ENERGY BENCHMARKING, REPORTING & DISCLOSURE IN CANADA:

A Guide to a Common Framework

CANADA GREEN BUILDING COUNCIL · CONSEIL DU BÂTIMENT DURABLE DU CANADA

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Prepared by:

Dave Ramslie, MSc, LEED AP, MCIP RPP
Principal, Head of Sustainability & Research
200 Granville Street, Suite 180
Vancouver, BC V6C 1S4
dramslie@integralgroup.com

Contact:

Sundeep Virdi, MES, SBA
Manager, Advocacy and Policy
47 Clarence Street, Suite 202
Ottawa, ON K1N 9K1
svirdi@cagbc.org

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EXECUTIVE SUMMARY

Energy benchmarking programs are growing in prominence and popularity across the world. In the U.S., various jurisdictions are leading the charge by requiring large buildings to report their annual energy consumption. However, Canadian provinces and local governments are only beginning to consider energy benchmarking regulations. To address this gap and promote the uptake of benchmarking regulations nation-wide, this white paper provides an overview of the fundamental considerations and challenges in implementing benchmarking policies in Canada.

The purpose of the National Energy Benchmarking Framework is to provide support to local and provincial governments that are developing energy benchmarking strategies and regulations. The development of a standardized approach to energy benchmarking initiatives will simplify the process of policy development and implementation through a streamlined approach, and provide reliable data that will support the pursuit of strategic investments in achieving building improvements and energy and greenhouse gas (GHG) emissions reduction targets. Moreover, a common approach to energy benchmarking on the national scale will provide consistency for building owners and managers to participate in benchmarking programs across Canada.

The contents of this paper are based on an extensive consultation process beginning with the formation of a Working Group including provincial and local governments, utilities, industry associations, and members of the real estate industry in September 2015. The Working Group identified the need for a framework to guide Canadian jurisdictions interested in benchmarking programs, and agreed upon a set of four basic principles of consistency, effectiveness, transparency, and capacity building published in a Summary Report in January 2016.

A second round of engagement was initiated with a broad set of stakeholders from across the country. In combination with lessons learned from existing benchmarking efforts in North American jurisdictions, extensive consultation enabled the identification of key steps and strategies required for the implementation of energy benchmarking programs in Canada. As such, this white paper reflects the diverse needs and interests of provincial and local governments, utilities, industry associations, and members of the real estate industry.

Figure ES-1: Four principles of energy benchmarking and corresponding action areas
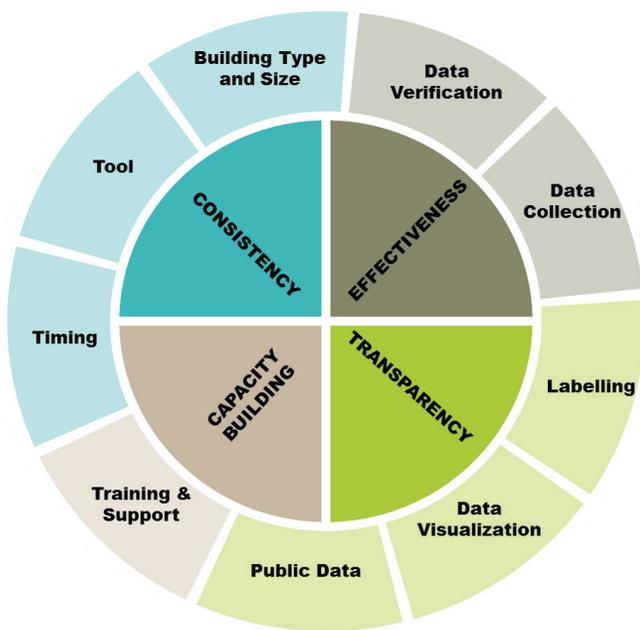
This Framework offers a set of recommendations and key areas of consideration for governments who wish to introduce annual energy reporting and benchmarking requirements. The four principles of Consistency, Effectiveness, Transparency and Capacity Building correspond to specific actions recommended in the following five areas:

• **Program Administration**, or the key roles and tasks essential to program delivery, including the expected time and resource expenditures associated with each phase;

• **Program Delivery**, or the steps and considerations necessary for building consistent, effective energy benchmarking programs, from setting building thresholds to encouraging compliance;

• **Data Quality Control**, or the challenges associated with the collection of high quality building energy data, and recommendations for their resolution;

• **Data Transparency**, or recommendations for making energy benchmarking data both accessible and actionable for a broad range of stakeholders; and

• **Building Industry Capacity**, or identified needs, opportunities and recommendations for providing industry support and training.

Program Administration

Energy benchmarking programs and regulations will require actors at local, provincial, and federal levels to act in concert to distribute responsibilities and burdens, make use of existing capacities, and ensure coordination and consistency across jurisdictions. Given the allocation of regulative and administrative responsibilities, provinces and local governments will be required to demonstrate leadership in establishing benchmarking programs and work in concert to achieve their successful implementation.

Program Delivery

Key steps to the development and implementation of energy benchmarking programs are outlined based on the recommendations in this white paper, including the goals and/or benefits of each step, and key considerations. Canadian jurisdictions interested in energy benchmarking programs are advised to prepare the ground by involving industry members early on in discussions around potential regulations or programs, and ensuring the opportunity to answer questions and address concerns around reporting requirements and approaches to disclosure.

A phased approach to the implementation of building size thresholds is recommended in order to allow administering bodies to develop internal processes, and provide additional time to owners of smaller and/or less wellresourced buildings to become familiar with benchmarking requirements. The framework highlights the importance of establishing clear systems of data management, and notes the process and time required to build a database of covered building and enforce compliance. Program administrators are encouraged to focus on clarifying benchmarking requirements and assisting building owners in reporting prior to issuing penalties for non-compliance.

Data Quality Control

The framework further highlights the need for accurate, high quality building energy data, and recommends the use of ENERGY STAR® Portfolio Manager as the key tool for reporting buildings. A number of data quality issues are noted and addressed through further recommendations for program administrators, utilities and other stakeholders to ensure an appropriate level of support is offered to reporting building owners. The need for an automated process of data uploading to Portfolio Manager is specifically noted, as well as the need to provide clarity and consistency in definitions, metrics, and data points of interest.

Data Transparency

For data to be useful to policy makers, utility conservation programs, and even building owners themselves, energy benchmarking programs must be considered as one component of a broader approach that links benchmarking efforts to other conservation policies and programs for energy and emissions reductions. Individualized performance profiles, benchmarking dashboards, and checklists of possible areas of performance upgrades are suggested as potential means of encouraging the use of building data as a way of managing building operations and improving performance. Building and sector performance should be explained in context to ensure the fair characterization of building performance, and to offer a clearer understanding of broad trends in performance over time.

Building Industry Capacity

The report concludes with a number of suggestions for program administrators and industry associations to consider when providing support to building owners. Local governments will be required to identify the kinds of training and support that will be most needed, and communicate these sources of support to industry members well in advance of implementing benchmarking programs. Industry needs will be greatest in buildings and sectors where benchmarking programs have not yet taken hold as a result of either higher complexity in building form, and/or their lower capacity overall. Clear and consistent support should be provided in multiple forms, including online resources, technical support centres, and training workshops. By offering these useful forms of support to building owners, program administrators can improve policy awareness, data quality, and importantly, compliance.

This report represents a first step towards consistent, effective benchmarking programs in Canada, and an entryway for further discussion and recommendations. As benchmarking programs move forward and industry capacity increases, the depth and usefulness of benchmarking databases will increase, offering new insights and opportunities for reducing energy consumption in Canada's built environment. Further, the greater the number of stakeholders and governments involved, the higher the likely success in reaching energy efficiency and emissions reductions targets. As such, it is important for provinces and local governments across the country to exhibit leadership and make energy benchmarking a new Canadian standard.

BACKGROUND

The Canada Green Building Council (CaGBC) has had a longstanding interest and involvement in energy benchmarking. In 2007, it piloted energy benchmarking in key building sectors across Canada, which eventually led to the creation of GREEN UP: Canada's Building Performance Program, the first of its kind in Canada to put energy benchmarking on the map for building owners and practitioners.

As a next step in supporting energy benchmarking in Canada, the CaGBC has developed a National Energy Benchmarking Framework to provide guidance to provinces and local governments interested in developing energy benchmarking strategies and regulations.

The need for a national framework is founded on the idea that a standardized approach to energy benchmarking initiatives will support both governments interested in reducing energy use and GHG emissions, as well as industry members. A common framework will help to simplify the process of policy development and implementation for governments and importantly, support the pursuit of strategic investments in achieving building improvements and energy and greenhouse gas (GHG) emissions targets. For building owners and managers, a single approach to benchmarking requirements will render participation in benchmarking programs more straightforward and streamlined across jurisdictions.

To initiate the process of creating a National Framework, the CaGBC formed a Working Group of government bodies and industry members to contribute their expertise and understanding of the needs and challenges associated with building energy benchmarking and disclosure policies in Canada. A series of Working Group meetings hosted by the CaGBC and led by Integral Group were held in September and October 2015. The driving intent behind this process was to arrive at a shared understanding of the nature and importance of a national approach to energy benchmarking efforts (both regulated and voluntary), and to develop a framework that would be useful and effective across Canadian provinces and cities. Working Group members agreed upon a set of principles needed to encourage consistency, quality, and national participation in energy benchmarking, reporting and disclosure policies. A series of recommendations for government were crafted based on existing stakeholder and industry research and efforts andsummarized into a Summary Report published in January 2016.[1]

This Summary Report formed the basis for a crucial second round of engagement with CaGBC stakeholders and key industry members from jurisdictions across Canada, in which the themes identified in the Summary Report were explored in further depth. In addition to this consultation process, best practices from North American jurisdictions were examined, including different approaches, models, and lessons learned from U.S. cities that could form a basis for possible replication in Canada. Stakeholders were asked to comment on the purpose and utility of a policy framework, the principles and policy options that were recommended, and any questions and gaps that should be identified.

In addition to the Working Group meetings and broader stakeholder engagement, the CaGBC partnered with the Toronto Atmospheric Foundation (TAF) to host a session at the Federation of Canadian Municipalities' (FCM) Sustainable Communities Conference in February 2016, which was attended by over 70 stakeholders representing 30 municipalities and over 20 industries. While this framework attempts to accurately represent the collective concerns, interests, and insight of this broad range of stakeholders in the building sector on both sides of the border (see Box 1), the recommendations outlined do not represent the views or opinions of any specific stakeholder.

[1] CaGBC. National Energy Benchmarking Framework: Report on Preliminary Working Group Findings. January 2016. http://www.cagbc.org/cagbcdocs/resources/CaGBC%20National_Energy_Benchmarking_Framework_Working_Group_Summary_Report_EN.pdf

BOX 1: Complete list of stakeholder participants

Local Governments (Canada)

City of Richmond
City of Surrey
City of Victoria
City of Vancouver
City of Toronto
Resort Municipality of Whistler
District of Squamish*
District of Saanich
Region of Waterloo
City of Waterloo*
City of Burlington*
City of Pickering
Town of Richmond Hill
City of Mississauga
Town of Caledon*
City of London*
City of Winnipeg MB
Brandon MB*
Lethbridge AB*
City of Edmonton
City of Halifax
City of Saint John's

* Denotes contributions made during a workshop at the
  FCM conference in February 2016, Ottawa

Local Governments (US)

City of Seattle
City of Cambridge
City of Minneapolis
City of San Francisco
City of Chicago
City of New York
City of Austin

Federal and Provincial Bodies and Utilities[2]

BC Hydro
BC Ministry of Energy and Mines (BC)
Manitoba Hydro (MB)
Manitoba Finance (MB)
Ministère de l'Énergie et des Ressources naturelles (QE)
National Research Council
Natural Resources Canada – Office of Energy Efficiency
Office of Climate Change & Energy Efficiency (NL)

Industry Members

Bentall Kennedy
Morguard Investments
Oxford Properties

Industry Members (US)

Boston Properties
Related Companies

Industry Organizations

Toronto Atmospheric Fund
Toronto and Region Conservation Authority
Association Québécoise Pour La Maîtrise de L'Énergie (AQME)
Canadian Urban Institute
QUEST Canada
Pembina
Institute for Market Transformation (IMT)
Real Property Association of Canada (REALpac)
Building Owners and Managers Association (BOMA) Canada, BC and Toronto
Condominium Home Owners Association (CHOA)
International Council for Shopping Centres (ICSC)

[2] In October 2015, the Ontario government introduced proposed amendments to the Green Energy Act, 2009, that would if passed, enable implementation of a reporting and benchmarking initiative for large buildings. A second round of public consultation on the benchmarking regulation proposal will take place between January and June 2016. The Ministry notes that the reporting and benchmarking components identified in this framework are largely consistent with the components being considered by Ontario. The Ministry is supportive of future collaborations and consultations related to the framework initiative pending further direction on Ontario's initiative.

