202.36 | n/a |
| **New York** | 4.09 | -6.82 | -109.45 | -138.13 | -140.29 |
| **Texas** | 31.78 | 138.12 | 15.69 | 198.72 | n/a |
| **Virginia** | -148.90 | -814.18 | -282.16 | -593.95 | -493.80 |

a balanced budget, which they define in different ways. For example, a state's official budget may or may not include the revenue and spending associated with a highway trust fund, a state pension fund, or any other special purpose fund with its own source of revenue. Some states project a balanced budget, as required, even if the state is in a difficult financial position. One state may show a balanced budget that excludes projected pension underfunding, while another state in the exact same situation may show a budget deficit that accounts for pensions. As a result, different state budgets are generally not directly comparable. For these reasons, we study data from each state to find its *own* projected budget surplus or deficit. The purpose is not to compare states, but to find the extent to which each state's own future budget deficit projection can be covered by the use of revenue from a carbon tax or from sale of $CO_2$ emission permits.

Table 1 shows our initial calculations, while an appendix shows sources of data and some of the differences between state budget definitions. The first panel of the table shows each state's own budget deficit projections in millions of nominal dollars, and the second panel shows those amounts per capita. California and Texas already project surpluses at least through 2016. Still, those two states could use cap-and-trade revenue to cut other distorting taxes, possibly reducing the economic costs of taxation. The future per capita deficit is only about $140 in New York and approaches $200 in New Jersey. Illinois temporarily increased its personal income tax rate from 3 percent to 5 percent, but that rate increase expires in 2015. Thus, under current law, the projected annual deficit in Illinois is $4.5 billion by 2017 ($349 per capita). The annual deficit in Virginia is a bit smaller in absolute terms ($4.2 billion), but it's $494 per person.

## Cap-and-Trade as a Revenue Opportunity

Whatever one thinks about U.S. climate policy, the state of Illinois will have to comply with any federal mandate. If the executive order in 2015 resembles the proposal released in 2014, as expected, then Illinois could comply by either of two approaches: (a) issue its own mandates to electric power plants, or (b) set up a permit system, sell permits to electricity generators, collect revenue, and reduce projected state deficits. By using a pollution tax or cap-and-trade permit system, the state leaves choices of specific emission reduction methods entirely to the private sector. Assuming firms minimize the cost of reducing emissions, this approach also minimizes the total cost of reducing emissions.

In Table 2 (page 5), we employ a U.S. EPA analysis of this plan, including their projection of the $CO_2$ emission level in each state under compliance with this proposal in 2020. We then calculate the possible revenue that could be collected using a carbon tax or the sale of permits.[11] For all of the reasons documented in our appendix, the price of a permit to emit one ton of $CO_2$ is likely to be about $20. We use that estimate for our main calculations in the table, but we acknowledge that the future price of a permit in Illinois might be higher or lower. If the price is only $10 or $30 per ton, then the future revenue would be 50 percent less or 50 percent more than shown in our table.

Compared to the other states here, Illinois currently generates more of its electricity from coal- fired power plants, so the EPA formula allows an emission rate of 1,366 lbs $CO_2$/ Mwh. (The allowed emission rate for California is 556, New

[11]United States Environmental Protection Agency. (Last updated June 25, 2014). EPA Analysis of the Proposed Clean Power Plan. Option 1 – State. Available at http://www.epa.gov/airmarkets/powersectormodeling/cleanpowerplan.html (select "Option 1 – State").

