It's ok, honey, we're an 8!

The potential for rebound in a residential energy efficiency program

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This 'think piece' is literally a 'thinking through' piece. I have written this as an exercise in thinking through the potential for rebound effects at the individual and household level as result of participation in an energy efficiency program, specifically the U.S. Department of Energy's Home Energy Score pilot program. I am also thinking through the lens of a sustainable consumption perspective that questions the appropriateness of traditional growth concepts. I propose a few questions:

- How can we analyze this pilot program to identify a rebound effect?
- What data are needed and what are 'good enough' data given practical constraints?
- What messages or components can be incorporated into this type of retrofitting program to hedge against a rebound effect?

First, I briefly describe the Home Energy Score. Second, I discuss the potential sources of a rebound effect in this program, considering how homeowners may perceive its messages. Finally, I offer a few possible answers to the questions above and hope workshop participants will make their own suggestions of how the issues these questions raise might be addressed.

The Home Energy Score – a pilot program for homeowners

The U.S. Department of Energy (DOE) Home Energy Score is a pilot program whose chief goal is to encourage homeowners to make their homes more energy efficient. It is an "asset rating" or rating of the structure of a house, based on a home energy audit. It generates a score on a scale of 1-10 and includes a set of recommendations tailored to the home. The Home Energy Score program is oriented around three goals: 1) provide homeowners with information about how their home uses energy 2) improve the energy efficiency of existing American residential building stock and, in turn, use less energy 3) to open up new markets for trained retrofitters. This program complements two of Secretary Chu's priorities to reduce energy consumption and to improve the energy literacy of the American populace but is also strongly influenced by the current economic and political situation. Saving energy is meant to save consumers money on utility bills while at the same time increasing demand for the home retrofit market.

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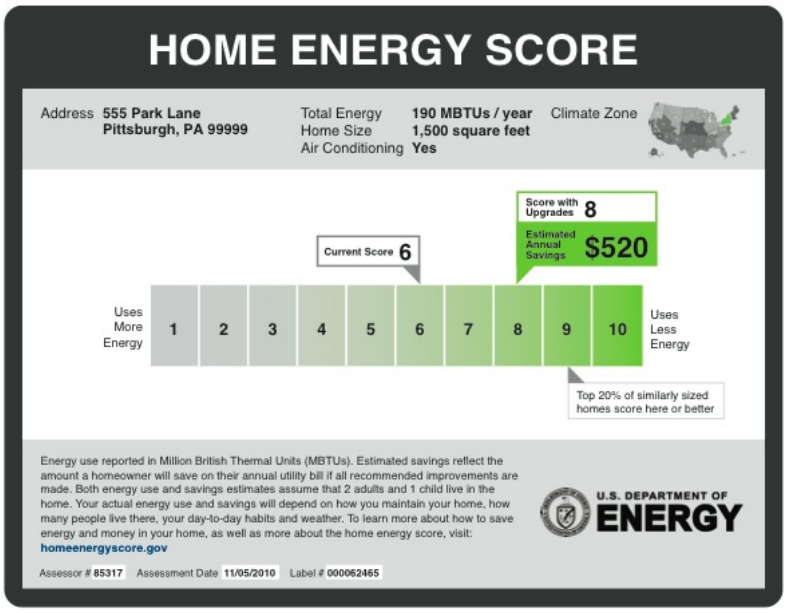
The Home Energy Score consists mainly of two parts: a label with a score and a set of recommended improvements for the homeowner. The 'label' (see, Figure 1) features a home's score on a scale of one to ten, where ten is maximum energy efficiency. A certified assessor trained to use the Home Energy Score software tool produces a score from an in-person audit of a house. The tool generates a score for a house as it is now, as well as a potential, improved score, after recommended improvements are made. Another key feature of the HES label is an indicator that shows the homeowner the score of the top 20% of energy efficient homes in the region. The label also displays a yearly estimate of how much a homeowner could save on their utility bills, if they make suggested improvements.

Figure 1: Home Energy Score sample label



Home Energy Score and potential rebound at the individual level

Efficiency programs are generally dogged by a larger question – does stimulating demand in the energy efficiency sector reduce energy consumption and consumption of other material resources, or merely shift consumption around? In the HES and similar programs, could we see a rebound effect on the individual level, where behavioral responses to technological improvement do not achieve expected reductions or even increases consumption (see, e.g., Biswanger 2001; Ehrhardt-Martinez & Laitner 2010). Moezzi (1998) concluded that energy efficiency gains do not result in reduced consumption and work against the goals of reducing consumption by keeping our sights set on increased productivity per watt or BTU. A study in the UK (Shipworth, et al. 2010) found that homeowners in homes that were more efficient set the thermostat higher and for longer periods of time, consuming more energy for heating overall, than homeowners in homes with fewer efficiency measures installed. There is evidence of an affluence effect here, but regardless of whether this is rebound or affluence affect, the overall finding was clear – more efficient homes/homeowners used more energy. An efficiency approach also tends to emphasize the device, not the user. At the practical level of a homeowner getting a Home Energy Score, *this could reinforce the idea that devices and technology use energy, not people*, especially in people with high performing houses (e.g., You said my house is a 9! It saves energy no matter what I do.)

