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Supporting the Development of  
**A MANDATORY ENERGY  
BENCHMARKING PROGRAM**

for Existing Buildings in the Metro Vancouver  
Region

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# Table of Contents

<b>Executive Summary</b> .....	<b>4</b>
<b>Introduction</b> .....	<b>5</b>
<b>Research Focus</b> .....	<b>5</b>
<b>Research Methodology</b> .....	<b>5</b>
<b>Background</b> .....	<b>6</b>
<b>Mandatory Benchmarking Policy</b> .....	<b>6</b>
<b>Summary of Benchmarking Policies in North America</b> .....	<b>6</b>
Building Types & Sizes Covered .....	<b>6</b>
Benchmarking and Reporting Requirements .....	<b>7</b>
Data Disclosure .....	<b>7</b>
<b>Requirements Beyond Benchmarking and Reporting</b> .....	<b>8</b>
Prescriptive Path .....	<b>8</b>
Performance Path .....	<b>9</b>
<b>Experience with Benchmarking in the Region</b> .....	<b>11</b>
<b>Expectations of Benchmarking in the Region</b> .....	<b>12</b>
<b>Policy Alternatives</b> .....	<b>14</b>
<b>Policy Evaluation Criteria</b> .....	<b>14</b>
<b>Policy Alternative #1: Municipal-Level Energy Benchmarking Policy</b> .....	<b>15</b>
<b>Policy Alternative #2: Building Energy Performance Standard</b> .....	<b>16</b>
<b>Policy Alternative #3: Regional Benchmarking Program</b> .....	<b>18</b>
<b>Policy Alternative #4: Carbon Emission Limits</b> .....	<b>19</b>
<b>Conclusion and Policy Recommendation</b> .....	<b>21</b>
<b>Recommendations for Metro Vancouver</b> .....	<b>22</b>
<b>Recommendations for Municipalities</b> .....	<b>22</b>
<b>Appendix A. Summary Tables of Benchmarking Policies</b> .....	<b>23</b>
<b>Appendix B. Case Study: New York City (NYC)</b> .....	<b>30</b>

## Executive Summary

Building energy benchmarking is an ongoing measurement of a building's energy performance. In the last decade, benchmarking and reporting policies have emerged to unlock new energy efficiency opportunities in the existing building stock by creating strong market signals and promoting data-driven decision making. As of June 2019, 34 jurisdictions in the U.S. and the Province of Ontario have adopted policies that require privately-owned buildings to benchmark and report their energy consumption. Some leading cities are further pursuing more comprehensive building policy packages that include prescriptive actions or performance targets to drive energy conservation and reduce carbon emissions.

In the Greater Vancouver region, there is currently no policy mandating energy benchmarking for existing buildings, but municipalities overwhelmingly agreed that developing such program has huge potential to help achieve municipal and regional climate goals. Exploring how Metro Vancouver and member jurisdictions can implement energy benchmarking under their respective authorities is the purpose of this report.

Four policy alternatives the report has put forth are:

- *Municipal-Level Energy Benchmarking Policy*  
Municipalities establish requirements for energy benchmarking and Metro Vancouver provides data management and technical assistance to support municipal-level policies.
- *Building Energy Performance Standard*  
Municipalities set an energy performance standard and require underperforming buildings to improve their energy efficiency. Energy benchmarking is used to track the compliance status of affected buildings. Similar to the first alternative, Metro Vancouver provides regionally coordinated data management and training support.
- *Regional Benchmarking Program*  
Metro Vancouver launches a regional benchmarking program, requiring buildings over a certain size threshold to measure and report their annual energy use and emissions.
- *Carbon Emissions Limits*  
Metro Vancouver sets carbon emissions limits for existing buildings and uses energy benchmarking for compliance checking.

Understanding the benefits and trade-offs associated with each policy alternative offers insights for Metro Vancouver and member jurisdictions to discuss the next steps and take actions in concert to their respective responsibilities. Actors at local, regional, and provincial levels will need to work cooperatively to hasten the development of energy benchmarking and decarbonization of the existing building stock in the region.

## Introduction

Greenhouse gas (GHG) emissions from buildings account for a quarter of total emissions in the Metro Vancouver region.<sup>1</sup> By adopting the BC Energy Step Code, new buildings are on a path to become “net-zero energy ready” by 2032.<sup>2</sup> However, a study conducted by the Pembina Institute shows that net-zero policies will only contribute to a third of the emissions reductions needed for municipalities and Metro Vancouver to achieve their climate targets. The rest will have to come from deep decarbonization of existing buildings.<sup>3</sup>

One of the key barriers of scaling up energy upgrades in existing buildings is the lack of information. Policymakers have a significant knowledge gap about how existing buildings are currently performing in their jurisdictions, and many building owners remain unaware in the efficiency of their buildings, leaving energy-saving strategies unpursued despite the existence of financial incentives. A growing number of jurisdictions across the world have passed energy benchmarking ordinances to address this information gap.<sup>4</sup>

Unlike building code criteria that are triggered by permit-requiring projects, mandatory energy benchmarking policies require large buildings to annually report their energy consumption and, in some cases, publicly disclose benchmarking data. Benchmarking requirements empower the real estate market to consider and recognize the value of energy efficiency and allow policymakers to further refine and develop plans, programs, and policies for existing buildings.<sup>5</sup> Along with benchmarking policies is a growing array of regulations and programs that help jurisdictions meet their climate commitments.

In North America, 34 jurisdictions in the U.S. and the Province of Ontario have passed mandatory benchmarking policies for existing buildings.<sup>6</sup> In Canada, the regulation of energy falls under the provincial jurisdiction, while given the circumstance that the Province of British Columbia (B.C.) has no current plans to establish a benchmarking policy, Metro Vancouver may be an appropriate entity to take leadership on developing a regional program to achieve relatively higher degree of consistency and minimize unnecessary duplication of resources across municipalities.

## Research Focus

This research explores policy options on how Metro Vancouver and member municipalities can lead the implementation of building energy benchmarking in the region. The main objective of this research is to provide strategic considerations regarding available pathways to develop energy benchmarking under their respective authorities.

## Research Methodology

A literature review and stakeholder interviews were used in this research. The author conducted the literature review through online keyword searches and eleven interviews, either in-person or over the telephone, between June and August 2019.

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<sup>1</sup> "Climate 2050 STRATEGIC FRAMEWORK". 2018. *Metrovancouver.Org*. [http://www.metrovancouver.org/services/air-quality/AirQualityPublications/AQ\\_C2050-StrategicFramework.pdf](http://www.metrovancouver.org/services/air-quality/AirQualityPublications/AQ_C2050-StrategicFramework.pdf).

<sup>2</sup> "Energy Step Code – Government of British Columbia". 2019. *Energystepcode.Ca*. <https://energystepcode.ca/>.

<sup>3</sup> Pierre Frappé Sénéclauze, Tom, Dylan Heerema, and Karen Tam Wu. 2017. "Deep Emissions Reduction in The Existing Building Stock". *Pembina.Org*. <https://www.pembina.org/reports/retrofit-strategy-bc-report-2017.pdf>.

<sup>4</sup> "Map: U.S. City, County, And State Policies for Existing Buildings: Benchmarking, Transparency and Beyond | IMT". 2019. *IMT*. <https://www.imt.org/resources/map-u-s-building-benchmarking-policies/>.

<sup>5</sup> Hart, Zachary. 2015. "The Benefits of Benchmarking Building Performance". *Imt.Org*. [https://www.imt.org/wp-content/uploads/2018/02/PCC\\_Benefits\\_of\\_Benchmarking.pdf](https://www.imt.org/wp-content/uploads/2018/02/PCC_Benefits_of_Benchmarking.pdf).

<sup>6</sup> *Ibid*,4.

## Background

### Mandatory Benchmarking Policy

Mandatory benchmarking policies comprise three components: benchmarking, reporting, and transparency.<sup>7</sup> Their corresponding requirements and targeting actions are summarized in Figure 1 below.

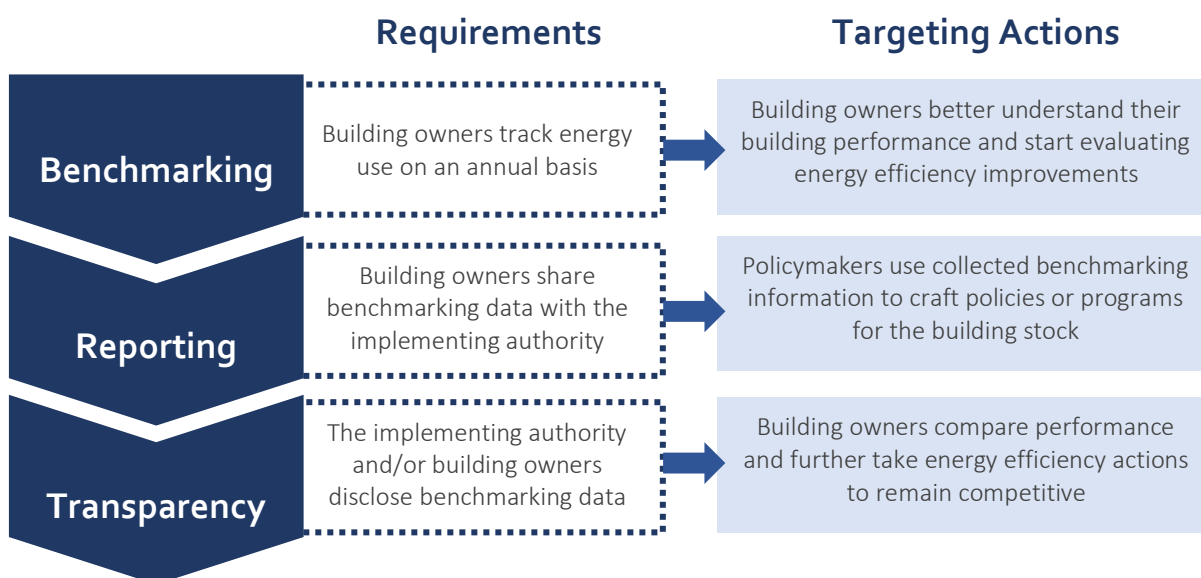


Figure 1. Encouraging Market Transformation Through Energy Benchmarking

### Summary of Benchmarking Policies in North America

As of June 2019, thirty U.S. cities, three states, one county, and the province of Ontario have passed policies requiring privately-owned commercial buildings, multifamily residential buildings, or both to benchmark and report building energy use data.<sup>8</sup> Due to the limited information available on policies in the State of New Jersey, the City of Des Moines and Edina, this section focuses on the other 32 jurisdictions and summarizes their key policy designs (refer to [Table A-1](#) in Appendix A).

