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FINANCIAL INCENTIVES FOR GREEN RESIDENTIAL BUILDINGS IN CANADA: A REVIEW FROM A REGULATORY LENS

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Abstract: Green building construction is a rapidly evolving industry in Canada. The growth in sustainable buildings construction is driven by market conditions and benefits acquired during buildings operational stage. However, adoption of green practice in residential buildings is negatively impacted by the high initial investments required for green products. Financial incentives provided by the federal, provincial, and local governments may encourage residential building developers, owners and users to adopt greener construction products and technologies. In this paper, a critical regulatory review of different types of financial incentives for green residential buildings in Canada is carried out. An investigation is performed to determine the variations in local government incentives for different types of residential buildings. As a case study, different types of financial incentives available for residential buildings in the provinces of British Columbia and Ontario are compared. The findings of this study can be used to identify the regions where development of green building communities is plausible in the future. The results will also help local authorities to further develop and improve their financial incentive policies for green residential sector.

KEYWORDS: Canada, Construction, Financial incentives, Green buildings, Sustainability

1 Introduction

A report by the (UNEP-SBCI 2009) shows that building sector is one of the largest consumers of energy and associated greenhouse gas emissions in urban areas. More than 40% of the global energy is consumed by buildings (UNEP-SBCI 2009). In order to reduce the carbon footprint of buildings, various sustainable materials, technologies and tools have been developed. Sustainable construction practices and technologies are often employed to ensure efficient use of resources with minimum health and environmental impacts, which constitutes green buildings (Dator 2010; Cole 2015).

Green building (GB) users and developers can reap many different benefits as compared to those of traditional buildings. Some of the benefits they receive are rental premiums, occupancy premiums, and financial incentives to lower the cost of construction (Kowalsky 2016). Most commonly employed energy savings measures in GB are renewable energy resources, high efficiency HVAC-systems, use of solar shading devices, window with low U-values, proper space planning and building orientation (Cole 2015).

GB projects are encouraged by the government via the use of regulatory incentives and mandates. The main objectives of instituting GB incentives for residential buildings are: to reduce the risks associated with new technologies, to reduce extra costs, to increase the rate of GB adoption and supply information (Qian, Chan, and Choy 2013). Research by Kowalsky (2016) shows a direct relationship between the number of incentives and green buildings. In addition, the money spent on these incentives leads to an increase in

GB stock (Kowalsky 2016). However, the residential sector in most municipalities remains free from these mandates and incentives (Dator 2010).

Canada does not have an economic policy specifically designed for green residential buildings (Hood 2008), however, financial incentives are available at all levels of the government. Studies indicate that effectiveness of these incentives varies at different regulatory levels, and also with respect to different regions (Hood 2008; Bond and Devine 2016). Financial incentives' type is also strongly related to green building accreditation system adopted by the building developers or users (Bond and Devine 2016). For example some utility providers in Canada provide incentives specifically for houses designed to meet R-2000 Standards (NRCan 2016) in the form of grants and subsidies, tax credits, tax exemptions, loans, technical assistance, marketing assistance, permit fee reduction or waivers depending upon the local regulations (Shazmin, Sipan, and Sapri 2016). In Canada, both the LEED accreditation and Energy Star® ratings are extensively used for green residential building certification (Reynolds 2017)

The objectives of this paper are to:

- Examine different types and regulatory levels of financial incentives available for Green Residential Buildings in Canada, and
- Provide an overview of different financial incentives available for two provinces British Columbia and Ontario by considering case study of a residential building.

To achieve these objectives a comprehensive literature review was carried out on financial incentives available around the world for green residential buildings. Data regarding economic incentives was collected from Natural Resources Canada Database, provincial data bases for British Columbia and Ontario along with local municipalities' websites and utilities.

2 Types of Financial Incentives

Construction and upgrade of residential buildings to GB is only possible when properly designed policies and incentives are available for both developers and users. Studies have shown that financial incentives such as tax credits and grants have been very successful in encouraging GBs (Kowalsky 2016; Bond and Devine 2016).

