Trends in Mandatory Municipal-Level Energy Benchmarking Policies for Large Commercial Buildings in the United States

by

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Author's Declaration

I hereby declare that I am the sole author of this thesis. This is a true copy of the thesis, including any required final revisions, as accepted by my examiners.

I understand that my thesis may be made electronically available to the public.

Abstract

Mandatory municipal energy benchmarking for commercial buildings are a novel form of policy emerging across cities in the United States. These benchmarking policies require the owners of covered buildings to report on energy consumption to a targeted group of stakeholders with the goal of attaining a variety of benefits including reduced greenhouse gas emissions, more efficient real estate markets, and energy savings for rate-payers. Energy benchmarking policies are rooted in new governance literature in which non-state actors adopt some or all of the decision-making authority of government, and targeted information disclosure literature which seeks to stimulate specific policy outcomes by incorporating new information into the decision-making process of both the targeted company and information consumers.

Early research on municipal energy benchmarking policies for commercial buildings has focused on the underlying reporting frameworks for benchmarking and minimal research has yet to examine the interplay between the many components of an energy benchmarking policy—everything from the size of building that is covered by the policy, to the disclosure trigger and penalty for non-compliance. The primary objective of this study is to assess whether the design of benchmarking policies conform to the expectations of *new governance* and *targeted information disclosure theories*. The principal approach employed within this thesis is that of comparative policy analysis with documentary analysis of seven active municipal benchmarking policies in the United States. This study concludes with an analysis of the gap between theory and practice, refinement of the theories that explain benchmarking, and highlighting of opportunities to improve the practice of early adopters.

This study finds that while differences in design exist between the individual policies, energy benchmarking policies do largely align with the expectations of new governance and targeted information disclosure theories.

Table of Contents

List of Figures

List of Tables

Chapter 1 - Introduction and Overview

1.1 - Mandatory Energy Disclosure as a Tool for Attaining Energy Efficiency Targets

In the United States, commercial buildings represented approximately one-fifth of the country's total energy consumption in 2010. The Environmental Protection Agency (EPA) and the American Council for an Energy-Efficient Economy have found that cost-effective energy retrofits could create savings of up to 10% (Cox, Brown & Sun, 2013), while the Intergovernmental Panel on Climate Change (2007) notes that energy efficiency "encompasses the most diverse, largest and most cost-effective mitigation opportunities in buildings" (para. 3). However, notwithstanding these opportunities, it has been noted that "despite the availability of new technologies and practices to increase energy efficiency, few are being implemented to scale" (National Round Table on the Environment and the Economy & Sustainable Development Technology Canada, 2009, p. 3). This discrepancy between cost-effective energy efficiency potential and the actual energy consumption of buildings has led policy-makers in the US to explore new tools to drive energy efficiency and conservation.

One such tool is that of mandatory energy disclosures—more recently termed *energy benchmarking*[1]—which was first demonstrated in Denmark with the launch of a rating system for commercial buildings in 1992 to "facilitate compliance with energy efficiency standards, inform the planning process for public programs and resources, and stimulate a market response to relative efficiency in buildings" (Leipziger, 2013, p. 6). These policies differ greatly in their structure but, at their core, require a building owner or manager to disclose energy consumption to designated stakeholders[2] who otherwise would not have access to this information. Since 2002, energy benchmarking policies for commercial buildings have spread to Brazil, China, Australia, and 24 US states and cities (Leipziger, 2013).

The EPA's ENERGY STAR Commercial Buildings Program has developed a web platform and methodology for reporting consumption entitled *Portfolio Manager* which has become the industry standard for

[1] Throughout this thesis "energy benchmarking" is meant to be understood as referring to a municipal-level policy that mandates energy disclosure from both public and private-commercial buildings. This use of the term energy benchmarking is distinct from voluntary or opt-in policies, and from benchmarking policies that only cover the corporate energy consumption of a municipality. These policies cover commercial buildings, and not residential or industrial building types.

[2] The terms "stakeholder", "information consumer", and "consumer" are used interchangeably in this thesis. The terms refer to an individual, community, organization, or government which has a direct interest in the improvement of the disclosed impact. This direct interest could be a utility which offers incentives to lower energy consumption to defer the need to develop new electricity generating capacity.

benchmarking in the US, and is employed by all energy benchmarking policies in the country. The EPA reports that in 2007 alone, the voluntary use of this program was responsible for reducing energy consumption by 78.3 billion kWh and greenhouse gas emissions by 18 megatonnes. These reductions are equivalent to removing 12.1 million passenger vehicles off the road annually (Council of Energy Ministers, 2009).

While ENERGY STAR is administered federally, benchmarking policies in the US, which require buildings to disclose energy consumption, are enacted at the state and municipal-level (Cox et al., 2013). Generated using the Institute for Market Transformation's BuildRating.Org policy comparison tool, Table 1 lists the 18 enacted benchmarking policies in the U.S as of December 31st, 2015 (Institute for Market Transformation, n.d.). A significant majority (83%) of the benchmarking policies have been created at the municipal-level, with nearly half (44%) recently enacted in 2014 or 2015. Data from these benchmarking policies are beginning to come in, most notably in New York City where 2014 data was reported for over 828 million square feet of private sector offices, retail stores, hotels, warehouses, educational facilities, and other non-residential building types (New York City, 2014). The results suggest that if the bottom half of reporting buildings could be brought to just the median level of energy performance, energy consumption and GHG emissions of these buildings would fall by 18% and 20%, respectively. Such an effort would reduce total citywide greenhouse gases by 9% (Cox et al., 2013).

Table 1. U.S. Jurisdictions with Mandatory Energy Benchmarking Policies for Commercial Buildings as of December 31st, 2015
(Institute for Market Transformation, n.d.)

	Jurisdiction	Enactment Date
Municipality	AUSTIN	2008
	NEW YORK CITY	2009
	SAN FRANCISCO	2011
	PHILADELPHIA	2012
	SEATTLE	2012
	BOSTON	2013
	CHICAGO	2013
	MINNEAPOLIS	2013
	CAMBRIDGE	2014
	MONTGOMERY COUNTY	2014
	ATLANTA	2015
	BERKELEY	2015
	BOULDER	2015
	KANSAS CITY MO	2015
	PORTLAND	2015
Sta	DISTRICT OF COLUMBIA	2008

WASHINGTON	2009
CALIFORNIA	2015

The quick growth in adoption of benchmarking policies demonstrates the desire of policymakers to experiment with alternative governance arrangements in order to achieve policy goals across a complex and decentralized building stock. However, in these early days a template for the design of a benchmarking policy has yet to emerge and there exists significant differences in how the jurisdictions leading in the adoption of benchmarking have structured the policies. What types of buildings should be required to report? What combination of incentives should a jurisdiction employ? How should civil society, associations, and the public more broadly be engaged? These are some of the questions that confront jurisdictions during policy design.

This study will examine the design of benchmarking policies and the process by which these elements are selected.

1.2 - Research Objectives and Questions

Energy benchmarking policies in the US lend themselves to comparative study because they all employ the same ENERGY STAR methodology and Portfolio Manager reporting tool, but select different approaches—or policy components—when designing the ordinances. This thesis defines a "policy component" as a variable which an enacting jurisdiction can independently determine while still participating within the ENERGY STAR framework and using the Portfolio Manager web platform. Examples of policy components include the type and severity of the penalty for noncompliance, or the size of building mandated to disclose data. The interaction between policy components adds an additional layer of complexity that must be considered to inform and understand policy design. Whereas the ENERGY STAR methodology is set, stakeholders are able to assert influence and policy-makers render design decisions that shape the ultimate utility of benchmarking locally at the policy component level.

The primary objective of this study is to assess whether the selection of benchmarking policy components conforms to the expectations of *new governance* and *targeted information disclosure theories* which describe the ability of information to achieve a desired impact by empowering non-state actors to assume some of the decision-making authority of government. This analysis of the gap between theory and practice will contribute to both refining the theories that explain benchmarking, and highlighting opportunities to improve the practice of early adopters. To advance this objective, the following questions will be considered:

Question #1: Which policy components does theory suggest that jurisdictions should select?

Question #2: Which policy components do jurisdictions select and are there apparent trends?

Question #3: How does the selection of policy components in active jurisdictions compare against theoretical expectations?

A secondary objective is to begin to reconcile the gap between theory and practice. To advance this objective, the following question will be explored:

Question #4: How does benchmarking advance an understanding of new governance and information disclosure theories?

1.3 – Theoretical and Practical Contributions

Existing literature which directly addresses energy benchmarking policies in U.S. municipalities (see Table 2 for a summary) focuses on the statistical methods used, the impact of disclosure policies on residential markets, or the effectiveness of these policies in general at increasing energy efficiency. A notable exception is Cox et al. (2013) which explores the conservation potential of municipal energy benchmarking policies in the US. However, no academic research, including Cox et al., has been found that examines the interplay between the many components of an energy benchmarking policy—everything from the size of building that is covered by the policy, to the disclosure trigger and penalty for non-compliance.

Table 2. The research focus of existing literature exploring U.S. municipal energy benchmarking

Research Focus	Source
Analysis of benchmarking rating systems & statistical methods	(Nikolaou, Kolokotsa, & Stavrakakis, 2011)
	(Hsu, 2014)
	(Chung, 2011)
Potential of benchmarking broadly or on residential markets	(Cox et al., 2013)
	(Markard & Holt, 2003)
	(Brounen & Kok, 2011)
High-level case study	(Cahill, 2012)
	(Mattern, 2013)
	(Boardman & Palmer, 2007)
Quantitative analysis of building performance	(Kontokosta, 2012a)
	(Hsu, 2012)
	(Kontokosta, 2012b)
Effectiveness of policies generally at increasing energy efficiency	(Eiholtz, 2009)
	(Fuerst, 2009)
	(Miller, 2008)
	(Uchida, 2007)

	(Zhu & Zhang, 2012)
U.S. benchmarking policy-specific	(Cox et al., 2013)

This thesis' novel focus on the policies themselves seeks to contribute to the literature by understanding how the design decisions of municipal policy-makers impact the utility of energy benchmarking policies. While the literature on U.S. municipal benchmarking policies specifically is sparse, there is a large body of knowledge exploring other forms of targeted information disclosure such as energy use in appliances and toxic substance releases from industry. Disclosure theory will be applied to the structure of benchmarking policies, utilizing the gap between theory and practice as a lens by which to explore the suitability of current theory in describing the design of benchmarking policies, and to assess emerging trends.

In addition to the theoretical contributions of this thesis, this topic is of interest to policy makers who are seeking to improve an existing benchmarking policy, or to implement a new law or ordinance. For example, of the seven benchmarking policies included in the dataset for this thesis, six implemented an amendment to their ordinance. This thesis can support the further evolution of benchmarking policies.

1.4 – Thesis Outline

This thesis is divided into seven chapters. Following this introduction in Chapter One, Chapter Two describes the research design, data availability and limitations, and methods. The population of benchmarking policies is screened to create a sample representing municipal policies with reported data. The policy components by which benchmarking policies are to be examined are put forward. Data sources are presented and categorized by the chapter in which it is used.

Chapter Three presents the *Theoretical Framework for Mandatory Energy Benchmarking within Commercial Real-Estate*, beginning with *new governance* as a theory which describes the increasing prevalence of "self-organizing, interorganizational networks [that] complement markets and hierarchies as governing structure for authoritatively allocating resources and exercising control and co-ordination" (Rhodes, 1996, p. 1). Building upon this base, market failures relevant to the commercial real-estate sector—namely *information asymmetries*, *split incentives*, and the *agent-principal problem*—are explored to demonstrate the need for corrective intervention. The appropriate policy response to these market failures is proposed by new governance literature to be *information disclosure* for its ability to alter purchasing decision-making and subsequently drive an increase in a targeted aspect of producer performance to meet shifting demand. *Mandatory energy disclosure regimes* are put forward as the procedural mechanism for enacting information disclosure. This chapter answers Question #1: which policy components does theory suggest that jurisdictions should select?

Chapter Four briefly recounts the history, development, and impact of the *Environmental Protection Agency's ENERGY STAR Portfolio Manager*. A summary of ENERGY STAR's methodological approach provides a deeper understanding of both the strengths and weaknesses of the platform, as well as its performance as a management decision-making tool. This knowledge is important when considering why a given policy may not align with the theoretical expectations of information disclosure tools more generally, and to assess the EPA's role within a benchmarking policy.

Chapter Five uses annual benchmarking reports and policy documents from the sample cities, gray literature, and academic literature to create case studies of *Active Municipal Benchmarking Policies.* As in Chapter Three, the approaches taken by municipalities are aligned with the policy components. Trends are identified in policy component selection. This chapter answers Question #2: which policy components do jurisdictions select and are there apparent trends?

In Chapter Six, *Results and Conclusions*, the remaining research objectives and questions of this thesis are addressed. The theoretical expectations of Chapter 3 and the applied practice of Chapter 5's sample cities are compared to answer Question #3: how does the selection of policy components in active jurisdictions compare against theoretical expectations? It is found that the theory accurately describes much of the policy design, but fails to fully capture the stated policy objectives and is unable to account for variances driven by local context. Next, this chapter uses the research results as a lens by which to comment on key debates in the literature and to address Question #4: How does benchmarking advance an understanding of new governance and information disclosure theories? This thesis concludes with recommendations for future research. A key recommendation is the standardization of city-level reporting on the performance of benchmarking policies to allow for national comparisons and learning.

Chapter 2 – Methodology

2.1 – Research Design

When designing this research study, the original intent was to conduct quantitative analysis of longitudinal benchmarking data in order to objectively test energy benchmarking policy theories "by examining the relationship among variables" (Creswell, 2013, p. 4). However, it was quickly discovered that both the data and the theories lacked sufficient maturity to use a quantitative methodology. Instead, a qualitative approach was called for which could leverage case studies and observed behaviour—in this instance built upon the primary sources of ordinances and reports.

The thesis reviews new governance and targeted information disclosure literature to form a framework for deductively analyzing the design decisions of the sample policies. Theory is used to select the policy component categories (see 2.2 – Policy Components) and then these policy components are explained by theory in Chapter 3. In this way, a hypothesized theoretical expectation is created for the selection of the policy components of an energy benchmarking policy.

The policy component selection of the sample policies (see Chapter 5) are observed using document analysis, an approach for systematically reviewing and evaluating documents (Bowen, 2009). The sample policies represent distinct policy environments—each operating under the jurisdiction of a different state, and governed by different locally enacted policies—by which to comparatively analyze policy component selection. This comparative analysis is used to identify a trend (explained in 2.5 - Research Methods) of policy component selection within the sample policies. Finally, the trend is compared against the hypothesized theoretical expectation.

The methods for this thesis are described in 2.5 – Research Methods.

2.2 – Data Availability and Limitations

It was noted in the previous chapter that current academic research into topics relating to benchmarking has not addressed policy design, but rather focuses on statistical methods, general effectiveness of policies, or building-level analysis of performance. This can be explained in part by data deficiencies resulting from the short operating time of benchmarking policies, poor data quality, and an inability to directly compare benchmarking policies. To illustrate the data challenges that confronted this thesis, the following list compares the strength of data available to researchers analyzing ENERGY STAR as a methodology, with the relative weakness of data available to researchers analyzing energy benchmarking policies that mandate reporting using ENERGY STAR:

- **Operating Length:** The ENERGY STAR's Commercial Building Program which provides the platform and methodology for benchmarking policies has been in operation since 1999. However, as was shown in Table 1, the oldest benchmarking policy in the U.S. was enacted in 2008, and 44% have been created since 2014. Seattle's Office of Sustainability and Environment (2014) explains that "given that implementing efficiency upgrades in buildings can take up to five years, it is likely that actual decreases in annual building [data] may take years to show up in individual or overall building energy performance results" (p. 35). It may be several more years before benchmarking policies have produced enough data to directly assess their effectiveness.
- **Data Quality:** ENERGY STAR employs a statistically robust national building survey at its core (detailed in *4.4 - ENERGY STAR Methodology and Portfolio Manager*) and its Portfolio Manager tool presently tracks the performance of over 400,000 commercial buildings across the U.S. representing 40% of the market. In contrast, even for the oldest benchmarking policies—New York and Seattle—improper data entry by building owners has in some cases disqualified large amounts of available benchmarking data (Northeast Energy Efficiency Partnerships, 2013).
- **Comparability:** Each city discloses different information (ex. compliance rates, building owner surveys) about its benchmarking policy which makes direct comparison difficult. The very nature of ENERGY STAR as a standardized repository of data allows for comparative analysis between buildings (see *Chapter 5 – Active Municipal Benchmarking Policies*). A significant opportunity exists for the standardization of program-level data from jurisdictions with benchmarking policies.

Since long-term analysis of both qualitative and quantitative data is simply not possible at this early stage for the aforementioned reasons, this thesis instead relies upon the analysis of the following primary documents and reports to understand the implementation of benchmarking policies within each jurisdiction:

- **Policy documents:** These documents include the ordinance, statute, or law—and any associated amendments and design documents—which mandates and governs the benchmarking policy. Policy documents dictate many of the policy components, including the type and size of buildings required to benchmark, and penalties for non-compliance.
- **Self-reported results:** Annual reports by the municipalities are important sources of publicly available self-reported results and discussions of the success of the jurisdiction's commercial benchmarking program. The self-reported results include data on rates of compliance, observed changes in consumption, feedback from building owners, and opportunities for improvement.

These primary sources will be complimented by gray literature from organizations such as the EPA and the Institute for Market Transformation, which have led the public conversation through the creation of reports, implementation guides, and practitioner interviews.

In addition to the literature which will provide the theoretical underpinnings of this thesis, some existing literature includes insights which advance an understanding of the components. For example, in reviewing data from New York City's Local Law 84, Hsu (2012) found that "a small number of consultants were responsible for a large proportion of the benchmarked buildings", and that many of these consultants improperly entered data (p. 6). This could have implications for how data is entered into the tools, whether data entry is automated, and training and certification for consultants.

2.3 – Screening for Active Jurisdictions

For the purposes of this study, it is important to screen the population of jurisdictions with a benchmarking policy in order to isolate a sample that is manageable, comparable, and has sufficient data for analysis. For example, Table 1 showed that of the 18 municipal and state jurisdictions with a benchmarking policy, 44% had been enacted since 2014. As previously mentioned, benchmarking policies normally have a phasing-in period which means that it can take several years before a municipality begins to report data from commercial buildings, and then several more before it can meaningfully reflect on the degree to which the policy has met its intended goals.

The scoping requirements listed in Table 3 were applied to the population of 18 jurisdictions with a benchmarking policy in order to create the sample. Jurisdictions were included in the sample only if they are operated municipally, have publicly available reports, and require disclosure from commercial buildings.

Table 3. Scoping Requirements for Creation of Research Sample

Requirement	Justification
Municipally-run	84% of benchmarking policies are municipally-run. States and municipalities may not be directly comparable because of geographic, legal, and capacity differences.
Availability of Reporting	Municipally-produced reports are relied upon for this thesis. Publicly accessible annual reports must be available for comparison across jurisdictions. Without at least one year of publicly disclosed data and an annual report, it is considered unlikely that sufficient information exists in the public sphere to allow for critical analysis of the interplay between policy components. For example, Kansas City, Missouri, enacted a benchmarking policy in 2015 which will require public buildings to report in 2016, some commercial buildings to report in 2017, and will require all covered buildings to report by 2018 (Insitute

	for Market Transformation, 2014). The first report including lessons from commercial building reporting will likely not be available until the fall of 2018. Time intensive qualitative analysis of policy documents and annual reports was used extensively for this thesis, necessitating a firm end-point to data collection. An annual report must have been accessible as of October 31st, 2014. This date was chosen to align with the reporting dates of several jurisdictions, as well as the requirements of this thesis process.
Commercial Disclosure Begun	Policies are often phased in by only requiring reporting from municipally-owned buildings in the first years of implementation to provide time for building owners to comply with requirements to obtain data (Mattern, 2013, p. 500). Influence of policies on management decision-making is central to information disclosure theory and it is considered unlikely that government disclosure can provide a suitable proxy.

In Table 4, the population of 18 jurisdictions with enacted ordinances are compared against the scoping requirements to identify the research sample. Once again, the Institute for Market Transformation's BuildingRating.org's policy comparison tool was used to generate the list of jurisdictions as it is the leading repository for information on US benchmarking policies, and works closely with both the EPA and municipalities. Policies are grouped into the categories of "in scope" if they meet the scoping requirements, or "out of scope" if they do not. After screening the jurisdictions there remain seven in scope benchmarking policies which will make up the sample for this research. Each of these cities has at least one annual report that details the self-evaluated performance of a commercial building benchmarking policy.

Table 4. Identification of Research Sample
With data from Institute for Market Transformation (n.d.)

	Jurisdiction	Enactment Date	Municipally-Run	Availability of Reporting	Commercial Disclosure Begun
In Scope	AUSTIN	2008	Yes	Yes	Yes
	NEW YORK CITY	2009	Yes	Yes	Yes
	SAN FRANCISCO	2011	Yes	Yes	Yes
	PHILADELPHIA	2012	Yes	Yes	Yes
	SEATTLE	2012	Yes	Yes	Yes
	BOSTON	2013	Yes	Yes	Yes
	CHICAGO	2013	Yes	Yes	Yes
Out of Scope	MINNEAPOLIS	2013	Yes	No	Yes
	CAMBRIDGE	2014	Yes	No	No
	MONTGOMERY COUNTY	2014	Yes	No	No
	ATLANTA	2015	Yes	No	No
	BERKELEY	2015	Yes	No	No
	BOULDER	2015	Yes	No	No
	KANSAS CITY MO	2015	Yes	No	No

PORTLAND	2015	Yes	No	No
DISTRICT OF COLUMBIA	2008	No	Yes	Yes
WASHINGTON	2009	No	No	Yes
CALIFORNIA	2015	No	No	No

2.4 – Policy Components

No formal identification of policy components exists either academically or by the EPA to describe benchmarking policy design. For guidance, this thesis relies upon more general characteristics identified by disclosure literature, as well as the categories used by civil society advocates (listed in Table 5).

Graham & Miller define transparency policies as sharing the characteristics of having (1) a public purpose, (2) a specific target, (3) a defined scope of information to be disclosed, (4) an articulated structure for information collection and communication, (5) an intended audience for the information, and (6) a system for enforcement (Graham & Miller, 2001).

Fung et al. (2007) describe a transparency policy as sharing the characteristics of (1) requiring public disclosure of (2) standardized and comparable information (3) for a specific practice (4) with a defined purpose.

The Institute for Market Transformation's BuildRating.org website classifies policy components into the categories of (1) compliance details, (2) deadlines, (3) disclosure details, (4) reporting details, (5) outreach, training, and support, and (6) utility-requirements (Institute for Market Transformation, n.d.).

Table 5. Categorized Policy Characteristics and Components Identified by Academic and Gray Literature

Graham & Miller (2001)	Fung et al. (2007)	Institute for Market Transformation (n.d.)
Public Purpose	Defined Public Purpose	n/a
Specific Target	Specific Practice	n/a
Defined Scope of Information	Standardized Information	Compliance Details
Structure for Information Collection and Communication	Comparable Information	Reporting Details
Intended Audience for Information	Required Public Disclosure	Disclosure Details
System for Enforcement	n/a	Deadlines
n/a	n/a	Utility Requirements
n/a	n/a	Outreach, Training and Support

Table 6 builds upon the policy components listed above and presents the policy components which will be used in this thesis. The policy component names have been chosen to reflect the language used by active jurisdictions, and additional components—such as adoption process—have been added which are not captured in the list above but are employed by municipalities.

Table 6. Policy Components used in this Thesis

Policy Component	Description
Stated Policy Objectives	Stated policy objectives describes the substantive and democratic reasons that a jurisdiction looks to benchmarking policies, including specific targets such as a decrease in GHG emissions and an increase in transparency.
Adoption Process	Adoption process describes the approach used to engage stakeholders in the selection of policy components.
Coverage & Implementation Schedule	Coverage describes the size and type of building required to disclose data. Implementation schedule describes the phased-in approach used by jurisdictions when launching a benchmarking policy.
Disclosure Requirements	Disclosure requirements describe the frequency and method of data sharing that is required.
Audience	Audience describes the intended information consumer, the medium of disclosure, and the technologies used to increase the utility of the data.
Data Submission	Data submission describes the method and requirements for buildings to provide benchmarking information to the city.
Compliance	Compliance describes the approach taken by cities to ensure that buildings adhere to the requirements of the benchmarking policy, and the training activities offered by a municipality to aid building owners in complying with benchmarking requirements.
Adaptation	Adaptation describes how policy makers use benchmarking as guidance and justification for further regulation, or expand existing benchmarking regulations to increase impact.