**Table 2: Annual State Operating Surplus (or Negative for Deficit) with Revenue from a Carbon Tax or Cap-and-Trade Price of $20/ton of $CO_2$**

| | FY 2014/15 (projected) | FY 2015/16 (projected) | FY 2016/17 (projected) |
|---|---|---|---|
| *Per Capita Cap-and-Trade Revenue at $20/ton (nominal dollars per person)* | | | |
| **California**[a] | California budget already includes existing cap-and-trade policy | | |
| **Illinois** | 115.05 | 114.11 | 113.86 |
| **New Jersey** | 16.87 | 16.54 | 16.47 |
| **New York** | 20.04 | 20.09 | 20.09 |
| **Texas** | 119.10 | 118.79 | 117.04 |
| **Virginia** | 36.43 | 35.98 | 35.61 |
| *Percentage Reduction in Deficit from Cap-and-Trade Revenue* | | | |
| **Illinois** | -78.6% | -36.4% | -32.7% |
| **New Jersey** | -21.7% | -8.2% | n/a |
| **New York** | -18.3% | -14.5% | -14.3% |
| **Virginia** | -12.9% | -6.1% | -7.2% |

Jersey is 647, New York is 635, Texas is 853, and Virginia is 884.) Thus, while Illinois would have to make cuts from its current high emission level, it is still allowed relatively large emissions per capita. We focus on annual revenue and deficit reduction in 2016/17, as shown in Table 2, but later years' revenue could be even higher with economic growth.

In 2016/17, if its carbon tax or permit price were $20/ton, Illinois could collect revenue equal to $114 per capita, or 33 percent of its projected budget deficit. At $30/ton, it could cover 49 percent. Potential revenue in New York is only $20 per capita, and in New Jersey it is $16 per capita. Virginia could collect a larger $35 per capita per year, but that revenue is a small percentage of Virginia's huge deficit.

While these numbers are obviously very preliminary, and not comprehensive, they certainly illustrate the significant size of potential revenue for any state that complies with the new federal mandate by introducing a carbon tax. Similarly, any state could introduce a cap-and-trade plan for carbon dioxide emissions permits where the state sells the permits. Whereas the handout of permits would provide significant profits to firms, the sale of permits can enable the state to reduce a substantial fraction of its looming fiscal deficit.

## Some Analysis and Discussion

Here, we provide some further analysis of other considerations, caveats, and limitations of these illustrative calculations.

First, we note that this revenue opportunity is not the same as "free money" to the states. It would impose costs on state residents and taxpayers. The use of a market mechanism (like a carbon tax or cap and trade) can be expected to minimize the total economic costs of achieving the required emissions reduction, and we argue that it will provide revenue to the state in the most efficient manner possible. But it is indeed a transfer from taxpayers to the state. The remaining questions are whether the state needs the money, whether it can reduce its budget deficit via spending reductions or other means, and what it should do with the money if it does tax emissions or sell permits.

Second, states may be compelled to use carbon tax or permit revenue for particular purposes other than for general revenue or to reduce deficits. Many environmental groups and other observers think it logical to earmark environmental tax revenue for environmental purposes such as energy efficiency programs – even though a pollution price or tax addresses the pollution problem efficiently and completely without specifying use of the revenue. If the state legislature feels compelled to use permit revenue for environmental programs, then that revenue is not available for deficit reduction.

Third, any climate policy has distributional effects from changing output prices, wage rates, and profits of firms.[12] Many argue that the net effects are regressive, because such policies raise the price of energy-intensive goods like electricity that constitute a high fraction of low-income family spending. While any approach used by Illinois to comply with the federal mandate would have similar effects on electricity prices, a cap-and-trade policy at least would allow the state to use some of the revenue to help low-income families offset those higher electricity costs. The Waxman-Markey cap-and-trade bill that passed the U.S. House of Representatives in 2009 earmarked 30 percent of permits to be used by Local Distribution Companies (LDCs) to reduce electricity bills.[13]

Fourth, more generally, any number of lobbies can think of other uses for carbon tax or permit revenue, so states will undoubtedly have trouble preserving all carbon revenue for use in reducing state budget deficits or cutting personal income tax rates. And, of course, new state $CO_2$ emissions policies may generate non-trivial administrative, monitoring, and enforcement costs.

