

## **IN SEARCH OF**

# THE GOOD LIFE

Taking a Snapshot of Built Environment Sustainability in BC January 2018













# **Opening Letter**

You can't change what you can't measure.

That's the premise behind the Real Estate Foundation of BC's series of "BC Snapshot" reports, which introduce frameworks and indicators for tracking BC progress towards sustainability goals.

In Search of the Good Life, the second in this series, takes a wide-angle look at the state of BC's built environments. By combining measures for health, environment, livability, affordability, cost-efficiency, prosperity, and resiliency, we gain a deeper understanding of quality of life in BC's cities, towns, and regions. With help from experts, we identified seven ambitious goals for BC communities. Using these goals as a guide, we created a framework that includes 13 desired impacts and 10 impact measures.

Because BC's communities are so diverse – in size, economic activity, and geography – we wrestled with choosing measures that can be fairly applied across the entire province. While Prince George and New Westminster have similar populations, their economies, transportation networks, and housing types are very different.

Another challenge we faced was in choosing data that scales and compares. Data about cities comes from many sources, including regional districts, provincial agencies, and community organizations. Sometimes, datasets are specific to one region or sector. In other cases, data is kept in different formats. Both situations create challenges.

Two years ago, REFBC commissioned an opinion poll to learn more about public attitudes on built environment sustainability. We found that four in five (81%) residents rate quality of life in their

neighbourhood as good or excellent. Respondents also told us that they value greenspace, energy efficiency, and access to shops, services, and transportation.

As a grantmaker, REFBC aims to transform land use attitudes and practices. We envision a BC where land use and real estate activities contribute to resilient, healthy communities and natural environments.

The recommendations from *In Search of the Good Life*, along with findings from the opinion polls and feedback from project partners help us to make better decisions about the work we fund, the projects we take on, and the investments we make.

No one organization can tackle change alone.

Change happens when diverse partners come together, agree on a vision for a better future, and work together to make change possible. We're grateful to the built environment experts, academics, and community leaders who have helped us to create a framework for built environment sustainability. We're also immensely proud of the work our grantees and project partners are doing in communities around the province: shaping industry standards for building and energy performance, piloting community-engaged models for neighbourhood planning, and researching zoning and building options to address housing demand in large cities.

Thank you,

Burry

JACK WONG, Chief Executive Officer, REFBC



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# **Executive Summary**

British Columbia's communities are diverse, yet they share common aspirations. All communities aim to become be more healthy, liveable, affordable, costefficient, environment- and climate-friendly, resilient, and economically robust. The built environment includes all the "physical stuff" a community is made of: housing, buildings, infrastructure and energy, and transportation systems. A sustainable built environment contributes to a high quality of life without undermining the natural systems (air, water, land) that support us. These interrelated systems enable cities and towns to function.

By developing an impact framework for measuring the sustainability of the built environment in BC, we assess the current state of communities, gain perspective on our progress, and identify areas for improvement. The measures in this framework can support decision-making on community growth, development, and service priorities. This report also begins a dialogue on how to include recommendations for improving data collection and monitoring so that more informed decisions can be made in the future.

When reliable data is available, impact measures can help illustrate how to advance built environment sustainability and improve quality of life for British Columbians. This framework includes seven ambitious goals, 13 desired impacts for the built environment, and an impact measure for each desired impact. A desired impact describes the transformational change BC is striving toward. An impact measure is an indicator or metric that

quantifies how close we are to achieving a desired result—or how far away we are. Three of these impact measures require further development and refinement.

This report also identifies gaps in data availability, accessibility, and verifiability. Data gaps represent real challenges in comprehensively assessing BC's progress. Geographic, demographic, and socioeconomic data is often needed at the community or neighbourhood scale. Planners, policy makers, and service providers can better understand what is going on and how built environment systems interact. In some cases, data is non-existent, revealing a need for better collection and standardization efforts.

These efforts require consolidating information across the province and collaborating with multiple levels of government. Multiple sectors should be involved, including academia, utilities, industry, civil society, and governments (including First Nations). Based on these findings, we make the following recommendations for data collection, monitoring, and reporting.



### **DATA RECOMMENDATIONS**

### 1

### **SHARED MEASUREMENT**

Philanthropic funders, including REFBC, could continue to champion development of a shared measurement framework for the built environment. This dialogue can support the provincial government, local governments, and communities in three ways:

- Support continuous learning and collaboration among ministries, departments, and interested organizations by building on recent successes.
- b. Contribute to more efficient governance, by helping highlight investments that offer greater returns, either through leveraging public funds in a single area, or through multiple goals across departments. For example, growth containment reduces demands on taxes, supports better health outcomes, and contributes to greenhouse gas reductions. However, measuring dispersed development is not straightforward and requires further understanding and discussion.
- c. Continue to support healthy, liveable, affordable, cost-efficient, environment- and climate-friendly, resilient, and economically robust communities that align with Provincial mandates and local government goals.

# 2 STRENGTHEN THE COMMUNITY ENERGY AND EMISSIONS INVENTORY (CEEI)

The Ministry of Municipal Affairs and Housing, working with the Climate Action Secretariat in the Ministry of Environment and Climate Change Strategy, could invest in strengthening and extending the excellent work already done on supporting indicators for the CEEI. This work could be strengthened to address a broader range of built environment goals including:

- a. A strong conceptual/organizational framework, built on a systems approach, that recognizes shared goals among various governmental ministries (e.g., linking Municipal Affairs and Housing, Health, and Transportation and Infrastructure) regarding built environment systems.
- b. Data collection and standardization initiative (see recommendation 3).
- c. A typology of communities that reflects BC's diversity across large urban centres and small rural communities. Community size is a useful starting point, but other characteristics may help to create meaningful categories.
- d. Regular reporting of results, on a timeline consistent with measurable and meaningful changes in performance (e.g., at a minimum, to coincide with the national census).

### 3

#### STANDARDIZE DATA

The Ministry of Municipal Affairs and Housing, working with the Climate Action Secretariat in the Ministry of Environment and Climate Change Strategy, could work with local governments to strengthen and standardize data collection and sharing, particularly with respect to geographic information system (GIS) data. The Integrated Cadastral Information Society could be an important partner in this effort.



### **OPEN-DATA INITIATIVES**

All levels of government could pursue open-data initiatives, ideally using common data standards, to enable third-party organizations to access government data. These initiatives need to be designed to address privacy and other related concerns up front.



### In addition, the report identifies ways to improve measurement in relation to many desired impacts:

- Engage Walk Score to clarify methodology, address potential community biases, and extend an analysis to more BC communities. A compatible, independent method drawing on shared municipal GIS data could also be used. (Lead: Ministry of Municipal Affairs and Housing, working with academics.)
- Define "suitability" of employment, possibly building on livable wage definitions, and develop a corresponding measure. Explore the distribution of commute distances around the median measure. (Lead: Ministry of Municipal Affairs and Housing.)
- Explore in depth the options to distinguish rural and urban areas in BC communities as an alternative to using an urban containment boundary. (Lead: Ministry of Municipal Affairs and Housing, working with academic institutions.)

- Use GIS data to integrate "parks and protected areas" data from the CEEI with census household data to provide a BC-wide measure equivalent to the one used by Vancouver and Surrey. (Lead: Ministry of Municipal Affairs and Housing.)
- Research options for linking housing diversity
  with community needs, drawing on established
  measures and exploring innovative approaches.
  Explore using municipal building permit data
  to better assess the accommodation of families
  and larger households in cities. (Lead: academic
  institutions.)
- Develop a measure of affordability based on the STAR Communities approach using census data. If valid transportation cost data cannot be obtained, use core housing need and apply to census tracts. (Lead: Ministry of Municipal Affairs and Housing.)
- Apply the State of Asset Management
   Framework across BC and update regularly.
   Develop a performance measure that links land use to efficient infrastructure use. An impact measure could calculate the percentage of new developments that use full life-cycle costs to

### **MEASURING PROGRESS IN BC**

There are several noteworthy examples of community performance measurement in place around BC. These precedents illustrate how accessible data can educate decision makers and the public.

#### **Province-wide:**

 Community Energy and Emissions Inventory (CEEI) and secondary indicators

#### **Municipal:**

· City of Surrey Sustainability Dashboard

### **Regional:**

- State of the Basin research framework by the Rural Development Institute at Selkirk College
- Okanagan Valley Interregional Monitoring and Evaluation Framework



estimate total development costs. (Lead: Asset Management BC, working with the Municipality of Municipal Affairs and Housing and civil society.)