These policy components will be used throughout the thesis to achieve the research objectives by allowing for categorization and cross comparison of theory and active policies.

2.5 - Research Method

The approach undertaken for the research in this thesis can be broken into three categories: (1) literature review, (2) document analysis, and (3) comparative analysis both across policies and between theory and practice. As the design of enquiry employed by this thesis is the case study, this three step approach permits contextualization, construction, and analysis of the case studies (Creswell, 2013).

First, the literature review in Chapter 3 presents theoretical expectations of a benchmarking policy. A theoretical expectation is defined as a description made by the literature of how an effective benchmarking policy (or targeted disclosure policy more generally) should be structured. For example, researchers looking at other disclosure regimes have found that, for consumers to find value in the new information, it must be presented in a clear, reliable, and readily accessible fashion that conforms to existing decision-making processes. The literature review was scoped to include English language articles on qualitative governance and design elements of transparency policies, with a focus on active policies targeting environmental and non-financial services impact areas within the United States. The impact area focus was selected to increase alignment with the intended goals and audience of energy benchmarking. The policy components were used to categorize the literature and direct the enquiry. For example, the literature does not explore data submission requirements in depth, and a targeted search was required to build out the theoretical expectation for this policy component.

Second, case studies were created for the sample of jurisdictions with an active benchmarking policy and presented in Chapter 5. The following steps were taken to create the case studies:

- **Compile Data Sources:** The data sources for each jurisdiction (identified in 2.2 – Data Availability and Limitations) were located through: (1) the benchmarking policy, environment, or energy section of a jurisdiction's website; (2) the Institute of Market Transformation's BuildingRating.org website which lists many of the documents; (3) Google searches using the name of the jurisdiction or policy, and complimentary terms such as "ordinance" and "annual report." For each jurisdiction, this method produced positive results and all desired documents were located. As a result, instances where information on a policy component was not found for a given city are believed to be the result of a lack of disclosure on the part of the jurisdiction. For example, stakeholder engagement documents, the enacting ordinance, and annual reports were found for the city of Chicago but no information was included on the cost to the city of running the benchmarking policy. Seattle included cost information as an appendix to its enacting ordinance. It is assumed that Chicago does not readily disclose this information.
- **Organized Data by Policy Component:** The documents were reviewed in full by the researcher and information was categorized by policy component. Sub-components, or variables, were then derived from the data. In the case of compliance, this included the sub-components of "one-time charge", "increasing charge", "building engagement & support", and "data verification." These sub-components represented the four design decisions that policy makers recorded in the enacting documents. This approach allowed for direct comparison between cities, and for alignment with the literature review.

- **Trends in Active Jurisdictions:** Sub-components were recorded as a simple "Yes" or No" for each jurisdiction. "Yes" was recorded in situations where an explicit acknowledgement was found in the primary documents of a jurisdiction. For example, Seattle's enacting documents do not mention a desire to reduce GHG emissions through the benchmarking policy, and so "No" was recorded. This approach is justifiable because implicit policy design decisions likely carry less weight than those captured in the enacting documents. Table 7 provides an example of this process in action, with each jurisdiction receiving either a "Yes" or a "No" before an overall trend is identified. The term 'trend' is not intended to suggest a best practice or recommendation, but rather a trend is defined as an action taken by a simple majority of jurisdictions. The small sample size and generalization into trends are design limitations of this study. However, it is an important step because the trends are used to codify how active jurisdictions structure benchmarking policies which then allows for comparison against the theoretical expectations.

Table 7. Demonstration of Approach for Identifying Trends

		Austin	Boston	Chicago	New York	Philadelphia	San Francisco	Seattle	**Trend**
Energy & Environment	GHG Reduction	No	Yes	Yes	Yes	Yes	Yes	No	**Yes (71%)**

Third, the analysis in Chapter 6 compares the theoretical expectations against the observed trends. This comparison is indirect as trends are described using a simple "Yes" or "No" statement, whereas theory is necessarily described in more general statements due to the fact that theory does not directly address energy benchmarking policy components. A table is presented with the trends for each policy component alongside the corresponding theoretical expectation. This table allows for the identification of gaps between what is observed in practice, and what is predicted by theory. This step addresses the primary objective of the thesis by assessing the suitability of current information disclosure theory at explaining the selection of policy components for municipal-level energy benchmarking policies in the U.S.

The secondary objective is then considered by employing the research results as a lens by which to comment on key debates in the literature, and to advance an understanding of new governance and information disclosure theories. Findings from the literature review and case studies are used to accomplish this reconciliation.

Chapter 3 - Theoretical Framework for Mandatory Energy Benchmarking within Commercial Real-Estate

3.1- Chapter Overview

The chapter begins with an exploration of new governance and targeted information disclosure as the theoretical base for this thesis. The remainder of the chapter presents theoretical expectations for energy benchmarking policy design. The purpose of this chapter is to address the first question of this thesis: “Which policy components does theory suggest that jurisdictions should select?”

3.2 - New Governance

Shifting ideologies and fiscal reforms launched fresh conversations in the 1980s on the ways of governing, with the introduction of terms such as "new public management", "entrepreneurial government", and the "3Es", which suggested the adoption of novel approaches to regulation. One such term is "new governance", which sought to describe an alternative process or approach for ordering society in which non-state actors adopted some or all of the decision-making authority of government on a particular issue (Rhodes, 1996; Crowley & Coffey, 2007). According to Crowley & Coffey (2007) “if government is essentially about the process of acting with total authority and legitimacy, then governance has become about extending this process beyond the state, raising the question of the extent to which authority and legitimacy can be assumed beyond government” (p. 24).

Within new governance literature there exist two viewpoints that describe the role of government—and the “extent to which authority and legitimacy can be assumed beyond government”—within this new paradigm in opposing ways (Crowley & Coffey, 2007, p. 24). Pierre & Peters “define governance as covering the whole range of institutions and relations involved in the process of governing, with its appeal being in making political science more policy relevant and in raising the issue of how to pursue collective goals” (Crowley & Coffey, 2007, p. 24-25). For Pierre & Peters, government retains an important role in governance because of its hierarchical position and control of critical resources (Pierre & Peters, 2000). Alternatively, Rhodes (1997) sees governance as offering an opportunity for increasing societal control through the use of networks that are capable of forming their own policies and identities outside of government and market control. Rhodes succinctly describes governance as “governing without government” (pp. 667), and representing a “hollowing out of the state” (pp. 660).

Lundqvist (2001) attempts to find a middle ground between Rhodes’s view that governance represents a "hollowing out of the state", and Pierre and Peters' view that governments steer governance. The case of Sweden's Local Investment Programs for Sustainable Development (LIPSD) is used to test the propositions of Rhodes and Pierre & Peters. Lundqvist (2001) sides with Pierre & Peters to an extent, finding that the Swedish government "created new structures and processes of governance to keep its initiative over constitutionally independent expert agencies and municipal governments--exactly those actors that, in Rhode's view, could make central governmental steering well nigh impossible" (p. 1). However, Lundqvist also recognizes a degree of “governing without government” because, although the Swedish government was able to assert direct control over the process and structures of governance, it was unable to control the end results. Lundqvist suggests that analysis of new governance must give "attention to the critical interplay between structure, process, and end results, and to government's role in governance" (p. 1).

Cashore (2002) finds alignment with Pierre & Peters by presenting governance as "the increasing use of procedures in which state policy-making authority is shared with (or given to) business, environmental, and other interests; and the increasing use of market-oriented policy instruments with which to address matters of concern to global civil society" (p. 503) At the same time though, Cashore divides governance into government-driven governance and non-state-market-driven governance. The latter enforces compliance within a supply chain through market incentives and disclosure to key supplier, regulator, and customer audiences. Cashore provides as an example of non-state-market-driven governance the Forest Stewardship Council’s certification program.

Fung, Graham & Weil (2007) assert that government action is required for governance by transparency for three reasons. “First, only government can compel the disclosure of information from private and public entities. Second, only government can legislate permanence in transparency. Third, only government can create transparency backed by the legitimacy of democratic process” (Fung et al., 2007, p. 6).

Energy benchmarking policies resemble the governance structure Lundqvist (2001) found in Sweden’s LIPSD so far as the framework is created and enforced by government, but there exists a degree of governing without government because—as will be explained later in this chapter—much of the desired impact is generated by market forces. Under Cashore’s (2002) classification system, benchmarking would be an example of government-driven governance. In addition to the core elements of benchmarking, an important strength is that they can lead to further government regulations and incentives based upon the information generated by disclosure. In this way, benchmarking can be a precursor and enabling force for traditional command-and-control regulations. This will be explored in greater depth in 3.11 – Adaptation and 5.9 – Adaptation.

Central to the argument for new governance as a policy tool is an increase in accountability (Norris, 2014; Estlund, 2011). Bovens (2007) defines accountability as “a relationship between an actor and a forum, in which the actor has an obligation to explain and to justify his or her conduct, the forum can pose questions and pass judgment, and the actor may face consequences” (p. 452). Accountability has been described as being the third wave of environmental regulation – following the original command and control approach and the subsequent introduction of market-based incentives such as emission fees and marketable permits (Cohen & Santhakumar, 2007).

Norris (2014) categorizes accountability as involving one of three power flows:

- Top-down: Traditional power flow in which a senior actor instructs a junior actor. An example is an employer requiring a performance review of an employee.
- Horizontal: Occurs when an actor incentivizes an actor of equivalent power or influence. An example is when a government agency presses another “to actively participate in deliberation and problem-solving…” (Norris, 2014, p. 206).
- Bottom-up: Occurs when a junior actor influences a senior actor. An example is an employee pressing their employer for increased environmental performance.

Energy benchmarking policies involve all three categories of accountability power flow. Top-down as government is requiring the disclosure of energy data, horizontal in that a major prospective tenant can demand action by a building owner, and bottom-up as civil society can advocate for change. That said, the time, format, and accessibility of disclosure of benchmarking data will enhance or limit the strength of accountability power flow.

Norris continues that accountability can be further examined to determine if it is principal-agent or reflexive accountability:

- *Principal-agent accountability* “occurs when one actor (the principal) pressures or coerces another actor (the agent) into doing the principal's will” (Norris, 2014, p. 206). An example is an employer instructing an employee to complete an action.
- *Reflexive accountability* occurs when an actor changes behavior in response to the release of information. It is termed reflexive because “it involves continual reflection on the significance of information coming from various sources” (Norris, 2014, p. 207). An example is the use of financial statements to modify the operations of an organization to lower expenses.

“Reflexive and principal–agent accountabilities are not mutually exclusive, because pressure or coercion (principal–agent accountability) may lead actors to change in response to information (reflexive accountability)” (Norris, 2014, p. 207). Energy benchmarking policies represent both principal-agent accountability and reflexive accountability. Principal-agent because government is mandating the act of disclosure and in some cases require additional actions—such as retrofits—and reflexive because intra-organizational and public accountability is created through the act of regular and public reporting (Norris, 2014). Principal-agent accountability can also act as a barrier to the implementation of energy efficiency. As will be explained later in this chapter, if a landlord (agent) controls the infrastructure of a building and the tenant (principal) is required to pay the utilities bill, this can create a split-incentive where the tenant is unable to upgrade the building infrastructure which leads to high utility bills, and the landlord has little incentive to pay for the upgrades because the energy savings will be realized by the tenant. New governance offers the promise of correcting for this barrier by changing the normative and real estate market context through the provision of new information.

In all forms of accountability, a key consideration is: who is accountable to whom? Who has a voice, and—importantly—who does not have a voice? Reporting requirements are often crafted, and subsequent evaluations often conducted, by select consulting firms and experts. Participation within reporting schemes is sometimes extended to important industry associations (ex. Building Owners and Managers Association) or well-known NGOs (ex. Environmental Defense Fund) to act as watchdogs and to represent the voice of voiceless beneficiaries (ex. global climate, economically disadvantaged communities). At best, this creates a layer between those impacted and the new governance system, which “raises profound questions of legitimacy and accountability” (Conley & Williams, 2011, p. 568). If the watchdogs are selected for their complicity, there is a danger that they will not properly advocate for the beneficiaries.

Critics of new governance “question the processes—or lack thereof—for selecting those who will share this diffused power and ask how these people and institutions will be held accountable” (Conley & Williams, 2011, p. 554). Shever (2010), for example, has examined the efforts of a multinational oil company to practice corporate social responsibility in Argentina. She concludes that it has been nothing more than a charade that “shifts the terrain of struggle away from the formal judicial domain . . . to the more pliable field of public opinion” (p. 41). In other words, it has been a shift from established democratic processes to corporate and technocratic shadows.

Shamir (2008) argues that this shift results in a marketization of authority wherein government, corporate, and civil society actors operate on par, and "a variety of 'guidelines', 'codes of conducts', 'principles' and 'standards'" replace coercive laws or regulations (p. 7). The broader concern, captured by Malsch (2013), is that a reliance on "the amoral and disembodied authority of market mechanisms [and] a technical arsenal of calculations and rankings" redirects the debate from an absolute morality described "in terms of the common social or political good [to] a defensive perspective based on the identified reputational risks and their impact on business" (p. 156). The implication is that new governance detracts from the ideal of an inclusive, accountable, and moral democracy.

Fung and Wright (2003) defend new governance against criticisms that it will result in bureaucrats and non-state actors assuming legislative roles. They argue that new governance is determined to assume the decision-making role previously held by isolated departments and agencies within government, and in doing so, new governance offers the possibility of restoring democracy to bureaucracy. Sabel (2008) and Zeitlin (2008) continue the argument, stating that the accountability driven by new governance can lead to both state and non-state actors employing newly available data generated by new governance to press for better policies.

Energy benchmarking policies in the U.S. are too new to yet assess whether they represent a shift of responsibility to corporations and technocrats, or if instead it restores democracy to bureaucracy. On the one hand, the design of benchmarking policies met resistance from powerful lobbying groups which shaped the end result (described in *5.3 – Adoption Process*). On the other hand, previously inaccessible and arcane datasets have been released to the public, providing new avenues for advocates to engage with building owners and push for improved policies (described in *5.6 – Audience).*

3.3 –Targeted Information Disclosure

"We call for a new understanding of the democratic mantra of 'access to information' so that it means more than simply placing data in the public domain. Instead, it means requiring the provision of content that is useful, customized, and interactive."

-Fung et al., 2007, p. 181.

Fung et al. (2007) describe three generations of disclosure policies beginning with right-to-know policies that sought to make government more transparent through measures like the U.S. Freedom of Information Action (1966), which captured a belief that the public has a right to government information. A second generation of targeted transparency policies defined access to specific information "with the aim of furthering particular policy objectives" (Fung et al., 2007, p. 25). A third generation has begun to build upon targeted transparency by leveraging the power of the internet to create user-centred programs that draw out the information of private actors into an accessible system facilitated by government. Gupta (2010) titles targeted transparency policies as “governance by disclosure [whereby] the very act of disclosing information is central to achieving various aims” (p. 2). When effective, these policies drive a specific policy outcome by incorporating information into the decision-making process of both the targeted company and consumers (Fung et al., 2007).

Estlund (2010) describes targeted transparency policies as “regulated self-regulation” (p. 404). While the language is different, Estlund’s description is similar to Norris’ (2004) principle-agent and reflexive accountabilities, and Lundqvist‘s (2001) governing without government within government-created processes, in that it recognizes the dual nature of targeted transparency policies as both a government imposition and a market force.

Mitchell (2011) presents education-by-transparency policies as an additional form of transparency wherein “the same actor is both targeted actor and information recipient” (p. 1885). Whereas under targeted transparency policy regimes an information producer (ex. company) is required to disclose specific information to an information consumer (ex. the public), education-by-transparency is designed to provide new or contextualized information to the information producer to inspire behaviour change. Education-by-transparency is similar to Norris’ (2004) reflexive accountability as both require the discloser to reflect on opportunities with a shifting environment for improved performance. Energy benchmarking policies are both targeted in that they seek to reduce information asymmetries, and educational in that they provide building owners with new and contextualized information to support the decision-making process of building owners. This thesis will use the term “targeted transparency” generally to include education-by-transparency, while continuing to distinguish energy benchmarking from earlier forms of disclosure and in recognition of the specific aims of the policy tool.

While there are many different formulations of transparency policies (see Table 8 for several examples), Fung et al. (2003) argue that transparency policies form a “cohesive policy innovation” (p. 5). By design, a targeted transparency policy will have a clearly defined purpose and associated metric which it seeks to influence by disclosing information from a specific source to an intended audience through an articulated system, and with a predicable method of enforcement (Graham & Miller, 2001).

Table 8. U.S.-based targeted transparency policies

Labor Management Reporting and Disclosure Act (1959)

Unions are required to reveal financial information (ex. revenues, expenditures) and governance practices (constitution, governance changes) annually. The intended goal was to reduce union corruption (Fung et al., 2007).
Home Mortgage Disclosure Act (1975) Requires banks and other lending institutions to disclose "the amounts and geographical distribution of their loan applications, origins, and purchases disaggregated by race, gender, annual income, and other characteristics" (Fung et al., 2007, p. 203). This law was created to limit racialized lending practices.
Toxic Release Inventory (1986) Disclosure of chemical releases that fall under a schedule of nearly 700 toxic chemicals. (Cohen & Santhakumar, 2007; Fung & O'Rourke, 2000). Covered toxic emissions decreased by 48 percent between 1988 and 2000 (De Marchi & Hamilton, 2006)
Worker Adjustment and Retraining Notification Act (1988) Organizations with 100 or more employees are required to "provide workers, the state government dislocated worker unit, and local government officials with written notice 60 days before a planned shutdown or large-scale layoff" (Ehrenberg & Jakubson, 1990, p. 39).
The Nutrition Labeling and Education Act (1990) Food producers are required to label amounts of key nutrients to counteract heart disease, cancer, and diabetes which lead to the deaths of 1.5 million Americans each year. These deaths have been found to be preventable by improved diet (Fung et al., 2007).
Los Angeles Restaurant Hygiene Disclosure Program (1997) Requires restaurants to post a card with results from a public health inspection (Weil, Fung, Graham, & Fagotto, 2006). Food-related hospitalizations decreased by as much as 20% (Jin & Leslie, 2003).
Transportation Recall Enhancement, Accountability, and Documentation Act (2000) Required automotive manufacturers to disclose facts about the rollover risks of each model, with the aim of improving safety of "top-heavy SUVs" (Fung et al., 2007, p. 195).

An example of a third generation targeted transparency policy is the Los Angeles Restaurant Hygiene Disclosure Program (established in 1997), which requires restaurants to post a simple quality card with results from a public health inspection (Weil et al., 2006). This program is successful because it clearly provides information at the point of decision for a consumer with little time cost to obtain and process the information. The program provides clear signals and alternative actions for the owners of the restaurants: address the items they received a failing grade for, and they will receive a passing grade for their hygiene card. A detailed study found that the Hygiene Disclosure Program could be responsible for a reduction in food-related hospitalizations by as much as 20%, and an increase in revenue for restaurants with strong health performance (Jin & Leslie, 2003).

A second example of a targeted transparency policy—and one of the most widely studied—is the Toxic Release Inventory (TRI) which was created by the Emergency Planning and Community Right-to Know Act (1986) following the Union Carbide Bhopal disaster in India that killed "at least 3,800 people and [caused] significant morbidity and premature death for many thousands more" (Broughton, 2005, p. 1). Under TRI, firms are required to disclose the release of toxins that fall under a schedule of nearly 700 chemicals (Cohen & Santhakumar, 2007; Fung & O'Rourke, 2000). The program was so successful that between 1988 and 2000 that emissions were decreased by 48 percent (De Marchi & Hamilton, 2006). Fung & O'Rourke (2000) state that "reductions of releases of chemicals on the TRI list sparkle in comparison to the lackluster performance of other EPA programs" (p. 116). See Table 99 for statements from a variety of voices on the impact of TRI.

Table 9. Statements about impact of TRI

"[TRI's] mandatory disclosure has done more than all other legislation put together in getting companies to voluntarily reduce emissions" (Seabrook, 1991, sec. G, p. 1.). Millar Etling, Environmental Manager, Dow Chemical
''Putting information about local pollution into the hands of the public is the single most effective, common sense tool available for protecting human health and the environment" (Mansur & Reeves, 1996, sec. A1). Al Gore, Vice President, United States
"[We] knew the numbers were high, and we knew the public wasn't going to like it" (Fung & O'Rourke, 2000). *Statement made prior to release of TRI data. Monsanto pledged to cut TRI chemicals by 90% in 3 years.* *Not Attributed,* Vice Chairman, Monsanto

Targeted transparency policies are purported to work by impacting the decision-making process of a key stakeholder (ex. consumer) and the discloser (ex. manufacturer), and providing new engagement opportunities for the public and policy-makers. Blok, de Groot, Luiten & Rietbergen (2004) lists the following three ways in which targeted transparency policies influence behaviour change in a firm:

- **Communication:** Successful policies educate targeted firms on opportunities for achieving the desired change and the supporting business case. Energy benchmarking policies typically reach out directly to building owners and managers with educational materials and in some cases require a building owner to acknowledge the energy performance of their building by signing a form submitted alongside the data.
- **Economic incentives:** Publicly traded firms which performed poorly under TRI suffered a loss in stock price which "translated into an average loss of $4.1 million in stock value for TRI firms on the day the pollution figures were first released" (Hamilton, 1995, pg. 98). Konar and Chohen (1997) found that firms which pollute the most experienced the greatest declines, but that these high polluters subsequently "became relatively lower TRI emitters following the public announcement of TRI data, both in absolute and relative terms within their industries" (Fung & O'Rourke, 2000, p. 19). These financial impacts extend beyond TRI. Numerous studies that analyze the commercial building sector (Christmas 2011, Campbell 2011, Miller et al 2008, Jackson 2009, Das et al 2011) "show higher occupancy rates, higher rents, and higher property values for high-efficiency buildings" (Cox et al., 2013, p. 4). While these studies do not look at the financial impacts within markets with benchmarking policies specifically, Kontokosta (2013) states that demand-side market mechanisms and regulations which are "designed to require better relative energy performance will increase risk exposure for less efficient buildings, thus prompting owners and developers (producers) to supply more efficient space" (Kontokosta, 2013, p. 35).
- **Normative incentives:** Disclosure policies should attempt to change the social context in which a decision is made. Press and civil society organizations are important agents in this process by using the data to pressure the worst performers (Fung & O'Rourke, 2000). Current benchmarking policies, as will be shown in the following chapter, take very different approaches to how data is disclosed which in turn changes how the press and civil society organizations can access the data and subsequently impact normative values.

While Blok et al. (2004) describe the ways in which a targeted transparency policy must influence behaviour change in firms specifically, Weil et al. (2013) expand the analysis to describe a relationship where behaviour change in consumers motivates action by firms. Weil et al. describe this relationship as an "action cycle" of "information provision, use and response" (p. 1410). When effective, consumers integrate new information provided by a targeted transparency policy into existing decision processes and shift consumption patterns in alignment with the desired outcome of the policymaker (Markard & Holt, 2003; Moskovitz, Cowart, Levy, & Roe, 1998). Depending on the information revealed, a "consumer may decide to reduce or withdraw from consuming the product of a firm that is a higher polluter. Investors may shun the stock of firms that are found to be high polluters—either through socially active investment decisions or by an assessment that highly polluting firms will ultimately be less profitable" (Cohen & Santhakumar, 2007, p. 600). For this shift in consumer purchasing to fully meet the policy outcomes desired by policymakers, "target companies must perceive and act on consumers' responses in ways that reduce risks, improve services, minimize corruption, or otherwise further a policy goal" (Weil, Graham, & Fung, 2013, p. 1410).