1. INTRODUCTION

Energy benchmarking is the process through which a building's energy performance is tracked in order to gauge changes in performance over time. The need for energy benchmarking rests on the fundamental principle that in order for owners, managers, or regulators to manage or reduce building energy use, they must first be able to measure it.

BOX 2: Benefits of energy benchmarking regulations

- Allows governments to target energy efficiency policies and programs more effectively, helping to achieve climate and energy goals

- Helps governments to design and monitor the effectiveness of regulatory approaches

- Improves energy awareness and literacy among building owners, managers, and consumers

- Allows building owners to identify poorly performing buildings and/or verify that investments in energy efficiency are achieving their intended goals

- Engages the market in energy conservation and allows for the inclusion of energy performance into market valuation of real estate, sending a market signal

- Gives recognition to owners of high performing buildings

- Provides a means of consumer and investor protection

- Creates jobs for skilled workers in energy audits, upgrades, and retrofits[3]

The collection of building energy use and other data allows building owners to compare their energy performance with their own past performance and with others in their sector. Owners can use this information about their building's performance over time to make informed decisions about how to manage and operate their buildings, and where to strategically invest and implement building improvements. Importantly, benchmarking data also allows stakeholders to understand trends in building performance across geographic areas or sectors, which in turn allows program administrators to identify poorly performing buildings and sectors and target demand-side management (DSM) programs more effectively.

A number of voluntary programs that already exist in both Canada and the US have shown promising results. For example, the U.S. Environmental Protection Agency offers the ENERGY STAR® certification program, in which commercial and industrial building owners can voluntarily submit energy and water consumption data to be scored based on their relative performance. The EPA has reported that buildings using ENERGY STAR®'s Portfolio Manager software have seen a 7% saving in energy use and a 6 point increase in their ENERGY STAR® score over the period of 2008-2011.[4] In Canada, industry-led rating systems such as the CaGBC's LEED® for Existing Buildings: Operations & Maintenance (EB: O&M) program mandate measuring building energy consumption using ENERGY STAR® Portfolio Manager as a requirement for achieving building certification. Despite the positive trends demonstrated by voluntary programs, however, they tend to attract top performers in the building industry, to the neglect of older or less energy efficient buildings in greater need of improvements.

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[3] The IMT/Political Economy Research Institute calculated that for every $1 million spent on operational improvements, 15.74 jobs are created; 13 jobs are created for every $1 million invested in capital investments.

[4] https://www.energystar.gov/sites/default/uploads/buildings/old/images/Energy_savings_in_Portfolio_Manager.jpg

Energy benchmarking regulations are therefore gaining prominence across the world as a fundamental strategy to reduce energy use and emissions from existing buildings, and have already shown considerable success in improving building energy performance in Europe and Australia. In 2015, the EU published a report summarizing the results of the 2002 Energy Performance of Buildings Directive, which requires EU countries to improve building regulations and introduce building-level energy certification schemes. Among their findings was evidence that publishing energy data allowed energy efficient buildings to be sold or rented more quickly than their poorly-performing peers.[5]

In North America, U.S. cities are leading the way in energy benchmarking. Several major American cities (e.g. Chicago, New York, Philadelphia) have introduced ordinances that require large buildings (over 50,000 square feet) to report energy consumption on an annual basis. Inspired by state and city-led efforts, smaller jurisdictions (e.g. Berkeley, Cambridge) and even counties (e.g. Montgomery County, MD) are beginning to require benchmarking as well. In many jurisdictions, data is shared publically via government websites and in some cases, using powerful visualization tools that display trends and allow users to explore different dimensions of energy use.

Box 3: Key terms	
Data Cleaning	Refers to the process of correcting or removing data entered into a database that is incorrect or incomplete
Data Transparency	Refers to the public disclosure of some or all building attribute and benchmarking data, making individual or aggregate building performance visible and accessible by academic institutions, organizations, and the public.
Energy Benchmarking	The process through which a building's energy performance is tracked in order to gauge changes in performance over time.
Energy Use Intensity (EUI)	A key metric in measuring a building's energy use and refers to energy use per square meter per year. EUI is calculated by dividing a building's total annual energy consumption by the total gross floor area of the building. EUI for separate fuel types can also be calculated.
Labelling	Refers to the public display of benchmarking scores (e.g. ENERGY STAR®), either on site or through an official listing, typically on a website. Building owners can use their score as a measure of distance from ideal energy performance, or as a marketing tool (akin to ENERGY STAR® labels on appliances).
Reporting	Refers to the required submission of benchmarking and attribute data to local, provincial, and/or federal governments or utilities by building owners or managers.

[5] IEEP 2015

Some examples of U.S. benchmarking programs and some of their notable characteristics are briefly outlined below:

New York City established one of the earliest energy benchmarking ordinances (LL 84-09)[7] in 2009, requiring annual benchmarking data to be reported from all private sector buildings over 50,000 square feet. The City achieved an 84% compliance rate in 2012, and publishes all reported data on the NYC Open Data database. New York City is also recognized for its partnerships with local academic institutions (e.g. New York University), established to assist in the analysis of benchmarking data and its display using online interactive mapping software.[8]

Philadelphia instituted its benchmarking ordinance (9-3402)[9] in 2012, and was among the first cities to display benchmarked data in an engaging visual format that allows users to explore a map of the city and accompanying data displays.[10] The City is also notable for its stringent approach to compliance, which imposes a $300 fine for non-compliance in the first 30 days, followed by $100 for every day thereafter. Philadelphia boasted a 90% compliance rate for its second year of reporting.

Minneapolis rolled out its benchmarking ordinance (47.190)[11] in 2012, beginning with public buildings and adding large commercial and institutional buildings of 100,000 and 50,000 square feet the following years. Minneapolis offers an interesting example of where partnerships with non-governmental organizations can facilitate program implementation. In this case, the Retiree Environmental Technical Assistance Program (RETAP) offered support to both administrators and building owners in the form of improved data management software and assistance to owners of smaller buildings to achieve compliance (see Box 7, p. 24).

Chicago adopted its energy benchmarking ordinance (Chapter 18-4 of Title 18 of the Municipal Code)[12] in 2013, which compels all commercial, institutional and residential buildings over 50,000 square feet to report their energy use. Chicago is one of the only jurisdictions to require owners to have their building data verified by an accredited professional to ensure its quality, but has coupled this requirement with extensive programs and partnerships that facilitate and encourage compliance. Like New York, Chicago publishes all building data as a large spreadsheet via its own Chicago Data Portal.[13]

Cambridge offers an example of a smaller city that has scaled benchmarking requirements (Ordinance 1360)[14] to a lower threshold so as to capture a broader range of buildings. As of May 2016, Cambridge will require non- residential buildings larger than 25,000 square feet and residential buildings of over 50 units to report on their energy use. As with several other cities, Cambridge's approach to disclosure has been to post contextualized energy data following the second year of reporting to allow owners some time to adjust to the ordinance and improve their performance.

[7] http://www1.nyc.gov/assets/buildings/local_laws/ll84of2009.pdf
[8] http://benchmarking.cityofnewyork.us/
[9] http://www.phillybuildingbenchmarking.com/about/
    #about-ordinance-anchor
[10] http://visualization.phillybuildingbenchmarking.com/#/
[11] http://www.ci.minneapolis.mn.us/environment/energy/WCMS1P-120169

[12] http://www.cityofchicago.org/city/en/progs/env/
    building-energy-benchmarking---transparency.html#Requirements
[13] https://data.cityofchicago.org/Environment-Sustainable-Development/
    Chicago-Energy-Benchmarking-2014-Data-Reported-in-/tepd-j7h5
[14] http://www.cambridgema.gov/CDD/zoninganddevelopment/
    sustainablebldgs/buildingenergydisclosureordinance.aspx

1.1 A National Framework

While many jurisdictions across Canada have already begun to benchmark their own buildings and facilities, few have begun to seriously consider the introduction of energy benchmarking regulations. Among the furthest ahead are the Provinces of Ontario and British Columbia, who are working with local governments int heir metropolitan areas to explore benchmarking policy options. In 2015, the Province of Ontario introduced amendments to the Green Energy Act, 2009 that will enable the government to require large property owners to report their energy and water consumption. In February 2016, the Ontario Ministry of Energy posted the regulation proposal for further stakeholder feedback, with specific requirements for annual reporting and disclosure. In BC, the Province has indicated that it is considering three possible regulatory options, with a decision expected in the spring 2016 legislative session.

In addition to these forays into benchmarking regulations, many Canadian provinces, utilities, and municipalities have also generated several insights into the needs and opportunities associated with corporate benchmarking procedures. This includes the Province of Manitoba, which has administered voluntary benchmarking programs for key utility customers over the last several years. Despite these burgeoning discussions, however, there is no overarching strategy that advocates for effective and efficient program design principles underpinning regulations. Some of the key benefits of a coordinated approach to benchmarking include:

Coordinated efforts for carbon reduction:
The built environment generates a significant proportion of Canadian GHG emissions. Many jurisdictions across the country have adopted energy conservation and GHG targets, but several challenges to the reduction of building energy use remain. A national framework would facilitate the introduction of important benchmarking policies that will help to achieve carbon and energy reduction goals and improve the creation of a coordinated effort that can engage communities across the country. As several jurisdictions are already beginning to explore benchmarking programs, a national initiative allows key players to drive these initiatives forward in tandem.

Greater uptake from industry: For owners and managers with portfolios of buildings in many cities, unified national requirements will simplify the process of benchmarking and provide a consistent approach to managing energy use across their portfolios. A national initiative can provide a platform for dialogue between industry and policy makers, address the needs of diverse stakeholders, and drive uptake of energy benchmarking and reporting requirements across the country.

Enhanced capacity for policy development:
The development of energy benchmarking regulations and policies requires a series of key decisions in regards to policy design, scope, and implementation approach. Canadian municipalities range significantly in both size and the capacity to develop and deliver complex environmental policies. A national initiative can help to provide or coordinate much-needed capacity for participating communities, and remove barriers to the introduction of benchmarking programs.

As a result, there is an important opportunity to create a common framework to guide both existing and future efforts in developing benchmarking programs and regulations.

2. PRINCIPLES

For a national energy benchmarking framework to be successful, unifying principles first need to be identified in order to address the major areas of expected challenges and concerns. Through extensive stakeholder consultation, four key principles were identified as crucial to the development of useful and targeted recommendations for Canadian jurisdictions.

2.1 Consistency

The purpose of energy benchmarking is to track building performance over time and compare it to other buildings in a similar area or sector. As such, an important component of benchmarking is the use of consistent tools. ENERGY STAR® Portfolio Manager is the tool of choice for jurisdictions in the United States that mandate benchmarking, and is already widely in use by Canadian provinces and municipalities. As of January 2016, approximately 13,500 buildings in Canada use the tool, representing approximately 14% of Canada's commercial floor space[15]. Portfolio Manager is constantly undergoing expansions to include new building types, which will increase its utility over time. Ensuring consistency of reporting requirements in different cities and provinces will allow for an apples-toapples comparison between building performance not only within a given community, but across the country.

2.2 Effectiveness

One of the key objectives of benchmarking initiatives is to empower local governments to achieve energy savings in the built environment. Having access to previously inaccessible information in a standardized form will help local governments and utilities refine energy conservation policy and program design and delivery. Effectiveness will also be achieved by developing streamlined approaches to benchmarking and reporting that facilitate compliance with benchmarking regulations, and empower building owners to act on energy results. The accuracy of data is a key component of ensuring the effectiveness of a benchmarking initiative (see Section 5).

2.3 Transparency

Sharing building data and performance metrics publically supports transparency and the movement toward open data. A key benefit of unlocking and releasing data to the public is that it increases the market's capacity to understand how energy is used in buildings, and the associated impacts of this usage. For consumers and the real estate market, energy data is valuable information that can support decision making in investment and management. Energy use data and energy efficiency can contribute positively to building valuation; however, the lack of such data is a current gap in advancing market mechanisms to advance building performance and valuation (see Section 6).

2.4 Capacity Building

Conducting stakeholder outreach, education and training activities related to benchmarking is essential to successful implementation. Raising awareness among building owners on the benefits of benchmarking and the objectives of a reporting initiative can build stakeholder support for policies and proactively support compliance, data quality and effectiveness. Raising awareness and literacy around energy use in buildings can also stimulate the marketplace for energy retrofits, develop capacity for energy management professionals, and ultimately drive actual energy savings in buildings (see Section 7).

