GREEN BUILDING POLICY AND CAPITAL INVESTMENT DECISION-MAKING: A GROUNDED THEORY STUDY

A dissertation presented
by
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ABSTRACT OF DISSERTATION

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ABSTRACT

Policymakers in the U.S. have taken steps to create systems and revise processes in order to reduce energy consumption and greenhouse gas emissions and slow climate change. Significant policy activity has taken place at the local level, and cities have implemented a variety of policies focused on the built environment. These policies range from financial and procedural incentives to formal restrictions and building codes, spanning changes in land use, design, construction and operations of new and existing buildings. The significant social, environmental and economic impact represented by these policies suggests the need for a thorough understanding of their effectiveness and impact.

Policy which governs the built environment depends on the informed participation of businesses. Corporations occupy and invest in the urban environment through new construction or renovation. However, research has not yet examined the underlying factors and dynamics which influence the extent to which businesses adopt, promote or obstruct the sustainable building policy changes of the past decade. An investigation of this nature is especially critical as a new wave of regulatory changes oriented toward resiliency of the built environment is under consideration by cities and states.

This dissertation focuses on the relationship between public policy and corporate decision-making and action. The overarching question of the study is, “How do businesses
which affect the urban built environment through real estate property development and management respond to regulatory change affecting buildings?” More specifically, “How does the adoption of building rating requirements, performance-oriented building codes, or building energy asset labeling/disclosure programs affect the way companies assess, prioritize and implement investment opportunities and obligations?”

Based on qualitative data derived from one on one interviews with professionals in corporate decision-making roles, I will argue that green building policy change is a mechanism which ignites a network of forces driving new business practices across a production ecosystem of companies linked by business relationships. In this ecosystem the real estate developer occupies a key role of marketplace initiator. The perception of regulation for developers is a significant factor in policy effectiveness. Due to the complexity of the process of production of the built environment, it is necessary to investigate the question at three levels – looking at the system of cause and effect as a whole as it is perceived by developers, delving into the behaviors of developers and allied professionals who operate within the system, and investigating the interpretations and responses to specific regulations which represent different approaches to the problem of climate change.

The data on professional perceptions of policy and market forces depicted in the form of causal maps will show that the overall system of policy-driven practice change is understood as a structure dominated by two sets of forces – those of public interests expressed through policy,
and those of the marketplace expressed in terms of supply and demand. The interaction of regulation and market influences the way that these forces impact the network of independent businesses which produce the built environment, the aggregated production ecosystem for urban buildings, and the way that individual professionals adapt and develop new practices in response to the requirements of regulation.

The attitudes, beliefs of norms of different professional groups represented in the network from real estate investors to developers to designers to contractors influences the adoption of these new practices. The successful implementation of regulation requires that each participating company in the production ecosystem achieve a degree of practice change alignment, yet the data suggests that practice change propagates at different rates based on the readiness and expertise of companies and professionals who comprise the ecosystem.

I will argue that causal maps combine with observation derived from the data to form a grounded theory about the way real estate developers experience practice change in three key aspects of their work, “Discovering Opportunity” - when potential projects are identified and prioritized, “Experiencing Difficulty” - when projects hit obstacles, and “Changing Practices” - the timeline over which regulations are internalized in a company through new processes and methods. Developers, as actors negotiating risks and competing to succeed within a marketplace governed by public regulations which protect the health, safety and welfare of the community, articulated a commitment to improving the urban environment through their work, and expressed
understanding of cause and effect relationships and complex interaction between economic and social worlds. Real estate developers are positive about the prospects for change and for the collaborative working relationship between company and public agency which enables successful project realizations. Interviewees spoke about alignment of goals, in that developers and agencies share an interest in creating economic opportunity for the community. At the same time, both are aware that at times they sit on opposite sides of the table. As a result, this research has implications for the way that policymakers assess the results of green building policies and develop future regulation to drive the production ecosystem as a whole in positive directions.
DEDICATION

This dissertation is dedicated to my husband, Bruce, whose love and intellectual curiosity motivated me during this long journey. This work is also dedicated to my sons, Nathaniel and Zachariah, who inspired me with their own burning desire to understand and improve the world. I also wish to thank my parents Alan and Shirley Ann, for their love and support and their lifelong commitment to the value of education, and my sisters Heidi and Tia, for their patience with the many times I postponed family projects.
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Finally, I would also like to acknowledge directly the hard work of those individuals - real estate developers, designers, contractors, building owners, managers, and policymakers - who face economic and social risks as they strive to make the world a better place by envisioning, nurturing and renewing our urban environments. It was their work which inspired me to take the project on in the first place.
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ACEEE ...................................................... American Council for an Energy-Efficient Economy
AIA ........................................................... American Institute of Architects
BERDO ..................................................... Boston Energy Reporting and Disclosure Ordinance
BOCA ...................................................... Building Officials and Code Administrators
CAPM ...................................................... Capital Asset Pricing Model
CEO ......................................................... Chief Executive Officer
CLD ........................................................ Causal Loop Diagram
CMBS ..................................................... Commercial Mortgage-Backed Securities
EPA ........................................................ Environmental Protection Agency
GGBP ....................................................... Greener Greater Buildings Plan (NYC)
GHG ........................................................ Greenhouse Gas Emissions
GTM ........................................................ Grounded Theory Methodology
HVAC ..................................................... Heating Ventilation and Air Conditioning Systems
ICBO ....................................................... International Conference of Building Officials
ICC ........................................................ International Codes Council
ICLEI ....................................................... International Council for Local Environmental Initiatives
IEBC ....................................................... International Existing Buildings Code
IECC ....................................................... International Energy Code
IFC ........................................................ International Fire Code
IgCC ....................................................... International Green Construction Code
IMC ......................................................... International Mechanical Systems Code
IPC ........................................................ International Plumbing Code
IRC ................................................................. International Residential Code
LEED ............................................................. Leadership in Energy and Environmental Design
NEPA ............................................................... National Environmental Policy Act
NYC ...................................................................................................................... New York City
NYCECC .................................................................. New York City Energy Conservation Codes
PlaNYC ............................................................................................................. Plan New York City
REIT .............................................................................................................. Real Estate Investment Trust
SREC .............................................................................................................. Solar Renewable Energy Certificate
TIF .................................................................................................................. Tax Increment Financing
TRA ............................................................................................................. Theory of Reasoned Action
USGBC .............................................................................. United States Green Building Council
UTAUT ............................................................................ Unified Theory of Acceptance and Use of Technology
ZBA .................................................................................................................. Zoning Board of Appeals
I. INTRODUCTION

The real estate industry is a large and influential commercial sector of the U.S. economy which derives income from creating, renovating and managing the built environment. This industry is regulated due to its potential impact on the lives and livelihoods of citizens. Since 2005, many municipalities across the U.S. have imposed new built environment regulations aimed at reducing the impact of building construction, renovation and occupation on climate change. Because these regulatory changes introduced new models of compliance and implementation into the marketplace, they provide a context for inquiry into the thought and value systems which govern how businesspeople map their understanding of regulation to the practice of business with the goal of profitability. The pervasive activity of the real estate industry provides opportunities to study the dynamic relationship between forces of policymaking and of the marketplace, and to gain a deeper understanding of the way these forces interact and result in practice change. The fundamental question of this research is – how do individuals with authority to make real estate investment decisions respond and how do professional practices evolve in dynamic economic, social, and marketplace contexts when policies change.

To increase understanding, this study builds on existing theories about the perceptions of regulation and their impacts on the behavior of individuals in roles with corporate decision-making authority. By studying the perceptions of regulated company representatives in the specific context of building regulation, it is possible to formulate a theory about the way
businesspeople convert their understanding into action and gain insight to inform future policy design (Millard-Ball, 2012).

Built environment changes are in large part executed by commercial businesses including real estate, architecture, engineering, and construction companies which form business networks to execute specific projects. As a first step in understanding the impacts across the wider network of businesses which participate in the transformation of the urban environment, this study focuses on the perceptions of individuals who launch the development process and initiate the formation of project teams, the professionals who work actively on projects in the real estate industry.

The fundamental question of this research is – how do individuals with authority to make real estate investment decisions respond, and how do professional practices evolve in dynamic economic, social, and marketplace contexts, when policies change. When regulators implement green building policies, it is generally with a clear understanding of the objectives that are being sought, combined with a hypothetical understanding of the way that regulated parties will behave in response. How do perceptions and attitudes evolve, in light of policy change as well as economic change? How do investors interpret policy amid the complex set of factors surrounding investment decisions?

By providing insight into corporate processes, thoughts and values to increase policymaker understanding of the likely consequences of specific regulations, this research aims to improve the effectiveness of policymaking related to the built environment. A better understanding of the dynamics of real estate investment decisions will enable policymakers to
more effectively create, adopt and enforce policies aimed at driving desired behaviors and practices. This research will posit a theory about the way real estate developers discover new opportunities, execute projects and experience changes in their business practices in light of green building policy change.

Real estate developers must anticipate and ameliorate risks associated with transforming the urban built environment while they manage a complex set of partner, consultant and policymaker relationships. This study delves into the perception of practice change and its propagation throughout a network of real estate professionals and affiliated partners. Green building policy change is a mechanism for transformation of the entire production ecosystem, in which the real estate developer is the initiator. This research is needed to improve understanding about the transformation of the entire ecosystem, and inform policymakers about the complex systems impacts that can be anticipated in light of future green building policy regulation.

**Real Estate Industry**

The real estate industry is comprised of organizations which develop, manage and trade assets in exchange for compensation – physical assets such as buildings or property complexes as well as intangible assets such as ownership rights. In addition, the real estate industry includes the work of organizations which provide related services such as brokerage or specialized consulting. Real estate development engages multiple organizations with a wide range of professional specializations to construct new properties and renovate or lease existing buildings.
The business activity of real estate impacts several related industries and has a significant impact on the economic, social and physical fabric of urban environments.

Laws providing opportunity for land ownership and development were developed in the earliest days of our country and fundamentally connected the real estate industry to prospects for individual freedom and prosperity. In the years following independence, land owned in public trust was sold to individual investors through negotiations and auctions. In 1862, Congress passed the Homestead Act, enabling large scale transfer of 160 acre homesteads to families which occupied and improved them for five years. Laws governing property rights and conveyance of rights to other parties evolved, supporting investment and speculation. Ground leases enabled property owners to accumulate wealth through the collection of payments for occupation of land. Some companies, such as the Holland Land Company, which purchased 3.3 million acres of land in New York State in 1792, began to pursue strategies of development, increasing the value of property through long-term planning, construction of assets and infrastructure, realizing financial returns through leases or retail sale. Improvements to property were closely connected to infrastructural improvement, as developers invested in roads or railway infrastructure and utilities to make the buildings they constructed more valuable (Miles & Urban Land Institute., 2007).
Economic Context

According to the Bureau of Labor Statistics, the real estate industry sector\(^1\) employed over two million people in 2013 and contributed over $2 trillion to the nearly $17 trillion GDP of the United States, or 13%\(^2\). In addition, private construction activity associated with the development of commercial and residential real estate exceeded $600 billion, and employed over six million people\(^3\).

Real estate is one of the four major asset classes, along with cash (including treasury bills, short term debt obligations backed by the U.S. Government), stocks (shares of ownership of a business or corporation), and bonds (a corporate debt obligation). In comparison with these other asset classes, real estate represents moderate to low risk, moderate financial return, high yield, low growth potential and offers a good option to protect investors against inflation (Geltner, 2007).

The real estate industry is subject to significant market volatility. In the 1980s, the market was booming based on the availability of funds from financial institutions including Savings and Loans. The financial crisis of the 1990s impacted real estate investments when constraints in the availability of funds to support development resulted from the Savings and Loan crisis. Eventually, the industry overcame the constraints placed on it by the Federal Reserve System as a response to the crisis (Hewlett & Kaufmann, 2008). During the period from 1969 to 1986, real estate investment outperformed investment in stocks (based on comparison with the SP500 stock

\(^1\) North American Industry Classification System (NAICS) code 531
\(^3\) NAICS 23
market index), treasury bills, and long term bonds. However from 1986 to 2003, real estate investments underperformed when compared to other assets. For one dollar invested in real estate in 1986, an investor would have seen that return drop and climb back to $1 by 1994, then incrementally increase year by year to $3.56 by 2003. In comparison, that dollar in the stock market would have skyrocketed to over $8 by 1999, dropped to a value below $6 by 2002, and ended up at $6.91 in 2003. Over this same period the consumer price increase increased from $1 to $1.67 (Geltner, 2007).

