

Special Report

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Energizing Household Energy Efficiency

- **Substantial progress has been made in improving household energy efficiency. However, more needs to be done, especially with energy usage and pricing on the upswing. Rising energy prices should help speed more efficiency gains in the future, generating long-term cost savings for households.**

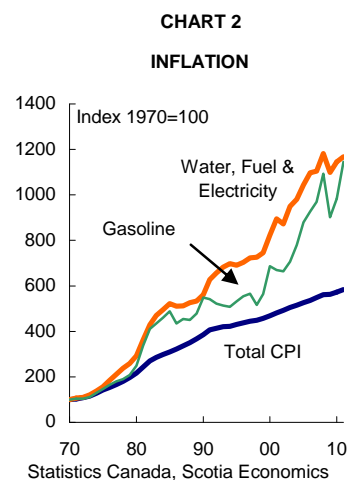
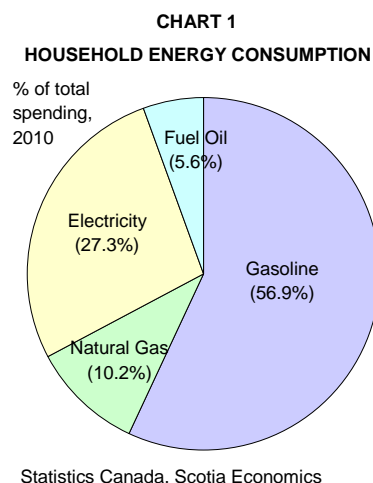
High energy costs, led by the roughly 40% jump in gasoline and heating fuel prices over the past two years, are taking a toll on consumer confidence, purchasing power and — ultimately — spending. In the first quarter of 2011, the share of household after-tax income allocated to energy consumption — gasoline, electricity, natural gas and other fuels — totaled 6½%, up roughly a percentage point from the level prevailing in early 2009. The recent easing back in oil prices has likely lowered this ratio in the current quarter, but only modestly.

High energy costs have dampened spending on other 'less discretionary' purchases. Energy demand is inelastic, at least in the short-term, due to the limited ability of households to substantially alter their driving patterns and other daily activities. Household expenditures on energy totaled roughly \$60 billion in 2010, or about \$4,500 per household. We estimate that higher energy costs will add about \$6 billion to this bill in 2011 — spending dollars that could otherwise have been allocated to other retail purchases, saved or used to pay down debt.

The squeeze on household budgets would be greater if not for continued soft natural gas prices. Moderate electricity price increases from 2007-2009 have also helped, though they too have begun to pick up more recently. Gasoline purchases have typically accounted for about half of total household energy consumption, though this share has risen in recent years (chart 1). Expenditures on housing-related energy — natural gas, fuel oil and electricity — account for the remainder.

Long-Term Savings Outweigh Transition Costs

There is an ongoing urgency to reduce household energy consumption because of the discernible upward trend in the price of energy. Energy costs have, on average, outpaced the general rate of inflation since the 1980s, and increasingly so over the past decade (chart 2). The rapid expansion in industrial activity among emerging markets, led by China and India, is a major factor in lifting demand, while periodic bouts of



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geopolitical tension have added to supply concerns. While natural gas price trends remain encouraging for consumers, the risk lies toward higher electricity costs and continued elevated oil prices.

From the perspective of households, reducing energy consumption, or at least slowing its rise, could generate significant long-term cost savings. It would also reduce the sensitivity of household spending to future energy price shocks. Despite improvements in energy efficiency in both the residential and passenger transportation sectors over the past two decades, household energy consumption as a share of total spending has remained relatively constant in a range of 6-7% (chart 3).

Signs Of Progress ...

There are a number of encouraging trends underway supporting gains in household energy efficiency. Motivated in part by high gasoline prices, consumers are shifting toward smaller, more fuel-efficient motor vehicles. Sales of compact cars and small crossover utility vehicles (CUVs) were up 16% y/y in April, 10 percentage points above the industry-wide gain, and now account for fully a third of overall sales volumes in Canada.

More Canadians are choosing higher-density urban living. High-density housing is more energy-efficient than traditional detached homes (chart 4). It also leads to lower motor vehicle use given proximity to services and better public transportation options. High land costs, reduced housing affordability, urban renewal efforts and demographic trends (including an aging population and increased immigration) will continue to support multi-unit housing demand.