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[15] http://www.nrcan.gc.ca/energy/efficiency/buildings/capacity-building-resources/newsletter/16376

Figure 1: Four principles of energy benchmarking and corresponding action areas
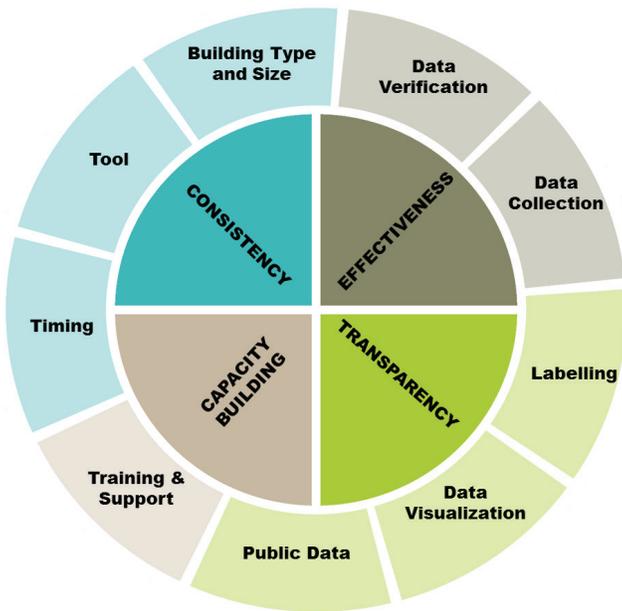
Figure 1 (above) shows how each of the four principles of *Consistency, Effectiveness, Transparency, and Capacity Building* correspond to specific action areas that require careful consideration. Based on the broad stakeholder consultation, the remainder of this Framework offers a set of recommendations and key areas of consideration for governments who wish to introduce annual energy reporting and benchmarking requirements. These are based on the needs and issues identified by Canadian and American actors, and include sections on the following areas:

Program Administration, or the key roles and tasks essential to program delivery, including the expected time and resource expenditures associated with each phase;

Program Delivery, or the steps and considerations necessary for building consistent, effective energy benchmarking programs, from setting building thresholds to encouraging compliance;

Data Quality Control, or the challenges associated with the collection of high quality building energy data, and recommendations for their resolution;

Data Transparency, or recommendations for making energy benchmarking data both accessible and actionable for a broad range of stakeholders; and

Building Industry Capacity, or identified needs, opportunities and recommendations for providing industry support and training.

3. PROGRAM ADMINISTRATION

Experiences from cities in the United States have demonstrated the crucial importance of partnerships between governments at regional and national levels that can provide the necessary resources to build, fund, and support benchmarking implementation plans. Partnerships with other non-governmental stakeholder have been used to leverage existing benchmarking expertise and experience to increase awareness, build capacity and facilitate compliance with new regulations. In Canada, energy benchmarking programs will similarly require actors at local, provincial and federal levels to act in concert to distribute responsibilities and burdens, make use of existing capacities, and ensure coordination and consistency across jurisdictions. Given the allocation of regulative and administrative responsibilities, provinces and local governments will be required to demonstrate leadership in establishing energy benchmarking programs and work in concert to achieve their successful implementation.

The following sections outline the specific roles and responsibilities that can be taken on by different stakeholder groups involved in the development of energy benchmarking programs and regulations.

3.1 Roles for Provinces

In Canada, the regulation of energy lies with the Provinces, making provincial energy and environment ministries central actors in the administration of energy benchmarking programs. Energy benchmarking regulations can achieve the highest degree of consistency and potential success, given their ability to regulate both buildings owners and the utilities that supply the energy data required to comply with benchmarking requirements. In taking the lead and primary responsibility for benchmarking regulation, provinces can also significantly improve coordination across municipalities, streamline benchmarking program requirements and timelines, and provide impetus and support to local governments. This is particularly the case when considering the variability in capacities across jurisdictions – larger cities have greater access to human and financial resources than smaller local governments. Provincial regulations offer important incentives for smaller jurisdictions to prioritize benchmarking activities, and offer resources to those unable to access the resources necessary to develop and implement an energy benchmarking program independently. Provincial coordination furthermore offers the greatest degree of consistency across municipalities, while maintaining a high degree of relevance and understanding of local context.

In Canada, there have been varying degrees of interest in energy benchmarking programs on the part of provincial authorities. As noted above, the Province of Ontario's Ministry of Energy has worked with the City of Toronto to introduce a regulatory proposal that if accepted, would require buildings over 50,000 square feet to report their monthly energy and water consumption data. The proposal would also require utilities to make whole building data available to buildings, and encourage them to automate the transfer of data. A selection of data points are to be shared publicly via Ontario's Open Data website one year after the initial reporting year.

The Province of British Columbia is similarly working with local governments in the Lower Mainland to explore different regulative options, including:

• A *model bylaw* developed by the Province that could be adopted and/or amended by individual interested local governments;

• An *opt-in regulation* that once developed, local governments could adopt but not amend;

• A *mandatory regulation* that would compel all local governments to act on benchmarking, but that would keep the responsibility for requiring compliance in the hands of the Province itself.

The three options proposed by the BC Ministry of Environment vary in terms of the extent to which responsibility is given to individual local governments for program administration, and by extension the administrative and financial burden. A regulation approach akin to Ontario's would go furthest in ensuring coordination across the province and reducing burdens for individual municipalities. Other provinces that have indicated interest in energy benchmarking regulations include the Province of Manitoba, which is working with Manitoba Hydro to expand benchmarking programs to additional Manitoba Hydro account holders. The Province of Quebec has also outlined its interest in exploring energy benchmarking in their 2013-2020 Action Plan on Climate Change.

Specific tasks to be taken on by provincial authorities include the following:

Explore benchmarking regulations

While Ontario and British Columbia are furthest along in the development of energy benchmarking regulations, remaining provinces have yet to explore it in any depth. For some provinces, the extent to which authority for energy benchmarking has been granted to local governments may be a primary consideration. In provinces where local government powers are limited, model bylaw or opt-in approaches would first require a series of amendments to be passed before they could even be considered.

Demonstrate leadership

Provincial governments must first demonstrate leadership and commitment to achieving energy and climate targets by benchmarking and reporting the energy usage and GHG emissions associated with provincial buildings and facilities. Benchmarking programs for provincial buildings can set the foundation for and/or encourage the eventual adoption of internal targets, as well as the identification of energy efficiency and conservation measures. This process also serves to improve awareness and understanding of Portfolio Manager and other practical dimensions of energy benchmarking. Where reporting programs already exist in individual ministries, new province-wide programming should draw from or extend these existing efforts.

Encourage improved data access

Provinces should work with local governments and utilities to improve customer access to whole-building consumption data to facilitate data collection and improve data quality. Provincial guidance is necessary for the clear definition of data privacy and/or confidentiality and areas in which existing legislation may need to be changed to ease the release of utility data. Where necessary, provinces should consider mandating the release of utility data at low or no cost to customers, including access to historical information. Where possible, a system of automated data transfer should be encouraged (see Section 5.2).

Manage benchmarking data

It is important that one or more provincial bodies act as the central database, or repository, for energy benchmarking data for multiple jurisdictions across the province as a way of establishing baselines, monitoring progress, and allowing for comparisons across data sets. Where a provincial regulation has not been put in place, authorities should first work with utilities and local governments to ensure comparability and consistency across data requirements, including acceptable sources of floor space area, which fields will be required, and which will be disclosed. Wherever data is held, it is important to furthermore establish a means of ensuring data is accessible to local governments and other interested actors. Partnerships with academic and research institutions should be established to explore data trends and identify opportunities to target policy incentives, and assist in the verification of data quality.

Provide support to local governments and industry

Provincial bodies play an important role in building awareness and literacy around energy efficiency and conservation, the role of benchmarking in improving building performance, and the options available to building owners to reduce building energy use. Provinces are best suited to administer industry support programs, as they are familiar with provincial legislation and can overcome regional language barriers. To avoid the unnecessary duplication of efforts and greatly reduce burden across individual local governments, provinces should work with utilities to provide a centralized call centre for benchmarking inquiries and customer service provision, and assist with industry training (see Section 7). Local government staff may furthermore benefit from provincially-led efforts to improve overall energy literacy and experience with energy benchmarking processes.

3.2. Roles for Local Governments

While authority for energy policy and regulation sits at the provincial scale, local governments are often responsible for the regulation and interaction with the building sector. As such, municipalities and cities will be required to work closely with provincial authorities to ensure the development of relevant and appropriate programs. Importantly, the extent to which local governments will be burdened with administrative roles in energy benchmarking programs will depend largely on the interest and action taken by Provincial authorities. Municipalities across Canada have expressed concerns as to the resources and capacities required to take on energy benchmarking program administration at the local government level. There is a shared sense among municipal stakeholders that provincial endorsement and/or legislation that require buildings to benchmark their data, coupled with provincial and utility-based grant programs to fund any industry support or training, are necessary to reduce the burden on local governments. A small number of municipalities furthermore expressed concerns as to the internal capacity and energy literacy of local government staff to request, analyze, and interpret benchmarking data. However, local governments will nevertheless play an important role in the development and administration of energy benchmarking programs, and can assume a number of roles.

Demonstrate leadership

Just as provincial authorities can demonstrate leadership in benchmarking publicly owned buildings, so too can local governments. Energy use of buildings and facilities could be reported and made publically available as a means of demonstrating commitment to energy and GHG reduction targets, offering a comparison to building performance in the private sector, and improving local capacity and understanding of benchmarking tools. Local governments can also act as advocates for provincial regulations and automated data transfer from utilities.

Forge collaborations

Collaborations both between internal departments, with local organizations and industry groups, and/or with other local governments should be explored as a means of raising awareness, improving coordination, and sharing resources. Internally, local governments should look to share information between departments that may be useful in building contacts and compliance lists – for example, from existing outreach programs. Communications departments are also key resources in raising awareness and improving compliance across the industry. Opportunities to share costs and resources among several local governments in an area can also help to build a critical mass to justify the time and effort required to implement benchmarking programs, particularly in the absence of provincial direction or support. Partnerships with other local governments can also be used to help make sense of data trends across regions.

Provide industry support

Local governments will also play important roles in providing support and guidance to building owners and operators. However, it will be important to leverage relationships and resources from service providers and utilities to make use of existing expertise and capacities. Even with provincial coordination, local governments will likely be required to host data management platforms, provide support to building owners, and encourage compliance.

3.3. Roles for Utilities

Utilities also play a key role in determining the success of energy benchmarking programs. Canadian municipal and industry-led benchmarking programs, as well as the experiences of U.S. cities, both point to the crucial importance of high quality, reliable data to enable meaningful comparisons of energy performance between buildings and over time. Drawing from the experiences of Manitoba Hydro and others, the following roles should be taken on by utilities:

Facilitate automated data upload to ENERGY STAR® Portfolio Manager

Where data is automatically uploaded from utilities directly into ENERGY STAR® Portfolio Manager, the time and resources required for data collection are greatly reduced, as are the opportunities for human error in the data entry process. This has been demonstrated in the State of California, which required the state's largest utilities to integrate a process of automatic data upload into their systems. While these systems of data transfer have not yet been perfected, they have gone a long way to facilitating energy benchmarking programs in Californian cities.

Examples of automatic data transfer procedures also exist in Canada. As the sole utility provider of both electricity and natural gas in the Province of Manitoba, Manitoba Hydro has been working with provincial bodies to connect all government buildings who report directly to ENERGY STAR® Portfolio Manager, as well as the accounts of its largest customers in a voluntary pilot program. All natural gas and electricity usage and cost data are uploaded directly into Portfolio Manager, reducing errors and minimizing effort required by program participants. The utility has been successful in implementing the program and has plans to expand it to make use of the data as a way of targeting participants for energy efficiency incentives programs.

Improve customer access to utility consumption data

It is important that utilities work to develop a means of electronic data exchange to support building owners by reducing the number of steps required in collecting and reporting utility data. Green Button is a secure energy data tool already in use by several utilities across North America that can be used to transfer utility and cost data to customers while protecting individual privacy and/or confidentiality. The process of automating the transfer of data can be phased in according to changing thresholds for building size and type (see Section 4.2). Relationships with other utilities could also be established or built upon as a means of identifying and overcoming hurdles to data automation, and/or to learn from existing models. This is particularly important for smaller Canadian utilities, who have more limited resources for the development of automated benchmarking data solutions.

Improve availability of whole building consumption data

Even where data is automated, barriers to continued access to utility data remain (see Section 5.2). Breaks in data can occur when an individual or tenant moves out of a building, rendering the accumulation of a consistent data set difficult. To further simplify the benchmarking process and protect consumer privacy and/or confidentiality, utilities should provide building managers with access to aggregate, whole building data. Otherwise, benchmarking a property with multiple accounts may require building managers to secure permissions to access data from individual tenants. Utilities can also work with provincial bodies to create building baselines using historic data, ensure datasets are managed and processed, and resolve concerns and barriers to building owner access to suite-level utility consumption information.

Explore improved metering options

Infrastructural issues can also inhibit benchmarking efforts. Too few meters on a property or campus can result in difficulties establishing the energy use for individual buildings, while too many meters (e.g. in a multi-unit residential building) can create difficulties for building owners who need to access multiple accounts (see Section 5.2). Utilities should therefore explore different metering options, notably the installation of separate aggregate meters in multi-tenant properties. While simply automating data is crucial, benchmarking procedures are vastly simplified where utilities provide whole building energy data to building owners.

