

# The Effects on Households of Allocation to Electricity Local Distribution Companies

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## Summary

Simulation modeling indicates that the assignment of 30 percent of allowance value to electricity local distribution companies raises the costs of climate policy by \$157 per household compared to providing a dividend of the same magnitude directly to households. If there is widespread reform of electricity pricing by separating fixed and variable charges, and if industrial and commercial customers respond rationally, the cost per household falls to \$66. There is significant redistribution of income from lower income to upper income households because of the policy.

## Introduction

The electricity sector is responsible for nearly 40 percent of emissions of carbon dioxide (CO<sub>2</sub>), but in the early decades of a program to limit emissions, two-thirds to three-quarters of emissions reductions are expected to come from this sector. The changes in the electricity sector may affect households in different regions and income groups in different ways.<sup>1</sup>

In a previous technical memo (5/19/09) we explored free allocation of emissions allowances to local distribution companies (LDCs) as a strategy to reduce the effect on electricity prices. These companies are regulated throughout the nation and could be expected to act as trustees on behalf of consumers. Free allocation of allowance value could offset the lion's share of the increase in electricity prices that would otherwise occur under a cap and trade program. However, the ultimate effect on households is uncertain: Does compensation for electricity consumption make households better or worse off compared to other approaches to compensation with the same allowance value?

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<sup>1</sup> See [technical memo](#): Paul, Burtraw and Palmer, 5/19/09, from Resources for the Future, for a discussion of regional effects on electricity prices.

Under a cap-and-trade policy, free allocation to LDCs could lead to lower electricity prices yielding increased electricity consumption and emissions in the electricity sector. To achieve the same level of emissions reduction from the entire economy would require greater emissions reductions in other sectors such as personal transportation, industry, etc. and ultimately a higher price on CO<sub>2</sub> emissions. In turn, this raises the costs of goods and services from these sectors.

An important consideration is how LDCs return allowance value to consumers. Roughly speaking, electricity bills have a fixed-cost component that covers the cost of providing service to a customer, and a variable-cost component that covers the cost for acquiring electricity from the wholesale market and varies with the amount of electricity consumed. If allowance value from a cap-and-trade program is used to offset the fixed-cost component of the electricity bill, customers would see a noticeable increase in their electricity price due to the cap-and-trade policy but a negligible increase in their total electricity bill. How customers might react depends on two important considerations. First, the degree to which fixed charges are separated from variable charges varies around the country, but the dominant practice in most jurisdictions places little of the fixed cost in a fixed charge, and most of the costs (fixed and variable) are recovered in volumetric charges (per kWh).<sup>2</sup> Second, even if LDCs were to separate these components and efficiently display in customer bills the allocation of allowance value as a reduction in the fixed charge, the outcome depends on whether customers respond rationally to the price signal at the margin. Industrial and commercial class customers may be more likely to respond in this way. Nonetheless, myriad recent studies highlight departures from rational behavior in energy consumption, and the prospect that customers would appreciate the distinction between their bill and the variable cost is speculative, especially for residential class customers.

To explore the possibilities we examine three options using detailed electricity market modeling coupled with a distributional analysis of impacts across regions and income groups. Analysis accounts for changes in supply and demand side investment and behavior in the electricity sector that could be expected by 2015. In one case, we assume **conventional electricity pricing and behavior for all customer classes**. These customers perceive the allocation of allowance value to LDCs as a reduction in the variable price of electricity. In a second case, we assume that LDCs are able to entirely **separate the fixed and variable charges and rational behavior by industrial and commercial customers**. That is, the behavior of these customers is not affected by the wealth transfer reflected in the reduction in their overall bill. The firms behave in a competitive manner by recognizing the marginal opportunity cost of electricity consumption and pass the bill savings on to their shareholders. However, residential customers respond to changes in their overall bill and perceive the allocation as a reduction in the variable price of electricity, similar to the first case. In a third case, we compare these outcomes with a scenario where there is no free allocation to LDCs and

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<sup>2</sup> Universal bill reform would be necessary to change the way bills are calculated, and that is governed by public utility commissions at the state level.

the same amount of allowance value that would be given to LDCs is returned to households as a **per capita, nontaxable dividend of 30 percent of auction revenue**.

When there is no free allocation to LDCs, the market clearing price is \$20.91 per metric ton. This amount is calibrated to match the price identified by EIA's analysis of the Lieberman-Warner bill (April 2008).<sup>3</sup> The amount of international offsets necessary to achieve the emissions target is held constant across all three cases, but the cost of offsets adjusts in step with the cost of achieving a consistent quantity of domestic emissions allowances.

## Results

The first scenario with conventional electricity pricing where all customer classes perceive a reduction in the cost of electricity consumption leads to the lowest electricity price, the greatest electricity consumption and the allowance price increases to \$26.90. The higher price affects the cost of other goods and services.

The second scenario separates fixed and variable charges and assumes rational behavior by industrial and commercial class customers, but assumes that residential customers continue to perceive a reduction in the cost of electricity. The response of industrial and commercial customers to higher variable electricity prices leads to a reduction in electricity consumption compared to the first case and an allowance price of \$22.72.

The third scenario considers the cost for households if the value of allowances allocated to LDCs were instead returned directly to households as a per capita nontaxable dividend. This results in the lowest value of \$20.91 since all electricity consumers would experience higher electricity prices leading to lower electricity demand.

As indicated in the attached table, before accounting for allowance value the cost on households would be \$829 on average.<sup>4</sup> (If all allowance value were returned to as a per capita dividend the cost per household would be \$130.) The right-hand side of the table summarizes the scenarios for the electricity sector with the nation divided into eleven regions and income deciles. On a national average basis, assuming conventional electricity pricing leads to an increased cost per household of \$157 compared to a per capita dividend of the same amount of allowance value. Assuming separate fixed and variable charges for industrial and commercial class customers raises the cost to households by \$66 compared to direct dividends.

There allocation to LDCs leads to a significant redistribution of income from lower income to upper income households. This is especially evident when comparing across the two LDC allocation scenarios. In the separate fixed and variable pricing scenario,

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<sup>3</sup> U.S. Energy Information Administration. 2008. [Energy Market and Economic Impacts of S.2191, The Lieberman-Warner Climate Security Act of 2007](#). SR/OIAF/2008-01, April.

<sup>4</sup> Government's increase in costs associated with energy consumption at the local, state and federal level is accounted for by withholding 14 percent of allowance value before this calculation.

commercial and industrial customers are assumed to take the subsidy on the fixed portion of their bill and pay it out as a dividend to shareholders. The higher variable costs, however, are passed on to all customers in the form of more expensive goods and services. While this impacts all households, the majority of shareholders are in the top income decile. On the national level, the top income decile fares \$673 better than under the per capita dividend allocation scheme. This increase is at the expense of households in the lowest five deciles, who do not own much equity, but are still faced with higher prices for goods and services.



Background on the model supporting this analysis can be found in:  
Burtraw, Sweeney and Walls 2009. The Incidence of U.S. Climate Policy: Alternative  
Uses of Revenues from a Cap-and-Trade Auction. [RFF Discussion Paper 09-17](#).