- Consolidate data for key green building certifications and design an index for assessing high-performance buildings (not solely LEED certified buildings). (Lead: BC Building and Safety Standards Branch, working with local governments, and civil society.)
- Develop a system to collect data on the adoption of incentives and regulations for the BC Energy Step Code. In addition, explore the use of Portfolio Manager to combine building energy use data with building area data (cubic metres) to assess energy efficiency in existing buildings. (Lead: to be determined.)
- Secure accurate vehicle kilometres travelled data for BC automobiles. (Lead: Ministry of Municipal Affairs and Housing, working with the Ministry of Transportation and Infrastructure and the Insurance Corporation of British Columbia.)
- Explore how to define and measure transportation network efficiency, reliability, and accessibility. (Lead: Ministry of Transportation and Infrastructure, working with stakeholders representing all transportation modes.)
- Aggregate data to monitor community vulnerability to hazards using readily available data, and explore more sophisticated risk assessment methods. (Lead: Emergency Management BC, working with local governments.)





# Introduction

Author Frank Sonnenberg once wrote, "Measuring progress is often like watching grass grow. While it's difficult to detect movement on a daily basis, it's simple to see growth over time." The purpose of this snapshot is to provide a framework for measuring built environment sustainability in BC, assess BC's progress, and lay a foundation for future improvements. While watching grass grow may be onerous, BC's progress toward a sustainable built environment should be apparent over time.

The authors often observed gaps in data that represent real challenges in comprehensively assessing BC's progress—for better or worse. Recommendations for the provincial government, local governments, and other agencies are included to improve understanding about data collection, monitoring, and reporting. This report contributes to previous Real Estate Foundation of BC (REFBC) research on the sustainability of BC's communities that examined trends, drivers, and barriers. The study found that BC communities appear to be making progress, and recommends pursuing monitoring and reporting to assess current realities and learn how to accelerate progress.

### CONTEXT

Many groups are interested in measuring built environment sustainability. Globally, the United Nations sustainable development goals include related built environment measures to address congestion, inadequate housing, and declining infrastructure. Nationally, the Federation of Canadian Municipalities' Quality of Life report illustrates

progress made in Canadian cities.<sup>2</sup> Other Canadian communities are adopting the STAR Community Rating System to monitor their effectiveness in the built environment.<sup>3</sup>

In BC, the Community Energy and Emissions
Inventory (CEEI) and Regional Growth Strategies
(RGS) employment measurement frameworks are
innovative initiatives. Regionally, the Okanagan Valley
Interregional Monitoring and Evaluation Framework,
the Columbia Basin Rural Development Initiative's
State of the Basin, and Surrey's Sustainability
Dashboard integrate measurement systems with
public engagement.<sup>4</sup>

Governments are placing an increasing emphasis on measuring progress and results. This change is driven by public demands for government accountability and for the ability to use informed and evidence-based decision-making when allocating scarce resources. Strategic planning and its focus on achieving agreed-upon goals and objectives, and the interest in making progress toward sustainability, are emerging trends in cities and towns.<sup>5</sup> By making civic and systems data public, open-data initiatives create exciting opportunities for more accessible and easier to understand performance management in the built environment.

### **MEASURING PROGRESS**

BC's communities are diverse, yet they share common aspirations. All communities aim to be more healthy, liveable, affordable, cost-efficient, environment- and climate-friendly, resilient, and



economically robust. The "built environment" refers to all the "physical stuff" a community is made of: housing, buildings, infrastructure and energy, and transportation systems. A sustainable built environment contributes to a high quality of life without undermining the natural systems (air, water, land) that support us. These interrelated systems enable cities and towns to function.

To make progress toward their sustainability goals, communities should optimize their built environments by better integrating land use, transportation, buildings, infrastructure, and housing.

For instance, in assessing a location's affordability, transportation costs must be added to housing expenses, instead of just looking at the cost of rent or real estate. Costs are lower for people who live closer to work, shops, and services. They are generally lower for those who walk, cycle, or take transit rather than drive. Housing affordability involves looking at land use, transportation, housing, and building considerations. Housing affordability therefore cannot be examined from one price point. Building design is another consideration, since energy-efficient buildings cost less to operate over the longer term, yet can cost more to build.

### RESEARCH CHALLENGES

Developing a framework and measuring progress is not without challenges. Each community is unique, which creates difficulty and nuances. We debated whether to categorize communities by size or by region, how to categorize a community as rural or urban, and whether to compare communities that are similar in size but economically divergent (e.g. Whistler, Gibsons, and Sechelt). These debates led us to ask whether there is a way to monitor progress in meaningful ways without making comparisons. We decided to focus on community size (by population) and avoid comparisons when possible. Our intent was to illustrate what we learned about the impact measures from individual municipalities.

Data availability, consistency, and reliability is another challenge. While exciting big data and opendata opportunities are emerging, BC data availability remains in transition. Data benchmarks or thresholds are not consistently agreed upon, and baseline data is not necessarily always available.

Because there are many direct and indirect relationships between community priorities and the built environment, it was hard to decide what was most important. To help us prioritize, we focused on REFBC's land use interest in the built environment.

### **HOW TO READ THIS REPORT**

This snapshot presents a framework for measuring progress that includes seven ambitious goals, 13 desired impacts for the built environment, and an impact measure for each desired impact. Measuring each desired impact helps assess whether BC is moving in a positive direction and whether decision-makers are tracking the things that residents care most about. Three of the impact measures are incomplete, as they have little or no identified data and require further discussion and refinement.

### **TERMS WE USE**

**Ambitious goal:** A picture of a desired future that is hard, but possible to obtain.

**Desired impact:** The outcomes we look for from the transformational changes we try to facilitate.

**Impact measure:** An indicator that helps quantify the achievement of our desired impacts.



# Okanagan Valley Interregional Monitoring and Evaluation Framework

The regional districts of North Okanagan, Central Okanagan, and Okanagan-Similkameen developed the Okanagan Valley Interregional Monitoring and Evaluation Framework. The framework identifies trends, commonalities, and distinctions among the regional districts.<sup>6</sup> Project indicators include urban containment and rural protection, agriculture, water, and climate change. Findings are meant to help guide local government decision-making. Indicators are a useful starting point for local dialogue about what is going on and what to improve.

The Okanagan initiative illustrates the value of taking a region-wide approach to identify challenges that can collaboratively focus priorities. It enables regional districts to prioritize resources and explore relationships in different areas such as active transportation and housing diversity.

For more information, visit rdno.ca

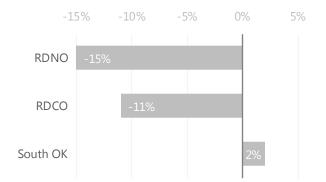




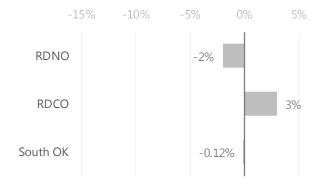


## FIGURE 1: PERCENT CHANGE IN NON-TRANSPORTATION GREENHOUSE GAS EMISSIONS FROM 2007 LEVELS

Percent change in non-transportation GHG emissions, 2007-2012 (CO<sub>2</sub> equivalent)



Percent change in non-transportation energy, 2007-2012 (GJ energy)



**Source:** Regional Districts of North Okanagan, Central Okanagan, and Okanagan-Similkameen, *State of the Basin Report 2016*, 2016: 8, http://www.rdno.ca/docs/Inter-regional\_v20.pdf.



# **Built Environment Systems**

REFBC's vision for built environment sustainability is for built environments across BC to support thriving, resilient communities and natural environments through smart community planning, affordable and diverse housing, efficient buildings and infrastructure, and active transportation and transit. The built environment contains four interrelated systems. Each system identifies a desired future (see Table 1).

### **TABLE I: BUILT ENVIRONMENT SYSTEMS**

ICON	SYSTEM	WHAT IT IS	DESIRED FUTURE
	Integrated Communities*	Land use, public space, and density.	Land use patterns that give people easy access to shops, services, recreation, and employment; protect natural and working lands; and offer comfortable, well-designed places and spaces.
	Housing	Full spectrum of housing types and tenures (own/rent).	Diverse housing that meets the full spectrum of needs related to age, access, and affordability.
	Buildings, Infrastructure, and Energy	Buildings, water/sewer pipes and facilities, roads, and energy production and distribution.	Smarter, less expensive buildings and infrastructure that are regenerative in terms of their energy and resource use.
© %	Transportation	Roads, sidewalks, paths, vehicles, and support systems.	Transportation systems that support high levels of walking, cycling, transit, and low-impact movement of goods.

<sup>\*</sup>In this report, we use the term "Integrated Communities" instead of "Land Use" to emphasize connections between land use components.



# **Ambitious Goals**

Ambitious goals describe where British Columbians want communities to be in the future. The goals act as a "North Star" to guide progress without prescribing the path a community takes to arrive at the destination. Goals of the built environment include the following:



Healthy: residents have healthy lifestyles and enjoy good physical, emotional, spiritual, and mental health.



Environment- and climate-friendly: communities emit fewer greenhouse gases, reduce water use and risks, and improve natural systems.



Livable: great public spaces and amenities make communities satisfying, enjoyable, attractive, and contribute to a high quality of life.