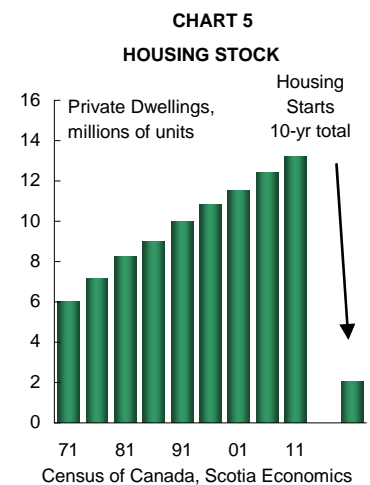
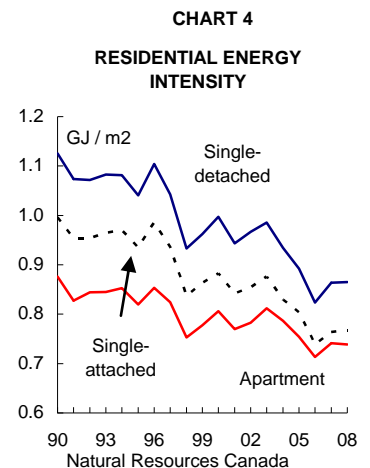
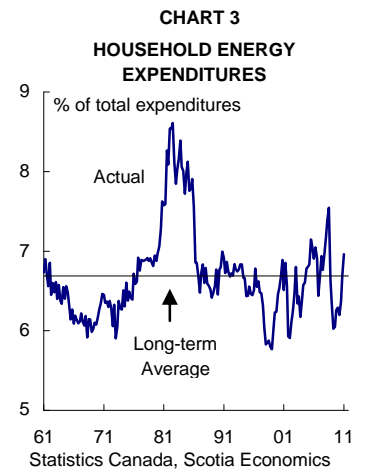
Third, new construction is becoming more energy-efficient. Driven by changing consumer demands and regulatory standards, new home builders are increasingly adopting energy-efficient technologies and materials. A good example are LEED standards. A LEED-certified home is estimated to use 30-60% less energy and 50% less water than an average home.

... But More Needs To Be Done

New construction takes considerable time to impact the energy efficiency of the aggregate housing stock. Canada's existing stock of housing totals more than 13 million dwellings. The cumulative addition to this stock from the boom in new construction over the past decade represents just 15% (chart 5).

Meanwhile, Canada's housing stock is aging. The majority of Canadian residences were built prior to the 1980s, and are far less energy efficient than current or more recent construction (chart 6). Data from the 2006 census suggested that over one-third were in need of minor or major repair.

As a result, energy-efficient renovations and retrofits to existing homes have the potential to make a bigger impact in driving improvements in the housing stock. Expenditures on renovations and alternations are the fastest component of housing investment over the past decade, expanding an average 8% annually in inflation-adjusted terms. The \$45 billion renovation industry is approaching new construction in total dollar value.

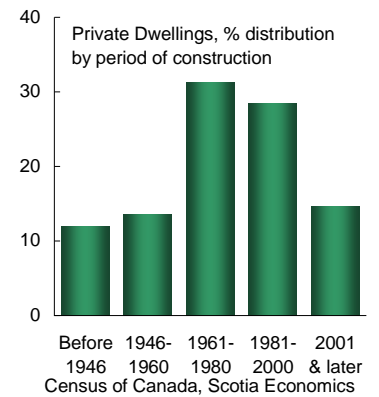


Energy efficiency is not a major driver behind decisions to renovate. A CHMC survey found less than 10% of completed or planned renovations are undertaken to make the home more energy efficient. Households have nonetheless shown a desire to incorporate energy-efficient and environmentally friendly components, such as replacing doors and windows or installing low-flow plumbing, into their renovation projects.

Looking ahead, we expect the pace of renovation spending could begin to moderate from the strong gains of the past decade alongside a more subdued outlook for home sales and price appreciation. Higher borrowing costs could also slow the drive to renovate, particularly for larger projects. Yet there are many affordable cost-saving options for boosting household energy efficiency, including replacing conventional incandescent light bulbs with more efficient alternatives such as compact fluorescent lights (CFLs), replacing aging appliances with newer more efficient models, or using a backyard clothesline.