A significant change in the industry at this time was the growth of the Real Estate Investment Trust (REIT), a type of publicly traded company which produces returns through development, ownership and management of real estate assets. As a public entity, individual investors can buy and sell shares of REIT companies through stock exchanges such as the New York Stock Exchange. In 1983 over eighty companies launched as REITs through initial public offerings. (Hewlett & Kaufmann, 2008) By the end of 2006, the combined value of the REIT industry was $438B in combined market cap. In the early 1990s, real estate companies had begun to trade commercial mortgage-backed securities (CBMS) bonds for real estate debt. In 2006, the total asset value of commercial mortgage-backed securities (CMBS) was $721B and the secondary mortgage market was $9.2T. The combined value of real estate investment trust companies amounted to 14% of all real estate capital sources (Leinberger, 2009).

One of the factors associated with the recent period of economic turmoil which we now call the Great Recession of 2007-2008 was mortgage lending which had been pooled into investments. A collapse in the value of real estate impacted the value of these investments which
imposed unsustainable pressures on the overall financial system. The demand for nearly all types of real estate collapsed. Not only housing, but also the markets for industrial, retail, office, and hotels were impacted. Access to funds to invest to develop property and confidence in the value of real estate as an investment evaporated. The disintegration of trust, a critical element in the dynamic system of finance and investment, precipitated economic disaster. ("Crash course: The origins of the financial crisis," 2013)

This study focuses on policy in two real estate asset classes - commercial and corporate real estate. The combined impact of commercial and corporate real estate amounts to 45.7% of the value of real estate as an asset class in the United States, or 16% of the assets of the American economy (Leinberger, 2009). To study the impact of policy on decision making for commercial or corporate asset improvement, it is useful to consider three principal factors which impact the dynamics of behavior in real estate – the market for products and services, the practices of the individuals operating within corporations which provide and consume products and services, and the regulatory context which circumscribes boundaries of appropriate practice.

Market Context

An overview of the structure and conditions of the marketplace for real estate provide useful context to learn how opportunity and decision-making are likely to be perceived by individual practitioners. As an industry, real estate is characteristically described in terms of different geographies and property types, or sectors, based on function and use. U.S. real estate
buyers and sellers are categorized into groups focused on residential and commercial property for the purposes of observing and forecasting economic activity. In 2008, the real estate asset class, broken into four major categories by economic value, consisted of 42.8% residential real estate for sale, 28.5% commercial real estate, 17% corporate real estate (owned and managed by companies for business purposes) and 11% public or government buildings and infrastructure (Leinberger, 2009).

This segmentation reflects the specialized knowledge and competency of companies and their strategies for success. Demand can be analyzed and monitored more effectively within specific sectors. This study focuses on the practices and behaviors within the commercial and corporate real estate markets, which impact the urban built environment through the development, renovation and management of properties to serve industrial and businesses uses.

Commercial Real Estate Market

The commercial real estate industry is comprised of interactions between three different interconnected markets – the space market, the asset market and the property development industry. The market for space consists of the supply of rentable square footage governed by landlords and leases meeting tenant demand. The asset market is a supply of property meeting the demand of investors for returns. The property development industry produces constructed and renovated buildings which become supply for the space market (Geltner, 2007). The structure of the real estate industry is based on the interconnection of companies with different specializations - extended project teams responsible for finance, design, construction, brokerage and operation of new commercial properties or substantial renovations.
The products of commercial real estate development are completed by groups of companies, each specialized, trained and, in some cases, licensed by the government to produce a specific aspect of the work. The outcome of these combined efforts is a new building or renovation modifying the urban fabric. These independent contributing companies are essentially network nodes, and the connections between the nodes are defined by contractual arrangements which govern the transmission of services, resources, information and risk in exchange for compensation. For the purpose of this study, this network of parties can be thought of as a production ecosystem, the aim of which is to produce the completed commercial building or effectively renovate and manage a corporate real estate asset. The interactions between business entities within the network are complex and dynamic. Commercial development projects are, for the most part, unique efforts which bring together teams of collaborating companies to complete a project. A business relationship experienced over a single project timeline limits the extent to which practices of communication, transaction and exchange between these parties can be developed and honed over time. Limitations in the effectiveness of each project-specific configuration of the production ecosystem are likely to factor into the business performance of the final product for the developer, as well as in the performance of each independent company in the production ecosystem. In addition, the independent nature of companies in each production ecosystem means that practice change is likely to be accomplished through a dynamic market-driven process rather than a hierarchical top-down organizational change. Alignment of practice changes within each company with regard to competency development, and the development and exchange of information and resources, are key to success (Henn, Hoffman, & Biggart, 2013) (Tsvetkova & Gustafsson, 2012) (Iveroth, 2012).
The developer of real estate, whether a corporate owner of property supporting a line of business or a company with a single business mission to develop property for income, is the keystone of this network, because this company’s decision to initiate a project is what launches the chain of events leading to a completed project. (Kamping-Carder, 2012). For this reason, the study focused on the responses of individuals with responsibility for decision making in order to understand the impact of regulations and the prospects for practice change within the real estate development company.

For professionals operating in the commercial and corporate real estate industries, an understanding of the commercial marketplace for space is a factor in professional success. This understanding is based on experience in interpreting information and assessing predictions for the supply and demand of real estate which will drive availability and cost. The factors which go into predictions include growth or decline of customer segments (i.e. companies requiring square footage to house operations), availability of certain types of real estate space products (i.e., office or retail space), pace and change in the availability of products (how fast buildings are being constructed or removed from the market), and the economic value of products (costs for square footage).

Economic models of the cyclic behavior of the market for office space are based on a historic review and analysis of relevant data points. For example in the case of office space, five prominent supply factors – construction activity, completion of office building projects, employment in companies needing office space, absorption (the rate at which office space is “consumed” or appropriated by tenants), and vacancy rates – are used to analyze the cycle of
changing demand this specific product (Wheaton, 1987) (Clapp, 1993). The demand factor also incorporates data which predicts the appetite of the market for specific real estate products, such as sustainable real estate, along with predicted demand for other amenities such as specialized features, superior or desirable materials, improved functionality, aesthetically pleasing characteristics or other features associated with quality. The demand for “green” value may be impacted by social factors or moral pressure on corporations to convince their customers that they are positive contributors to society by consuming resource prudently (Creel, 2012).

The idea that investment actions are predicated on the analysis of supply and demand is tempered by the risk associated with predictions, in other words, the likelihood of inaccuracy or unanticipated events rendering predictions incorrect and affecting the pricing of investments. Such events might include changes in society, such as the impact of natural disasters on the perception of real estate value in a particular region, unexpected public health emergencies, or changes in regulation (Garner, 2008) (Nwogugu, 2011). Economic models which reflect investment risk such as the Capital Asset Pricing Model (CAPM), a prominent industry construct which relates risk and return in calculating the expected value of an asset (Sharpe, 1964) (Lintner, 1965) (Mossin, 1966) (Treynor, 2008), are employed by practitioners to assess and select opportunities. Investor opportunity analysis assumes that commitment to an investment makes sense if the assessment of returns based on costs results in a maximization of the investor’s utility, or provides the best returns for the costs.

Information about the market and its products is a factor which affects the accuracy of economic models such as CAPM. The concept of market efficiency refers to the degree to which
accurate and accessible information about the behavior of buyers and sellers in reflected in the pricing of assets. In an efficient real estate market, the price of a specific building would reflect information about how much money each potential buyer would be willing to pay, and each of the buyers in the pool would have knowledge about the seller’s willingness to close a deal based on an offer. Market efficiency is the degree to which information about likely behavior of the parties is available on both sides of the transaction. And this likely behavior is influenced by information about many factors associated with the property and with the companies and individuals active in the industry (Jaffe & Sirmans, 1995). Information pertaining to decisions in the commercial real estate market includes a range of qualitative and quantitative factors, such as past reliability of economic predictions, impact of the specific characteristics of real estate products on asset value, and demonstrated impact of asset characteristics on building performance. Market thickness, the presence of many buyers and sellers, impacts the relative difficulty or ease of selling an asset. Although commercial aircraft are more easily deployable than real estate assets, Gavazza’s aircraft study on the impact of market thickness on allocations and prices for large physical assets provides insight about the real estate industry, and suggests that market thickness has a significant impact on trade (Gavazza, 2011).

Other impacts on the commercial real estate marketplace are shifts in society and the effects of relocation as individuals, families and organizations move in pursuit of economic or social opportunities. Central Place Theory provides insight about the connection between services and geometric configurations of human settlements. Urban environments offer economies of scale, value of collection – geographic proximity of groups and amenities, and
access to other positive factors (externalities) associated with specific locations (Lösch, 1937) (Christaller & Baskin, 1966) (Geltner, 2007). The shift of the United States population to urban environments continues to be a key trend impacting the value of real estate in cities (Emerging Trends in Real Estate 2014, 2014). In addition to demographic movements, the preferences for spaces to accommodate life and work are changing. Environments which connect mixed uses – living space, offices, public places - to public transportation and which reduce reliance on the private automobile are considered efficient and are becoming desirable (Ewing, 2008) (Leinberger, 2009).

Industry Structure

As a context for this research and to formulate an understanding of the market in which real estate professionals operate, it is useful to dig deeper into the structure of the real estate industry. Two prominent industry theories – Porter’s Five Forces model and Scherer’s Structure Conduct Performance paradigm are helpful in understanding the way that businesspeople perceive their environments.

Research suggests that business performance in the industry is driven by competitive forces and Porter’s Five Forces model outlines five essential competitive forces which drive potential profitability for corporate entities in a particular industry (Porter, 2007). The actions of policymakers impact all five forces, affecting the behavior and practices of companies in the marketplace. The forces described in the model are 1) the threat of new entrants, 2) the bargaining power of suppliers, 3) the bargaining power of customers or buyers, 4) the threat of
substitutes and 5) the resulting force of rivalry between competitors already present in the industry.

Policy regulating an industry impacts the threat of new entrants, since limitations can be placed on the market for new participants by the need for licenses or patent protection on intellectual property. Supplier bargaining power occurs when the industry requires access to limited resources, such as the availability of developable property in desirable and dense urban areas. Regulations affect supplier power and constrain corporate license to operate by requiring certain practices. Customer bargaining power results when it is easy for buyers to shift from one supplier to another, when there are many suppliers with equivalent offerings, or when customers can themselves assemble resources to develop their own products or services internally. Policymakers can influence the power of buyers by regulating that companies provide accurate and sufficient information to enable increased transparency of marketplace alternatives. Similarly, the threat of substitutes can be seen as the option for buyers to meet their needs with alternative products or services from a different industry. Transparency, which may be increased by regulation as mentioned earlier, can also make substitutes more attractive or attainable, increasing the threat. Rivalry within the industry takes the form of pricing discounts, communication and advertising campaigns, and often results from an industry with many participants at a comparable level of size and market power (Porter, 2007).

Scherer’s Structure Conduct Performance paradigm describes company performance as an outcome which begins with the basic conditions of supply and demand in an industry. These conditions produce a market structure, defined as the interaction of buyers and sellers, product
differentiation, barriers which prevent or constrain entry into the marketplace, degree of diversification and vertical integration. Market structure influences company practices – the strategic conduct and decisions which are made related to products, investment and compliance – which results in corporate performance. Public policy – such as financial impacts (taxes and subsidies), strategies for promotion and research price control and other forms of regulation - is depicted in this model as an input influencing market structure and also as an influence on company performance (Scherer, 1996; Scherer & Ross, 1990). These two theories suggest the range of factors which may shape company practices and impact business performance, including public policy impacts.

