The Building Energy Code Collaborative and trends which may influence energy efficiency codes and standards in housing

Prepared for:

Canadian Home Builders' Association

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Table of Contents

Purpose of this Paper

The paper looks into the membership, intent and progress of the Building Energy Codes Collaborative. As well, it takes a brief look at some of the pressures for updating energy codes arising from other areas, with excerpts from some key reports on how demand would need to be reduced to meet various energy and greenhouse gas emissions targets.

Membership:

The Building Energy Codes Collaborative is chaired by:

> Rodney C. McDonald, B.A., M.A., LEED® AP
> Chair, Manitoba Energy Code Advisory Committee and
> Sustainability & Standards Specialist, Manitoba Hydro

Vice chair is:

> James Douglas, Manager of Code Development, Legislation and Appeals
> Ontario Ministry of Municipal Affairs and Housing

Michel Lamanque, Commercial Buildings Incentive Program account manager at NRCan's Office of Energy Efficiency, acts as secretary. He reports that approximately 30 people representing federal and provincial/ territorial departments responsible for energy or building codes attended BECC's last in-person meeting in September, 2006.

Intent:

The BECC was established in 2005, after the Council of Energy Ministers (CEM) indicated support for four priority areas that May. One of those priorities was the updating of the 1997 Model National Energy Codes (MNECs), either for adoption by authorities within their jurisdictions or as a benchmark for programs.[1]

Information from NRCan says BECC offers opportunities to:

- pool resources with other jurisdictions during energy code updates, offering economies of scale
- allow building code and energy efficiency officials to interact with counterparts in other regions
- help ensure national consistency on building and housing energy efficiency requirements, and provide a consistent set of requirements for code enforcement officials, design professionals and contractors across Canada
- open the door to uniform national education and certification programs

The initial focus is on updating the Model National Energy Code for Buildings MNEC-B), which generally relates to buildings more than 3 storeys in height and 600 square

[1] There is a Model National Energy Code for Houses (MNEC-H) and a Model National Energy Code for Buildings (MNEC-B). At this point, BECC is only pursuing updates to the MNEC-B.

metres in size. It currently covers industrial, commercial and institutional buildings, and larger (primarily multi-unit) residential uses, under a definition very similar to buildings normally covered in Part Three of the National Building Code.

BECC chair Rodney McDonald says[2] the group's initial focus has been simply to marshall political and financial support for updating the MNEC-B progeny document. The first task is to show the Canadian Commission on Building and Fire Codes (CCBFC) that there is a real need and provincial/territorial commitment to re-examine the document. If the CCBFC chooses to accept the proposal, the technical work to update the document will go through the codes centre's normal development process including wide consultation. At that point, "BECC would simply be a stakeholder just like any other."

A brief paper prepared by BECC for discussions with jurisdictions responsible for building codes says:

> "Over the last decade, governments, utilities, industry associations and councils, and developers and builders have advanced energy efficiency in new buildings by various non-regulatory means. Despite the progress to date, there is now a much stronger emphasis on energy efficiency than ever before due to local, regional, and national concerns about energy security (both supply and infrastructure), energy price volatility, and climate change. For these reasons, there is a desire among some jurisdictions in Canada to take a new regulatory approach to energy efficiency in buildings. This is creating a need to update Canada's Model National Energy Code for Buildings (MNECB), to reflect today's higher energy prices and construction costs, new building technologies and construction techniques, and concerns about greenhouse gas emissions."

The paper sets out an argument for choosing changes to the progeny document, which provinces or territories may choose to adopt by regulation:

> "Regulations are a critical component of a market transformation process, following voluntary gains achieved by consumer education, industry training and support, voluntary efforts by industry, and utility and government incentive initiatives that secure market acceptance for energy efficiency. The role of an energy code is to raise the minimum performance requirements in all jurisdictions that adopt the code. To continue the momentum of the market towards energy efficiency, it is imperative that an updated MNECB take effect by 2012, or as soon as possible."

There is also a perception that going through the CCBFC's very effective and transparent process would produce a better document, with more opportunities for ongoing Canadian input, than pursuing changes to a design guideline or standard, such as ASHRAE 98.1.

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[2] In a telephone conversation with the author on December 21, 2006.

Provinces and Territories

Ontario already references the MNEC-B in its building code, and has increased the minimum energy efficiency level in buildings, effective January 2007. British Columbia, Saskatchewan, Quebec, and the Northwest Territories are all developing energy efficiency requirements for these types of buildings.

In September 2006, Manitoba released *Building Energy, Building Leadership – Recommendations for the Adoption, Development and Implementation of a Commercial Building Energy Code in Manitoba.* This was prepared by the Manitoba Energy Conservation Advisory Committee, chaired by BECC chair Rodney C. McDonald of Manitoba Hydro. This report may help define one province's interest in updating the 1997 MNEC-B.