#### Building Types & Sizes Covered

25 of the 32 studied jurisdictions target both commercial and multifamily buildings<sup>9</sup>, and 9 of them adopted a phased approach, requiring commercial buildings to report their compliance metrics first, followed by multifamily buildings.

In terms of the size threshold, these policies vary widely from 5,000 sq. ft to 100,000 sq. ft. Most of the policies currently apply to buildings greater than 50,000 sq. ft, while phased implementation will lead to smaller building size thresholds in subsequent years.

In addition to building size, the number of dwelling units is another metric used to determine multifamily buildings that are covered by benchmarking policies in six jurisdictions.<sup>10</sup> For example,

<sup>7</sup> "Energy Benchmarking and Transparency Benefits | IMT". 2017. *IMT*. <https://www.imt.org/resources/fact-sheet-energy-benchmarking-and-transparency-benefits/>.

<sup>8</sup> "Map: U.S. City, County, And State Policies for Existing Buildings: Benchmarking, Transparency and Beyond | IMT". 2019. *IMT*. <https://www.imt.org/resources/map-u-s-building-benchmarking-policies/>.

<sup>9</sup> Benchmarking policies in Washington state, Montgomery County, Portland (OR), Austin, Pittsburgh, Boulder, Salt Lake only apply to commercial buildings.

<sup>10</sup> California; Portland, ME; San Diego; Boston; Cambridge; and South Portland

Boston's Building Energy Reporting and Disclosure Ordinance applies to multifamily buildings that are 35,000 sq. ft and above or have 35 or more units.<sup>11</sup>

## Benchmarking and Reporting Requirements

All policies reviewed for this report require building owners to collect and enter necessary property information and monthly energy use data for a full calendar year into ENERGY STAR® Portfolio Manager (Portfolio Manager).<sup>12</sup> Nineteen of these jurisdictions also ask for water use tracking.

Once data is entered, all jurisdictions except for Washington State require data reporting. Three reporting pathways are observed, and they differ in terms of actions that need to be taken by building owners. First, most jurisdictions **provide a web link** which automatically adds a reporting template to each Portfolio Manager account. Building owners then submit an electronic annual benchmarking summary to the implementing authority. Unlike other jurisdictions, the City of Seattle requires covered buildings (i.e. buildings that are subject to benchmarking requirements) to **authorize the City to download building performance data via Portfolio Manager**.<sup>13</sup> In addition to reporting through Portfolio Manager, the City of Austin offers another option. Austin Energy, the local utility company, calculates the annual energy consumption data for the buildings. Building owners just need to **confirm the accuracy of the property information online** for reporting compliance.<sup>14</sup>

## Data Disclosure

Transparency is achieved through data disclosure. There are three types of data disclosure among the studied policies (see the text box below).

### THREE TYPES OF DATA DISCLOSURE

- **Public transparency** is a requirement for an implementing authority to make key benchmarking information publicly accessible.
- **Transactional transparency** is a requirement for building owners to disclose a building's energy efficiency metrics to prospective tenants, lenders, or buyers at the time of sale or lease of a building.
- **Energy labelling** is a numerical or alphabetical rating assigned to buildings by an implementing authority based on annual benchmarking reporting. The rating would be posted in a publicly visible and prominent location.

The more common type is public transparency. All studied jurisdictions except for Washington State have such requirement. Benchmarking data is disclosed via downloadable spreadsheets, analyzed in summary statistics or reports, and visualized in interactive maps. Data disclosure starts between one and three years after initial reporting. It is also worth noting that Atlanta only discloses benchmarking information of buildings with energy performance equal to or better than the national median.<sup>15</sup>

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<sup>11</sup> "Building Energy Reporting and Disclosure Ordinance". 2019. *Boston.Gov*. <https://www.boston.gov/departments/environment/building-energy-reporting-and-disclosure-ordinance#about>.

<sup>12</sup> ENERGY STAR® Portfolio Manager is an online energy management tool for tracking and assessing energy and water consumption across buildings.

<sup>13</sup> "Benchmarking & Reporting Compliance Checklist". 2018. *Seattle.Gov*. <https://www.seattle.gov/Documents/Departments/OSE/Benchmark/EBR-Checklist-2018.pdf>.

<sup>14</sup> "Key Code Reporting Option". 2016. <https://austinenergy.com/ae/energy-efficiency/ecad-ordinance/for-commercial-buildings/key-code-reporting-option>.

<sup>15</sup> Energy Star score  $\geq 55$  or energy use intensity  $\leq$  national median established by the most recent Commercial Buildings Energy Consumption Survey or Residential Energy Consumption Survey of the Energy Information Administration

Seattle, Berkeley, Chicago, and Austin require both public and transactional transparency, while Washington State only uses transactional transparency with no other form of public transparency as the state does not have access to the benchmarking data. Building owners need to disclose Energy Star score<sup>16</sup> and a full calendar year of benchmarking data at the time of sale or lease contract signing, but they are not required to report benchmarking data to the state.<sup>17</sup>

Chicago and New York have energy labelling requirements for buildings covered by benchmarking policies. Starting in summer 2019, Chicago will provide each covered building a Placard (see Figure 2) with an energy rating between one and four stars based on its ENERGY STAR score.<sup>18</sup> In the City of New York, building owners will be assigned grades from A to F beginning in 2020, with A being ENERGY STAR score equal to or greater than 85 and F being buildings that fail to submit required benchmarking information.<sup>19</sup>



Figure 2. Draft of the Chicago Energy Rating Placard

## Requirements Beyond Benchmarking and Reporting

Twelve studied jurisdictions require additional actions beyond benchmarking. Two pathways for compliance are the *prescriptive path* in which owners of covered buildings must complete specified energy efficiency actions, and the *performance path* in which covered buildings need to achieve efficiency improvement or emissions reduction targets ( see [Table A-2](#) in Appendix A for further details).

### Prescriptive Path

In studied jurisdictions, prescriptive actions fall into four main categories: energy audit, retro-commissioning, mandatory energy upgrades, and efficiency improvement measures (see the following box for detailed explanations).

<sup>16</sup> The 1–100 Energy Star score helps assess how a building is performing compared to similar buildings nationwide. A score of 50 is the median. If a building scores below 50, it means it's performing worse than 50% of its peers, while a score above 50 means it's performing better than 50% of its peers.

<sup>17</sup> "5854-S2.PL.". 2009. *Apps.Leg.Wa.Gov*. <https://apps.leg.wa.gov/documents/billdocs/2009-10/Pdf/Bills/Senate%20Passed%20Legislature/5854-S2.PL.pdf>.

<sup>18</sup> "Chicago Energy Rating". 2019. *Chicago.Gov*. <https://www.chicago.gov/city/en/progs/env/ChicagoEnergyRating.html>.

<sup>19</sup> "GBEE - Greener, Greater Buildings Plan - LL84: Benchmarking". 2019. *Www1.Nyc.Gov*. <https://www1.nyc.gov/html/gbee/html/plan/ll84.shtml>.



## FOUR PRESCRIPTIVE ACTIONS

**Energy Audit** is a systematic investigation of heating, cooling, and other energy-using systems in a building. It helps building owners to understand how energy is consumed, as well as potential improvements they can take to optimize the overall energy performance in their buildings. Since the submission of an energy audit report is required to demonstrate compliance, it also provides jurisdictions with an inventory of the equipment and systems being used in the private building stock.<sup>20</sup>

**Retro-Commissioning** is the process of identifying and correcting deficiencies in existing systems of a building. In the course of building operation, degraded performance, suboptimal management, neglected maintenance of energy systems all lead to losses in energy efficiency. Retro-commissioning helps optimize building energy operations and ensure that investments in equipment and systems can result in energy savings over time.<sup>21</sup>

**Mandatory Energy Upgrades** are approached in two ways. First is that a jurisdiction specifies an action that buildings owners must make. For example, Boulder requires covered buildings to complete lighting upgrades that meet the current version of the International Energy Conservation Code.<sup>22</sup> Commercial buildings over 25,000 in New York are required to install sub-metered for each large non-residential tenant space.<sup>23</sup> The second is to require that building owners implement recommended energy-saving measures identified through retro-commissioning. One example is Seattle's Building Tune-Ups Program, where covered building owners must complete and document corrective actions in a report to the City.<sup>24</sup>

**Efficiency Improvement Measures** provide building owners with clearly defined ways to implement energy conservation opportunities of heating, cooling, lighting, and domestic water in buildings. Covered buildings are required to perform a certain number of measures in a list. Reno, San Jose, and Washington DC offer this as an alternative pathway for a building that does not meet performance standards.

## Performance Path

Three types of performance path policies have been observed. The first is to earn a **certification** representing high performance such as LEED for Existing Buildings: Operations & Maintenance (EBOM)<sup>25</sup>, Net Zero Energy Building, or EPA Energy Star. The second is to **demonstrate improved performance** in at least one of the evaluation metrics, including Energy Star score, weather normalized energy use intensity (EUI), total energy consumption, or GHG emissions, as shown in Table 1 below. In addition to different targets, the design of baseline year, compliance cycle, and performance measurement also varies across studied jurisdictions (see [Table A-3](#) in Appendix A for more details).

<sup>20</sup> Hart, Zachary, Jayson Antonoff, and Hilary Firestone. 2016. "Building Performance Policies: A Comprehensive Approach". *Aceee.Org*. [https://aceee.org/files/proceedings/2016/data/papers/9\\_955.pdf](https://aceee.org/files/proceedings/2016/data/papers/9_955.pdf).

<sup>21</sup> *Ibid*, 20.

<sup>22</sup> "Boulder Building Performance Efficiency Requirements". 2019. *BoulderColorado.Gov*. <https://bouldercolorado.gov/sustainability/boulder-building-performance-efficiency-requirements>.

<sup>23</sup> "GBEE - Greener, Greater Buildings Plan - LL88: Lighting Upgrades & Sub-Metering". 2019. *Www1.Nyc.Gov*. <https://www1.nyc.gov/html/gbee/html/plan/ll88.shtml>.

<sup>24</sup> "Implementation of Building Tune-Ups Requirement". 2017. *Seattle.Gov*. [https://www.seattle.gov/Documents/Departments/OSE/OSE\\_DIRECTORS\\_RULE\\_2016-01.pdf](https://www.seattle.gov/Documents/Departments/OSE/OSE_DIRECTORS_RULE_2016-01.pdf).

<sup>25</sup> Leadership in Energy and Environmental Design is a globally recognized green building rating system. LEED EBOM is for existing buildings that are undergoing improvement work or little to no construction.