Finally, targeted transparency may also have a policy impact. The real or implied threat of additional policy measures may also incentivize firms to voluntarily improve their performance and related disclosed metrics (Fung, Graham, & Weil, Full Disclosure: The Perils and Promise of Transparency, 2007).

Targeted disclosure policies are not without detractors. The critiques range from questions about the quality of the data being reported and the lack of sustained reductions for TRI (Natan & Miller, 1998), to more troubling accusations of misplaced incentives resulting in a system which produces negative results. The example of hospital and physician reports cards is a useful demonstration of the challenges associated with disclosure. While proponents argue that report cards help "patients to identify the best physicians and hospitals, while simultaneously giving providers powerful incentives to improve quality," critics respond that they are likely to "encourage providers to 'game' the system by avoiding sick patients or seeking healthy patients or both" (Dranove et al., 2003, p. 556). If a hospital is penalized for high patient mortality, it may be incentivized to reject the most ill patients, opting instead to maximize its score by treating only cases where the result is relatively assured. The complexity of medical care makes it extremely difficult to create a reporting system that does not create false incentives (Dranove et al., 2003).

3.4 – Stated Policy Objectives

The foundational policy objective for implementing an energy disclosure policy—although certainly not the only one—is what Jaffe and Stavins (1994) call the "energy efficiency gap," a term which describes the economic and social barriers preventing the attainment of technologically feasible efficiency. They describe the energy efficiency gap as the "paradox of gradual diffusion of apparently cost-effective energy efficient technologies" (Jaffe and Stavins, 1994, p.91). Sorrell et al. (2000) similarly describes these barriers to energy efficiency as “mechanisms that inhibit investment in technologies that are both energy efficient and economically efficient” (Sorrell et al., 2000, p. 27).

Cox et al., through interviews with active benchmarking jurisdictions, found that all benchmarking policy managers believed that “a large information gap related to building energy consumption existed in their jurisdiction prior to the benchmarking and mandated disclosure laws” (Cox, Brown, & Sun, 2013, p. 3). According to Cox et al., this energy efficiency gap is the result of three main information failures:

1. **Information asymmetry**: When one actor has more information than another actor—possibly resulting from a hierarchical power dynamic—“suboptimal energy efficiency decisions” may be produced (Chai & Yeo, 2012, p. 461). In the case of commercial buildings, owners and managers often have greater access to a building’s energy efficiency performance data than would a prospective tenant, buyer, or financier (Cox, 2013). This asymmetry may cause consumers to “lack adequate baseline information about quality characteristics and variation to compare products and practices” (Weil et al., 2013, p. 1410). This problem extends to the public sphere, where service providers and public agencies lack information on buildings. The management adage of ‘you cannot manage what you do not measure’ can similarly be applied in the policy context with ‘you cannot effectively regulate what you do not understand.’ Energy disclosure policies are an important tool for policy-makers because buildings are complex and often opaque to external eyes, which make it exceedingly difficult to craft effective policies to drive energy efficiency. Instead, correcting for information asymmetries through the use of energy benchmarking sets normative constraints which align with the overarching policy goal of increased energy efficiency (Kontokosta, 2013).
2. **Principal-agent problems:** Principal-agent problems “occur when one party (the agent) makes decisions in a market [and] a different party (the principal) bears the consequences” (Cox, Brown, & Sun, 2013, p. 2). An example within the commercial building market is the “split incentive” problem wherein the building owner (agent) invests in the up-front costs of an energy efficiency upgrade, but the tenant (principal) enjoys the energy cost savings. In this scenario, energy efficiency investments may be limited by “an inequitable distribution of costs and benefits and a subsequent undervaluation of potential savings” (Kontokosta, 2013, p. 35). Prindle (2007) found that principal-agent problems also exist within the construction phase, where architects, engineers, and contractors make design decisions (agent) which will either benefit or hinder future owners and tenants (principle). New tools, such as “green leases” are

beginning to emerge in which the benefits and costs of energy efficiency upgrades are shared by the principle and agent, and energy benchmarking is seen as a mechanism for incentivizing and monitoring green leases (Kontokosta, 2013).

3. **Artificially high discount rate:** As a result of technological risk aversion and knowledge gaps, owner and managers have been found to apply discount rates to energy efficiency technologies that are "far higher than theoretically anticipated, resulting in few purchase of high-efficiency equipment" (Cox, Brown, & Sun, 2013, p. 2). This is caused in part because "knowledge gaps add to the cost of capital and limit the efficient pricing of energy investments in the market" (Kontokosta, 2013, p. 35).

As a policy tool, benchmarking is therefore regarded favourably because "greater information on energy performance would allow tenants to incorporate energy metrics into leasing decisions" which "in turn, should create demand for more efficient buildings, thereby increasing asset value and encouraging building owners to improve the relative energy efficiency of their buildings to make them more competition" (Kontokosta, 2013, p. 35). In other words, by adding new information to the marketplace, energy benchmarking is believed to close the energy efficiency gap by correcting for the three aforementioned information failures.

Additionally, jurisdictions are motivated to adopt energy benchmarking policies because they are often seen as the low-cost option to pressure firms to reduce negative environmental impacts by equipping "consumers, investors, and regulators with the proper tools to assess corporate strategies and liabilities, thereby giving companies an economic incentive to reduce emissions" (Zhu & Zhang, 2012, p. 705). The prevailing narrative is that information disclosure programs cost "government far less than drafting and implementing industry wide regulations" (Cohen & Santhakumar, 2007, p. 600). Fung & O'Rourke (2000), identify the cost of TRI to the EPA as approximately $23 million/annum. Beyond this statement, no specific discussion was found on the cost of disclosure programs to government, the cost to the market, consideration of the cost-benefit ratio, or the cost savings relative to command-and-control regulations. Cohen & Santhakumar propose a list of costs that should be identified and compared against the environmental benefits of a given disclosure policy. The costs include:

- **Government control:** Costs include policy making, data collection and verification, and data dissemination and program communications. For energy benchmarking, costs occur federally for the design and delivery of EPA's ENERGY STAR, and municipally for the implementation of the policy.

- **Business reporting:** Costs include collecting and reporting data, communicating results to stakeholders, and taking voluntary action to reduce pollution. For commercial buildings this cost will be centered in labour costs and efficiency upgrades. While larger organizations, such as a property manager like Bentall Kennedy, may have a dedicated sustainability or energy management staff person, smaller operations will need to add these tasks to an employee with an un-related job profile.
- **Civil society engagement:** Civil society organizations are required to analyze data, develop strategies, communicate with their public, and pressure corporate and state actors for change through lobbying and litigation. All of these steps have costs, primarily staffing. Government may wish to consider subsidies through grants for some aspects of civil society engagement as it represents a substitution for government evaluation and enforcement.
- **Opportunity Cost:** There is a limit to the number of policies that a government can impose on an industry to address an environmental metric. By choosing to implement a targeted transparency policy, the jurisdiction may be foregoing the use of other policy tools. In the case of benchmarking, this could mean foregoing an increase in the building code. This cost is amplified if the benchmarking policy is unsuccessful in creating the desired change (Cohen & Santhakumar, 2007)

Finally, jurisdictions may find benchmarking attractive if more traditional command-and-control policies are deemed too politically contested. It is likely easier politically to require disclosure of information, for example, than it is to require an energy efficiency upgrade. Weil et al. contend that governments look to targeted transparency tools such as benchmarking "when rules, taxes, or subsidies prove impractical as policy tools" (Weil et al., 2013, p. 1410). These policies are also seen as satisfying "the democratic belief that the public has a 'right to know' that they might be affected by third party pollution" (Cohen & Santhakumar, 2007, p. 600). However, Gupta argues that it is "important to ask whether transparency is simply a default option when more transformative governance pathways are precluded" (Gupta, 2010, p. 7). Once again circling back to the separate but connected arguments of Norris (2014) and Lundqvist (2001) that transparency policies have a dual nature as both a government imposition and a market force, it is important to acknowledge that "one cannot have a meaningful right to information unless someone else has a corresponding duty to provide that information" (Caldart, 1985, p. 384). For disclosure to be effective, government rule-setting and enforcement is still required "in those cases where [a building owner or manager] fails to comply with a duty to generate, retain, or disclose information, or seeks to limit the scope of that duty, it is the availability, timeliness, and strength of the relevant legal enforcement mechanism that will ultimately determine whether or not the duty is fully performed" (Caldart, 1985, p. 387). While depth of disclosure and enforcement will be explored further later in the chapter, jurisdictions must be motivated by more than simple political expediency in the selection of disclosure as the preferred policy option.

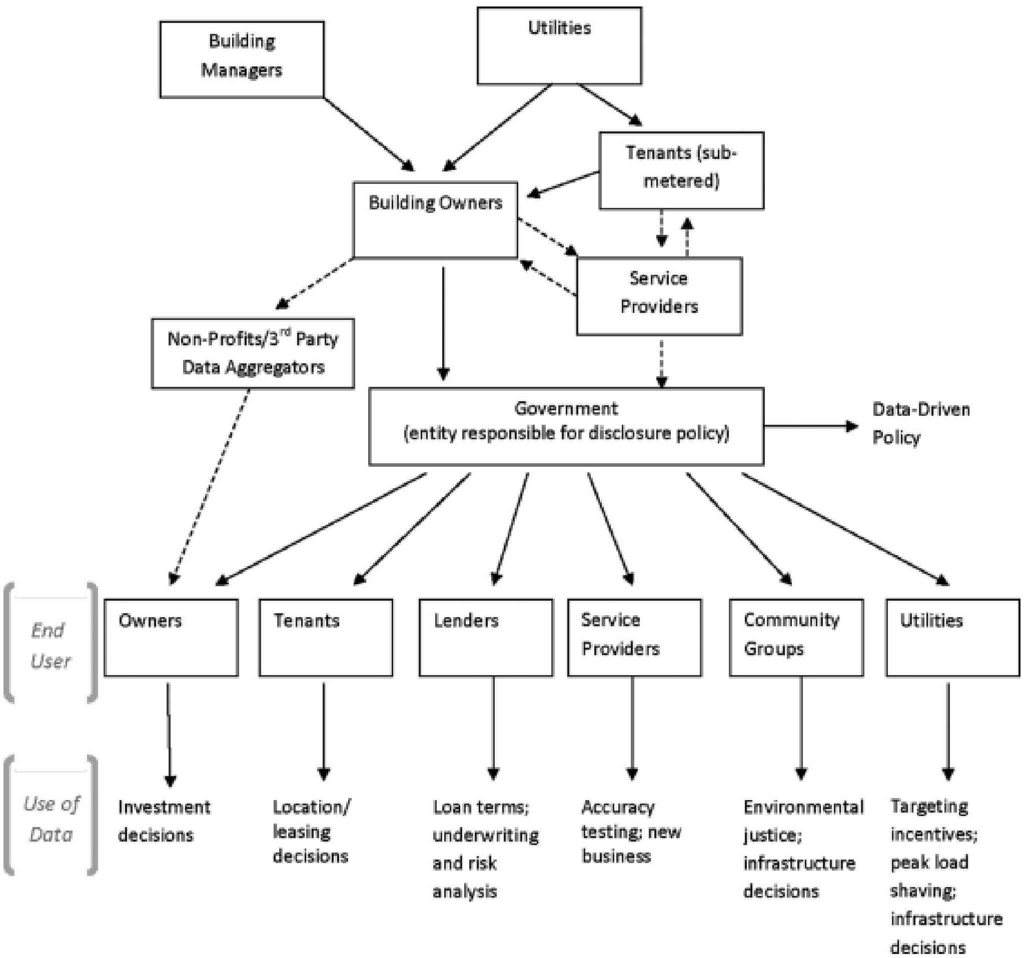
In summation, it can be expected that jurisdictions seeking to implement an effective benchmarking policy will be motivated by a need to close the energy efficiency gap and:

1. To create a more efficient market by providing information to key stakeholders including prospective tenants, buyers, and financiers
2. An inability of command-and-control policies to capture the complexity of buildings, and the need for policy-makers to have additional information
3. To correct for principal-agent problem by providing the information to encourage mutually beneficial solutions
4. The low-cost of a benchmarking policy relative to traditional command-and-control policies
5. To reduce information failures, and to allow for the proper pricing and discount rate to increase adoption of efficient technologies
6. Improve a specific and measurable environmental metric
7. Need for policy-makers to have additional information to craft more effective regulations

3.5 – Adoption Process

Energy benchmarking policies interact with, depend upon, and influence a wide array of stakeholders (see Figure 1) by shifting the flows of information. Building owners obtain data from managers, utilities, and sub-metered tenants. This data is transformed by NGOs and government to improve policies and to communicate back to the data providers as well as the public at large.

Figure 1. Benchmarking information flows



(Kontokosta, 2013)

The inclusion of such a wide array of voices is challenging. As Fung, Graham & Wright (2002) explain, "because many transparency policies impose concentrated costs on a limited number of disclosers for the sake of dispersed beneficiaries, the deck is stacked against them" (p. 36-37). Fung et al. (2003) tell of the impact of political influence during the creation of the Securities and Exchange Acts. Congress authorized the Securities and exchange Commission to enforce mandatory accounting standards, but business and investment bank lobbyists watered down the regulation to exclude "railroad stocks, intrastate issues, and all stocks already issues" (Fung, Weil, Graham, & Fagotto, 2003, p. 7).

The Institute for Market Transformation (2011) suggests that benchmarking policies should require "the disclosure of benchmarking inputs, such as gross building area, operating hours, space type and other information [which] maximizes benchmarking transparency and thus discourage willful misrepresentations of inputs to achieve better benchmarking ratings" (p. 49). However, it notes that real estate lobbyists have successfully kept this feature out of the benchmarking policies in most jurisdictions.

The requirement of integrating users into policy design can be extended to include other stakeholders such as civil society and government—voices which can represent the dispersed beneficiaries. With this broad view, policy adoption “becomes a shared problem-solving process” (Lobel, 2004, p. 297), embodied by the concepts of “multi-party cooperation”, “constructive dialogue”, “multistakeholder consultation”, and “democratic participation” (Lobel, 2004, p. 362). However, if stakeholder engagement is merely a rubber stamping of a pre-determined approach, it legitimizes the transference of authority from the democratic state to the market while excluding those closest to the unresolved impact. Interestingly, little conversation exists within the literature about the approach for engaging stakeholders in policy design, despite the wide recognition of stakeholder influence (Fung et al., 2007).

Fung et al. (2007) suggest that effective targeted transparency policies share the two major themes of user centricity and policy sustainability. User centricity describes the act of designing policies to satisfy the informational needs, management decision-making structures, and technical abilities of both information consumers and producers (Fung et al., 2007). Stakeholder engagement early in the process is important to ensure the proper inclusion of these design considerations.

Policy sustainability describes the act of designing policies “that gain in use, accuracy, and scope over time” which is important “because markets and public priorities change, and because policy makers constantly need to fill loopholes discovered by reluctant information disclosers” (Fung et al., 2007, p. 11). As transparency systems impose costs on the disclosing group for the benefit of a large and often unorganized group of information users, those disclosing have an upper hand and ample incentive to shape the transparency system over time to meet their interests. To remain relevant and impactful, Fung et al. (2007) identify three dimensions that are required for policy sustainability as “expanding scope of information relative to the scope of the problem addressed; increasing accuracy and quality of information; and increasing use of information by consumers, investors, employees, political activists, voters, residents, and/or government officials” (Fung et al., 2007, p. 109). In many ways, policy sustainability is simply an extension of user centrality. If the information becomes useful and important to an array of users, there will be greater incentives for the system to be not only maintained but continually improved.

Fung et al. (2007) discussed the implementation schedule for the U.S. Transportation Recall Enhancement, Accountability, and Documentation (TREAD) Act, a policy that "required public disclosure of the rollover propensity of each new-model car and SUV as measured by government tests" (Fung et al., 2007, p. 195). Of the eight disclosure policy case studies that Fung et al. reviewed, TREAD was unique by including provisions that required the government to continuously improve the accuracy of the rating system. The result has been a policy that has continued to increase the rollover safety of vehicles.

It can be expected that policy-makers designing the engagement process for an energy benchmarking policy will seek to:

1. Engage a wide array of stakeholders in the design process
2. Ensure that the information provided will be integrated into the existing decision processes of consumers
3. Understand how disclosers will interpret and respond to behaviour change from consumers
4. Use federally produced resources and civil society publicizing to reduce costs
5. Consider the costs and benefits of the policy in the design documents so as to identify whether benchmarking is the right approach for meeting energy goals

3.6 – Coverage & Implementation Schedule

Although the TRI has been hailed for its effectiveness, Graham & Miller (2001) note that it covers only large businesses and a limited number of chemicals which allows some manufacturers to avoid reporting under the policy altogether or substituting chemicals. Similarly, critics of the Worker Adjustment and Retraining Notification Act note that it too is not universally applied as it only covers large businesses, and offers exemptions in cases where the business is seeking a buyer, if the causes of the shutdown are not reasonably foreseeable, in cases of natural disasters, or if the business moves within a "'reasonable' commuting distance of its previous site and offers employees jobs at the new location" (Ehrenberg & Jakubson, 1990, p. 39).

The stakeholder pressures discussed earlier in this chapter are certainly one explanation for the exemptions. However, an argument can also be made in favour of the exemptions because they target the firms which have the largest impact and, in doing so, limit the administrative costs of working with many small organizations (Kontokosta, 2013).

The literature does not directly address how policies should structure coverage requirements, but extrapolations can be made based on existing programs. Fung et al. (2007) lists seven case studies of

U.S. transparency policies that target organizations. Table 10 lists the policies and identifies the restrictions put in place to scope the type (and ultimately the number) of organizations covered by the policy. The Transportation Recall Enhancement, Accountability, and Documentation Act (TREAD), and the Home Mortgage Disclosure Act both are broadly applied to their respective sectors. The remaining five case studies, however, are scoped to cover specific types of organizations. While Fung et al. (2007) describe unique political pressures that led to the scoping requirements of each policy, an alternate explanation—not found in the literature—could be that, relative to the number of firms that would be covered by the Securities and Exchange Act if it were applied broadly to also include all non-profit organizations and small businesses, the automotive and mortgage lending industries are smaller in size, and more homogeneous in capacity, structure, and financial might. Simply put, small and homogeneous populations may not require as many exemptions because fewer outliers exist, whereas large and heterogeneous populations may require exemptions to account for a diversity of situations.

Table 10. U.S. Transparency Policies that Target Organizations

Policy	Covered Organizations
Securities and Exchange Acts	Publicly traded firms
Occupational Safety and Health Administration	Manufacturing firms
Toxic Release Inventory	Manufacturing firms over threshold of emissions
Nutrition Labeling and Education Act	Food processors, exempting "fast-food outlets, full-service restaurants, fresh meats and seafood, deli items, and dietary supplements" (Fung, Graham, & Weil, Full Disclosure: The Perils and Promise of Transparency, 2007)
Transportation Recall Enhancement, Accountability, and Documentation Act	Manufacturers of cars and SUVs
Home Mortgage Disclosure Act	Banks and other lending associations
Work Adjustment and Retraining Notification Act	Public firms. Private and non-profit organizations if they have over 100 employees

Targeted transparency policies are often phased in over time. The segmentation of covered buildings by square footage and building type allows jurisdictions this option of phasing in coverage over time, rather than requiring all buildings to begin reporting at the same time. Kontokosta (2012b) identified a pattern within the implementation schedule of existing benchmarking policies to phase in coverage over several years—beginning with government buildings, then introducing buildings with high square footage, and finally buildings with lower square footage. This approach is selected in order to allow the city to improve internal processes while responding to a smaller client-base, and for the consulting and engineering sector to build capacity as market demand increases. Phased-in implementation also allows government and large buildings, which often have established sustainability reporting policies already in place, to demonstrate early leadership and allay fears of those new to sustainability reporting.

While the literature is limited in its discussion of the implementation of targeted transparency policies, taken together it can be expected that policy makers designing the implementation schedules for an energy benchmarking policy will seek to:

1. Limit the type of buildings covered by the policy in heterogeneous markets and where there are a large number of actors
2. Focus on large emitters to increase the impact relative to the administrative cost
3. Phase in coverage over several years in order to allow for institutional learning and program improvement, and to allow market of engineers and consultants to build capacity

3.7 – Disclosure Requirements

Disclosure policies can release information to the market either through triggered or scheduled disclosure. Under triggered disclosure, building owners are required to disclose information upon an event such as placing a building on the market for sale. Scheduled disclosure, which the vast majority of benchmarking policies use, normally requires annual disclosure of energy consumption data. Triggered disclosure is useful so far as it provides current information to prospective buyers and financiers, but it prevents standardized reporting, longitudinal comparisons and incentives for continual improvements. Triggered disclosure appears to be used as a compromise option to lessen the demand upon disclosers. In addition to infrequent reporting, triggered disclosure tends to limit data dissemination to those involved in a financial transaction (ex. prospective financier and buyer) whereas scheduled reporting typically involves disclosure via a web platform to the public at large (Northeast Energy Efficiency Partnerships, 2013).

TRI reports were criticized because the data to be disclosed was due “more than a year after [the emissions] took place” (Graham & Miller, 2001, p. 18). This delay is a challenge for actors who use the data to pressure the firm for behaviour change.

It can therefore be expected that policy makers designing the disclosure requirements for an energy benchmarking policy will seek to:

1. Use scheduled disclosure, as opposed to triggered disclosure, to allow for predictable disclosure, and time series data
2. Require timely public disclosure

3.8 – Audience

Transparency attains the desired policy goal when it influences the decisions of both consumers and producers (Fung & Wright, 2003). However, both consumers and producers of information reach information saturation. Simon (1955) proposed the "satisficing principle" to describe the situation where firms "apply rules of thumb and routines" as they are unable to "acquire and process all relevant information" (Blok et al., 2004, pg. 24). Applied more generally to include consumers and civil society, the satisficing principle speaks to competing demands for the attention of data consumers. (Weil, Graham, & Fung, Targeting Transparency, 2013). For data to influence consumers, the data must be "made available to the prospective consumer at the point of purchase or consumption" as useable information (Bui, 2002, p. 4). In the commercial real estate market, policy makers seeking to improve energy efficiency through disclosure must fight to be heard over data on pricing, characteristics of the building including square footage and location, walkability scores, and even competing environmental ratings such as LEED.

The high level of informational static highlights the importance of disclosing only the information that will have the greatest impact; that which information consumers most value. The challenge continues, however, because "a national real estate investment trust that owns a particular office building may respond differently to new regulations or shifting tenant demands than a family firm that owns and manages a small portfolio of buildings in a specific market" (Kontokosta, 2013, p. 39). Consumers must be able to easily compare and "distinguish between different products according to their characteristics" (Markard & Holt, 2003, p. 1461). This requires "a thorough understanding about consumer preferences and knowledge" (Markard & Holt, 2003, p. 1462). For example, Aasen & Lindberg (2010) found that consumers prefer data to be presented in a pie chart for the power supply mix, where a bar graph was preferred for emissions. Terminology such as "system power" was deemed to be too technical (Aasen & Lindberg, 2010). In the case of benchmarking policies, this is complicated by the plurality of information consumers. Energy and sustainability professionals employed by large firms will demand different information than the general public (Aasen & Lindberg, 2010). Therefore, different types of buildings and different types of owners may require different types of education and incentives to meet the policy goals. Energy benchmarking policies should consider options for presenting data that accommodates the needs and level of expertise of a given building owner (Graham & Miller, 2001).

It can therefore be expected that policy makers designing information for different audiences in an energy benchmarking policy will seek to:

1. Develop different disclosure formats to accommodate the preferences and knowledge of information consumers
2. Leverage civil society and associations to disseminate disclosed data and increase pressures on polluting firms

3.9 – Data Submission

Early benchmarking research has found that the manual entry of energy data causes "significant human errors" while being time costly to the building owner and to the government that must validate proper entry (Kontokosta, 2013, p. 41).

The nature of build energy consumption data—mainly produced in standardized formats by utilities—positions it well for automation which can "significantly reduce the likelihood of data entry errors related to manually inputting energy meter information" (Institute for Market Transformation, 2011, p. 49). Portfolio Manager currently provides the functionality for utilities to upload data on behalf of a consenting building owner (Mattern, 2013). This is increasingly becoming the preferred method—in terms of data accuracy and encouraging compliance through ease of upload—as a more utilities offer ABS.