Provide industry support and education

Utilities are also ideal sources of support and expertise for building owners and managers. Energy managers and conservation program representatives are ideal contact points for raising awareness and interest in energy benchmarking programs and promoting energy efficiency and conservation measures to customers with poorly performing buildings. Existing call centres can be adapted and expanded to handle benchmarking inquiries and support by working in concert with provincial and/or municipal bodies. Utilities could furthermore create supplementary documentation for customers that clarify existing Portfolio Manager training materials from NRCan, provide clear steps on how to connect directly with the utility, and offer troubleshooting tips.

3.4. Roles for Federal Bodies

Several federal bodies have direct interest in and expertise relevant to energy benchmarking. Since 2011, Natural Resources Canada (NRCan) has been working to adapt the U.S. Environment Protection Agency's ENERGY STAR® Portfolio Manager as a part of its national building energy benchmarking initiative. Modifying Portfolio Manager has required NRCan to adapt several features, such as Canadian energy sources, GHG factors, weather data, French language options, and the conversion into metric units. ENERGY STAR® scores are now available in Canada for K-12 school, commercial office spaces, hospitals, and supermarket/food stores. The development of an ENERGY STAR® score for senior care communities and residential care facilities is also underway.

Other federal bodies that may act as key partners in the improvement of data quality and analysis could include the National Research Council, which represents a considerable source of capacity and expertise in data management, modelling and analysis. The NRC's highperformance building program in particular is seeking to collaborate with other stakeholders in the development of specific building technologies, but could be expanded to include overall building performance measures, including benchmarking. Further, the high quality weather and climate data collected by Environment Canada could be used in the standard normalization of energy data entered into Portfolio Manager. Finally, Statistics Canada may also represent a source of support for the statistical analysis of benchmarking data and the identification of broad trends.

Continue to expand ENERGY STAR® Portfolio Manager

Of all of the above federal agencies, NRCan perhaps has the most important role in national energy benchmarking efforts in the continuous development of ENERGY STAR® scores for a wider range of Canadian building types.As energy benchmarking regulations increase in number across the country, so too will the demand for a more diverse range of building types with an associated ENERGY STAR® score. Multi-unit residential buildings (MURB) in particular will be a priority. There is also an opportunity for NRCan to work with the US Environmental Protection Agency to improve data quality control measures embedded within Portfolio Manager.

Improve data consistency and analysis

NRCan has already made a commitment to making Portfolio Manager data available to the building sector, and has begun to craft reports on key trends that have been identified through the tool. Such efforts should be continued in order to improve industry actors' understanding of performance trends across sectors and regions, and identify areas of weakness in the use of Portfolio Manager itself. Specifically, NRCan could play a key role in using regional and national data sets to better understand where key sources of data errors occur. NRCan can also help to establish common metrics or definitions to help improve the consistency of benchmarking data across jurisdictions. To help support building owners reporting, automatic conversions from imperial to metric units of measurement should be provided.

Establish Federal partnerships

NRCan can make use of the expertise and resources available through partnerships with other federal bodies. As noted above, the federal National Research Council can act as a key stakeholder to assist in the analysis of large datasets, and provide diagnostic support and expertise to refine data points in the longer term. Environment Canada could similarly play an important role in strengthening data quality by offering weather-related data for the normalization of climate impacts on building performance across Canada.

Work with stakeholders to develop interfaces

As utilities work to automate their data transfer, NRCan should provide input and guidance on the development of programs that can interface with Portfolio Manager. Similarly, NRCan can take a lead in assisting local governments in adapting or developing systems of data management.

Provide industry support and training

NRCan also represents an important source of expertise and support for the use of Portfolio Manager through its provision of technical documents, webinars, and other training resources. NRCan could work with provinces and municipalities interested in implementing energy benchmarking programs to ensure that these sources of support are made available to both staff and building owners, and that the development of additional resources is done in consultation with NRCan.

3.5. Roles for Industry Organizations and NGOs

Canada's industry organizations represent a wealth of experience and expertise on voluntary energy benchmarking programming, and should be considered key stakeholders in the development of any energy benchmarking regulation. Federal and local chapters of the CaGBC, BOMA Canada, REALpac and the ICSC have all been active in encouraging participation in benchmarking activities and providing support to participating members (see Box 4). Any energy benchmarking regulation will require active consultation with these important industry actors to ensure that new requirements are consistent with existing programs to reap the benefits of lessons already learned, and reduce the potential burden on property owners already participating in voluntary programs. Outreach efforts on the part of local or provincial governments should make use of these existing channels, as well as other memberbased forums such as Home Owners Associations, Landlords' Associations, and others.

Improve industry awareness and compliance

Industry organizations are important actors for bringing broader awareness across the industry, as they are already deeply engaged and have long-standing and typically positive rapports with their members. Local chapters should provide support and guidance to local governments in the development of benchmarking programs and associated resources. Business and service providers in particular stand to benefit from energy benchmarking regulations in the added business it may bring, and can therefore act as important allies in the encouragement of policy development and compliance.

Provide industry support and training

Industry organizations can also be key actors in providing support to properties with fewer resources (e.g. Class B and C commercial) or to more complex building types (e.g. shopping malls) who may have more difficulty complying to new regulations. Data verification in particular is an important area in which industry organizations can offer pro-bono/volunteer services to building sectors with lower capacity, including social housing.

Box 4: Existing industry efforts in Canada

Leadership in Energy and Environmental Design (LEED) for Existing Buildings: Operations and Maintenance (LEED EB: O&M) certification program requires reporting in six key areas of environmental performance, including energy. Portfolio Manager is used to establish energy efficiency performance. To achieve the energy performance prerequisite, a minimum ENERGY STAR® score of 69 is required; as of October 31, 2016, a score of 75 will be required.

Building Owners and Managers Association of Canada (BOMA Canada) offers its Building Environmental Standards (BESt) certification program to commercial building operators, which provides a framework for measuring and managing six key areas of environmental performance, including energy.

Real Property Association of Canada (REALpac) introduced its Energy Benchmarking Survey, which requires reporting of energy consumption, in 2010. In 2014, 279 buildings in the Canadian office sector participated, representing nearly 10 million square metres of office space.

International Council of Shopping Centres (ICSC) has developed a Property Efficiency Scorecard for shopping centres, a particularly difficult property type to measure and benchmark. Participating properties measure and report on energy use, water consumption, recycling/waste, and green operating practices.

American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) offers Building Energy Quotient, a building energy labeling program that helps building owners to evaluate their building's "as designed" and "in operation" performance. The standard is based on metered energy use and uses an ASHRAE Level 1 Energy Audit to determine energy saving measures.

3.6. Roles for Universities and Research Institutions

Universities and other academic or research-based institutions represent ideal partners for the analysis and interpretation of data. Such arrangements benefit both academics in gaining access to previously unavailable data, and program administrators who lack the time, resources, or expertise to delve more deeply into benchmarking data. Importantly, academic institutions can begin to use benchmarking data in ways that allow for a deeper understanding of building performance trends, broadening the use of benchmarking programs to begin to take on a more diagnostic function. To this end, some roles for academic and research institutions include the following:

Provide support for data analysis
Such partnerships offer unique opportunities to track the effectiveness of programs over time, refine data collection standards, and understand complex patterns of energy consumption in the urban landscape. For example, New York University scholars are already making use of the data published out of New York's benchmarking ordinance in order to determine models that allow for normalized comparisons and help identify appropriate means of targeting polices to specific sectors[16] . Researchers can also act to link disparate data to explore connections between different energy programs and incentives, as well as the performance of specific building systems.

Provide industry and local government support
Several universities additionally offer internship programs that place students in municipal government offices to assist in the development or administration of policies and programs of interest. These types of programs could be extended internally and/or to community colleges to help staff call centres or provide one-on-one support to property managers and building owners learning to use ENERGY STAR® Portfolio Manager. Community colleges could additionally develop training and/or credit programs for Portfolio Manager or energy benchmarking more generally in order to improve industry capacity and supplement labour availability in the market (e.g. Seneca College's Building Environmental Systems (BES) program).

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[16] E.g. Hsu 2012; Kontokosta 2012

Table 1: Summary of administrative responsibilities by actor type

Stakeholder group	Administrative or other responsibilities
Provincial Bodies	• Explore benchmarking regulations • Demonstrate leadership • Encourage improved data access • Manage benchmarking data • Provide support to local governments and industry
Local Governments	• Demonstrate leadership • Forge collaborations • Provide industry support
Utilities	• Improve availability of whole building consumption data • Ensure data management and continuity • Explore improved metering options • Provide industry support and education
Federal Department	• Continue to expand ENERGY STAR® Portfolio Manager • Work with utilities to develop ENERGY STAR® Portfolio Manager interfaces • Provide industry support and training • Continue to analyze data sets and generate research
Industry Organizations	• Improve industry awareness and compliance • Provide industry support and training
Academic and Research institutions	• Provide support for data analysis • Provide industry and local government support

4. PROGRAM DELIVERY

In this section, some of the key steps required in the development and implementation of energy benchmarking programs are outlined, including a set of recommended policy options for jurisdictions considering energy benchmarking programs or regulations. Each step is described in terms of their goals and/or expected benefits, and key dimensions to be taken into consideration. The material presented below draws on the four guiding principles outlined in section 2, and is gleaned from the experiences of cities in the United States, as well as high level analyses of existing benchmarking programs.[17]

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[17] US Department of Energy 2015; Krukowski and Keicher 2012

The precise number of full-time equivalent (FTE) staff necessary for each step of program delivery are estimated at approximately 0.5 - 1.5. These FTE estimates are based on the experiences of U.S. cities. However, actual FTE and the amount of time and effort required will vary according to the level of involvement from provincial authorities, the capacity and size of both the administering body and the building industry, and the involvement of industry associations and utilities. Required FTE from local government administrators can be greatly reduced where collaborations are formed with local academic and/or non-governmental organizations to offer services in the delivery of benchmarking programs (see Box 14).

4.1 Preparing the ground

Prior to launching an energy benchmarking program, it is important for program administrators to engage local stakeholders as a way of gaining the support of key actors and leveraging the expertise and support of potential advocates. Such engagement strategies have been considered foundational to the success of several programs in the U.S. at both state and city levels.

For example, over the course of the development of their benchmarking ordinance, City of Chicago staff engaged with industry members and local stakeholders and eventually received the public endorsement of over 85 organizations. A small number of these continue to work as a part of the City's benchmarking working group, which provides support and continues to encourage compliance to reporting requirements. In Austin, the local utility similarly reached out to local businesses and service providers, who strongly advocated for compliance and offered energy audits and other follow-up services. Canadian jurisdictions interested in energy benchmarking programs should therefore involve industry members early on in discussions around potential regulations or programs, and provide the opportunity to answer questions and address concerns around reporting requirements and approaches to disclosure. Invited parties should include members of the real estate industry, such as property managers, building owners, and brokers.[18] As noted above, working with industry organizations including local CaGBC, BOMA or REALpac chapters can offer several opportunities to glean experiences from existing programs. Involving local businesses and service providers can additionally serve as a means of gaining additional support and advocacy for compliance.

Box 5: Benefits of early industry engagement

- Introduce concepts and benefits of energy benchmarking and efficiency
- Demonstrate best practice examples and opportunities for cost savings
- Resolve industry concerns and achieve consensus on requirements
- Raise awareness and improve compliance rates
- Involve industry associations to leverage existing support and expertise
- Coordinate outreach via landlords' and owners' associations, industry organizations, local businesses, brokers, property managers, etc.
- Draw on lessons learned from existing benchmarking programs

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[18] Barr and Malone 2010

4.2. Setting building size thresholds

4.2.1. Aligning thresholds with policy objectives

The size and type of buildings that are required to report will depend in part on the jurisdiction in question. One way of determining appropriate building size thresholds is to determine the proportion of total floor area that should be covered by the policy. For example, a larger city with a policy that extends to buildings of ≥50,000 square feet (≥4,645 square metres) could impact up to 50 per cent of total built area, while a smaller city with relatively fewer large buildings may elect to extend the benchmarking requirement to buildings of ≥20,000 or 30,000 square feet (≥1,858 or 2,787 square metres) or larger in order to impact a larger percentage of the building stock. Typically, commercial and industrial buildings should be phased in first, as they have fewer challenges than multi-unit residential buildings with multiple meters and owners/tenants.

Individual jurisdictions could consider performing an initial audit of their existing building inventory to determine what size thresholds are appropriate for their specific context.

While a greater percentage of floor space is preferable, setting higher thresholds may still result in significant improvements. For example, Chicago's Building Energy Use Benchmarking Ordinance applies to all commercial, institutional and residential buildings of ≥50,000 square feet. The ordinance covers less than 1% of the city's buildings, but accounts for approximately 20% of the total energy use of the built environment.