Resilient: communities recover quickly when disasters occur and limit their exposure to hazards.



Affordable: cost of living is within a resident's means and reduces inequality. Canadian inequality has risen substantially since 1980.



**Economically robust:** businesses support competitiveness, and attract and retain diverse labour pools.



Cost-efficient: community infrastructure is maintained, built, and replaced, which reduces the tax burden on residents and businesses and supports a financially healthy local government.



# Our Ability to Measure

Table 2 on the following pages shows the relationships among the desired impacts, the impact measures, the built environment systems, the ambitious goals, and the ability to measure the impacts.

Desired impacts describe where British Columbians want their communities to be in the future. While related, each desired impact is discrete and can be measured, aggregated, and reported by an impact measure. The ability to measure each desired impact varies:

- Five are well developed: BC data is available, and the measure is relatively strong, although there is room for improvement.
- Five are moderately developed: they have a recommended measure but lack aggregated or strong data.
- Three are poorly developed: they have little or no data sources, or do not have a recommended measure.





### TABLE 2: BUILT ENVIRONMENT SUSTAINABILITY IMPACT FRAMEWORK



















DESIRED IMPACT	IMPACT MEASURE	<b>ABILITY TO MEASURE</b>	<b>BUILT ENVIRONMENT SYSTEMS</b>			AMBITIOUS GOALS							
Impact Statement	Recommended Impact Measure	• • well developed     • moderately developed     • poorly developed	Integrated Communities	Housing	Buildings, Infrastructure, and Energy	Transportation	Healthy	Livable	Affordable	Cost Effective	Climate Friendly	Resilient	Robust Economy
Residents can access amenities within their neighbourhood or town.	Average Walk Score	• • •	•			•	•		\$	٥	•		
Residents can find suitable jobs close to home.	Commute distance - Census	• • •	-				•	$\odot$	\$	Ф	<b>②</b>		
The growth of towns and cities is contained.	% development within an urban containment boundary	• •	•							٠	•		
People in towns and cities have access to green and natural spaces.	% households within 400 metres of public green space	• •	•			•	•	☺					
The diversity of housing options matches the needs of the community.	N/A	•		•			•	©	\$				•
Housing is affordable for all.	Core housing need - Census	• • •						$\odot$	\$				
Infrastructure is efficient and cost-effective.	N/A	•			•					٥			
All buildings are high-performance.	LEED certified buildings per 100,000 people	• •					•	©		٠	<b>②</b>		
All buildings are energy efficient.	% local governments that adopt incentives and/or regulations for upper steps of BC Energy Step Code	• •								0	•		
Transportation systems support low-impact trips.	Mode share, commute to work – Census	• • •				-	•		\$	٠	•		
Transportation networks offer efficient and reliable access.	N/A	•	•			•				٠			-
In high-risk locations, existing development is protected and new development is restricted/prohibited.	% of developed land located in identified hazard areas.	• •	•	•	•	٠				٥			<del>-</del>
Communities produce 80% fewer greenhouse gas (GHG) emissions than in 2007.	Community GHG emissions – CEEI	• • •	-			•				٠	•		

<sup>\*</sup>Systems with shading are the primary systems affecting the desired impact. Those without shading have a secondary level of influence on the desired impact.





# **DESIRED IMPACTS**

Residents can access amenities within their neighbourhood or town.

Average Walk Score

Residents can find suitable jobs close to home.

Commute distance – Census

The growth of towns and cities is contained.

**development** within an urban containment boundary

People in towns and cities have access to green and natural spaces.

% households within 400 metres of public green space

The diversity of housing options matches the needs of the community.

III N/A

Housing is affordable for all.

Core housing need - Census

Infrastructure is efficient and costeffective.

III N/A

All buildings are high-performance.

LEED-certified buildings per 100,000 people

All buildings are energy efficient.

% local governments that adopt incentives and/ or regulations for upper steps of BC Energy Step Code

Transportation systems support lowimpact trips.

Mode share, commute to work – Census

Transportation networks offer efficient and reliable access.

III N/A

In high-risk locations, existing development is protected and new development is restricted/prohibited.

% of developed land located in identified hazard areas

Communities produce 80% fewer greenhouse gas (GHG) emissions than in 2007.

Community GHG emissions – CEEI

# Residents Can Access Amenities Within Their Neighbourhood or Town

### **AMBITIOUS GOALS**



Healthy



Livable



Affordable



Cost-efficient



Climate-friendly



Resilient



**Robust Economy** 

## BUILT ENVIRONMENT SYSTEMS



**Integrated Communities** 



Transportation

### **OVERVIEW**

Ease of access to amenities (shops, services, jobs, public spaces) is one way to measure quality of life. In many small towns (population 10,000 or less), most people live within a 10 to 15 minute walk of the town centre, but may have to drive to larger centres for some needs. In larger towns, some residents may have quick access, while others drive from their neighbourhood to get to shops and services.

Easy access to amenities is particularly relevant to lower-income households for whom transportation is a major expense. By accessing services locally, residents have more opportunities for active travel (walking, cycling), which supports healthy living in two ways: a reduction in GHG emissions leads to cleaner air, and fewer trips made by car reduces the likelihood of injury in traffic collisions.

These factors can improve the health of occupants living nearby and benefit traffic patterns by reducing reliance on cars.

### RECOMMENDED IMPACT MEASURE

### **Average Walk Score**

The Walk Score system measures how easy it is to access amenities from a particular address. Points between 0 and 100 are awarded based on distance to services. Addresses that have many destinations in close range are considered "walkable" and receive high scores. Locations that have few shops and services nearby and require people to drive to access amenities are considered "car-dependent" and receive lower scores.

69

communities in BC have been rated by Walk Score.

35%

of rated communities are scored as "somewhat" or "very" walkable.

### **METRIC**

Walk Score has rated 69 communities in BC. Most are scored as car-dependent, and 35% are deemed somewhat or very walkable (see Table 3).

### **TABLE 3: WALK SCORE RATINGS IN BC**

Walk Score	Interpretation	<b>Large City</b> 200,000+	<b>Small City</b> 50,000+	Large Town 10,000+	Small Town 5,000+	Total	%
0 to 24	Very car-dependent: Almost all errands require a car.	-	-	4	1	5	7%
25 to 49	Car-dependent: A few amenities are within walking distance.	-	9	21	10	40	58%
50 to 69	Somewhat walkable: Some amenities are within walking distance.	2	5	10	2	19	28%
70 to 89	Very walkable: Most errands can be accomplished on foot.	1	2	2	-	5	7%
	Total	3	16	37	13	69	100%

Source: Walk Score, Average Walk Score, 2017, https://www.walkscore.com/CA-BC.7



### Residents Can Access Amenities Within Their Neighbourhood or Town

### **III** Average Walk Score

### INTERPRETATION

Data shows that communities of all sizes can be highly accessible. Large cities, which are home to many amenities, tend to have higher scores.

### **FURTHER DETAILS**

Walk Score measures the walkability of any address by routes and times using a patented system. For each residential address, Walk Score analyzes walking routes to nearby amenities and awards points based on the distance travelled. Amenities within a five-minute walk (approximately 400 metres) are given maximum points. No points are given for walks over 30 minutes.

Walk Score has some limitations, including how difficult it is to access its propriety data. Also, this data is likely biased to score larger centres higher because more online geographic data is available for larger cities. Finally, it is not clear how Walk Score defines "amenities."

Walk Score has also developed a Transit Score, which may complement this measure in the future.8

### **IDEAL MEASURE**

Many regions and communities are exploring ways to define walkability. An excellent measure used is the total number of households within walking distance (defined as 400 metres) to amenities such as grocery stores, retail, parks, frequent transit, and schools. On a provincial level, data is difficult to compile and would require working with municipalities to share geographic information system (GIS) data. Surrey's Sustainability Dashboard and the Capital Regional District Regional Growth Strategy are noteworthy precedents.<sup>9</sup>

### **NEXT STEPS**

The Ministry of Municipal Affairs and Housing, working with academics, could work with Walk Score to clarify methodology, address potential biases, and extend analysis to more BC communities. A compatible but independent method drawing on shared municipal GIS data could also be used.



# Residents Can Find Suitable Jobs Close to Home

### **AMBITIOUS GOALS**



Healthy



Livable



Affordable



Cost-efficient



Climate-friendly



Resilient



**Robust Economy** 

## BUILT ENVIRONMENT SYSTEMS



**Integrated Communities** 



Transportation

### **OVERVIEW**

When people live closer to their workplaces, they can spend less time commuting, which in turn can reduce travel costs and carbon emissions. Studies have shown that less time spent driving has positive physical and mental health benefits.<sup>10</sup>

Defining a "suitable" job has its own challenges. More communities use livable wages to define suitable jobs. A livable wage is the minimum income necessary for a worker to meet their basic needs. Metrics often examine the ratio of jobs to available housing, but this measure fails to capture locations where high housing costs are prohibitive. Using a ratio of commuting distance to annual income could reveal interesting data.



