Energy efficiency measures in some EU countries could be backfiring

Policy efforts to decrease energy consumption by improving efficiency may be lessened by rebound effects. New research on household energy consumption indicates just under half EU countries (plus Norway) have rebound effects above 50%, and six are over 100% which means the efforts to increase efficiency backfire, i.e. they increase, rather than reduce, overall household energy consumption. There is a need to think critically about a policy response to the rebound effect and gain a better understanding of why it occurs.

Rebound effects of policy measures occur when savings from energy efficiency are eliminated by increases in energy consumption. Recently, energy policy has focused on improving energy efficiency of appliances as a means to reduce energy consumption and associated CO₂ emissions. However measures to promote better insulation or more efficient domestic appliances can suffer rebound effects. This occurs because improved efficiency allows people to save money, enabling them to consume more energy.

To inform EU policy in this area there is a need for a country-by-country estimate of the rebound effects, using centralised data and consistent definitions of rebound effects. The research calculated general rebound effects in each of the 28 EU countries, plus Norway, using figures on energy efficiency and consumption of energy services from 2000–2011 from the EU’s Odyssee database.

Rebound effects were calculated as the percentage increase in use of energy services that occurs for every percent increase in energy efficiency over the time period 2000–2012. In a more general context, energy services are the ‘product’ derived from consuming energy such as warmth, cooling and air quality.

The study estimated that 13 of the 29 countries had rebound effects of less than 50% during this period. Economists consider these to be in the ‘weak’ rebound effect zone as more than half the gain in energy efficiency is being effectively utilised to reduce energy consumption. These countries were mainly north-western European countries, which have implemented advanced energy-efficiency programmes such as Sweden, Belgium, France, Luxembourg, Germany, Austria, Ireland, the Netherlands and the UK. Cyprus, Croatia, Portugal and Romania also fell into this category.

Eleven countries suffered strong rebound effects that were over 50% and six of these had effects of over 100%. When effects exceed 100% this is called a ‘backfire’ since an increase in efficiency increases rather than decreases energy consumption. The most dramatic rebound effects were in Lithuania (380%) and Hungary (552%), but two Scandinavian countries, Denmark and Finland, also suffered backfires. It is unclear how much energy consumption would have risen without energy efficiency policies in place.

Negative rebound effects were seen in five countries: Slovakia, Slovenia, Spain, Greece and Norway. Here, consumption reductions cannot be explained by improvements in energy efficiency alone, indicating other factors are at work. In these countries, with the exception of Norway which had only a small negative rebound effect of -4%, economic hardship could be a driving factor for decreases in consumption.

It was not in the scope of the study to identify specific causes of rebound effects but, to gain some insight into this area, it considered the case of Germany more closely. Here it identified four likely factors that affect rebound effects: changes in fuel prices, income, environmental awareness and demography and lifestyle.

The study suggests that rebound effects could present a barrier to the effectiveness of energy efficiency measures. Research focusing on these four factors could provide valuable insight into why energy efficiency measures do or do not work and help policymakers to improve effectiveness.