It should be noted that larger buildings tend, on average, to be better managed; therefore, the lowest cost energy efficiency gains are likely to come from smaller buildings. Several cities are beginning to lower the threshold for buildings that must comply with their benchmarking ordinances – for example, Seattle has recently introduced benchmarking requirements for buildings larger than 20,000 square feet, while San Francisco requires non-residential buildings greater than 10,000 square feet to report. Even medium-sized cities may have few buildings over 50,000 square feet (≥4,645 square metres) in size, making a lower threshold preferable.

However, as smaller buildings are also those with fewer abilities to take on benchmarking requirements, the inclusion of these buildings should be coordinated to coincide with the availability of automatic utility data uploads.

Table 2: Phasing in implementation

	Government Buildings	Commercial/Industrial Buildings	Multi-Unit Residential Buildings
Year 1	≥950 m2* (≥10,000 sq ft)	≥9,300 m2 (≥100,000 sq ft)	
Year 2		≥4,600 m2 (≥50,000 sq ft)	≥9,300 m2 (≥100,000 sq ft)
Year 3		≥2,300 m2* (≥25,000 sq ft)	≥4,600 m2 (≥50,000 sq ft)
Year +		≥950 m2* (≥10,000 sq ft)	≥2,300 m2* (≥25,000 sq ft)

Prior to launch of program

4.2.2. Phasing in implementation

As indicated above, it is important for administering bodies to begin benchmarking their own buildings in order to demonstrate leadership, but also to build internal capacity. Municipalities and/or provinces should furthermore understand the energy consumption of publicly owned buildings in comparison to private industry or those in other jurisdictions. Working with the jurisdiction's own benchmarking data improves staff familiarity and understanding of the requirements and challenges associated with benchmarking programs.

Following the establishment of benchmarking for government buildings, reporting requirements for different market sectors and buildings sizes can be implemented in phases. This approach allows administering bodies to develop internal administrative processes and even learn from larger (e.g. Class A) buildings that have prior experience with benchmarking procedures. Experience from the U.S. has shown that phasing in smaller buildings too early can actually overwhelm administrative capacity in early years.

For example, Seattle's original building size threshold was raised from its initial >10,000 square feet to >20,000 square feet to accommodate the City's ability to support reporting buildings and encourage compliance. Phasing in implementation also provides additional time to the owners of smaller and/or less well-resourced buildings to become familiar with benchmarking requirements and establish their own reporting procedures.

A recommended approach for phasing in implementation is outlined in Table 2. As discussed earlier however, it is essential for jurisdictions considering and energy benchmarking program to first undertake an inventory of local buildings. For smaller municipalities with a low number of high energy users, it is important to consider the expected rate of return on energy benchmarking programs and compare them to alternative means of encouraging energy efficiency, particularly in the absence of provincial guidance. Given the resources and time required on the part of both administrators and building owners, it may be preferable to encourage or extend existing industry-led efforts that place the onus on industry members to report and that make use of existing benchmarking programs and standards. For utility-run programs, it may also be preferable to begin program implementation with key account holders (e.g. large companies, universities, hospitals), and expand to smaller accounts as capacity increases.

Box 6: Benefits of phasing in implementation

- Start benchmarking programs from a position of strength
- Demonstrate leadership to industry members
- Improve internal capacity of program administrators
- Glean lessons from more experienced building types
- Allow smaller buildings to become familiar with reporting requirements
- Improve overall industry awareness and compliance rates

4.3. Establishing a system of data management

Central to the success of energy benchmarking programs is the establishment of a system of managing incoming benchmarking reports. To this end, the U.S. Office of Energy Efficiency and Renewable Energy has developed the Standard Energy Efficiency Data (SEED) platform, which provides program administrators with a web-based and open source of data management software. The program allows the import of large sets of data from multiple sources (including Portfolio Manager), which can then be cleaned and checked for errors. SEED also allows licensed users to conduct analyses using key building metrics, track compliance, and generate detailed reports.

SEED is currently being piloted in 10 U.S. cities via the SEED Platform Collaborative, which provides users free hosting and technical support. However, other cities are developing their own programs with similar capabilities in partnership with local industry organizations (see Box 7). Currently, the SEED platform has not yet been adapted for use in Canada, which will require Canadian jurisdictions to request a conversion, or else develop their own data management programs.

Box 7: Minneapolis and RETAP

The City of Minneapolis staff received considerable support for their benchmarking ordinance from the Minnesota Retiree Environmental Technical Assistance Program (RETAP), an organization that employs retired professionals in providing support for facility assessments and community sustainability programs. Among the support services RETAP provided were:

- Promotion and awareness raising of the ordinance

- Direct assistance to building owners/managers in uploading data to Portfolio Manager, numbering a total of approximately 70 customers

- Development and support for the City's Benchmarking Management System, the in-house data management portal

RETAP will continue to work with the City of Minnesota to expand the number if building owners supported.

4.4. Building a compliance list

Among the necessary steps in implementing energy benchmarking programs, creating an accurate and comprehensive compliance list was consistently identified by program administrators in the U.S. as one of the most challenging. This is a particularly important and often challenging task in benchmarking efforts as building-scale information is rarely collected by, or made available to local governments. Once thresholds for building size and type are established, jurisdictions interested in implementing benchmarking programs must therefore identify specific buildings that must comply, and the associated contact person for each building or property. While the bulk of this effort occurs at the initial stage of benchmarking programs, data must be continuously updated to reflect changing ownership and shifting building thresholds. Cities in the U.S. emphasized the importance of ensuring that data management systems are established prior to engaging in this step of the process, and noted two major steps involved.

First, cities interested in energy benchmarking programs have typically begun compiling their compliance lists by accessing existing building records available in property assessment databases, such as Ontario's Municipal Property Assessment Corporation (MPAC). This step can require consolidating disparate data sets from various sources. Compliance can also be determined by cross-referencing these databases with GIS or mapping programs such as Google Maps to identify specific property characteristics such as the number of buildings on a property, or even the number of floors in a given building (to estimate floor space area). Buildings can then be segregated by type and receive a property and/or building identification number.

Once buildings are identified, accurate contact information for building owners and/or managers must be found and entered into the compliance database to create an initial mailing list. As owners and managers may change frequently, the process of finding and maintaining accurate building information is an ongoing and often iterative process that can take several rounds of communication. Some cities have drawn on member-based forums to locate accurate current property contact information.

4.5. Notifying building owners

With a compliance list established, program administrators can begin the task of notifying building owners as to their upcoming benchmarking requirements. Although requirements will vary according to the number and size of buildings required to comply, a minimum of 1.0 FTE is recommended at this stage. To give building owners ample time to make the necessary arrangements, compliance lists and notifications should be publicly posted before the end of year and well in advance of reporting deadlines (see 4.6.1. below). To broaden general awareness of benchmarking programs, information should be sent directly to buildings that fall under later phases of implementation as well as those under compliance in the first year. Reminder notifications sent in the months leading up to the deadline can help to encourage compliance and ensure administrators have the proper contact information. Administrators may want to require an acknowledgement and agreement as to the applicability of the compliance list from building owners. Awareness and support can also be garnered through media reports and press releases.

To facilitate the process of complying, notifications should also include any helpful information, including building/property ID, instructions for Portfolio Manager, opportunities for training or support, lists of service providers, and relevant contact information. Messaging around compliance should be clear and direct, but include information on the benefits of energy benchmarking and best practice examples. Where possible, follow-up communication procedures can also be established, such as personal calls to high value utility customers, or automated calls to all users. Emails, calls and other forms of inbound and outbound communication should be tracked using data management software.

4.6. Encouraging compliance

4.6.1. Timing
A key piece of information to be included in notifications sent to building owners is the deadline for achieving compliance. Reporting deadlines should be consistent across Canadian jurisdictions to allow property owners with diverse portfolios to streamline and clarify reporting requirements. Because utility data is often not available in real-time, a window of time is required to allow utilities to aggregate and release data, and for utilities and/or building owners to input relevant data into Portfolio Manager. It is therefore recommended that deadlines for data submissions should be established approximately five months after the end of the calendar year.

4.6.2. Flexibility
While approaches to compliance vary across U.S. cities (see Table 3), there is general agreement that resources and effort are better spent assisting building owners in understanding the purpose of energy benchmarking and achieving compliance than reviewing appeals or enforcing fines. Flexibility and support are important to the development of positive relationships with industry, particularly to those owners who have minimal understanding of benchmarking requirements or capacity to complete the necessary steps. For many building owners, achieving compliance is furthermore contingent upon their access to data and/or the timeliness with which leaseholders submit their individual utility data. Many U.S. cities give building and property owners the benefit of the doubt in issuing notices of non-compliance that first ensure the accuracy of contact information and provide a list of resources to encourage compliance. For example, the City of Chicago allows building owners the opportunity to demonstrate that they have made a "good-faith" effort to comply. If staff identify missing or improper data entries, building owners are provided a set of instructions on the way to fix the problem. To date, there has been no evidence of fraudulent reporting.

That said, retaining some means of enforcement in the form of penalties for non-compliance can help support program effectiveness. To incentivise compliance, a key consideration in the establishment of penalties is to set fines on par with or higher than the average fee charged by local service providers for data reporting and verification. Legal language as to the accuracy of the information reported should also be included into reporting requirements. Those who do comply could also be publicly recognised for their efforts.

4.6.3. Exemptions
Where exemptions from compliance requirements are requested, a process of individual review is required. Establishing an internal process is important to ensure that each case is reviewed with the proper context and understanding required.
Some reasons for exemptions include:

- Building eligibility: e.g. administrator's building data is incorrect

- Ownership change: e.g. new owners unaware of compliance requirements

- Financial distress: e.g. where building is under possession of receiver or foreclosure

- Extenuating circumstances: e.g. excessive damage

- Low occupancy: e.g. average physical occupancy of less than 50%

- New construction: e.g. certificate of occupancy issued during reporting year

Table 3: Examples of U.S. approaches to compliance

City	Administrative or other responsibilities
New York City	Failure to comply results in a violation and a penalty of $500. Continued failure to benchmark by subsequent deadlines of August 1, November 1, and February 1 results in additional violations on a quarterly basis and a penalty of $500 per quarter with a maximum of $2,000 per year.
Boston	Failure to comply results in a notice of violation. Failure to comply with the notice of violation within 30 days results in a fine of $200 for buildings over 50,000 SF or 50 units, and $75 for buildings of >35,000 SF or 35 units per day of non-compliance.
San Francisco	Benchmarking reports are currently accepted year-round without penalty, but the City requires an audit every 5 years unless the building has achieved LEED® or ENERGY STAR® certification. While enforcement emphasizes outreach and collaboration, the ordinance allows the Department of Environment to issue fines of up to $100 per day for buildings >25,000 SF, to a maximum of $2,500.
San Francisco	Failure to comply results in a notice of violation, followed by a fine of up to $300 per day of non-compliance.
Minneapolis	Failure to comply results in a notice and fine of $200, which doubles every 45 days to a maximum of $2000 (Note: this was not enforced in the first year of the ordinance).
Seattle	Warning notices are issued to non-complying buildings, followed by a fine of $1,000 per quarter for buildings >50,000 SF, and $500 for buildings >20,000 SF, to a max of $4,000 and $2,000 respectively.

Box 8: More carrots, fewer sticks
• Consistency in reporting deadlines across municipalities encourages compliance
• Fines should be set as a way to incentivize participation, not punish laggards
• Resources are better spent encouraging compliance than assigning fines
• Resource needs for enforcing compliance decline over time

5. DATA QUALITY CONTROL

The sections presented above outline a number of ways in which the development and administration of energy benchmarking programs can be streamlined and simplified, for both program administrators and building owners. It should be noted that while benchmarking programs should strive to make data collection and entry as straightforward and streamlined a process as possible, it is important that this does not occur at the expense of acquiring useful and accurate data that can be compared across building types and sectors.

Perhaps the most important dimension to a successful benchmarking program or regulation is the need for high quality building energy data. However, Canadian and U.S. stakeholders widely reported concerns over the quality of data reported into existing programs, for both voluntary and/or internal corporate benchmarking activities, as well as formally regulated programs.

5.1. Establishing a common tool

Many issues of data quality and comparability can be resolved by the consistent use of ENERGY STAR® Portfolio Manager. This is currently the tool used by the vast majority of U.S. jurisdictions, as it provides an extensive database for a range of building types. The tool is free, simple to access, and provides the necessary data fields and reporting to support decision making among building owners and managers, governments, and utilities. The database, which allows for buildings to be compared, is updated regularly using statistically significant surveys of building stocks. To adapt the tool for use in Canada, Natural Resources Canada (NRCan) established an agreement with the U.S. Environmental Protection Agency (EPA), and is in the process of adding more building types. In general, Portfolio Manager has been shown to be an excellent tool for a variety of building types in both the U.S. and Canada, and has been instrumental in moving benchmarking efforts forward.