"In Manitoba, between 1989 and 2003, there was an overall 19% decrease in natural gas use by houses, and an overall 8% increase in natural gas use by commercial buildings," the report says. To address this, the Advisory Committee recommends that Manitoba:

- adopt the 1997 MNEC-B by regulation for new commercial construction
- develop and adopt Manitoba amendments to that code by January 2009 (25% more efficient than the MNEC-B)
- support and participate in BECC's national initiative to update the MNEC-B with a target date of 2012

The Advisory Committee also encourages Manitoba to make some specific recommendations to BECC:

- that BECC membership include architects, builders, building officials, building operators, building owners, engineers, manufacturers, policy makers, regulators and utilities
- that an updated MNEC-B:
    - require a minimum 25% higher energy efficiency than the 1997 MNEC-B (25% beyond code is the current requirement for the Commercial Building Incentive Program, or CBIP)
    - also apply to major renovation of existing buildings (but with consideration for historical preservation)
    - reference regularly updated standards such as ASHRAE 90.1
    - allow for passive building systems and additional energy supply technologies
    - include acceptance testing for code compliance
    - use an objective-based approach
    - be updated in parallel to the National Building Codes

Finally, the *Building Energy, Building Leadership* report also recommends Manitoba's energy code be considered a first step in a longer-term process towards a sustainable building code. "With the current momentum for green building," the report continues, "it is perhaps possible to envisage a Model Green Building Code by 2018, followed by a Sustainable Building Code around 2025. Finally, in the next 40 to 50 years there may be demand to establish a Model Restorative Building Code."

It acknowledges that some people want these changes immediately, while others consider them totally outside the realm of codes. “In light of these differences, a long term dialogue, allowing for the presentation and respect of all perspectives, will be necessary in order to realize substantial movement on the time scale offered here.”

Given the work involved in updating the Model National Energy Code for Buildings, the BECC is not expected to discuss the need for updating the Model National Energy Code for Houses yet. “During a brief discussion of this item at the first BECC meeting in 2005 it was determined that there is currently no real interest in updating the MNEC-H,” McDonald says.

The home building industry has made remarkable progress on energy efficiency, even in the absence of regulations. In Saskatchewan, Nova Scotia and New Brunswick there are no requirements in the building code for any insulation at all. Today, houses in those provinces have the highest standard of energy efficiency in the whole country.

However, a quick reading of some other initiatives connected with greenhouse gas emissions and clean air targets as well as energy efficiency suggests pressure for changes to the MNEC-H, and/or to further provincial/territorial requirements affecting houses, may be building.

A number of provinces are already considering or introducing changes to building codes for Part Nine buildings. In another approach, Nova Scotia announced in January 2007 that it was considering requiring all new houses to display an Energuide rating label by 2008. New houses could be required to achieve a rating of 72 in 2009, rising to 80 by 2011. A $500 provincial incentive could be added, to encourage consumers to achieve the 80 rating before 2011.

BECC Progress

BECC's first exploratory meeting was held in Winnipeg in December of 2005, with representatives from NRCan and provincial/territorial energy departments. The objectives were to facilitate information exchange, discuss current barriers and opportunities, and explore possibilities for increased cooperation. British Columbia, Alberta, Saskatchewan, Manitoba, Ontario, Quebec, Nova Scotia, Newfoundland & Labrador, Northwest Territories and Nunavut presented the current state of activities related to energy codes for buildings in their jurisdictions, as well as their plans for the future.

That has been followed by two more meetings in May 2006 (Toronto) and September 2006 (Vancouver), where a number of representatives from departments responsible for building codes were added. The next full meeting will take place in the spring of 2007.

The plan of action is to build support and financing, establish targets and ask the Canadian Commission on Building and Fire Codes (CCBFC) to take on the actual updating of the Model National Energy Code for Buildings.

BECC chair Rodney McDonald made a presentation to the CCBFC's executive committee meeting in June 2006. Questions were raised about administrative burden and required staffing to enforce an energy code, provincial support, impact assessment, liability, costs of ongoing updating for any code/progeny document, and the impact of growing market demand for energy efficiency.

BECC submitted an updated business plan for a MNEC-B review to the CCBFC in mid December. It was discussed at the CCBFC executive committee meeting in mid January, and will be added to the agenda for the next full CCBFC meeting in Calgary on February 18 - 19.

The business plan sets out political and financial support for the review, as well as information about BECC, its membership, etc. Details will not be made public until after the CCBFC meeting. However, before that meeting McDonald said the group had received letters of support from more than half of Canada's provinces and territories, which represent more than half of the country's population.

CCBFC will make its decision based on the degree of demonstrated commitment from provinces and territories across the country, as well as an examination of the benefits and costs, scope, priority, and available resources. If the work proceeds, it is not expected to be complete until at least 2010.