Households can also take advantage of various programs and incentives available from federal, provincial, territorial and municipal governments as well as certain energy utilities to conserve energy and generate long-term cost savings. These range from the use of smart utility meters and off-peak pricing, to targeted rebates for energy efficient home improvements (e.g. replacing older less efficient heating/cooling systems or adding insulation). The federal *Budget 2011*, for example, committed an additional \$400 million over the 2011-2012 fiscal year to extend the popular ecoENERGY Retrofit-Homes program, which provides grants to eligible households to offset the cost of energy-efficient upgrades.

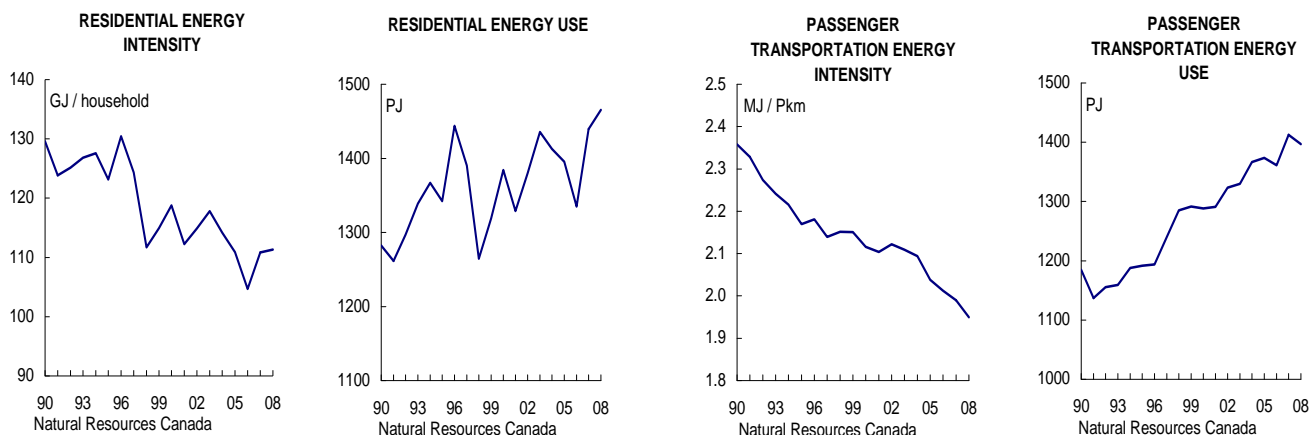
CHART 6
HOUSING STOCK



Appendix A: Household Energy Use and Energy Intensity

Residential energy intensity (i.e. energy use per household) has declined steadily since the mid-1990s. A shift from heating oil to more efficient natural gas systems, significant gains in the energy-efficiency of major appliances and the increased adoption of compact fluorescent lights (CFLs) have more than offset the negative impact of larger average dwelling sizes, a surge in the use of personal computers and electronic devices, and increasing air conditioning use. At the same time, population growth combined with fewer people per household has contributed to the continuing rise in total residential energy use over the same period.

A similar trend is evident in the passenger transportation sector. Energy intensity (i.e. energy use per passenger kilometre) has declined steadily since the early 1990s alongside improvements in motor vehicle fuel efficiency. Nonetheless, total energy use has risen steadily, with fuel efficiency gains more than offset by a rise in the number of drivers and registered vehicles, the growth in the popularity of light trucks (e.g. minivans and sport-utility vehicles) and an increase in the average distanced traveled per driver.



Appendix B: Highlights from Statistics Canada's 2009 Households and the Environment Survey

A recent study by Statistics Canada shows that Canadians are increasingly adopting energy-efficient and environmentally-friendly practices in their home, though there is still considerable scope to boost participation further:

- 75% of households had at least one compact fluorescent light (CFL), though the use of halogen and diode lights remained low
- 49% of households with a thermostat had a programmable one, up from 42% in 2007; 61% lowered the nightly temperature during the winter, up from 55% in 2007
- 64% used a clothesline or drying rack
- 63% had a low-flow shower head, up from 28% in 1991
- 42% had a low-volume toilet, up from 9% in 1991
- 18% of non-apartment dwellers had a rain barrel or cistern to capture rain water
- 66% drank primarily tap water, up from 59% in 2007; 24% drank primarily bottled water, down from 30% in 2007