

GC 2020 Draft Green Building Action Plan

1. GOAL: GREEN BUILDINGS

Lead the world in green building design and construction

Original target #1: All new construction carbon neutral

Proposed revision: Require all buildings constructed from 2020 onward to be carbon neutral in operations.

This change clarifies the scope of energy uses and emission sources that will be considered in the carbon neutral calculations.

Original target #2: Improve efficiency of existing buildings by 20%.

Proposed revision: Reduce energy use and greenhouse gas emissions in existing buildings by 20% over 2007 levels.

This change gives us a more rigorous target that discourages fuel switching to low carbon energy sources while still requiring an overall reduction in energy use.

2. BACKGROUND

When it comes to greening our city, there is a great deal of potential in the building sector. Buildings account for 55% of citywide GHG emissions in Vancouver. Half of those emissions come from residential buildings, both multi-unit and single family dwellings. As the number one source of emissions by a substantial margin, any reduction in energy consumption and GHG emissions in the building sector will have a significant impact on Vancouver's overall GHG footprint.

Canadians spend more than 90% of our time indoors. As such a focal point of our lives, buildings should be designed to operate efficiently and occupants should be aware of how their activities translate to energy consumption. Buildings should be designed appropriately to suit our climate, provide comfortable, healthy indoor environments, and to be durable, accommodating current and future uses.

Much of our current building stock does not meet the abovementioned criteria. In recent years other considerations took priority over energy efficient design and occupant comfort. Much of our existing building stock is inefficient in its design and operation, and as a result these buildings consume more energy than is necessary, primarily through heat loss and overuse of mechanical systems. Our goal is to build a suite of tools and partnerships that build capacity, foster innovation, cultivate demand and awareness, such that high performance carbon neutral design and construction becomes the baseline and can be seen as complementary to other important design considerations.

Our current regulations for new buildings are competitive or better than other jurisdictions across North America. Until recently, efforts to green buildings in Vancouver have not addressed the performance of existing buildings. We can mandate that new construction is built green, but this only gradually transforms our overall building stock. It is more challenging to improve the performance of existing buildings that are already in operation than to mandate design requirements to new buildings.

In terms of specific challenges, energy is cheap in BC, so homeowners, tenants and business owners do not have the price signals that other jurisdictions do to conserve energy. Another challenge is the "split incentive" wherein landlords and developers are not inclined to pursue energy efficiency design or retrofits as tenants and purchasers are responsible for paying their utility bills, and therefore it is the tenant that benefits from the savings. Cost is a barrier to retrofitting existing buildings; owners will only pursue upgrades with very short paybacks. First costs borne by the developer are also perceived as a

barrier in new construction. There is a barrier in terms of industry capacity. In both the new construction and retrofit sectors, there is a need for education, training and capacity building in energy efficient design construction, and operations.

3. TARGET

Require all buildings constructed from 2020 onward to be carbon neutral in operations

Approach: (a) First reduce actual energy demand by 50% (this reduction is in absolute terms [kwh/m²/yr] compared to a 2010 baseline). Specific building sector reduction targets will be identified by further technical analysis and review; (b) Supply remainder through renewable energy sources (e.g. renewable district heating, solar thermal, geothermal etc)

For new buildings our target is to mandate carbon neutral new buildings by 2020. The City of Vancouver has adopted a working definition of carbon neutral buildings. The City's definition for purposes of this target is as follows "carbon neutrality is achieved through a process of measuring emissions, reducing use of carbon-based energy sources and producing the required energy through renewable means or offsetting any emissions such that there is no net carbon emitted through the operation of a building."

In order to achieve this target the City will focus on energy conservation first, supplying renewables second and where necessary making use of low GHG intensity grid-supplied electricity for applications that require high quality energy. The purchase of offsets will be used as a last case scenario as a bridging mechanism in special cases where a plan to achieve renewable energy on-site may require a longer development horizon.

Reduce energy use and greenhouse gas emissions in existing buildings by 20% over 2007 levels.