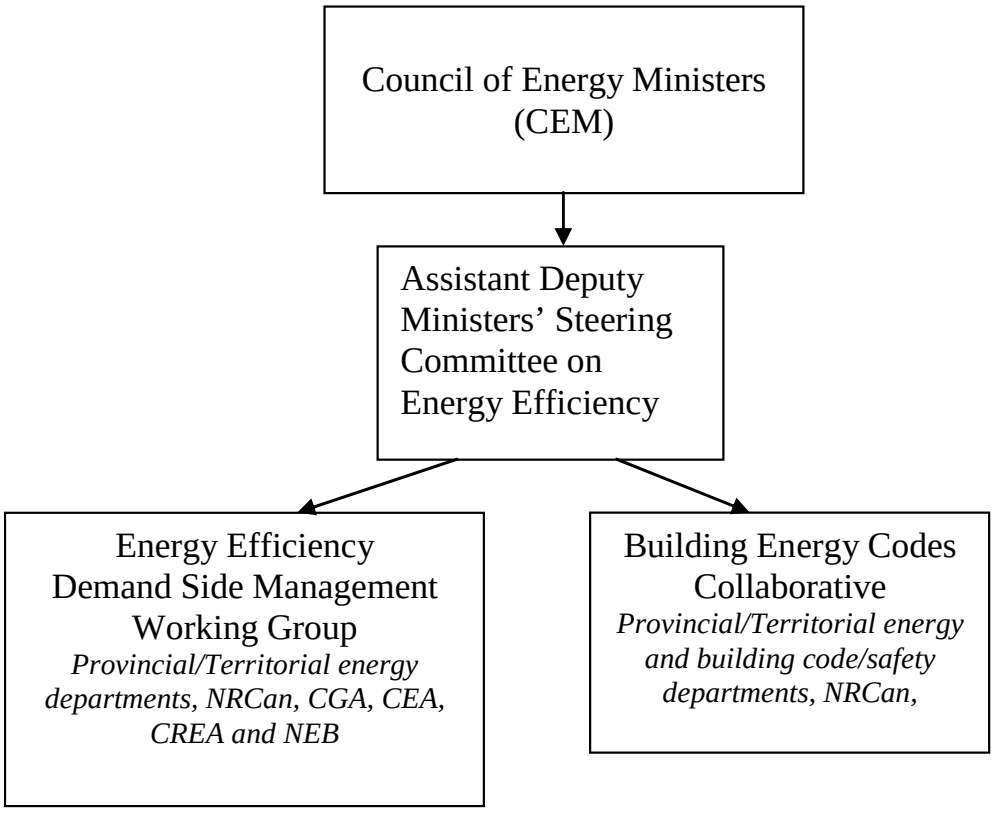
At the moment, it appears that no one has defined exactly what the update to the MNEC-B should include. Would it propose that the new standards increase efficiency by a specific percentage? If so, what would the target be? Would it consider the length of payback? Would the scope stay the same or be more restricted? Would it just address commercial buildings? Commercial-institutional? Industrial? Some townhouses? Stacked townhouses and walk-ups? High-rise residential?

McDonald says that specifics would be left up to a CCBFC Standing Committee and the normal development process.

BECC Background and Related Groups

BECC reports to the Assistant Deputy Ministers' Steering Committee on Energy Efficiency (ASCEE), which is jointly chaired by NRCan and the British Columbia Ministry of Energy Mines and Petroleum Resources. In turn, ASCEE reports to the Council of Energy Ministers (CEM).

BECC was recommended by another group which now reports to ASCEE – the Energy Efficiency Demand Side Management Working Group, referred to as DSMWG. The DSMWG itself started out in 2003 as an advisory group for collaboration between NRCan, the Canadian Electricity Association (CEA), and the Canadian Gas Association (CGA). In 2004, with the added participation of provincial and territorial jurisdictions, it evolved into a broader government-energy industry forum for discussions on demand side management between CEM and the energy industry. The Canadian Renewable Energy Alliance was added in 2005, and the National Energy Board in 2006.



The CEM is working on an energy efficiency action plan, which is expected to be ready for discussion at that group's meeting in June 2007. The time frames under discussion are 2012, 2020 and in some cases as far out at 2050. One portion deals with demand side management, and one part of that is BECC's work on codes.

In September of 2006, DSMWG published a paper describing the energy situation and setting out short and long term goals and targets. The project manager for this task was the Canadian Gas Association, and funding was provided by CGA, the Canadian Electricity Association, and NRCan.

Demand Side Management Potential in Canada: Energy Efficiency Study modeled energy consumption in Canada from 2000 to 2025 using a reference baseline case and three different scenarios. The main conclusion is that it would be possible to reduce energy consumption by between three and 10 per cent by 2025, by using a very wide set of regulatory and non-regulatory tools across sectors. Policy instruments considered included marginal cost energy pricing, higher density land use policies, enhanced energy performance codes and standards, carbon liability, and greater market penetration of energy technologies for on-site application and generation. See next section for more details.

