

Modeling the ACES Act: Assumptions Regarding Allowance Allocation and Offset Credits

Michael Dworsky, Marc Hafstead, and Lawrence Goulder*

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This note explains how we developed the allowance allocations for the ACES Act policy simulations reported in our SIEPR Policy Analysis Memo. It also describes the assumptions we make regarding the supply of offset credits.

1 Allowance Allocation in the ACES Act

Many provisions of the ACES Act mandate the distribution of allowances or auction proceeds to particular industries or groups of households. We call these provisions ‘direct’ allocation to households and firms. In addition to direct allocation, over 40% of allowances will be used to provide relief to the retail customers of electric and natural gas utilities. Since the ACES act delegates the disbursement of this relief to utilities and state utility commissions, we call these provisions ‘indirect’ allocation to households and firms; additional assumptions are required to represent these provisions in our model.

Allocations in the ACES Act are subject to phase-in and phase-out provisions as well as other year-to-year changes. We therefore calculate allocations to each industry on a year-by-year basis. Specifically, we use the ACES Act to determine each recipient’s allocation as a percentage of each year’s emissions cap. We then use the resulting shares as the inputs into our model.

1.1 Direct Allocation

1.1.1 Direct Allocation to Industry

Direct allocation to industry includes lump-sum transfers to oil refineries as well as output-based allocations to merchant coal units and trade-vulnerable industries. Because we do not model the producer response to output-based allocation rules, we assume that the output-based allocations are utilized to the statutory maximum in every year.¹

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¹See HR 2454 PCS, sections 782 (Refineries), 783 subsection (c) (Merchant Coal Units), and 763-64 (Trade-vulnerable Industries). The industries in our model that correspond to the bill’s

1.1.2 Direct Allocation to Households

Direct allocation to households includes lump-sum transfers to low-income households (15% of allowance value in every year) and funding to states for home heating oil purchase assistance.² As other allocation provisions phase out over the years 2026-2030, allowances not otherwise allocated will be auctioned to finance lump-sum rebates to households: this use of allowance value ultimately accounts for roughly 50% of allowances in 2030 and later.³

1.2 Indirect Allocation

Indirect allocation refers to the ‘electricity consumers’ and ‘natural gas consumers’ provisions of the ACES allocation plan.⁴ These provisions, which jointly account for about 40 % of allowances until they are phased out in 2026-2030, are designed to finance reductions in the energy bills of electricity and natural gas consumers.

The mechanics of this program leave the eventual distribution of allowance value across industries and households somewhat ambiguous. The allowances allocated under this program are initially distributed to the utilities themselves. The law states that this distribution is to be “for the benefit of retail ratepayers,” and there is a provision to ensure that distributions to utilities are just sufficient to defray increased electricity costs due to the ACES act. In short, even though these allowances are handed out to utilities, the law also orders utilities to pass that allowance value downstream to their retail ratepayers.

The large number of allowances at stake under this provision demands that we attempt to account for the distribution of this allowance value in order to assess the overall distributional impact of the ACES Act. Accordingly, we have to make an assumption about the extent to which industries (and the household sector) are able to appropriate this allowance value through their roles as energy consumers. We model these provisions as a lump-sum transfer of allowance value to all industries and households *in proportion to their average energy demand over the period 2012-2030* in the reference case. Specifically, we calculate total intermediate input and consumption use of electricity (excluding investment, government spending, and exports) over this time period and use the resulting

definition of potentially trade-vulnerable industries are: Food/Tobacco, Textiles, Wood/Paper Products, Chemicals, Primary Metals, Machinery, and Motor Vehicle Production. We divide allowances among these industries in proportion to the quantity of emissions over the period 2012-2030 due to each industry’s use of intermediate inputs in the reference case. Throughout this section of the web appendix, section references are to HR2454 PCS, the Senate discussion draft of HR 2454.

²The law provides funding for financial assistance and energy efficiency programs targeted at residential and commercial users who use heating oil, propane, or kerosene for space heating or hot water heating. While some of this funding will flow to commercial users, we assume that the primary beneficiaries will be households. See section 785 for further details.

³See sections 782, 785 (home heating oil), and section 791 (low-income consumers). See section 789 for details of the Climate Change Consumer Refund.

⁴See section 782 for total allocations under these provisions. See section 783 for electricity consumers and section 784 for natural gas consumers.

industry/household shares of total energy consumption as the factor by which we allocate allowances set aside to protect electricity consumers. We proceed analogously for natural gas.

We believe this assumption roughly captures the eventual distribution of these benefits. The law states that the distribution of allowance value across ratepayer *classes* - commercial, industrial and residential - must be based on aggregate electricity deliveries to each class. Allocation decisions at more detailed levels appear to be at the discretion of utilities and state regulators. Our proposed allocation rule is consistent (by construction) with the constraint that bill reductions be divided ratably across classes.