**Corporate Context**

The real estate company is the context for the study, since this organization takes the initiative to seek out property development opportunities and engage other companies to form the production ecosystem to complete the project. On an ongoing basis, and for each individual project, the company serves as a platform providing resources, defining culture and determining strategy which drives practices (Burgelman, 1983). As business entities, real estate companies vary in many ways – governance, market focus, organizational structure, culture, leadership, and scale of human and financial resources. Each company is likely to adopt a strategy which defines how it intends to succeed in a competitive marketplace, and this strategy will represent the ideas, values and mission of the company’s leadership. Strategic decisions will include positions on the role the company aspires to occupy in the industry, the customers the organization intends to
serve, how the company will brand or differentiate its offerings in the marketplace, what core competencies the organization will develop, how the company intends to grow and where it will locate products geographically, how the company will remain profitable, will organize, what sources of capital will be accessed, how capital will be deployed, and how the company will respond to the challenges posted by the cyclical nature of the demand for real estate products. In addition, real estate companies must determine how much risk to take on in the business, and how to ameliorate risk (Hewlett & Kaufmann, 2008).

**Regulatory Context**

Regulation of the real estate industry began when policymakers perceived the necessity of protecting the health, safety and welfare of the community (Ching & Winkel, 2012). Disasters, such as the Great Chicago conflagration in 1871, or the San Francisco earthquake of 1906, resulted in damage to property which injured or killed many people. These tragedies spurred officials in those cities and beyond to rethink optimum design, rules for construction, and plans for zoning to protect citizens from urban catastrophe. Municipalities began to adopt zoning ordinances and building codes. Chicago developed a building code in 1875 to increase access to insurance for businesses.

For the most part, local jurisdictions govern the process and form of building projects through their authority to issue building and occupancy permits. Through codes and ordinances, which specify requirements for building projects, jurisdictions justify their role in influencing the
built environment in order to protect the safety and welfare of the community and its members. As these regulations grew over time, a plethora of codes at different jurisdictional levels created conflicts and complexity. Industry groups, such as the Building Officials and Code Administrators (BOCA), the International Conference of Building Officials (ICBO), Southern Building Code Congress and other groups began creating model codes which were created with input from professionals with economic and technical knowledge.

Over time, the model codes were collected into a common format by the International Codes Council (ICC). Many states, but not all, regulate building development through a state-wide code, such as the ICC’s International Building Code (IBC) (Ching & Winkel, 2012). Today, many jurisdictions adopt modified version of model codes which reflect the specific concerns of their communities, and real estate developers and practitioners must be mindful of a long list of building codes, standards and regulations which affect each individual project, such as the IRC (residential), IECC (energy), IEBC (existing buildings), IFC (fire), IMC (mechanical systems), IPC (plumbing), and others. Emerging codes and standards, such as the ICC’s International Green Construction Code (IgCC) are being developed, and a handful of jurisdictions have begun to adopt them.

**Sustainability and Green Buildings**

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4 For complete list of documents, see the web site of the International Codes Council (www.iccsafe.org)

5 The ICC lists adoptions of the IgCC in some communities for state-owned facilities (Florida, Rhode Island), as a voluntary code (Phoenix, Scottsdale, Kayenta Township in Alaska, Richland in Washington, the state of Maryland, Keene in New Hampshire), or mandatory as core of the local building code (alternative to mandatory LEED compliance, Boynton Beach, Florida, Oregon in limited aspects, Fort Collins in limited aspects and North Carolina in limited aspects).
Current initiatives to address climate change are related to older notions of environmental sustainability. The issue of sustainability has been in the public discourse since the time of Thomas Malthus’s essays commenting on the tension between population growth and the earth’s capacity to support human subsistence (Malthus, 1798). Legislation such as the Lacey Act of 1900 and the Antiquities Act in 1903 established government protections for resources perceived to be endangered, such as wildlife or wild areas. Researchers Rachel Carson and Paul Ehrlich, among others, drove social concern for the environment (Carson, Darling, & Darling, 1962) (Ehrlich, 1968). Public awareness led to the successful passage of legislation such as the National Environmental Policy Act (NEPA), created the Environmental Protection Agency, the Clean Air Act in 1970, and several others to address water, energy, pesticides, hazardous wastes, and endangered species (Robertson, 2014).

In the past decade, municipalities incorporated climate actions among the objectives and improvements targeting the built environment. Since 2005, hundreds of U.S. mayors opted to sign the “U.S. Conference of Mayors Climate Protection Agreement”\(^6\) drafted and endorsed by the 73rd annual U.S. Conference of Mayors meeting in Chicago, committing to reduce climate impacting emissions in their respective jurisdictions to seven percent below 1990 levels by 2012 ("The U.S. Mayors Climate Protection Agreement," 2005). Municipalities observed that action was not being taken at the Federal level and over six hundred cities and towns in the U.S. opted to create their own policies aimed at reducing the impact of the built environment (Millard-Ball, 2012). Stated objectives of these policies focused on the intention to make good on climate

action commitments and make urban environments more energy- and resource-efficient, healthful and appealing\(^7\).

Although climate change law is related to notions of environmental sustainability, these two categories of policy action differ in focus. Sustainability development law works to reduce negative impact on the environment based on the way land and infrastructure are shaped to support economic development. Sustainability policy takes the form of regulation which reduces the use of resources, including natural resources and precious natural features such as wetlands, reduces pollution, reduces damage by storm water runoff, and drives the development of healthier environments. In comparison, climate change regulation strives to limit greenhouse gases through mechanisms such as trading markets which address network externalities by incorporating carbon impacts into prices, taxes on carbon, constraining energy options and reducing emissions by targeting their sources (Nolon & Salkin, 2011).

Climate change action plans adopted by states or municipalities incorporate regulations specific to the development or management of the built environment. For local governments in the US with climate action plans, the plans are used at the strategic or overarching policy level. Climate actions and their measurements focus on reducing climate-impacting emissions in regulated areas. These plans set targets for emissions reduction, establish measurement practices and lay out initiatives designed to achieve reductions. Recognizing the significant impact that occupation of built environments has on urban emissions, actions often include extensions of

\(^7\) [http://www.epa.gov/statelocalclimate/local/local-examples/action-plans.html](http://www.epa.gov/statelocalclimate/local/local-examples/action-plans.html)
traditional building regulations – such as building codes or zoning ordinances – to limit the greenhouse gas production caused by building development, and to require completed building projects to be more energy efficient through design and construction innovation.

If a climate action plan proposes mandatory building regulation, its implementation becomes the charge of a city agency or legislative body which enacts an ordinance or other formal enforcement mechanism. At the same time, the climate action plan itself, while lacking in regulatory force, nevertheless influences the marketplace and drives practice change by increasing awareness and local knowledge, shaping consumer preferences, or raising the issue and promoting the topic in the public discourse (Millard-Ball, 2012).

In some cases, the building code enhancements resulting from climate action plans or executive intention focus on energy conservation. Regulations may require compliance with green building policies and proscribe design characteristics understood to be resource-efficient, such as the use of building products which have been identified or certified as sustainable, or the use of renewable materials, sustainable construction methods, commissioning – fine-tuning of building systems, efficiency levels, or sustainability reporting.

The narrative about the objective and urgency of climate action which is employed to build public support for climate action plans reminds the public of the degree to which urban elements, such as building occupation, use energy, observe the migrate trends into and within regions of the city, the aging of city building stock, the need to improve building and infrastructure efficiency, and note the effect of the interaction of buildings with public systems for transportation and utilities.
Policies resulting from climate action plans often include incentives for specific types of development, formal restrictions and building codes, driving change in land use, design, construction and operation of new and existing buildings. In a limited number of cases, policies have been challenged legally. However, the number of green building requirements in U.S. cities is growing and some communities are enacting second or third generation policies with increased stringency.

The economic recession reduced the activity of new construction in the U.S and shifted industry focus toward renovation or retrofit of existing buildings. A Pike Research report calculated that the North American market for energy efficiency retrofits equaled $16.8 billion in 2011. This report identified a number of drivers for investment, including cost reduction, societal pressure, and marketability of real estate assets, i.e. to attract tenants or buyers. In addition, the report classified market participants into four categories with the largest category, 44% of the market, labeled “reluctant participants” driven to invest due to code and standard compliance. The report identified a range of local, state and federal policy approaches across the U.S., including building and energy code regulation, green building rating programs (such as formal LEED certification or “certifiability”, which refers to an internal process of demonstrating how building projects meet the requirements without formal certification), public promotion such as the 2009 White House GHG reduction commitment, federal tax deductions, support for research and education, performance contracts, benchmarking and financing programs (Schoonover, 2012).
In 2013 The American Council for an Energy Efficient Economy conducted a study of the energy efficiency programs of major United States cities. Among the factors which contributed to the city by city ranking, building efficiency was studied in terms of five metrics – residential and commercial code stringency, code compliance efforts, incentives/requirements for efficient buildings, for retrofits or for energy audits, benchmarking requirements, and the availability of programs and services to support efficiency. The point value for building policies was 29% of the overall city energy efficiency scorecard. Building policies contributed the largest point total of the five factors for the energy efficiency score of 100 potential points, reflecting the impact that the built environment has on urban energy efficiency. The other four factors were transportation policies (28%), energy and water utilities and public benefit programs (18%), local government operations (15%) and community-wide initiatives (10%) (Mackres, 2013).

Boston

The history of climate action in Boston can be traced back to 2000, when the city enlisted in a campaign to further climate protection sponsored by the International Council for Local Environmental Initiatives, or ICLEI8. The following year, Boston convened an Energy Advisory Committee to focus on reducing municipal energy usage. In 2002, the Mayor of Boston, Thomas M. Menino convened a Green Building Task Force with members from building finance, design, construction, management and building operations and maintenance. In this same year, the city constructed the first green municipal building, the George Robert White Environmental

8 www.iclei.org
Conservation Center, which achieved a Silver Designation in the United States Green Building Council’s (USGBC) LEED (Leadership in Energy and Environmental Design) rating system for green buildings.

In 2004, Boston’s Green Building Task Force released a report, recommending green building actions including education and awareness, incentives, planning and leadership, expansion of design teams to include sustainable expertise from engineering and construction professionals, finance programs to support green building development, business/economic development programs, and a formal effort to incorporate standards and measurement starting with the application of the USGBC’s LEED rating system.

The recommendations included the first municipal LEED zoning requirement in the United States. City-sponsored development, including projects which receive city financing or land disposition, were required to demonstrate how they were capable of achieving LEED certification and city facilities would be built to a level of sustainability equivalent to LEED Silver. Recommended also was legislation to make green building tax credits available, and a revision of city proposal processes to award additional points for LEED expertise and proposals.

In 2005, Boston signed the U.S. Mayors Climate Protection Agreement and committed to meeting or exceeding Kyoto Protocol targets for reduction of greenhouse gas emissions.

In 2007, the Boston Zoning Commission adopted a formal Green Building provision known as Article 37\(^9\), which amended the city’s zoning code and required all building projects

\(^9\) [http://www.cityofboston.gov/images_documents/1-1-07_art_37Boarddraft_tcm3-2720.pdf](http://www.cityofboston.gov/images_documents/1-1-07_art_37Boarddraft_tcm3-2720.pdf)
over 50,000 square feet to be built according to the LEED certification standard. The requirement was called “LEED certifiable”, since project teams would comply with this requirement by documenting compliance with the city and were not required to receive a formal notification of their compliance from the USGBC.

In 2009, the city convened a Climate Action Leadership Committee, which produced recommendations for actions to address climate change in a 2010 report “Sparking Boston’s Climate Revolution”. The city passed the proposal to enact the Stretch Energy Code, a state level program which connected support programs to communities willing to require stricter energy efficiency regulations for all new buildings. In 2011, Boston published an updated climate action plan, “A Climate of Progress”. In 2013, Boston passed the Building Energy Reporting and Disclosure Ordinance (BERDO)\(^\text{10}\) which required large and medium sized buildings to report annual energy and water use to the city, and required the city to make this information publicly available.