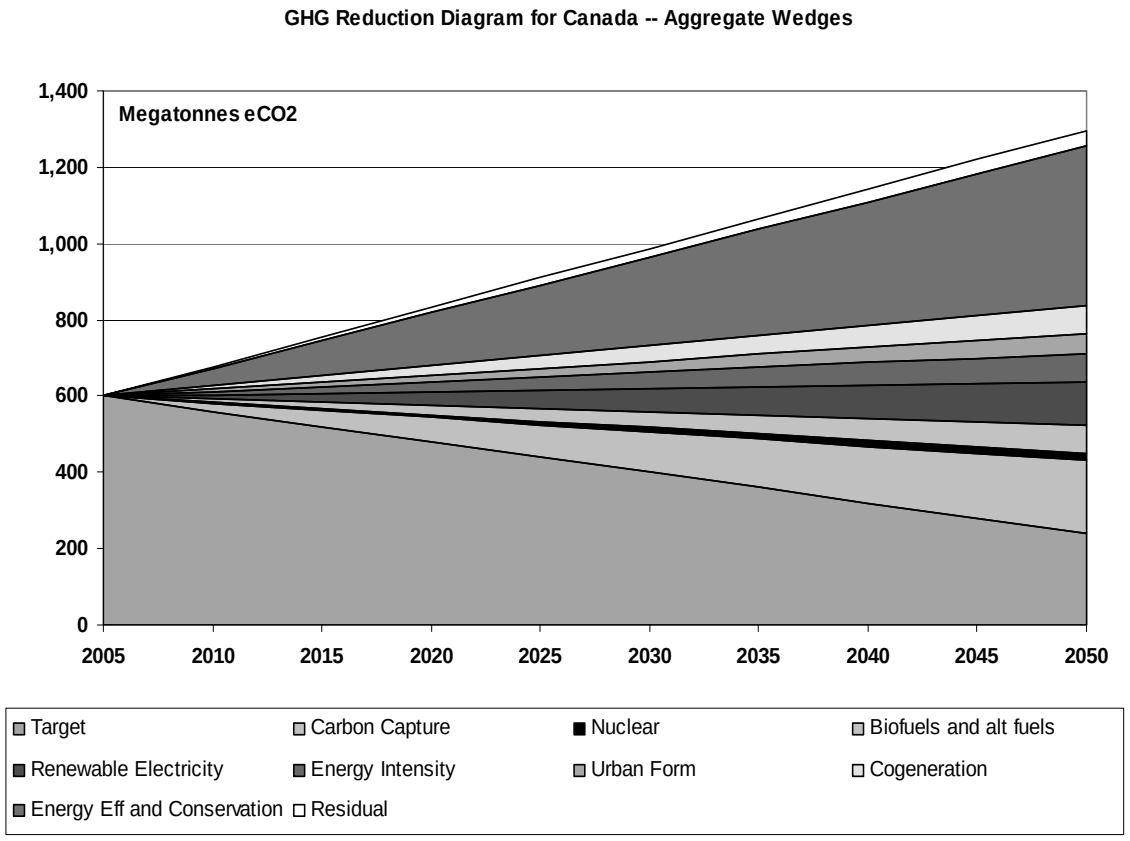
Targets

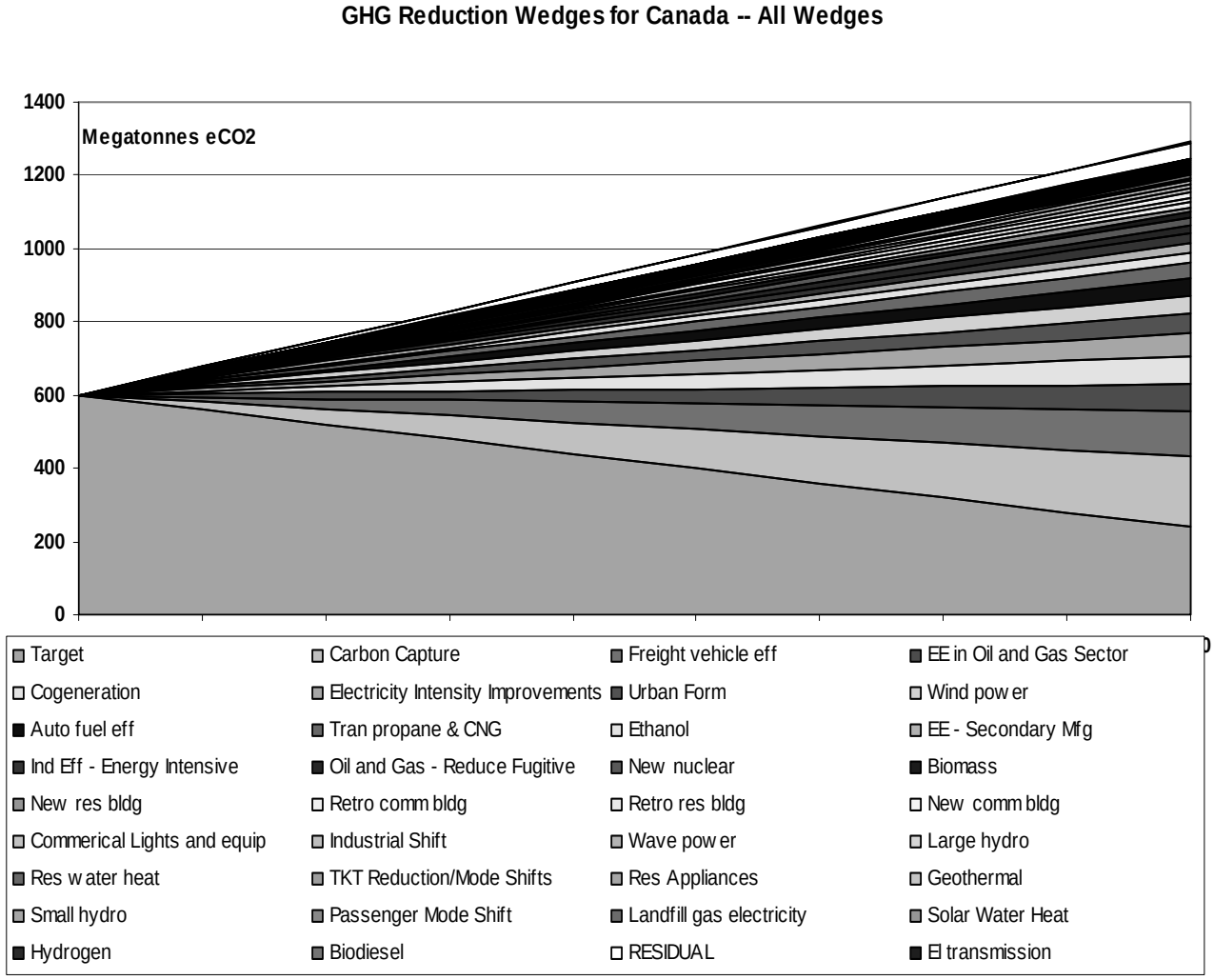
Across the country, various groups are working on demand side management plans aimed either at energy efficiency alone or at energy efficiency as a significant part of greenhouse gas emission reduction and/or clean air plans. All of these target many different sectors, with a fairly wide variety of tools. Residential buildings – both new and existing – are included in each. The following sections give details and quotes from two key reports.