### RECOMMENDED IMPACT MEASURE

### Commute Distance

This measure calculates the length of trips between home and workplace.

4.38 km

Average of mean commuting distances across 26 BC communities.

### **METRIC**

Average commuting distance, as determined by Statistics Canada.

### **TABLE 4: MEDIAN COMMUTING DISTANCE**

Community size (population of CMA)	Number of Communities	Average of Median Commuting Distance (kilometres)
Large city (>200,000)*	2	6.00
Small city (50,000 – 200,000)	7	5.61
Large town (10,000 – 50,000)	16	3.79
Small town (5,000 – 10,000)	1	2.10
Total	26	4.38

<sup>\*</sup> Vancouver census metropolitan area (CMA) and Victoria CMA data

Source: Statistics Canada. Commuting Distance (km) (9), Age Groups (9) and Sex (3) for the Employed Labour Force 15 Years and Over Having a Usual Place of Work of Canada, Provinces, Territories, Census Metropolitan Areas and Census Agglomerations, 2006 Census - 20% Sample Data, 2006, http://open.canada.ca/data/en/dataset/fc421b58-7701-4fe8-acc9-c815b847f23f.<sup>12</sup>

### Residents Can Find Suitable Jobs Close to Home

### **Commute Distance**

### INTERPRETATION

The median commute distance is less than 5 kilometres in most communities. Commute distances appear longer as communities get larger. The median does not provide information about the distribution of commute length (i.e. whether most commutes are similar to the median or if there is a wide range of distances).

### **NEXT STEPS**

Provide a commonly agreed upon definition for "suitability" of employment, possibly building on livable wage definitions, and develop a corresponding measure. Explore the distribution of commute distances around the median measure.

### **FURTHER DETAILS**

Census data provides a level of confidence in data reliability.<sup>13</sup> One disadvantage is that this data does not show travel mode and travel time. Some people travel long distances via a highway or by rapid transit. These trips may be less stressful than shorter trips along congested routes. It is difficult, therefore, to compare commuting distances between cities and rural communities.

Data shows wide variability, with some smaller communities having short median commutes and larger communities having longer ones. Presumably, desirable jobs are located farther away from home yet in the same region. A notable finding is that most communities have a median commute distance of less than 5 kilometres. With supportive infrastructure (e.g., separated cycling paths and frequent transit), this distance is convenient to cover by bicycle or transit. For example, in Dawson Creek half of all workers live less than 1.7 kilometres from their workplace. Residents therefore may not be as car dependent as people from other nearby communities.





# The Growth of Towns and Cities is Contained

### **AMBITIOUS GOALS**



Cost-efficient



Climate-friendly

### BUILT ENVIRONMENT SYSTEMS



**Integrated Communities** 

### **OVERVIEW**

Development patterns over the last 50 years have emphasized low-density land use, separated uses, roads, and infrastructure. These design patterns may offer privacy, flexibility, and car convenience, but they are expensive and socially isolating and promote inactive lifestyles.

BC's Local Government Act helps address these challenges by stipulating growth within existing boundaries. Urban containment policies help protect natural and agricultural land, reduce GHG emissions, improve health benefits, and limit infrastructure costs.



### RECOMMENDED IMPACT MEASURE

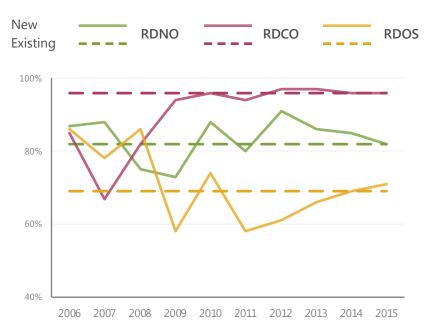
# Percentage of development within an urban containment boundary

Communities with urban containment boundaries can measure how much and where they are growing within designated areas.

### **METRIC**

Percentage of development permits for sites within an urban containment boundary. Data provided for the Okanagan region.

# FIGURE 2: PERCENTAGE OF NEW AND EXISTING HOUSING LOCATED INSIDE DESIGNATED AREAS



**Source:** Regional Districts of North Okanagan, Central Okanagan, and Okanagan-Similkameen, *State of the Basin Report 2016*, 2016: 11, <a href="http://www.rdno.ca/docs/Inter-regional\_v20.pdf">http://www.rdno.ca/docs/Inter-regional\_v20.pdf</a>.





### The Growth of Towns and Cities is Contained

# Percentage of development within an urban containment boundary

### INTERPRETATION

Data illustrates new and existing building permit averages.

### **FURTHER DETAILS**

Urban containment boundaries are outlined in municipal Official Community Plan policies to limit growth outside urban centres. Nevertheless, changing boundaries often incorporate lowdensity development in rural areas over time. A shifting urban containment boundary can result in inconsistent urban–rural edges and baseline measures.

### **IDEAL MEASURE**

A common approach to measuring growth containment is to use census or municipal data to measure the proportion of growth in urban areas. Urban and rural areas can be differentiated by population density, density of housing units, or a combination of employment and density. Another approach analyzes satellite imagery using algorithms to define and locate urban edges of a community in a base year. In subsequent years, updated imagery is analyzed to estimate development changes. There is greater potential for using satellite imagery as technical applications continue to evolve. <sup>14</sup> Whatever measure is chosen, the foremost challenge is to

define an accepted threshold to differentiate urban and rural areas.

In some communities, development happens outside the containment boundary, "leaping over" green space or protected land. Depending on where this happens, "leapfrog" development patterns could be classified as urban, rural, or urban-rural mix. Containment boundary classifications may not inform whether leapfrog development is confined by growth containment.

### **NEXT STEPS**

As an alternative to urban containment boundaries, planners could explore distinguishing rural and urban areas.



**DESIRED IMPACT** 

# People in Towns and Cities Have Access to Green and Natural Spaces

### **AMBITIOUS GOALS**



Healthy



Livable

# BUILT ENVIRONMENT SYSTEMS



**Integrated Communities** 



Transportation

### **OVERVIEW**

Public green spaces (e.g., parks, sports fields, and natural areas) offer residents opportunities for exercise and to connect with nature. 

Properties next to green spaces have higher property values, and public green spaces provide households of all incomes access to nature.

Green space also helps absorb precipitation and runoff, convert carbon dioxide to oxygen, and regulate temperature. Green spaces are valuable economic and recreation assets.





### RECOMMENDED IMPACT MEASURE

# Percentage of households located within 400 metres of public green space

Under this impact measure, a distance equivalent to a five-minute walk (400m) is considered convenient access to a public green space.

### FIGURE 3: ACCESS TO GREEN SPACE



Sources: City of Surrey. Sustainability in Surrey, n.d., http://dashboard.surrey.ca/; City of Vancouver. Access to Nature, 2016, http://vancouver.ca/green-vancouver/accessto-nature.aspx.

### INTERPRETATION

The measure illustrates how most residents in Surrey and Vancouver have convenient access to public green space within five minutes of their homes. According to the survey, 75% of Surrey residents (14.7 people/hectare) and 92% of Vancouverites (55 people/hectare) have access. Residents of lowerdensity Surrey may rely more on their private yards than public parks to get outdoors.

### **FURTHER DETAILS**

GIS data could produce accessible public green space within a five-minute walk of home for most

BC communities. Because the measure focuses on designated parks and natural areas, it may under-estimate access to public green space for smaller communities. Crown land is not included as designated green space.

Alternative measures could include the following:

- Total public green space per capita, which is currently measured by the CEEI. This measure draws on provincial, local, and federal datasets of "parks and protected greenspace."
- Public and private green space combined into a measure on a per capita basis, using satellite imagery to assess green space.
- Measuring a five-minute walk from home to either private or public green space.

### **NEXT STEPS**

The Ministry of Municipal Affairs and Housing could integrate "parks and protected area" data from the CEEI with census household data to create a measure similar to what is used in Vancouver and Surrey. Standardized GIS data would have to be collected at the local government level.



### **DESIRED IMPACT**

# The Diversity of Housing Options Matches the Needs of the Community

### **AMBITIOUS GOALS**



Healthy



Livable



Affordable



Resilient



Robust Economy

# BUILT ENVIRONMENT SYSTEMS



Housing

### **OVERVIEW**

In a complete community, residents have access to a variety of housing forms, tenures, sizes, and price points. Wider variety supports residents in making the housing choices that fit their household size, life stage, and income. This variety appears across four factors:

- **Form**: apartment, townhouse, duplex, single-family home, secondary suite, laneway, houseplex, etc.;
- Tenure: renting, fee-simple ownership, strata, co-op, co-housing;
- Size: microsuite, studio, number of bedrooms and bathrooms; and
- Price: market, below market, affordable ownership, subsidized (social).

