SESSION 6D

THE REBOUND EFFECT: SHOULD WE CARE?

Moderator: Edward L. Vine, California Institute of Energy and Environment/ Lawrence Berkeley National Laboratory

PANELISTS:

David B. Goldstein, Natural Resources Defense Council
John A. "Skip" Laitner, American Council for an Energy-Efficient Economy
David Owen, journalist and author

PANEL SUMMARY:

"Rebound" effects refer to those effects that can mitigate the reductions in energy consumption associated with energy efficiency. David Owen's article in *The New Yorker* (2010) on energy efficiency and rebound phenomena, followed by the Breakthrough Institute's report (2011) and John Tierney's article in the *New York Times* (2011), have sparked a lively debate about the potential for improvements in energy efficiency to more than negate environmental gains. While the scholarly treatment of rebound effects goes back a century and a half to Jevons (1865), Brookes (1990) and Khazzoom (1980, 1987) are generally credited with establishing the modern awareness of rebound phenomena.

Rebound comes from several sources, requiring important distinctions. Typically, rebound analysts distinguish *consumer*-side effects from *producer*-side effects. A second distinction is between so-called *direct* and *indirect* rebound. On top of these rebound classifications, some analysts identify a so-called *macroeconomic* effect. For the focus of this panel – the evaluation of energy efficiency programs - we primarily discuss direct and indirect rebound effects for consumers. The <u>direct rebound effect</u> on the <u>consumer side</u> theoretically arises because an energy efficiency gain reduces the effective price of energy, potentially causing consumers to use more of it. An example is the installation of more efficient heaters or air conditioners that causes the household to heat or cool more rooms. The <u>indirect rebound effect</u> on the <u>consumer side</u> theoretically arises from consumers taking the money saved from, say, buying a more efficient refrigerator, and potentially spending it to purchase other goods and services that require energy.

David Owen uses air conditioning as an example of indirect rebound. According to Owen, more efficient air conditioners have led to a decrease in the cost of running an air conditioner, and the decreased costs, therefore, have made air conditioners more affordable to more people. As a result, more people have bought air conditioners, leading to increased electricity usage. Owen's critics argue that the causes of rising use of air conditioners were due to rising household incomes and the declining price of air conditioners, not because of greater energy efficiency. Similarly, they argue that rising incomes and declining costs are driving growing saturations of microwave ovens, personal computers, and flat screen televisions, and that improved energy efficiency has contributed only marginally to the growing use of these services. They also affirm that energy efficiency has helped to moderate (but not eliminate) the associated increases in energy use as these services grow.

Clearly, it is theoretically possible for some consumers in some situations to act in accord with Owen's theory, but even that is correlation, and causation is still questionable. Unfortunately, the energy efficiency evaluation industry is not very well positioned to respond to these arguments, because we

have not made any significant effort to study the issue of rebound in the last 18 years. Nadel (1993) serves as the last best review of rebound studies in energy efficiency programs: from his review of 42 studies, he concluded that rebound could occur but that it was not a widespread phenomenon. Instead, he noted that rebound was more likely a localized phenomenon, largely limited to specific end uses (e.g., residential lighting (10% increase in operating hours due to the installation of CFLs), and industrial plant production (2% increase due to the installation of energy efficiency process measures)). For other end uses, he found no data or inconclusive data supporting the rebound effect.

We have organized this panel to make evaluators more aware of: (1) these rebound studies and the implications for their work – particularly for those working on potential studies and carbon emission reduction plans and policies (i.e., the policy context); (2) the methodological issues associated with these studies – in particular, the reliance on a few questions in self-reported surveys and small samples of households or buildings for the micro effects analysis, and the lack of causation in the macroeconomic effects studies; and (3) additional data or analysis that addresses the issue of second-order effects of efficiency improvements

More research is clearly needed, so that advocates and opponents of the rebound issue can have a firm basis to support their positions! We hope that the panelists will also discuss the type of research that is needed in program evaluation: Retrospective Evaluation and Prospective Evaluation. In retrospective evaluation, past evaluation studies of energy efficiency programs are examined to see how the rebound effect was calculated and to see if the methodology could have been improved. In prospective evaluation, future evaluation studies incorporate a methodology that includes the analysis of the rebound effect. These new studies will build on the lessons learned from retrospective evaluation. If the analysis of the rebound effect becomes of greater interest, then it may be useful to add this type of analysis to the evaluation guidelines that states use for evaluating energy efficiency programs.