Stakeholders pointed to a few concerns about the operation of Portfolio Manager. For example, it is sometimes felt that buildings perceived to be high performers achieve a low score, and vice versa. This illustrates the importance of providing adequate education and outreach, to ensure proper use and understanding of the tool.

**NRCan: Continue to expand
Portfolio Manager capabilities**

NRCan should continue to work to expand the range of space types that can be scored within Portfolio Manager. Data centres and multi-unit residential buildings in particular would help expand the usefulness of the platform.

**PROGRAM ADMNISTRATORS:
Support building owners and managers**

Building owners and managers will require considerable support in data collection and entry into ENERGY STAR® Portfolio Manager. A range of building energy benchmarking resources are provided by NRCan[19], which should be extended to those required to report.

5.2. Addressing data quality issues

Other data quality issues have been noted by stakeholders. Four principle sources of data quality issues and suggestions for their resolution are noted below.

5.2.1. Inaccessibility

As indicated above, a key challenge to successful benchmarking programs lies in the ability of property managers or building owners to access utility data. This can be a challenge even on relatively simple properties where the capacity to find and/or read meters is low. Where a single property has multiple accounts, tenants' concerns around privacy or confidentiality may limit property managers' ability to access each tenant's energy consumption data. In multi-tenant buildings, even a single uncooperative tenant can prevent property managers from accessing the data needed to accurately benchmark the entire building. Furthermore, where a tenant vacates their unit, previously collected energy data can be lost. In large buildings with many tenants, the challenge to acquire a full and complete data set can be considerable.

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[19] See http://www.nrcan.gc.ca/energy/efficiency/buildings/energy-benchmarking/resources/3753 for tools and information, technical reference documents, and links to training resources.

PROVINCES: Automate data uploading to Portfolio Manager

As noted above, where data uploads are automated by utilities, concerns over data quality are greatly minimized. To streamline their data automation process, the State of California developed a set of terms and conditions in 2008 that allowed utilities to collect energy use data via an online authorization for data release that eliminated the need for individual (paper) authorizations. This process has facilitated the success of benchmarking programs in Californian cities, as has also been the case in Manitoba, where the existence of a single utility has streamlined voluntary benchmarking processes. In Ontario, recently proposed changes to the Green Energy Act, 2009 would require electricity, water and natural gas utilities across the province to make whole building, aggregated consumption data available to building owners. In British Columbia, utilities BC Hydro and Fortis are in different stages of exploring program development for automatic data transfer.
However, many other utilities have not yet developed the capability.

PROGRAM ADMINISTRATORS: Consider existing barriers in assessing compliance

Where barriers to utility data have not yet been resolved, it will be important for program administrators to recognize where building owners have made a "good faith effort" in capturing a complete set of building utility data (see Section 4.6). In cases where barriers are significant, administrators should show leniency in enforcing compliance.

PROPERTY MANAGERS/LANDLORDS: Include data sharing requirements into leasing agreements

Green leases incorporate energy and sustainability requirements into standard leases, including energy and water targets, outline tenant responsibilities, and allow landlords to make improvements in energy efficiency and overall building performance (e.g. REALpac's green office lease). Such leases can also include requirements for tenants to share energy data directly with building owners, both during tenancy and after vacancy.

5.2.2. Inaccuracy and insufficiency

While an abundance of meters in multi-tenant buildings poses one set of challenges, an insufficient number of meters can present another. It is not uncommon for multiple buildings on a property to share a single utility meter on a 'campus', which in turn requires individual building owners or tenants to estimate their consumption as a proportion of the whole. Such estimates are often based on floor space area, which itself is often underestimated as a result of a number of factors, including the unavailability of floorplans, the inability to measure the actual conditioned floor area, or the existence of multiple conflicting measurements of floor space. Where data is not available or is unclear, the resulting data is inaccurate. Other errors can occur as a result of low reporting capacity among property managers or owners, who may not be able to locate or identify the appropriate data. Where reporters are required to manually enter utility consumption, data can furthermore be subject to human error in the data entry process.

UTILITIES: Expand metering options

Again, aggregate utility meters for individual buildings, as well as automatic data transfer capabilities, can help to resolve many data quality issues (see Section 3.3).

PROGRAM ADMINISTRATORS/INDUSTRY ORGANIZATIONS: Offer training and support

Consistent and high quality support can assist property managers in accessing the appropriate data. Where capacity is low, free data verification services can help to ensure data entered into Portfolio Manager is accurate.

5.2.3. Inconsistency

In order for Canadian energy benchmarking programs to be successful, data points must be comparable within and across Canadian jurisdictions, including the fields that are selected for comparison, and the sources of data considered appropriate or acceptable. Such consistency ensures not only the accuracy and comparability of building energy use across jurisdictions, but transparency in data analysis and labelling as well. However, inconsistency in the selection of data points of interest across jurisdictions, or in the acceptability of data sources, can render the data obtained through benchmarking programs incomparable and make benchmarking more complicated for building owners with properties in multiple jurisdictions. Variations or lack of clarity in reporting requirements and fields can therefore result in the entry of incorrect data points (e.g. charges unrelated to actual energy consumption). These data quality issues can be resolved by ensuring consistency in the data points that are requested, and by establishing a common set of methodologies and definitions.

PROGRAM ADMINISTRATORS/UTILITIES:
Clarify definitions and metrics

To achieve a comparable data set across jurisdictions, building owners must be required to submit data using a common set of definitions of cost and use. Instances where consistency is critical include:

- *Location data:* building location (vs. head office)
- *Floor space area:* gross floor area (vs. gross leasable space)
- *Units of measurement:* square meters (vs. square feet)
- *Metered consumption:* actual (vs. estimated)
- *Cost:* consumption charges only (vs. e.g. full costs including rebates /meter charges)

PROGRAM ADMINISTRATORS:
Ensure selected fields are consistent

The data that building managers are required to report must furthermore be consistent with and comparable to other existing programs. While individual jurisdictions may wish to add regionally-specific data points to benchmarking data management software, efforts should be focused on ensuring the accuracy of a base set of comparable fields.

5.2.4. Incomprehensibility

Finally, the format in which data is provided to building owners is important to ensuring accurate data entry. Where automated data uploads are not yet available, customer requests for utility and other data are sometimes fulfilled in unhelpful formats. To be useful, data must be provided in readable format that includes clear indications of units of measurement and headings. Customers may also experience time delays in receiving responses from utilities, making compliance with benchmarking requirements more difficult.

UTILITES: Standardize formats for data transfer

The format of data reports should be clarified and standardized within and across jurisdictions, and accompanied by a set of guidelines for reading utility bills.

5.3. Data verification

In addition to the recommendations noted above, a powerful means of ensuring that reported data is of higher quality is to have it verified. Data verification is the process through which energy benchmarking reports are submitted for verification by a licensed professional or accredited verifier. Verification helps to ensure a higher consistency and quality in reported data overall, levels the playing field for reporting buildings, and helps to improve building owner energy literacy. Quality control measures have recently been incorporated into Portfolio Manager via a "Data Quality Checker" that issues alerts for missing or suspect data entries. However, benchmarking reports can still be submitted without addressing the alarms, indicating the need for a more active and rigorous process of verification. In fact, data verification is increasingly recognized as an essential element to energy benchmarking and reporting policies that can reduce burdens on program administrators, who may spend considerable time and resources "cleaning" benchmarking data.

Some industry actors have expressed concerns that data verification processes will unnecessarily burden landlord and property managers, particularly those who are already voluntarily submitting energy data via industry benchmarking programs. While several larger property and building owners may have the in-house capacity to conduct verification internally, smaller or less resourced buildings will require external support and/or training, which can add an extra cost to the process of benchmarking. As such, verification requirements must balance the need for high quality data with the capacities and resources available to industry members.

5.3.1. Approaches to verification

Several U.S. cities have begun to introduce verification requirements into their benchmarking ordinances. The City of Chicago is furthest along in asking reporters to have their data checked by a licensed professional in the first year of reporting, and every third year thereafter. Verifiers review and complete the Portfolio Manager checklist, which is then added to the final report and kept by building owners for a period of at least three years. Chicago's approach has included engagement across the industry to ensure verification is performed accurately and consistently. City staff work with service providers to ensure they are aware of benchmarking requirements, and accept verification from a wide range of certified professionals to ensure flexibility. A volunteer-run pro-bono data verification program is also offered by the local U.S. Green Building Council (USGBC) Chicago Chapter to provide services to buildings with lower overall benchmarking capacity (see Box 14, p. 43). Montgomery County, MD requires a similar process. Both the City of New York and the City of Seattle have begun to enforce data accuracy in greater earnest by issuing warning letters to buildings with outlying reports. Seattle staff are also considering incorporating building retrofit requirements for buildings over 20,000 square feet. Some cities have taken on the process of verification in-house, reviewing errors (e.g. unusually high or low EUI values) as they are flagged by Portfolio Manager or other data management platforms. This process is time-consuming and often requires several communications with building owners before data concerns are resolved. A number of Canadian and U.S. industry organizations offer additional examples of how verification can be included into volunteer programs.

For example, REALpac requires data verification from all buildings who wish to receive recognition for excellence in building performance by following the Energy Benchmarking Program Data Verification Procedure.[20]

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[20] http://c.ymcdn.com/sites/www.realpac.ca/resource/resmgr/energy_

5.3.2. Requiring data verification

Based on the experiences and expertise of Canadian and U.S. stakeholders, it is recommended that reported data be verified by a qualified professional in the first year of reporting and at regular intervals (e.g. every three to five years) thereafter to ensure accuracy of benchmarking data.

However, a certain degree of flexibility should be used when requiring verification. Where buildings have access to appropriate (i.e. certified professional) in-house expertise, verification procedures by members of building staff or tenants may be accepted to ensure low-cost options are available.

Program administrators should make sure that reporting building owners are aware of existing resources, such as Portfolio Manager's Data Quality Checker, in order to save costs (see Section 6). In these cases, administering bodies may also wish to periodically audit a proportion of self-verified reports, particularly outliers that exhibit exceptionally high or low EUI.

A wide range of certified professionals should be considered acceptable for eligibility, including Professional Engineers, Certified Energy Managers, and Building Technologists.[21] Finally, where buildings have received certification from an established standard (e.g. LEED®), administering bodies should consider waiving verification requirements altogether.

Box 9: Approaches to data verification

- Automatic software alarms that flag missing or improper data entries
- Random audits by program administrators
- Established audits of high/low performers (e.g. 10th percentile)
- Required review by in-house or third-party professional with recognized credentials
- On-site audits and utility meter audits

Box 10: Program administrator tips for improving data quality

- Ensure staff is sufficiently trained to support building owners and operators in achieving compliance
- Provide rapid feedback to building owner queries or improper data entries
- Engage directly with service providers to ensure their understanding of program requirements
- Offer pro-bono verification for smaller buildings with lower capacity
- Subject reports to random audits, for example by sampling within each building size and type grouping, or based on high/low EUI values
- Consider occasional on-site verification or spot checks

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[21]To support policy development at a national level, CaGBC will work with industry associations and academic institutions to develop a list of criteria for eligible professionals, or a list of eligible professional degrees and certifications.

6. DATA TRANSPARENCY

Once energy benchmarking data is obtained, it is important that data is used to effect actual reductions in building energy use and GHG emissions, starting by establishing baselines and goals for different sectors. At the core of energy reporting and benchmarking initiatives is the idea of "unlocking" data previously inaccessible to policy makers, utility conservation programs and even building owners themselves. For data to be useful to these actors, however, energy benchmarking programs must be considered a first step, one component of a broader approach that links benchmarking efforts to other conservation policies and programs for energy and emissions reductions.

6.1. Making data actionable

6.1.1. Reporting back

A key challenge facing program administrators is the ability to return analyzed benchmarking data back into the hands of building and property owners. For owners to act on benchmarking data, they require information on key areas of potential improvement, and a means of undertaking actual building performance improvements. One approach for providing this is to create individualized performance profiles for building owners, or score cards, that demonstrate their performance compared to others in their category. The City of Seattle provides an example of such a program: it is piloting the creation of performance profiles in a phased approach beginning with the office sector and extending to multi-family housing. Seattle also hosts an Energy Benchmarking Dashboard that allows building owners to enter in their building's EUI and ENERGY STAR® score to determine whether they qualify as low, average or high energy users. This type of program offers building owners the opportunity to move towards the use of data for managing building operations on a regular basis.

With more sophisticated data, program administrators can also create checklists of building components and associated measures that can improve specific system performance. Areas of potential improvement should be broken down into the following areas:[22]

1. **Operations and Maintenance:** Several procedures and programs can help to reduce energy consumption without the need for major capital investments. Simply by exploring building energy usage and occupancy rates, energy-saving operational changes can be made to reduce energy use quickly and at low-cost. Some of these can be as simple as turning lights off during unoccupied periods, but training and education is often required for building staff.

2. **System Optimization:** To reduce energy use intensity, building managers and operators can take a number of steps to ensure that equipment and system components are functioning optimally. The installation of sub-meters can also help to identify the relative energy usage of different systems or areas, providing the capability for load profiling and identification of phantom energy loads.