NRTEE 2006 – Addressing Overall Targets

The National Round Table on Environment and the Economy produced its *Advice on a Long Term Strategy on Energy and Climate Change* in June of 2006. The main conclusions from this report are that it is possible to make significant (60%) reductions to greenhouse gas emission by 2050, but only if energy is used more efficiently and if energy is produced by emitting less carbon. "Energy and climate change policy in the 21st century means addressing both energy *use* and energy *production*," this report says. "The question is not *which* technologies to deploy, but how to deploy *all* of the potential GHG reduction technologies. How to effectively deploy many different technologies in several sectors is an important policy issue."

The illustration below and the one on the next page are from *Long Range GHG Reduction Scenarios for Canada*, powerpoint slides prepared for a presentation by Ralph Torrie, vice president of ICF International, for the National Round Table on the Environment and the Economy, November 2006. They illustrate the kinds of energy use reductions NRTEE has identified as required to meet the target of 60% reduction in GHG by 2050.




GHG Reduction Wedges for Canada -- All Wedges
Megatonnes eCO2
1400
1200
1000
800
600
400
200
0
Target
Carbon Capture
Freight vehicle eff
EE in Oil and Gas Sector
Cogeneration
Electricity Intensity Improvements
Urban Form
Wind power
Auto fuel eff
Tran propane & CNG
Ethanol
EE - Secondary Mfg
Ind Eff - Energy Intensive
Oil and Gas - Reduce Fugitive
New nuclear
Biomass
New res bldg
Retro comm bldg
Retro res bldg
New comm bldg
Commerical Lights and equip
Industrial Shift
Wave power
Large hydro
Res water heat
TKT Reduction/Mode Shifts
Res Appliances
Geothermal
Small hydro
Passenger Mode Shift
Landfill gas electricity
Solar Water Heat
Hydrogen
Biodiesel
RESIDUAL
El transmission

NRTEE 2006 – Measures in the Residential Sector

For residential buildings, the 60 per cent reduction scenario made several assumptions with regard to the residential sector, some of which, the report says, "illuminate the need for early action". The report describes those assumptions as follows:

- "That 90 per cent of the existing 6.6 million single family homes and the 5.6 multi-family dwellings will undergo an energy audit over the next 50 years and that the identified savings (which) can be made through air sealing, insulation upgrades and other (measures) will be carried out. This implies that 2.5 to 3 per cent of Canadian homes will need to be audited and retrofitted each year, or approximately 165,000 homes per year.

- "That virtually every furnace in service today will be replaced by 2050 with high efficiency furnaces (greater than 90 per cent) becoming standard equipment by 2008. Of the approximately 3.5 million homes in Canada using electricity to heat their homes, some 520,000 electrically heated homes in Alberta, Saskatchewan and the Atlantic provinces (which all use a large proportion of coal to generate electricity) will need to be converted at a rate of about 26,000 homes per year. In areas where natural gas is not accessible, these homes would be converted to high efficiency propane furnaces.

- "That the 4.1 million new single family dwellings projected to be built by 2050 will be 30 per cent more efficient than current standards by 2010. Similarly, the 3.4 million multifamily dwellings projected to be built between 2010 and 2050 will be 60 per cent more efficient.

"New homes would be better insulated and sealed, with higher quality windows and doors. They would be heated with high efficiency furnaces where setback thermostat controls are standard and designed to take greater advantage of available solar gain in winter. It is expected that many of these upgrades are already cost effective for home-owners and result in more comfortable homes – and energy bills – with homeowners enjoying energy costs at least 30 per cent lower than they would otherwise have been," the report says.