Fifth, while an increase in the state income tax would place burdens on Illinois taxpayers, a state carbon pricing system could place most of its burden on investors outside

[12]Bento, Antonio M. (2013). Equity Impacts of Environmental Policy. Annual Review of Resource Economics, 5: 181–96.

[13]United States Environmental Protection Agency. (May 17, 2009). Ways in Which Revisions to the American Clean Energy and Security Act Change the Projected Economic Impacts of the Bill. Available at http://www.epa.gov/climatechange/Downloads/EPAactivities/EPAMemoonHR2454.pdf. It gave permit revenue to LDC's to reduce the impact of prices on ratepayers, but the lower electricity price reduces the efficiency of emission reduction. Similarly, the new U.S. plan would require each state to reduce its emissions rate per Mwh, which reduces the incentive to cut output. States are allowed to convert that rate into a tonnage cap, and sell permits, which is more efficient because it both reduces emissions per Mwh and reduces use of electricity.

of Illinois. Wholesale markets determine electricity prices, so rates depend on the cost of production at the last power plant that comes online. In Illinois, carbon-intensive, coal-fired power plants are used earlier in the dispatch order, while low-carbon natural gas plants are the last ones to come online and effectively set the price. Thus, a cap-and-trade program would lead to a relatively small cost increase at the natural gas plants that set the electricity price, so the new market price of electricity may be too low to cover costs at carbon-intensive, coal-fired plants. Seventeen of the 20 coal-fired power plants in Illinois with annual emissions above the 25,000 MTCO2 threshold are owned by publicly traded companies. Further, those 17 plants account for 62 percent of annual emissions from sources above the reporting threshold in Illinois. As a result, the nationwide stockholders of those companies may suffer a loss.

Another potential distributional effect could be on the wages and job security of workers at electric utilities and coal mines. But the economic burden via that path is also probably small. Power plants are long term investments that are difficult to replace in the short run. A cap-and-trade program might encourage a somewhat earlier retirement of coal-fired power plants and their replacement by gas-fired power plants. Workers can gradually move from old to new generation facilities. However, Illinois could use some of the permit revenue to create a program to retrain displaced miners if that industry is hit hard by the cap-and-trade program.

Finally, if higher production costs cannot be passed on to consumers via higher electricity prices or to workers via lower wages, the result is reduced profits. Reduced profitability lowers the value of a business and the stock price of publicly traded companies. Large companies have many stockholders around the world, and they may have well-paid lobbyists operating in Illinois, but only a small fraction of their owners live in Illinois. •

**Table 1 Appendix**

Some states report budget numbers in calendar years, while others use various fiscal year configurations. If calendar year is used, then the first year in the heading applies as the budget year; "n/a" indicates budget data not available from current sources.

[a] Source: "The 2014-15 Budget: California's Fiscal Outlook," Figure 1 (General Fund and Education Protection Account Combined).

[b] Source: "Governor's Office of Management and Budget 2014 Three Year Projection" (General Funds only).

[c] Source: "The Governor's FY 2015 Budget Summary," Schedules 1 & 4 (General Budget Items only).

[d] Source: "Report on the State Fiscal Year 2013-14 Enacted Budget and Financial Plan, July 2013," Figure 7 (General Fund and State Operating Funds).

[e] Sources: Revenue projections are from the "Biennial Revenue Estimate—83rd Texas Legislature," Table A-16. Expenditure data and projections are from the Texas Legislative Budget Board appropriations (all State fiscal obligations excluding activity related to trust funds).

[f] Sources: Commonwealth Data Point for historical revenue and expenditures. Projected revenue growth is from "General Fund Six-Year Financial Plan" (we assume 4.0 percent revenue growth in 2014 as the State's projection starts in 2015). Projected expenditure is from other budget reports (General and Non-General Funds).

