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Briefing Note 2010 – 16

27 August 2010

Overcoming Barriers to Residential Energy Efficiency

Produced in partnership with [ISIS | A Research Centre | Sauder School of Business | UBC](#)

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Issue

BC's [Clean Energy Act](#) sets ambitious targets for the province, including reducing the expected increase in demand for electricity by 66% by 2020. In Canada, about [16% of energy usage occurs within residences](#)ⁱ, making them key targets for application of energy efficiencies. Technologies like highly efficient heating, ventilation and air conditioning (HVAC) systems, insulation and 'smart meters', can significantly reduce household energy usage. Many of these technologies are cost-effective, allowing homeowners to recoup costs from energy savings in fewer than 7 years.

Background

There has historically been relatively low uptake of these products in home construction or retrofits. The [average BC home has been built to an Energuide rating of only around 56-65 \(out of 100\)](#)ⁱⁱ. In Vancouver, only 3% of homes had renovations that included energy efficiency upgradesⁱⁱⁱ last year. A number of barriers prevent buildings from achieving energy efficiency through construction or renovation. These include *split incentives* (the builder who incurs the added cost of energy efficient materials does not reap the benefits of the energy cost savings), *risk aversion* (the uncertainty of the level of savings over the lifespan of the improvements) and high up-front costs. Homeowners' decisions vary depending on whether their homes are owner- or renter-occupied, single-family or multi-unit, and new or pre-existing.

Options

BC has a number of tools to overcome these barriers, reduce GHG emissions and support the green building sector.



Regulation: The province has the authority to set building codes in all communities except Vancouver. Both Vancouver and the province have already regulated higher residential energy efficiency, requiring new homes to have Energuide ratings of 85 and 80 respectively. These positive regulations do not, in themselves, resolve the residential energy usage issue; most buildings that will be standing decades from now will be ones that have already been built, under less stringent building codes. To foster the retrofit of these homes, Vancouver has proposed a renovation by-law that will require all renovations over \$5,000 to also include energy efficiency upgrades. Setting regulations that require all newly constructed homes to be energy efficient avoids the problem of split incentives. Of course, regulations also have their disadvantages - without strict enforcement, which is beyond the capacity of most communities, many buildings will not fully meet building code. Renovations also raise costs for contractors who have traditionally had difficulties charging premiums for energy efficient houses^{iv}.

Incentives: Incentive programs, like BC's LiveSmart, which provides rebates for a wide variety of residential energy improvement measures, can help mitigate the high up-front costs of renovations. Rebates rarely cover all costs for energy efficiency improvements, so these incentives only reduce the problems of high-upfront costs, split incentives and risk-aversion. They are usually intended to be short-term, existing only until customer awareness stimulates the production demand necessary to lower prices. These programs can be costly and difficult to sustain. The recent cancellation of Canada's ecoENERGY program, even after an infusion of \$80 million in the 2010 budget, demonstrates this. In addition, incentive programs often have significant administrative requirements to deter fraud, which can make them less attractive to potential renovators. Finally, they need to be planned carefully in order to ensure that they create additional demand for energy efficiency products at a cost-effective level rather than simply subsidize those who are already inclined to buy these products, as was the case with [incentives to purchase hybrid vehicles](#)^v.

Audit Programs: Audit programs that assess energy leakage and potential efficiency savings can provide more certainty for homeowners about the anticipated savings and cost-recovery from energy efficiency improvements. They also help homeowners make better decisions about which energy efficiency measures to purchase. For this reason, some incentive programs, like LiveSmart, make audits a pre-requisite for receiving incentives. Furthermore, audits have the side-benefit of documenting energy use reductions that could potentially be a source of carbon credits for the funder of a renovation program. However, audits cannot provide certainty about the lifespan of retrofit improvements. On average, audits cost approximately \$350 for a single-family dwelling without necessarily resulting in the recommendations being acted upon.

Financing: Financing programs can decrease the challenges around high up-front costs for renovators. When planned properly, the financing program repayments are less than the savings made on energy bills. A wide variety of financing programs have emerged across North America; some allow repayments through the renovator's utility or property tax bill, thus putting the loan responsibility onto the new owner upon sale of the home. In some cases a premium is charged on the interest rate, allowing the program to be self-sustaining. Financing programs, though, do not overcome split incentives in cases where a renter pays their own utility bills, and thus reaps the efficiency rewards. On-utility-bill and on-tax-bill financing may require legislative changes to give appropriate authorization to municipalities and utility companies. Energy efficiency financing programs are discussed in another briefing note.

Conclusion

The tools listed above all have the potential to help the province achieve its GHG emission goals and bolster the green building industry. Vancouver's renovation by-law, if implemented, may provide lessons on how to promote home energy efficiency and increase renovation demand. A review of BC's LiveSmart program would also be valuable to verify whether it has created additional green-building demand cost-effectively and to determine to what extent, if any, it should be expanded to compensate for the loss of the federal ecoENERGY program. Financing programs also provide significant opportunities for decreasing GHG emissions from homes. Facilitating their emergence through developing partnerships with utility companies and implementing supportive legislation will help increase residential energy efficiency.

Further Reading

Abbot, Jamie, Guy Dauncey, Blaine Juchau 2009. "Green Landlords--Solving the Rubik's Cube of Energy Efficiency in Rental Housing", BC Sustainable Energy Association.
<http://www.bcsea.org/greelandlords>

ⁱ NRCan, Energy Use Data Handbook Tables (Canada), Total End-Use Sector, Table 2, 2007, June 2, 2010, <http://www.tdds-sst.gc.ca/default.asp?lang=En&n=AADC6287-1&offset=3&toc=show>

ⁱⁱ Community Action on Energy and Emissions, Energy Efficiency & Buildings--A Resource for BC's Local Governments, 2007, June 2, 2010, http://www.fraserbasin.bc.ca/publications/documents/caee_manual_2007.pdf

ⁱⁱⁱ CMHC, Renovation and Home Purchase Detailed Data Tables – Vancouver, 2009, June 2, 2010, <https://www03.cmhc-schl.gc.ca/catalog/productDetail.cfm?lang=en&cat=134&itm=1&sid=bb782527f05548e291184eb35a0072a0&fr=1275850027793>

^{iv} Royal Institute of Chartered Surveyors, Green Buildings, Green Value, Growing Assets, 2007, June 2, 2010, http://www.bluewildernessgroup.com/index.php?action=display&cat=43&doc=greenvaluesreport_1.pdf

^v Chandra, A., S. Gulati and M. Kandlikar Green Drivers or Free Riders? An Analysis of Tax Rebates for Hybrid Vehicles, Working Paper, 2009, June 2, 2010 <http://ssrn.com/abstract=1348808>