New York

In the ACEEE’s 2013 report, New York City tied with San Francisco for third overall most efficient city, with a point score of 69.75 points out of 100. The city is a leader in green building policies, receiving 22 out of 29 possible points. New York released the first climate action plan, PlaNYC, in 2007, a product of over twenty-five city agencies in discussion with

\(^{10}\) [http://www.cityofboston.gov/eeos/reporting/](http://www.cityofboston.gov/eeos/reporting/)
academic, business, civic and community partners. The plan, originally overseen by the Mayor’s Office of Long-Term Planning and Sustainability now working with the Office of Recovery and Resiliency for implementation, outlined initiatives to meet the plan’s goal of reducing carbon emissions by 30 percent by 2030. According to the PlaNYC overview\textsuperscript{11}, an inventory of CO\textsubscript{2}e emissions by sector attributes 75\% of the emissions to buildings including residential (37\%), commercial (21\%), industrial (8\%) and institutional (8\%).

PlaNYC acknowledges three relevant facts - that 75\% of New York City’s greenhouse gas emissions come from the energy used in buildings, that buildings which exist in the city today will comprise 85\% of the built environment in 2030, and that, although there are nearly one million buildings in the city, a significant percentage (45\%) of the energy used citywide can be traced to a much smaller set of 22,000 very large buildings. Because of their significant impact, there is a focus on green building for PlaNYC, and it is outlined in a separate document, New York’s “Greener, Greater Buildings Plan (GGBP)\textsuperscript{12}”. This plan incorporates four regulatory elements and two supplementary components, beginning with a New York City energy code requiring building renovations to comply with the state energy code. Local Law 84 requires that building owners submit annual benchmarking data to the city for purposes of public disclosure. This type of law is also known as a reporting/disclosure law for energy consumption by buildings. Next, Local Law 85 strengthens NYC Energy Conservation Codes (NYCECC) and increases the emphasis on building systems audit and tuning to improve energy performance and

reduce waste. Local Law 87 improves lighting and sub-metering opportunities for energy reduction, so that tenants can have better information about their energy usage. In addition, two supplementary components support increased education to expand the workforce capable of delivering improved energy performance, and to provide financial support for energy efficiency measures from the city’s federal stimulus funding (New York City Mayor’s Office of Long-Term Planning and Sustainability, 2014).

In 2014, New York released the PlaNYC progress report, the sixth annual update describing accomplishments and status toward the plan’s goals. The report includes updates on both the original emissions reduction goals of the 2007 PlaNYC as well as progress on new requirements outlined in the plan for “A Stronger More Resilient New York” 13 reflecting the need for action following the destruction wrought by hurricane Sandy in 2012. According to the Greener, Greater Buildings plan overview, a reduction of 11.7% was achieved in citywide GHG (greenhouse gas) emissions between 2005 and 201014. The report attributes this emissions reduction to two factors – increasing reliance of cleaner electricity and steam generation technologies, and community usage reductions through building efficiency. The overview document ascribes some of the success of the program to the participation of partners, to education and training for building industry groups, financing support through a newly formed corporation focused on energy efficient finance, information and data provided by utilities to inform decision-making and benchmarking.

Evaluation of adoption and effectiveness

Across many jurisdictions, researchers have begun to look back over nearly ten years of climate action plans and assess the degree to which these policies have been progressing toward their objectives. Stone, Vargo and Habeeb projected likely effectiveness of climate action plans in terms of their ability to address urban warming effects for the fifty most populous metropolitan areas of the U.S. The researchers used time-series temperature trend analyses and compared the emissions control and heat management strategies proposed in climate action plans and determined that the climate actions plans might fail without greater focus on land-based warming mitigation (Stone, Vargo, & Habeeb, 2012).

Although climate actions plans respond to the overarching objective of reducing greenhouse gas emissions, researchers comment on the challenges inherent in using emissions as a measurement of effectiveness. Millard-Ball, as an alternative, studied the 2008 data provided by 478 incorporated cities in California and assessed policy effectiveness as positive impact on energy, waste, and transportation as indicated by eight quantitative variables, including dollar volume of expenditures, counts of ordinances and programs for sustainable building and infrastructure, and worker percentages engaged in transit sharing (Millard-Ball, 2012).

At the same time, policymakers who craft regulations impacting real estate are mindful that building codes and enforced standards have economic impacts, affecting the marketplace for building products and services. As policy approaches such as building codes, zoning ordinances and other forms of regulation evolve, individuals and corporate entities who aspire to success in
the real estate marketplace adapt to changing market conditions and adopt new practices to meet new requirements.

Legal Issues

In 2008, a legal challenge arose to the enforcement of certain provisions of the green building code in Albuquerque, New Mexico Air Conditioning Heating and Refrigeration Institute v. City of Albuquerque, No. 08-633 MV/RLP, 2008 WL 5586316. The Air Conditioning Heating and Refrigeration Institute, a trade association representing individuals and companies engaged in manufacturing, distributing and installing building products for heating, ventilation and air conditioning (HVAC) systems, objected to the prescriptive compliance path outlined in Volume I of city’s energy conservation code which applied to commercial and multi-family buildings as being preempted by federal legislation. In 2010 and in 2012, the court agreed that the provisions of the Code affecting the selection of equipment and products were preempted as a matter of law.

A different decision was reached in the case of BIAW et al. v. Washington State Building Code Council\textsuperscript{15}, which similarly dealt with question of conflicts between state and federal law. In this case, the court sided with the defendants and allowed that state and local governments can set energy efficiency targets for building projects which exceed federal standards, provided there are other means by which to achieve the targets with products which meet federal standards.\textsuperscript{16}

\textsuperscript{15} BIAW v Washington State Green Building Council

Besides the issue of preemption, other legal considerations which influence whether jurisdictions are met in the courts with resistance to green building regulations include questions of antitrust, non-delegation of authority, incorporation by reference, and enforcement and liability (Steinman, 2009). As communities move beyond incentive policies to push the built environment to higher levels of green, legal analysis of the prospects for adoption of model building regulation by municipalities confronts three predominant regulatory approaches which communities have adopted – a green building requirement defined by a third party rating system (such as the USGBC’s LEED), a model green building zoning ordinance, or a form-based prescriptive building code - and suggests there are issues of private delegation, inconsistency, inadequate expertise, standards disagreement, local variability, and exclusionary input which may interfere with future implementation (Wolf, 2011) (James, 2010). A 2013 study on city energy efficiency by the American Council for an Energy-Efficient Economy included a scoring of the 34 most populous cities in the United States according to the energy efficiency policies for both municipal and private buildings. The study found that 13 of the 34 cities studied achieved above average scores for their building policies based on superior code stringency, enforcement and compliance, efficient building requirements and incentives, energy use benchmarking, rating and disclosure (Mackres, 2013). The study also pointed out that all cities, including top-rated Seattle, have room to improve in making their building policies more energy efficient. As cities move to enact new building and zoning codes, benchmarking and other green building policies, companies which provide the services to renovate, retrofit, design and construct buildings will need to adopt new practices in order to meet increasingly stringent requirements. This study focuses on the perceptions and business practices of real estate companies and their consultants
and collaborators in the building process, as these companies adapt and devise new methods and approaches to completing daily work and behaviors to accommodate new and increasingly regulations.

**Practices**

To understand the impact of green building policies, this study focuses on the business practices and perceptions of real estate companies which work in collaboration with consultants in the building process, and digs into the factors which influence these perceptions to better understand how policies are connected to the forces driving or inhibiting practice change. Business practices include the methods and approaches to completing daily work, along with the behaviors and decision-making processes which underlie investment in capital projects to renovate or create new buildings.

Company strategies are relevant to the study, in order to observe the way policy change impacts both high-level direction and the translation of that direction into tactics or practice. A company strategy defines an industry role and incorporates awareness and intention to act based on the strengths and weaknesses of the company. It is generally assumed that business practices are derived from strategies determined by a company’s leadership – CEO, President or Division Heads. Company strategy is defined in eight primary areas - industry role (what the company does and for which customers), brand (customer focus and positioning in the marketplace), core competency (company capabilities), growth and deployment (company focus on markets,
products and customers segments), profitability (efficiency and methods to achieve positive
returns from costs), organization (company roles and internal accountability), capital (resources
to fund opportunities), and cycle approach (response to market volatility) (Hewlett & Kaufmann,
2008). Strategy drives prioritization as it articulates the intention of the company. Strategy also
serves as a backdrop against which decisions are evaluated and assessed. To support
interpretation of the interview feedback which was gathered in the study, dominant concepts and
theoretical frameworks from business research were considered.

A key strategic consideration for commercial real estate companies is the way that they
manage risk, which can include the risk of investing large amounts of capital to complete long-
term construction projects in marketplaces of uncertain returns, as well as the risk of operating
completed buildings in a dynamic market for tenants (Hewlett & Kaufmann, 2008). As policies
which govern real estate development evolve, they affect the risk of executing a project, either
because additional investment will be needed to make projects comply with emerging
regulation, or because regulation will impact the demand for a real estate product, or the supply
of buyers or tenants for the product. Regulation may also impact market thickness, by
constraining opportunities for companies to participate in the market, to create, buy or sell assets.

The commercial real estate company strategy considers decisions in terms of the business
concept of the “value chain” – a progressive set of linked actions completed by different groups
within the company itself so that its product successfully offers something of value to the
marketplace. An effective sequence of related activities, a functioning value chain, is necessary
for a company to receive rents, or payments, leading to profitability and sustainability of the
business (Porter, 1998). These standard business activities include the design, production, distribution, marketing, sales and support of a product (M. A. O'Mara, 1999). Research has identified three basic competencies which drive business performance in an industry – the ability to deliver a product at the lowest cost (cost leadership), the ability to deliver a unique product which is recognized by the marketplace as such (differentiation), and the ability to successfully deliver a product within a focused niche (narrow competitive scope) (Porter, 1998).

The perspective of the value chain is also relevant to corporate real estate, the business function internal to a company which is charged with managing physical property assets to support operations, as opposed to commercial real estate which primarily derives profit from the rent or sale of assets. Corporate real estate may be organizationally perceived as a cost center within a company and less of a strategic asset (M. A. O'Mara, 1999). Corporate real estate professionals are charged with managing their contribution to the value chain of company performance, including mapping company strategy to space needs and developing and maintaining facilities (Davis & Facilities, 2000).

The value chain of internal activities is supported by the actions of related organizations which join to form a value network (Biem & Caswell, 2008). In real estate, many critical business practices necessary to producing a building product with value to tenants or real estate buyers – architectural or interior design, mechanical or structural engineering, construction management, fabrication, assembly and installation of building components, building systems commissioning, brokerage, and specialized consulting – are executed by other companies. As these companies aggregate to form a production ecosystem of interconnected and interdependent
companies, the business practices which ensure the functioning of the production ecosystem to deliver newly construction buildings or renovations are key elements to success. (Roulac, 1999)

A focus of this study is to understand how this practice change crosses the boundaries of the companies which form the production ecosystem.

Research into the propagation of practice change in the form of new technology investment suggested that a firm’s ability to realize value or become profitable when changing practices is dependent on the transformations which occur (such as new investment or activities) in the companies which complement the work of others in the ecosystem (Kapoor & Lee, 2013).

