

## Policy Analysis Memo

# Profit Impacts of Allowance Allocation under the American Clean Energy and Security (ACES) Act

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### *Introduction*

Last June the U.S. House of Representatives approved the American Clean Energy and Security (ACES) Act, a climate bill sponsored by representatives Henry Waxman (D-CA) and Ed Markey (D-MA). The Senate is now drafting its own climate bill. If the Senate approves its own proposal, an integrated House-Senate bill will then be voted on by the full Congress.

A major element of the ACES Act is a federal cap-and-trade system. Under the Act, total emissions of greenhouse gases (GHGs) from major sources face a declining cap. GHG emissions from covered sources would need to decline by 17 percent relative to 2005 levels by 2020 and by 83 percent relative to 2005 by 2050.

The Act would achieve the desired reductions by circulating a limited supply of emissions allowances to various covered industries. The Act's impact on industry profits depends critically on how the value of these allowances is allocated to the covered industries.

This Policy Analysis Memo provides results from simulations with a general equilibrium model relating to allowance allocation under the ACES Act. This memo compares the allowance value allocation under the ACES Act with the allocation that would just maintain the profits of major industrial sectors at their business-as-usual levels.<sup>1</sup> The model shows that the Act provides most industries with more allowance value than would be necessary to maintain profits.

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<sup>1</sup> This memo complements our recent SIEPR Policy Brief (Goulder, Hafstead, and Dworsky, 2009a), which examined the profit implications of a range of potential allocation designs. The policy brief did not consider the ACES Act's allocation in any detail. The present memo focuses exclusively and sharply on the Act's allocation.

## *Allowance Allocation under the ACES Act*

The allocation of allowance value follows two distinct regimes under the ACES Act.<sup>2</sup> Prior to 2025, almost all allowance value will be dedicated to reductions in retail energy bills for households and businesses, to direct aid to economically vulnerable industries and groups of households, and for various energy and environmental policy purposes. These goals will be served through both the awarding of free allowances and the use of revenues from auctioned allowances. Most of these provisions phase out between 2026 and 2030, after which time most permits will be auctioned to finance per-capita tax rebates (“Climate Change Consumer Refunds”) to households.

Under the ACES Act, in each year to 2025 about 83 percent of the emissions allowances will be freely allocated to various entities, with the remaining 17 percent auctioned. After 2025, about 30 percent will be freely allocated and 70 percent auctioned. The split between free allocation and auctioning of allowances does not by itself affect the distributional impacts of the ACES Act. What is critical is how the *allowance value* is distributed, no matter whether this value is conferred via free emissions allowances (which subsequently can be used or sold) or via transfers of the government’s auction revenue to various parties.

Accordingly, we summarize here the Act's allocation provisions by defining five different ways in which the Act distributes allowance value:

- *Direct Allocation to Firms via Free Allowances:* In several industries, firms will receive allowance value directly in the form of free allowances. In the year 2020, for example, up to 18.7 percent of allowances will be directly transferred to petroleum refineries, trade-vulnerable industries, and merchant coal generators.<sup>3</sup>
- *Indirect Allocation to Firms and Households via Local Distribution Companies:* A large share of allowances will be freely allocated to local distribution companies (electric and natural gas utilities). In 2020, for example, this share is 40 percent.<sup>4</sup> The law instructs these utilities to use this allowance value to finance reductions in the energy bills of their industrial, commercial, and residential retail customers. The reductions that accrue to each class of ratepayers is to be proportional to the energy consumption of that class.
- *Direct Transfers to Households:* In every year of the cap-and-trade program, 15 percent of allowances are auctioned to finance lump-sum rebates to low-income households.

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<sup>2</sup> Allowance allocation is addressed in Title VII, Part H of the ACES Act.

<sup>3</sup> Allocations to Trade-Vulnerable Industries and Merchant Coal Generators under the Act are based on each firm’s annual sales. In our simulations, we abstract from the output-based nature of these allocations and assume that the maximum allowable quantity of allowances is distributed to each industry group in every year. See the web appendix to this policy analysis memo for details.

<sup>4</sup> The total allocation to electric and natural gas local distribution companies is actually 44 percent in each year during the interval 2016-2025. However, allocations to merchant coal generators are deducted from the pool of allowances allocated to electric utilities, resulting in the 40 percent figure presented here.

Additional allowances – 1.5 percent in the year 2020 – are freely allocated to state governments to fund assistance to non-industrial users of home heating oil. The state governments would subsequently sell these allowances and devote the proceeds to households.

- *Policy Initiatives:* Under the ACES Act, most of the allowance value not dedicated to one of the above three general categories is used to fund over a dozen policy initiatives either by allocating allowances to governments and private actors or through dedicated use of auction revenues. This represents a significant share of the total allowance value – 24 percent in 2020. Among various social, energy, and environmental goals, the largest programs in this category aim to fund energy research, prevent deforestation, and encourage carbon capture and sequestration projects.
- *Deficit Reduction:* In years 2025 and earlier, allowances not elsewhere allocated will be auctioned to finance deficit reduction. The provisions described above absorb most of the allowance value; hence this provision is likely to account for a very small share of total allowances in the cap-and-trade system. Under our assumption that output-based allocations to industry reach the statutory maximum, less than one percent of allowances are available for deficit reduction in 2020.