Use of a financial incentive at the right time is important to gain full sustainability targets for which the economic incentive is being provided. For instance, incentives such as Investment Tax credits are attractive for building users, however, when applied during the buildings' operation period the replacement of building equipment (old appliances, furnaces or/and HVAC systems) may occur prior to the end of its useful life. This will offset the maximum possible sustainability targets that can be attained due to these incentives. On the other hand application of utility rebate incentive during a buildings' operation time will encourage the use of equipment to their full useful period and make replacement possible at the end of useful life (Brotman 2016). Sometimes an existing financial incentive such as GB retrofitting incentives may become unattractive to a residential building user due to falling utility prices. Hence, more effective financial incentive models need to be developed and modified to take into account the different phases of a residential building life and external factors affecting the building use. (Brotman 2016).

2.1 Tax Incentives

Tax incentives are the most common instrument used for policy level implementation of green technologies. (Curtin, McInerney, and Ó Gallachóir 2016). There are three main types of financial tax incentives: tax exemptions, tax credits and tax reduction in Canada (Shazmin, Sipan, and Sapri 2016). However, only tax exemption incentives are available for green residential buildings. This incentive is based solely upon costs of green components or devices (Shazmin, Sipan, and Sapri 2016). Tax exemption incentives or tax breaks are provided to green residential building developers for a limited time range and scope. Other developed countries have tax incentives as credits and reductions. The bases of these incentives can also be increased to include increased property tax assessments, rate of property tax assessment and certification

levels for green building (Shazmin, Sipan, and Sapri 2016). This indicates that the financial incentive tax models for green residential buildings in Canada need to be further developed.

2.2 Loan Incentives

Loans are also a very common type of financial incentive offered both by governmental organizations and commercial banks (Curtin, McInerney, and Ó Gallachóir 2016). Loans for GB are charged at a lower rate than commercial loans. Green residential buildings loan incentives can be divided into two main types: financial loans for GB users, and loans for developers. Loans for green residential building users can be in the form of subsidies, mortgage loans, cash discounts, low-interest loans. For developers, loan incentives are usually in the form of direct investment by the regulatory authority into a green building project. The main purpose of loan incentives for developers is to encourage research, development and promotion of green buildings.

Loan incentives form the largest portion of financial incentives available for green residential buildings in Canada. They are offered by financial institutions such as Canada Mortgage and Housing Corporation (CMHC), banks, utility companies (Example: FortisBC in British Columbia offers rebates on use of Natural Gas Fireplace, Power Smart Residential Loan by Manitoba Hydro and others) and municipality loans for green residences (NRCan 2016). Loan incentives are available for construction of new homes as well as for retrofitting or replacements. Like tax and grant incentives, huge regional variations exist both in the amount and type of available loans.

2.3 Grants Incentives

Grants are applied to a certain percentage of capita costs or investment costs of a component. They are used as an incentive for adoption of green residential buildings at an individual as well as community level (Curtin, McInerney, and Ó Gallachóir 2016). Grants are another way to offset green residential building costs (Hood 2008). Since a specific economic benefit is associated with GB financial grants, they have proven quite successful. As higher costs are associated with them, they are mostly suitable as part of regulatory incentives at provincial or national levels (Bond and Devine 2016). Contrary to financial tax incentives offered for green residential construction, numerous grants are present at both provincial and municipality levels. The largest number of grants are available in Quebec province through utility provider “Gaz Métro” (NRCan 2016). Most GB grants in Canada are based on the use of high energy efficient equipment. Some special grants such as Home Energy Low-Income (HELP) and Residential Energy Efficiency Program (REEP) are specifically designed for building users with low income (NRCan 2016).

3 Regulatory Financial Incentives

Canada’s residential building stock comprises of five types of buildings: detached houses, semi-detached houses, row houses, mobile homes and apartments (NRCan 2016). Financial incentives for green residential buildings vary throughout Canada in type, quantity and amounts. These regulatory financial incentives can be distributed into three levels of government: National, Provincial and Municipality incentives (NRCan 2016).

3.1 National Level

According to NRCan (2016) database, six basic types of financial incentives are available in Canada for green residential construction at national level. Most of these incentives are in the form of loans offered by financial institutions. The amount of incentive offered depends upon the life stage (design, construction, operation, demolition) of a residential building and the type of green building certification. Example CMHC offers refunds on the financial loans up to 15% for an Energy Star® house and up to 25% for an R-2000 certified building (Reynolds 2017). Different banking systems in Canada are also offering incentives for home owners who want to construct or upgrade a house to green building standards. Banks are providing incentives especially on installation of solar panels and high energy efficiency equipment (NRCan 2016; Reynolds 2017). Canadian Green Building Council also offers registration and certification fees waivers for residences made under proponents LEED® Canada under Homes Affordable Housing Program (Reynolds

2017). Genworth Financial Canada incentive program for green homes also provides premium refund for energy efficient homes (NRCan 2016). It should be noted that National level incentives cannot be equally availed at all locations in Canada because of differences in demographics, weather, types of constructions, local resources, green building technologies and components along with certification methods available in different regions.

