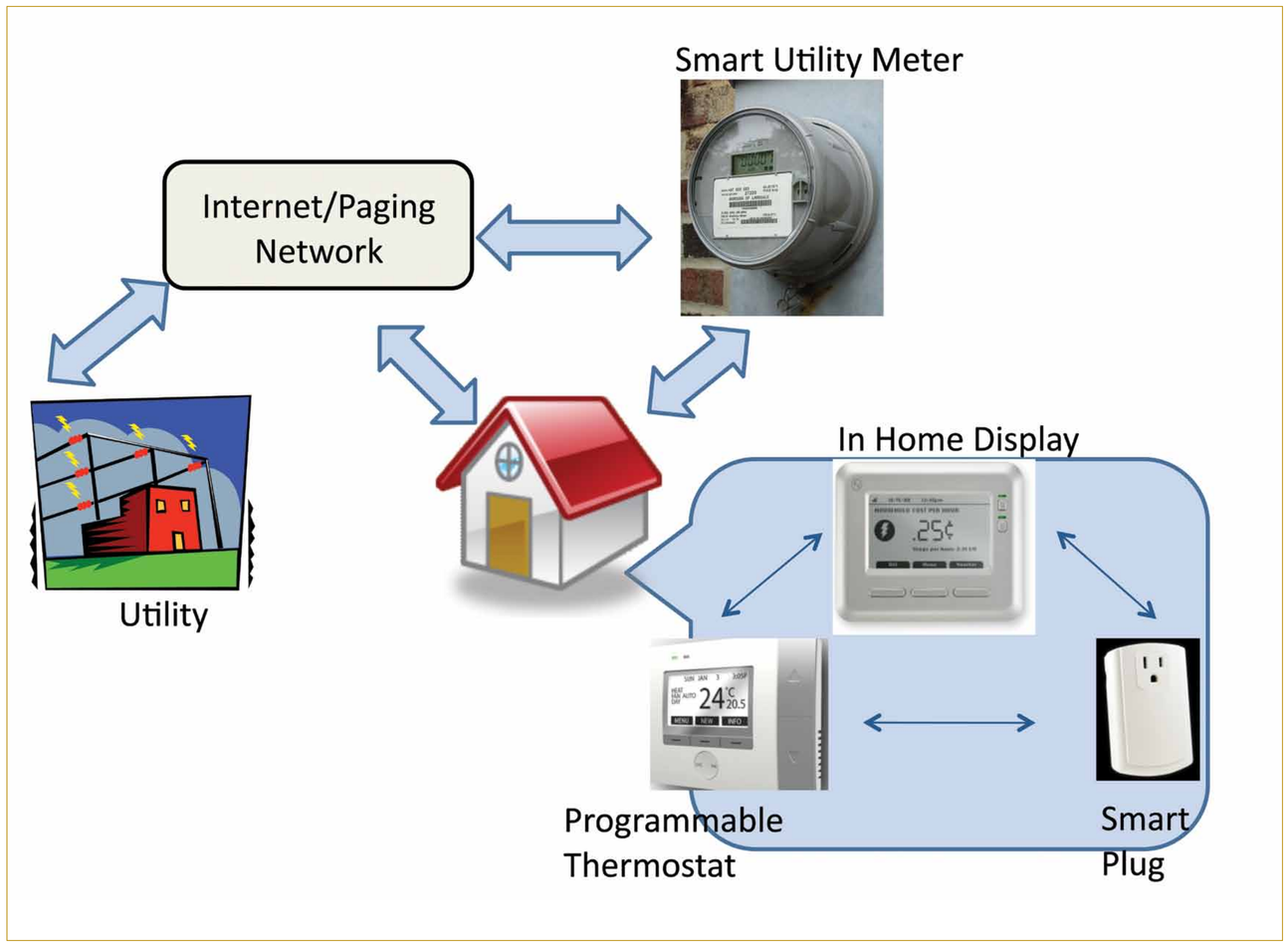
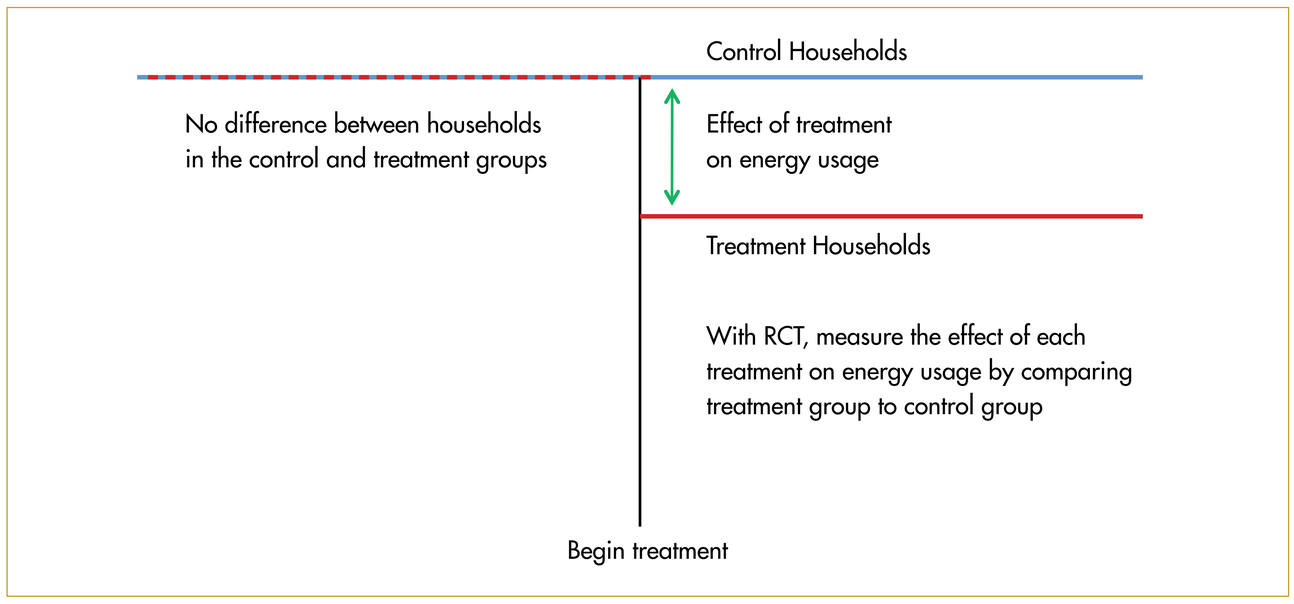
Home Energy Conservation