At its core, however, the production ecosystem is driven by a development process initiated by the developer/owner/client who secures real estate finance, evaluates land for acquisition, establishes pro forma models which calculate and determine project feasibility, manages resources and tasks within budget and schedule, funds projects through work with the capital markets, manages the entitlement process, reduces the risk of project completion, and manages cash flow. Real estate professionals routinely project business performance using traditional practices which include financial calculations which predict and assess projects in terms of financial viability, such as the total return\textsuperscript{17}, the cap rate (capitalization rate)\textsuperscript{18}, or the discounted cash flow rate\textsuperscript{19} (Geltner, 2007) (Linneman, 2004).

\begin{itemize}
\item \textsuperscript{17} Total Return calculates the overall projected income from the project
\item \textsuperscript{18} Capitalization Rate is calculated from the operating income to be derived from a completed project divided by the value of the asset.
\item \textsuperscript{19} Discounted Cash Flow Rate calculates future cash flows from a project as a series of amounts discounted based on the anticipated change in the value of money in the future.
\end{itemize}
II. THEORETICAL BACKGROUND

Policy Assessment

The fundamental question of this research is whether green building policies are effective in stimulating practice change in the production ecosystem which constructs the urban built environment. General theories about measuring the effectiveness of policy begin with policy analysis, which is the study of policy as an independent activity, related to but distinct from individual disciplines such as political science, sociology, or economics (Dunn, 1981). Policy analysis strives to clarify an underlying problem and “produce and transform policy-relevant information that may be utilized in political settings to resolve policy problems” (Dunn, 1981). Dunn’s proposed framework for policy analysis lays out three approaches – an empirical approach which asks “Does it exist?”, “What are the facts?”, an evaluative approach which asks “Of what worth is it?”, “What are the values?”, and a normative approach which asks “What should be done?”, “What actions are called for?”. This study is aligned with the first of these approaches, asking “What are the facts?” or “Does the desired behavior, i.e. practice change, exist” in the production ecosystem which constructs the built environment in cities? Dunn lists five categories of policy-relevant information – problems, alternatives, actions, outcomes and performance. This study focused on the outcomes as expressed by one specific group which was affected by green building policy, real estate developers and corporate real estate professionals. In further describing the ways that policy outcomes can be studies, Dunn distinguishes between
outputs and impacts, the latter of which are the changes in behavior and attitudes which are the primary subject of this research study.

Bardach provides a guide for policy analysis, which reflects on the complexity of the systems which are impacted by policy, and their dynamic nature. It is often the case that a social system which a policy is meant to change, for example green building policy which aspires to drive a set of economic actors to new practices and behaviors, is complex, only partially understood, and highly dynamic (Bardach, 2009). There is a need to go beyond the surface characteristics of such a complex system to increase our understanding of its dynamics. This study proposes to start the process of understanding a complex system by eliciting the real estate perspective on the forces at work, and sketching out the initial dynamic forces spanning from policy to marketplace.

The interplay between positive and negative forces in federal regulation is studied by Baumgartner and Jones, who conclude that the notion of equilibrium-based explanation of policy change has limited utility, since invariably aspects of policy are subject to positive feedback, negative feedback and change. The researchers mention the application of “extreme value theory” which strives to quantitatively account for large scale fluctuations through statistics. This notion underscores the need to understand the sources of influence, cause and effect, on behaviors at the level of individual contributors with initiator roles in the process of building design, construction and building operations, namely developers and corporate real estate professionals (Baumgartner, 2002).
Reason and Purposes for Constructing Models

In order to understand influence and behaviors from the perspective of specific individuals, the study starts with the concept of mental models which have been identified as salient factors in business decision-making (Cyert & March, 1992; March, Simon, & Guetzkow, 1993), including specifically in the field of real estate investment decision-making. (Jaffe, 1979).

The importance of mental models as a means of representing the complexity of the world was explored early on by Johnson-Laird, who incorporated the idea that models include theories about the world and that each theory should be capable of being described as an effective procedure (Johnson-Laird, 1983). Johnson-Laird referred to a doctrine of mental logic and reasoning based on propositions. In addition, representations were believed to be computable, or expressed in the form of logical premises and deductions. This supports the notion that the mental models of individuals in professional real estate roles contain notions about the causes and effects of actions, based either on training, mentoring, or firsthand observation of cause and effect throughout their personal experiences. The framing of the study is based on the notion that the mental models of real estate professionals can be glimpsed through their perspectives on their experiences, and on the specific impacts that green building policy changes have had on their work and their expectations.
Regulation and Corporate Behavior

The research on regulation and business is the primary context for this project. The standard instruments for public policy are laid out in a useful framework by Linder and Peters (1990) – instruments range from direct provision of public resources to taxes to certification or licensing restrictions. Green building policy spans the full range of these approaches, which makes it a useful candidate for research. Policy evaluation research utilizes methods of assessment including degree of adoption, quality, attainment of stated goals and objectives, or cost/benefit analysis. As designed, policies are often based on models of economic ideals, although policy theory suggests that assumptions about utility maximization don’t always accurately predict behavior (Schneider and Ingram 1990). Research on the dynamic aspects of policy (Baumgartner and Jones 2002) suggests the value of applying qualitative research and causal mapping techniques to better understand mental models of decision-makers in this rich context.

The impact of policy on business has been studied by a number of researchers. Clarke (2000) looked at the history and nature of regulation and the impacts on firms. Nijsen’s (2009) research has looked at compliance in terms of cost and benefits. Johnstone and the Organisation for Economic Co-operation and Development (2007) focused specifically on the way environmental regulations affect corporate behavior, and added a perspective of the impact of the inner workings of the firm. This research project will extend this body of work through the development of a theory about the mental models and decision-making frameworks of industry
participants based on stated responses, insights and observations about the impact of regulation specific to green buildings.

These policies represent significant social, environmental and economic impacts on individuals, businesses and communities. Their effectiveness hinges on the informed participation of businesses which invest in the urban environment through new construction, renovation or modification of operational processes. J. F. DiMento (1986) identified a general framework to describe the interaction of policymakers, businesses and support groups through environmental policy adoption. He described a dynamic system of relationships between Government Regulators (policymakers and enforcers), Business Targets of Compliance, and Support Groups. Key factors identified by DiMento include the application of clear, consistent communication so that businesses understand policy requirements, along with continuous, adequately-funded enforcement. There is a need for greater understanding of the dynamics of the policy-business interaction, and also a confirmation of the impact that communication and enforcement actions have on capital investment decision-making processes in businesses which are ostensibly driven by formal analyses of risk and return (DiMento, 1986). This is especially critical as a wave of code changes oriented toward green buildings is under consideration by cities and states.

Climate mitigation policy aimed at regulating the physical form of the urban environment directly impacts the practices of business professionals in real estate development and in the allied businesses which create buildings – architects, engineers, contractors and product suppliers (Miller & Geltner, 2005).
Investment Decision-making

A significant body of research has focused on the factors and influences which underlie decision-making. The Theory of Reasoned action (TRA), which has been broadly applied in a range of social and business situations, is of particular interest to the issue of professional decision-making in complex situations (Fishbein & Ajzen, 2010). TRA posits that human behavior is the outcome of a sequence of factors which begin with the background of the individual – personal, social and information access. Stemming from background and situational factors, the theory next considers three prominent categories of belief on the part of the decision-maker – behavioral, normative, and control. The behavioral belief is the decision-maker’s conviction that a specific outcome will be achieved as a result of the behavior. The degree of conviction or strength of the belief is included in this factor. The normative belief is the conviction that it is good to comply with the behavior. The control belief is the conviction that the individual has the power to execute whichever behavior is decided.
Each belief factors into the attitude of the individual toward the behavior. Behavioral belief influences the attitude toward the behavior, whether it is perceived positively. Normative belief influences the perception of norm, i.e. whether the individual perceive the behavior to be standard practice. And the control belief influences whether the individual perceives themselves acting in the desired way, with the capacity and support or independence to do so. These three factors influence the individual’s intention towards the behavior, which in turn results in the individual executing the behavior. Some additional control factors – whether the individual actually possesses the skills, abilities, or external support to execute the behavior – are also factors influencing the final outcome.
E. Ellinger et. al. employed the Theory of Reasoned Action in a study of the impact of investment in the organizational human resources on the commitment of employees to their jobs and employer. The researchers observed the fact that there are a range of dynamic factors which catalyze the steps from background to beliefs to attitudes and norms and ultimately to behavior (Ellinger et al., 2013). Venkatesh et. al. applied the Theory of Reasoned Action in the context of consumer acceptance and use of information technology. This research team tapped several adoption theories in addition to TRA to formulate a unified theory about technology acceptance and use which they termed UTAUT (Unified Theory of Acceptance and Use of Technology) and UTAUT2 in a later study. Although the technology acceptance model focused on a different population – consumers in Hong Kong – the study provided insight into the question of changing habits in a time of dynamic change for requirements and options (Venkatesh, L. Thong, & Xu, 2012).

The adoption of new practices in the real estate industry incorporates aspects of technology-driven disruption, since the imperative to meet increasingly stringent requirements for reduced energy consumption, increased daylighting, reduction in toxic materials, improved air quality and other building occupation factors can only be satisfied by technology innovations and alternatives to traditional practice. Trkman and Turk extended the work of Venkatesh et. al. to the issue of broadband, e-government and e-commerce services adoption. In their research, their focus moved from the decision-making of individual consumers to a structured analysis and factor identification of the causal relationship between factors, among which was governmental policy interventions. The researchers developed a conceptual framework for broadband and e-
government adoption which included the notion of cause and effects between factors. (Trkman & Turk, 2009)

The degree of impact of social norms formed from professional training, workplace mentorship, or incentives, or continued identification and education as a member of a particular professional group is an aspect of the study. Venkatesh and Davis (2000) built social influences into the concept of subjective norm in their second generation model of technology adoption. Other researchers have studied this factor and determined it to be significant in cases of technology adoption. Given this track record of research in technology adoption, it would be promising to extend this body of research with a study of the impact of the social factors influencing adoption in the form of business practice change.

In addition, the literature on decision-making cited above suggests the value of investigating how established models are applied in situations of regulatory change and how behavioral or values-based factors come in to play as these models evolve in the context of real estate practice change. An important area of research context is the body of research on decision-making and investment behavior. (Keren, 2011) clarifies the links between cognition and language and emphasizes the importance of “Decision Framing” as a key concept. Decision-making research suggests that the way decisions are framed has an impact on the behavior of decision-makers. Given the long-term nature of real estate development, such investment decisions are core to business strategy. One approach to strategic decisions research divides the topic into content research – the ‘what’ of strategy – and process research – the ‘how’ of strategy (Papadakis, 2010). In addition, a theoretical framework on the analysis of change processes
which result as an outcome of social influence through compliance, identification and internalization. Kelman suggests the value of inquiry into the impact of communications on whether individuals choose to conform to diverge from established norms (Kelman, 1958).

Because management of risk is a primary responsibility of real estate investment, the interpretation of policy in the context of risk assessment associated with regulatory change is an aspect of the research. The link between risk-taking and behavioral decision-making was explored by (P. a. D. R. Bromiley, 2010), who examined the behavioral theory of the firm, behavioral decision theory and agency theory. Researchers found that decision-making did not necessarily follow the expected pattern of problem definition, diagnosis, solutions-development and assessment, suggested the value of different approaches – thinking first, seeing first, and doing first – depending on the specific problem at hand (Mintzberg & Westley, 2001). Similarly, March considered the differences between rational choice and identity, who the decision-maker is, underscoring the importance of learning more about the individual and the context, including values and history, to understand their impacts on specific decisions (March & Heath, 1994).

**Mental Models and Dynamic Systems**

A related concept which the research will explore is whether a more holistic perception of the relationships between the work of development corporations, the regulatory environment and the marketplace impacts the way decisions are made and the eventual outcomes and effectiveness of policy. An important theoretical framework which has been applied successfully to describe and predict complex social, economic and environmental systems over time is system
dynamics modeling, which was first applied to social systems in the context of operations research (Forrester, 1961). System Dynamics Modeling matured over the past few decades as a method of discovering and representing feedback processes which influence the actions and changes in complex systems.

The project includes an application of causal mapping to business strategy. Models of real estate and construction which appear in the System Dynamics Modeling literature support the value of applying causal models to this specific industry (Sterman, 2000) (Ford, 2010). Causal or system dynamic models of the intersection of green building policy change and real estate development have not yet been developed. Texts covering model-building in groups (Vennix, 1996) and in communities focused on environmental issues (Van den Belt, 2004) provide context for structuring causal mapping sessions to gather data for the research. This study applies qualitative coding procedures to the development of causal maps of mental models, adopting a method of coding and identification of causal references which system dynamics modeling researchers have applied in other policy and economic contexts, including that of the Federal Reserve economic policy discussions and of floodplain management (Kim, 2012) (Deegan, 2011).