3. **Retrofit: Where needed,** building owners may need to replace or retrofit building systems altogether, including lighting, heating, ventilation, and air conditioning.

Experience from the U.S. indicates that it is important for score cards to be targeted towards individual performance, and that messaging be tailored for specific sectors and levels of performance. Performance in individual utilities (e.g. fuel oil, gas, electricity) should also be indicated to show performance relative to others of the same building type. To ensure that information is received, it is recommended that performance profiles are sent to both the individual who filed the report, as well as the owner and/or legal entity responsible for the building. While the time required for building data to be submitted and analyzed precludes program administrators from disseminating building score cards quickly, the timeline for issuance should be set as early as possible.

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[22] TRCA 2014

Box 11: Important scorecard information for building owners

- Individual building performance (EUI, ENERGY STAR® score)
- Comparative performance for individual building characteristics, sector, and location
- Key areas of potential improvement and next steps
- Potential cost savings from improvements
- Contact information for service providers
- Links to relevant incentives programs
- Additional resources

6.1.2. Targeting incentive programs

Associated with the provision of individualized scorecards is the need for utilities and governments to target incentives programs more effectively. As benchmarking data grows, different sectors and market areas can be divided into low, moderate or high performance categories, according to their EUI or ENERGY STAR® scores. This data can then be used to target demand side management (DSM) incentive program marketing and outreach toward the lowest performing buildings and sectors. Incentives themselves can be tailored towards different sectors or levels of performance, or tied to early participation in benchmarking programs. Using additional asset information can further help to identify groups of buildings that can be served by a similar program. To ensure that the effectiveness of conservation incentives programs is maximized, provincial utilities should work in concert.

6.1.3. Moving towards performance-based regulation

Beyond incentive programs, benchmarking data can also provide a foundation from which performance-based regulations can be developed. Once different performance tiers are established, sector-specific targets can be developed that identify an acceptable level of building performance. Such targets can then be passed along to individual buildings as a measure of their relative distance to the target, which must be achieved at or prior to time of sale, lease, or building alteration. Jurisdictions may also wish to consider including requirements for energy auditing or upgrades for low-performing tiers. For example, buildings that fall under New York City's benchmarking ordinance (LL 84) are also required to conduct an energy audit and retro-commissioning of base building systems every ten years (LL 87).

As capacity and literacy increases overall, benchmarking programs may begin to include more specific data on building systems and characteristics (e.g. HVAC, lighting, any past retrofits) to further strengthen administrators' understanding of building performance. For example, data on building age and systems can assist regulators in determining the effect of high building code requirements on actual building performance. Such trends can also be explored by linking benchmarking data to existing data sets that contain information on building, occupancy, and energy efficiency variables (e.g. the Commercial and Institutional Building Energy Use Survey).

6.2. Making data visible

Beyond providing actionable data to governments and utilities, transparency is also about communicating energy benchmarking data to designers, building operations and energy management industries, researchers, and the public. Depending on the audience in question, the specific objective of the data sharing and the kinds of data to be shared may vary. For tenants, brokers, investors and other members of the real estate industry, access to data on specific building performance will inform purchasing or leasing decisions and allow the entry of energy efficiency considerations into the real estate market. For researchers and academics, access to benchmarking data will enable the identification of trends that can help inform efficiency and conservation efforts. For building designers, benchmarking data can help identify gaps between predicted and actual performance, helping to improve the accuracy of building design.

In the US, all cities with benchmarking ordinances have now opted to publicly disclose benchmarking data via various means and platforms, including municipal Open Data sites, government websites, downloadable excel spreadsheets, infographics, and interactive online mapping tools (see Table 4). Until recently, Seattle only required building owners to disclose energy performance data whenever requested by a tenant (existing or prospective), lender, or buyer. However, staff have recently introduced new legislation to City Council that will soon require full data transparency.

Examples of data visualization and public engagement tools in Canada include MyHEAT, an online tool that displays individual buildings' heat loss via an interactive thermal image map of Calgary neighbourhoods. Homeowners are encouraged to search for their residence and are offered tips and links to opportunities for retrofit financing .[23]

It should be noted that several concerns and challenges have been raised by Canadian commercial real estate industry members surrounding the full public disclosure of data. Industry concerns centre primarily on the potential for an unfair characterization of low-performing buildings where conservation or efficiency gains are difficult to achieve, or are limited given building uses or characteristics. Others noted that with full public disclosure, building owners may furthermore be tempted to enter incorrect data in order to achieve a higher performance rating and score. Indeed, the public disclosure of benchmarking data is the point of greatest possible contention when establishing benchmarking regulations. As such, regulators should ensure that they have consulted with their local industry representatives, and should be selective in their choice of data points to be publicly disclosed to ensure a balance is struck between achieving the desired effect on markets and industry awareness, and addressing industry concerns around data confidentiality. Table 4 outlines a number of data points that many jurisdictions in the US have released to the public, and which Canadian regulators may wish to consider. A number of additional recommendations on the steps and considerations that should be taken into account when establishing transparency requirements are outlined below.

Box 12: Levels of data disclosure

- Unidirectional: Data reported to government/utility only
- Private: Data analysed and returned to building owners only
- Transactional: Data provided to prospective buyers
- Upon request: Data provided to prospective tenants, buyers, or leasers
- Aggregated: Data presented online and/or in annual reports in aggregated form
- Public: Data presented in online, annual reports, and/or mapping software

[23] https://myheat.ca/map

Table 4: Typical information disclosed by benchmarking cities (adapted from Resource Media 2014)

Building Information	Energy Performance Information
• Property/building nameProperty/ building address	• ENERGY STAR® score (where available)
• Property/building owner name	• Site energy use intensity (Site EUI)
• Property/building owner address	• Weather normalized site EUI
• Property/building owner contact information	• Source energy use intensity (Source EUI)
• Neighborhood/district	• Weather normalized source EUI
• Tax parcel number	• Total electricity use
• GPS Coordinates	• Total natural gas use
• Property/building ID	• Total fuel oil use
• Year of construction	• Total diesel use
• Primary/additional use type(s)	• Total steam use
• Gross floor area	• Total greenhouse gas emissions
• Green building certification	• Greenhouse gas emissions intensity
• Third party certification	• Water use/indoor water use
	• National median comparisons
	• Local median comparisons

6.2.1. Timing the release of data

Just as building sizes and types should be phased into reporting requirements, so too should data transparency be introduced as requirements are expanded and capacities improve. To give building owners time to understand benchmarking requirements and improve performance, public disclosure of data should be released between one and three years after the initial year of reporting. While specific program start dates will vary across the country, it is furthermore important that the timing of data release dates are consistent across municipalities.

6.2.2. Presenting data in multiple formats

For data to be useful and usable, it is important that it is presented firstly, to a level of detail, and secondly, in a variety of forms and forums for easy access.

A public registry of energy (and water) data presented in a searchable and downloadable format (e.g. Excel) provides building owners, academics and interested members of the public easy access to the full benchmarking database. Where possible, these databases should allow users to select data points of interest that in turn generate charts and graphics

Annual reports of aggregated province/city-wide results and trends should be published. Accessible reports that provide relevant and compelling information detailing compliance rates, sectoral progress, and case study examples of high performing buildings, encourage uptake and use by decision-makers and media alike. However, it should be noted that with a higher level of analysis, greater resources are needed, resulting in longer wait times for the public release of data. In the US, cities are typically unable to release benchmarking data sooner than the beginning of the following

year, resulting in a minimum of 7 months between report submission and release. As programs become more established, administrators should explore options to streamline transparency reports to include only the most relevant and useful data. Further, while these reports focus on broad trends, specific system-level data and building details will be important for program administrators and academic bodies to understand trends and tendencies over sectors or geographic locations.

Data mapping and visualization techniques should be explored as a way of presenting data in an engaging and interesting format. Visualizations are powerful in that they have the potential to create their own narratives by displaying trends and representations that would not otherwise be seen. Several U.S. cities have developed interactive mapping programs that allow user to search, filter and interact with energy benchmarking data, including Philadelphia and Boston (see Figure 2).

Figure 2: Philadelphia's energy benchmarking visualization tool

- **Program administrators**
  Explore partnerships with academia, non-profit and private sectors to make energy information more accessible and impactful in the public realm. Such partnerships can not only assist in developing detailed profiles important for improving the utility of data, but creating them in a more timely fashion that confers a higher relevance and utility to data reported back to building owners.

- **Research and academic institutions**
  Assist administering bodies to track the effectiveness of benchmarking programs over time by exploring and merging disparate data sets. For example, individual buildings can be tracked to measure performance upgrades, participation in incentives programs, and/or the participation in other energy efficiency measures and programs.

6.2.3. Contextualizing building and sector performance

To address industry concerns and provide both decision-makers and the public with a clearer understanding of broad trends in performance, both online and print reports should also begin to tell the larger story of energy efficiency and conservation efforts in the building sector. In the US, some cities have looked to third party consultants to assist in crafting a narrative that explains sectoral-level efforts and improvements, provide in-depth looks into specific building actions, and situate high/ low performing buildings in a broader landscape. Such information and contextualization is important to clarify variations or differences in energy performance, especially with regard to typically high energy users, or buildings that have achieved significant gains in energy performance despite a lower ENERGY STAR® score.

For exceptional situations, it is important for program administrators to create a process by which buildings can apply for exemption from public disclosure of data altogether. Buildings for which energy performance data is not comparable with other buildings should be considered for exemption, as a fair and/or accurate comparison would be difficult or impossible to achieve. Other situations where exemptions should be considered are those where its release may compromise legitimate business confidentiality concerns. Building types that should be considered for exemption include shopping centres, heritage buildings, data centres, television studios, trading floors, and buildings used primarily for industrial manufacturing purposes. Financial information should be kept secure in all cases.

6.2.4. Offering building labels

Finally, building performance labelling should be considered as a means of allowing high performing buildings to demonstrate and display achievements in energy performance. The ENERGY STAR® score offers a useful and recognizable option that is familiar to members of the public and to marketing departments alike. Simple comparisons using scores out of 100 are easy for prospective tenants or buyers to understand, and as such should be offered as an optional product that building owners may choose. Administering bodies should consider developing a suite of marketing and promotional tools for specific sectors alongside the use of an ENERGY STAR® label.

7. BUILDING INDUSTRY CAPACITY

In this final section, different approaches to providing industry support are outlined with the goal of providing Canadian jurisdictions interested in benchmarking programs a clear overview of Canadian needs and potential tools to facilitate the implementation of benchmarking programs. As indicated above, experiences from the U.S. indicate the importance of proactively offering industry support in order to activate the market and prepare service providers for benchmarking requirements.

Local governments will be required to identify the kinds of training and support that will be most needed, and communicate these sources of support to industry members well in advance of implementing benchmarking programs. U.S. experience also demonstrates the value of providing clear, consistent and useful forms of support to building owners and managers. This is because offering ample support in multiple formats can improve policy awareness, data quality, and compliance.

For example, Seattle's streamlined and extensive efforts to assist building owners have been identified as a major reason for the overall success of the program and have been credited with the achievement of the highest compliance rates in the U.S.[24] As such, it is important for Canadian jurisdictions to explore existing methods of support and capacity building to ensure Canadian industry members are equipped and ready to take on benchmarking requirements.

7.1. Capacity needs in the Canadian industry

It is worth mentioning that several concerns exist regarding the Canadian industry's overall capacity to meet the requirements of a mandatory benchmarking program. The time, effort and resources to achieve compliance have been identified by industry stakeholders as a potential regulatory burden on the building sector. Of course, the capacity of building owners and sectors will vary considerably across the country.

Larger commercial owners, managers and operators are among those with the most experience in benchmarking programs and are anticipated to require the least amount of support. As noted above, 14% of Canada's commercial real estate have already entered energy data into ENERGY STAR® Portfolio Manager, representing hundreds of millions of square feet across the country. However, even these more experienced sectors will require support, as new programs may bring new requirements. With higher capacity also comes more sophisticated questions, requiring a high level of understanding on the part of benchmarking support staff.

Box 13: Capacity needs in brief

- Work with industry partners to boost overall capacity
- Clarify requirements and reporting deadlines
- Focus resources on where there is greatest need
- Provide consistency in support to assist owners in finding the answers they need
- Offer pro-bono services for low capacity buildings

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[24] Resource Media 2014

Nevertheless, where industry needs will be the greatest are in those buildings and sectors where benchmarking programs have not yet taken hold as a result of either higher complexity in building form, and/or their lower capacity overall. In the U.S., less experienced or sophisticated operators have typically been found in building types such as social housing, places of worship, and Class B/C commercial, while multi-family residential and shopping malls have required the greatest support.