It gives more detail on specific assumed measures for different sectors. It also estimates how much each of these would contribute to the total (1,013 Mt CO2e per year) emission reductions relative to the baseline – after accounting for the way measures interact with each other.

The assumed measures affecting the residential sector are[3]:

- Residential Existing Buildings – Energy Retrofits = equivalent to a reduction of 13 Mt CO2e per year (1.28% of total target)
  "Single Detached made 30% more efficient, Multiple dwellings made 20% more efficient and all oil and gas furnaces converted to 90% efficient."

[3] More details are given in the report itself.

- Residential – Lighting, Equipment & Appliances Efficiency = 6 Mt CO2e per year reduction (0.59% of total target)
  "Residential lighting energy use per household reduced by 60% by 2025 and by 75% by 2040; non-substitutable appliance efficiency increases 25%, substitutable appliances by 20%."

- Residential – New Building Shell Efficiency (heating/cooling) = 14 Mt CO2e per year reduction (1.38% of total target)
  "Single detached homes 30% more efficient and new multiple dwellings 60% more efficient than current standards by 2010."

- Residential – Air Conditioning Efficiency = 0.15 Mt CO2e per year reduction (0.14% of total target)
  "Improvements to building envelopes as well as higher SEER units reduce air conditioning use by 40%."

- Residential – Water Heating (Efficiency, Water Conservation & Fuel Choice) = 7 Mt CO2e per year reduction (0.69% of total target)
  "Water conservation, more efficient gas heaters, conversion of electric to tankless, and oil-fired to natural gas as they are replaced."

According to the figures given, achieving all these measures would provide approximately 3.96% of the target emissions reductions by 2050. Changes to urban form might add another 5.13%.

- Urban Form/ Neighborhood Planning – dwelling type mix, mobility requirements, district energy potential = 52 Mt CO2e per year (5.13% of total target)
  "2% annual shift from Single Detached to Multi-Family dwellings. Passenger transportation PKT assumed to be 33% lower for multi-family households."

NRTEE 2006 – Measures in Other Sectors

To put these reductions into perspective, here are several measures in other sectors identified in the NRTEE report as having a large impact:

Wedge	**Mt eCO2**	**% of target**
Carbon Capture	191	18.85
Truck efficiency improvement	126	12.44
EE in Oil and Gas Sector	74	7.30
Cogeneration	73	7.21

Electricity Intensity Improvements	65	6.42
Urban Form	52	5.13
Wind power	50	4.94
Personal vehicle fuel efficiency	46	4.54
Total – these selected measures	**677**	**66.83**

Some specific targets and measures outlined in the report include:

- commercial buildings – "*all new buildings/integrated energy systems meet LEED Platinum (60% energy reductions) by 2010; half of existing buildings are renovated to that standard (50% reductions), the rest to 25% by 2050; significant reductions in energy use for lighting, hot water heating and equipment"* = 38 Mt CO2e per year (3.75% of total target)

- cogeneration of electricity – "*industrial cogeneration, micro turbines and CHP in apartment and commercial buildings"* = 73 Mt CO2e per year (7.08% of total target)

- personal transportation – "*efficiency increases 2.25% per year from 2005-2014, 2.40% per year from 2015-2020, and 2.55% per year to 2050, resulting in efficiency of 3.01L per 100km by 2050; transit bus efficiencies triple by 2050; public transit useage almost doubles by 2050; nonmotorized travel increases by 2% per year, and light vehicle travel is reduced by 0.28% per year due to increased telecommuting and substitution of communications for travel"* = 53 Mt CO2e per year (5.23% of total target)

- freight transportation – "*light & medium trucks triple fuel efficiency by 2050, heavy trucks double fuel efficiency by 2050, rail and marine sectors decrease energy intensity by 50% and 25% respectively; trucking decreases by 10% while rail and marine each increase by 5%"* = 133 Mt CO2e per year (13.13% of total target)

- alternative fuels for transport – "*increased use of ethanol., bio-diesel and hydrogen"* = 35 Mt CO2e per year (3.16% of total target)

- oil and gas energy intensity – "*oil sands energy use per dollar of gross output decreases by 1% per year; pipelines by 0.5% per year; petroleum refining industry by 0.6% cu. m. per year, and 'fugitive emissions' from pipelines are reduced by 30% by 2020 and 50% by 2030"* = 96 Mt CO2e per year (9.47% of total target)

- carbon capture and storage – "*all fossil fired generation in Alberta and Saskatchewan use CO2 capture by 2040, reducing emissions by 90% from what*

they would otherwise be without CO2 capture, and 30% of all oil and gas emissions (extraction and refining, etc.) are captured by 2030 rising to 60% capture by 2050" = 191 Mt CO2e per year (18.85% of total target)

- new power sources: "*replacing and adding to nuclear plants in Ontario (= 20 Mt CO2e per year); new large hydro in Quebec Labrador and Ontario (= 8 Mt CO2e per year), new wind power (= 50 Mt CO2e per year); photovoltaic (= 2 Mt CO2e per year); small hydro (= 5 Mt CO2e per year); tidal/wave power (= 10 Mt CO2e per year); landfill gas recovery/utilization (= 5 Mt CO2e per year); solar water heating (= 4 Mt CO2e per year); and geothermal (= 6 Mt CO2e per year)"* – these are estimated to produce reductions equivalent to 105 Mt CO2e per year (10.36% of total target)

Obviously, efficiency in the energy/utility and transportation sectors is a huge issue.