A non-psychological factor that could be related to this and contribute to rebound is that energy efficiency is not measured on a progressive scale in the HES. All homes, small or large, are treated more or less equally, on a linear scale. There is a consideration of regional weather differences (e.g., home in Minnesota is expected to use more energy for heating than a home in Maryland). But the home score is an efficiency rating, energy per ft^2, not an absolute measure of how much energy a home consumes. So a large, efficient home can still receive a decent score, even if it consumes a large amount of energy due to its size. As discussed by Harris, et al. (2010) the concept of 'progressive efficiency' would increase the scale of measurement as the energy use increases. A large home would have to be much more efficient per ft^2 than a small home to make up for its size. Another way to address this is to assess energy per capita, instead of per ft^2. Without a progressive efficiency measure in place, a homeowner could unwittingly create a rebound effect, for example, when moving to a larger home. For instance, a homeowner of a 1000 ft^2 home that has an HES score of 7 might feel that moving into a 2500 ft^2 home with a score of 6 really isn't much of a difference and can justify their increased energy consumption.

Another psychological factor that could motivate a rebound effect in a program like the HES is moral licensing. Moral licensing is the idea that having done a 'good' thing (in this case, on behalf of the environment) a person then feels free to do something 'bad'. Mazar and Zhong (2010) found a moral licensing effect in consumers buying green products who later cheated on a game where they could earn money at a significantly higher level than their peers who were only given the option of buying conventional products. There is the potential with participants in energy efficiency programs such as HES to feel that they have done their part by insulating their home and so they feel justified to indulge in some way, to consume a bit more than they would have otherwise.

At the start of this piece I proposed a few questions that could help us process both how to assess a rebound effect in an energy efficiency program and avoid a rebound if it exists.

1. How can we analyze this pilot program to identify a rebound effect?

We could collect utility bill data to assess for a rebound effect but we should also assess all purchases, to assess for indirect rebound through consuming more resources, which would not be possible. Residents can also be interviewed to assess perceived change on their part, in terms of attitudes, values, and behaviors. However, this would not assess actual behavior. A carbon footprint exercise, before and after HES, could be an estimate of behavior. These self-reports though could be easily subject to a presentation bias, whereby just being assessed and knowing that the program is concerned with reducing energy consumption would bias responses towards using less energy. Also, would it be helpful to separate out a person's bad habits that consume a lot of energy or resources that are very distinct from any changes made to the home? Does it even matter if we are looking at energy use on a per capita basis?

2. What data are needed and what are 'good enough' data given practical constraints?

Collecting utility bill data, before and after the HES assessment and over a long period of time, giving homeowners enough time to make changes (and also tracking what changes they make, if any) would be one possibility. However, this can be difficult to obtain.

3. What messages or components can be incorporated into this type of retrofitting program to hedge against a rebound effect?

Here are some possibilities:

1 - Clearly promote conservation: A stronger approach would promote conservation over efficiency (Rudin 2000; Siderius 2004). This would help challenge the dominant social paradigm that consumption is equal to growth. This is not a popular option, especially given our current political context, dominated by pursuit of job growth. Perhaps a start would be to put a variety of benefits such as conserving resources, environmental protections, increasing comfort, on *equal* footing with saving money and increasing home value. This would not dismantle a growth model of consumption but it could start to expand our popular ideas of what are considered costs and benefits.

2 – Use "Progressive Efficiency" measures: As suggested by Report actual energy used per capita, not an average based on a generalized household pattern of use. Make comparisons across function, not within 'class'. One solution Moezzi (1998) suggests for an energy efficiency focused policy world is labels that compare a product not just to similar models of a given product but to other models in the same class of products or even different systems for the same function. In the case of houses, this would mean comparing homes not just to similarly sized homes but to all homes, and possibly single family homes to townhomes to apartments, to show which type uses less energy overall. Moezzi's suggestion is still a device-oriented 'people' approach.

3 – Put people in the spotlight, not devices. Karen Ehrhardt-Martinez and Skip Laitner (2010) suggest an approach where people's needs are at the center of a program and the changes required to reduce the impact of meeting those needs are developed from that. They contend that this is a more integrated solution with potential to reduce multiple barriers to energy conservation and simultaneously promote habits and values of conservation. Can non-economic motivations - increasing comfort, a desire to leave a positive legacy, following group norms – be incorporated into the label and outreach materials? These would have to be combined with a conservation message. As described earlier, a motivation to increase comfort can lead to a rebound effect (Shipworth, et al. 2010).

4 - Social context matters. Part of a more people centered approach is an expanded notion of what motivates people and attending to the social contexts in which people live. Could the program include some sort of signifier of social status or inclusion in a larger group? Could this be promoted as 'the norm' instead of as an exception? People live in a world saturated with social dynamics that influence their decisions. Income, class, ethnicity, gender, power differentials, values, desires for social status, different modes of expressing values are all social contexts that shape people's decisions. Attending to these is challenging but ultimately could provide a more meaningful experience with better results (Lutzenhiser 1993; Ehrhardt-Martinez & Laitner 2010).

5 - Acknowledge that no one is an island. Involve everyone in a household who might be interested in saving energy, particularly children who may have stronger environmental values than their parents. Tapping into social networks is another possibility, outside of the nuclear family model. A community based approach can target a block or neighborhood or even an online community to establish group norms for energy conservation, social support for making changes, and provide a means for checking the credibility of proposed changes with trusted persons. Social norms and peer pressure could help potentially reduce rebound from moral licensing.

6 – Talk to citizens, not just consumers. An individual consumer choice model underpins the HES. Engaging individuals is certainly a large part of the puzzle of how long-term cultural change can happen. But people are more than consumers. One alternative that is possible, though unlikely in the current political context, is that we favor collective choice by governance (e.g., collectively setting high standards for buildings or mandating energy efficiency) over change made through individuals' consumption. The HES could include a civic message about how we can save more energy through larger infrastructure changes, like improved standards, sustainable community planning, etc., and that everyone can be involved in making those changes without buying a thing. Could a citizen approach where people feel part of a larger, ongoing, collective effort also help avoid the moral licensing problem, where small choices and efforts seem to liberate consumers to 'cash in' on their positive action?

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