**Table 1: Summary of Performance Improvement Targets**

Jurisdiction	Building Performance Improvement Target (meet one of more of the following targets)			
	Energy Star Score	Weather Normalized EUI	Energy Consumption	GHG Emissions
Reno	↑ 15 points	↓ 10% (source)	/	/
San Jose	↑ 15 points	↓ 15% (source)	/	/
Washington DC	/	↓ 20% (site)	/	/
Los Angeles	/	↓ 15% (source)	/	/
Boston	↑ 15 points	↓ 15% (site)	↓ 15%	↓ 15%

The third path requires building owners to *meet specific energy efficiency or GHG emissions standards* to achieve compliance. For instance, the City of Boulder requires a Home Energy Rating System (HERS) score of 120.<sup>26</sup> The City of New York imposes emissions intensity caps on buildings larger than 25,000 sq. ft.<sup>27</sup> As seen in the following table, there are four jurisdictions that have set performance standards. Reno, San Jose, and Boulder target towards energy efficiency, while New York focuses on GHG emissions.

**Table 2: Summary of Performance Standards**

Jurisdiction	Building Performance Standard (meet one of more of the following targets)			
	Energy Star Score	Weather Normalized EUI	HERS	GHG Emissions
Reno	> 50	> Median	/	/
San Jose	>75	25% < Mean	/	/
Boulder	/	/	> 120	/
New York	/	/	/	< The emission intensity limit for its building type

It is also interesting to note that Orlando and Washington DC use energy performance in addition to size threshold to segment buildings and implement tiered requirements. In Orlando, buildings that are below the national median Energy Star score or an equivalent energy performance metric are required to perform energy audit or retro-commissioning.<sup>28</sup> Instead of using the national calculations, Washington DC requires buildings that are below the local median Energy Star score or an equivalent metric to advance their energy efficiency over the 5-year compliance period.<sup>29</sup> Unlike Orlando and

<sup>26</sup> "SmartRegs Inspection Information". 2019. *BoulderColorado.Gov*. <https://bouldercolorado.gov/plan-develop/smartregs-inspection-information>.

<sup>27</sup> "New York City Passes GHG Emissions Cap for Buildings - Local Law 97". 2019. *Energywatch*. <https://energywatch-inc.com/breaking-new-york-city-council-passes-first-of-its-kind-ghg-emissions-cap-for-buildings/>.

<sup>28</sup> "Building Energy & Water Efficiency Strategy". 2019. *Orlando.Gov*. <https://www.orlando.gov/Initiatives/Building-Energy-Water-Efficiency-Strategy>.

<sup>29</sup> "Building Energy Performance Standards". 2019. *Doee.Dc.Gov*. <https://doee.dc.gov/service/beps>.

Washington, the City of Boulder ties efficiency improvements to the rental license approval process, requiring all licensed rental housing to meet a minimum energy efficiency standard.<sup>30</sup>

## Experience with Benchmarking in the Region

This section reviews policies and programs in 21 member municipalities of Metro Vancouver and finds that four municipalities currently have policies related to energy benchmarking. Table 3 shows that benchmarking is considered as an administrative requirement for new Part 3 buildings (large and complex buildings)<sup>31</sup> and projects subject to rezoning. Covered buildings are required to set up a Portfolio Manager account, connect automatic data upload with utilities if applicable, and allow municipalities to access the account for reviewing ongoing energy performance but not for public disclosure. At the time of writing this report, no building has yet submitted benchmarking information to any municipality.

**Table 3: Municipalities' Experience with Benchmarking**

City	Policy	Status	Targeted Scope	Action Required
Vancouver	<a href="#">Green Buildings Policy for Rezonings</a>	Effective April 28, 2017	Rezoning applications	<ul style="list-style-type: none"> <li>Separate master metering for each energy utility, and submeter major energy end-uses and space uses within each building</li> <li>Set up a Portfolio Manager account</li> <li>Retain a qualified service provider to assist with annual energy benchmarking reports to the City and review the reporting for accuracy for minimum three years after occupancy</li> </ul>
Burnaby	<a href="#">Part 3 Green Building Policy</a>	Effective July 1, 2019	Rezoning applications	<ul style="list-style-type: none"> <li>Separate master metering for each energy utility, and submeter major energy end-uses and/or space uses within each building</li> <li>Set up a Portfolio Manager account</li> <li>Provide the City with "Read Only" permission<sup>32</sup></li> <li>Register Section 219 covenant on property to require ongoing reporting<sup>33</sup></li> </ul>
		Effective Feb 11, 2019	New Part 3 buildings	
Surrey	<a href="#">BC Energy Step Code Bylaw Amendment</a>	Effective April 1, 2019	New Part 3 buildings	<ul style="list-style-type: none"> <li>Set up a Portfolio Manager account</li> <li>Provide the City with "Read Only" permission</li> </ul>
Richmond	<a href="#">Building to the Energy Step Code: Part 3 Buildings</a>	Effective September 1, 2018	New Part 3 buildings	<ul style="list-style-type: none"> <li>Set up a Portfolio Manager account</li> <li>Provide the City with "Read Only" permission</li> </ul>

<sup>30</sup> "SmartRegs Inspection Information". 2019. *BoulderColorado.Gov*. <https://bouldercolorado.gov/plan-develop/smartregs-inspection-information>.

<sup>31</sup> Part 3 buildings are buildings classified as Group A, B or F-1 that exceed 600m<sup>2</sup> in building area or three storeys in building height and that have major occupancies.

<sup>32</sup> "Read Only Access" allows others to view and download all information about a building, but not to make any additions or changes.

<sup>33</sup> "ZONING BYLAW AMENDMENTS". 2017. *Eagenda.Burnaby.Ca*. <https://eagenda.burnaby.ca/sirepub/cache/2/hwuy024ggzmuakmjhohfcvxn/74808282019083744300.pdf>.

## Expectations of Benchmarking in the Region

The themes summarized below featured prominently in findings from stakeholder interviews.

### **1. *Benchmarking is a starting point to reduce energy consumption and carbon emissions from existing buildings.***

All of the municipal respondents interviewed for this report identified a large information gap in understanding the energy performance of existing buildings and believe that energy benchmarking can bridge this gap. A benchmarking program will provide data for them as well as property owners to better understand building performance. Moreover, it is widely accepted that understanding energy use is the first step towards the ultimate goal of reducing energy usage and GHG emissions from existing buildings. Therefore, benchmarking enables governments to further design action-oriented policies or programs and prepare the industry for future regulations.

### **2. *Voluntary energy benchmarking for existing buildings should eventually become mandatory***

Stakeholders overwhelmingly agreed that an energy benchmarking program should be mandatory. Some stakeholders felt that having a voluntary program is an important step to initiate outreach to the industry, test data management tools and develop case studies for mandatory requirements. The Open Green Building Society is now planning a two-year BC Benchmarking Pilot Program, a voluntary program for both commercial and multifamily properties with the goal to move towards mandatory programs. BC Hydro will consider providing data analysis for a mandatory or a voluntary benchmarking program to support greater participation.

### **3. *Most municipalities prefer the concept of a regional or provincial benchmarking program***

Municipal respondents almost uniformly expressed concerns about limited funding and staff to monitor compliance status, analyze collected data, and provide supporting activities needed for a mandatory city-level benchmarking program. It is still uncertain whether municipalities have the legal authority to make requirements regarding existing building benchmarking as there is no precedent within Canada. Additionally, the authority for regulating GHG emissions only exists at the regional and provincial level.

In addition, respondents have different expectations of getting support from city councils. Some were confident that the councils would approve a benchmarking proposal, others thought the councils might push back on mandatory benchmarking due to the lack of a template in the region and a consideration of limited resources. Some respondents highlighted the importance of educating city council on the value of a benchmarking program.

There is a shared sense among municipal respondents that industry will be more supportive of consistent requirements across the region or the province. So, most respondents thought that a regional or provincial program would be preferable. An alternative view expressed that a regional benchmarking program may not be a good fit for the expected building policy ecosystem in the city. Using the same benchmarking tool could help ensure the consistency between a municipal and regional program.

### **4. *Assigning clear roles and responsibilities throughout the design and implementation of a regional or provincial benchmarking program is critical to success***

Municipal respondents would like to work closely with Metro Vancouver or the Province at the policy design stage to ensure that the development of an appropriate and effective regional or provincial program, but they had mixed opinions about their ongoing involvement. Some suggested sharing resources among municipalities to help Metro Vancouver implement a regional benchmarking program, while others said that they would be more likely to act as advocates for a

regional regulation and connect building owners to available training programs. In either case, most respondents expressed a desire to have centralized data management led by Metro Vancouver.

**5. *Comprehensive building policy packages can drive more rapid improvements but need educational support and data quality verification.***

All respondents are interested in pursuing more comprehensive building policy packages that include prescriptive actions such as energy audits and retro-commissioning, and performance targets, in addition to benchmarking. They mentioned the importance of educating the industry about the benefits of these energy conservation strategies. For policies with performance targets, some respondents expressed concerns about challenges in setting meaningful and attainable goals and in preventing data manipulation for compliance purposes.

**6. *A provincial energy labelling program may be a challenge for benchmarking requirements in the region***

Some stakeholders mentioned that the provincial government is exploring policy options to develop an energy labelling program. Inconsistent reporting mechanisms between a benchmarking and a labelling program may burden large buildings that are covered by both programs. Although these two programs are not naturally exclusive, stakeholders noted the following two challenges: First, it remains unclear when and how a provincial energy labelling program would be implemented. Secondly, the two programs might be difficult to coordinate if they have different objectives. Energy labelling is a market-based approach, while energy benchmarking aims to lay the foundation of existing building decarbonization policies in the region. However, both programs can be done well if they are coordinated. An example is New York. The City will assign energy efficiency scores and grades for energy labelling based on the Energy Star score that a building earns using the Portfolio Manager through the benchmarking process.<sup>34</sup>

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<sup>34</sup> "GBEE - Greener, Greater Buildings Plan - LL84: Benchmarking". 2019. *Www1.Nyc.Gov*. <https://www1.nyc.gov/html/gbee/html/plan/ll84.shtml>.

## Policy Alternatives

This section discusses how Metro Vancouver and municipalities can approach energy benchmarking for existing buildings and evaluate the benefits and trade-offs of proposed policy alternatives in terms of a set of criteria.

### Policy Evaluation Criteria

The following figure shows five criteria that are used in the assessment of proposed policy alternatives.



