

# Households' response to multiple energy policy instruments

by Bente Halvorsen

## Overview

Consumers face multiple environmental regulations aiming to change their behavior. The policy instruments used may either be monetary (taxes and subsidies), direct regulations (standards) or soft policy tools (information campaigns and energy labeling). These policies aim to reduce emissions from energy use and change the energy mix towards the use of renewable energy.

Investment subsidies, taxation and direct regulations are often referred to as hard policy tools. Hard policies aim to change behavior through changes in economic incentives and external factors affecting a decision. Other types of instruments, such as information campaigns, energy advisory services and energy labeling, are often referred to as soft policy instruments. They aim to change behavior through changes in attitudes, norms and awareness. This implies that hard and soft policy measures aim to change behavior through different mechanisms, one through changing exogenous factors affecting the decision, the other by changing preferences (intrinsic motivation). How a particular household responds to these different policies depends on the preferences of its members, how easily preferences are changed and their opportunities for substitution in consumption.

The use of soft policy tools in social science (other than economics) is often argued on the basis of a cognitive approach for human behavior, emphasizing the importance for the subjective interpretation of reality rather than objective rationality (Schön, 1983, Dryzek, 1987, Fisher, 1995). Empirical economic policy analyses mainly focus on the effects of hard policy tools, such as taxes (see e.g. Khazzoom, 1991, Berkhout et al., 2004, Kasahara et al., 2007). In traditional economic analysis, preferences are assumed not to change over time, ignoring the main aim of most soft policy measures. Empirical evidence of the effects of soft policy tools do, however, suggest that e.g. information campaigns can be very effective in changing behavior (Henry, 2003, Janmaat, 2007).

If these soft policy measures are able to change preferences over time, the use of soft policy tools are likely to affect the effectiveness of hard policy measures and visa versa; either reinforcing each other or cancelling each other out. There exists some literature on how *hard* policy tools may crowd-out morally motivated (intrinsic) behavior (Frey, 1994 and 1997, Tögensen, 1994, Halvorsen, 2008). These crowding-out effects are often found when monetary incentives are introduced in cases where the main behavioral motivator is moral and social norms. Introducing monetary incentives gives the notion that it is OK to pay for services otherwise provided out of duty. However, we know little about how the use of soft policy tools affect decisions and the price and income response in well established markets, like the energy market.

## Methods

In this analysis we analyze the importance of, and interactions between, different policy measures for changing household energy consumption. We develop a model for how changes in preferences as a result of soft policy measures will affect households' responses to hard policy measures, to see if soft policies are enhancing or reducing the overall effectiveness of hard policy instruments.

The model is estimated on data from 23 years of consecutive cross-sectional data from the annual Norwegian Survey of Consumer Expenditure (SCE) over the period 1986 to 2009, together almost 28000 observations. We have individual information about the expenditures, consumption and prices of energy goods, dwelling characteristics, information about household members and ownership of major domestic appliances for each individual household. Information about household income is merged from the Norwegian Tax register to

each individual in the household. The Norwegian Institute of Meteorology provides information about temperature by municipality. We also have information about various type information works by Enova, the governmental agency for promotion of more efficient and environmentally friendly energy consumption in firms and households.

### **Expected results**

Preliminary results indicate that hard policies are effective, and that the effect of the soft policy measures mainly comes through changes in the demand's response to changes in prices and income (both positive and negative). We find that electricity taxes have a significant and substantial negative effect on electricity consumption, and that this effect is reinforced by energy economization information services on the phone and the web. We also find that energy economization information on the web also has a direct negative effect on electricity consumption. However, we find no significant direct effect of the phone service for energy economization information, information flyers or for media activities, but we do find that increased informational efforts through the media and flyers reduce the negative price effects, making taxation less effective. On the other hand, we find that this kind of information significantly offsets the increase in electricity demand resulting from an increase in income. Finally, we find that the introduction of energy labeling on electric household appliances has had a significant negative effect on electricity consumption, but that this effect decreases over time.

### **References**

- Berkhout P.H.G., A. Ferrer-i-Carbonell, J.C. Muskens (2004): The Ex Post Impact of an Energy Tax on Household Energy Demand, *Energy Economics*, 26(3), pp. 297-317.
- Bruvoll, A. and B.M. Larsen (2006): Greenhouse gas emissions in Norway: Do carbon taxes work?, in T. Sterner and A. Muller: Environmental taxation in practice, Ashgate Publishing Limited. Also published in *Energy Policy* 32 (4), pp. 493-505.
- Dryzek, J. (1987): *Rational Ecology: The Political Economy of Environmental Choice*, Brasil Blackwell, Oxford.
- Fisher, F. (1995): *Evaluating Public Policy*, Nelson-Hall Publisher, Chicago.
- Frey, B.S. (1994): How intrinsic motivation is crowded out, *Rationality and Society* 6, pp. 334-352.
- Frey, B.S. (1997): *Not just for the money. An economic theory of personal motivation*. Edward Elgar, Cheltenham UK.
- Halvorsen B. (2008): Effects of norms and opportunity cost of time on household recycling, *Land Economics* 84(3), pp. 500 - 516.
- Henry, G.T. (2003): Driving Less for Better Air: Impacts of a Public Information Campaign, *Journal of Policy Analysis & Management*, 22(1), pp. 45-63.
- Janmaat, J. (2007): A Little Knowledge: Household Water Quality Investment in the Annapolis Valley, *Canadian Journal of Agricultural Economics*, 55(2), pp. 233-53.
- Kasahara, S., S. Paltsev, J. Reilly, H. Jacoby, A.D. Ellerman (2007): Climate Change Taxes and Energy Efficiency in Japan, *Environmental and Resource Economics*, 37(2), pp. 377-410.
- Khazzom, J.D. (1991): The Impact of Gasoline Tax on Auto Exhaust Emissions, *Journal of Policy Analysis & Management*, 10(3), pp. 434-454.
- Schön, D.A. (1983): *The Reflective Practitioner: How Professionals Think in Action*, Temple Smith, London.
- Tøgersen, J. (1994): Monetary incentives and environmental concern. Effects of a differentiated garbage fee, *Journal of Consumer Policy* 19, pp. 125-143.