

SIDE EFFECTS OF ENERGY EFFICIENCY MEASURES

Energy efficiency and the Rebound effect

The Rebound effect. Economists recognise a phenomenon, called the Rebound effect (also known as Jevon's Paradox and the Khazoom Brooks Postulate) in which efficiencies in delivery of a commodity lead to lower prices which then stimulates increased consumption. It is evident in the idea that as machines use less energy, those machines are used more. As applied to energy consumption, it has been used by some to argue that governments should not spend taxes on programs to improve efficiency and instead should leave it up to the market. For example, The **Breakthrough Institute (BTI)** argued⁶⁶ that "there is a large expert consensus and strong evidence that below-cost energy efficiency measures drive a rebound in energy consumption that erodes much and in some cases all of the expected energy savings". Specifically they claimed that usage may increase by 60-100%, nearly cancelling any benefit derived. If the Rebound effect applies as described by the BTI then the capacity of energy efficiency to reduce global emissions would be significantly compromised.

Demand elasticity and rebound. Central to the idea of rebound is demand elasticity, which is the extent to which demand is effected by prices. Demand for a commodity with inelastic demand will change very little as price changes. End-use demand for electricity is regarded as somewhat inelastic^(66 pp 9), however rebound can occur because of indirect and macro-economic effects.

Critiques of Rebound. In an analysis of the BTI arguments, Afsar et al⁶⁷ have concluded that:

- the Rebound Effect is more like 10-30% of energy savings rather than the 60-100% cited;
- anecdotal cases reported by the popular press can be discounted by looking at actual energy use data (eg information from the US Energy Information Agency shows that, yes, more homes do have two refrigerators, but total energy used in refrigeration has still reduced);
- increases in energy use (as well as TV sizes and number of refrigerators) have more to do with growth in GDP and population than the Rebound Effect itself;
- the underlying model used by the Breakthrough Institute contains a number of highly questionable assumptions; not least of which is a built-in assertion that increased efficiency will result in increased usage. These points weaken the case substantially;

• a statistical analysis of data provided by the American Council for Energy Efficient Economy demonstrates a real correlation between the quality of a US state's energy efficiency program and a reduction in per-capita energy use. A particularly clear trend is evident in the per capita electricity use between California and the rest of the US over the last twenty years.

Pears³⁹ suggests that energy efficiency measures can give rise to further energy efficiency, ie a contra-rebound effect

"...it can be argued that EE (energy efficiency) measures can have an amplification effect whereby satisfaction with one EE product can encourage use of the savings to buy other EE products, and this drives down cost of EE products for society".

Price and efficiency. Under 'rebound' theory, unit energy prices fall in response to efficiency-driven falls in demand. In the years ahead, retail energy tariffs are unlikely to fall with demand because of countervailing factors such as a) energy resource constraints, b) carbon pricing, and c) increased network charges (see Energy_Prices_Forecast). This is apparent in recent years (ie since late 2008) where Australian net grid electrical demand has fallen (see 3.1 above) while prices have risen⁶⁸.

Summary. To the extent that rebound exists at all in the case of national energy efficiency, BZE takes the view that it is not significant, and does not counter the demonstrable effects that efficiency programs have on overall energy consumption.

Accordingly, the Buildings Plan has not incorporated any Rebound effect into the modelling because no structural reduction in grid energy price is expected.

Furthermore the authors of the plan take the view that energy efficiency measures can lead to significant net reductions in energy consumption and are confident that the estimates from the proposed retrofits are realisable, if widely adopted in Australia.

Home Insulation Program

In Australia, the media response to the Home Insulation Program (HIP) has led to scepticism about the efficacy of government regulation and programs⁶⁹.

Unfortunately, there is a misconception that the HIP was generally a failure and caused a significant number of house fires and deaths. Whilst it is true that 156 fires occurred, what has not been reported widely is the set of conclusions from the CSIRO Report⁷⁰. Analysis of the CSIRO Report^{71, 72} found that the rate of fires within the twelve month period after insulation installation was 13.9 per 100,000 under the HIP, compared to the historic rate of 47.3 per 100,000. The long term rate of insulation-related fires (greater than 12 months) was found to be between 0.6 and 1.1 fires per 100,000 under the scheme, compared to the long term average of 2.6 per 100,000. So the HIP actually represented a significant reduction on the long term rates of insulation associated fires!

The Home Insulation Program led to 1.1 million homes receiving ceiling insulation, a measure that is generally considered to be the single most effective action for reducing space conditioning loads and improving comfort (this is supported by modelling in this report). A report commissioned by the Insulation Council of Australia and New Zealand (ICANZ)⁷³ found that installing ceiling insulation could on average increase a building's performance by 2.2 stars and save households \$300 per annum. The 2011 Update to the Garnaut Review stated that "industry sources also suggest that the insulation program and photovoltaic installations have had some effect."

The update also indicated that "despite recent difficulties in administration of energy efficient assistance programs, such as the Home Insulation Program (ANAO 2010), the weight of evidence suggests that it is possible for such programs to be safely and effectively delivered".

What has not been quantified, is the number of lives that have already been saved (and will be saved in the future) by improving the thermal comfort of dwellings and reducing exposure of occupants to extreme temperatures.

Source: <http://decarboni.se/publications/zero-carbon-australia-buildings-plan/4-side-effects-energy-efficiency-measures>