Figure 3. Five Evaluation Criteria

- ***Effectiveness to Increase Energy Efficiency***  
This criterion is intended to determine to what extent a policy option can contribute to energy savings in the Metro Vancouver region. It can be measured through changes in average EUI (kWh/m<sup>2</sup>) from the first calendar year a policy option is implemented. Because of the limited resources, expected levels of changes (high, medium, low) are used for evaluation in this report.
- ***Effectiveness to Reduce GHG Emissions***  
This criterion considers the impact of a policy option on reducing regional carbon emissions and can be measured through percentage changes of emissions from existing buildings relative to 2010 levels. Facing the same limitation as of the first criterion, this report uses levels of impacts (high, medium, low) instead.
- ***Cost of Implementation***  
This criterion refers to the costs associated with initial implementation and ongoing program support. Due to the lack of information about baseline costs, relative levels of costs (high, medium, low) are applied in the evaluation based on the comparison among four policy options. Cost allocation between Metro Vancouver and municipalities will be discussed in the following evaluation.
- ***Legal Feasibility***  
Consistency with current legal framework of an implementing authority is a key criterion to understand whether a particular option makes sense from an operational standpoint. This report uses three levels (high, medium, low) to evaluate each policy option.
- ***Industry Acceptability***  
This criterion considers the acceptance of pursuing a particular policy option from the perspective of industry. Compliance challenges and consistency of requirements across local, regional and provincial governments will affect the levels (high, medium, low) of acceptance.

## Policy Alternative #1: Municipal-Level Energy Benchmarking Policy

Municipalities could establish requirements for energy benchmarking of buildings above a certain size threshold, and Metro Vancouver provides data management and technical assistance to support municipal-level benchmarking policies (see Figure 4).

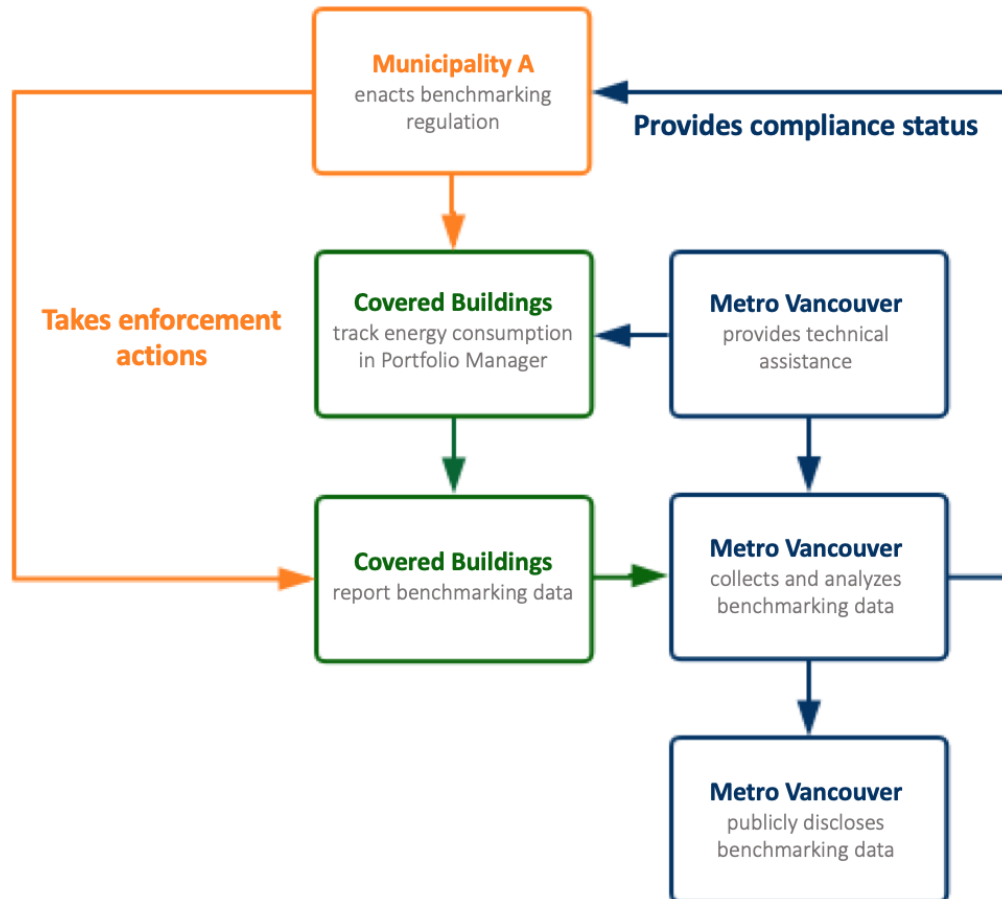


Figure 4. Policy Alternative #1: Municipal-Level Benchmarking for Existing Buildings

In terms of data management, Metro Vancouver could design “customized” reporting templates based on the requirements in different benchmarking policies and provide weblinks to building owners for electronic data submission. Staff then examine every submission and follow up if there is any data missing or accuracy problems. Metro Vancouver could further disclose collected benchmarking information publicly on behalf of municipalities. For technical assistance, Metro Vancouver could engage utility or other outside partners to provide compliance guidelines, build a help desk, and develop training programs to facilitate municipalities’ benchmarking mandates. Before a certain date in a calendar year, Metro Vancouver would need to provide the compliance status for municipalities to take enforcement actions.

Municipal-level benchmarking has the potential to increase energy efficiency. Buildings that are required to benchmark showed 3 to 8 percent reductions in energy consumption or energy use intensity following a two- to four-year of policy implementation.<sup>35</sup> Reduced energy usage also results in GHG emissions reduction. New York City saw a 14 percent reduction in carbon emissions from

<sup>35</sup> "Energy Analysis and Environmental Impacts Division Lawrence Berkeley National Laboratory". 2017. *Emp.Lbl.Gov*. [https://emp.lbl.gov/sites/default/files/lbnl\\_benchmarking\\_final\\_050417\\_0.pdf](https://emp.lbl.gov/sites/default/files/lbnl_benchmarking_final_050417_0.pdf).

benchmarked buildings between 2010 and 2015.<sup>36</sup> However, benchmarking policies are only enabling strategies to gain these impacts, and the number of buildings would be covered in the region remains unknown given its dependence on the progress of design and implementation of municipality-led benchmarking programs. This delay may also be a barrier to the policy alternative being effective in meeting municipalities' and Metro Vancouver's committed climate targets.

In this proposed alternative, the cost of implementation would be distributed between municipalities and Metro Vancouver. Municipalities would be responsible for costs associated with program design, conducting outreach and enforcement. Metro Vancouver would cover the costs related to data management and assistance services. Although Metro Vancouver would carry some of the financial burden, each municipality would still have to spend a significant amount of money to implement the policy. According to a report on evaluating U.S. building energy benchmarking programs, during the start-up and the first year of policy implementation, jurisdictions estimate costs of \$300,000 to \$1,200,000. In the following years, the annual cost ranges between \$150,000 and \$800,000.<sup>37</sup>

The legal research conducted by the City of Richmond indicates that municipalities can make requirements regarding energy benchmarking. However, at present, there is no established municipal-level benchmarking program for existing buildings in the region. Market acceptance is another challenge for this policy alternative due to the potential inconsistency of benchmarking requirements from city to city.

**Table 4: Evaluation of Policy Alternative #1: Municipal-Level Energy Benchmarking**

Evaluation Criteria	Desired Direction	Policy Alternative#1: Municipal-Level Energy Benchmarking Policy
Effectiveness to increase Energy Efficiency (High/Med/Low)	↑	Low
Effectiveness to Reduce GHG Emissions (High/Med/Low)	↑	Low
Cost of Implementation (High/Med/Low)	↓	Med
Legal Feasibility (High/Med/Low)	↑	Med
Industry Acceptance (High/Med/Low)	↑	Med

## Policy Alternative #2: Building Energy Performance Standard

Although energy benchmarking policies can provide building owners with information about their building performance, it could take considerable time and effort for them to act on the information. To achieve deeper energy savings and collect data from existing buildings, municipalities could require buildings over a certain size threshold that are below a specific energy performance standard (e.g. an Energy Star score or weather-normalized site EUI) to improve their energy efficiency over the compliance cycle. Metrics for performance improvement could be a reduction in EUI, total energy usage, or an increase in Energy Star score. Energy benchmarking serves as a screening and compliance tracking tool under this scenario. And similar to the responsibilities in Policy Alternative #1, Metro Vancouver could support member municipalities by providing data management and technical assistance services (see Figure 5).

<sup>36</sup> "New York City's Energy and Water Use 2014 And 2015 Report". 2017. *Www1.Nyc.Gov*. <https://www1.nyc.gov/html/gbee/downloads/pdf/UGC-Benchmarking-Report-101617-FINAL.pdf>.

<sup>37</sup> "Energy Analysis and Environmental Impacts Division Lawrence Berkeley National Laboratory". 2017. *Emp.Lbl.Gov*. [https://emp.lbl.gov/sites/default/files/lbnl\\_benchmarking\\_final\\_050417\\_0.pdf](https://emp.lbl.gov/sites/default/files/lbnl_benchmarking_final_050417_0.pdf).



Compared to Policy Alternative #1, this option targets directly at building energy performance and hence would be more effective to increase energy efficiency as well as reduce GHG emissions. An example here is Washington D.C.'s Performance Standards program. It has the potential to reduce annual citywide energy usage by 21 percent, which equates to 1.05 million tons of GHG emissions.<sup>38</sup> However, unlike D.C. and other cities in the U.S., it is still uncertain whether municipalities in B.C. have the legal authority to set energy performance standards for existing buildings as the regulation of energy lies with provincial governments in Canada.