Industry Practices and Norms in Real Estate

The field of real estate development has, over time, evolved more rigorous standard practices pertaining to investment and project execution. Prior to 1960, the field of real estate investment lacked a development methodology for evaluating real estate investment property. There was a need for better understanding of modeling and theory building at that time.
Practitioners now have access to a range of standard tools and methods to support analysis of business alternatives and decision-making. These methods include a number of financial calculations which compare parameters such as a loan to value ratio - the dollar value of the loan required to complete a project compared to the expected value of the asset. Researchers have compared these financial measurements to project outcomes, such as revenue, and come to conclusions about which variables shed the most light and most accurately predict project profitability and success (Jaffe & Sirmans, 1995) (Jaffe, 1979; Jaffe & Sirmans, 1982).

Industry practices in real estate suggest that decisions are made according to established rational models and processes. The literature of real estate development practices provides a useful set of tools and calculations for investment evaluation (Lindholm, 2008) (Miles & Urban Land Institute., 2007). Economic models for real estate markets in urban settings provide a useful context for development of system dynamics models which capture the elements of these complex systems and their interactions (DiPasquale & Wheaton, 1996).

References in real estate economics (Geltner, 2007) and market analysis (Schmitz & Brett, 2001) suggest how specific projects should be evaluated in terms of risk and potential reward as investment opportunities. (Long, 2011) (Sah, Gallimore, & Sherwood Clements, 2010) and (Lützkendorf & Lorenz, 2007) conducted research on the process of investment decision-making which provides insight into the ways that real estate investment decisions diverge from established practices such as Markowitz portfolio theory20, and are impacted by non-financial

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20 Modern Portfolio Theory is a theory about how portfolios should be optimally constructed.
parameters (Markowitz, 1952). The backdrop of assessment and professional practices, including financial modeling, projection and evaluation, are important contexts for discussions with real estate industry participants. Behavioral theory for questions of capital asset investment has been studied in the context of corporate real estate decisions made by manufacturing companies under environmental regulation (P. Bromiley, 1986). A comparable study of which includes real estate developers in the context of green building policy is needed to expand this discussion, and a qualitative investigation yielding insights about behavioral factors would augment the body of work based on quantitative studies.

**Market Transformation**

The final idea which informs this study is the concept of market transformation, which has been defined as a policy objective to drive changes in energy industry and increased adoption of innovations termed “clean”, such as solar, wind, biofuel-based energy disassociated with climate impacting greenhouse gas emissions. Researchers have begun to approach market transformation with theories connected to the idea of ecosystems of interlocked providers. There is an opportunity for this research to study the concept of market transformation within the production ecosystem of real estate companies, architects, engineers, contractors and interlocked providers for the buildings in urban environments (Blumstein, Goldstone, & Lutzenhiser, 2000).
III. RESEARCH DESIGN AND METHODOLOGY

This study investigates the way green building regulation affects industry practices in the design and construction of major buildings in urban environments. Commercial or multi-family residential construction is executed by groups of companies with specialized expertise. It is comprised of many disciplines, including architecture, engineering, interior design, construction, sub-contracting, finance, brokerage, building product manufacturing and specialized consulting. A study of real estate development is confronted by the complexity of the design, construction and asset management process, which is executed as a collective undertaking by a group with many perspectives. One way to gain insight into this process is to focus on a single group in order to develop a theory about the overall system through their perspectives. In order to gain insight into the workings of this complex industry sector, this research focused on the business practices and perspectives of one set of especially influential actors – the individuals with authority, accountability and resources to launch and complete projects. The scope of this research project was limited to gathering data directly from individuals in real estate roles - individuals with authority to make decisions and to respond to policy and regulation changes within their professional responsibilities – as opposed to the other professionals active in the process of delivering completed buildings or renovations to a client, owner, potential customers or occupants. The research focused on the changes in practices and perspectives of real estate developers who produce new buildings or renovate existing buildings in urban environments.

The two primary areas of focus which drove the grounded theory research direction were understanding the thoughts and actions of real estate professionals given changes in green
building policy, and

understanding the real estate professional’s perceptions of economic and social systems, in other words, the context for these changes.

Empirical data consisted of expressed perspectives of individuals with authority to make real estate decisions. By gathering the perspectives of professionals working in organizations which initiate and complete urban building projects - real estate developers or corporate business entities charged with overseeing real estate – this research proposed a theory about the interactions between policy and market factors in this economic sector.

The principle research questions addressed by this study are:

RQ1: How is the system of policy and market forces perceived by individuals who execute urban development or renovation projects?

RQ2: How do professional attitudes, beliefs and norms impact the decisions and behavior of individuals experiencing real estate practice changes related to green building policies?
RQ3: In businesses which affect the urban built environment through property development and management, how do individuals respond to green building regulation?

Sub-question: “How do prominent categories of green building policy – permit streamlining, financial or tax incentives, building rating requirements, performance-oriented building codes, and benchmarking (building energy asset labeling/disclosure programs) – affect the way individuals practice their work?”

**Grounded Theory**

To gain insight into the nature of practice change and formulate a theory about policy impacts, the research method known as grounded theory was selected because it offered an opportunity to derive a theory from qualitative data. Grounded theory method (GTM) was developed by Barney G. Glaser and Anselm L. Strauss nearly fifty years ago (Glaser & Strauss, 1968) and the method has been applied to many research areas, including questions of corporate activity and management decision-making which are related to the focus of this study (Goulding, 2002). GTM provides a means for researchers to build theory in a topic area which has not yet been thoroughly investigated. Academic studies have investigated real estate in many aspects - including studying approaches to valuation (Wang & Wolverton, 2002) and economics of real estate investment decision-making (Sah, 2011), and behavioral research in property management (Diaz, 1999). Qualitative research into the observations and perspectives of real estate
developers provided insight into decision-making in corporate relocation (M. O'Mara, 1999), and delved into the strategy and structure of real estate in the retail sector (Gibson, 2001). A mixed method approach was employed in a study of practitioner views about real estate risk assessment (Khumpaisal, Ross, & Abdulai, 2010). However, a grounded theory study of professional response to building policy change in the real estate community, and specifically to green building regulation, has not yet been published. The grounded theory method is well suited to this study.

As opposed to other research methods where data-gathering follows the articulation of a hypothesis, with GTM the researcher constructs a theory about categories and relationships in parallel as data is gathered. The core elements of grounded theory practice are empirical observations combined with coding, memos, categorization of qualitative data, comparisons across categories, and simultaneous theory-building. This approach to qualitative research has evolved over the past decades. The method of grounded theory was expanded by a number of researchers, and the term grounded theory is now applied to several methodological variations based on the specific steps by which analysis is conducted and the consideration of the researcher’s knowledge and/or bias in the analysis of data. (Strauss & Corbin, 1997) (Charmaz, 2006) (Clarke, 2005).

Causal Mapping

Practitioners in real estate make decisions based on an understanding of the likely consequences of specific actions, based on their professional training and experiences. A theory
about the impact of policy on real estate decisions benefits from insights about ways practitioners conceive of the economic and social systems within which they operate to achieve their objectives. The concept of mental models and the value of representations of these models in the form of images or diagrams has been demonstrated through research, which defined types of mental representation such as “strings of symbols that correspond to natural language, mental models which are structural analogues of the world, and images which are the perceptual correlates of models from a particular point of view” (Johnson-Laird, 1983). The human tendency to abstract complex physical or social systems into simplified representations - models or maps - aids in understanding and provides a framework for decision-making. The types of maps applied in social settings range from maps which identify concepts and associations, to those which show causality, to those which structure argument and conclusion and more complex relationships.

A causal map or causal loop diagram (CLD) is a method of depicting relationships as they are understood in mental models. A causal map will show resources or factors as nodes connected by vectors representing influences or impacts. For example, a simple causal map might illustrate the relationship between food consumption and an impact on appetite.

![Figure 2 - Causal map of food and appetite](image-url)
The minus sign in the diagram suggests a mental model for an inverse relationship between food and appetite – namely that as one consumes food, a drop in appetite results. The diagram by itself is not sufficient to tell the entire story of the relationship between these two elements of the system. It needs to be clearly explained so as to avoid misinterpretation. If the arrow represents the quantity of food in view and accessible as opposed to food consumed, then the impact on appetite might be the opposite. In other words, the more food one has available, the more one’s appetite might be perceived to grow.

Causal mapping is particularly useful in understanding systems where factors or resources interact in complex or unanticipated ways, such as when two factors combine to counteract one another, or to form a feedback loop. Applications of cognitive mapping in the context of complex policy situations incorporated causal assertion and demonstrated impact in decision-making in military and political arenas (Axelrod, 1976).

Causal maps provide insight about the way a system is understood to be organized by the participants. As a technique, causal mapping has been applied in research on issues of management decision-making (Huff, 1990) and technology innovation (Nakayama & Armstrong, 2005). Early applications of cognitive mapping to social situations were based on key assertions – that meaning was derived from contrast and similarity, that individuals seek an explanation of the world, and that the organization of concepts into hierarchies was a means to understanding (Eden, 1988).

Studies of the application of causal mapping in qualitative research suggest that eliciting information from mental models of individuals experiencing a phenomenon could lead to the
creation of useful theories about the system as it is conceptualized by participants and described through focus groups or individual interviews (Luna-Reyes, 2003). A technique for coding cause and effect was drawn from causal mapping studies applied to related situations of policy impacts in natural resources and economic situations, which share aspects of the problem of sustainable buildings which are developed through business enterprises (Morecroft, 2007) (Deegan, 2011) (Deegan, 2009) (Kim, 2012).

**Sampling**

The complexity of real estate development and its impact on the environments in which people live and work suggests that a comprehensive theory should reflect consideration of multiple perspectives - that of individuals with authority to make real estate decisions within their professional roles, those of allied professionals who work in related companies interacting to deliver a completed building product to a client or owner and potential customers or occupants, as well as the views of policymakers, corporate tenants, community leaders and other affected stakeholders. This project aimed to tackle the problem of eliciting a multifaceted grounded theory by studying this complex system through the perspective of a single stakeholder group. This initial foray was proposed to inform the understanding of the overall process, and at the same time yield feedback on the value of the approach and its potential for further expansion to related branches of the overall system in the future.
The scope of this project was therefore limited to gathering data directly from individuals in decision-making roles. The data analysis and resulting theory was based on the expressed perspectives of individuals with authority to make decisions about real estate projects within their authority in positions of employment with organizations active in commercial development. The research focused on those practices undertaken by real estate developers who produce new buildings or renovate existing buildings in urban environments.

A theoretical sampling strategy was employed to gather data from twenty-four individuals in professional roles which enabled them to influence real estate projects in Boston or New York City. The objective of the sample selection was to gather responses from a wide range of individuals so as to yield sufficiently diverse points of view from which to draw theoretical observations. A focus on commercial or large scale residential development (i.e. multifamily) was emphasized so that the sample could reflect the perspective of industry segments critical to urban growth and economic development, and which have been a focus of green building policy. By keeping the industry focus consistent, while varying the sample by firm and interviewee characteristics, geographic location and degree of sustainable project focus, the intention is for the research to yield a theory with broad applicability.

Contacts with industry groups and with individuals in the design and construction industry were leveraged to solicit interviews with professional members in decision-making roles in these two cities. Invitations to participate in research were sent out to individuals identified by position descriptions and corporate affiliations on social networks such as LinkedIn, or by presence on industry panels at real estate conferences and events. As interviews were completed,
snowball sampling was employed to expand the set of interview subjects through recommendations and contacts of initial interviewees to reach a targeted number of over twenty interviews.

<table>
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<th>Geo Focus</th>
<th>Role</th>
<th>Public Green Position?</th>
<th>Interview Format</th>
<th>Public v. private</th>
<th>Organization Size</th>
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Figure 3: Table of interview characteristics, including geographic focus and organizational role of subjects.
The sample included individuals from private companies and from publicly traded companies, individuals connected to corporate real estate departments which served functional roles inside businesses in non-real-estate industries (such as retail, hospital, education, high tech products or services) as well as individuals whose employer’s primary revenues were derived from property leasing or asset sales. In addition, the sample included individuals whose influence on projects was exercised through services, such as brokerage or specialized feasibility consulting, provided to real estate companies. The sample included companies with stated goals or a corporate mission focused on providing sustainable green properties in the marketplace, and companies with no public positioning on sustainability. The demographic characteristics of the sample varied in terms of gender and age, but these factors did not shape the selection of interviewees.