When interviewed by Cox et al., a manager of one benchmarking policy said that if the jurisdiction were to begin again, "aggregated building data rules would be the first thing instituted" (Cox et al., p. 3). Some utilities and municipalities have been cautious to implement ABS because of technical and privacy constraints. California passed a bill requiring all electric and gas utilities to keep one year of energy consumption records for all non-residential buildings in a format which can be uploaded direct to Portfolio Manager (Cahill, 2012).

It can be expected that policy-makers designing the data submission component of an energy benchmarking policy will seek to:

1. Automate data submission in partnership with utilities to lower time cost and increase accuracy

3.10 - Compliance

Much of the criticism surrounding the TRI—and similar targeted transparency policies—is directed towards data and compliance issues. To re-quote Gupta, for targeted transparency policies "the very act of disclosing information is central to achieving various aims" (Gupta, 2010, p. 2). If the data cannot be trusted, the influence that it will have in adjusting behaviour will be diminished. Challenges identified with the data accuracy and compliance for the TRI include:

- **Estimated Data:** Submissions are not based on actual measured emissions, but are instead industry estimates of emission releases (Wolf, 1996). Allowing firms to estimate the emissions produced permits "accidental and intentional underreporting" (Fung & O'Rourke, 2000, p. 7). Energy benchmarking policies do not avoid these challenges entirely, as will be discussed below, but the data is generally more reliable because building owners are required to report source energy data; normally off bills from a utility.
- **Accounting Changes Instead of Physical Changes:** Natan and Miller (1998) found firms to have made "paper changes" which claim reductions without any physical emission reductions. These paper changes are possible because firms are granted considerable leeway in establishing the accounting parameters. An example is the "redefinition of on-site recycling as 'in-process recovery' [which] has resulted in significant paper reductions" (Fung & O'Rourke, 2000, p. 8). If widespread, these behaviours could call into question the veracity of the reductions attributed to TRI. Energy benchmarking policies avoid this challenge through the use of ENERGY STAR and Portfolio Manager. Under this system, it is the EPA and not the building owner that establishes the accounting methodology.
- **Insufficient Data Verification:** The EPA inspects approximately 3% of TRI reporting firms each year (Fung & O'Rourke, 2000). Bui found that the data is "riddled with errors, ranging from the merely typographical to some that may be indicative of more serious problems" (Bui, 2002, p. 5). Bui goes on to say that "if the public has no confidence in the accuracy of the data and the government cannot assure the public of its accuracy, disclosure will to that extent be ineffective" (Bui, 2002, p. 5). Kontokosta agrees that a "lack of confidence" in the quality of the information being disclosed "undermines the usefulness of the information, thus making it less likely to be used in future decision-making processes" (Kontokosta, 2013, p. 38). For energy benchmarking policies, basic levels of verification are built into the tool, but municipalities are required to conduct verification of data after each submission period.

The Institute for Market Transformation (2011) recommends that jurisdictions conduct periodic random and targeted audits of benchmarking data in order to ensure accuracy. Where problems are found, these should be communicated to stakeholders to reduce accidental errors. Additionally, the Institute recommends requiring all building owners and consultants to sign benchmark data to increase accountability and compliance. When building owners fail to comply with the policy it is important to issue a penalty which is capable of incentivizing desired behaviour. Compliance challenges for Europe's benchmarking policy has been attributed to a lack of proper enforcement including "sending warnings to noncompliant parties, issuing fines or openly denoting noncompliance where benchmarking information is published online" (Institute for Market Transformation, 2011, p. 47).

Kontokosta (2013) found other challenges in the early years of New York's benchmarking policy, including "uncertainty over variable definitions and the proper method for handling unique building- and lot-specific circumstances" and "limited access to some of the require information, such as a consistent source for gross building square footage" (p. 37-38).

The academic literature directly discussing benchmarking does not address issues of outreach, training and support to increase compliance. Research is required to identify best practices for educating building owners and consultants on proper data submission and avenues for increasing energy efficiency, tenants and financiers on the importance of the disclosed data for informing their decisions, and civil society on ways in which this data can support their mission.

The Institute for Market Transformation (2011), in a scan of existing policies and director-level interviews of benchmarking practitioners, does recommends several action items for jurisdictions to take for outreach, training and support of building owners and supporting consultants. These include:

1. **Direct Contact:** Reach out through mail or phone to building owners and managers to explain policy and compliance requirements.
2. **Identify Partners:** During rollout, look to stakeholders in the real estate industry to act as ambassadors within the industry and for media. Owners of buildings with existing ENERGY STAR ratings may be a useful starting point. Identify potential partners—including associations such as BOMA, utilities, civil society, and other government agencies—to support efforts by conducting training sessions and outreach activities.

3. **Conduct Training:** Provide training that corresponds with the building type classifications used by ENERGY STAR including hotel and office space. The EPA has existing resources to support some of this training.
4. **Ongoing assistance:** Offer a help centre for building owners and managers to call for questions on the program and assistance working past data submission problems.

It can be expected that policy-makers designing the compliance component of an energy benchmarking policy will seek to:

1. Prioritize data quality through thorough verification of data each reporting period
2. Have robust enforcement which signals to the market that compliance is in fact mandatory
3. Conduct periodic audits to verify reporting accuracy
4. Offer training and support for disclosers on data submission and behaviour improvement

3.11 – Adaptation

For a disclosure policy to remain effective it must evolve, as "systems that do not keep pace with changing markets and public priorities can become counter-productive" (Fung et al., 2002, p. 37). After its initial success, the rate of decline of chemicals reported under TRI began to slow. The EPA suggests that this decline occurred because "some manufacturers were able to make relatively inexpensive and rapid changes in the early years of TRI reporting" and further decreases would have necessitated costly new processes or products (Graham & Miller, 2001, p. 12). Additionally, macroeconomic growth continued to drive absolute growth (Graham & Miller, 2001). For benchmarking policies, a similar trajectory could be experienced by which simple recommissioning and low-cost upgrades generate significant early reductions, and then decline after the so-called low-hanging fruit is exploited.

Policy makers may evolve disclosure policies by either amending the existing policy or implementing additional requirements. Bui (2002) argues that the most significant impact of TRI and the means by which it drove business action is by providing state and local government with the information and incentive required to create command-and-control regulation. In addition to policy makers, Fung & O'Rourke (2000) finds that TRI is often used by civil society to pressure for stronger environmental policies. Carol Dansereau of the Washington Toxics Coalition is quoted as saying that her goal in using the TRI is to "build more regulation, more implementation of existing regulations, and more enforcement" (Fung & O'Rourke, 2000, p. 19). An example is the state of Louisiana that was identified in 1989 as having the third highest level of toxic emissions in the country. After receiving negative pressure from media and civil society, the state enacted anti-toxic laws that lowered toxic emissions levels by 50% in 7 years (Fung & O'Rourke, 2000).

In terms of energy benchmarking policies, previously unavailable data allows cities and utilities to target poorly performing buildings with educational programs, financial incentives, and policies such as mandatory energy audits. (Kontokosta, 2013).

It can be expected that policy-makers designing an energy benchmarking policy will seek to:

1. Analyze incoming data to identify ways to improve the policy
2. Implement additional policies to complement benchmarking policies after several years in existence

3.12 –Question #1: Which policy components does theory suggest that jurisdictions should select?

Table 11 responds to the first question that this thesis seeks to address:

Question #1: Which policy components does theory suggest that jurisdictions should select?

The literature describes a policy with the stated objectives to create a more efficient market through the provision of information which will alter consumer behaviour and, in doing so, influence the discloser to modify behaviour. Additionally, benchmarking policies are intended to influence behaviour of the discloser directly by communicating new information which highlights previously unknown opportunities for improvement. It is deemed important to correct for principal-agent problems and to overcome limitations of traditional command-and-control approaches. Cities are expected to design these policies by engaging a wide array of relevant industry and civil society stakeholders.

The number and type of buildings covered by the policies should be limited to lower implementation costs while maximizing the impact, and should be phased in over several years to allow for institutional learning and the market of supporting consultants to develop.

The information provided to data consumers should be targeted towards the needs of the consumer in order to ensure that it is understood and can properly influence decision-making. The use of scheduled disclosure will allow for more useful data and the ability to engage civil society and associations in the dissemination of data and pressuring of firms.

To increase compliance and improve data quality, submission should be automated in partnership with utilities, however verification of data and periodic audits should be conducted to ensure quality. Robust enforcement and penalties, in consort with dissemination of information to stakeholders on apparent accidental data errors should additionally be used to limit non-compliance and poor data quality. Assist buildings in complying, and responding through improved behaviour, with the policy through building-type customized training, call centre support, and direct reach outs. Industry stakeholders are important partners that should be leveraged for publicizing the program and offering of training.

Cities should actively monitor incoming data to look for opportunities to improve the policy so that it remains relevant and useful for both information disclosers and consumers. The literature was not specific as to what types of amendments may be impactful.

Finally, jurisdictions should consider the costs and benefits of implementing an energy benchmarking policy against other possible policy options for achieving their goals in order to ensure that benchmarking is actually the right approach.

Table 61. Theoretical Policy Component Selection

Question #1: Which policy components does theory suggest that jurisdictions should select?	
Policy Component	**Theoretical Expectation**
Stated Policy Objectives	1. Inability of command-and-control policies to capture the complexity of buildings 2. Need for policy-makers to have additional information to craft more effective regulations 3. Correct for principal-agent problems by providing the information to encourage mutually beneficial solutions 4. To create a more efficient market by providing information to key stakeholders including prospective tenants, buyers, and financiers 5. Low-cost of a benchmarking policy relative to traditional command-and-control policies 6. To reduce information failures, and to allow for the proper pricing and discount rate to increase adoption of efficient technologies 7. Improve a specific and measurable environmental metric

Adoption Process	1. Engage a wide array of stakeholders in the design process 2. Ensure the information provided will be integrated into the existing decision processes of consumers 3. Understand how disclosers will interpret and respond to behaviour change from consumers. 4. Use federally produced resources and civil society publicizing to reduce costs 5. Consider the costs and benefits of the policy in the design documents so as to identify whether benchmarking is the right approach for meeting energy goals
Coverage & Implementation Schedule	1. Limit the type of buildings covered by the policy in heterogeneous markets and where there are a large number of actors 2. Focus on large emitters to increase the impact relative to the administrative cost 3. Phase in coverage over several years in order to allow for institutional learning and program improvement, and to allow market of engineers and consultants to build capacity
Disclosure Requirements	1. Require public disclosure 2. Use scheduled disclosure, as opposed to triggered disclosure, to allow for predictable disclosure, and time series data
Audience	1. Develop different disclosure formats to accommodate the preferences and knowledge of information consumers 2. Leverage civil society and associations to disseminate disclosed data and increase pressures on polluting firms
Compliance	1. Have robust enforcement which signals to the market that compliance is in fact mandatory 2. Conduct periodic audits to verify reporting accuracy (see Adaptation below) 3. Prioritize data quality through thorough verification of data each reporting period

	4. Offer training and support for disclosers on data submission and behaviour improvement
Data Submission	1. Automate data submission in partnership with utilities to lower time cost and increase accuracy
Adaptation	1. Analyze incoming data to identify ways to improve the policy 2. Implement additional policies to complement benchmarking policies after several years in existence

Chapter 4 - Energy Benchmarking in the United States

4.1 – Chapter Overview

This chapter highlights the importance of ENERGY STAR as a program and methodology to benchmarking policies in the United States, and tracks the evolution of ENERGY STAR to provide a lens through which to view emerging benchmarking trends.

4.2 – Relationship between ENERGY STAR and Benchmarking Policies

As previously identified, all of the benchmarking policies within the research sample make use of ENERGY STAR and its Portfolio Manager platform. Municipalities adopt ENERGY STAR because it has established itself as the industry standard through voluntary participation, is nation-wide and easily comparable, and lowers the start-up costs of a new program by relying on existing federal infrastructure (Burr, Keicher, & Leipziger, 2011). While the focus of this thesis is on municipal policies requiring commercial buildings to benchmark, it is important to first develop a basic understanding of the underlying ENERGY STAR methodology on which the policies rely.

Energy benchmarking policies require the participation of (1) ENERGY STAR, (2) a city, (3) information discloser, and (4) information consumer. Table 12 lists the role of each of these actors (with discloser and information consumers grouped together for brevity). The design of a benchmarking policy is primarily the responsibility of ENERGY STAR and the city. ENERGY STAR provides and continues to develop its Portfolio Manager tool—including the underlying methodology—while the city works with local stakeholders to design the enacting policy. In implementation, ENERGY STAR has only a minor role as the technical expert and platform provider, while the city and information discloser/consumer work together to acquire the necessary data. During reporting, the discloser is supported by the city to submit data through Portfolio Manager and ENERGY STAR then returns a benchmarked score. Behaviour change is the responsibility of both the city which will seek policy avenues to address the conclusions of the information, and of information producers/consumers who internalize the information before changing behaviour.

Table 12. Role of ENERGY STAR, City, Disclosers, and Information Consumers

Phase	ENERGY STAR Role	City Role	Information Discloser / Consumer Role
1. **Design**	• Develop & Provide Portfolio Manager reporting tool • Develop underlying reporting	• Engage local stakeholders in design • Enact policy which defines building	• Provide feedback to City on policy design

	methodology which converts energy data into a benchmarked score	coverage (ex. size & type), non-compliance penalties, method of submission, etc • Build outreach & training capacity	
2. Implementation	• Provide technical assistance for using Portfolio Manager	• Conduct outreach, training • Enforce compliance	• Develop internal capacity to comply with policy
3. Reporting	• Collect data and return benchmarked score	• (Optional) Work with utilities to develop automatic data uploading • Provide support to information producers • Aggregate and analyze data for city-wide lessons	• Engage tenants to retrieve required data • Submit data either directly to Portfolio Manager or through automated utility offering
4. Behaviour Change	• n/a	• Based on results, create new policies or update existing policies to change behaviour	• Information consumers demand efficiency improvement • Information producers improve efficiency

4.3 - The History and Impact of ENERGY STAR and Portfolio Manager

The ENERGY STAR label can be found on everything from appliances and office equipment, to homes and commercial buildings. The program was launched in 1992 as "a voluntary government program that reduces air pollution through increased energy efficiency [which informs] businesses and consumers about energy efficient solutions and makes it easier to save money and protect the environment for future generations" (Boyd, Dutrow, & Tunnessen, 2008, p. 709).

In 1999, ENERGY STAR launched a new Commercial Buildings Program (Mattern, 2013). This expansion built upon similar rating and disclosure programs in Europe and Australia (Cox, Brown, & Sun, 2013). The EPA designed ENERGY STAR to support "management practices that result in superior corporate energy performance and provide the management tools that enable energy efficiency" (Boyd et al., 2008, p. 710). By identifying energy efficiency improvements in buildings, ENERGY STAR provides managers with direction and evidence to support the energy reduction goal setting of an organization (Boyd et al., 2008).

It is important to make the distinction between ENERGY STAR reporting, rating, and certification. To participate in ENERGY STAR, a building must report energy consumption through the Portfolio Manager tool. Any building type may report consumption data and receive their EUI. If an ENERGY STAR rating has been developed for the given building type, "Portfolio Manager provides a 1-100 rating for a building's energy performance in a given year. A score of 50 represents the average and a 75 or higher represents superior performance. A score of 1 signifies the lowest possible energy performance, and each additional point represents a one percentile improvement." If the building receives an ENERGY STAR rating between 75-100, it may apply for certification and the right to use the ENERGY STAR label (Mattern, 2013, p. 494).

The first ENERGY STAR for commercial buildings rating was specifically for office buildings, but today approximately 60% of commercial square footage (see Figure 2) in the US has access to an ENERGY STAR rating and certification label designed to account for building type particulars. Buildings types which do not have a dedicated rating are still able to track and report energy through ENERGY STAR, but do not receive a performance rating or ENERGY STAR certification label (US Environmental Protection Agency's ENERGY STAR, 2011). The process for developing a rating system and usage of the Portfolio Manager reporting tool will be described later in this chapter.

Figure 2. Commercial Building Types with Corresponding ENERGY STAR Rating System

- Data Centres
- Dormitories
- Hospitals
- Hotels
- Houses of Worship
- K-12 Schools
- Medical Offices
- Office Buildings, Bank/Financial Institutions, and Courthouses
- Retail Stores
- Super Markets
- Warehouses
- Wastewater Treatment Plants

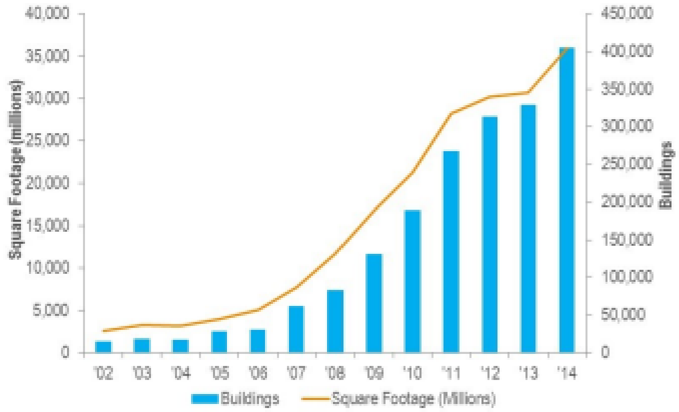
(US Environmental Protection Agency's ENERGY STAR, 2011, p. 2)

Reported results show that "on average, ENERGY STAR certified buildings use 35% less energy and cause 35% fewer greenhouse gas emissions than similar buildings" (ENERGY STAR, n.d.). These certified buildings represent a small subsection of all buildings that report via ENERGY STAR as a building must perform at or above the 75^{th} percentile to be eligible for certification (Nikolaou et al., 2011). Less efficient buildings also experience benefits from participating in ENERGY STAR. The EPA reports that buildings that consistently benchmark receive average annual energy savings of 2.4% compared to business-as-usual. Additionally, the EPA found that “buildings starting with below average energy efficiency in 2008 saved twice as much energy as those starting above average” (US Environmental Protection Agency's ENERGY STAR, 2012, p. 1). This is a significant finding as it helps to alleviate concerns that mandatory energy benchmarking policies could penalize underperforming buildings that are simply not able to increase efficiency. While programs and policies are rarely beneficial for everyone, the fast-paced savings achieved by low-performing buildings in the EPA study suggests that they were likely missing low-hanging fruit prior to recognizing the opportunities identified by benchmarking. It will be interesting to see if this trend holds as buildings are required by municipal policies to benchmark, or if voluntary participation incentivized only the below average performing-buildings with the greatest potential to opt-in to ENERGY STAR.

With the advent of the first benchmarking policies, ENERGY STAR continues to evolve its role and impact. Figure 3. shows that the use of ENERGY STAR has increased significantly among commercial buildings. As we will see in 5.2 – Stated Policy Objectives, this increase aligns with the adoption of mandatory energy benchmarking policies, beginning with Austin in 2007 and New York in 2008. At the end of 2014, when all of the policies within this thesis’ sample were active, ENERGY STAR reports its rating system was being used by over 400,000 commercial buildings representing 35 billion square feet of real-estate. Top performing buildings which received an ENERGY STAR certification (requiring performance at or above the 75^{th} percentile) have reported cumulative cost savings of $3.4 billion and GHG reductions of 17 million $MtCO_2e$ (ENERGY STAR, n.d.). The increase in adoption that is seen in Figure 3 refers solely to the act of benchmarking and does not necessarily mean that any corrective action was taken to increase building efficiency. In other words, you can report your energy consumption and then take no steps to improve your performance. That said, it takes time to track data, identify opportunities, upgrade facilities, and then apply for ENERGY STAR certification, it can be expected that the aforementioned impacts attributed to ENERGY STAR will increase substantially in the coming years.

Figure 3. Cumulative buildings and square footage benchmarked in Portfolio Manager

(U.S. EPA, 2014)



In addition to the direct and measured benefits, ENERGY STAR has created an impact as a platform and inspiration for other building rating systems including the US Green Building Council's Leadership in Energy and Environment Design (LEED) rating system, and for tools offered by both the Building Owners and Managers Association (BOMA) and the American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) (ENERGY STAR, n.d.).

4.4 - ENERGY STAR Methodology and Portfolio Manager

The EPA's approach for developing a rating system is designed to "provide an accurate and equitable assessment of a building's energy performance" (US Environmental Protection Agency's ENERGY STAR, 2011, p. 4). The criteria to guide this approach are:

1. "Evaluate energy performance for the whole building" as opposed to individual equipment such as an HVAC system which may be efficient on its own but over-sized for the needs of the building (US Environmental Protection Agency's ENERGY STAR, 2011, p. 4).
2. "Reflect actual billed energy data" by requiring utility data to be inputted into Portfolio Manager since simulations often do not properly account for the impact of building operations and maintenance (US Environmental Protection Agency's ENERGY STAR, 2011, p. 4).
3. "Normalize for operation" to account for the buildings operational characteristics such as "hours of operation or number of occupants" (US Environmental Protection Agency's ENERGY STAR, 2011, p. 4).

4. “Provide a peer group comparison” so that the rating provides a useful benchmark against buildings with a similar business function (ex. hospital or retail store) and operating characteristics (US Environmental Protection Agency's ENERGY STAR, 2011, p. 4).

These criteria, such as tracking whole-building performance and normalizing actually billed energy data, not only shape the ENERGY STAR program but also aspects of municipal policies. For example, jurisdictions are beginning to automate data uploading directly from utilities in order to overcome challenges of getting accurate whole-building data (Burr et al., 2011). This local action is only possible because Portfolio Manager includes the functionality of automated data uploading.

At its core, ENERGY STAR Portfolio Manager is a statistical analysis tool that relies primarily upon the US Energy Information Administration’s Commercial Building Energy Consumption Survey (CBECS), which is “a national survey that assesses the characteristics, consumption and expenditures of the commercial building population” (Mattern, 2013, p. 491). CBECS collects “complete billing data and operational details” for 6,000 commercial buildings representing a wide variety of types (US Environmental Protection Agency's ENERGY STAR, 2011, p. 4). ENERGY STAR uses CBECS to develop an average performance of “a building based on its type, space attribute data, location, and energy consumption by fuel type” (Mattern, 2013, p. 493). The existence of CBECS is important as “gathering energy information to fill a database with a representative sample of the building stock is not only expensive, but also technically complex” (Nikolaou et al., 2011, p. 58).

It is important to recognize that by using CBECS, a building benchmarked through ENERGY STAR is not compared with other “real” buildings entered into Portfolio Manager or those in the same benchmarking jurisdiction, but rather against the national average. The EPA selected this approach in order to ensure a nationally representative and statistically valid dataset (ENERGY STAR). New York and other cities with benchmarking policies are now exploring, in partnership with the EPA, the possibility of using the large local datasets as an additional layer to allow for local benchmarking with scores that are reflective of performance within a jurisdiction and real estate market (New York City Mayor's Office of Long-Term Planning and Sustainability, 2014).

The EPA applies normalizing screens to the CBECS survey because two seemingly identical buildings could have markedly different consumption patterns if, for example, they exist in different parts of the country and with different types of occupants. For benchmarking to be useful, the EPA creates “peer groups” of US commercial buildings “that have the same primary business function and similar operating characteristics” (US Environmental Protection Agency's ENERGY STAR, 2011, p. 10). The EPA performs a series of regression tests on the CBECS that allow “for analysis of a dependent variable (ex. source energy use intensity), subject to various independent characteristics (ex. operation and weather)” (US Environmental Protection Agency's ENERGY STAR, 2011, p. 5). These regression tests are performed on the CBECS dataset and not on individual buildings entered into Portfolio Manager. The end result is a predicted source EUI based on the constraints of the building (the independent variables). The actual, or reported, source EUI of buildings in the CBECS is divided by the predicted source EUI to calculate the energy efficiency ratio. This ratio is used to build the ENERGY STAR Lookup Table which is then used to assign an ENERGY STAR performance rating. "For example, the ratio on the [curve] at 1% corresponds to a rating of 99; only 1% of the population has a ratio this small or smaller” (US Environmental Protection Agency's ENERGY STAR, 2011, p. 12). More simply, the ratio shows how well a building is living up to its potential as compared with a representative sample of its peers.