One thing which is not included in the NRTEE targets is the influence of land use and forestry. In 2003, the net removal of GHG emissions was estimated at 44 Mt CO_2e – with carbon removals associated with forest lands being the dominating factor. "If it were included in the national total, this flux would decrease the national GHG emissions by 9 percent," the background report says.

NRTEE 2006 – Further analysis

The NRTEE is conducting further analysis on costs and benefits, policies to encourage the dissemination and high enough adoption of these technologies, and ways to provide long-term policy signals with respect to GHG reduction. It has held a series of half-day seminars with representatives of business, provincial and municipal governments, and non-governmental organizations. On-line comments were collected on that outreach at the end of 2006.

The report doesn't appear to call for changes to building codes affecting residential construction specifically, but regulation advocates may argue that code changes will be necessary to achieve a 30% reduction in emissions for new single detached homes and a 60% reduction for multi-family homes within three years.

It is CHBA's longstanding position that any discussion of government actions must take a disciplined approach, with proper consideration of need and, practicality and cost efficiency, full information, and wide consultations. Tools should be matched to the issues, and regulation – which can freeze technologies and impede innovation – should only be used where necessary.

It will also be important to identify and remove public sector impediments to energy efficiency and GHG reduction. For example, this could include such things as conflicting requirements between jurisdictions, confusing consumer information programs, etc.

NRTEE is also charged with providing advice on precise targets, and scenarios to achieve them, for the federal government's Clean Air Act, introduced October 19, 2006.

Demand Side Management Working Group 2006 – Residential Sector

The NRTEE is not the only group working on targets and scenarios. As mentioned earlier, the DSMWG has also published a report with targets for increasing energy efficiency. *Demand Side Management Potential in Canada: Energy Efficiency Study* released in September 2006 follows a similar pattern to the NRTEE study, but only forecasts out to 2025. It looks at different wedges by use and sector to reach three different target levels above the baseline. These are defined as "Economic", "Achievable 1" and "Achievable 2".

The impact on the residential sector increases quite dramatically, as the scenarios become more aggressive. Under the Economic scenario, the residential sector is expected to contribute 24% of the total energy reduction in 2025. Under Achievable 1, it is expected to contribute 41% of the total, and under Achievable 2, it is expected to contribute 53%.

Part of the reason for this is that the modeling shows a much higher potential for residential and commercial energy use reduction than for industrial. In industry, the report says, "fuel switching to gas and the additional natural gas required to cogenerate (the cogeneration effect) simply outweighs the gains in energy efficiency."

This report also has an appendix with specific measures. For residential, these include:

Economic Scenario:

- 13% reduction in energy demand by 2025, most achieved in electricity use (almost half from energy efficient lighting, 12% by co-generation in apartment buildings)
- 10% reduction in natural gas energy demand, with 57% of that in space heating and 33% in domestic hot water; cogeneration increases natural gas energy demand

The following chart from the report illustrates the kind of measures expected:

List of Actions Included in Economic Potential Analysis – Residential
(because the CIMS modelling was region-specific, specific inclusion of these actions differed by region)

Minor appliances, new with 1 W standby power
Clothes Washer, 20% to 25% improved efficiency
Clothes Dryer, Electric/Gas, Moisture Sensor
Cooking range electric, 20% efficiency improvement
Refrigerator, New Better Efficiency, 30% efficiency improvement
Lighting - compact fluorescent
Non-appliance hot water; low-flow devices

Hand dishwashing with tap aerator
Dishwasher, Energy Star; 26% Impr.
Electric intermittent fan, system efficiency of 34%
enhanced MNECH shell – new construction (italics added)
natural gas furnace, 90% to 92% efficiency
oil furnace, 92% efficiency
electric heat pump, 145% efficiency
Water heating, Apartment, cogeneration, reciprocating engine, natural gas, apartments only
Water heater with storage tank, electric – higher efficiency (EF=0.94)
Water heater with storage tank - Apartment, Oil-fuelled, new top-rated efficiency (EF=0.68)
Water heater with storage tank – Electric with heat pump
Water heater, instant – no storage tank, Non-apartment, Natural gas-fuelled, new, standard efficiency

The report notes that there are some important differences between CIMS and other analyses. For one, "CIMS models air sealing and insulation actions in existing dwellings as a whole house retrofit. This action did not pass the economic test and, consequently, was not included in the potential. The utility specific studies examined the effect of specific retrofit measures that did pass the economic test, specifically, air leakage sealing."