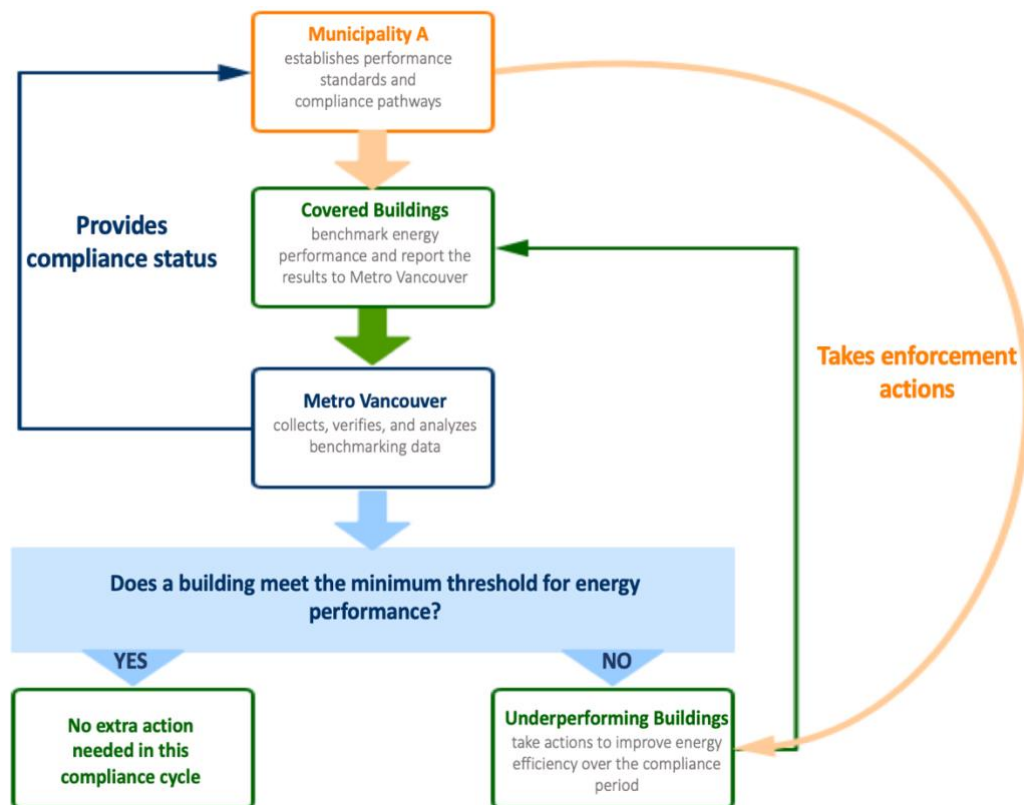


Figure 5. Policy Alternative #2: Building Energy Performance Standard

In this alternative, municipalities would face increasing cost with policy design for research on establishing a threshold for screening covered buildings and setting performance targets. Although municipalities only need to focus on underperforming buildings, more efforts would be needed to support each building, making the outreach cost constant. On the other hand, Metro Vancouver would spend more on data verification and training program development. As in Policy Alternative #1, inconsistency among programs in different local jurisdictions would be a burden for the building industry. And more demanding requirements may make this alternative more difficult to gain support from the industry.

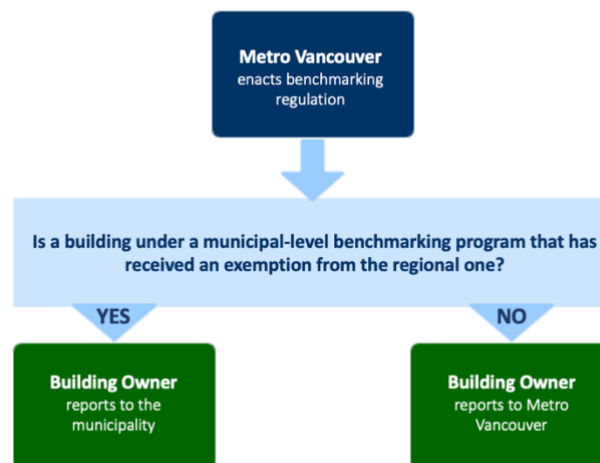
<sup>38</sup> "C40 Washington DC BEPS Analysis". 2019. *Doee.Dc.Gov*. [https://doee.dc.gov/sites/default/files/dc/sites/d DOE/service\\_content/attachments/C40%20Washington%20DC%20BEPS%20Analysis%20-%20Cover%20Letter%20%2B%20Memo%20Report%2019%20June%202019.pdf](https://doee.dc.gov/sites/default/files/dc/sites/d DOE/service_content/attachments/C40%20Washington%20DC%20BEPS%20Analysis%20-%20Cover%20Letter%20%2B%20Memo%20Report%2019%20June%202019.pdf).

**Table 5: Evaluation of Policy Alternative #2: Building Energy Performance Standard**

Evaluation Criteria	Desired Direction	Policy Alternative #2: Building Energy Performance Standard
Effectiveness to increase Energy Efficiency (High/Med/Low)	↑	High
Effectiveness to Reduce GHG Emissions (High/Med/Low)	↑	Med
Cost of Implementation (High/Med/Low)	↓	High
Legal Feasibility (High/Med/Low)	↑	Med
Industry Acceptance (High/Med/Low)	↑	Low

### Policy Alternative #3: Regional Benchmarking Program

Metro Vancouver could also consider launching a regional benchmarking program, requiring building owners in the region that have a gross floor area greater than a certain size threshold to benchmark their energy consumption and report the results via Portfolio Manager annually. If municipalities have their own benchmarking requirements, they can either opt in to the regional program or apply for an exemption from the regional program. Once the exemption is received, building owners only need to follow their local reporting instructions and report to the local jurisdictions. Metro Vancouver would support benchmarking in municipalities that have not been granted an exemption (see Figure 6).



**Figure 6. Policy Alternative #3: Regional Benchmarking Program**

Unlike Policy Alternative #1 and #2, the scope of buildings covered by a regional benchmarking program scales up. Therefore, even though benchmarking itself does not directly increase building energy efficiency and cut GHG emissions, a regional program may have bigger impacts on these two metrics compared to scattered municipal-level programs.

Considering the cost, Metro Vancouver takes responsibility for most of the policy design and implementation costs. Since municipalities only act as advocates in this scenario, there would be no substantive labor and capital inputs for them. Although Metro Vancouver would bear more costs

compared to the above two alternatives, economies of scale will instead be realized due to the extent of building coverage. So, cost would be high to Metro Vancouver in this alternative but may be lower in total costs. Also, it is likely that industry would prefer this option because of its high consistency.

While Metro Vancouver is authorized to regulate air contaminants including greenhouse gases that are generated through the burning of fossil fuels in buildings, a typical energy benchmarking program does not specifically target reducing GHG emissions or other air contaminants. Further work would be required to design an emissions benchmarking regulation that fits within its authority. An early task of this policy alternative would be developing new legal requirements.

**Table 6: Evaluation of Policy Alternative #3: Regional Benchmarking Program**

Evaluation Criteria	Desired Direction	Policy Alternative #3: Regional Benchmarking Program
Effectiveness to increase Energy Efficiency (High/Med/Low)	↑	Med
Effectiveness to Reduce GHG Emissions (High/Med/Low)	↑	Med
Cost of Implementation (High/Med/Low)	↓	Low
Legal Feasibility (High/Med/Low)	↑	Unknown (further work required)
Industry Acceptance (High/Med/Low)	↑	High

### Policy Alternative #4: Carbon Emission Limits

Establishing GHG emission limits for existing buildings and using energy benchmarking as progress tracking and compliance checking mechanism may be another policy option. Metro Vancouver could set increasingly stringent carbon emission intensity limits (metric tonnes of CO<sub>2</sub>e per square metre) by building type for buildings over a specific size threshold from 2022 to 2050. Covered building owners are required to benchmark their energy consumption and periodically file a report containing the information to Metro Vancouver to demonstrate compliance with the applicable building emissions limit. An example implementation timeline patterned after New York’s building emissions limits is listed below.



**Figure 7. An Implementation Timeline of Policy Alternative #4: Carbon Emission Limits**

This policy alternative has the potential to significantly reduce carbon emissions. A case in point is the Local Law 97 in the City of New York. By capping the emissions for buildings over 25,000 sq. ft, the City expects to cut 5.3 million metric tons of carbon emissions, the equivalent of San Francisco’s

citywide emissions.<sup>39</sup> The carbon emission limits would be met by a mix of fuel switching and building energy efficiency upgrades. So, the impact of this alternative on efficiency depends on what actions would be taken to reduce emissions in existing buildings. In terms of the legal feasibility, Metro Vancouver has the delegated authority to control and regulate GHG emissions.<sup>40</sup>

There are two following challenges associated with this alternative:

The first is that the industry might not be ready for this legislation. Looking back to New York’s case (see the case study of New York City in [Appendix B](#)). In 2009, the City enacted the Greener, Greater Buildings Plan, a comprehensive set of energy efficiency laws. The Plan includes annual energy and water benchmarking with public disclosure; an energy audit and retro-commissioning every ten years; adherence to the energy code for any renovation or alteration project; lighting upgrades and the installation of sub-meters for large non-residential tenant spaces. Starting in 2018, the City also requires covered buildings to display their energy labels.<sup>41</sup> All these regulations help building owners get prepared gradually for the emissions limits. As Metro Vancouver has not set any of the above requirements, the lack of a culture of managing energy usage in existing buildings in the Greater Vancouver region may result in resistance to the introduction of a regulation that limits GHG emissions.

Increased costs for Metro Vancouver are the second challenge of this alternative. Note that, New York established a new department, the Office of Building Energy and Emissions Performance, to implement and enforce the carbon emissions bill. Additionally, the City is now conducting outreach, creating education programs, and expanding the NYC Retrofit Accelerator<sup>42</sup> to support the legislation. These actions could help increase industry acceptance but may also raise costs considerably. In addition to operational expenses, Metro Vancouver may need to resource policy design studies that explore policy options including: setting the limits, developing alternative pathways, choosing the most appropriate compliance tool, etc.

**Table 7: Evaluation of Policy Alternative #4: Carbon Emission Limits**

Evaluation Criteria	Desired Direction	Policy Alternative #4: Carbon Emission Limits
Effectiveness to increase Energy Efficiency (High/Med/Low)	↑	Med
Effectiveness to Reduce GHG Emissions (High/Med/Low)	↑	High
Cost of Implementation (High/Med/Low)	↓	High
Legal Feasibility (High/Med/Low)	↑	High
Industry Acceptance (High/Med/Low)	↑	Low

<sup>39</sup> "Ground-breaking Climate Legislation Sets Carbon Emissions Caps for Energy Use in NYC'S Large Buildings Starting In 2024.". 2019. *Urbangreencouncil.Org*. [https://www.urbangreencouncil.org/sites/default/files/urban\\_green\\_emissions\\_law\\_summary\\_v3\\_0.pdf](https://www.urbangreencouncil.org/sites/default/files/urban_green_emissions_law_summary_v3_0.pdf).

<sup>40</sup> "GVRD Air Quality Permitting Process and Decisions: General Legal Framework and Guiding Principles". 2019. *Metrovancouver.Org*. Accessed August 29. <http://www.metrovancouver.org/services/Permits-regulations-enforcement/PermitRegulationEnforcementPublications/AirQualityPermittingProcess.pdf>.

<sup>41</sup> "Legislation - Sustainability". 2019. *Www1.Nyc.Gov*. <https://www1.nyc.gov/site/sustainability/legislation/legislation.page>.

<sup>42</sup> NYC Retrofit Accelerator offers a free one-stop resource and personalized advisory services for building owners

## Conclusion and Policy Recommendation

The following is a summary table and assessment of the four policy alternatives the report has put forth.