The dependent variable used by ENERGY STAR is the source energy use intensity (source EUI) of a building. The purpose of conducting a regression analysis is to explain how the dependent variable is influenced by the independent variables. In the case of ENERGY STAR, it is to determine the “variation in source EUI associated with each of the independent variables” (US Environmental Protection Agency's ENERGY STAR, 2011, p. 7). Source EUI can be broken apart into the two concepts of:

- **Source Energy:** The energy used by a building can come in the form of electricity generated by a utility, or onsite through combustion of a fuel such as natural gas. Whereas natural gas represents a raw fuel (primary energy), the electricity represents a useable form of energy that has been converted from a raw fuel (secondary energy). ENERGY STAR converts all energy recorded on utility bills (site energy) to primary (source) energy in order to allow for comparison (US Environmental Protection Agency's ENERGY STAR, 2011). National average ratios are used to convert site to source energy because “the key unit of analysis for Portfolio Manager is the building. It is the efficiency of the building, not the utility, which is evaluated” (U.S. EPA's ENERGY STAR, 2013, p. 4). In practice this means that a building in a state that relies on coal for electricity is not held at a disadvantage to a building in a state that relies on hydro.
- **Energy Use Intensity:** EUI is the most commonly used metric to compare energy performance within a sample peer group. Similar to intensity metrics in greenhouse gas accounting, EUI can be calculated as energy use per worker in an office building, energy use per bed in a hotel, or energy use per square foot (Nikolaou et al., 2011). ENERGY STAR uses the latter, “dividing the

total source energy defined above by the gross floor area of the building" (US Environmental Protection Agency's ENERGY STAR, 2011).

As mentioned, the independent variables the EPA is concerned with are factors that could influence the source EUI of a building. The independent variable examples listed above—"operation" and "weather"—can be understood as:

- **Weather conditions:** Data is normalized to remove the impacts of scenarios such as temperature differences between Austin and Seattle, or the impact of a stronger hurricane season on New York compared to previous years (Chung, Review of building energy-use performance benchmarking methodologies, 2011). Specifically, weather conditions incorporated into ENERGY STAR include "average daily temperature, temperature maximum and minimum values, humidity, and cloud cover" (US Environmental Protection Agency's ENERGY STAR, 2011, p. 9). For example, ENERGY STAR calculates Heating Degree Days and Cooling Degree Days as a deviation from a standard temperature of 65F, tallied annually as the sum of deviations over the entire year (US Environmental Protection Agency's ENERGY STAR, 2011).
- **Occupancy uses:** New York's benchmarking found occupancy uses to be a significant differentiator in the EUI of a building (New York City Mayor's Office of Long-Term Planning and Sustainability, 2014). For example, a standard office tower uses energy differently than a mixed-use office tower that has a grocery store on the main floor which uses energy-intensive refrigerators (Chung, Review of building energy-use performance benchmarking methodologies, 2011).

Top performing buildings are eligible to apply for an ENERGY STAR certification, similar in intent to the US Green Building Council's LEED certification as a demonstration of organizational leadership. The performance scale and ENERGY STAR rating is only available for certain types of buildings as "developing a scale that accounts for the operative characteristics of each building requires access to nationally representative, statistically robust survey data" (US Environmental Protection Agency's ENERGY STAR, 2011, p. 2). This is not yet possible for all building types. In the case of building types for which an energy performance scale has not yet been created, the "EPA provides average energy use per square foot derived from the [Commercial Buildings Energy Consumption Survey] data" (US Environmental Protection Agency's ENERGY STAR, 2011, p. 2). Additional ENERGY STAR performance scales are developed on an ongoing basis.

The ENERGY STAR methodology can be most easily understood from the perspective of a building manager. Figure 4. Steps to Compute an ENERGY STAR Rating using Portfolio Manager4 summarizes the steps required of a building manager to compute a rating, beginning with entering building (ex. primary use of building, number of workers, size of building, hours of operation) and consumption (ex. electricity consumption from utility bill) data into Portfolio Manager. The actual and predicted source energy intensities, and corresponding efficiency ratio, are calculated. The ratio is used to pull a rating between 1-100 from the Lookup Table. If the rating is between 75-100, the building may apply for an ENERGY STAR certification (U.S. EPA, n.d.).

Figure 4. Steps to Compute an ENERGY STAR Rating using Portfolio Manager

Excerpt from the EPA document
ENERGY STAR Performance Ratings – Technical Methodology

1. User enters building data into Portfolio Manager

- Complete energy information includes all energy consumption at the building for a 12-month period.
- The user must enter specific operational characteristic data. These characteristics are those included as independent variables in the EPA regression analysis.

2. Portfolio Manager computes the Actual Source Energy Use Intensity

- Source EUI is computed from the metered energy data.
- The total consumption for each energy meter entered by the user is converted into source energy using the source to site conversion factors.
- Source EUI is the sum of source energy across all meters in the building divided by the gross floor area.

3. Portfolio Manager computes the Predicted Source Energy Intensity

- Predicted Source EUI is computed using the regression equation for the specific building type.
- For each operating characteristic entered by the user, the centered value is computed. The centered value is the difference between the user-entered value and the mean value in the CBECS population.
- The terms in the regression equation are summed to yield a predicted source EUI.
- The prediction reflects the expected energy use for the building, given its specific operational constraints.

4. Portfolio Manager computes the energy efficiency ratio

- The energy efficiency ratio is: Actual Source EUI / Predicted Source EUI
- The energy efficiency ratio expresses how much energy a building uses relative to its predicted energy use. A lower ratio indicates that a building uses less energy; a higher ratio indicates the opposite.

5. Portfolio Manager looks up the efficiency ratio in the Lookup Table

- The lookup table maps each energy efficiency ratio to a cumulative percent in the population.
- The lookup table identifies whether the energy efficiency ratio for a building is bigger or smaller than the ratios of its peers.
- The lookup table returns a rating on a scale of 1-to-100.
- A rating of 75 indicates that the building performs better than 75% of its peers.
- Buildings that earn a 75 or higher may be eligible to earn the ENERGY STAR.

(US Environmental Protection Agency's ENERGY STAR, 2011, p. 12-13)

Chapter 5 – Active Municipal Benchmarking Policies

5.1 – Chapter Overview

This chapter presents case studies, divided across eight policy components, of the seven active jurisdictions. Trends are identified for each policy component where a simple majority of the jurisdictions have selected a given design variable. The purpose of this chapter is to address the second question of this thesis: "Which policy components do jurisdictions select and are there apparent trends?"

5.2 – Stated Policy Objectives

All seven policies in the sample have been enacted between 2008 and 2013 with the earliest results publicly reported by New York's Local Law 84 in August 2012. As shown in Table *,* four out of the seven policies were enacted in 2012 and 2013. This narrow gap between the implementation of pioneering policies and the next iteration of policies allows for the possibility that the early results legitimized and enticed others to follow suit. This is a view that is supported by the policy objectives (covered below in Table) of Boston which refers to preceding policies by stating, "New York City, Seattle, San Francisco, Minneapolis, Philadelphia, Austin, and Washington, D.C., have demonstrated benchmarking's acceptability & feasibility" (City of Boston, 2013, p. 1). When Austin implemented its leading policy in 2008, it too conducted a scan but was only able to look for guidance from policies that targeted residential energy efficiency such as the State of Nevada and Berkeley, California (Energy Efficiency Upgrades Task Force - City of Austin, 2008). Senior levels of government are also important drivers for the adoption of benchmarking policies with San Francisco recognizing California's Long Term Energy Efficiency Strategic Plan goal of attaining a scenario where "fifty percent of existing [commercial] buildings will be equivalent to zero net energy buildings by 2030 through achievement of deep levels of energy efficiency and clean distributed generation" (Mayor's Task Force on Existing Buildings, p. 3). If the sample benchmarking policies produce positive results, and states continue to set forward-looking goals, other cities may similarly appeal to this demonstrated feasibility as they adopt their own benchmarking policies.

Table 13. Date of Enactment of Benchmarking Policies
Adapted from Institute for Market Transformation (n.d.)

Jurisdiction	Policy Name	Authority in Charge	Enacted Date

Austin	Energy Conservation Audit & Disclosure Ordinance	Austin Electric Utility	2008
Boston	Building Energy Reporting and Disclosure Ordinance	Air Pollution Control Commission	2013
Chicago	Energy Use Benchmarking Ordinance	Commissioner of Business Affairs and Consumer Protection	2013
New York	Local Law 84	Department of Buildings	2009
Philadelphia	Building Energy Benchmarking Ordinance	Office of Sustainability	2012
San Francisco	Existing Commercial Buildings Energy Performance Ordinance	Department of Environment	2011
Seattle	City of Seattle Energy Benchmarking and Report Program (Ordinance 123226)	Office of Sustainability and Environment	2012

While all cities made some mention of their policy objectives for advancing a benchmarking policy, a few cities include explanations that are noticeably more thorough and thoughtful. Table 4 categorizes the stated policy objectives into the broad areas of Energy & Environment; Economic; Political, Policy & Planning; Human & Health; and Other (summaries can be found in Appendix A - Policy Motivations & Impact Estimates)

The stated policy objectives most often cited were found to be GHG reductions (71%) and energy efficiency (57%), cost savings for ratepayers (57%), an often generally worded increase in transparency (57%), a desire to improve management decision making through the provision of information (43%), and the need to bring existing buildings inline with new building code efficiency regulations (43%).

The greenhouse gas emissions attributed to buildings as a percentage of total emissions vary markedly across the cities, with Boston reporting approximately 75%, Chicago 71%, Philadelphia 60%, and San Francisco 50%. (City of Boston, 2013; City of Chicago, 2014; City of Philadelphia, 2014). This variance in GHG emissions could be the result of differences in building stock, urban form, local energy mix, or accounting procedures. Regardless of the percentage, GHG emissions are a strong motivator for cities to adopt benchmarking policies. San Francisco acknowledge that scientific and federal agencies recommend an 80% reduction in GHG emissions by 2050 which amounts to a 2.5% annual decarbonisation or energy reduction, “sustained for a generation” (Mayor's Task Force on Existing Buildings, 2009, p. 3).

Two explicit recognitions of the impacts of climate change were included. Boston stated in the opening paragraph of its ordinance that climate change causes "sea-level rise, higher temperatures, and more intense storms" (City of Boston, 2013, p. 1). San Francisco went even further by directly connecting the impacts of climate change to the city itself:

> "Documented phenomena in California include warming temperatures, precipitation disruptions, reductions in average Sierra snowpack and changes in timing of spring runoff. Projections for the remainder of the century continue to grow more ominous with profound implications for the provision of clean water, hydroelectric generation, and the agriculture that feeds our city. As a City bounded by water on three sides, coastal inundation is a continuing threat to our community, real estate and infrastructure" (Mayor's Task Force on Existing Buildings, 2009, p. 1).

In four (57%) of the cities, the policies are inspired by or linked to an existing climate or energy plan, or senior level government leadership. Philadelphia sees benchmarking as offering the "best opportunity to achieve the Greenworks [climate action plan] target of reducing greenhouse gas emissions 20 percent by 2015" (City of Philadelphia, 2014, p. 6). Chicago's 2012 sustainability plan included a call to increase building energy efficiency through transparency (City of Chicago's Office of the Mayor, 2013). New York City established its benchmarking policy in connection with wider efficiency regulations and energy codes (Northeast Energy Efficiency Partnerships, 2013).

That a climate or energy plan should lead to an interest in energy benchmarking is quite logical. San Francisco reports that, although it "has established high standards of environmental performance for new construction," the city adds to its building stock at just 0.8% per year (Mayor's Task Force on Existing Buildings, 2009, p. ii) At this pace, San Francisco notes that "it could take more than sixty years to 'green' even half of San Francisco" (Mayor's Task Force on Existing Buildings, p. ii). Austin also seeks to have an impact on the existing stock of "buildings constructed prior to the implementation of current energy codes" (City of Austin, 2008, p. 1). Seattle found that if the lower half of its building stock achieved median energy efficiency, building owners would realize 25% energy savings and $56.1 million of dollar savings (Seattle Office of Sustainability & Environment, 2014).

Improving transparency was noted as a policy objective by three cities (43%). Seattle recognizes that "localized datasets increase transparency and provide greater relevance for planners and utilities than national datasets," and that benchmarking is important for providing "building performance information accessible to building owners, industry professionals and policymakers" (Seattle Office of Sustainability & Environment, 2014, p. 7). Philadelphia is less specific in its acknowledgement of the value of benchmarking policies to policymakers, saying only that in order to improve efficiency data must be improved (City of Philadelphia, 2014). Chicago is even less clear in the value it hopes to derive from benchmarking, describing a desire for increased energy performance transparency (City of Chicago, 2014).

Boston and Chicago both look to benchmarking as a potential driver of competitiveness and the green economy. Boston sees benchmarking as a tool for spurring the growth of a "green economy and job creation", increase business attractiveness and demonstrate "innovative leadership" (City of Boston, 2013, p. 1). Chicago does not place a direct focus on the green economy but instead it sees the potential for efficiency to increase competitiveness and resiliency through cost savings (City of Chicago, 2014).

Table 14. Stated Policy Objectives

Categorization of stated policy objectives identified by cities within design documents, enacted policies, or self-reported results.

		Austin	Boston	Chicago	New York	Philadelphia	San Francisco	Seattle	**Trend**
Energy & Environment	GHG Reduction	No	Yes	Yes	Yes	Yes	Yes	No	**Yes (71%)**
	Energy Efficiency or Conservation	Yes	Yes	No	No	Yes	Yes	No	**Yes (57%)**
	Climatic Change	No	Yes	No	No	No	Yes	No	**No (71%)**
	Avoided New Supply	Yes	No	No	No	No	No	No	**No (86%)**
Economic	Cost Savings for Ratepayers	Yes	Yes	Yes	No	Yes	No	No	**Yes (57%)**
	Spur Green Economy	No	Yes	No	No	No	No	No	**No (86%)**
Political, Policy and Planning	Meet Targets in Climate or Energy Plan	Yes	Yes	No	Yes	Yes	No	No	**Yes (57%)**
	Bring Existing Buildings up to New Building Code	Yes	No	No	Yes	No	Yes	No	**No (57%)**
	Improve Data for Better Urban Planning	No	No	No	No	Yes	Yes	Yes	**No (57%)**
	Senior Level of Government Directive or Leadership	No	No	No	No	No	Yes	No	**No (86%)**
Human & Health	Reduced Pollution	No	Yes	No	No	No	No	No	**No (86%)**
	Occupancy Enjoyment	No	Yes	No	No	No	No	No	**No (86%)**
Other	Increase Transparency	No	No	Yes	Yes	No	No	Yes	**No (57%)**

	Improve Building Owner Decision Making	No	Yes	No	No	Yes	Yes	Yes	**Yes (57%)**
	Demonstrated Feasibility	No	Yes	No	No	No	No	No	**No (86%)**

Table 15 lists the projected impacts of the policies categorized by impact area. A complete list of projected impacts can be found in *Appendix A - Policy Motivations & Impact Estimates.* The most widely projected impact was annual cost savings (57%), energy reductions (57%), GHG emission reductions (43%), and retrofit investments (43%). Boston and Seattle both provided no projected impacts.

Table 15. Projected Policy Impacts

Categorization of policy projected impacts identified by cities within design documents or enacted policies.

Category	Jurisdiction	Projected Impact
Energy reductions	Austin	20% increase in energy efficiency by 2020
	Boston	n/a
	Chicago	13-23% reduction in consumption by (6.5–11.2 million MMBTU/year) if all buildings achieved 50th or 75th percentile EUI respectively.
	New York	n/a
	Philadelphia	10% reduction in consumption by 2015
	San Francisco	50% reduction in consumption by 2030
	Seattle	n/a
GHG emission reductions (tonnes)	Austin	n/a
	Boston	n/a
	Chicago	460,000-844,000
	New York	2,720,000 (5.3%) by 2030
	Philadelphia	n/a
	San Francisco	64,000 by 2015
	Seattle	n/a
Cost savings (annual) *Note: Not stated whether amount is only private savings or includes government savings. Assumed private savings as the discussion focuses primarily on private savings.*	Austin	$38,593,874
	Boston	n/a
	Chicago	$44-$77 million
	New York	$12.2 billion
	Philadelphia	$100 million
	San Francisco	n/a
	Seattle	n/a
Retrofit investments	Austin	$83,600,000
	Boston	n/a
	Chicago	$152-$265 million
	New York	$5.2 billion
	Philadelphia	n/a
	San Francisco	n/a
	Seattle	n/a
Job growth	Austin	n/a

	Boston	n/a
	Chicago	"More than 1,000" (City of Chicago, 2014)
	New York	Thousands of construction jobs "in energy auditing, retro-commissioning, upgrading lighting, and maintaining equipment" (New York City Mayor's Office of Long-Term Planning and Sustainability, 2014, p. 3)
	Philadelphia	n/a
	San Francisco	n/a
	Seattle	n/a
ENERGY STAR score	Austin	Before June 1, 2016 80% covered building will either: • Have an ENERGY STAR score of at least 50, or; • Have 20% improvement in efficiency above an existing ENERGY STAR score of 50 (City of Austin, 2008)
	Boston	n/a
	Chicago	n/a
	New York	n/a
	Philadelphia	n/a
	San Francisco	n/a
	Seattle	n/a
Other	Austin	n/a
	Boston	n/a
	Chicago	n/a
	New York	• Benchmarking to contribute 10% of reductions towards GHG reduction goal of 30% by 2030 • Improve air quality • Improve comfort of indoor environment • Increase reliability of electrical systems
	Philadelphia	n/a
	San Francisco	n/a
	Seattle	n/a

Jurisdictions that reported energy reduction projections most commonly spoke in terms of a reduction in consumption (Chicago, Philadelphia, and San Francisco), but an increase in energy efficiency was also used (Austin). The generalized and interchangeable fashion in which jurisdictions use the definitions of efficiency increase and consumption reduction makes it difficult to discern if a city is speaking in intensity or absolute terms. For example, if the entire market reduces consumption by 20% then the aggregate consumption will decrease, whereas if all buildings improve efficiency by 20% but the floor area within the city continues to increase than what appeared to be an absolute projection is in-fact an intensity projection and emissions will continue to increase.

Challenges to interpreting and comparing the projected impacts continue as Chicago reports the potential of a reduction in consumption between 13-23%. This range takes into account two scenarios.

In the first, all buildings achieve an EUI equivalent to the 50th percentile. The second scenario, where all buildings achieve an EUI equivalent to the 75th percentile. There does not appear to be any timeline or path for arriving at one scenario or the other, but rather the impacts appear to be an identification of possible statistical outcomes as opposed to projections of an expected outcome.

New York's projected GHG emission reductions stand out for its sheer size at over 2.7 million tonnes by 2030. Chicago's projections remain opaque because of the aforementioned planning approach used, but the City identifies possible savings of between 460,000 and 844,000 tonnes. San Francisco's target is perhaps the most interesting as it is a five-year target set in 2010 of 64,000 tonnes reduced by 2015. Data has not yet been released for 2015 but when it does, it will provide an early measure of the success of benchmarking at lowering greenhouse gas emissions.

Information on the costs and benefits to the municipal corporation enacting the policies was even more sparse and difficult to compare (see Table 16). With the exception of Austin and Seattle, there was very little discussion on the costs of the program to the city—including in the design documentation, enacting ordinance, and annual reports.

Table 167. Cost and Benefit Analysis

	Austin	Boston	Chicago	New York	Philadelphia	San Francisco	Seattle	**Trend**
Operational Costs to the City	No	No	No	No	No	No	Yes	**No (86%)**
Deferred Costs to the City	Yes	No	No	No	No	No	No	**No (86%)**
Projected Impacts of Policy	Yes	No	Yes	Yes	Yes	Yes	No	**Yes (71%)**

Seattle's ordinance is unique in that it includes an appended fiscal note which estimates year 1 costs to be $240,000 (staff and consultants) and year 2 costs to be $180,000 (staff and compliance). The fiscal note estimates revenues in year 1 of $153,000 and year 2 of $178,000 from enforcement fines (City of

Seattle, 2009). It is not clear whether these estimates include only new staffing costs, or if it allocates funds to cover overhead costs of supporting departments.

Austin does not directly address program costs but instead takes a look at the deferred costs to the utility of continual energy consumption growth. The Northeast Energy Efficiency Partnerships reports that "Austin Energy is the eighth largest city-owned utility in the US, and upon passing the [ordinance] Austin Energy was given the role of administrated the [benchmarking] policy, reporting results and ensuring compliance" (Northeast Energy Efficiency Partnerships, 2013, p. 44). The benefit to Austin Energy then, is not enforcement fines, but rather the significant cost savings of differed generating capacity investments. Austin's Energy Efficiency Upgrades Task Force predicts that by 2020 the demand from customers will be greater than supply by 238 megawatts, and that the cheapest new generating capacity it could construct—a gas power plant—would require an expenditure of $706,000 per megawatt for a total of $168 million. However, this cost would quickly grow with a new nuclear plant to meet the 238 megawatt demand, costing $590 million. (Energy Efficiency Upgrades Task Force - City of Austin, 2008).

The stated policy objectives of the jurisdictions are diverse and often vague, and yet they set an important foundation for the shaping of the policies themselves. It will be shown in Chapter 6 that the stated policy objectives are correlated with the design decisions. This is a logical conclusion as policy-makers first set the overarching goals of a policy before considering the best approach for attaining these goals. For example, if reflexive-accountability and education-through-transparency are primary objectives for a policy (ex. improve building owner decision-making) it could be reasonable to forego public disclosure on an interactive website, and instead only require disclosure to the government and certain key stakeholders. For this reason, it is important that the selection and recording of policy objectives should be carefully considered. The following section will explore the processes used by jurisdictions for adoption of the policies, processes which include the selection of the stated policy objectives.

5.3 – Adoption Process

Formal stakeholder engagement is an important consideration for jurisdictions as it contributes to the formation of both the stated policy objectives and the design of a policy. Austin, Boston, and San Francisco (43%) disclosed at least some details about the process by which they created the benchmarking policy or which voices were given a seat at the table (see Table 7). In the three cities where a formal stakeholder working group process to guide the creation of energy benchmarking policies was disclosed, the group was established either as a standalone committee tasked with exploring benchmarking specifically (Austin and San Francisco) or as part of an existing climate strategy working group (Boston) (Mayor's Task Force on Existing Buildings; City of Boston, n.d.).

Table 17. Stakeholder Engagement

	Austin	Boston	Chicago	New York	Philadelphia	San Francisco	Seattle	**Trend**
Standalone Working Group	Yes	No	No	No	No	Yes	No	No (71%)
Climate Strategy Working Group	No	Yes	No	No	No	Yes	No	No (71%)

For example, Austin's council directed "the City Manager to create a Task Force to identify and recommend City Code revisions to implement cost effective energy efficiency retrofits and upgrades of Austin [buildings]" (Energy Efficiency Upgrades Task Force - City of Austin, 2008, p. 5). San Francisco convened its Existing Commercial Building Task Force "to recommend policies, actions, and partnerships that will meet local and state goals to improve energy efficiency in buildings in order to reduce greenhouse gas emissions, conserve resources, enhance electricity reliability, and improve the competitiveness of commercial buildings in the City" (Mayor's Task Force on Existing Buildings, p. ii).

The composition of these task forces (see Table 18 for a summary and Appendix B – Task Force Composition for a complete listing) varied from city to city but was largely comprised of real estate and financial professionals, contractors, and advocates.