3.2 Provincial Level Incentives

Provincial level incentives are mostly offered through utility providers. These incentives have been found to be very successful in promoting green residential buildings. Utility providers arrange incentives that are targeted at decreasing electricity, oil, gas and water usage through the use of efficient equipment and systems. Provinces of British Columbia, Manitoba Ontario and Quebec have the greatest number of GB incentives most of which are offered through their utility providers. Alberta on the other hand has no provincial level incentive and its green residential building developers and users can avail national and municipality incentives only (NRCan 2016). Some provincial level incentives such as MicroFit and Feed-in-Tariff offered in Ontario encourage energy generation through renewable energy sources for green residential buildings (Reynolds 2017).

3.3 Municipality Level Incentives

Municipality level incentives have been revealed to be most effective in the generation of green residential building neighbourhoods. Municipality level financial incentive models are based on local conditions and hence, their impact is greater. Some of these incentives are designed for the improvement of a specific system or component of residential building. Few examples of municipality incentives designed for a specific goal are: City of Guelph's Rainwater Harvesting Rebate Program, Region of Halton Residential Toilet Rebate Program, Town of Banff Residential Rebates and Incentives for home energy use, City of Kitchener's Stormwater Credits etc. (NRCan 2016). Since municipality level green building incentives have huge variations regarding end goals, some municipalities are becoming much more efficient in managing the energy and water resources at residential building level. For instance District of Saanich in British Columbia has one of the most elaborate incentive schemes for green residential buildings and offers rebates for houses designed to any four of the energy standards: EnerGuide 80, R-2000, Built Green or Power Smart for New Homes (Boehm 2010). This increases the scope and flexibility for making more green residential buildings. Similarly, Tap by Tap program available for Okanagan and Colwood is a program that focuses on water and energy savings (NRCan 2016). Markham, Calgary and Vancouver are good examples of Canadian cities that have made a huge progress towards increasing their green residential building stock (Boehm 2010). More extensive research needs to be performed to evaluate the impacts of the incentives offered at municipality levels. The lessons learned from different municipality level incentives for green residential buildings should be able to provide a framework for improvement and application of these incentives in other regions of Canada.

4 Case Study

British Columbia and Ontario are pioneers in green residential building construction in Canada (Boehm 2010). Green residential building incentives in these two provinces are more than in any other province of Canada. Some financial incentives offered in these provinces are unique and not available elsewhere in Canada such as Micro-Fit program in Ontario, Stormwater credit program in Kitchener, Ontario (NRCan 2016). According to Statistics Canada (2016), Ontario is the most populated province of Canada, while British Columbia ranks as the 3rd most populous province (Statistics Canada 2016). British Columbia and Ontario have incentive programs that differ regarding incentives offered at building component and system levels. Often green residential building incentives are offered by utility providers and they may vary depending upon the major energy resources used in that province.

In order to analyze, improve and adopt different financial incentive programs available in different regions of Canada, it is important to first understand the different types as well as the dollar amount provided for each incentive to GB owners or developers. Since this paper is a first step in understanding the regularity

context of GB incentives in Canada, a critical review in the form of tabulated comparison among incentives is performed for these two key provinces. The table comparing incentives for the two provinces comprises of values selected from multiple sources and hence, provides an overview of the different incentives available in each province. This comparison is performed assuming a best case scenario where a building owner or developer adopts the most efficient building component, equipment or system for improving the building sustainability level. Similarly, when an incentive for GB is being offered by multiple sources, the incentive with the highest dollar value is chosen for comparison. In this comparison, national level incentives are not taken into consideration as they will be the same for the two regions. The incentives available at municipality levels are also tabulated in Table 1.

