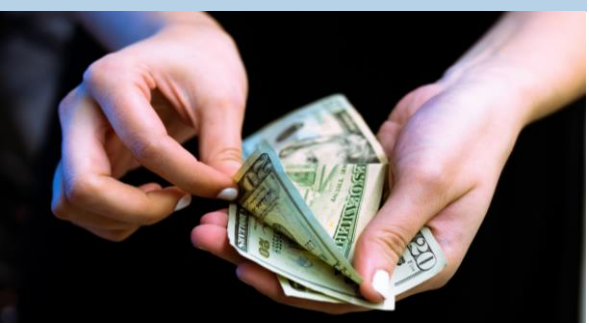
EPRI

P201 Back Pocket Insights

KEY INSIGHTS

- **Using a carbon tax to incentivize decarbonization may raise household energy services costs, and the lowest income households see the greatest relative increases.**
- **Redistribution of carbon revenues may be sufficient to offset spending increases and even lower energy costs for the lowest income households.**
- **Redistribution relies on the presence of residual emissions and on redirecting funds from non-electric sectors.**
- **The mechanism of redistribution changes the outcomes of households, both between and within income classes.**

Based on EPRI technical update: *Understanding Distributional Impacts of Decarbonization: Evolution of Consumer Spending on Energy*, 3002026644



Understanding Distributional Impacts of Decarbonization: Evolution of Consumer Spending on Energy

by Chris Roney

Linked analysis of household energy spending survey data with long-term decarbonization scenarios reveals impacts of decarbonization across income classes.

The costs of decarbonization may not be borne evenly by all members of society, and many modeled least-cost decarbonization scenarios either report only aggregate welfare or implicitly assume that transfers occur between those who are positively and negatively impacted. Whether and how compensation occurs may have implications for the impacts of decarbonization policy on individual households.

Absent additional carbon policy, average household spending on energy services could decline by 22% in 2050 as a result of electrification and direct efficiency improvements (controlling for inflation, from 2020). Average direct spending on electricity increases by about 13%, since a greater portion of household energy is provided by electricity. These cost decreases come alongside 52% energy system CO_2 reductions below 2005 levels by 2050.

Four policy scenarios were tested with rising carbon taxes to drive additional emissions reductions. Under these scenarios, economy-wide CO_2 could decline 64-83% by 2050 from 2005 levels (Fig, 1), with electric sector CO_2 declining 96-100%.

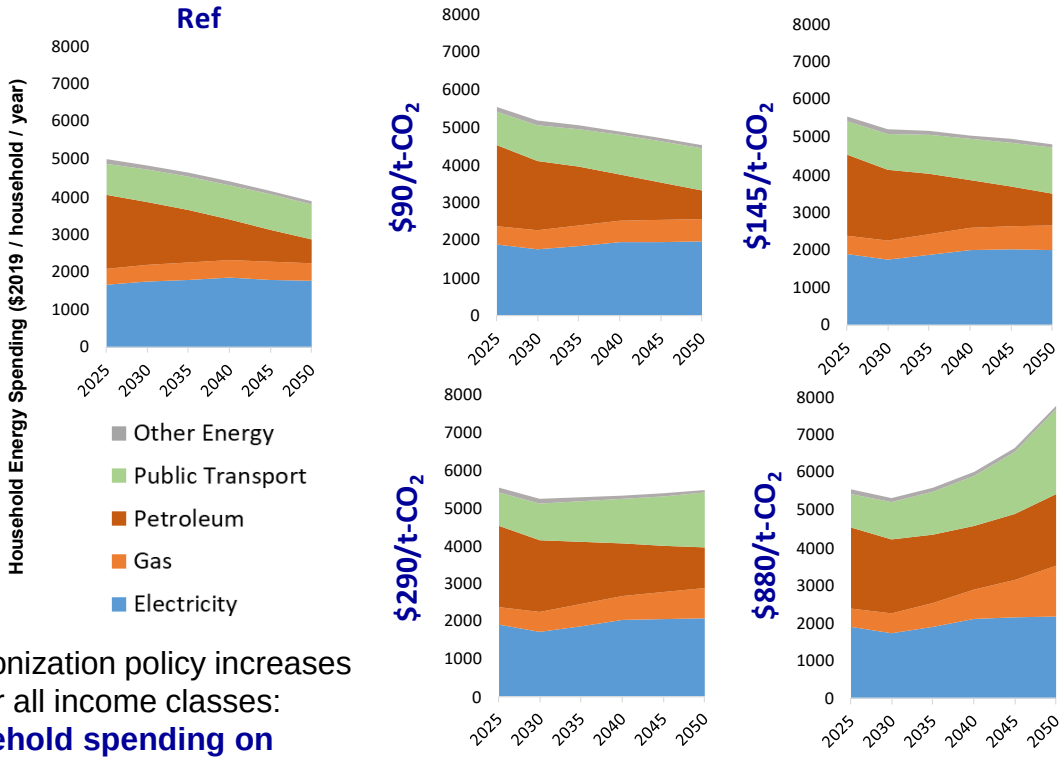


Figure 1. Average Gross Household Energy Expenses to 2050. Policy scenarios are carbon taxes increase to reach the shown 2050 value.

Additional decarbonization policy increases gross spending for all income classes:

- **Average household spending on energy rises by 2-10% of current total spending** (on all activities).
- **For the lowest income decile, household spending increases by 4-22%** of their average current total spending (on all activities), or roughly double 2050 energy spending under current policies.
- The highest income decile sees the largest absolute increases in spending (up to $8000).

However, carbon taxes are revenue positive, accumulating funds from sectors and consumers who pay for the tax rather than switching fuels. These funding sources are highly contingent on policy design and behavior. The most stringent policy scenario shows 30% of emitters opting to pay for negative emissions credits from the electric sector rather than pay the tax, and advanced technology availability may increase the attractiveness of fuel switching in hard-to-decarbonize sectors, thereby reducing the pool of revenue. Under the studied scenarios, **direct per capita revenue redistribution can be sufficient to offset the increased costs of decarbonization** to households (Fig. 2) and **can even decrease energy costs for low-income households**. Further analysis of spending can be found in the multi-model Stanford Energy Modeling Forum paper on equity implications.

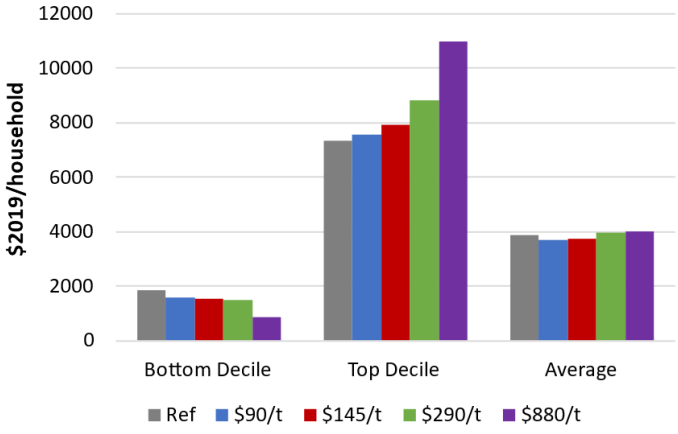


Figure 2. Average Household Energy Expenses Net of Carbon Payments - 2050.

FOR MORE INFORMATION

Read the full report for 201-D members: Understanding Distributional Impacts of Decarbonization: Evolution of Consumer Spending on Energy Services.

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