Approach: Encourage energy efficiency upgrades through (a) regulation and market mechanisms (b) the development of accessible, affordable energy efficiency services and financing programs to assist the consumer in making upgrades. Note: This target refers to a 20% reduction on average across all buildings (e.g. poor performers will target >20% improvements while efficient buildings may only improve slightly)

This target is based on projected energy efficiency retrofits and improvements to a portion of the city's building stock that will take place between today and 2020. The target is for reductions in both GHG emissions and energy use because while different fuel types have varying footprints in terms of GHG emissions, it is not enough to simply mandate a reduction in GHG emissions - it is our goal to reduce the absolute energy demand of buildings to support broader GHG reductions provincially and regionally.

Both of these targets are consistent with international best practices for carbon reduction in the built environment, and are supported by the latest climate science as being necessary for climate change mitigation.

4. STRATEGIES AND SHORT TERM ACTIONS

Overall the City views the alignment of regulation with incentives, financing tools, capacity building, quality assurance and user engagement as being necessary to achieve both targets. Below is a general summary of both strategies followed by more specifics broken down by the six aforementioned focus areas (regulation, financing tools etc.).

2020 Carbon Neutral Buildings Strategy Summary:

With the above alignment in mind and after consulting with our advisory committee, staff propose to target a minimum of 50% improvement (over 2010) in energy conservation in new construction by 2020. While achieving this improved efficiency, staff also propose introducing minimum requirements for renewable energy in new buildings for the purposes of heating and conditioning spaces. This renewable energy can be provided either on or off site and will focus on the generation of heat. The City recognizes

that there will still be a need for grid-supplied hydroelectricity, which by Provincial mandate will be carbon neutral by 2016. The strategy will ensure that this electricity is used conservatively for processes where no other suitable replacement is available.

20% reduction in GHG's and Energy use in Existing Buildings

This strategy is based on the application of modest regulation that will become more aggressive over time as financing tools and incentives become more available. Staff propose that mandatory abatement programs will become required in some sectors in order to reach the number of buildings required to achieve our target as we approach 2020. This will only occur once robust financing tools are in place.

Strategies:

1. **Regulation:** create better, easier to use legislation that requires higher performing buildings at defined intervals e.g. 2011, 2014, 2017, 2020. Regulation is a key tool to ensure building performance improvements. In reviewing international best practices on GHG reductions in the built environment, every jurisdiction that has been successful in reducing GHG's has used regulation as a tool. Vancouver's approach is to introduce regulations that as much as possible mitigate financial implications for building owners and developers, while improving energy performance and lowering associated GHG's. In order to introduce more aggressive improvements through regulation, the city will develop new financial tools to connect the upfront costs to the long-term operating cost savings.

As a regulator, Vancouver will adapt its policy framework and compliance regime such that it will be based on actual outcomes that support GHG reductions rather than the modeled results of energy simulation. We will seek simplicity in policy development and raise requirements consistently and predictably to minimize uncertainty in the market.

- **Outcomes-based codes**

By 2014, the City will move toward outcomes-based codes, which will enforce the actual performance of the building rather than its predicted or modeled performance. In essence the outcomes-based code will enforce energy intensity targets expressed in kilowatt-hour or Kilo-joules per square meter per year (kWh/m²/yr or kJ/m²/yr). The outcomes-based code approach simplifies the compliance process.

- **Green Renovation Policy**

The Vancouver Building by-law currently has sections that pertain to existing buildings that require upgrades for fire, and life safety the addition of energy efficiency would be a powerful tool in lowering GHG's.

In 2011, Vancouver's Green Renovation Program proposes that all homeowners applying for renovation permits do an energy audit and take on a number of energy efficiency upgrades. The homeowner has the choice of a prescriptive path – a checklist of upgrades to complete – or a performance path in which they must improve their EnerGuide rating by a prescribed order of magnitude. The scope of required upgrades is dependent on the scope of the renovation. The program is designed such that required upgrades account for about 5% of the total renovation cost and have 2-3 year payback periods. Improvements will be quantified by before and after home energy assessments to measure the related energy savings and GHG emissions reductions.