1.3 Policy Initiatives

In total, direct and indirect allocation of allowance value to firms and households accounts for 65% to 75% of the yearly allowance supply through 2030. Almost all of the remaining 25% to 35% of allowances are set aside to fund a wide range of energy, environmental, and social policy initiatives.⁵ Over a dozen uses of allowances or auction revenues fall into this residual category. The most important provisions in this group are the following (with 2020 allocations as percentages of the cap in parentheses):

- Carbon Capture and Sequestration (CCS): to reward facilities that install CCS projects (5%)
- State Energy and Environment Development (SEED) accounts: to fund various renewable energy/energy efficiency projects (5%)
- Supplemental Reductions: to fund projects that reduce deforestation (5%)

In addition to these big-ticket items, a variety of other policy objectives (including research, building efficiency, wildlife protection, climate change adaptation, and aid to displaced workers) are funded at much lower levels, typically 0.3% to 0.6% of the allowance supply. Since the social cost-benefit ratio for this class of initiatives is unclear, we classify all allowances in this category as lump-sum rebates to households.

1.4 Deficit Reduction

The remaining supply of allowances in each year through 2025 is dedicated for deficit reduction.⁶ Because almost all allowances are dedicated to other uses under the provisions described above, the quantity of allowances available for deficit reduction is very small (zero to two percent).

⁵See section 782 for a summary of the allocation levels for these policy initiatives.

⁶See section 782, subsection (q).

2 The Supply of Offset Credits

The ACES Act allows for participants in the cap-and-trade system to cover their emissions by submitting offset credits. We therefore need to specify a supply curve for offset credits in order to simulate the economic impacts of the bill. The basic rules governing offset supply in the ACES Act are the following:

- up to 1 billion metric tons each of domestic offsets and foreign offset credits may be redeemed in each year.
- if fewer than 900 million metric tons of domestic offsets are available, the allowable use of foreign offsets is increased to fully offset any shortage until 1.5 billion metric tons of foreign offset credits have been redeemed
- one ton of domestic offsets covers one ton of emissions in all years
- one ton of foreign offsets covers one ton of emissions in 2012-2018; in 2019 and later, 1.25 tons of foreign offsets are required to cover one ton of domestic offsets

We base our offset supply curves on EPA's estimates of potential offset credits available in agriculture and forestry. EPA uses a model called FASOMGHG to estimate the supply of domestic offsets in these sectors; a model called GTM is used to estimate the supply of international offsets due to forestry.⁷ EPA simulates offset supply under a carbon price rising at 5% per annum and publishes the resulting quantity of GHG mitigation from the domestic and international sectors as a 10-year average. EPA's models are dynamic, so the offset supply curves evolve over time to reflect land constraints and other dynamic issues. Note that the quantities reported by EPA reflect aggregate net changes in emissions from the global agriculture and forestry sectors. As we discuss below, this is a much larger figure than the likely supply of admissible offset credits under a cap-and-trade system.

To develop our offset supply curves from EPA's estimates of potential abatement, we smooth the time path of offset supply by fitting a line through average supply at each price for the first two decades of cap-and-trade (covering years through 2030).⁸ For domestic offsets, we make no further adjustments.

International offsets, however, face many practical difficulties that are not incorporated into EPA's estimates. Offsets under the ACES Act may only be obtained from countries that have bilateral or multilateral treaties with the US sanctioning the supply of offset credits. Ensuring the environmental integrity of offsets is notoriously difficult, suggesting that factors such as monitoring capabilities, contract enforcement, and ambiguity over the correct baseline will

⁷The supply curves from these models were taken from the Data Annex to EPA's June 2009 analysis of HR 2454, available online at: <http://www.epa.gov/climatechange/economics/economicanalyses.html#hr2452>.

⁸The 10-year averages published by EPA define allowance supply at a given price as a step function over time with large jumps every 10 years. We prefer to increase offset supply smoothly in a way that yields the same average supply over each 10-year window.

constrain the production of admissible offset credits relative to EPA's projections. Finally, EPA does not account for competition from other developed countries for offset credits. Insofar as other countries' climate strategies allow for international offsets, a large share of the potential offset supply will be sold to other countries, shrinking the residual supply curve faced by the US.

CBO attempts to account for these technical and institutional constraints in its cost estimate of the ACES Act. We incorporate CBO's assessment of the effective offset supply by scaling down our international offset curves so that they go through the (price, quantity) pairs for international offsets that CBO reports for 2012 and 2020.⁹ As we did for the evolution of the underlying EPA estimates, we linearly interpolate the proportion of emissions reductions that are admissible as international offset credits for years between 2012 and 2020. This proportion remains constant in years 2020 and later. The international offset supply curves we use in our simulations are the product of this adjustment factor and EPA's dynamic estimates.

⁹CBO reports a quantity of offsets for 2020 but only reports prices through 2019: we extrapolate the price trend for one year to derive our international offset adjustment.