For the Achievable 2 scenario, a much more aggressive package of policy and program measures was modeled. This package aimed to push the boundaries of the achievable potential, but still primarily by inducing take-up of measures that cost less than the avoided cost of the energy forms being displaced. The report includes the following policy instruments for this scenario:

- Subsidies targeted to energy efficiency measures
- Marginal cost pricing for electricity
- A carbon liability
- An aggressive schedule of subsidies to accelerate the market penetration of onsite renewable energy technologies to displace current fuel shares in secondary energy end uses, (i.e., not including renewables to displace primary energy supply)
- An aggressive schedule of *legislatively backed advanced minimum energy performance targets* for both equipment and buildings (italics added)
- Changes in the shares of projected housing types (low rise versus mid-to highrise) to mimic the potential effects of aggressive urban land use policy instruments to affect intensities, densities, shares of building types and advance community energy systems. The percentage of single detached dwellings was reduced in

absolute terms by 25% in 2025. The reallocation of shares from single detached to other housing was applied in equal proportions between apartment and row housing.

The following chart from Appendix C of the report (Exhibit C3.2) gives some specifics:

Exhibit C3.2: Levels and Schedule of Standards Application in CIMS

End use	What's available in CIMS for new/replacement stock	Recommended Standard and schedule	Rationale/Discussion
New housing	Standard and Efficient (R2000) which represents a 30% performance improvement	30% is R2000 in 2010, 60% in 2015, and 100% in 2020	Setting the level to R2000 immediately would require improved construction in approximately 95% of the housing construction, phasing in will provide a more realistic scenario.
EQUIPMENT			
Furnaces	Efficiencies (AFUEs) of 78 and 92	50% penetration of AFUE 92 by 2015 and 100% penetration by 2020.	Immediate increase to 92% would eliminate over 80% of models available, phasing in will provide a more realistic scenario.
Gas water heaters	EF 0.58, 0.65 & 0.86.	Eliminate EF 0.58 by 2015.	Improved technologies are available.
Low Flow Fixtures	Regular or low flow	Eliminate all regular by 2010.	Regular flow is already eliminated in BC so, change is possible.
Air Conditioning	4 levels for Central (SEER 30102000); 2 levels for room (EER 900 to EER 820)	Eliminate lowest efficiency level in both classes by 2010.	Lots of potential for improvement in AC. Wide range of efficiencies on the market.
Refrigerators	485 kWh, 435kWh , 392 kWh, 339 kWh and 281 kWh (this is a custom fridge).	Eliminate 485 kWh in 2005 and 435 kWh in 2010.	Lots of potential for improvement in refrigerators. Wide range of efficiencies on the market.
Dishwashers	EF 0.46, EF 0.58 and EF 0.94	Eliminate 0.46 by 2010.	0.46 became the minimum in July 2004. Lots of room for improvement.

Clothes washers	MEF 23, 29, 31, 36, 46	Eliminate EF 23 in 2010, 29 in 2015, and 31 in 2020	Lots of potential for improvement. Wide range of efficiencies on the market.
Freezers	3 levels of efficiency 1) standard level; 2) efficiency improvement of 10% upright, 15% chest; 3) efficiency improvement of 10% upright, 50% chest	Eliminate standard option in 2010. Assumes constant share in study period of 75% chest and 25% upright	Lots of potential for improvement. Wide range of efficiencies on the market.
Minor Appliances	standby power loss 1 kw	Make 1kW standby mandatory by 2015.	There is a lot of interest in this area internationally and technology is available at low cost.

Again, these scenarios assume legislatively-backed standards, which suggests the initiative may create pressure for codes, either at the national model code level or at the provincial level. Alternatively, it may be used as a standard for incentive programs, etc.

The DSM Working Group also has extensive scenarios for other sectors.

NRCan Strategic Roadmap 2007

Within the Office of Energy Efficiency, work is going on to produce a Strategic Roadmap. This would be used primarily internally to guide activities. It looks at the current situation and trends that would affect the built environment over the next 25 years. A draft is expected by March 31. Jean-Yves Létang, who is staffing the project, says CHBA will definitely be included in any consultation process, which would take place after March 31.

Federal Sustainability Plans 2007

The federal Environment Minister tabled 28 departmental Sustainability Development Strategies in the House, before it rose in December. The fourth set of three-year plans since 1995, these deal with the period 2007-2009, and focus on six key issues: clean water, clean air, reducing greenhouse gasses, sustainable extraction and use of natural resources, sustainable communities and sustainable government and decision-making. Environment Canada, which leads the federal sustainability strategies initiative, also intends to publish an overall report in the spring, bringing these strategies together into one cohesive plan.

In its own Sustainable Development Strategy for 2007-9, the department stresses the importance of working together across federal departments. “Under the current departmental approach, sustainable development has largely been compartmentalized along institutional lines and collaborative work on government-wide initiatives has been

limited," it says. But ... "Based on the collaborative process developed for the fourth round of SDSs, departments and agencies are working on:

- building coherence across the sustainable development strategy process based on a set of common federal sustainable development goals; and
- strengthening accountability to Canadians by developing common formatting standards to enable government-wide reporting on the federal sustainable development goals."