In Canada, regarding energy consumption heating loads in residential buildings are much higher than cooling loads due to its cold climate. Financial incentives on heating systems are being offered by both provinces. Ontario offers similar incentives for oil furnaces and boilers while British Columbia encourages the use of gas furnaces and boilers by providing 3 times higher incentives as compared to oil boilers and furnaces. The biggest difference is seen for geothermal systems where Ontario is offering a much higher amount than British Columbia. Incentives such as those for Integrated Mechanical System (IMS), Wood-burning appliance, Solid Fuel-Fired Outdoor Boiler are only being offered in Ontario. This difference may be due to the longer winter season and different energy generation sources available in Ontario as compared to British Columbia.

For ventilation system much higher incentives for HRV units are provided by British Columbia. In addition, the installation of energy saving ventilation fan is provided a rebate as compared to Ontario which has no such incentive. Ontario offers four additional incentives as compared to British Columbia on water heating equipment. These include incentives on three special type of heaters and one incentive on a unique energy saving equipment: Drain Water Heat Recovery unit (DWHR). Use of energy recovery equipment such as DWHR can result in both savings on energy bills and reduction of carbon footprint of the building. British Columbia is encouraging the use of tank-less water heaters and condensing water heaters through incentives that are much higher than those offered in Ontario.

Insulation incentives for residential buildings are offered on different components of building. It can be seen that British Columbia is offering greater incentives for home developers and users as compared to Ontario. However, floor insulation incentive is not offered by British Columbia but available for residents of Ontario. Lighting system upgrade incentive is offered in British Columbia but the value varies depending on the type of lights installed. Ontario offers up to CAD \$1,000 on the use of energy efficient lighting system. Installation or upgrade of a house's windows, doors and/or skylights to energy efficient ones are offered CAD \$30 higher incentive per unit in British Columbia as compared to Ontario.

Use of energy star home appliances can save up to \$100 per appliance. Ontario does not have any incentive on upgrade of home appliances. Energy Certified Buildings are also offered an incentive the amount (CAD \$) of which varies with the building type. For British Columbia the value ranges from CAD \$2,000 for Single family detached house to \$60,000 for Multi-unit residential buildings (MURBs). Ontario offers a higher incentive for overall building upgrade or construction amounting to CAD \$2,500 for a single family house. Energy rebates are also offered for MURBs in Ontario however, the amount that can be offered as a financial incentive is not specified.

Renewable energy systems at household level are encouraged for green residential buildings in both provinces. Ontario offers a special incentive called MicroFIT which is Feed-in Tariff program(Reynolds 2017). The users are not only able to save themselves from energy bills but get additional rebates when extra energy is given back into utility suppliers grid system. Water saving incentives like storm water credits or rainwater harvesting incentives for residential building projects are also available in both provinces. However, the amount of financial incentive offered is not specified for either province.

In addition to financial incentives of green residential buildings components, equipment or systems some special incentives are offered for specific building users and developers. In both provinces incentives are available for low income households to upgrade their residential buildings to energy efficient. British Columbia is also offering financial incentives for energy upgrades in non-profit housing and Aboriginal housing while Ontario has no such incentive.

Table 1: Comparison of Green Residential Building Financial Incentives (in CAD\$)

