Application of smartphone technology to economic and environmental analysis of building energy conservation strategies

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They can help us pass the time, socialise and yes, even work, but can smartphones also help us save the planet? A paper recently published in the *International Journal of Sustainable Energy* suggests they can.

Four researchers from Canada, Patrick Leslie, Joshua M. Pearce, Rob Harrap and Sylvie Daniel, investigated how smartphones could be used in energy 'audits', designed to help householders adopt energy conservation measures (ECMs) to reduce emissions, conserve resources and reduce operating costs.

Traditionally, energy audits are undertaken by trained staff who travel from house to house, burning lots of petrol on the way. Their audits tend to focus on heating and cooling, and ignore other energy-thirsty devices, such as appliances. As the authors note, householders don't often lack the ability to make the energy-saving changes the auditors suggest, 'but the ability to recognize which changes are possible and which have the largest potential to reduce energy use'. The vast majority of homes will also never have such an audit. Enter the smartphone.

Rather than waiting for an audit, the authors suggest that if suitable software could be created, householders could perform their own with their smartphones. Much of the technology needed already exists: phone sensors can take pictures for reports, act as crude light meters or confirm a variety of measurements; GPS data is already available for a wide

range of applications. Even existing technology could analyse users' appliances, provide the energy-efficiency rankings of similar homes, and give breakdowns of current energy use.

The authors envisage an intuitive tool with which an untrained user would be able to choose their house type, energy source and payment method, choose an ECM and input data as instructed. For example, a user might provide the type and number of light fittings in their home, then receive suggestions for energy-saving replacements in real time; as technology developed, the range of tasks that could be performed by smartphone would grow.

A smartphone could also 'push' users to make changes when conditions are right, for example, when a federal rebate or cheaper tariff was available. Unlike the traditional 'one-off' audit, this system 'has the potential to keep users actively involved and constantly engaged with the energy efficiency of their homes'.

Smartphone audits aren't perfect, the authors admit, crucially lacking a 'blower door test' to measure how well a home is sealed, so some alternatives would need to be found. A smartphone-based system would also require changes to subsidy programmes in many jurisdictions.

But by far the biggest advantage of the smartphone-based energy auditing system is the high potential for accelerated energy and emissions savings. In their Southern Ontario case-study area alone, the researchers estimated that it would take auditors 55 years to cover all 157,000 dwellings in the current fashion. With smartphone technology, all the homes could, in theory, be audited simultaneously, allowing homeowners to make ECMs much sooner; cumulative carbon-dioxide savings from smartphones would surpass those from traditional audits in 13 to 17 years, even with conservative assumptions. In Canada, residential buildings account for 16.3% of total energy use, so the

implications for vast energy savings throughout the smartphone-using world, as outlined in this innovative article, are immense.

More information:
www.tandfonline.com/10.1080/1478646X.2011.578746

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