Efforts to build industry capacity must therefore be focused in these sectors. Areas in which support can typically be required include the following[25] :

- Clarifying compliance and reporting requirements
- Acquiring utility data
- Identifying shared meters
- Filling in missing meter readings
- Identifying specific monthly consumption values
- Troubleshooting ENERGY STAR® Portfolio Manager
- Clarifying units of measurement, e.g. imperial vs. metric, water use intensity, energy use intensity, weather normalization
- Identifying building characteristics, e.g. type/sector, gross floor area
- Contact information for service providers

The extent to which program administrators are able to provide support will determine many building owners' approach to compliance. For example, where extensive support is offered free of charge, fewer buildings will require the use of service provider (as in Seattle, for example). Where fewer resources are provided, a higher uptake of vendor services can be observed, as in the case of New York City. As noted above, partnerships between governments and other actors will be required to adequately support the building industry. The cost effectiveness of capacity building and support will also be greatest where they are centralized at regional or provincial scales.

7.2. Providing support

As with other aspects of energy benchmarking programs, support for industry should be rolled out as different building types and sizes are phased in. Three primary sources of support should be offered by program administrators and/or supporting third party organizations.

7.2.1. Online resources

Central to a successful benchmarking policy is the development of a clear and helpful program website where reporting building owners can easily find all relevant information. While generic how-to guides and webinars for ENERGY STAR® Portfolio Manager are provided by NRCan, more specific guides for local programs and their requirements are also needed. Useful items that should be provided to building owners include:

- Full text of the policy/regulation
- Compliance deadlines
- Fact sheets with general information and FAQ
- Step by step guides to meet full compliance requirements
- Compliance checklists
- Links to existing resources and tutorials
- Local resources and service providers
- Instructions for fixing compliance errors

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[25] Brown et al 2015; Krukowski and Keicher 2012; interview data

7.2.2. Technical support centres

Technical support or call centres form a central component of successful benchmarking programs, which provide daily support to owners, managers and service providers. These centres have been found to be crucial in achieving high compliance rates and high quality data. These centres provide reporting actors with a single "one-stop shop" in which they are able to pose questions, raise concerns, and receive assistance. They also serve as information centres that build awareness of energy efficiency and conservation efforts and programs, as well as the benefits of energy and GHG reduction programs. The U.S. Institute for Market Transformation[26] conducted an extensive survey of support centre characteristics; based on these and Canadian stakeholder consultation, the following recommendations for call centres can be made:

- **Planning**: Allow a minimum of 12 weeks for the development and planning of the help centre, and include all relevant stakeholders into the process.

- **Communication**: While the help centre is under operation, ensure constant communication with collaborating partners, utilities, and other stakeholders to ensure needs are being met, information is accurate, and resources are used effectively.

- **Coordination:** A full-time, on-site manager is needed to coordinate with partnering organisations and ensure consistent support is offered.

- **Support**: While staffing needs change over time, it is important to provide support throughout the duration of the program. Hours of operation and staffing support should be increased according to compliance deadlines, notifications, and enforcement deadlines. During low periods, staff can be scaled back and/or engaged in proactive outreach.

- **Consistency**: As owners may require multiple interactions, consistency in staffing should be maintained whenever possible to increase the level of support and reduce frustrations. Consistency in customer interactions should be ensured by maintaining a clear log of email and telephone interactions, as well as the standardization of self-service forms (e.g. ID requests, exemption requests, information updates).

- **Service**: Support centres should be staffed with individuals who have technical expertise, database management skills, and the experience/willingness to adopt good customer relations skills. As many building owners can be frustrated with compliance requirements, a protocol for handling difficult customers should also be developed.

- **Partnerships**: Help centre staff should consider partnering with local colleges, universities, or industry associations to boost available support during peak compliance times.

- **Resources**: Based on experiences from the cities of New York and Seattle, IMT estimated that US$50,000 to $100,000, or 1 to 3 FTEs, should be allocated to running a help center. These figures should be adjusted according to the scale of the policy (e.g. provincial vs. regional/municipal), building stock and industry capacity.

- **Impact**: The impact and outcome of services provided should be recorded, as well as areas in which more outreach or clarification are needed. Proactive outreach should also be explored.

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[26] Krukowski and Keicher 2012

7.2.3. Drop-in sessions and/or training workshops

For those who require additional support, industry training sessions should be held together with both service providers and building owners and managers. Many U.S. cities have offered these kinds of in-person resources at a frequency of approximately 2-3 times per year. For example, Minneapolis held two workshops in the months leading up to their June compliance deadline, while Chicago has hosted "data jams" to assist in data verification (see Box 14). Typically, workshop attendance declines over time, reducing the resources that need to be allocated towards them. In the months leading up to compliance deadlines, drop-in sessions can also be offered one day a week to allow reporting building owners and managers to receive assistance on their Portfolio Manager files. Both training workshops and informal drop-in sessions can also be supported by local partners who provide volunteer assistants during peak times, such as local CaGBC chapters and university or college programs; third-party service providers may also host events. Workshops and training sessions should be paired with outreach efforts that improve awareness of benchmarking requirements and options for assistance.

- **Program administrators**: Consult with NRCan to develop training and ensure that the correct information and procedural requirements are communicated to building owners and managers.

- **Industry organizations**: Organize data jams or similar events that allow building owners with lower capacity to bring in data and receive assistance from volunteers familiar with or trained in Portfolio Manager and building data management.

- **Academic institutions**: Tie class or program requirements to volunteer opportunities to help provide support and assistance in data reporting and verification to building owners and managers.

Box 14: Working with industry partners

The City of Chicago has been recognized for the partnerships it has created with local industry organizations in order to boost industry capacity and compliance rates. Two groups in particular have been central to supporting building managers and owners in the compliance process:

- Elevate Energy, a local NGO based in Chicago, has been an important source of assistance for energy conservation and efficiency efforts generally, and the benchmarking program more specifically. Their paid staff offer support to Chicago in the following areas:

  - Data management
  - Data analysis
  - Customer support and data verification
  - Stakeholder engagement

- USGBC Illinois has offered volunteer services for the support of building representatives in two forms: pro bono support and "data jams" for buildings with low capacity to verify their data, and "Benchmarking sleuths" who perform direct on-site outreach to building owners.

8. CONCLUSION

This report has provided a summary of the key steps, components and considerations necessary for provinces and local governments interested in pursuing energy benchmarking requirements. The principles of consistency, effectiveness, transparency, and capacity building have served as the foundation for each section and should guide future efforts to implement benchmarking programs. While the specific nature of benchmarking programs will require some adaptation to suit local industry capacities and contexts, the contents of this document provide an overarching framework for energy benchmarking programs, based on both stakeholder consultation with Canadian industry members, as well as the experiences of U.S. actors. The major recommendations provided by this framework include the following:

- **A multi-stakeholder effort**
  Successful benchmarking programs involve a wide array of stakeholders, from regional and local governments to industry organizations and academic partners. Canadian jurisdictions should seek out partnerships with other industry actors to share responsibilities and resources, and ensure concerns and constraints are addressed early on.

- **Walking the talk**
  Local and provincial governments should demonstrate leadership in benchmarking government buildings and facilities prior to requiring the private sector to doing so. Phasing in the implementation of benchmarking requirements allows both administering bodies and industry actors to build capacity and learn the intricacies of benchmarking over time.

- **Support industry members**
  Industry should be provided with ample support to help building owners and managers understand reporting requirements and verify that data is accurate. Flexibility and providing helpful assistance in the first several years helps to build internal support for benchmarking regulations and improve compliance.

- **Improving data quality**
  Establishing a common tool and parameters for data entry and verification will help to improve the quality and therefore accuracy of benchmarked data. Removing barriers to accessing understandable whole building data is necessary to minimize reporting burdens and opportunities for errors.

- **Using benchmarking data**
  Energy benchmarking programs must form one component of a larger effort to improve the energy efficiency of the built environment. Data should be made available to a wide array of actors in a variety of formats that put data into the hands of those who can make use it, while ensuring industry concerns are addressed.

This report also represents a first step towards consistent, effective benchmarking programs in Canada, and a jumping off point for further discussion and the establishment of more specific recommendations. As benchmarking programs move forward and industry capacity increases, the depth and usefulness of benchmarking databases will increase, offering new insights and opportunities for reducing energy consumption in Canada's built environment. Further, the greater the number of stakeholders and governments involved, the higher the likely success in reaching energy efficiency and emissions reductions targets. As such, it is important for provinces and local governments across the country to exhibit leadership and make energy benchmarking a new Canadian standard.

REFERENCES AND ADDITIONAL RESOURCES

Barr, A and Mahone, D (2010) Benchmarking California's buildings: lessons learned on the road to energy use disclosure. ACEEE Summer Study on Energy Efficient Buildings.

Brown, C, Turcato, A and Gorgolewski, M. (2015) Best Practice Guide. Methodology and Results for Energy and Water Benchmarking. Ryerson University, Department of Architectural Science. *http://www.ryerson.ca/content/dam/graduate/buildingscience/featuredprojects/Best_Practice_Guide.pdf* \

BOMA Canada (2014) BOMA BESt Energy and Environment Report. The National Green Building Report. *http://www.bomabest.com/wp-content/uploads/BBEER-2014-Full-Report.pdf*

Department of Energy (DOE, 2015). Benchmarking and transparency policy and program impact evaluation handbook. Prepared by Navigant Consulting Inc. and Steven Winter Associates, Inc.

Hsu, D (2012) City of New York LL84 data analysis and quality assessment (2012). Department of City and Regional Planning, University of Pennsylvania.

Institute for Market Transformation (2015) Building energy performance policy. *http://www.imt.org/policy/building-energy-performance-policy*

Institute for Market Transformation (2015) Analysis of job creation and energy cost savings from building energy rating and disclosure policy. *http://www.imt.org/resources/detail/analysis-of-job-creation-and-energy-cost-savings-from-building-energy-ratin*

Institute for Market Transformation (2015) U.S. Building Benchmarking and Disclosure Policies Map. http://www.imt.org/resources/detail/map-u.s.-building-benchmarking-policies

Intelligent Energy Europe Programme, IEEP (2015) 2016: Implementing the Energy Performance of Buildings Directive (EPBD). *http://www.epbd-ca.eu/outcomes/2011-2015/CA3-BOOK-2016-A-web.pdf*

Kontokosta, C (2012) Local Law 84 Energy Benchmarking Data Report to the New York City Mayor's Office of Long-Term Planning and Sustainability. Center for Urban Science and Progress, New York University.

Krukowski, A and Keicher, C (2012) Benchmarking help center guide.
Institute for Market Transformation, Washington DC.

New York City (2012) Local Law 84 Benchmarking Report - August 2012, p.8, plaNYC.

REALpac (2015) History of REALpac's Energy & Water Benchmarking Programs. *http://www.realpac.ca/?page=RPEBP1Intro*

Hart, Z (2015) The benefits of benchmarking building performance. Institute for Market Transformation, Washington DC.

REALpac (2012) The REALpac Energy Benchmarking Program Data Verification Procedure. Released January 9th, 2012.

REFERENCES AND ADDITIONAL RESOURCES
REALpac (2014) Energy benchmarking report. Performance of the Canadian office sector.
Resource Media (2014) Seattle building energy benchmarking ordinance. 2013 technical support evaluation.   Final report, June 13, 2014.
Sorensen Allacci, MA, Campo, M and Keicher, C (2015) Decoding the data: opportunities and barriers to bringing building energy performance data to the market. Institute for Market Transformation, Washington DC; Rutgers Centre for Green Building, Rutgers University; Consortium for Building Energy Innovation, Philadelphia.
Toronto Atmospheric Fund (2014) The energy reporting requirement. A background report.   Issued February 2014.
Toronto and Region Conservation Authority (TRCA, 2014) Town Hall Challenge – 20 by '15. Achieving the energy target of 20 ekWh/sq. ft./year by 2015 in Town and City Halls.

Canada Green Building Council
Every Building Greener

The CaGBC (www.cagbc.org) is the leading national industry organization advancing green building and sustainable community development practices. We work closely with our member organizations who are involved in the design, construction and operation of buildings and homes in an effort to make every building greener. The CaGBC reduces environmental impacts from the built environment through education/training, project certification, advocacy and research. The CaGBC is the license holder for the LEED green building rating system in Canada. In addition to LEED, the CaGBC also supports the WELL Building Standard and GRESB (Green Real Estate Sustainability Benchmark) in Canada, and oversees the Canada Coalition for Green Schools. The CaGBC is member of the World Green Building Council supporting international efforts to reduce environmental impacts from the built environment.

INTEGRAL GROUP

Integral Group is a global network of professional engineers collaborating under a single deep green engineering umbrella. Specializing in the design of simple, elegant, cost-effective systems for a wide variety of project types: residential, mixed use, institutional, industrial and commercial buildings, we provide businesses and utilities with comprehensive analyses of installations that help prioritize their energy performance potential. Integral Group has worked on energy benchmarking for the City of Toronto, the Government of British Columbia, and is widely regarded as a pioneer in building design, sustainability and performance.

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