Table 18. Task Force Composition

	Austin	**Boston**	**Chicago**	**New York**	**Philadelphia**	**San Francisco**	**Seattle**
Civil Society / Cause	5	1	0	0	0	0	0
Engineering / Contractors / Industry	4	0	0	0	0	9	0
Finance	4	3	0	0	0	2	0

Real Estate / Property Management	10	7	0	0	0	5	0
Municipal / Regulator	4	0	0	0	0	0	0
Utility	1	0	0	0	0	1	0
Total	**28**	**11**	**0**	**0**	**0**	**17**	**0**

The importance of the task force composition is evident in the voting record published by Austin. The Austin policy included voluntary participation in targets for performance improvement by buildings covered by the benchmarking policy. Task force members were asked to consider whether these goals should be applied mandatorily if not met through voluntary participation. Four task force members voted in favour of mandatory targets and 17 voted against mandatory targets. The arguments highlight the challenges in climate change mitigation work more broadly:

- **In Favour of Mandatory Targets:** Those in favour argued that (1) "voluntary targets would have little or no practical effect if there was no foreseeable risk that mandatory measures would be implemented"; (2) the time cost of waiting for action was too high and that mandatory requirements were required to drive action; and, (3) that mandatory targets were required to incentivize landlords who otherwise have less incentive to improve efficiency and reduce bills of tenants (Energy Efficiency Upgrades Task Force - City of Austin, 2008, p. 3).
- **Opposed to Mandatory Targets:** This argument can be subdivided into (1) the market should be given a chance to internalize the new information before changes are mandated and that any mandatory policies should be based up data collected through the policy; (2) energy price increases should be relied upon instead of regulation; and, (3) a general opposition to any mandatory requirements (Energy Efficiency Upgrades Task Force - City of Austin, 2008).

The 4-17 voting equates to 19% of task force members voting in favour of more stringent policy. While the individual votes of the task force members are not recorded, this roughly corresponds with the percentage of 'Civil Society / Cause' task force members of 18%. While this is by no means conclusive, it does suggest that composition of a task force should not be overlooked.

The trend of not making use of a standalone working group or climate strategy working group could be a lost opportunity for jurisdictions. While no assessments were found of whether stakeholder engagement increases the utility of a given benchmarking policy, the literature provides some insights and will be explored later in this thesis.

5.4 - Coverage & Implementation Schedule

The size and types of commercial buildings which are to be covered by the regulation and required to report are different in each jurisdiction. The Northeast Energy Partnership (2013) advises that it is important for cities to construct energy benchmarking policies with a firm knowledge of the local building stock. It uses the examples of Austin and New York to demonstrate this need. Austin's building stock is dominated by medium-density buildings, whereas New York has a greater proportion of high-density buildings. For example, in New York, "large buildings of over 50,000 sq-ft comprise just 2 percent of the total building stock, but these buildings consume over 45 percent of the energy consumed by all buildings in the city" (Northeast Energy Efficiency Partnerships, 2013, p. 18). With this in-mind, New York built a benchmarking program to focus on this 2% of the building stock in order to lower costs to the city and maximize the return.

A challenge in selecting the size and usage requirements for covered buildings is the lack of complete local building data. Seattle developed its database of buildings using ownership, location, age of building, and floor area data from the local property assessor. To improve the dataset, private databases from real estate market research firms like CoStar were leveraged, as well as direct outreach to the building owners. The first reporting period required extra staff attention in order to update and make corrections to the database using the reported data (Seattle Office of Sustainability & Environment, 2014).

Table 19 lists the year that a building size is required to report. Five (71%) of the jurisdictions require reporting from government buildings, with New York and Boston (29%) mandating disclosure from government facilities before private buildings. Jurisdictions which do not require government reporting, all use a phased-in implementation schedule which begins with the largest buildings before moving to smaller buildings (see Table 20 for a summary).

Table 89. Implementation Schedule

The symbol (g) represents a government building reporting requirement. The numbers represent the square footage requirement for reporting, where all buildings at or above that size are required to report. Adapted from the Institute for Market Transformation's policy comparison tool (Institute for Market Transformation, n.d.).

Jurisdiction	2010	2011	2012	2013	2014	2015	2016
Austin			75,000	30,000	10,000		
Boston				All (g)	50,000		35,000
Chicago					250,000 250,000 (g)	50,000 50,000 (g)	
New York	10,000 (g)	50,000					
Philadelphia				50,000			

				50,000 (g)			
San Francisco		50,000	25,000	10,000			
Seattle			50,000 50,000 (g)	20,000 20,000 (g)			

This approach allows for institutional learning and capacity building with a smaller number of reporting organizations. Similar to a pilot program, the jurisdiction can have a greater number of staff hours to work with a smaller number of organizations as during early implementation there is a greater likelihood of challenges with systems and training, and less standardization. Focusing on large buildings is also advantageous because they are more likely to have in-house energy or sustainability expertise who require less support to meet the requirements of the policy. Finally, the supporting industry of consultants and engineers also needs time to build up its own capacity to meet increased demand.

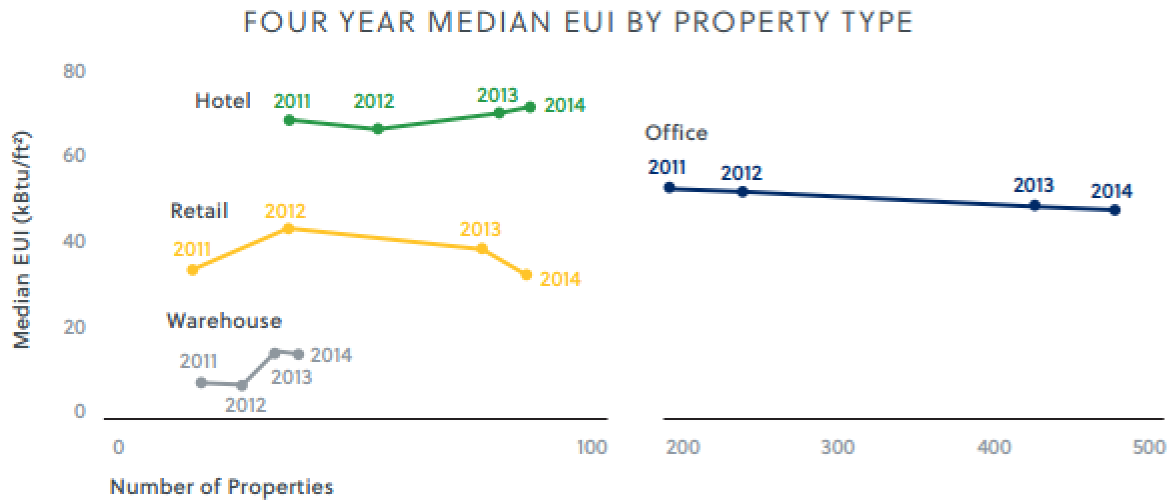
Philadelphia is unique in that it requires government disclosure and commercial disclosure in the same year. No explanation was found as to why this approach was selected by Philadelphia. A more detailed description of how jurisdictions define the size of buildings covered by benchmarking policies is provided in Appendix C – Definition of Buildings Covered by Benchmarking Policy.

Table 20. Implementation Approach

	Austin	Boston	Chicago	New York	Philadelphia	San Francisco	Seattle	**Trend**
Government Reporting	No	Yes	Yes	Yes	Yes	No	Yes	**Yes (71%)**
Phased-In Reporting	Yes	Yes	Yes	Yes	No	Yes	Yes	**Yes (86%)**

As new buildings begin to report data in the early years of a benchmarking policy, the result may become skewed. Figure 5 shows the changing EUI by property type for San Francisco over a four-year period as new buildings began to report. Although median EUI decreased for office buildings between 2011 to 2014, the results for hotel, retail, and warehouse properties are less linear. This change could be the result of less efficient buildings being required to report, genuine differences in the building stock between large and small buildings, and lack of energy knowledge on the part of owners of smaller buildings (SFEnvironment, n.d.). A longer time series is required to arrive at an answer.

Figure 5. Median EUI by Property Type in San Francisco (2010-2014)



(SFEnvironment, n.d.)

The selection of covered buildings goes beyond the square footage. A commercial building can be used for many different purposes and by many different occupants. Table 21 shows that six (86%) of the jurisdictions include exemptions or variances for certain types of buildings in a variety of situations including (1) financial distress, (2) upcoming demolishment or substantial remodelling, (3) occupancy less than 50 percent, and (4) exhaustion of available upgrades (see Table 9) (Energy Efficiency Upgrades Task Force - City of Austin, 2008; City of Chicago, 2013; Seattle Office of Sustainability & Environment, 2014; Institute for Market Transformation, n.d.). Features of the building not directly related to the occupancy are also often excluded, including cellular towers and electric vehicle charging stations (City of Chicago, 2013). Although exemptions and variances are a standard practice across the jurisdictions, the specific exemptions mentioned above are not uniformly applied across the jurisdictions.

Table 91. Coverage Exemptions

	Austin	Boston	Chicago	New York	Philadelphia	San Francisco	Seattle	**Trend**
Exemptions	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes (86%)

The coverage and implementation schedules of the jurisdictions show a measured approach of demonstrating government leadership, providing time for capacity building and learning with a smaller number of disclosers, and exempting building types that are anomalous. In Chapter 6, the coverage and exemptions will be unpacked further by drawing upon lessons from the literature about policy sustainability and stakeholder pressures.

5.5 – Disclosure Requirements

Table 22 lists the audience and trigger for disclosure. The jurisdictions can be categorized as employing either a point of transaction trigger or a scheduled date trigger for disclosure.

Table 102. Disclosure Requirements

	Austin	Boston	Chicago	New York	Philadelphia	San Francisco	Seattle	**Trend**
Public Disclosure	No	Yes	Yes	Yes	Yes	Yes	No	**Yes (71%)**
Scheduled Disclosure	No	Yes	Yes	Yes	Yes	Yes	No	**Yes (71%)**
Triggered Disclosure	Yes	No	No	No	No	No	Yes	**No (71%)**

The majority of jurisdictions (71%) require annual disclosure on a set date, and disclose the data on a public website. This public disclosure is written directly into the ordinance or law, with a statement requiring municipal benchmarking officials to make the information publicly available (SF Environment, City & County of San Francisco, 2014). Boston's ordinance defines the medium of disclosure as the City of Boston website, the time of disclosure as "no later than October first of each year," and the content to be disclosed as including at least "building identification, energy intensity, greenhouse gas emissions per square foot, Energy Star rating, [and] water consumption per square foot" (City of Boston, 2013, p. 6). Boston's ordinance is unique in that it directs the benchmarking department to provide at least 30 days for buildings owners to "review the accuracy of information to be disclosed" prior to disclosure, and that building owners shall be allowed to provide context to the energy and water usage of their buildings which should be disclosed along with the data (City of Boston, 2013, p. 6).

The City of Chicago is less specific in its ordinance, permitting the benchmarking department to "choose to make specific reported benchmarking information available to the public through the City of Chicago Energy Benchmarking Website, the City of Chicago Data Portal, or other communication vehicles. (City of Chicago - Department of Business Affairs and Consumer Protection, 2014). Where Chicago is specific though, is through an exemption for buildings containing "a data center, television studio, or trading floor that together exceed ten percent of the gross square footage" (City of Chicago, 2013, p. 4). This exemption is put in place to prevent building-wide data from being skewed by a heavy consumer, and to protect trade secrets of a technology firm which could be revealed through energy data (City of Chicago, 2013).

Austin and Seattle both take a point of transaction trigger approach wherein disclosure is required when a commercial building is available for purchase or lease. It is important to note that the audiences for disclosure in both cases—Austin and Seattle—of a point of transaction trigger are prospective buyers and tenants, and not the public-at-large. Mattern (2013) has attributed Austin's decision not to disclose information to the wider public as motivated by Texas privacy policies which protect consumption and credit data. The challenge of privacy laws extends beyond Texas. Mattern provides an example of a 1997 ruling by the Washington Supreme Court which "found that the state's constitutional guarantee that 'no person shall be disturbed in his private affairs' extended to residential electricity consumption information'" (p. 507). While Washington is not a case study included in this study, it is noteworthy because it suggests that the Texas experience could be widespread across the country, and a relevant consideration for jurisdictions considering a benchmarking policy.

There are no instances of a policy which uses triggered disclosure and publicly discloses the data. This is logical as the trigger is a commercial transaction which involves a closed group of actors. Disclosure requirements are closely linked to the discussion in the following section—intended audience—as the requirements shape the type of information available and who has access.

5.6 – Audience

57% of the jurisdictions provide an interactive graphical display of the data (see Table 113 for a list of cities' approach to disclosure of public data). This number increases to 80% when Austin and Seattle—the two jurisdictions without public data disclosure—are removed. Of the jurisdictions with public disclosure only San Francisco does not have an interactive graphical display. No information was found which suggests why San Francisco does not have an interactive graphical display.

Table 113. Approach to Disclosure of Data

	Austin	Boston	Chicago	New York	Philadelphia	San Francisco	Seattle	**Trend**
Graphical Display	No	Yes	Yes	Yes	Yes	No	No	Yes (57%)
Numerical Display	No	Yes	Yes	Yes	Yes	Yes	No	Yes (71%)
Annual Report	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes (100%)
Civil Society Enabling	No	No	No	No	No	No	No	**No (100%)**

An example of an interactive graphical display is that of Philadelphia which hired a local technology firm to develop "an easy-to-use data visualization tool which will allow building owners, tenants, and service providers easy access to this information" in an effort to move "beyond the public disclosure of a difficult-to-navigate spreadsheet toward a tool specifically designed to compare results and call out [the] most efficient buildings" (City of Philadelphia, 2014, p. 22). Figure 6 and Figure 7 show screenshots of the data tool used by Philadelphia with the former showing the data using the map setting, and the latter in the chart setting. Each dot represents a reporting building, with colours delineating between building type, and size of dot indicating the EUI of the building. As opposed to an Excel spreadsheet, the graphical interface allows a prospective tenant or purchaser to easily compare buildings within a certain type and geographical location. These same features are common across the jurisdictions with an interactive graphical display, although each jurisdiction uses a different platform with different user interfaces.

Figure 6. Philadelphia Data Visualization in Map Setting

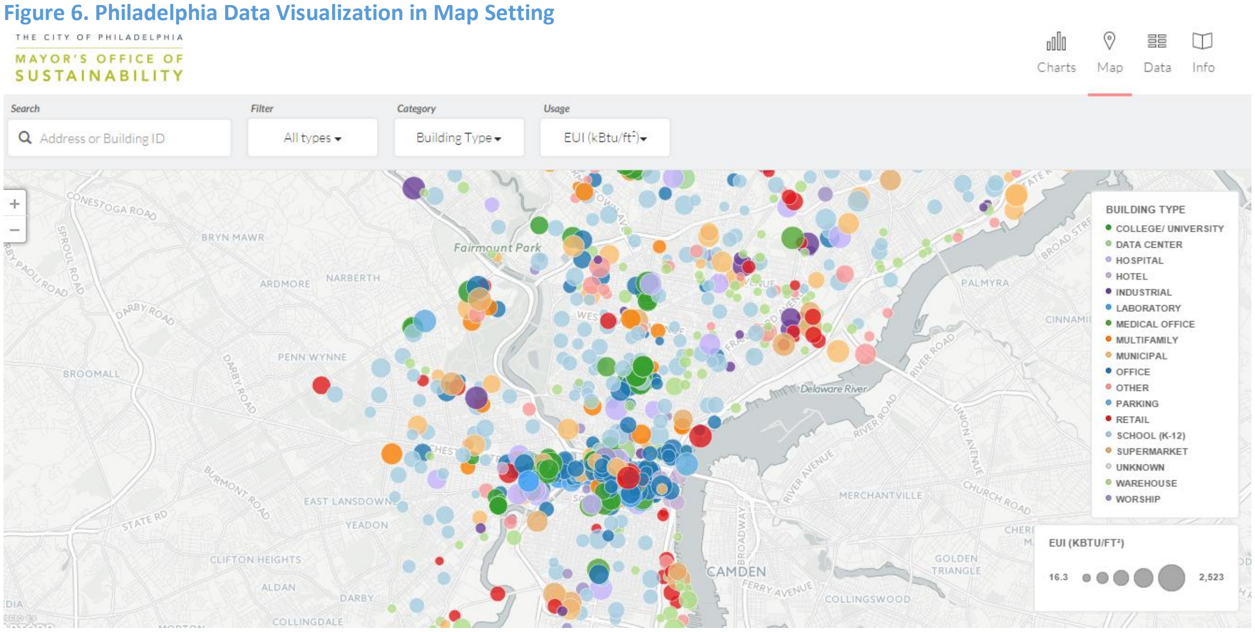
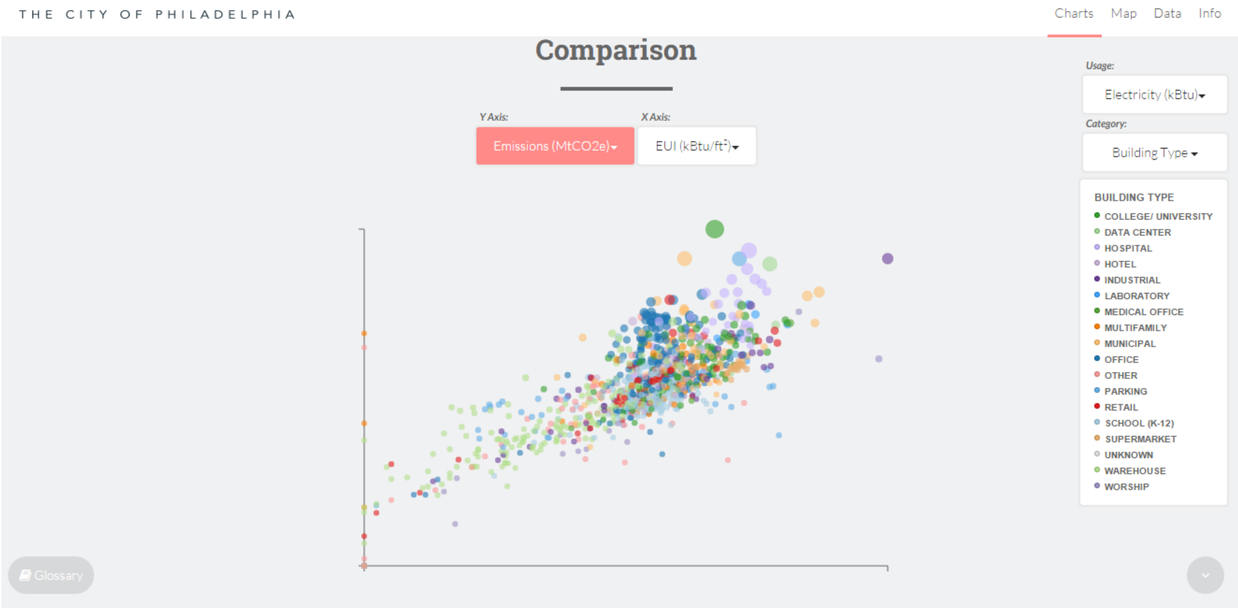


Figure 7. Philadelphia Data Visualization in Graph Setting



Cities also take varying approaches to reporting on results of benchmarking to council and the public. Chicago's ordinance requires staff to "prepare and submit an annual report to the mayor and the city council reviewing and evaluating energy efficiency in covered buildings, including summary statistics on the most recent reported energy benchmarking information and a discussion of energy efficiency trends, cost savings, and job creation effects results from energy efficiency improvements" (City of Chicago, 2013, p. 4). Staff are permitted to publish the report but are instructed not to report any data that could identify a specific building during its first year of reporting (City of Chicago, 2013).

Philadelphia instructs its staff to annually submit a report to council which addresses "(a) the energy and water efficiency of buildings in the City, (b) the accuracy of benchmarked data and whether there is a need to train individuals required to benchmark, (c) compliance with the requirements of this Section, (d) any administrative and legislative recommendations for strengthening the administration and enforcement of this Section, (e) the effectiveness of the Benchmarking Application in accounting for City conditions, including, but not limited to, high density occupancies, large building size, and high-energy uses such as data centers and television studios, and (f) such other information and analysis as the Office of Sustainability deems appropriate" (City of Philadelphia, 2012, p. 5).

No information was found which suggests that the jurisdictions actively encourage and support civil society advocates in understanding, analyzing, and using the data to pressure disclosers into modifying behaviour.

5.7 – Data Submission

Despite the lack of apparent reported evidence, the belief among benchmarking cities appears to be strongly held that automated data uploading is an important component as "direct data upload between the utility and Portfolio Manager minimizes data entry errors, missing data and ensures consistency with utility records" (Seattle Office of Sustainability & Environment, 2014, p. 54). In its 2014 report, Austin—the oldest benchmarking policy in the sample—noted a need to "simplify the data submittal process and tool" (Austin Energy - City of Austin, 2014, p. 8). Newer policies have tended to build data uploading automation directly into the enacting policy. In Boston, "building owners may authorize an energy or water utility or other third party to report building-specific data on their behalf" (City of Boston, 2013, p. 4). Table 1224 shows that 86% of cities allow for some degree of automated data submission. For example, while Philadelphia similarly allows an owner to arrange for their utility or energy supplier to submit the required data, the policy is clear that utilities and energy suppliers are not required to provide this service (City of Philadelphia, 2012). Most cities do not report the rate at which buildings use automated data uploading, however, Seattle's reports that in 2014, 78% of buildings use automated reporting for electricity consumption (Seattle Office of Sustainability & Environment, 2014).

Table 124. Automated Data Submission

	Austin	Boston	Chicago	New York	Philadelphia	San Francisco	Seattle	Trend
Automatic Data Uploading	Yes	Yes	No	Yes	Yes	Yes	Yes	**Yes** (86%)

As technology continues to evolve—including the introduction of the internet-of-things into building operations—it can be expected that the degree of automation of data submission will continue to improve and allow new opportunities for providing data that is updated more frequently, has greater depth, and eases the reporting process for building owners.

5.8 - Compliance

Disclosure policies require high rates of compliance in order to be effective (Northeast Energy Efficiency Partnerships, 2013). Without high compliance, a city is unable to generate a "robust, long-term dataset that is representative of [its] building stock" which diminishes the informational value for decision-makers (Seattle Office of Sustainability & Environment, 2014, p. 43).

Compliance rates are difficult to directly compare across cities because of the dramatic differences in scale and building stock. For example, Seattle led the nation in 2014 with a compliance rate of 93%. In comparison, New York achieved a compliance rate of 84% during the same year. However, Seattle's dataset included nearly 3,000 covered buildings, while New York received reports from over 23,400 buildings (Seattle Office of Sustainability & Environment, 2014; New York City, 2014). In general, though, benchmarking programs report rates of compliance between 75% and 90% (City of Philadelphia, 2014). While cities with the highest rates of compliances anecdotally credit their success to a variety of factors—including automated data uploading—no analysis or surveys were published by the cities to test which factors led to high rates of compliance.

In situations where compliance is not achieved, all seven cities have a provision in the policy which enables penalties to be levied against the building owner in order to encourage corrective behaviour (see Table 25 for a categorization of penalties). Austin is alone in only having a one-time charge of $500—although a larger fine of $2,000 can be imposed if criminal negligence is shown. In all other cases, the cities use an on-going charge which continues to penalize building owners for each period of non-compliance. A period of non-compliance is defined differently by the jurisdictions as being either a day or quarter during which the building owner remains non-compliant. These on-going charges typically accumulate to a maximum range of somewhere between $2,000 and $4,000 per year.

Table 135. Compliance

	Austin	Boston	Chicago	New York	Philadelphia	San Francisco	Seattle	Trend
One-Time Charge	Yes	No	Yes	Yes	Yes	No	No	**Yes (57%)**
Increasing Charge	No	Yes	Yes	Yes	Yes	Yes	Yes	**Yes (86%)**
Building Engagement & Support	Yes	No	Yes	Yes	Yes	Yes	Yes	**Yes (86%)**
Data Verification	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**Yes (100%)**

To engage building owners, Austin conducted a series of letter writing campaigns including thank you letters upon submission and non-compliance letters (Austin Energy - City of Austin, 2014).

Philadelphia issued "individual report cards to each of the more than 1,900 buildings that [complied]. These report cards [included] a full explanation of individual results along with local and national comparison and details on local inventive programs to improve energy performance" (City of Philadelphia, 2014). Seattle aims to maintain outreach on an ongoing basis in recognition that buildings change owners every 2-5 years. By maintaining engagement, Seattle can ensure that its contact database is up to date, and that new building owners are aware of both the benchmarking program and related incentives (Seattle Office of Sustainability & Environment, 2014). Chicago, Seattle, and Philadelphia all offer help desks which field phone calls, with peak usage occurring during reporting periods (Seattle Office of Sustainability & Environment, 2014; City of Chicago, 2014; City of Chicago's Office of the Mayor, 2013; City of Philadelphia, 2014).