Table 1 indicates the shares of allowance value falling in each of these five general categories. The first two categories are especially important in our analysis, since they represent sources of the allowance value that firms receive for free. Firms receive this value either directly from the government in the form of allowances, or indirectly through reductions in utility energy bills.

### *Simulating the ACES Act*

We apply a multi-period numerical general equilibrium model of the U.S. economy to assess the profit impacts of the ACES Act's allocations. The model divides U.S. production into 25 industry categories, giving close attention to energy supply and use. The model offers a unique treatment of capital dynamics, enabling it to assess the extent to which firms' assets would be stranded by cap and trade and the associated implications for profits. The model's structure is described in Goulder and Hafstead (2009); its data are documented in Hafstead, Mahoney, and Goulder (2008).

We perform two main types of policy simulations. In one, we allocate allowance value to firms and households according to the specifications of the ACES Act. In the other, we allocate just enough free allowance value to various industries to preserve the profits in those industries. In both simulations, the time-profile of total allowances circulated matches that of the ACES Act.

The provisions of the Act largely focus on quantities of allowances devoted to various purposes. The allowance value associated with these quantities will depend on allowance prices. A critical determinant of these prices is the availability of offsets (see Goulder,

Hafstead, and Dworsky, 2009b), and this availability is highly uncertain. Accordingly, we introduce a range of assumptions about the availability of offsets.<sup>5</sup>

### *Simulation Results*

Table 2 shows the results from our simulations under central case assumptions. In the first numbered column we indicate the total allowance value offered free to each of the major industry categories, as well as (in parentheses) the free allowance value offered through direct provision of allowances. The second numbered column shows the percentage changes in the present value of profit over the interval 2009-2030 that result from this freely offered allowance value. The third numbered column indicates the free allowance value that would be needed by each industry category to preserve profit over the 2009-2030 interval.

According to our central case simulations, U.S. industry overall receives about 1.8 times the value of allowances needed to maintain profits. The petroleum refining industry, in particular, receives about two and a half times the value of allowances it would need for profit-preservation. The industries categorized as trade-vulnerable receive about three times as many allowances as profit-maintenance would require. In contrast, coal-fired electricity generators receive about three quarters of the value of allowances needed for profit-preservation. The direct compensation provided in the ACES Act reduces this industry's present-value loss of profits over the interval 2009-2030 to 4.3 percent from a 15.4 percent loss in a scenario where no allowances are given out free.<sup>6</sup>

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<sup>5</sup> To estimate an offset supply curve, we begin with the latest EPA estimates on potential domestic and foreign offset supplies. The Congressional Budget Office (CBO) recently reported that the EPA foreign offset estimates do not reflect the true cost due to transaction and verification costs. We scale the foreign offset supply curve to match CBO foreign offset estimates, which are reported in <http://www.cbo.gov/ftpdocs/104xx/doc10497/08-03-Offsets.pdf>.

<sup>6</sup> Our model may lead us to overestimate of the adverse impact of the ACES Act on coal generators for several reasons:

(i) We model the output-based allocations to merchant coal generators as lump-sum allowance transfers. In fact, output-based allowance allocation effectively provides a subsidy for increased output, which mitigates the impact of emissions caps on firms' profits.

(ii) We have assumed that coal-fired generators receive none of the allowance value that is provided to other industries indirectly by way of local distribution companies. These companies may in practice set rates so that some of this compensation ultimately benefits merchant coal generators or vertically integrated utilities with coal generating assets. Reductions in consumer energy bills – even if confined to the fixed component of those bills, as the law intends – are likely to increase sales, reducing the profit losses to utilities and generators relative to our simulation results. In testimony before the Senate Finance Committee, Burtraw (2009) estimates that this effect would increase generator profits by \$2.5 billion per year over 2015-2020 in regions of the country with competitive wholesale markets. Our model does not account for this market response, which is of a similar magnitude to yearly direct compensation to coal generators over this period.

(iii) We do not allow for carbon capture and sequestration (CCS) technology in our simulations. CCS would make the use of coal more economically viable, and the installation of CCS at electric generators would trigger additional allowance allocation to these facilities under Subtitle B of Title I of the ACES Act.

Our central estimate is that, in total, U.S. industry receives \$134 billion more in free allowance value over the period 2012-2030 than is needed to preserve profits over that period. This amounts to about \$7 billion per year in 2009 present value, or \$60 per household per year.<sup>7</sup>

Table 3 compares the ACES Act and profit-preserving allowance value allocation under differing assumptions for the cost of offset supply.<sup>8</sup> In the low-cost offset scenario, offsets play a larger role, reducing the need for emissions reductions from covered domestic sources. This reduces the demand for emissions allowances and leads to lower allowance prices. This implies, in turn, that the allowance *values* associated with the given allocations of emissions allowances under the ACES Act are lower than in the central case. Although the Act still provides more free allowance value than is needed to preserve profits, the difference between what the Act provides and what is needed for profit-preservation is smaller than in the central case. This difference is \$90.2 (\$210.5-\$120.3) billion, as compared with \$134.0 (\$294.6-\$160.6) billion in the central case.