### RECOMMENDED IMPACT MEASURE

### III N/A

### **FURTHER DETAILS**

While there are several ways to measure housing diversity, no metrics have yet to link diversity of supply to community need. The Housing Diversity Index, for example, uses single-detached, ground-oriented units, and apartments based on census data. The Housing Diversity Index uses the Simpson's Diversity Index to calculate the structural size (e.g., detached, attached, multi-unit) and number of bedrooms in a home for the analysis.

The Capital Regional District uses the net share of new dwelling units by structural type to assess the amount of choice residents have, yet does not adequately consider various structure types. The District defines "suitable housing" as housing that has enough bedrooms for the size and makeup of the residing household.

### **NEXT STEPS**

Few multi-unit residential buildings are suitable for families in urban communities (i.e. containing units with three or more bedrooms). Municipal building permit data could be collected to develop a measure to better assess how families and large households are accommodated in cities.



# Housing is Affordable For All

### **AMBITIOUS GOALS**



Livable



Affordable



Robust Economy

### BUILT ENVIRONMENT SYSTEMS



Housing



**Integrated Communities** 



Transportation

### **OVERVIEW**

Housing affordability is a growing challenge in most communities. Housing is considered affordable when total housing costs (rent, mortgage, utilities, property taxes, condo fees) do not exceed 30% of a household's pre-tax income. Households that are spending more than this 30% are considered to be in core housing need.<sup>20</sup>

Core housing need fails to differentiate between low-income households and high-income households, for which 30% of income may be affordable; 30% of \$80,000 is much more rent than 30% of \$25,000 pre-tax income! Core housing need, as a measure of affordability, also does not factor in transportation costs, which can add significant expense, particularly for households with two or more vehicles.



### RECOMMENDED IMPACT MEASURE

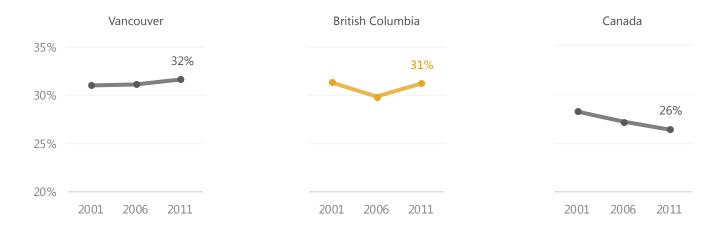
# Hercentage of renter households in core housing need

This measure assesses what percentage of renters spend more than 30% of their pre-tax income on rent. Focusing on renters helps concentrate on lower-income households, since renters typically earn half of what homeowners earn.<sup>21</sup>

31%

of BC renters were in core housing need, at the time of the 2011 National Household Survey.

### FIGURE 4: PERCENTAGE OF RENTERS IN CORE HOUSING NEED



Source: Canada Mortgage and Housing Corporation (CMHC). *Housing Conditions and Core Housing Need*, 2017, <a href="https://www.cmhc-schl.gc.ca/en/hoficlincl/homain/stda/data/data\_013.cfm">https://www.cmhc-schl.gc.ca/en/hoficlincl/homain/stda/data/data\_013.cfm</a>. Data tables are based on Statistics Canada National Household Survey (2011) and Census (2001 and 2006).<sup>22</sup>

### INTERPRETATION

BC has more renters than other parts of Canada do. One-third of BC renters spend more than 30% of their pre-tax income on rent.<sup>23</sup>

### Housing is Affordable For All

### Percentage of renter households in core housing need

### **FURTHER DETAILS**

To not be in core housing need, housing must meet three criteria:

- Adequate housing does not require major repairs;
- Rent costs less than 30% of total before-tax household income; and
- The home has enough bedrooms for the size and make-up of resident households.

### **IDEAL MEASURE**

There is growing momentum to include transportation costs in affordable housing measures. For example, the US-based STAR Community Rating System incorporates income and transportation costs. This measure considers both housing and transportation costs, and focuses on households that fall below income thresholds in relation to their neighbourhood.

A community shows that 80% of households in an US census block group (neighbourhood), earn the area median income (AMI) and spend less than 45% on housing and transportation combined. For example, 60% of households in US census block groups earn 80% of the AMI and spend less than 45% on housing and transportation combined. These neighbourhoods would be eligible for STAR

points. Scoring at the neighbourhood scale is more accurate and highlights areas where affordability is a challenge.

Metro Vancouver's study on housing and transportation costs (see sidebar), illustrates the impact of transportation costs on housing affordability. While the study relied on detailed trip diary data, the CEEI could work with the Insurance Corporation of British Columbia (ICBC) to develop an assessment of BC household transportation costs.<sup>24</sup>

The ideal measure could use median values by census tract and apply the STAR approach to compare household housing and transportation costs with income. Canadian census tracts are similar in size to a neighbourhood, and boundaries are rarely revised. Aggregation of municipal boundaries may be approximate because census tracts do not always match with municipal boundaries.<sup>25</sup>

### **NEXT STEPS**

Develop a measure based on the STAR Communities approach using census data. If valid transportation cost data cannot be obtained, use core housing need and apply to census tracts.



### **CASE STUDY**

# Metro Vancouver Housing and Transportation Cost Burden Study

Metro Vancouver analyzed total housing and transportation costs using 2011 National Household Survey and regional trip diary data. The study reviewed costs across income categories and focused on lower-income households. Findings indicate that housing and transportation accounted for 40% of pre-tax income for homeowners with mortgages, and 49% of pre-tax income for renters. Housing and transportation costs for renters earning less than \$50,000 make up 67% of pre-tax income, which illustrates the severity of the region's affordability problem.

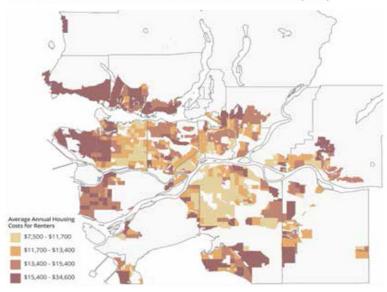
The study examined relationships between housing and transportation costs across regions (see Figure 5 and Figure 6). Many regions with higher rental housing costs have lower transportation costs and vice versa. Combined housing and transportation costs are highest in Langley, Pitt Meadows, and Maple Ridge for "working renter" households. The study found that less expensive housing does not translate into lower household costs. Patterns are similar for households with mortgages.<sup>26</sup>

Closer access to employment, amenities, shops, services, and transit and active transportation can reduce total transportation costs. Locations closer to amenities may have higher housing costs. Linking land use, transportation, and the economy to a more affordable and competitive region is important when discussing economic competitiveness and a robust workforce.



## FIGURE 5: ANNUAL HOUSING COSTS FOR WORKING RENTERS IN METRO VANCOUVER

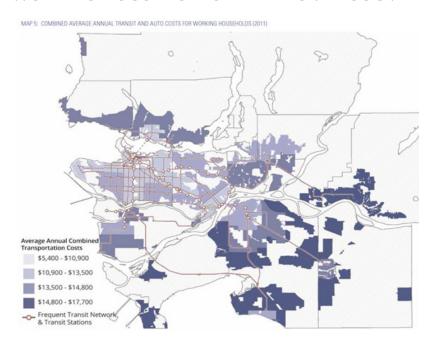
MAP 2: ANNUAL HOUSING COSTS FOR WORKING RENTERS (2011)



**Source**: Metro Vancouver. *The Metro Vancouver Housing and Transportation Cost Burden Study*, 2015: 9,

http://www.metrovancouver.org/services/ regional-planning/PlanningPublications/ HousingAndTransportCostBurdenReport2015. pdf

# FIGURE 6: COMBINED AVERAGE ANNUAL TRANSIT AND AUTOMOBILE COSTS FOR WORKING HOUSEHOLDS IN METRO VANCOUVER



**Source**: Metro Vancouver. *The Metro Vancouver Housing and Transportation Cost Burden Study*, 2015: 13,

http://www.metrovancouver.org/services/ regional-planning/PlanningPublications/ HousingAndTransportCostBurdenReport2015. pdf



# Infrastructure is Efficient and Cost-Effective

### **AMBITIOUS GOALS**



Cost-efficient



Resilient



Robust Economy

## BUILT ENVIRONMENT SYSTEMS



Buildings, Energy, and Infrastructure



**Integrated Communities** 

### **OVERVIEW**

Civic infrastructure is a largely invisible network of roads, potable water, sewer and stormwater pipes, and water treatment facilities. Canadian municipalities possess \$1.1 trillion worth of infrastructure, yet a third is in fair or poor condition.<sup>27</sup>

To maintain this network, municipalities make capital investments in servicing, renovating, and replacing infrastructure. Local governments invest in these expansions and upgrades, primarily financed through development charges and property tax revenue. Over time, local revenue has not kept up with expenses.<sup>28</sup>

Before adopting the Public Sector Accounting Board Standard 3150 in 2008, local governments did not need to depreciate capital assets. In other words, a road built in 1947 had the same book value as a road built in 2007. Most municipalities have not depreciated their infrastructure adequately or set aside sufficient funding for major repairs.<sup>29</sup>

Compact communities are more cost-efficient because they need fewer roads and pipes per resident. By saving on operations and maintenance, compact communities can invest more money in construction. They can also use savings to better prepare for floods, fires, earthquakes, and other disasters that risk infrastructure damage.