Beyond outreach to ensure basic compliance, training workshops were used to support building owners and managers understand what benchmarking means for their business. Both Austin and Chicago hosted free workshops and posted training videos online (Austin Energy - City of Austin, 2014; City of Chicago's Office of the Mayor, 2013). Seattle states that "the energy benchmarking program should be positioned as a 'bridge' to help building owners and managers understand and act on their building's energy performance data" (Seattle Office of Sustainability & Environment, 2014, p. 44). Training and workshops are seen as the means by which to support building owners and managers in understanding their data and identifying steps for action (Seattle Office of Sustainability & Environment, 2014).

New York found that through a combination of update letter and calls, training sessions and workshops, and a help line, it was able to increase compliance. In the first year that New York operated its benchmarking policy it attained compliance of 75%. This compliance rate is low compared to the high compliance rates of Seattle identified in the previous section. However, New York argues that the high percentage of large facilities that makes up its building stock diminished the utility of penalties at driving compliance as the fees charged are relatively inconsequential. Instead, outreach, training and support was responsible for attaining compliance (Northeast Energy Efficiency Partnerships, 2013).

Data quality must always be verified regardless of the mode of submission (Northeast Energy Efficiency Partnerships, 2013). For example, Seattle reports that during its first two years of reporting, 5% of covered buildings reported either an increase or decrease in energy consumption of at least 50%

(Seattle Office of Sustainability & Environment, 2014). Significant changes in reported energy consumption could certainly be the result of reporting errors (see Figure 8 for adapted excerpt of Seattle document outlining sources of data inaccuracies), but can also be the result of real increases or decreases in energy consumption, or changes in occupancy (Seattle Office of Sustainability & Environment, 2014).

Figure 8. Potential sources of data inaccuracies

1. Inclusion of all meters not verified. Buildings using utility automated benchmarking for aggregating multiple tenant meters into one upload could be missing electric, steam or gas meters if the meters were not correctly verified by the owner or manager.
2. Use of unverified property square footage. Although the data accuracy assessment determined that the use of King County square footage does not appear to substantially bias results, building owners could increase accuracy by calculating square footage based on building plans or actual measurements.
3. Data centers, cell phone towers and electric vehicle charging stations. These three loads may substantially affect a building's energy use if they are not separately metered. Portfolio Manager requires building owners to separately document data centers. It is possible that the 44 out of 429 offices (10%) recording a data center space represents an underreporting of data centers. Cell phone towers and electric vehicle charging stations are not documented in Portfolio Manager, and could be included in building EUIs if not separately metered and excluded.
4. Outliers. The data cleaning process conservatively removed only the top and bottom 1% of EUIs in the entire dataset, leaving some unlikely values in the dataset that could represent benchmarking errors. Additionally, the assessment found some variability in EUI for buildings with two years of data, with 5% of buildings reporting a change in EUI of 50% or greater. These cases along with extreme values could be reviewed on a case by case basis by technical assistance staff to identify and resolve any issues. It is also likely that reporting practices will improve over time, resulting in fewer outliers.
5. Building occupancy not frequently updated. In the statistical sample (n=75), 15% of commercial buildings 50,000 square feet or larger updated occupancy information between 2011 and 2012.

Adapted from Seattle Office of Sustainability & Environment (2014). 2011/2012 Seattle Building Energy Benchmarking Analysis Report. p. 19-20.

The strength of the identified compliance trends suggests that jurisdictions are taking compliance seriously. A key test of the sustainability of benchmarking policies will be the continued increase of compliance and ensuring meaningful penalties for non-compliance as disclosers and those who are disadvantaged by the policy—whether actual or perceived—push back. Further time series data is required for this analysis.

5.9 – Adaptation

Amendments made to benchmarking policies after initial implementation range from simple implementation changes to significant expansions of reporting and retrofit requirements. An example of a simple implementation amendment is Boston's decision to grant an additional 120 days in the first year for data submission in response to feedback from building owners who asked for more "time to familiarize themselves with the ordinance" (City of Boston, 2014).

The three types of amendments (see Table 1426) which create significant expansions are the mandated reporting of water consumption (57%), audits (57%), and retro-commissioning (29%).

Table 146. Amendments to Benchmarking Ordinances
Adapted from Institute for Market Transformation (n.d.)

	Austin	Boston	Chicago	New York	Philadelphia	San Francisco	Seattle	Trend
Audits	Yes	Yes	No	Yes	No	Yes	No	**Yes (57%)**
Water Use	No	Yes	No	Yes	Yes	Yes	No	**Yes (57%)**
Retro-Commissioning	No	No	No	Yes	No	No	Yes	**No (71%)**

Audit requirements can be understood by looking at the examples of San Francisco and Boston which respectively represent the two primary approaches of (1) requiring an audit, and (2) requiring an audit with a corresponding action. San Francisco requires an energy audit—which meets or exceeds American Society of Heating, Refrigeration, and Air-Conditioning Engineers (ASHRAE) standards—every five years to identify "specific cost-effective measures that would save energy" (SF Environment, City & County of San Francisco, 2014, p. 1). San Francisco staggered audit due dates over a period of three years in order to allow the consulting industry time to meet quickly growing demand (SF Environment, City & County of San Francisco, 2014).

Boston goes one step further in requiring that a covered building complete either an energy audit or "action" within "five years of its first energy reporting deadline and within every five-year period thereafter" (City of Boston, 2013, p. 4). An action can include (1) a reduction of EUI by at least 15%, (2) an improvement in ENERGY STAR rating by at least 15 points, and (3) installation of renewable energy onsite that increases its available renewable energy supply by at least 15% of energy consumption (Air

Pollution Control Commission - City of Boston). Buildings with an ENERGY STAR performance rating, LEED designation, or a “comprehensive management plans” are exempted from the assessment or action requirement (City of Boston, 2013, p. 4).

Water reporting requirements are an extension of existing energy benchmarking requirements and the data is submitted through Portfolio Manager. In the case of Boston and Philadelphia, water reporting was included in the original ordinance requiring energy reporting, and reporting timelines and penalties are consistent for energy and water (City of Philadelphia Department of Licenses and Inspections; City of Boston, 2013). While New York also mandated the disclosure of water in its initial law creating benchmarking, it added the exemption that "benchmarking of water use shall not be required unless the building [is] equipped with automatic meter reading equipment by the department of environmental protection" (The City of New York, 2009, p. 3-4). This exemption was temporary and connected with a city-wide program to install automatic meter reading equipment.

Retro-commissioning, while less common than water reporting and audit requirements, is attractive because it is viewed as a low-cost measure capable of reducing a building’s energy consumption between 5-15% by optimizing the operation of existing systems (Jump, Denny, & Abesamis, 2007, p. 1). New York requires retro-commissioning reports from covered buildings every ten years, with buildings staggered over the decade to spread the demand for consultants performing the retro-commissioning. Retro-commissioning requirements apply to HVAC systems, large equipment, lighting, and water pumps. Covered buildings are required to review operating protocols and system calibration, clean and repair systems, and ensure maintenance and operations staff are properly trained (City of New York, 2009).

5.10 – Question #2: Which policy components do jurisdictions select and are there apparent trends?

The second question that this thesis seeks to address is:

> Question #2: Which policy components do jurisdictions select and are there apparent trends?

Table 27 summarizes the policy components and trends that were identified in Chapter 5’s review of active benchmarking policies. As defined in *2.5 - Research Method*, this thesis defines a trend as a policy component adopted by a majority of jurisdictions.

Cities are encouraged to adopt benchmarking policies by the successful implementation of benchmarking in other jurisdictions, and by the climate and energy goals of senior levels of government. Reducing GHG emissions is the primary policy objective for a city to adopt a benchmarking policy. The policies are designed through the use of either a standalone committee purposefully assembled to create a benchmarking policy, or by previously established climate strategy working groups. These committees tend to include real estate professionals, contractors, and advocates.

Policies are designed to maximize the floor area impacted while minimizing the number of buildings required to report. Finding the right threshold for coverage and assembling the proper information for reaching out to owners is a challenge due to a lack of available data. To form an initial understanding of the building stock, cities use a combination of local property assessor data and private databases from real estate market research firms such as CoStar. It can be expected that the first year of implementation will require additional reach outs and engagement in order to update the databases. Phased-in reporting is used to allow for capacity building, beginning with the largest buildings covered by the policy as well as government buildings.

Data is reported publicly using a graphical interface at a regularly schedule date which coincides with an annual report summarizing results and lessons learned. This format and schedule increases the utility of the data for decision makers, advocates, and planners.

Jurisdictions partner with local utilities to provide automatic data uploading in order to minimize data errors, however, verification is still required in order to ensure data quality. Penalties which increase to a capped amount are imposed for non-compliance.

Jurisdictions partner with local utilities to provide automatic data uploading in order to minimize data errors, however, verification is still required in order to ensure data quality. Penalties which increase to a capped amount are imposed for non-compliance. In addition to the threat of penalties, training and support services in the form of letter writing campaigns, workshops, and seminars were useful for compliance. These additional supports are best customized to meet the requirements of building owners depending on their level of knowledge and the particular needs of their building type.

In order to expand the impact of benchmarking policies, amendments or additional requirements are included to mandate reporting of water consumption and audits.

Table 157. Trends in Active Jurisdiction Policy Component Selection

	Austin	Boston	Chicago	New York	Philadelphia	San Francisco	Seattle	**Trend**
Stated Policy Objectives								

Energy & Environment	GHG Reduction	No	Yes	Yes	Yes	Yes	Yes	No	**Yes (71%)**
	Energy Efficiency or Conservation	Yes	Yes	No	No	Yes	Yes	No	**Yes (57%)**
	Climatic Change	No	Yes	No	No	No	Yes	No	**No (71%)**
	Avoided New Supply	Yes	No	No	No	No	No	No	**No (86%)**
Economic	Cost Savings for Ratepayers	Yes	Yes	Yes	No	Yes	No	No	**Yes (57%)**
	Spur Green Economy	No	Yes	No	No	No	No	No	**No (86%)**
Political, Policy and Planning	Meet Targets in Climate or Energy Plan	Yes	Yes	No	Yes	Yes	No	No	**Yes (57%)**
	Bring Existing Buildings up to New Building Code	Yes	No	No	Yes	No	Yes	No	**No (57%)**
	Improve Data for Better Urban Planning	No	No	No	No	Yes	Yes	Yes	**No (57%)**
	Senior Level of Government Directive or Leadership	No	No	No	No	No	Yes	No	**No (86%)**
Human & Health	Reduced Pollution	No	Yes	No	No	No	No	No	**No (86%)**
	Occupancy Enjoyment	No	Yes	No	No	No	No	No	**No (86%)**
Other	Increase Transparency	No	No	Yes	Yes	No	No	Yes	**No (57%)**
	Improve Building Owner Decision Making	No	Yes	No	No	Yes	Yes	Yes	**Yes (57%)**
	Demonstrated Feasibility	No	Yes	No	No	No	No	No	**No (86%)**
Operational Costs to the City		No	No	No	No	No	No	Yes	**No (86%)**
Deferred Costs to the City		Yes	No	No	No	No	No	No	**No (86%)**
Projected Impacts of the Policy		Yes	No	Yes	Yes	Yes	Yes	No	**Yes (71%)**
Adoption Process									
Use of ENERGY STAR Resources and Technology		Yes	Yes	Yes	Yes	Yes	Yes	Yes	**Yes (100%)**
Standalone Working Group		Yes	No	No	No	No	Yes	No	**No (71%)**
Climate Strategy Working Group		No	Yes	No	No	No	Yes	No	**No (71%)**
Coverage & Implementation Schedule									
Government Reporting		No	Yes	Yes	Yes	Yes	No	Yes	**Yes (71%)**
Phased-In Reporting		Yes	Yes	Yes	Yes	No	Yes	Yes	**Yes**

								(86%)
Scoping Requirements Limiting Reporting by Building Size and Type	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**Yes (100%)**
Exemptions	Yes	Yes	Yes	Yes	No	Yes	Yes	**Yes (86%)**
Disclosure Requirements								
Public Disclosure	No	Yes	Yes	Yes	Yes	Yes	No	**Yes (71%)**
Scheduled Disclosure	No	Yes	Yes	Yes	Yes	Yes	No	**Yes (71%)**
Triggered Disclosure	Yes	No	No	No	No	No	Yes	**No (71%)**
Audience								
Numerical Display	No	Yes	Yes	Yes	Yes	Yes	No	**Yes (71%)**
Graphical Display	No	Yes	Yes	Yes	Yes	No	No	**Yes (57%)**
Annual Report	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**Yes (100%)**
Civil Society Enabling	No	No	No	No	No	No	No	**No (100%)**
Data Submission								
Automatic Uploading	Yes	Yes	No	Yes	Yes	Yes	Yes	**Yes (86%)**
Compliance								
One-Time Charge	Yes	No	Yes	Yes	Yes	No	No	**Yes (57%)**
Increasing Charge	No	Yes	Yes	Yes	Yes	Yes	Yes	**Yes (86%)**
Building Engagement & Support	Yes	No	Yes	Yes	Yes	Yes	Yes	**Yes (86%)**
Data Verification	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**Yes (100%)**
Adaptation								
Audits	Yes	Yes	No	Yes	No	Yes	No	**Yes (57%)**
Water Use	No	Yes	No	Yes	Yes	Yes	No	**Yes (57%)**
Retro-Commissioning	No	No	No	Yes	No	No	Yes	**No (71%)**

The trends suggest two main delineations or approaches that jurisdictions take:

- Open Disclosure: Requires disclosure annually (scheduled disclosure). Data is released publicly and is available on an interactive website which accommodates the needs and level of expertise of the data consumer.

- Closed Disclosure: Requires disclosure upon sale, lease or financing of the building (triggered disclosure). Data is released only to the parties involved in the financial transaction.

There appears to be a general consensus among advocates, the EPA, and policy-makers that open disclosure is preferable, and no argument was found in favour of closed disclosure—even by the jurisdictions that employ it. Rather, closed disclosure is an approach used by jurisdictions because of privacy legislation and stakeholder pressure at the time of implementation (Mattern, 2013). With the exception of some minor differences in the stated policy objectives (closed disclosure jurisdictions record policy objectives that are less focused on the climate, and more focused on issues such as transparency and ratepayer costs), there are few discernable design differences between open and closed disclosure policies.

The only policy component with a notable division in policy design is that of adaptation. A greater degree of differences in this component is logical as it extends benchmarking beyond its original purpose of information disclosure, and instead mandates an action or additional type of disclosure. This policy component will likely see the most experimentation and variability over the coming years as jurisdictions try different approaches to meet their policy objectives. The remaining policy components have strong alignment across the jurisdictions.

Chapter 6 – Results and Conclusions

6.1 – Chapter Overview

This chapter represents the bulk of the analysis of the thesis, comparing the active jurisdictions against the theoretical expectations, and then exploring the gap between the two in order to both contribute to theory and provide new insights for practitioners. This chapter begins with Question #3 which asks how the selection of policy components in active jurisdictions compares against theoretical expectations. In this section, a table is presented which highlights where there is alignment and where there is a gap. The conversation here is applied and focuses on the data at hand. Next, Question #4 circles back to broader debates within new governance and targeted information disclosure literature. This thesis concludes by with recommendations for future research.

6.2 - Question #3: How does the selection of policy components in active jurisdictions compare against theoretical expectations?

The third question that this thesis seeks to address is:

> Question #3: How does the selection of policy components in active jurisdictions compare against theoretical expectations?

Table 28 compares the trend identified for each policy component against the theoretical expectations. The three final columns in the table show where there is "Alignment of Theory & Practice", "Theory Unmet by Practice" and "Undescribed Practice."

It is found that theory accurately describes policy decisions such as:

- The policy objectives of seeking to improve a specific and measurable environmental metric and to generate new information to support polluters in improving behaviour
- The use of the federally produced ENERGY STAR methodology and Portfolio Manager platform in order to reduce time and financial costs
- The need to focus on large emitters and phase in coverage over time
- Requiring public and scheduled disclosure, with information customized and targeted towards specific types of data consumers

This alignment of theory and practice is logical because they speak to the core elements of targeted information disclosure as a tool for generating new information to drive a behaviour change through principle-agent and reflexive accountability. This alignment confirms that energy benchmarking can be appropriately described as a targeted information disclosure policy, and that policy makers are adhering to the core elements of information disclosure theory.

Where there is a gap between theory and practice, however, is mainly on matters of policy objectives and process:

- **Policy Objectives:** Theory anticipates policies which seek to achieve the objectives of generating new information to correct for improper discount rates and principle-agent problems, to overcome weaknesses of command-and-control policies in managing the complexity of building energy systems, and to improve the level of information for policy makers. While these objectives may have been considered privately, they were not captured in the enacting or design documents of the majority of jurisdictions. Only two of the seven jurisdictions shared information on the process they used to create the policies, and even in these instances the information is rather sparse, so it is difficult to know which policy objectives were considered and why certain ones made it into the enacting documents while others did not. The author's hypothesis is that policy makers communicated the policy objectives for the target audience of elected officials and the general public. Messages of greenhouse gas emission mitigation, reduced costs for ratepayers, and more efficient markets were likely considered to be more attractive than identifying weaknesses of command-and-control policies or challenges with discount rates. While there are significant differences between the stated policy objectives, there is little evidence at this point to suggest that these differences influenced design decisions for other policy components.
- **Process:** Theory describes the need to engage stakeholders early and meaningfully in the adoption process in order to ensure that the data which is produced can be incorporated into existing decision processes, and to reduce counter-pressures once the policy is enacted. Civil society should continue to be engaged once implemented to increase compliance, conduct training to allow for reflective accountability, leverage public pressure to encourage improved energy performance by disclosers, and increase legitimacy through broad stakeholder engagement. Additionally, both during the design process and into implementation, jurisdictions should solicit feedback from information consumers (in the case of benchmarking, this is both the builder owner and community stakeholders) in order to ensure that information is used within existing decision processes. These process steps were not described by the majority of jurisdictions in their enacting or design documents. As the importance of stakeholder

engagement is a generally held practice for municipal government, the jurisdictions can perhaps be awarded the benefit of the doubt that stakeholders were engaged either through a municipal climate strategy or targeted working groups. However, without an explicit recognition and description of the process it is difficult to know whether certain stakeholder interests were prioritized over others. It is the hypothesis of this author that the reliance on the pre-constructed ENERGY STAR methodology and Portfolio Manager reporting tool may have simply led jurisdictions to overlook the importance of engagement as many of the data reporting and output functions have been pre-determined. It will be interesting to see if, as municipal energy benchmarking policies increase in prevalence, whether jurisdiction will simply base new policies on existing policies, and forego stakeholder engagement altogether.

Finally, there are several instances where policy makers made a design decision which was not addressed by the literature at all. Perhaps the most interesting is the mandating of government reporting as a component of benchmarking policies. This is a departure from targeted information disclosure policies which tend to focus on industrial, commercial, or residential actors. While the first generation of right-to-know disclosure policies were government—focused, these are distinct from targeted information disclosure policies (as was described in Chapter 3). There are several explanations for this novel policy feature. First, unlike the examples of the Toxic Release Inventory or the Transportation Recall Enhancement, Accountability, and Documentation Act which target the industrial design and processes of primarily large multi-national corporations, energy consumption in commercial buildings has direct overlap with municipal governments who own or lease commercial properties within the jurisdiction. Second, because these government-owned commercial facilities consume energy just as another commercial facility would, the same business case of cost savings and occupant health also motivates government action. The involvement of government within the policy could encourage greater energy reductions and cost savings for the municipal corporation, and improve the quality of the policy by allowing the government a first-hand-account of how the policy is implemented and experienced.

Table 28. Alignment of Theory & Practice

Policy Component		Trend	Alignment of Theory & Practice	Theory Unmet by Practice	Undescribed Practice
Stated Policy Objective					
Energy & Environment	GHG Reduction	**Yes (71%)**	• Improve a specific and measurable environmental metric • Generate new information to support polluters in improving behaviour	• Need for policy-makers to have additional information to craft more effective regulations • Low-cost of a benchmarking policy relative to traditional command-and-control policies • Inability of command-and-control policies to capture the complexity of buildings • Allow for the proper pricing and discount rate to increase adoption of efficient technologies • Correct for principal-agent problems by providing the information to encourage mutually beneficial solutions	• Cost Savings for Ratepayers • Meet Targets in Climate or Energy Plan
	Energy Efficiency or Conservation	**Yes (57%)**			
	Climatic Change	**No (71%)**			
	Avoided New Supply	**No (86%)**			
Economic	Cost Savings for Ratepayers	**Yes (57%)**			
	Spur Green Economy	**No (86%)**			
Political, Policy and Planning	Meet Targets in Climate or Energy Plan	**Yes (57%)**			
	Bring Existing Buildings up to New Building Code	**No (57%)**			
	Improve Data for Better Urban Planning	**No (57%)**			
	Senior Level of Government Directive or Leadership	**No (86%)**			
Human & Health	Reduced Pollution	**No (86%)**			
	Occupancy Enjoyment	**No (86%)**			
Other	Increase Transparency	**No (57%)**			

	Improve Building Owner Decision Making	**Yes (57%)**			
	Demonstrated Feasibility	**No (86%)**			
Operational Costs to the City		**No (86%)**			
Deferred Costs to the City		**No (86%)**			
Projected Impacts of the Policy		**Yes (71%)**			
Adoption Process					
Use of ENERGY STAR Resources and Technology		**Yes (100%)**	• Use federally produced resources and civil society publicizing to reduce costs	• Engage a wide array of stakeholders in the design process, including civil society champions • Ensure the information provided will be integrated into the existing decision processes of consumers, resulting in behaviour change	
Standalone Working Group		**No (71%)**			
Climate Strategy Working Group		**No (71%)**			
Coverage & Implementation Schedule					
Scoping Requirements Limiting Reporting by Building Size and Type		**Yes (100%)**	• Limit the type of buildings covered by the policy in heterogeneous markets and where there are a large number of actors • Focus on large emitters to increase the impact relative to the administrative cost • Phase in coverage over several years in order to allow for institutional		• Government Reporting
Government Reporting		**Yes (71%)**			
Phased-In Reporting		**Yes (86%)**			
Exemptions		**Yes (86%)**			

		learning and program improvement		
Disclosure Requirements				
Public Disclosure	**Yes (71%)**	• Require public disclosure -Use scheduled disclosure, as opposed to triggered disclosure, to allow for predictable public disclosure, and time series data		
Scheduled Disclosure	**Yes (71%)**			
Triggered Disclosure	**No (71%)**			
Audience				
Numerical Display	**Yes (71%)**	• Develop different disclosure formats to accommodate the preferences and knowledge of information consumers	• Leverage civil society and associations to disseminate disclosed data and increase pressures on polluting firms	• Release of Annual Report
Graphical Display	**Yes (57%)**			
Release of Annual Report	**Yes (100%)**			
Civil Society Enabling	**No (100%)**			
Compliance				
One-Time Charge	**Yes (57%)**	• Have robust enforcement which signals to the market that compliance is in fact mandatory • Actively disseminate information to stakeholders on apparent accidental data errors • Conduct periodic audits to verify reporting accuracy (see Adaptation below)		
Increasing Charge	**Yes (86%)**			
Building Engagement & Support	**Yes (86%)**			
Data Verification	**Yes (100%)**			

		• Prioritize data quality through thorough verification of data each reporting period • Offer training and support for disclosers on data submission and behaviour improvement		
Data Submission				
Automatic Uploading	**Yes (86%)**	• Automate data submission in partnership with utilities to lower time cost and increase accuracy		
Adaptation				
Audits	**Yes (57%)**	• Implement additional policies to complement benchmarking policies after several years in existence	• Implement adaptation process to analyze incoming data and identify ways to improve the policy	
Water Use	**Yes (57%)**			
Retro-Commissioning	**No (71%)**			

6.3 – Objective #4: How does benchmarking advance an understanding of theory

The fourth, and final, question that this thesis seeks to address is:

> Question #4: How does benchmarking advance an understanding of new governance and information disclosure theories?