This will be followed by a similar program whereby upgrades will be required of commercial and multi-unit residential buildings.

- **HVAC By-law**

Currently the City does not regulate the commissioning, maintenance, fuel choice or efficiency of heating, cooling and ventilation equipment in buildings. All of these are necessary components of achieving

sustained energy efficiency and lower GHG's emissions required to meet the noted targets. Vancouver will target development of an HVAC by-law by early 2012.

2. **Financing Tools:** Vancouver recognizes that financing for energy efficiency upgrades in new buildings and retrofits is required to catalyze wide-spread market transformation. To this end, Vancouver will work with stakeholders to ensure that opportunities for financing energy efficiency upgrades are available in multiple market segments. We will seek solutions that tie the investments to the beneficiaries and eliminate the split incentive. Financial tools will facilitate more aggressive regulation as they increase upfront affordability and introduce fairness as they allow all future owners of buildings to share equally in the benefits of the upgrades.

- **Home energy retrofit financing: Property Assessed Clean Energy (PACE)**

Vancouver is developing a program to help homeowners finance energy efficiency upgrades in their homes. After undergoing a home energy audit, homeowners will be able to select from a 'menu' of energy efficiency upgrades that will be covered under the PACE program. Homeowners will have the opportunity to pay for the work over a period of time as an additional item on their property tax bill. Incremental payments will be modelled to be less than or equal to the savings on utility bills. When the house is sold, the new owner becomes responsible for the payments and benefits from the savings derived from the retrofits. Improvements will be quantified by before and after home energy assessments to measure the related energy savings and GHG emissions reductions.

- **Multi-Unit Residential Retrofit Financing**

The City is currently partnering with utilities and major financial institutions to deliver financing for collective property and some in-unit Energy Efficiency measures. The program is again structured to ensure that the savings are sufficient to fund the upgrades. The City sees this as not only a method to ensure that energy efficiency upgrades occur in a sector that badly needs them but also serves as a platform for retrofitting electric vehicle infrastructure into these projects.

3. **Incentives:** Vancouver will actively promote existing utility and government incentive programs and, where there are gaps, be creative in developing effective incentives and partnering with others to deliver programs. In addition to this the City recognizes that in order to achieve carbon neutrality within two construction cycles (approximately five years), investment in innovation is required. The City could be a partner in this investment if there are co-learning benefits for the broader industry. The City may have to be a partner in this in order to ensure that future programs include process improvements: a "fee-bate" model, increased development rights, grants, or tax adjustments, for example.

- **Solar Hot Water Incentive**

\$4,300 is currently available towards the installation of a solar hot water system for people building new homes in Vancouver. 25-30% of a home's energy is devoted to heating water. Solar hot water systems are efficient in Vancouver's climate, and can supply up to 60% of water heating energy annually. Currently, the systems have a payback period of about 25 years, but as fuel prices continue to rise, savings will be greater. Each system will be metered in order to quantify the amount of solar heat produced as well as reduction in natural gas (or electricity) consumption. The City was able to provide this incentive by partnering with Terasen Gas, Offsetters, and SolarBC.

4. **Capacity Building:** The re-imagination of Vancouver's building stock will require new skills and new knowledge. Local government will need to partner with industry and professional associations, post secondary institutions and trades in order to ensure that the necessary resources are available to meet the needs of market as it undergoes a decade of rapid evolution. The City is in a unique position to convene disparate groups, connect information and leverage its brand as a trusted source of information.

- **Capacity Building: Passive Design Toolkits & Green Home Renovation Guides**

-The City of Vancouver published a set of 11 Green Home Renovation Guides that provide information about materials, designs and construction techniques that will help homeowners and contractors reduce their impact on the environment. Guides are free and available on the web and in print.

-The Passive Design Toolkits provide best practices for homes and larger buildings for passive design elements such as layout, orientation, insulation, landscaping and ventilation. They are targeted to City staff and the design and development communities, intended to help us move toward a new, higher standard of energy efficiency without sacrificing thermal comfort.