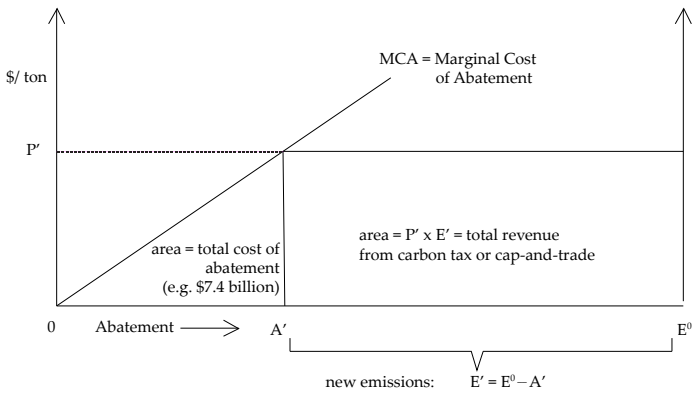
[g] Population combines historical and projections by State from the U.S. Census. The projections are based on the 2000 Census on 5-year intervals. We calculate population for intermediate years using a linear interpolation. The U.S. Census does not provide State population projections based on the 2010 census.

**Table 2 Appendix**

To explain the intuition and the nature of our calculations, Figure 1 below is a simple partial equilibrium diagram that assumes competitive markets, no uncertainty, and no adjustment costs. With no price on emissions and no abatement, firms optimize their choice of emissions at quantity $E^0$. With no efforts at abatement, economic theory suggests that the cost of the very first unit of abatement is near zero. The simple linear marginal cost of abatement (MCA) rises from left to right, but it can also be read from right to left as the marginal product of emissions as an input to production (since the cost of not emitting a ton is the output it could have produced). The federal requirement can be converted to a mandated tonnage limit E′, where the marginal value is P′, so the "scarcity rents" (profits) are the rectangle P′×E′. With tradable permits, the market price would be P′, and the handout of permits would provide P′×E′ of profits to recipients. Relative to that outcome, the state could instead sell the permits and capture the rents – raising revenue efficiently with minimum economic costs.

Moreover, the total cost of abatement is the area under the MCA from zero to A′. The future price per ton of emissions, P′, is highly uncertain, but we provide four kinds of

**Figure 1: Emissions Quantity, Price, and Marginal Cost of Abatement (MCA)**




calculations and intuition in order to establish the general ballpark for that likely future price:

1. The U.S. EPA projects that its clean power plan "Option 1" may cost $7.4 billion, and it projects total abatement of 383 million metric tons (MMtons) from 2020 business-as-usual levels to reach emissions of 1,777 MMtons in 2020. Since the area ($7.4 billion) is one-half the base (383 MMtons) times the height, these assumptions yield a height of P′ = $38.6/ton.

2. States do not start from zero abatement. Several Northeastern states participate in the Regional Greenhouse Gas Initiative (RGGI). California has its own cap-and-trade program, and other states have voluntary plans or other mandates. For a second simple calculation, suppose the marginal cost of abatement is already at the price that will apply under the new plan, and that this MCA curve is flat from the current amount of abatement to the required abatement. Then the cost ($7.4billion) is a rectangle with base of 383 MMtons and height of P′=$19.3/ton.

3. Before the President's plan was announced in June 2014, Burtraw *et al* (2014) used a large computer model to calculate the possible price per ton under alternative plans. The option most similar to the plan analyzed here is their national cap-and-trade plan with 400 million short tons of abatement, where their projected price is $18/ton.

4. The EPA projected that the permit price under Waxman-Markey would be from $17 to $22 per metric ton CO2 in the year 2020. See United States Environmental Protection Agency. (April 20, 2009). EPA Analysis of the Waxman-Markey Discussion Draft: The American Clean Energy and Security Act of 2009. Executive Summary. Available at http://www.epa.gov/climatechange/Downloads/EPAactivities/WaxmanMarkeyExecutiveSummary.pdf

For purposes of illustrative calculations above, we focus on a price of $20/ton, but we also use a range of prices that includes $10, $20, and $30.