### N/A

### **FURTHER DETAILS**

Few communities understand the state of their infrastructure or replacement costs. Two tools may help inform an infrastructure impact measure. The State of Asset Management in BC is a framework developed by Asset Management BC (AMBC) that helps local governments manage infrastructure in cost-effective ways.<sup>30</sup> The Community Lifecycle Infrastructure Costing (CLIC) tool developed by the BC Ministry of Municipal Affairs and Housing helps link land use and infrastructure costs at a neighbourhood scale.<sup>31</sup>

Potential measures that require further discussion and development include asset management performance based on AMBC's framework, infrastructure deficit (or similar measure combining infrastructure condition and funding for renewal), and the percentage of new developments (e.g., number of municipalities, neighbourhoods, developments, units) that use full life-cycle costs to estimate total development costs.

### **NEXT STEPS**

AMBC could apply the State of Asset Management Framework across BC and update it regularly. AMBC, working with the Ministry of Municipal Affairs and Housing, could develop and implement a performance management approach that measures and links land use to efficient infrastructure use.





# All Buildings Are High-Performance

### **AMBITIOUS GOALS**



Healthy



Livable



Cost-efficient



Climate-friendly



**Robust Economy** 

## BUILT ENVIRONMENT SYSTEMS



Buildings, Energy, and Infrastructure

### **OVERVIEW**

Although the term "high-performance" is widely used in the building industry, an emphasis on energy and GHG emissions has created confusion. Depending on the certification standard, high-performance buildings may also feature:

- · Superior precipitation management;
- Facilities for bicycles and electric vehicles;
- · Water conservation;
- · Indoor environmental quality; and
- Use of reused, recycled, and local materials.

High-performance buildings reduce demands on a community, since occupants are healthier, more productive, and save money on energy.

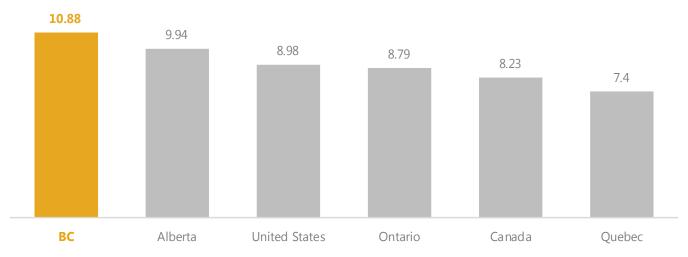
# Number of Leadership in Energy and Environmental Design (LEED) certified buildings per 100,000 people

The LEED certification system awards points for various "green" building features. The number of certified LEED buildings per 100,000 people can be used to estimate the number of high-performance buildings in a city.

10.88

LEED certified buildings per 100,000 people in British Columbia

### FIGURE 7: NUMBER OF LEED CERTIFIED BUILDINGS PER 100,000 PEOPLE



Source: Canada Green Building Council. "Canada Green Building Council LEED Database." In *LEED in Motion: Canada*, 2017, http://www.usgbc.org/resources/leed-motion-canada.



### All Buildings Are High-Performance

# Number of Leadership in Energy and Environmental Design (LEED) certified buildings per 100,000 people

### INTERPRETATION

BC is a leader in high-performance buildings. It has more LEED certified buildings per capita than other provinces in Canada, and more than the US state average.

**FURTHER DETAILS** 

LEED is a popular green building certification that covers various aspects of environmental performance. The Canada Green Building Council maintains a database of LEED certified buildings.<sup>32</sup> While there are other stringent green certification systems, LEED has generated the most uptake over the past two decades in North America.

There are limitations to focusing solely on LEED certified buildings. First, high-performance buildings in general are undercounted by not including other building certifications such as Living Building Challenge, Passive House, BREEAM, and Built Green Canada. Second, LEED certification is mostly applied in the institutional and commercial sectors and in larger buildings typically located in larger municipalities. Residential construction for LEED is under-represented. Finally, certification is relatively expensive, so many high-performing buildings are not certified.

The LEED certification system focuses on environmental performance, and does not include other quality of life metrics in its ratings. In BC, the recently launched BC Energy Step Code (see Case Study) may motivate builders to focus on energy performance compliance rather than other aspects of building design.

### **NEXT STEPS**

Once data from other green building certifications is made accessible, an index combining all high-performance certifications could calculate high-performance buildings more holistically. The BC Building and Safety Standards Branch could lead this endeavour, working with local governments and civil society.



# Sechelt Hospital

Sechelt Hospital achieved LEED Gold Certification based on these features:

- Energy use is 40% less than comparable facilities in the region.
- Zero-carbon heating and cooling system relies on groundwater thermal energy and 19 kilowatts of solar energy.
- 75% of rooms have access to daylight via skylights and clerestory windows.
- Facility has bike racks, shower facilities, and ridesharing.
- Vegetated rooftop absorbs precipitation, supports nesting birds, and provides an attractive and natural view for patients.

- Landscaping is water-efficient and uses local, culturally appropriate plants.
- 50% of wood is Forest Stewardship Council certified and sourced in BC.
- 87% of construction waste was diverted from the landfill.
- Indoor air quality is superior, due to low-emitting materials and windows that open.

For more information, visit vch.ca.





# All Buildings Are Energy Efficient

### **AMBITIOUS GOALS**



Cost-efficient



Climate-friendly

## BUILT ENVIRONMENT SYSTEMS



Buildings, Energy, and Infrastructure

### **OVERVIEW**

Energy-efficient buildings provide quieter spaces, reduce lifetime energy costs and demands on energy infrastructure, and help mitigate climate change. The BC government's CEEI monitors energy use in buildings by using utility data. However, energy use data for the entire building area is not tracked to monitor energy efficiency.

The BC Energy Step Code is a provincial regulation that local governments may use, if they wish, to incentivize or require a level of energy efficiency in new construction that goes above and beyond the requirements of the *BC Building Code*.<sup>33</sup> It consists of a series of steps, representing increasing levels of energy-efficiency performance. By gradually adopting one or more steps of the standard, local governments can increase building performance requirements in their communities. The Province has set a goal that all new buildings must reach a "net-zero energy ready" level of efficiency by 2032; the BC Energy Step Code aims to provide the policy pathway to reach that goal.<sup>34</sup>



# Percentage of local governments that adopt incentives or regulations for upper steps of the BC Energy Step Code

This measure calculates the percentage of municipalities adopting incentives or regulations for steps three and four for new large, complex buildings (called "Part 3" buildings in the Code), or steps four and five for new houses and small buildings (called "Part 9" buildings in the Code). A combined, aggregate measure of incentives and regulations could be reported, or the two building types could be reported separately.

### **FURTHER DETAILS**

If municipalities are required to collect BC Energy Step Code compliance data through the building permit process, it may be possible to monitor the number of buildings reaching each step. The BC Energy Step Code does not apply to existing buildings.

### **IDEAL MEASURE**

A measure of energy performance, coupled with overall building energy intensity (energy use per cubic metre) would provide a comprehensive assessment of building energy efficiency.

### **NEXT STEPS**

Identify a host agency to collect and analyze municipal incentive and regulation data for the BC Energy Step Code. A measure combining building energy use with total building area data to produce an energy efficiency measure for existing buildings could be developed, drawing on the approach used by Portfolio Manager for energy benchmarking.<sup>35</sup> Data should be collected on an annual basis through a survey to local governments, perhaps by BC Housing, the Union of BC Municipalities, or the Ministry of Municipal Affairs and Housing.



# Transportation Systems Support Low-Impact Trips

### **AMBITIOUS GOALS**



Healthy



Affordable



Cost-efficient



Climate-friendly

## BUILT ENVIRONMENT SYSTEMS



**Transportation** 



**Integrated Communities** 

### **OVERVIEW**

Most people travel by car for convenience, comfort, and independence, and to transport things. Nonetheless, car ownership costs are often overlooked. The Canadian Automobile Association estimates vehicle costs at \$10,000 per year, including fuel, car maintenance, and insurance.<sup>36</sup> Other externalized costs that drivers do not directly pay for relate to pollution, noise, inactivity, stress (road rage), and subsidized road infrastructure.

By providing viable alternatives to driving, communities reduce personal transportation costs. Elements of active transportation systems include convenient, comfortable, frequent, and reliable transit; safe bicycle routes; and sidewalks and trails. By shifting some users to active and public transportation, communities can reduce congestion and travel time for residents who need to drive.