**Table 8: Summary of the Assessment of Four Policy Alternatives**

Evaluation Criteria	Desired Direction	Policy Alternative #1: Municipal-Level Energy Benchmarking Policy	Policy Alternative #2: Building Energy Performance Standard	Policy Alternative #3: A Regional Benchmarking Program	Policy Alternative #4: Carbon Emission Limits
Effectiveness to increase Energy Efficiency (High/Med/Low)	↑	Low	High	Med	Med
Effectiveness to Reduce GHG Emissions (High/Med/Low)	↑	Low	Med	Med	High
Cost of Implementation (High/Med/Low)	↓	Med	High	Low	High
Legal Feasibility (High/Med/Low)	↑	Med	Med	Unknown	High
Industry Acceptance (High/Med/Low)	↑	Med	Low	High	Low

In response to the warnings on global warming in the *Special Report* released by the Intergovernmental Panel on Climate Change (IPCC), Metro Vancouver has adopted new climate targets that aim to achieve carbon neutrality by 2050 with an interim goal of 45 percent GHG emissions reduction from 2010 levels by 2030.<sup>43</sup> Realizing this vision will require bold and proactive actions. One of the “secret ingredients” is energy benchmarking, which provides data for Metro Vancouver and member municipalities to understand the existing building stock and further develop policies and programs to drive deeper energy savings and emissions reduction.

Municipal-level energy benchmarking policies enable municipalities to design benchmarking requirements reflecting local conditions. Data management and training support from Metro Vancouver could also reduce the implementation burden on municipal governments. However, the reductions in energy use and GHG emissions needed to meet the municipal and regional climate targets cannot be directly achieved from energy benchmarking alone, and inconsistent requirements among municipalities may be another challenge for this policy alternative.

Establishing building energy performance standards could achieve high energy savings as it requires the least-efficient buildings to make improvements. But this policy alternative could not ensure continued data reporting as energy benchmarking only happens at the beginning and the end of a compliance cycle and whether member jurisdictions have the authority to set standards remains unknown. Additionally, increased total costs, inconsistent standards among municipalities, and potential industry resistance are the barriers to policy implementation.

Unlike the above two alternatives, a regional energy benchmarking program avoids a patchwork of differing requirements and expands the scope of coverage which could lead to economies of scale. But similar to the policy alternative #1, energy benchmarking does not have direct impacts on

<sup>43</sup> "METRO VANCOUVER REGIONAL DISTRICT CLIMATE ACTION COMMITTEE REGULAR MEETING". 2019. *Metrovancouver.Org*. [http://www.metrovancouver.org/boards/ClimateAction/CAC\\_2019-Jul-12\\_AGE.pdf](http://www.metrovancouver.org/boards/ClimateAction/CAC_2019-Jul-12_AGE.pdf).

efficiency improvement and emissions reduction. Another challenge to this policy alternative is that more research is required to determine if Metro Vancouver is the appropriate regulatory authority for an energy benchmarking program.

Regulating carbon emissions could help both regional and municipalities to achieve their emissions reduction targets. But as energy benchmarking is a compliance checking mechanism which is only performed at the end of a compliance cycle, a continuous data flow is not available under this scenario. Industry resistance to regulated emission targets and increasing cost associated with policy design and industry capacity building would also be matters of concern for this alternative.

It is also worth noting that the policy alternatives provided in this report are not mutually exclusive and may need to be implemented concurrently to support the decarbonization targets for existing buildings. Understanding the benefits and trade-offs associated with each policy alternative offers insights for Metro Vancouver and member jurisdictions to discuss the next steps and take actions in line with their respective responsibilities.

### **Recommendations for Metro Vancouver**

- Explore options for implementing a regional benchmarking regulation under Metro Vancouver's legal authority
- Outline major elements of the selected policy option
- Consult with municipalities and the provincial government on the proposed policy design
- Engage and consult with industry stakeholders

### **Recommendations for Municipalities**

- Identify and clarify or update long-term objectives and goals for energy and GHG reduction
- Educate city councils about the importance and benefits of energy benchmarking
- Conduct legal analysis of municipalities' authority to establish building energy performance standard
- Benchmark city-owned buildings and publicly disclose data
- Develop education and training programs on benchmarking and other energy-saving strategies for existing buildings

Although this research focuses on the development of a regional benchmarking program, the Province of British Columbia can play a central role in leading a provincial requirement for energy benchmarking of existing buildings as well as establishing provincial energy performance standards and GHG emission limits for existing buildings. A provincial program would be most impactful regarding the total building floor area covered and would achieve the highest degree of consistency and cost effectiveness. Therefore, there is value for Metro Vancouver and municipalities to engage the Province to consider the development of a provincial benchmarking program and performance requirements.

## Appendix A. Summary Tables of Benchmarking Policies

Table A-1. Comparison of Key Policy Designs of Energy Benchmarking and Reporting Policies

Jurisdiction	Building Covered	Phased Implementation	Benchmarking Data	Reporting Approach	Data Disclosure	Format of Disclosure	Complementary Policy
Atlanta	Com & MF ≥ 50k Com & MF ≥ 25k	Aug 01, 2015 Aug 01, 2017	Energy + Water	Reporting link	Public	Data spreadsheet (for buildings that have Energy Star score ≥ 50 or EUI ≤ national median)/ Summary statistics	Energy audit
Austin	Com ≥ 75k Com ≥ 30k Com ≥ 10k	Jun 01, 2012 Jun 01, 2013 Jun 01, 2014	Energy	Reporting link/ Key Account Reporting Process	Public/ Transactional	<u>Public</u> : Data spreadsheet; Interactive map <u>Transactional</u> : ENERGY STAR scores	N/A
Berkeley	Com & MF ≥ 50k Com & MF ≥ 25k Com & MF ≥ 15k Com & MF ≥ 5k Com & MF < 5k	Jul 01, 2018 Jul 01, 2019 Jul 01, 2020 Jul 01, 2021 Jul 01, 2022	Energy	Reporting link	Public/ Transactional	<u>Public</u> : Summary report; <u>Transactional</u> : Most recent Energy Report including ENERGY STAR scores	Energy audit
Boston	Com ≥ 50k MF ≥ 50k or ≥ 50 units Com ≥ 35k MF ≥ 35k or ≥ 35 units	Sep 15, 2014 May 15, 2015 May 15, 2016 May 15, 2017	Energy + Water	Reporting link	Public	Data spreadsheet/ Summary report/ Interactive map	Meeting the requirements of either a performance or a prescriptive path
Boulder	Com ≥ 50k Com ≥ 30k Com ≥ 20k	Aug 01, 2016 Jun 01, 2018 Jun 01, 2020	Energy	Reporting link	Public	Data spreadsheet/ Summary report/ Interactive map	RCx + Energy audit + Lighting upgrade; Rental properties should the requirements of either a performance or a prescriptive path
California	Com > 50k MF > 50k and 17 units	Jun 01, 2018 Jun 01, 2019	Energy	Reporting link	Public	<i>Shared benchmarking data available to the public</i>	N/A
Cambridge	Com ≥ 50k MF ≥ 50 units Com ≥ 25k	May 01, 2015 May 01, 2016	Energy + Water	Reporting link	Public	Data spreadsheet/ Summary report/ Interactive map	N/A
Chicago	Com ≥ 250k Com ≥ 50k MF ≥ 250k MF ≥ 50k	Jun 01, 2014 Jun 01, 2015 Jun 01, 2016	Energy	Reporting link	Public/ Transactional	<u>Public</u> : Data spreadsheet/ Summary report/ Interactive map/ENERGY STAR scores; <u>Transactional</u> : ENERGY STAR scores	N/A
City of South Portland	Com ≥ 5k MF ≥ 10 units	May 01, 2018	Energy + Water	Reporting link	Public	Summary report	N/A
Denver	Com & MF ≥ 50k Com & MF ≥ 25k	Jun 01, 2017 Jun 01, 2018	Energy	Reporting link	Public	Summary report/ Interactive map	N/A

Jurisdiction	Building Covered	Phased Implementation	Benchmarking Data	Reporting Approach	Data Disclosure	Format of Disclosure	Complementary Policy
Evanston	Com & MF ≥ 100k Com & MF ≥ 50k Com & MF ≥ 20k	Jun 30, 2017 Jun 30, 2018 Jun 30, 2019	Energy + Water	Reporting link	Public	<i>Shared benchmarking data available to the public</i>	N/A
Fort Collins	<i>Com ≥ 20k Com ≥ 10k MF ≥ 20k Com ≥ 5k MF ≥ 10k MF ≥ 5k</i>	<i>Mar 01, 2020 Mar 01, 2021 Mar 01, 2022 Mar 01, 2023</i>	Energy + Water	Reporting link	Public	<i>Shared benchmarking data available to the public</i>	N/A
Kansas	Com & MF ≥ 100k Com & MF ≥ 50k	May 01, 2017 May 01, 2018	Energy + Water	Reporting link	Public	Data spreadsheet/ Summary report	N/A
Los Angeles	Com & MF ≥ 100k Com & MF ≥ 50k Com & MF ≥ 20k	Jul 01, 2017 Apr 01, 2018 Apr 01, 2019	Energy + Water	Reporting link	Public	Data spreadsheet/ Summary report	Meeting the requirements of either a performance or a prescriptive path
Minneapolis	Com ≥ 100k Com ≥ 50k MF ≥ 100k	Jun 01, 2014 Jun 01, 2015 Jun 01, 2019	Energy + Water	Reporting link	Public	Data spreadsheet/ Summary report	N/A
Montgomery	Com ≥ 250k Com ≥ 50k	Jun 01, 2016 Jun 01, 2017	Energy	Reporting link	Public	Data spreadsheet/ Summary report/ Interactive map	N/A
New York	Com & MF ≥ 50k Com & MF ≥ 25k	May 01, 2010 May 01, 2018	Energy + Water	Reporting link	Public	Data spreadsheet/ Summary report/ Interactive map/ENERGY STAR scores and energy efficiency grades	Energy audit + RCx + Lighting upgrades + Sub-metering + Carbon intensity limits
Ontario	Com ≥ 250k Com & MF ≥ 100k <i>Com &amp; MF ≥ 50k</i>	Jul 01, 2018 Jul 01, 2019 <i>Jul 01, 2020</i>	Energy + Water	Reporting link	Public	<i>Shared benchmarking data available to the public</i>	N/A
Orlando	Com & MF ≥ 50k	May 01, 2018	Energy + Water	Reporting link	Public	<i>Summary report/ Interactive map</i>	Energy audit
Philadelphia	Com ≥ 50k MF ≥ 50k	Nov 01, 2013 Jun 30, 2016	Energy + Water	Reporting link	Public	Data spreadsheet/ Summary report/ Interactive map	N/A
Pittsburgh	Com ≥ 50k	Jun 01, 2018	Energy + Water	Reporting link	Public	<i>Data spreadsheet/ Summary report/ Interactive map</i>	N/A
Portland, ME	Com ≥ 20k MF ≥ 50 units	May 01, 2018	Energy + Water	MI	Public	Data spreadsheet	N/A
Portland, OR	Com ≥ 50k Com ≥ 20k	Apr 22, 2016 Apr 22, 2017	Energy	Reporting link	Public	Data spreadsheet/ Summary report/ Interactive map	N/A