- **Continued Leadership in Civic Facilities.**

The City of Vancouver has already developed Canada's first Net-Zero Multi-unit residential building and has begun construction on its first Living Building. In order to seed the market and build capacity in design and construction field there should be continued leadership to build Carbon Neutral New Buildings within its own portfolio of facilities.

5. **User Engagement, Education and Outreach Programs:** Energy conservation goes beyond technology and building science. Building occupants must also be engaged in the conservation process and require the necessary information to make informed decisions both in lifestyle choices and purchasing decisions. To support this, Vancouver believes that new tools such as social marketing, education, and building labelling and benchmarking will be required.

- **Building Labeling**

Building labelling programs provide information to the public about the performance of buildings and how energy savings translate to cost savings. As a labelling pilot, Vancouver proposes to label 1000 large residential, industrial, commercial and institutional buildings over a period of 18 months. Labels will empower tenants and building owners to make decisions about building occupancy and operations based on energy performance. Vancouver will partner with the gas and electric utilities to create uniform labelling standards. The City will also explore mandatory disclosure legislation that will require commercial and high density residential buildings to disclose energy use to the City with the eventual goal of making this information publicly accessible.

- **Quality Assurance: Home Energy Assessments**

Homeowners are encouraged to go through the EcoEnergy assessment through a registered NRCan contractor. The assessment provides an EnerGuide rating out of 100. The City of Vancouver's current code for new construction is targeting a baseline rating of 80 for all new homes. Conducting an assessment before and after undertaking renovation work will allow homeowners and policy makers to track our progress towards reducing energy consumption.

5. CROSS REFERENCE

- **Climate Leadership: District Energy**

As part of the climate leadership target, the City is developing a strategy around new opportunities for district energy systems based on renewable fuel sources. The district energy strategy supports our carbon neutral buildings by 2020 goal by providing access to renewable heat sources to service new construction and lower GHG's of existing buildings that could be connected. Much of the success of being able to provide carbon neutral new buildings will depend on successful deployment of low-carbon district energy through out the city.

- **Smart Location of Density:**

For holistic GHG reductions the placement of high performance buildings in walkable neighborhoods close to transit is critical. Higher densities with a mix of uses focused on corridors or nodes is also supportive of district energy development. Looking for sources of high quality, low cost, waste or renewable heat sources close to transit as potential sites for higher densities will yield even greater GHG reductions than if either were considered in isolation.

- Green Economy: Green Job Creation

Encouraging green renovations throughout the City of Vancouver will stimulate the local renovation industry and create new job opportunities in green home renovations. To stimulate growth in this industry the City of Vancouver is partnering to seed a weatherization business that will train unemployed people to provide affordable basic weatherization services for Vancouver homeowners and reduce their energy use and GHG emissions.

8. INPUT FROM CONSULTATION

The following ideas came out of the public consultation process and are being considered or incorporated into the 2020 plan:

- Energy Retrofit Financing
- Bring Life to our Rooftops; Cool roofs to combat the "heat island" impact, and save energy and reduce emissions
- Energy audit old infrastructure and implement rehabilitation and refurbishment to green standards.
- create incentives for every homeowner to install Photovoltaics, Wind Turbines, or Solar Hot Water
- Tax breaks or incentives for those that build very green, carbon neutral or living buildings
- Future proof Green Buildings by adapting to projected climate conditions
- Mandatory 2 day "Green Building" 2 day workshop for Contractors & Sub Trades
- No more floor-to-ceiling windows (improved passive design requirements)
- Heat pumps not electric baseboards in all new homes!

The following ideas were not included in the plan as they are out of scope or jurisdiction or would have little or no value in terms of meeting our targets:

- Cap building energy consumption for different building types on a per occupant basis NOT area
- Variable Property Taxes based on FSR
- Make available reclaimed/recycled wood from Vancouver Parks Board and BC Wood Recycling
- Earthen home construction
- Power fitness centres with existing equipment