Data-Gathering

The timeline for interviews lasted five months, beginning in May 2014 and running through the fall with the final interviews completed in October. All interview subjects were provided with an unsigned consent form which followed the template provided by the Northeastern University Institutional Review Board. An open-ended interview was conducted with each individual, lasting between thirty to sixty minutes, most lasting an hour. Interviews were conducted in person and over the phone. In all cases, interviews were digitally recorded with permission of the interviewee.
Each meeting commenced with a brief introduction of the project and an explanation of the format of the interview which described assurances of confidentiality and freedom for the interviewee to end the discussion at any time. The interviewer followed an outline of key questions, but interviews varied in terms of areas of emphasis. Interviewees were given latitude to bring up related anecdotes or perspectives. The interview began with questions about the interviewee background and role, general description of the affiliated company and business strategy for customers and products. The researcher focused the conversation on the characteristics of development projects, touching on decisions, decision-making processes with specific questions on the impact of the five primary green building policy types - permit streamlining, financial incentives, third party rating system regulation, benchmarking or labeling regulation, and building codes. The researcher gathered information about each interviewee's perception of the market, trends and issues, including the way regulation affects the business. In addition, the researcher noted when company or industry perspectives were expressed.

Notes were taken during each interview session. Interviews were digitally recorded and transcribed. The audio files were transcribed in one of three ways – by a Northeastern student, by a web-based transcription service, or by the researcher herself. These audio files, transcripts and notes were combined with published documents from each company and memos recording observations to form the complete data record for each individual. All elements of this record were loaded into a computer-aided qualitative data analysis tool for processing21.

Analysis

As a former architect with work experience in design and construction, the researcher was aware that industry experience would be a factor in the approach to the problem. The researcher approached the initial analysis of the data with an open mind, but with awareness that background in the field of study would influence data-gathering, interpretation and analysis. A constructivist approach incorporates awareness of the researcher who interprets and constructs a view of the world as a participant/element of the world being observed (Breckenridge, Derek, Ian, & Margaret, 2012). Ultimately, the GTM variation known as “Constructivist Grounded Theory” aligned with an understanding of the role of the researcher in shaping the results of analysis and formulating theory. In addition, this approach was conducive to the research questions about green building policy response, which takes place within a complex system of interaction between different actors in corporate and governance roles.

Following the protocol of grounded theory, analysis of the data began with open coding. The initial coding pass was done with as few preconceived notions as possible, focusing on the data which addressed the specified issues - general response to green building regulation and to the five different categories of green building policy – codes, financial incentives, permit streamlining, third party rating, and benchmarking. Coding was done “in vivo”, where labels were developed and applied to sections of each interview transcript. By applying in vivo coding, a preliminary set of codes began to emerge. The list of codes was grouped by characteristic and initial approaches to categorization, which related the actors, actions, events, and decision-making, were developed. Ultimately, the open coding and categorization process yielded a
hierarchy with 230 code items grouped into eleven main categories. The main categories were Causes and Effects, Company, Ecosystem, Governance, Groups, Marketplace, Measurement, Policy, Professional, Project Examples, and Sustainable Tactics.

A second pass was based on focused coding where a broader view of theoretical ideas emerged as open and in vivo coding progressed. Focused coding would need to consider both the conditions, actions and consequences as expressed by the interviewees and the prominent conditions of cause and effect. Selective or conceptual codes were derived as the researcher interpreted the narrative data of interview transcriptions. In classical or glaserian GTM, theoretical coding is usually based on a selection from eighteen prominent coding families which ask important questions, such as the 6 Cs (causes, contexts, contingencies, consequences, covariances and conditions), degree, dimension, interactive, theoretical, type, identify-self, means-goals, (social) unit, cultural, consensus and other families (Charmaz, 2006; Glaser, 1978).

The Straussian GTM concept of “axial coding” is a means to organize the fragments identified by open coding into more coherent structures. The use of a well-defined paradigm or framework to guide coding is advocated (Strauss & Corbin, 1998), suggesting that codes will emerge from the data based on specific categories – conditions, actions, consequences. For the purposes of this project, axial coding focused on causality progressed as transcriptions were closely coded for evidence of cause and effect perceptions. Each instance was noted in a cause/effect chart which provided an identifier, a cause and an effect interpretation, and a direct quote of the associated text as evidence. Speakers and affiliations were not noted to preserve interviewee confidentiality. When specific companies or individuals were mentioned, these were
edited into generic forms, such as COMPANY. The researcher interpreted the text based on the context and applied knowledge of the industry to draw conclusions about the cause and effect implied by the speaker. For example, when the interviewee said “So for me it’s an opportunity to be somewhat more daring because I have some equity to spend down”, this was interpreted to represent the fact that “Financial Resources” (Cause) is a condition which leads to (Openness to) Risk (Effect on a Resource).

The constructivist approach to GTM incorporates the notion of axial coding, as well an awareness of multiple social realities which interact to create knowledge and support different interpretations of meaning by different actors (Charmaz, 2000). The researcher worked to retain focus on the experiences and observations of the interviewees and their perspectives on policy’s impact on the real estate development process. At the same time that the study required theoretical inquiry into the perspectives and responses of the real estate developer, it was
important to investigate the characteristics of the dynamic system of cause and effect within with the real estate developer operates. In order to gain insight into mental models and the perception of the system of economic and social factors, diagrams were created to illustrate the model fragments identified in the cause and effect analysis. Each cause/effect instance was diagrammed individually (see appendix for illustrations). The cause and effect diagrams were then aggregated and restructured around the three theoretical codes which emerged – Discovering Opportunity, Experiencing Difficulty and Changing Practices. The three aggregated diagrams suggested a theory about the way these theoretical concepts were impacted by forces such as policy change, economic, social or technological factors. Throughout the mapping process, the researcher was mindful of the fact that the diagrams represented the interviewee perception of causality rather than actual causality.

Elements of extant theories emerged as relevant concepts in data analysis. For example, as the formation of professional norms reoccurred in a number of conversations, the code “attitude about practice change” began to capture individual progression through a social space of professional expectations. The connection of this attitude to existing theories about behavioral change, such as the Theory of Reasoned Action (Fishbein & Ajzen, 2010), aided in understanding and led to theory-building (Charmaz, 2008).

The theoretical coding process revealed a number of factors pertaining to the background, attitudes, and norms of interviewees, and the way these factors contributed to decision-making. The theory of reasoned action (TRA) connects behavioral intention to factors of attitude, behavioral intention and norms (Fishbein & Ajzen, 2010). A separate focused coding pass was
done to identify and highlight instances of data which pertained to this theory, specifically data which connoted interviewee attitude, background, behavior, belief, control, intention or perception of the situation.
IV. PRESENTATION OF FINDINGS

This research proposes a grounded theory about the impact of green building policy on behaviors and thought-processes of real estate professionals working in organizations which initiate and execute urban building projects. Empirical data was gathered in the form of interview transcripts. This data was analyzed by a series of coding steps - open/substantive, focused, axial (along two principal dimensions - cause/effect and reasoned action) and theoretical coding. A theory emerged in response to the three principal research questions –

RQ1> perceptions of policy and market relationships,

RQ2> professional attitudes, beliefs and norms, and

RQ3> response to specific regulations.

Research Question 1 – Perceptions of Relationships

The data indicates that real estate professionals perceive that their work is impacted by two sets of forces – social forces which include the attitudes and perceptions about policy, social inputs which affect policy, the specific requirements, and changes and implementation of those requirements, and market forces which include the context which enables the market to function, the economic context and demand factors which drive performance.

| RQ1: How is the system of policy and market forces perceived by individuals who make decisions and complete urban development or renovation projects? |
In this analysis, cause and effect coding revealed the mental models and identified instances where interviewees described perceptions of the economic, social and technical systems in which they operated. The set of cause/effect relationships spanned policy, market, ecosystem and project situations (see Appendix for full listing).

To compile the fragments into aggregations, C/E relationships were sorted into sets based on common cause or effect elements. For example, an interviewee commented on the impact of agency communication about changes in policy.

“Not that I can keep up, I’m just -- there so much going on that there are things that are going on that I just don’t -- haven’t heard about. I had no idea that -- well, we had a boiler conversion which is part of our mortgaging and cost is going up. So I said what if we got this offline and got separate financing. I had no idea that Mass Save would give us $500,000. .. So I just poked around the website”

This relationship was coded as a Cause Effect where “Cause” was “Communication about Programs and Benefits” and “Effect” was “Awareness, assessment, ultimately adoption”. The interpretation of this relationship was that Program Communication had a positive impact on Developer Awareness which had a positive impact on Developer Engagement. In this case, a new implicit element was incorporated into the Causal Fragment Diagram to represent the intermediary step of awareness between communication and engagement.

Figure 5 - Cause Effect Coding Chart element
The set of 83 causal fragment diagrams were generated (see Appendix for diagrams) and sorted according to their association with one of the three primary categories - “Discovering opportunity”, “Experiencing difficulty”, or “Changing practices”. The fragments were then combined based on common elements. For example, the causal fragment in Figure 6 was combined with two other fragments which shared the Effect element of “Developer Engagement” (Figure 7).
This first stage analysis resulted in four aggregated causal loop diagrams containing all 83 causal fragments – “Discovering Opportunity”, “Experiencing Difficulty”, and two separate variations of “Changing Practices”, reflecting the Developer perception of the policymaker practice change and Developer practice change.
Figure 8 – Policy Elements among Causes and Effects when Discovering Opportunity

In Figure 8, policy oriented cause/effect relationships are highlighted to distinguish the role that policy is perceived to have when developers seek and evaluate new business opportunities. Developers perceive that the way a particular zoning policy is communicated
impacts both market awareness of a trend and shifts in market demand. As market preferences change, program communication helps developers become aware that these shifts produce business opportunities. There is also a perception that projects which align with agency goals as expressed by regulation increase the flexibility in negotiations between agencies and developers. In other words, as developers adopt the practices motivated by regulatory changes, agencies look favorably on projects and may be willing to consider alternative solutions or proposals which benefit the developer. A final element that factors into developer awareness and engagement with practice change is the recommendation or perceived position of other businesses in the production ecosystem. If architects who provide design services to developers are advocating for more sustainable project features and anticipating regulatory pressure and market demand for such, developers are more likely to be aware and engaged by the prospects of practice change.
Figure 9 - Policy Impact on Cause and Effects for Experiencing Difficulty
In Figure 9, policy oriented cause/effect relationships are highlighted to distinguish the role that policy is perceived to have as developers encounter obstacles when constructing new buildings or renovations. Often, obstacles are interpreted as situations which negatively impact project cost or which increase the risk of project success. Regulations are perceived to pose obstacles to projects when there is a gap between the goals of a project and policy requirements. The gap drives changes in project requirements, which in turn is perceived to impact project costs. After projects are completed and as building owners move into business operations, regulatory constraints are perceived to pose increased costs to landlords. There is a positive opportunity when compliance with regulations enables landlords to gain increased rents or to realize gains through reduced energy costs, since that benefit is sometimes associated with green building requirements. Within organizations, approval hierarchy levels are mentioned as a factor which can impact the availability of internal resources to execute practice change in the development company. Within organizations, the complexity of the way regulatory changes are processed can prove an obstacle to compliance.
Figure 3 - Policy Impacts on Cause and Effects for Changing Practices - Policymaker aspects as articulated by Developers

The causal map in Figure 9 depicts developers’ perceptions of the forces associated with policy development, implementation and change. Developers understand the loop which drives ongoing changes in policy requirements. As policies roll out through implementation, policymakers receive feedback, complaints, and suggestions for modifications, which in turn lead to revision. Developers also observe that increasing stringency, such as through changes in the standard building energy code, is a common factor over time. Other factors impacting the degree of opportunity for policy innovation, which in turn affect requirements over time, include education of the professional community and the marketplace about the need for regulation and
its impacts, industry experience in observing actual impacts of regulation on projects, and the openness of agencies and companies to innovate.

Figure 4 - Policy Impact on Cause and Effects for Changing Practices - Developer aspects
Figure 10 depicts developers’ perceptions of the forces associated with business practice change within the developer organization. The hub of this causal map is clearly the willingness to change practices, which is influenced by a range of marketplace and policy factors. Practice change – new methods or approaches to completing tasks associated with the business - results in changes in the demand for products in the marketplace, changes in the products themselves, and changes in the process by which products are developed.