Jurisdiction	Building Covered	Phased Implementation	Benchmarking Data	Reporting Approach	Data Disclosure	Format of Disclosure	Complementary Policy
Reno	<i>Com &amp; MF ≥ 100k</i> <i>Com &amp; MF ≥ 50k</i> <i>Com &amp; MF ≥ 30k</i>	<i>Apr 01, 2020</i> <i>Apr 01, 2021</i> <i>Apr 01, 2022</i>	Energy + Water	MI	Public	<i>Summary report</i>	Meeting the requirements of either a performance or a prescriptive path
Salt Lake	<b>Com ≥ 50k</b> <i>Com ≥ 25k</i>	<b>May 01, 2019</b> <i>May 01, 2020</i>	Energy	Reporting link	Public	<i>Shared benchmarking data available to the public</i>	N/A
San Diego	<b>Com ≥ 50k</b> <b>MF ≥ 50k and 17 units</b>	<b>Jun 01, 2019</b> <b>June 01, 2020</b>	Energy	Reporting link	Public	<i>Shared benchmarking data available to the public</i>	N/A
San Francisco	Com ≥ 50k Com ≥ 25k Com ≥ 10k MF ≥ 50k	Oct 01, 2011 Apr 01, 2012 Apr 01, 2013 Jul 01, 2019	Energy	Reporting link	Public	Data spreadsheet/ Summary report/ Interactive map	Energy audit
San Jose	<b>Com &amp; MF ≥ 50k</b> <i>Com &amp; MF ≥ 20k</i>	<b>May 01, 2019</b> <i>May 01, 2020</i>	Energy + Water	Reporting link	Public	<i>Summary report</i>	Meeting the requirements of either a performance or a prescriptive path
Seattle	Com & MF ≥ 50k Com & MF ≥ 20k	Oct 01, 2012 Apr 01, 2013	Energy	Authorize the City to download data	Public/ Transactional	<u>Public</u> : Data spreadsheet/ Summary report/ Interactive map; <u>Transactional</u> : Benchmarking data and ENERGY STAR scores upon request	RCx
St. Louis	<b>Com &amp; MF ≥ 50k</b>	<b>Apr 01, 2018</b>	Energy + Water	Reporting link	Public	Data spreadsheet	N/A
Washington	Com ≥ 50k Com ≥ 10k	Jan 01, 2011 Jan 01, 2012	Energy	N/A	Transactional	Benchmarking data and ENERGY STAR scores	N/A
Washington DC	Com & MF ≥ 200k Com & MF ≥ 150k Com & MF ≥ 100k Com & MF ≥ 50k	Apr 01, 2010 Apr 01, 2011 Apr 01, 2012 Apr 01, 2013	Energy + Water	Reporting link	Public	Data spreadsheet/ Summary report/ Interactive map	Meeting the requirements of either a performance or a prescriptive path

**Note:**

1. Com = Commercial buildings, MF = Multifamily buildings
2. Bold font indicates covered buildings required to comply as of July 2019. Italic font indicates covered buildings required to comply at a future date.
3. RCx = Retro-commissioning/ Tune-ups

**Table A-2. Summary of Complementary Policies**

Jurisdiction	Complementary Policy Description
Atlanta	<p><u>Energy Audits:</u></p> <p>Commercial and multifamily buildings over 25,000 sq. ft shall undertake an ASHRAE Level 2 energy audit every ten years beginning in 2019. Owners are free to choose whether or not or which of the recommendations to implement. Exemptions are available for high-performance buildings.<sup>44</sup></p>
Berkeley	<p><u>Energy Assessment:</u></p> <p>All buildings in Berkeley are required to conduct an energy assessment within a specified time period (once every five years for large buildings 25,000 sq. ft or larger and once every ten years for buildings less than 25,000 sq. ft) beginning in 2018 or at the point of building sale. If selling, energy information, including compliance documents and a copy of the energy report are required to be disclosed at time of contract signing. Buildings with an ENERGY STAR score of 80 or above are exempt from this requirement, but still need to benchmark and report annually.<sup>45</sup></p>
Boston	<p><u>Energy Action and Assessment Requirement:</u></p> <p>Commercial and multifamily buildings over 35,000 sq. ft must demonstrate that they are highly efficient, achieve energy consumption or carbon emissions reduction targets, or perform an energy assessment every five years starting in May 2019. The performance targets include a 15% reduction in site EUI, total site energy consumption, total GHG emissions, or a 15-point increase in Energy Star score. The baseline is established with the second year of a building’s energy data and the compliance is verified through the annual energy benchmarking and reporting.<sup>46</sup></p>
Boulder	<p><u>Building Performance Efficiency Requirements:</u></p> <p>Commercial buildings with 20,000 sq. ft or larger are required to implement efficiency actions over a phased compliance timeline starting in 2019. The actions include: 1) conduct energy assessment in accordance with ASHRAE Energy Audits Standard every 10 years; 2) perform retro-commissioning every 10 years and implement measures within two years of the study; 3) complete one-time lighting upgrades. High performing buildings can be exempt from the above efficiency requirements.<sup>47</sup></p> <p><u>SmartRegs:</u></p> <p>All licensed rental properties are required to meet an energy efficiency standard. Property owners can comply with SmartRegs by following a prescriptive or performance path. The performance path requires a HERS score of 120, and the prescriptive path involves a checklist of efficiency improvement measures as an alternative for compliance. According to the City of Boulder, 98 percent of SmartRegs property owners choose to achieve compliance through the prescriptive path.<sup>48</sup></p>

<sup>44</sup> "A GUIDE TO ENERGY AUDITS". 2019. *Atlantabuildingbenchmarking.Files.Wordpress.Com*. Accessed July 22. <https://atlantabuildingbenchmarking.files.wordpress.com/2019/01/formatted-energy-audit-guide-final.pdf>.

<sup>45</sup> "BESO Large Buildings - City of Berkeley, CA". 2019. *City of Berkeley. Info*. <https://www.cityofberkeley.info/BESOSchedule/>.

<sup>46</sup> "BERDO ENERGY ACTION AND ASSESSMENT REQUIREMENT - GUIDANCE". 2018. *Boston.Gov*. [https://www.boston.gov/sites/default/files/document-file-10-2018/berdo\\_action\\_assessment\\_guidance-two\\_pager\\_10.3.18.pdf](https://www.boston.gov/sites/default/files/document-file-10-2018/berdo_action_assessment_guidance-two_pager_10.3.18.pdf).

<sup>47</sup> "Boulder Building Performance Efficiency Requirements". 2019. *BoulderColorado.Gov*. <https://bouldercolorado.gov/sustainability/boulder-building-performance-efficiency-requirements>.

<sup>48</sup> "SmartRegs Inspection Information". 2019. *BoulderColorado.Gov*. <https://bouldercolorado.gov/plan-develop/smartregs-inspection-information>.

Jurisdiction	Complementary Policy Description
Los Angeles	<p><u>Energy and Water Audits and Retro-Commissioning:</u></p> <p>Starting in 2020, commercial and multifamily buildings 20,000 sq. ft or more must undergo an energy audit and retro-commissioning every five years. Energy audits shall meet or exceed ASHRAE Level 2 audits. Retro commissioning shall be performed in accordance with ASHRAE Guideline 2.0 Commissioning Process for Existing Systems and Assemblies. High-performance buildings, buildings with at least 15 percent EUI reduction, or buildings that have completed specific efficiency improvement measures within the five-year compliance cycle can gain exemption.<sup>49</sup></p>
New York	<p><u>Greener, Greater Buildings Plan:</u></p> <p>Commercial and multifamily buildings over 50,000 sq. ft shall perform energy audits and retro-commissioning once every ten years starting in 2013.<sup>50</sup> Multifamily buildings with common areas greater than 25,000 sq. ft and commercial buildings greater than 25,000 sq. ft are required to upgrade lighting systems to meet New York City Energy Conservation Code standards by 2025. Also, commercial buildings greater than 25,000 sq. ft need to install electrical sub-meters for non-residential tenant space over 5,000 sq. ft and provide monthly energy statements.<sup>51</sup></p> <p><u>The Climate Mobilization Act:</u></p> <p>Beginning in 2024, buildings over 25,000 sq. ft shall comply with carbon emission intensity limits for its building type. The limits will continue to fall in 2023, 2040, and by 2050.<sup>52</sup></p>
Orlando	<p><u>Energy Audits or Retro-Commissioning:</u></p> <p>Commercial and multifamily buildings over 50,000 sq. ft and receive an Energy Star score below 50 must perform an energy audit or a retro-commissioning one time every five years beginning 2025. Free energy audits provided by the Orlando Utilities Commission are eligible for compliance.<sup>53</sup></p>
Reno	<p><u>Building Performance Goals:</u></p> <p>Commercial and multifamily buildings equal to or over 30,000 sq. ft shall either achieve the energy and water performance targets for at least two years following the baseline year before the compliance due date or conduct prescribed efficiency actions every seven years starting in 2026. High-performance buildings can request for an exemption<sup>54</sup></p>

<sup>49</sup> "Ordinance No. 184674". 2017. *Ladbs.Org*. [http://www.ladbs.org/docs/default-source/publications/misc-publications/ord\\_184674\\_12-15-16.pdf](http://www.ladbs.org/docs/default-source/publications/misc-publications/ord_184674_12-15-16.pdf).

<sup>50</sup> "GBEE - Greener, Greater Buildings Plan - LL87 - How to Comply". 2019. *Www1.Nyc.Gov*. Accessed July 22. [https://www1.nyc.gov/html/gbee/html/plan/ll87\\_comply.shtml](https://www1.nyc.gov/html/gbee/html/plan/ll87_comply.shtml).

<sup>51</sup> "GBEE - Greener, Greater Buildings Plan - LL88: Lighting Upgrades & Sub-Metering". 2019. *Www1.Nyc.Gov*. <https://www1.nyc.gov/html/gbee/html/plan/ll88.shtml>.

<sup>52</sup> "New York City Passes GHG Emissions Cap for Buildings - Local Law 97". 2019. *Energy watch*. <https://energywatch-inc.com/breaking-new-york-city-council-passes-first-of-its-kind-ghg-emissions-cap-for-buildings/>.

<sup>53</sup> "Building Energy & Water Efficiency Strategy". 2019. *Orlando.Gov*. <https://www.orlando.gov/Initiatives/Building-Energy-Water-Efficiency-Strategy>.