# Percentage share of commute trips by mode (cycling, walking, transit)

Measuring the proportion of trips by travel modes (i.e. mode share) is a way to measure viable transportation options. The share of each trip can be counted through trip diary calculations. Commute trip shares are collected every five years in the census.

11%

of BC residents take transit, walk, or cycle to work.

### **TABLE 5: AVERAGE MODE SHARE BY COMMUNITY SIZE**

Community size (population of CMA)	Number of Communities	Average Commute Mode Share (transit, walk, or bicycle)
Large city (>200,000)*	2	25%
Small city (50,000 – 200,000)	7	9%
Large town (10,000 – 50,000)	16	11%
Small town (5,000 – 10,000)	1	8%
Total	26	11%

<sup>\*</sup> Vancouver census metropolitan area and Victoria census metropolitan area.<sup>37</sup>

Source: Statistics Canada. Commuting Distance (km) (9), Age Groups (9) and Sex (3) for the Employed Labour Force 15 Years and Over Having a Usual Place of Work of Canada, Provinces, Territories, Census Metropolitan Areas and Census Agglomerations, 2006 Census - 20% Sample Data, 2006, http://open.canada.ca/data/en/dataset/fc421b58-7701-4fe8-acc9-c815b847f23f.38



### **Transportation Systems Support Low-Impact Trips**

### **Average Mode Share by Community Size**

### INTERPRETATION

BC's largest cities have a 25% travel mode share for commuting by transit, cycling, and walking. Nine out of 10 commuters rely on driving in smaller communities.

### **NEXT STEPS**

The Ministry of Municipal Affairs and Housing could work with the Ministry of Transportation and Infrastructure and ICBC to secure VKT data for vehicles.

### **FURTHER DETAILS**

Community transportation systems are rapidly changing with the adoption of ridesharing services, electric vehicles, and even early self-driving cars. While electric vehicles decrease GHG emissions in BC, they do not alleviate parking or congestion issues. Monitoring driving distances, or vehicle kilometres travelled (VKT), helps link vehicle use with household location, composition, and demographics. Mobile phone data, such as that used by Internet and rideshare providers, may become more accessible to monitor driving patterns over time.



# Transportation Networks Offer Efficient and Reliable Access

### **AMBITIOUS GOALS**



Livable



Cost-efficient



Resilient



Robust Economy

## BUILT ENVIRONMENT SYSTEMS



**Transportation** 



**Integrated Communities** 

### **OVERVIEW**

Travel times are dependent on distance and efficient and reliable transportation networks. Efficiency refers to how quickly people and goods can move around, and reliability concerns how consistently transportation networks function. Commuters value efficient and reliable transportation networks. Uncrowded highways are efficient, yet highways are often congested. Traffic jams make driving unreliable for getting quickly to a destination.

There is little consistency in how efficiency and reliability are measured with regards to mobility.<sup>39</sup> In BC, percentages of VKT in congested conditions (on highways) measure rates of reliability. Speed averages and traffic volumes are used to measure mobility for driving efficiency.

The sustainable transportation sector is becoming more interested in how accessible transportation networks function.<sup>40</sup> Accessible transportation is measured by how convenient the transportation mode is for reaching goods, services, and activities. No consensus has been reached on how to measure how accessible transportation networks operate.<sup>41</sup>

### RECOMMENDED IMPACT MEASURE



### **NEXT STEPS**

Further understanding is required to define and measure transportation network efficiency, reliability, and accessibility.



### **DESIRED IMPACT**

# In High-Risk Locations, Existing Development Is Protected and New Development Is Restricted/Prohibited

### **AMBITIOUS GOALS**



Healthy



Livable



Affordable



Cost-efficient



Climate-friendly



Resilient



**Robust Economy** 

# BUILT ENVIRONMENT SYSTEMS



**Integrated Communities** 



Housing



Buildings, Energy, and Infrastructure



Transportation

### **OVERVIEW**

Communities are exposed to floods, fires, earthquakes, tsunamis, landslides, and extreme weather. The cheapest way to manage these risks is to avoid development in high-risk locations or, if a natural disaster has already taken place, to avoid rebuilding in the same high-risk location after a disaster. Recent innovations in resilient buildings and landscape designs will help to manage risk.<sup>42</sup>

Assessing development in hazardous locations becomes more complicated when at-risk areas expand in size and scale. Maps in Official Community Plans and related bylaws can assess vulnerability by calculating the percentage of developed areas within hazardous areas.



# Percentage of developed land located in identified high-risk hazard areas

This measure focuses on the vulnerability of physical buildings and infrastructure due to natural hazards. It does not address how vulnerable infrastructure (e.g., energy or wastewater facilities) functions during disasters.

#### **FURTHER DETAILS**

The STAR Community Rating System addresses the structural ability of buildings and infrastructure to withstand disasters. Modelling a measure in BC may produce a more sophisticated assessment of a community's exposure to risks: for example, the number of homes below code standards located in designated high-risk areas, percentage of residents living in designated high-risk areas, or critical infrastructure below code standards located in designated high-risk areas.<sup>43</sup>

BC could also look to the US National Oceanic and Atmospheric Administration's Community Vulnerability Assessment Tool to produce an assessment of a community's exposure to risks.<sup>44</sup>

### **NEXT STEPS**

Emergency Management BC could work with local governments to aggregate readily available GIS data on community vulnerability province-wide, and should explore more sophisticated risk assessment methods.





# Communities Produce 80% Fewer GHG Emissions Than in 2007

### **AMBITIOUS GOALS**



Climate-friendly



Resilient

# BUILT ENVIRONMENT SYSTEMS



**Integrated Communities** 



Housing



Buildings, Energy, and Infrastructure



**Transportation** 

### **OVERVIEW**

In BC, most community-level emissions come from buildings and transportation. To improve transportation efficiency, communities can encourage residents to use more efficient vehicles or to switch to active and public transportation modes. Planners can also integrate land use and transportation planning to increase travel options and reduce trip times.



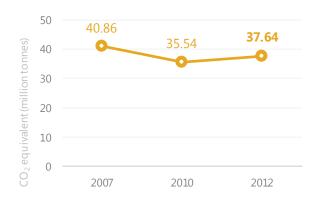
### III Total community GHG emissions

The province's CEEI provides an inventory of energy use and GHG emissions at the community level. CEEI reports data for local governments to support communities meeting climate action goals.

### **METRIC**

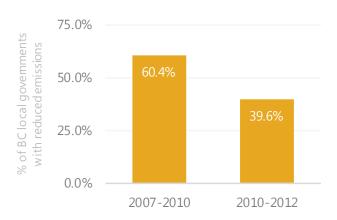
Total community GHG emissions per tonne, as measured by the CEEI.

## FIGURE 8: TOTAL COMMUNITY GHG EMISSIONS



**Source:** Province of British Columbia. *Community Energy and Emissions Inventory*, n.d., <a href="https://www2.gov.bc.ca/gov/content/environment/climate-change/data/ceei">https://www2.gov.bc.ca/gov/content/environment/climate-change/data/ceei</a>

# FIGURE 9: LOCAL GOVERNMENTS WITH DECREASING EMISSIONS



**Source:** Province of British Columbia. *Community Energy and Emissions Inventory*, n.d., <a href="https://www2.gov.bc.ca/gov/content/environment/climate-change/data/ceei">https://www2.gov.bc.ca/gov/content/environment/climate-change/data/ceei</a>

### INTERPRETATION

On the whole, community GHG emissions decreased between 2007 and 2012, with emissions dropping steadily from 2007 to 2010, and rising slightly from 2010 to 2012 (perhaps due to changes in economic activity).<sup>45</sup> Between 2007 and 2012, 20% of communities showed decreases, suggesting that a price on carbon and other strategies are having a desired effect to reduce carbon emissions.



### **Ideal Community GHG Emissions**

### **FURTHER DETAILS**

Following ratification of the 2015 Paris Agreement, Canada committed to reducing GHG emissions 30% below 2005 levels by 2030. BC set its own GHG reduction target in 2007: 80% below 2007 levels by 2050.

The CEEI reports on direct GHG emissions from fossil fuel use. The CEEI also reports on indirect emissions from electricity produced at generation plants and the decomposition of biomass in landfills. Data comes from the following sources:

- Buildings: natural gas and electricity consumed by end users.
- On-road transportation (Lower Mainland) GHG emissions: produced by licensed vehicles.
- Community solid waste: GHG emissions produced by decomposition of organic matter in landfills and GHG emissions associated with incineration of solid waste.
- Land use changes from deforestation: Air photo interpretations to estimate GHG emissions.

Transportation data using utility and GHG intensity data is imprecise due to a lack of data outside the Lower Mainland and lack of VKT data.

### **NEXT STEPS**

The Ministry of Municipal Affairs and Housing, working with the Ministry of Transportation and Infrastructure and ICBC, could obtain personal VKT data.