| System | Building Component | British Columbia | Ontario |
|---------------------------|-------------------------------------------|----------------------------|----------------------------|
| Heating System | Gas Furnace | \$1,000 ⁴ | \$790 ⁶ |
| | Gas Boiler | \$1,000 ⁴ | \$750 ⁶ |
| | Oil Boiler | \$300 ⁶ | \$750 ⁶ |
| | Oil Furnace | \$300 ⁶ | \$790 ⁶ |
| | Ground/water heat pump system | \$ 2,500 ⁶ | \$4,375 ⁶ |
| | Air-Source Heat Pump | \$800 ¹ | \$500 ⁶ |
| | Heat Pump Tune-Up | \$50 ² | - |
| | Air Source Heat Pump Loan | Not Specified ⁴ | Not Specified ⁴ |
| | Integrated Mechanical System (IMS) | - | \$1,625 ⁶ |
| | Wood-burning appliance | - | \$375 ⁶ |
| | Solid Fuel-Fired Outdoor Boiler | - | \$375 ⁶ |
| | Electronic Thermostats | \$50 ^a | \$40 ^a |
| | Fireplace | \$300 ² | - |
| Ventilation System | Heat Recovery Ventilator (HRV) | \$1,100 ¹ | \$375 ⁶ |
| | Ventilation Fan | \$50 ¹ | - |
| Cooling System | Central Air Conditioner | - | \$250 ⁶ |
| | Window Air Conditioner | - | \$25 ⁶ |
| Domestic Hot Water System | Solar Hot Water heater | - | \$1,250 ⁶ |
| | Tank-less Water Heater | \$400 ² | \$375 ⁶ |
| | Condensing Water Heater | \$1,000 ² | \$375 ⁶ |
| | Drain Water Heat Recovery(DWHR) | - | \$165 ⁶ |
| Building Insulation | Ceiling / Attic / Roof Insulation | \$750 ⁶ | \$500 ³ |
| | Exterior Wall Insulation | \$1,500 ⁶ | \$1,500 ³ |
| | Exposed Floor Insulation | - | \$190 ⁶ |
| | Basement Insulation | \$1,375 ⁶ | \$1,000 ³ |
| | Crawl Space Insulation | \$1,000 ⁶ | \$1,000 ⁶ |
| | Air Sealing | \$500 ¹ | \$240 ⁶ |
| | Whole building Insulation Upgrades | \$1,200 ¹ | Not Specified ⁴ |
| Lighting System | Energy saving light bulbs (CFLs) | Not Specified ⁴ | \$1000 ⁴ |
| Fenestration Systems | Windows / Doors / Skylights | \$70 ^b | \$40 ^b |
| Plumbing System | Toilets | Not Specified ⁴ | \$75 ^b |
| Appliances | Clothes washers | \$100 ² | - |
| | Clothes dryers | \$100 ² | - |
| | Refrigerators | \$100 ² | - |
| Energy Rebate | Single Family Home | \$2,000 ² | \$2,500 ⁴ |
| | Multi-unit residential buildings (MURBs) | \$60,000 ⁴ | Not Specified ⁴ |
| Other Incentives | Feed-in-Tariff program | - | Not Specified ⁴ |
| | Stormwater credits | Not Specified ⁴ | Not Specified ⁴ |
| | Incentives for low income houses | \$4,000 ⁴ | \$2,750 ⁵ |
| | Incentives for non-profit housing | Not Specified ⁴ | - |
| | Incentives for Aboriginal Housing upgrade | Not Specified ⁴ | - |

¹ (BC Hydro 2016),

² (FortisBC 2016),

³ (NAIMA Canada 2016),

⁴ (NRCan 2016),

⁵ (HELP 2016),

⁶ ("Home Performance Your Local Energy Advisor" 2011)

^a Incentive is for 5 thermostats,

^b Incentive is for single installation unit

Through this preliminary study on comparison of financial incentives offered in provinces of British Columbia and Ontario, it can be noticed that a variation exists in the types of incentives offered. Some green building upgrades are offered more incentives in British Columbia than Ontario.

In addition to above, some incentives are not available in one or both provinces. Examples are those for specific heating system components and renewable energy incentives like Feed-in Tariff that are available only in Ontario. Furthermore, some special incentives are offered only to specific users in British Columbia but are not available in Ontario. In addition, although some incentives exist in both provinces, the maximum available dollar value of these incentives have not been specified in either one or both of these provinces. Non-specified values make it impossible to compare the effectiveness of these incentives. The next step of our research will apply a combination of incentives provided in each province separately on the same residential building considering different possible scenarios such as new construction or building upgrade. The aggregated value of incentives thus achieved will help to decide which province offers greater benefits in the construction of green residential buildings.

5 Conclusion and Recommendations

Financial incentives are essential to offset higher investment costs associated with the construction of green residential buildings. This exploratory study has shown that financial incentives for green residential buildings vary both in type and amount in different regions of Canada. Among the three types of financial incentives, tax incentive models need the most improvement in order to encourage green residential building construction at policy level. Tax incentives scope needs to be expanded to include tax reductions and credits relating to Canada green building environment. A preliminary comparison of financial incentives for two provinces (British Columbia and Ontario) shows a huge variation in amounts offered for individual system and components. Furthermore, for some incentives the maximum available limit is not specified which makes it difficult to decide conclusively which province has a better overall financial incentives program. A more detailed and in-depth comparison is needed on financial incentives available for the different types of residential buildings. Moreover, a cost-benefit analysis needs to be performed on various financial incentives in order to help GB users and/or developers choose the best incentive for their specific scenario. In addition, a comprehensive comparison of best practices relating to financial incentives for green residential buildings in other countries, especially the U.S. which has similar green building policies, needs to be carried out.

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