<sup>54</sup> "Staff Report SREP-2019-6493". 2019. *Renocitynv.Iqm2.Com*. [http://renocitynv.iqm2.com/Citizens/Detail\\_LegiFile.aspx?Frame=&MeetingID=1725&MediaPosition=&ID=10490&CssClass=](http://renocitynv.iqm2.com/Citizens/Detail_LegiFile.aspx?Frame=&MeetingID=1725&MediaPosition=&ID=10490&CssClass=)

Jurisdiction	Complementary Policy Description
San Francisco	<p><u>Energy Efficiency Audit:</u></p> <p>Commercial buildings larger than 10,000 sq. ft must obtain an energy efficiency audit of the entire building once every five years, starting in 2013. Audits for covered buildings with 50,000 sq. ft and larger have to meet or exceed the American Society of Heating, Refrigeration, and Air-Conditioning Engineers (ASHRAE) Procedures for Commercial Building Audits Level 2. Smaller buildings between 10,000 and 49,999 sq. ft are required to meet audit requirements in ASHRAE Level 1. Energy audit is not required if the building is recognized by a third party as high performing.<sup>55</sup></p>
San Jose	<p><u>Performance Standard for Energy and Water Efficiency:</u></p> <p>From 2021, commercial and multifamily buildings equal to or over 20,000 sq. ft shall either meet specific performance standards, demonstrating that buildings are highly efficient or have increased energy efficiency, or comply with efficiency improvement pathway every five years through one of the following three alternative approaches: 1) conduct an energy or water audit; 2) perform retro-commissioning; 3) adopt energy and water efficiency improvement measures.<sup>56</sup></p>
Seattle	<p><u>Seattle Building Tune-Ups:</u></p> <p>Commercial buildings with 50,000 sq. ft or larger must conduct a building assessment for systems and operations and implement corrective actions every five years. Beginning in early 2019, compliance deadlines will be phased in by building size. Buildings with low energy use (EUI &lt;20 kBtu/sq. ft), exemplary energy performance certification, such as LEED Gold or Platinum O+M, Living Building, or Net Zero Energy Certifications, or those that have recently completed a tune-up equivalent project may qualify for an alternative compliance.<sup>57</sup></p>
Washington DC	<p><u>Building Energy Performance Standards:</u></p> <p>Starting in 2021, commercial and multifamily buildings over 50,000 sq. ft that are below the local median Energy Star score by building type or equivalent will be required to comply with a performance pathway or a prescriptive list of energy efficiency measures over the 5-year compliance period. The performance pathway requires a building to reduce 20% normalized site EUI over the last two years of the five years.<sup>58</sup></p>

<sup>55</sup> "Existing Buildings Energy Performance Ordinance: Overview". 2019. *Sfenvironment.Org*. [https://sfenvironment.org/sites/default/files/fliers/files/sfe\\_gb\\_ecb\\_ordinance\\_overview.pdf](https://sfenvironment.org/sites/default/files/fliers/files/sfe_gb_ecb_ordinance_overview.pdf).

<sup>56</sup> "CITY OF SAN JOSÉ ENERGY AND WATER BUILDING PERFORMANCE ORDINANCE". 2019. *Library.Municode.Com*.

[https://library.municode.com/ca/san\\_jose/codes/code\\_of\\_ordinances?nodeId=TIT17BUCO\\_CH17.85CISAJOENWABUPEOR\\_PT4BEBEPADEINENWAPE\\_17.85.410PEPAPRWHARHIEFHAEINEF](https://library.municode.com/ca/san_jose/codes/code_of_ordinances?nodeId=TIT17BUCO_CH17.85CISAJOENWABUPEOR_PT4BEBEPADEINENWAPE_17.85.410PEPAPRWHARHIEFHAEINEF).

<sup>57</sup> "About Building Tune-Ups - Environment | Seattle.Gov". 2019. *Seattle.Gov*. <https://www.seattle.gov/environment/climate-change/buildings-and-energy/building-tune-ups/about-building-tune-ups>.

<sup>58</sup> "Building Energy Performance Standards". 2019. *Doee.Dc.Gov*. <https://doee.dc.gov/service/beeps>.

**Table A-3. Summary of Performance Improvement Targets**

Jurisdiction	Performance Improvement Targets
Boston	<ul style="list-style-type: none"> <li>• Reduce a building’s total site energy consumption, site EUI, or total GHG emissions by at least 15% percent relative to its performance during the second calendar year it complies with the B&amp;R policy (the baseline year) over the five-year compliance cycle</li> <li>• Achieve an Energy Star score at least 15 points higher than the score a building receives during the baseline year</li> </ul>
Los Angeles	<ul style="list-style-type: none"> <li>• Achieve at least 15 percent reduction in weather normalized source EUI compared to the first year of the five-year compliance cycle</li> </ul>
Reno	<ul style="list-style-type: none"> <li>• Achieve an Energy Star score at least 15 points higher than the score a building receives during the first calendar year it complies with the benchmarking policy (baseline year) for at least two of the seven years following the baseline year, or</li> <li>• Reduce a building’s normalized source EUI by at least 10 percent relative to its performance in the baseline year</li> </ul>
San Jose	<ul style="list-style-type: none"> <li>• Achieve an Energy Star score at least 15 points higher than the score a building receives during the first calendar year it complies with the benchmarking policy (baseline year) for at least two of the three years preceding the compliance due date, or</li> <li>• Reduce a building’s normalized source EUI by at least 15 percent relative to its performance in the baseline year</li> </ul>
Washington DC	<ul style="list-style-type: none"> <li>• Achieve at least 20 percent reduction in weather normalized site EUI averaged over the last two years of the five-year compliance cycle, as compared to the performance averaged over the two years preceding the first year of the five-year compliance cycle</li> </ul>

## Appendix B. Case Study: New York City (NYC)

### Regulations for Existing Buildings<sup>59</sup>:

- Greener Greater Buildings Plan (GGBP) (2009)
  - Local Law 84: Benchmarking requires an annual benchmarking of energy and water use with public disclosure for buildings over 25,000 sq. ft
  - Local Law 85: Energy Conservation Code requires buildings to meet the most current energy code for any renovation or alteration project
  - Local Law 87: Energy Audits & Retro-Commissioning requires buildings over 50,000 sq. ft to audit, retro-commission, and submit information to the City every ten years
  - Local Law 88: Lighting Upgrades & Sub-metering requires upgrades for lighting to meet the current Energy Conservation Code standards and the installation of electrical sub-meters for non-residential tenant space greater than 5,000 sq. ft in non-residential buildings over 25,000 sq. ft.
  - Local Law 33: Energy Labelling (2018) requires buildings covered by local law 84 to display their energy efficiency scores and grads
- The Climate Mobilization Act (2019)
  - Local Law 96: Property Assessed Clean Energy (PACE) Financing funds building retrofits through long-term, low-interest financing program
  - Local Law 97: Carbon Emissions Bill caps on GHG emissions for buildings over 25,000 sq. ft

### Voluntary Program for Existing Buildings:

- NYC Carbon Challenge is a voluntary leadership program. Participants take actions towards 30 percent GHG emissions reduction in their buildings over ten years. The program provides support and resources to help participants achieve their reduction targets.<sup>60</sup>

### Support Resources for Benchmarking:

- Website + Compliance Instructions + Covered Building List
- The New York State Energy Research and Development Authority (NYSERDA) is a public benefits corporation, playing an important role in the development of the City's outreach and assistance strategy of the benchmarking program. In 2011, NYSERDA launched the Flex Tech Benchmarking Pilot Program, offering financial incentives in benchmarking services for commercial buildings and funding training workshops.<sup>61</sup>
- Greener Greater Buildings Plan Digest contains reminders and advisories associated with the GGBP. The Mayor's Office of Sustainability is responsible for compiling the Digest.<sup>62</sup>
- Benchmarking Help Center provides one-on-one guidance by phone and email, a free group presentation, and a free group training session on request.<sup>63</sup>
- Utility Engagement: Con Edison (Electricity) and National Grid (Natural Gas) support automatic uploading of whole building aggregated data into Portfolio Manager.

### Other Support Resources:

- NYC Retrofit Accelerator offers a free one-stop resource and personalized advisory services for building owners
- Education Assistance from organizations such as Urban Green Council and Building Energy Exchange

<sup>59</sup> "Legislation - Sustainability". 2019. *Www1.Nyc.Gov*. <https://www1.nyc.gov/site/sustainability/legislation/legislation.page>.

<sup>60</sup> "GBEE - The New York City Carbon Challenge". 2019. *Www1.Nyc.Gov*. <https://www1.nyc.gov/html/gbee/html/challenge/mayor-carbon-challenge.shtml>.

<sup>61</sup> "Benchmarking and Disclosure: Lessons from Leading Cities". 2012. *Abettercity.Org*. <https://www.abettercity.org/docs/sustainability/Benchmarking%20report%20-%20Final.pdf>.

<sup>62</sup> "GBEE - Greener, Greater Buildings Plan - Outreach & Training - Local Law 84 Outreach & Training". 2019. *Www1.Nyc.Gov*. [https://www1.nyc.gov/html/gbee/html/plan/training\\_ll84.shtml](https://www1.nyc.gov/html/gbee/html/plan/training_ll84.shtml).

<sup>63</sup> "GBEE - Greener, Greater Buildings Plan - LL84: Benchmarking - Where to Get Help". 2019. *Www1.Nyc.Gov*. [https://www1.nyc.gov/html/gbee/html/plan/ll84\\_help\\_center.shtml](https://www1.nyc.gov/html/gbee/html/plan/ll84_help_center.shtml).

## Lessons Learned from an Expert Interview<sup>64</sup>:

- **Industry readiness is the key to successful building policies.** NYC's policies all targeted at large buildings over 50,000 sq. ft. These buildings are owned by mature real estate organizations that have enough resources to meet benchmarking and beyond-benchmarking requirements.
- **The benchmarking requirement is necessary but not sufficient to improve the performance of a city's building stock.** A benchmarking policy is the first step. It provides knowledge for the industry as well as the city. Without an energy benchmarking requirement, the industry would not understand their energy consumption, which is a challenge for governments to implement policies that go beyond benchmarking.
- **A city's ultimate climate goal is the basis for all building policies.** NYC aims to achieve net-zero carbon emissions by 2050, which is the reason why the city enacted GHG emissions limits for large buildings instead of energy efficiency targets.
- **Occupancy density needs to be considered in the development of a carbon cap policy for buildings.** Reducing emissions is more efficient from high-occupancy buildings than from low-occupancy buildings. However, a carbon cap may incentivize an opposite way as high occupant density would result in higher GHG emissions. Recognizing the impact of this factor at the policy design stage is important.

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<sup>64</sup> The themes summarized below are from the interview with Yetsuh Frank from Building Energy Exchange.