### MOVING TOWARDS 100% RENEWABLE ENERGY

Some municipalities, such as Vancouver and Victoria, have committed to deeper reductions through 100% renewable energy by 2050 targets.

Nelson's Low Carbon Path to 2040 plan sets a 43% GHG emissions reduction target by 2040, while the District of Saanich is exploring using 100% renewable energy in municipal operations.<sup>46</sup>

Transitioning to renewable energy sources reduces fossil fuel dependency, and helps communities to meet GHG reduction targets.

# **Conclusion and** Recommendations

This snapshot provides a framework for measuring progress toward a sustainable built environment in British Columbia. The report illustrates challenges of measuring progress, including lack of agreement on basic definitions, non-standardized data aggregation by municipalities, and unclear validity of available data and measures. Accurately measuring progress requires geographic, demographic, and socioeconomic data at a community and neighbourhood scale. Some data is readily available, but some needs to be collected from local governments, and other data needs to be further standardized and consolidated.

Despite these challenges, there are successes in measuring and reporting on progress in BC. This report is meant to generate discussions about how to improve data collection, monitoring, and reporting.

By articulating the impacts British Columbians desire, measuring the progress we are making, and identifying what needs to be improved, we can work together to make these aspirations become reality. While the provincial government should play a leading role in organizing data, active participation is required by multiple sectors.

### DATA RECOMMENDATIONS



### 1 SHARED MEASUREMENT

Philanthropic funders, including REFBC, could continue to champion development of a shared measurement framework for the built environment. This dialogue can support the provincial government, local governments, and communities in three ways:

- a. Support continuous learning and collaboration among ministries, departments, and interested organizations by building on recent successes.
- b. Contribute to more efficient governance, by helping highlight investments that offer greater returns, either through leveraging public funds in a single area, or through multiple goals across departments. For example, growth containment reduces demands on taxes, supports better health outcomes, and contributes to greenhouse gas reductions. However, measuring dispersed development is not straightforward and requires further understanding and discussion.
- Continue to support healthy, liveable, affordable, cost-efficient, environment- and climate-friendly, resilient, and economically robust communities that align with Provincial mandates and local government goals.



# 2 STRENGTHEN THE COMMUNITY ENERGY AND EMISSIONS INVENTORY (CEEI)

The Ministry of Municipal Affairs and Housing, working with the Climate Action Secretariat in the Ministry of Environment and Climate Change Strategy, could invest in strengthening and extending the excellent work already done on supporting indicators for the CEEI. This work could be strengthened to address a broader range of built environment goals including:

- a. A strong conceptual/organizational framework, built on a systems approach, that recognizes shared goals among various governmental ministries (e.g., linking Municipal Affairs and Housing, Health, and Transportation and Infrastructure) regarding built environment systems.
- b. Data collection and standardization initiative (see recommendation 3).
- c. A typology of communities that reflects BC's diversity across large urban centres and small rural communities. Community size is a useful starting point, but other characteristics may help to create meaningful categories.
- d. Regular reporting of results, on a timeline consistent with measurable and meaningful changes in performance (e.g., at a minimum, to coincide with the national census).

### 3 STANDARDIZE DATA

The Ministry of Municipal Affairs and Housing, working with the Climate Action Secretariat in the Ministry of Environment and Climate Change Strategy, could work with local governments to strengthen and standardize data collection and sharing, particularly with respect to geographic information system (GIS) data. The Integrated Cadastral Information Society could be an important partner in this effort.

### OPEN-D

### **OPEN-DATA INITIATIVES**

All levels of government could pursue open-data initiatives, ideally using common data standards, to enable third-party organizations to access government data. These initiatives need to be designed to address privacy and other related concerns up front.



TABLE 6: SUMMARY OF DESIRED IMPACTS AND DATA RECOMMENDATIONS

<b>Desired Impact</b>	Impact Measure	Data Recommendations
Residents can access amenities within their neighbourhood or town.	Average Walk Score	Engage Walk Score to clarify methodology, address potential community biases, and extend an analysis to more BC communities. A compatible, independent method drawing on shared municipal GIS data could also be used.
Residents can find suitable jobs close to home.	Commute distance	Define "suitability" of employment, possibly building on livable wage definitions, and explore tracking livable wage jobs to develop a corresponding impact measure. Explore the distribution of commute distances to suitable employment around the median scores measure.
The growth of towns and cities is contained.	Percentage of development within an urban containment boundary	Explore in depth the options to measure dispersed development by defining and distinguishing rural and urban areas as an alternative to using urban containment boundaries.
People in towns and cities have access to green and natural spaces.	Percentage of households living within 400 metres of public green space	Use GIS data to integrate "parks and protected areas" data from the CEEI with census household data to provide a BC-wide measure equivalent to the one used by Vancouver and Surrey.
The diversity of housing options matches the needs of the community.	N/A	Research options for linking housing diversity with community needs, drawing on established measures and exploring innovative measures and approaches. Explore using municipal building permit data to develop a measure to better assess the accommodation of families and larger households in cities.
Housing is affordable for all.	Percentage living in core housing need	Develop a measure of affordability based on the STAR Communities approach, using census data. If valid transportation cost data cannot be obtained, use core housing need and apply to census tracts.



### **TABLE 6 CONTINUED**

<b>Desired Impact</b>	Impact Measure	Data Recommendations
Infrastructure is efficient and cost-effective.	N/A	Apply the State of Asset Management Framework across BC and update regularly. Implement a results-based performance management approach that measures and links land use to efficient infrastructure use. An impact measure could calculate the percentage of new developments that use full life-cycle costs to estimate total development costs (lead: Asset Management BC, working with the Municipality of Municipal Affairs and Housing and civil society).
All buildings are high- performance.	Number of LEED certified buildings per 100,000 people	Consolidate data for key green building certifications and design an index for assessing high-performance buildings (not solely LEED certified buildings) (lead: BC Building and Safety Standards Branch, working with local governments and civil society).
All buildings are energy efficient.	Percentage of local governments that adopt incentives and/or regulations for upper steps of BC Energy Step Code	Develop a system to collect data on the adoption of incentives and regulations for the BC Energy Step Code. In addition, use Portfolio Manager to calculate energy use that combines building energy use data with building area data (cubic meres) to assess energy efficiency in existing buildings.
Transportation systems support low-impact trips.	Percentage share of commute trips by mode (cycling, walking, transit, and car)	Secure accurate vehicle kilometres travelled (VKT) data for BC automobiles (lead: Ministry of Municipal Affairs and Housing, working with the Ministry of Transportation and Infrastructure and ICBC).
Transportation networks offer efficient and reliable access.	N/A	Explore how to define and refine measures for accessibility as related to network efficiency, reliability, and accessibility.

### **TABLE 6 CONTINUED**

<b>Desired Impact</b>	Impact Measure	Data Recommendations
In high-risk locations, existing development is protected and new development is restricted/prohibited.	Percentage of developed land located in identified hazard areas	Aggregate data to monitor community vulnerability using the proposed measure, and explore more sophisticated risk assessment methods (lead: Emergency Management BC, working with local governments).
Communities produce 80% fewer GHG emissions than in 2007.	Total community GHG emissions	Improve CEEI data collection and analysis methods for transportation, particularly for VKT data.



# **Appendix: Methodology**

### **DEVELOPING THE FRAMEWORK**

REFBC defines the built environment as a system made of land use, transportation, housing, and buildings and infrastructure subsystems, and the relationships between them. For each sub-system, we identified desired impacts to qualitatively describe the future performance of the built environment. A literature review identified potential impact measures for each desired impact.

#### **REVIEWING AND REFINING**

The advisory committee reviewed the preliminary framework and related measures, or sources of impact measures. We reviewed and refined a set of criteria for individual measures and the entire set of measures.

### Criteria for impact measures:

- Available: Data is available and easily accessible.
- Understandable: Data is easily understood by a diverse range of non-technical audiences.
- Credible: Data is supported by valid information and interpreted in a scientifically defensible manner.
- Reliable: Data is likely to be available consistently over time, from the same or alternative sources.
- Temporal: Data has the capacity to measure trends regularly over time.
- Relevant: Data/indicator reflects community values and interests.

- Useful: Results can be used to support improved decisions.
- Integrative: Data demonstrates connections among key dimensions of sustainability.
- Comparable: Data can be compared across regions.

### Criteria for the set of impact measures:

- Balanced: Does the set cover all important areas without undue emphasis on any one area?
- Supports consensus: Is the set likely to clarify consensus on the objectives of the system/ organization?
- Complete: Does the set address all important aspects of the system?

### RECOMMENDING IMPACT MEASURES

Drawing on the results of the first committee meeting, the project team recommended a series of impact measures for consideration at their second meeting. The team discussed and analyzed findings and identified potential alternatives. They clarified the desired impacts and available impact measures, and assessed these for gaps.

#### **REPORT**

The committee peer reviewed a draft for comment in September 2017. The report was finalized based on input received.



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