In the high-cost offset case, the effects work in the opposite direction. This scenario implies higher allowance prices and magnifies the differences between the value of allowances provided under the ACES Act and the value needed for profit-preservation. Here the difference is \$168.4 (\$357.6-\$189.2) billion.

### *Conclusions*

The results from our numerical general equilibrium model indicate that by providing U.S. industries with a relatively small fraction of the allowance values created by the ACES Act, profit losses associated with the introduction of a cap-and-trade program can be avoided. Thus, sustaining profits is consistent with devoting to other social purposes a substantial share of the allowance value created by the ACES cap-and-trade program.

We find that the ACES Act provides industry with 75-89 percent more allowance value than is needed to preserve industry profits. The range reflects different assumptions about the costs of supplying offsets. A large fraction of the allowance value received by firms arrives indirectly – after being transformed into reductions in electricity bills. The Act devotes a large share of the allowances to local distribution companies, which would be obligated to sell these allowances and use the proceeds to finance reductions in ratepayer bills, including industrial ratepayers. As a result of the direct and indirect allocation of allowance value, most energy-intensive industries are likely to enjoy increased profits under the ACES Act.

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<sup>7</sup> The total number of U.S. households for this calculation is the Census Bureau's estimate for 2008, available at: <http://www.census.gov/population/www/socdemo/hh-fam/cps2008.html>.

<sup>8</sup> In the low-cost offset case, we assume that the cost at each level of quantity along the supply curve is 50 percent of the cost in the central case. In the high-cost case, we assume the cost is 150 percent of the central case cost.

## *References*

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**Table 1: Allocation of Allowance Value in the ACES Act**

-- percentages of total value --

	<b>2020</b>	<b>2012- 2030 Average</b>
Free Allocation to Industry		
Direct Allocation via Free Allowances	18.7	15.9
Indirect Allocation via Local Distribution Companies	29.1	25.0
Free Allocation to Households		
Indirect Allocation via Local Distribution Companies	10.9	15.8
Direct Transfers	17.0	15.0
Funding of Policy Initiatives	23.5	26.6
Deficit Reduction	0.8	1.8

**Table 2: ACES Act Allocation vs. Profit-Preserving Allocation  
Outcomes over the Interval 2009-2030**

	(1)	(2)	(3)	(4)
	<b>ACES ACT</b>		Profit- Preserving Allowance Value <sup>1</sup>	Ratio: (1)/(3)
	Allowance Value Offered <sup>1,2</sup>	Percentage Change in Profit <sup>3</sup>		
Coal-Fired Electricity Generation	22.6 (22.6)	-4.3	31.1	0.73
Trade-Vulnerable Industries	143.1 (84.1)	2.1	44.4	3.22
Petroleum Refining	11.3 (10.2)	2.7	4.5	2.50
Other Industries	117.6 (0.0)	0.4	80.6	1.46
<b>Industry Total</b>	<b>294.6 (117.0)</b>	<b>0.5</b>	<b>160.6</b>	<b>1.83</b>
Industry Total as Percent of Economy's Allowance Value	40.5 (15.5)		21.3	

Total emissions associated with freely provided allowance value, 2009-2030, in billions of CO<sub>2</sub>-equivalent tons:

ACES Act: 56.2

Profit-Preserving Allocation: 17.0

<sup>1</sup> Present value over the period 2009-2030, in billions of 2005 dollars.

<sup>2</sup> The numbers in parentheses are direct free allowances to industry

<sup>3</sup> Percentage change in the present value of profit over the interval 2009-2030

**Table 3: Allowance Allocation, 2009-2030,  
Under Alternative Assumptions for Offset Supply<sup>1</sup>**

	<b>Low-Cost Offsets</b>			<b>Central Case</b>			<b>High-Cost Offsets</b>		
	ACES ACT		Profit-Preserving Allowance Value	ACES ACT		Profit-Preserving Allowance Value	ACES ACT		Profit-Preserving Allowance Value
	Allowance Value Offered	Percentage Change in Profit		Allowance Value Offered	Percentage Change in Profit		Allowance Value Offered	Percentage Change in Profit	
Coal-Fired Electricity Generation	16.2	-3.8	23.6	22.6	-4.3	31.1	27.5	-4.5	36.1
Trade-Vulnerable Industries	102.3	1.5	31.5	143.1	2.1	44.4	173.8	2.5	54.3
Petroleum Refining	8.1	1.9	3.2	11.3	2.7	4.5	13.7	3.3	5.5
Other Industries	84.0	0.3	61.9	117.6	0.4	80.6	142.7	0.5	93.2
<b>Industry Total</b>	<b>210.5</b>	<b>0.3</b>	<b>120.3</b>	<b>294.6</b>	<b>0.5</b>	<b>160.6</b>	<b>357.6</b>	<b>0.6</b>	<b>189.2</b>
Industry Total as Percent of Economy's Allowance Value	40.5		22.6	40.5		21.3	40.5		20.9

<sup>1</sup> Values in billions of 2005 dollars