Energy benchmarking policies are a multi-stakeholder and multi-level policy innovation which offer a useful lens to advance an understanding of new governance and information disclosure theories. As a general framework, each iteration of energy benchmarking is a unique municipally-enacted policy which requires disclosure of information through the federally developed and managed ENERGY STAR platform with the goal of incentivizing market-driven energy efficiency improvements.

At a policy level, benchmarking is a government-driven imposition which regulates the market by requiring the disclosure of specific information. This aligns with the arguments of Pierre & Peters (2000) and Fung et al. (2007) that governments ensure a top-down accountability power flow by maintaining a key implementation and oversight role, due in part to the monopoly that they hold on legislative permanence and process legitimacy. Municipalities set the overarching goals of a benchmarking policy, control the adoption process, and dictate the terms of involvement.

At the market level, however, a broader understanding of benchmarking policies is required. This understanding posits that the horizontal and bottom-up accountabilities of, respectively, competitive pressures and tenant/purchaser demands necessarily diminish the role of government. Despite the top-down accountability power flow, benchmarking policies (as a new governance approach) must share the role of governing with designated stakeholders.

These understandings are not contradictory but rather represent a multi-tiered power structure. As opposed to Rhodes' "governing without government", benchmarking can be better understood as "governed governance." More simply, government creates the rules of the game, and it is up to building owners to maximize their success within that arrangement.

The evolution of benchmarking policies—through the implementation of mandatory audits and retro-commissioning adaptations—may strengthen the "government" within this form of governance. Proponents of new governance contend that governments should look to targeted transparency policies when high levels of uncertainty and complexity make regulations difficult to enact or enforce. However, these advocates fail to present a vision for a re-engaged government if disclosure succeeds in empowering municipal staff and easing regulatory uncertainty. ENERGY STAR began as a voluntary program used by high-performing buildings to demonstrate industry leadership, before becoming a mandatory policy which requires reporting by all buildings covered by the policy. Similarly, benchmarking policies may evolve from a procedural to substantive requirement; from a policy which allows information consumers to voluntarily respond to the information generated by benchmarking, to a policy which requires that poor performers take corrective action. This development could continue to be driven by policy-makers themselves—as has appeared to be the case in the adaptations implemented by the sample policies—or as a result of pressure from stakeholders.

This continued development is not assured. Fung et al. (2007) identified that policy sustainability—a term which they define to include an expansion of scope and utility for information consumers—requires a strong counter-pressure to disclosers which have an obvious desire to decrease the degree of accountability. As has been shown, though, municipalities have poor stakeholder engagement beyond the direct constituency of building owners. Only two of the jurisdictions used a defined adoption process which engaged stakeholders, and of the two jurisdictions that did disclose a stakeholder engagement process, only one provided enough depth for analysis. What was discovered in this one instance was a pattern in the voting record on whether to include substantive requirements. The votes were correlated with the professional background of the participants (i.e. real estate professionals voted against substantive requirements and civil society voted for substantive requirements). Beyond the adoption process, none of the jurisdictions were found to have taken an active approach to engaging civil society—through the same awareness phone calls and educational workshops that were offered to real estate professionals—after implementing the policy.

Perhaps more consequential than the impact on the policies' development though, are the implications for the democratic process itself, and the "profound questions of legitimacy and accountability" that are raised by not engaging stakeholders (Conley & Williams, 2011, p. 568). If stakeholders remain unengaged in the governance process, critics may be justified in their concerns that targeted information disclosure policies result in the marketization of authority and reinforcement of existing power structures. If, as championed by Fung & Wright (2003), new governance offers the possibility of restoring democracy to bureaucracy, the disclosure policy which imposes its own forms of bureaucracy must seek to maximize its democratic elements through broader participation of stakeholders most directly effected by the targeted impacts.

In practice, and despite these democratic shortcomings, energy benchmarking appears to be accomplishing its democratizing goal of assuming the decision-making role previously held by isolated departments and agencies within government. It has generated detailed new datasets that were previously not accessible even to government departments and agencies. However, while the importance of integrating new information with existing decision making processes is consistently highlighted in the literature, there is no evidence that any of the jurisdictions took steps (ex. information consumer focus groups) to improve the likelihood that the data would be internalized. This could suggest that municipal staff have a deep and implicit understanding of the stakeholders who they are tasked with supporting on a regular basis, or that municipalities believe that the long history of ENERGY STAR has allowed for an iterative learning partnership between the EPA and early voluntary adopters of Portfolio Manager which removed the need (real or perceived) for individual municipalities to engage on this level of process design. If, indeed, the EPA has removed the need for municipal action on this front, it could encourage periods of voluntary testing before launching a mandatory disclosure policy. Alternatively, the lack of engagement could further raise questions about the legitimacy of energy benchmarking policies—and new government theories generally—to truly bring democracy to bureaucracy.

The role of the EPA makes the case of benchmarking policies rather unique in that they include multiple-level government orchestration. Snidal & Abbott (2009) describe orchestration as an essential element in new governance wherein either a state or non-state actor provides “a wide range of directive and facilitative measures designed to convene, empower, support, and steer public and private actors engaged in regulatory activities” (p. 510). In benchmarking, both the EPA and the municipality separately orchestrate actions within jurisdictional lines. It is therefore significant that every municipal benchmarking program has selected to use the ENERGY STAR methodology as opposed to a competing program. The approach is consistent with theoretical expectations that municipalities should seek to minimize implementation and operational costs by utilizing existing resources. It does, however, contrast with other programs such as the Toxic Release Inventory or the Los Angeles Restaurant Hygiene Disclosure Program, both of which are spearheaded by one level of government which then leads implementation. This arrangement can be attributed to the complexities of the energy market, required datasets for statistical validity, pre-existing and broad industry support for ENERGY STAR, and high cost of entry a municipality to develop a competing platform.

Finally, while the literature presents disclosure as a low cost option for achieving a policy result (Cohen & Santhakumar, 2007), no cost comparisons were provided by the municipalities involved, and only one reported or projected any of the associated costs. Additionally, there is very little non-anecdotal evidence in the literature itself to support this conclusion. Further analysis is required to determine if cost savings are truly an argument in favour of benchmarking. One question that should be considered is: "cheaper for whom?" Municipalities often do not have control over building codes or other forms of command-and-control policies to influence energy efficiency. Therefore, the creation of a benchmarking policy, while it could reduce aggregate costs to all levels of government, may increase costs to the municipality relative to business-as-usual. Researchers must develop models that capture the direct and indirect costs of disclosure policies, with special attention given to capture both single-tier disclosure systems (ex. restaurant hygiene assessments) and multi-tier disclosure systems (ex. municipal benchmarking).

6.4 – Conclusions and Recommendations for Future Research

Mandatory municipal energy benchmarking policies are an important emerging policy tool in the United States with the potential to have a meaningful impact on the energy consumption and association greenhouse gas production of commercial buildings. This study assessed whether the design of benchmarking policies conform to the expectations of new governance and targeted information disclosure theories.

Key applied findings of the study include:

- Benchmarking does represent a coherent form of targeted information disclosure and existing benchmarking policies closely follow the theoretical expectations of the core elements of a disclosure policy.
- Benchmarking represents both principal-agent and reflexive accountability that makes use of top-down, horizontal, and bottom-up power flows.
- The stated policy objectives of the jurisdictions do not appear to have a material impact on the resulting policy design, even though there are significant differences in the objectives themselves.
- Benchmarking policies differ from theoretical expectations in that they do not seem to engage stakeholders fully in policy adoption processes, or consider how the information generated by the policies will be incorporated into existing decision processes. This could be the result of a reliance on perceived best practices from existing benchmarking policies, and because the

underlying ENERGY STAR methodology and Portfolio Manager platform make jurisdictions feel that the core aspects have already been determined.

- Beyond the adoption process, municipalities employ poor stakeholder engagement practices to encourage broader participation. This is problematic as literature has identified civil society participation as important for transforming and communicating disclosed information, and for applying pressure to both disclosers and policy makers.

This thesis has taken a novel approach by looking at the design of benchmarking policies and whether the selection of policy components align with theoretical expectations. This focus on the design of the policy differs from other research which analyzes the methodology of benchmarking systems or topics associated with energy efficiency in commercial buildings more generally. As a new area of study, there are many opportunities for future research including:

- **Standardization of Reported Data:** A significant challenge to this research has been the lack of comparable and consistently reported data across jurisdictions. There exists the opportunity for the EPA or a civil society organization such as the Institute for Market Transformations to facilitate standard reporting from jurisdictions with a benchmarking policy. This will allow for lessons to be more easily shared across the country, for performance of benchmarking policies to be tracked and compared with peers, and for deeper research. Further academic research should first be conducted to evaluate the breadth and depth of data being collected by jurisdictions, and to assess which metrics should be standardized for future research.

- **Information Consumer Interviews:** For a targeted transparency policy to be effective it must alter the decision-making process of information consumers. No research has yet been conducted that looks at whether the information being provided is valued and internalized by the market, and to what degree the policy component selection and activities of a jurisdiction impacts the utility of the data. For example, how does the type of outreach, training, and support impact the utility of the information. A second example is the type of trigger and method of disclosure, such as the difference between New York's scheduled disclosure on a public graphical website, and Austin's time-of-sale disclosure which is released only to select stakeholders.

- **Cost and Benefit Analysis:** Very little data was communicated from the jurisdictions about the cost of operating a benchmarking program and how this compares with other types of regulation.

- **Quantitative assessment of policy component performance:** As benchmarking policies collect data, and information consumers have the opportunity to respond, there exists an opportunity to compare changes of EUI in different jurisdictions to identify how the policy components impact effectiveness. The policy characteristics and policy goals act as independent and dependent variables. When additional market and political characteristics are added, regression analysis could be performed on policies to find the relative importance of independent variables in maximizing the effectiveness of a policy.

- **Benefits of Government Participation in Information Disclosure:** Energy benchmarking policies distinguish themselves from most other forms of targeted information disclosure policies as they almost always require government disclosure alongside commercial facilities. Research is required to identify whether this approach has added benefits to the municipal corporation (such as energy and cost savings that would not have occurred without the benchmarking policy) and improvements for policy delivery because of a unique relationship for knowledge sharing between the energy manager disclosing the information for the city and the policy maker or service manager delivering the program. This could have broader implications for information disclosure policies in general and encourage government participation going forward.

- **Network Governance and the Orchestrating Role of the EPA:** For energy benchmarking policies, the EPA provides significant orchestration through the provision of the ENERGY STAR methodology, Portfolio Manager platform, funding for municipalities, promotional materials and marketing, and research support. Research is required to better understand the role that the EPA plays for benchmarking policies and the degree to which its involved is a key element of success.

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Appendices

Appendix A - **Policy Motivations & Impact Estimates**

Paraphrased summaries of policy motivations sourced from design documents, enacted policies, and self-reported results.

Jurisdiction	Motivations	Impact Estimates
Austin	• Achieving 700 megawatts of efficiency savings by 2020 under the Austin Climate Protection Plan • Have impact on buildings constructed before improved building code • Lower business operating costs	If all eligible properties conduct upgrades between 2009 and 2020 then by 2020: • Average energy efficiency will improve by at least 20% with the least energy efficient buildings improving to at least the national average • Total Cost of Upgrades: $83,600,000 • Cost of Rebates $33,155,00 • Cost to Property Owners: $50,450,000 • Annual Energy Savings: $38,593,874 • Simple Payback in Years: 1.3 • Austin Energy would have spent approximately $313,000 per megawatt (average includes residential). • Average cost of $53/tonne of CO2 reduction (average includes residential) (Energy Efficiency Upgrades Task Force - City of Austin, 2008) By June 1, 2016 80% of commercial square footage will either: • Have an ENERGY STAR score of at least 50, or; • Have 20% improvement in efficiency above an existing ENERGY STAR score of 50 (City of Austin, 2008)
Boston	• Buildings produce ~1/3 of Boston's GHGs • Climate change causes "sea-level rise, high temperatures, and more intense storms" • Boston Climate Action Plan calls for 25% GHG reductions by 2020 and 80% by 2050. Identifies disclosure ordinance as a contributing policy option • New York City, Seattle, San Francisco, Minneapolis, Philadelphia, Austin, and	*No estimated impacts found*

	Washington, D.C., have demonstrated benchmarking's acceptability & feasibility. • Assist owners in making cost-effective efficiency investments that reduce GHGs, improve occupant comfort, and reduce air pollution • Spur green economy and job creation, increase business attractiveness and demonstrate innovative leadership (City of Boston, 2013)	
Chicago	• Buildings produce 71% of city's GHGs and consume $3 billion per year in energy • Efficiency provides opportunity for cost savings, increased competitiveness, and improved resiliency • Increase the transparency of building energy performance. (City of Chicago, 2014)	• "High-intensity buildings [use] three to seven times more energy per square foot than low-intensity buildings in the same sector. The potential savings opportunity if all buildings achieved the median (50th percentile) or the 75th percentile for energy use intensity in their sector is enormous:" ○ 13–23% reduction in weather-normalized source energy use (total of 6.5–11.2 million MMBTU/year) ○ $44–77 million in energy cost saving ○ 460,000–844,000 tons of avoided greenhouse gas emissions (equivalent to removing 95,000–175,000 cars from the road) ○ Energy efficiency investments of $152–265 million ○ More than 1,000 jobs would result from the investments to achieve these savings" ○ (City of Chicago, 2014)
New York ***Note: not included in ordinance but in overarching energy plan policy document***	• Established goal of reducing citywide emissions30% by 2030. • 75% of New York's GHG emissions come from building energy use. • In 2030, 85% of buildings will be those already in existence today. • While New York has nearly 1 million buildings, 22,000 of them consume roughly 45 percent of the energy citywide, representing all types of buildings.	• Overarching Greening, Greater Buildings Plan has projected impacts of: ○ Costs of $5.2 billion ○ Saving $12.2 billion ○ Estimates are direct savings and do not include health savings from reduced pollution or avoided energy supply costs.

	• New York's Greening, Greater Buildings Plan has a focus on energy transparency • (New York City Mayor's Office of Long-Term Planning and Sustainability, 2014)	○ GHG emission reductions of 5.3% by 2030 (2.72 million tonnes) ○ LL84 will contribute 10% of reductions towards citywide GHG reduction goal of 30% by 2030. ○ Thousands of construction jobs "in energy auditing, retro-commissioning, upgrading lighting, and maintaining equipment." ○ "Building owners will benefit from the energy savings" ○ Pollution reduction will improve air quality ○ "Efficient energy technology and upgrades will better regulate indoor temperature and lighting, improving the comfort of the indoor environment" ○ "Lower demand for electricity will also make citywide electrical systems more reliable." (New York City Mayor's Office of Long-Term Planning and Sustainability, 2014)
Philadelphia	• Buildings produce 60% of GHGs. • "Best opportunity to achieve the Greenworks target of reducing greenhouse gas emissions 20 percent by 2015." • Increased efficiency can help owners realize significant savings • Large commercial buildings waste up to 30% of energy consumed • Improving efficiency requires improved data (City of Philadelphia, 2014)	• Bringing underperforming large commercial buildings up to an average level of energy efficiency could save owners $100 million in energy costs annually. (City of Philadelphia, 2014) • Intended to reduce building energy consumption by 10% by 2015 and is a key component of the Greenworks Plan. (City of Philadelphia, n.d.)
San Francisco	• The operation, construction, and demolition of buildings accounts for almost half of San Francisco's greenhouse gas emissions (Figure 1.)	• A 50% reduction in commercial building energy use in 20 years will have the same effect as taking 50% of commercial

	• The City has established high standards of environmental performance for new construction. However, at the historic rate of 0.8% new buildings per year, it could take more than sixty years to ‘green’ even half of San Francisco. • Commercial and industrial buildings account for 48% of building-sector emissions, and municipal buildings and facilities account for an additional 14% of emissions from buildings. • Documented phenomena in California include warming temperatures, precipitation disruptions, reductions in average Sierra snowpack and changes in timing of spring runoff.9 Projections for the remainder of the century continue to grow more ominous with profound implications for the provision of clean water, hydroelectric generation, and the agriculture that feeds our city. As a City bounded by water on three sides, coastal inundation is a continuing threat to our community, real estate and infrastructure. • User better data to develop focused policy to incentivize building owners • California's Long Term Energy Efficiency Strategic Plan goal for existing commercial buildings states that: "Fifty percent of existing [commercial] buildings will be equivalent to zero net energy buildings by 2030 through achievement of deep levels of energy efficiency and clean distributed generation." (Mayor's Task Force on Existing Buildings)	building stock to zero-net energy, but at lower cost. • It is estimated to reduce climate emissions by at least 64,000 tons per year. (Mayor's Task Force on Existing Buildings)
Seattle	• Localized datasets increase transparency and provide greater relevance for planners and utilities than national datasets. • “Make building performance information accessible to building owners, industry professionals and policymakers.”	*No estimated impacts found*

	(Seattle Office of Sustainability & Environment, 2014)	

Appendix B – **Task Force Composition**

Austin	Boston	San Francisco
COA Resource Management Commission	Colliers International	Director of Client Solutions Cushman & Wakefield of California
President Austin Mortgage Banker's Assn	Synergy Investments	Green Consulting Services Manager Swinerton Management & Consulting
Consumer Protection Advocates, Texas Ratepayers Organized to Save Energy	Millennium Place	Property Manager Hines
Pres. CenTex Chapter of TX Association of Real Estate Inspectors	Winn Development	Associate and Design Team Leader Huntsman Architectural Group
Air Conditioning Contractors Association	Westin Boston Waterfront	Principal Cantrell, Harris, & Associates
Specialty/Green Realtors	Boston University, Facilities Management & Planning	Principal Enovity
Central Texas Association of Mortgage Brokers	Federal Reserve Bank of Boston	Managing Principal and Founder Galley Eco Capital
Enviro/Energy Advocates	Partners Health Care	CEO Building Wise LLC
Housing Affordability Providers/Advocates Austin Community Design/Development Center	First Resource Companies	Partner MBV Law
Real Estate Council of Austin	Beacon Capital Partners	Founder and Vice Chairman New Resource Bank
Large commercial property owners	Boston Properties	Northern California Vice President Able Engineering
Austin Apartment Association, Large property owners		Chief Engineer of 455 Market Cushman & Wakefield
Austin Board of Realtors-immediate past chairman		Green Building Consultant Simon & Associates, Inc.
Austin Apartment Association, Independent Rental Owners Committee		Managing Director Landmark Exchange Management
Lender/ Mortgage Brokers		Principal Strategic Planner, Area 1 Pacific Gas & Electric Company
Lenders - AE partners, credit unions, banks, etc. University Federal C.U.		Vice President Webcor Builders

COA Electric Utility Commission		Manager of Engineering Services Shorenstein Property Management & Construction
Heritage Society, Executive Director		
Austin Tenants' Council, Executive Director		
Air Conditioning Contractors Association		
Building Owners and Managers Association		
Specialty/Green Realtors (Austin Fine Properties)		
Greater Austin Home Builders Association		
County Clerk (property records), Head of Recording Division		
Real Estate Appraisers		
International Facility Management Association		
American Institute of Architects		
U.S. Green Building Council (Balcones Chapter)		
(Energy Efficiency Upgrades Task Force - City of Austin, 2008) (Mayor's Task Force on Existing Buildings) (City of Boston, n.d.)		

Appendix C – Definition of Buildings Covered by Benchmarking Policy

Jurisdiction	Definition
Austin	Commercial facility means a building used for civic, commercial, and/or industrial uses, excluding manufacturing, with a gross floor areas of 10,000 square feet or greater. Gross floor area means the total number of enclosed square feet measured between the exterior surfaced of the fixed walls within any structure used or intended for supporting or sheltering any use or occupancy (City of Austin).
Boston	Based on definition in Boston Assessing Department, "a parcel with one or more buildings that equal or exceed 35,000 square feet in gross building area, and of which 50 percent or more of the gross building area, excluding parking, is used for commercial, retail, office, professional, educational or other non-residential purposes, or any grouping of non-residential buildings designated by the Commission as an appropriate reporting unit. The term 'non-residential' shall not include and building that is a city building." (City of Boston, 2013)
Chicago	The ordinance applies to existing municipal, commercial, and residential buildings larger than 50,000 square feet, with first-time compliance deadlines based on size and occupancy use. Building Size: Building size is defined as gross square footage - the total number of square feet measured between the exterior fixed walls of a building. This includes common space, private space, mechanical or electrical rooms, and interior parking. (City of Chicago, n.d.)
New York	As it appears in the records of the department of finance: (i) a building that exceeds 50,000 gross square feet, (ii) two or more buildings on the same tax lot that together exceed 100,000 gross square feet... (The City of New York, 2009)
Philadelphia	Either of the following: (i) Any commercial building with indoor floor space of 50,000 square feet or more. (ii) (ii) All commercial portions of any mixed-use building where a total of at least 50,000 square feet of indoor floor space is devoted to any commercial use. Any two or more buildings that are served by one common energy meter without sub-metering, such that their energy use cannot be tracked individually, shall be considered one building for the purpose of determining indoor floor space. For purposes of this definition, the term "commercial" shall mean relating to or associated with any activity, whether or not undertaken for a profit, involving any form of trade or commerce, or requiring consideration in exchange for any good, service, or privilege.

San Francisco	"Nonresidential building" and "building" mean a facility composed of occupancy type(s) other than residential--including type A,B,E,I-1,I-2,I-3,M,R1 and S, as defined by California Building Code Title 24 Section 302 (2010) as amended--where a gross area of 10,000 square feet or more is heated or cooled in its interior. "Gross Floor Area" or "Area" means the total number of square feet measured between the principal exterior surfaces of enclosing fixed walls (City of San Francisco, 2010).
Seattle	A structure or any portion of a Nonresidential benchmarking structure which: a) is subject to the provisions of the Seattle Building Code, and b) Has a gross area of more than 10,000 square feet, excluding parking, and c) Is any classified occupancy under the Seattle Building Code other than Residential R-2 or R-3 (City of Seattle, 2010).

Appendix D – Approaches to Disclosure

Jurisdiction	Trigger	Frequency	Audience
Austin	Point of Transaction	Sale, Rent	Buyers, Tenants
Boston	Scheduled Date	Annual	Public (Website)
Chicago	Scheduled Date	Annual	Public (Website)
New York	Scheduled Date	Annual	Public (Website)
Philadelphia	Scheduled Date	Annual	Public (Website)
San Francisco	Scheduled Date	Annual	Public (Website)
Seattle	Point of Transaction	Sale, Rent	Buyers, Tenants, Financiers
(Institute for Market Transformation, n.d.)			

Appendix E - Display

Jurisdiction	Numeric of Graphical Display	Link to Website
Boston	Graphical	http://berdo.greenovateboston.org/
Chicago	Graphical	https://data.cityofchicago.org/Buildings/Elevation-Benchmarks-Map/kmt9-pg57
New York	Graphical	http://benchmarking.cityofnewyork.us/
Philadelphia	Graphical	http://visualization.phillybuildingbenchmarking.com
San Francisco	Numeric	n/a

Appendix F – Penalties for Non-Compliance

Jurisdiction	One-Time Charge	On-Going Charge	Other
Austin (City Council of the City of Austin, 2011)	Up to $500	n/a	Fine increased to $2,000 if criminal negligence
Boston (City of Boston, 2013)	n/a	$75 to $200/day up to $3,000	Tenants fined up to $35 for failing to provide owners with required energy data
Chicago (City of Chicago, 2013)	$100	$25/day	n/a
New York (The City of New York, 2009)	$500	$500/quarter to benchmark maximum of $2,000	n/a
Philadelphia (City of Philadelphia, 2012)	$300	$100/day after initial 30 days	
San Francisco (SF Environment, City & County of San Francisco, 2014)	n/a	45 days after public notice: • 25,000 sq. ft. or larger, fined $100/day up to $2,500 • Less than 25,000 sq. ft. fined $50/day up to $1,500	Prior to penalty: • Issue warning • 30 days after warning post public notice on city website
Seattle (City of Seattle Legislative Information Service, 2012).	n/a	• 50,000 sq. ft. or larger, fined $1,000/quarter • Less than 50,000 sq. ft. fined $500/quarter	n/a