Getting the Most out of Home Area Network Technology: How to discover what makes people conserve.



▲ Figure 1 provides a diagram of a HAN. With smart meters, the meter can communicate high-frequency energy usage and expenditure information either directly to an in-home display (IHD) or indirectly via the internet. The technology also allows households to automate energy use decisions and control appliances remotely.



▲ The RCT design is optimal for transparent and unbiased evaluation of a program's impact. Treatment and control households are similar aside from the treatment, allowing post-treatment differences in energy usage to be attributed to the interventions.

THIS PROJECT EXPLORES the possibility of using a home area network (HAN), which utilizes smart meters and in-home devices to communicate high-frequency energy usage and expenditure information directly to homeowners, to induce energy conservation. This technology provides new avenues for influencing home energy decisions either through dynamic pricing or non-price mechanisms such as behavioral nudges and technological default settings.

These interventions will help policy-makers understand how to decrease greenhouse gas emissions associated with electricity generation, which account for more than 40 percent of the 6,000 million metric tons of carbon dioxide produced annually in the U.S.

We design a randomized field experiment to test interventions made possible by HAN. Households will be randomly assigned to a control group that receives no treatment, or one of several treatment groups. Some households will face higher prices during critical peak hours. Others will receive an in-home display that provides real-time information about electricity usage and expenditure. A third group will receive a combination of these two interventions. A fourth group will receive HAN technology that includes networked plugs, programmable thermostats and in-home displays. Another group will test the power of opt-out conservation settings, whereby appliances connected to networked plugs will be automatically shut-off during critical events. A final group will be given information about their neighbors' usage, thus appealing to the desire to conform to social norms.

Differences in post-treatment energy use will be attributable to the interventions, allowing us to determine which levers of conservation are most powerful.

ENERGY

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