Practice change willingness is impacted by the degree to which disclosure of building performance impacts business performance, as evidenced by the causal loop which connects levels of disclosure to scrutiny to complaints to expertise to measurement revisions and ultimately to increased practice change willingness.
The degree of difficulty of policy compliance also has an impact on willingness to change. Respondents mentioned the connection with regard to the level of stringency of green building rating systems as well as disclosure or benchmarking. The opportunity for financial advantage, either in the form of outright incentives given for compliance, or when compliance leads to favorable treatment such as permitting schedule acceleration, is noted by developers as a factor which can influence whether or not a project investment goes forward to completion.

After reviewing the causal maps associated with these three important business phases, the next step in the analysis was to aggregate the causal factors into a single map. For clarification and legibility, the integrated causal map clusters the forces into the Policy or Marketplace drivers, the forces which operate within the Project Ecosystem with the particular focus on the owner developer, and the forces with connect directly to specific Projects. The Market and Policy forces are fundamental drivers for change in the Production Ecosystem, which includes real estate companies and other ecosystem participants, as experienced through the decisions made on projects. The data suggest that green building policy change is a mechanism for practice change across the entire production ecosystem, within which the real estate developer plays a key role.
Figure 6 – Integrated Causal Map with Policy, Marketplace, Ecosystem, (Real Estate) Company, Project factors.
Figure 7 – Integrated Causal Map – Enlargement of Policy Forces segment
Figure 8 – Integrated Causal Map enlargement of Market Forces segment
Figure 15 – Integrated Causal Map enlargement of Production Ecosystem segment, containing Owner Company segment

Figure 16 – Integrated Causal Map enlargement of Owner/Developer Company segment
Figure 17 – Integrated Causal Map enlargement of Project Forces segment.
Research Question 2 – Professional Attitudes, Beliefs and Norms

The second research question delved into the impact of the professional attitudes, beliefs and norms of individuals, structured along the lines of the Theory of Reasoned Action (Fishbein & Ajzen, 2010). The data shows that individuals who operate as professionals in real estate companies follow patterns which are defined by established norms and practices, and that these individuals perceive the forces of policy change through the filters provided by their professional experiences and identity and respond accordingly.

RQ2: How do professional attitudes, beliefs and norms impact the behavior of individuals experiencing real estate practice changes related to green building policies?

The second coding pass incorporated a deeper focus on the codes associated with professional attitudes, beliefs and norms such as “background”, “career trade-offs”, “confidence”, “green building attitude”, “industry perception”, “policy attitude”, “social attitude”, or “work attitude” which had emerged during open coding. Additional codes pertaining to “behavior”, “control”, “intention” and “perception” enabled a comparison of the emerging factors with the concepts underlying prominent theories about behavior in professional contexts, such as the theory of reasoned action (TRA) (Fishbein & Ajzen, 2010). This theory proposes that predictions about human behavior are possible with insight about an individual’s background, beliefs, attitudes and the environment of norms in which the individual operates.
Background

Interviewee backgrounds for this study were diverse. As to be expected, design, construction or finance backgrounds were mentioned by many interviewees. Interestingly, other interviewees described careers in advocacy or social change. Such backgrounds provide insight into the way that building policy is understood by individuals with knowledge and first-hand experience of the production ecosystem from other aspects besides investment or development, or for whom sustainable building is a natural outgrowth of an interest in improving the city. In addition to early career experience, interviewees described mentors or internship experiences which enabled them to develop decision making skills, and to learn aspects of project and financial management.

Beliefs

Many interviewees expressed beliefs connected with green building policy. For the most part, interviewees expressed varying views whether changing practices would lead to desired or anticipated outcomes.

“I'd say LEED. It’s almost entirely marketing. It’s just not a performance indicator, but it’s important to tenants, at least commercial tenants, I think. I think they are motivated by that to be in a building that they can talk about for the...that first meeting, ‘we are in this lovely building that does X, Y and Z and it’s LEED platinum and it does this that and the other thing’.”

As opposed to belief in the actual outcomes of practice change, a belief about norms – a conviction that others whose opinions are influential want to see the behavior performed – is a factor driving professionals toward practice change. Interviewees intimated that the industry as
an aggregate is moving toward more sustainable building practices, suggesting that the
performance of the behavior of practice change would be considered normative.

“Now the good part of all this conversation is that the market is fully starting to change and the
appraisal community and the underwriting community that are going to be giving loans and all
that kind of stuff; they’re starting to get involved. So they’re all -- that’s going to help I think
start to make changes where you’re going to be able to have an appraiser and look of the
building that’s got a LEED certification or brand certification or something should understand
and quantify additional value.”

There were statements about the norms of specific groups in the production ecosystem, such as
design professionals.

“I’ve found that architects embrace a lot of the policy initiatives especially as they pertain to
green building because they think that there’s tremendous value.”

Although the real estate developer occupies the top position in the chain of command for
projects, interviewees were subdued in their belief about control to perform the behavior. Given
the fragmented nature of the production ecosystem, authority, resources and opportunities were
not necessarily present to enable individuals to change practices. The requirement to develop
additional skills or rely on a knowledgeable team to overcome obstacles was mentioned.

“So on the team, ...MEP consultants who come in have to construct in compliance... I think a lot
of people just bank on, look, they understand it, have them do it. But ..go up the level to the top, I
just don’t know if anyone’s .. educated enough about.. what does it really mean, you know, what
am I doing, what’s the benefit of it... As project managers, we need to educate our clients a little
bit more on that. And I hear about it all the time but I’m not even that familiar with, like, how
different it is now from where, you know, what the old code was, you know, the stretch code from
the old.”
Not all believe in LEED

“LEED, I don’t know the history of how LEED came into existence, but it’s a paperwork issue and the idea of being better if you have all the right parts then you will have all the right...and the completed unit will somehow perform better. I don’t think there has been any proof of that, but if you are talking about regulating the performance of the building, well, then you are talking about penalties for builders, you are talking about penalties for building owners. “

Attitude

As opposed to a belief about potential impact in practice change, codes emerged which addressed the question of attitudes about the behavior of practice change. Some interviewees perceived the behavior favorably independent of financial outcomes, and were convinced it would be appropriate. The phrase “right thing to do” was used by several interviewees, including by some who were not affiliated with companies with a stated sustainable mission or product. The benefits of green workplaces or residences such as employee productivity or improved health were mentioned in connection with value, along with an awareness of the difficulty of measuring economic impact.

“Developers and owners are more aware of various processes of materials and stuff like that and most developer owners given a reasonable cost incremental would go towards to do the right thing. “

“You’d have to work to change the policy. So we've never let a good project be stopped because of a policy. We would always go talk to somebody. And that's not always perceived well in the press but it's the right thing to do.”
“I think it is actually very good that cities have adopted it because you do want to send a message that you want people to be conscious of energy. I believe in the goal.”

Others were less convinced, seeking evidence in the form of tangible or economic benefits.

“No. I think there's absolutely zero market value. I don't believe in paying more money for a LEED-rated building. Now, the market value comes in if in fact the LEED expenses are less money. So my operating expenses are less, well, theoretically, they're supposed to be high-net. So it's creating more value. But you know, is the person paying more rent because it's a LEED building? I don't think so.”

“We’re not pursing passive house certification, nor even LEED certification, because we don’t see any value of that from a marketing standpoint.”

“So it really is the return ... we’re taking into account the savings that they’re looking to achieve. So these are really financial decisions that are -- I’m not sure that we're all like big people doing the right thing for the environment, these are financial positions because at the end of the day we’re talking about people that own real estate and that real estate is an income producer for them.”

Perceptions and Norms

Interviewee perceptions about practice change, and about the expectations of stakeholders for real estate developers to change their practices, is another important factor. The data suggests that the real estate developers are well aware of a social trend which affects market demand for sustainable buildings. Several observed that the United States Green Building Council, a private, non-governmental organization with no public accountability, has significantly impacted the market.
"But the other thing that happened is that they – USGBC[C] - did a good job marketing it because a lot of tenants said, "I won't come in to your building unless you're green." and therefore we have market forces. So whether I like green or not like green, my market wants green."

"Because, you know, people want that to put the sticker on the building, you know?"

Real estate developer perception of the expectation for green building as defined by the USGBC is developed through contact with an industry which promotes LEED achievement. Perception of costs and feasibility of achieving LEED compliance is affected by stories and promotion which touts the accomplishment of recent projects, and increases the perception that LEED has evolved from an exotic luxury to something commonplace, achievable with little to no extra cost, and in fact, expected in the marketplace for certain classes of commercial buildings.

"I think it’s getting to a point where it doesn’t cost that much more and there’s not that, you know, premium to do it because sometimes when it just comes down to dollar and cents, someone’s like, “I’m not going to do it.” In this case, like obviously, and I’m sure the first time Genzyme did their LEED platinum building, you know, it was too expensive, but now, you know, people are... like, you hear LEED platinum a few times. I mean, I was at the National Grid headquarters, LEED platinum. I was at this other building, LEED platinum, like, ah, I guess it’s not so, not so unique. I mean, I... it’s still unique but it’s not like the first LEED platinum building, you know?"

Control

The idea of control is an important factor in the reasoned action model. There are actually three aspects to this concept – the belief in control of the behavior based on interactions between the individual and the rest of the process, the perception in the ability of the individual to control his or her own behavior, and actual control. Codes emerged from the data which suggested a
range of views relating to control over practice change in real estate. Real Estate developers have control over the process of design, construction and operations through their role as project drivers and providers of financial resources to make the project happen.

“For instance, ARCHITECT is our architect on MAJOR PROJECT. We told them upfront, ‘Look, we need 30% below ASHRAE in energy consumption on this. Here’s what we need. We’d like to do chilled beams. Let’s go try and figure out as a team.’ I think when you hire any architect, you have to tell them what your expectations are upfront.”

“Now, on the energy side, we’ll work with our mechanical engineer we have on this project is ENGINEER. We’ll work with ENGINEER. They run an energy model. They'll be able to predict the energy cost for us. And then we use that information and we’ll build out a proposed return payback period.”

However, there are limitations to the control which the developer can exercise over a fragmented production ecosystem.

“So essentially there’s a conspiracy of interest between the architect and the general contractor. And the way we dealt with that is pretty extreme which is to go over the whole thing. So the architect is hardly involved in bit of word and in a lot of ways neither is general contractor. We got full roster of subs and took -- after they had all their own subs then we took about 25% on for price. So these are enormous effects. “

And as benchmarking policies emerge with a focus on actual energy use, owners may become accountable for the performance of their buildings in use by tenants. However, control over the occupants’ behavior is problematic. A real estate developer’s willingness to change practices will be impacted by the degree of control over the final outcome and likelihood of realizing the associated benefits.
“LEED could tell you to put occupancy sensors on your lighting, .. but in reality.. you can override them and just not do them.”

“If you’re a tenant like we are in this building .. how are your utilities paid and maybe that needs to be restructured, where there needs to be a policy where it’s like, look, the tenants are responsible to pay for their energy consumption, not some... You have 10 tenants in a building and you pay a little piece of it or something, because then they’ll feel the pain and then they’ll be incentivized to, like, reduce it.”

In some cases, interviewees were driving toward more sustainable outcomes in their building, but green building policy based on third party ratings specified a prescriptive approach and constrained the project’s more ambitious goals. In this case, the format and enforcement model of the policy itself reduces the individual’s control over the outcomes.

“Well, the building was essentially at a platinum level without trying. The one problem that we had is this wing here...it’s built like a Passive House which is all of it here comes in to a heat recovery ventilator. And the way that works is that when the air goes out 90% of the heat or cool or 95% is transferred to the incoming air. So you’re able to have ventilation without heat loss or cold loss. One of the regulations is that if you have a hood on the stove, the hood cannot vent to the outside. .. LEED requires that you do vent to the outside. So we lose LEED points because we don’t do that.”

The flexibility to negotiate the specific compliance path for a policy contributes to a sense of collaboration between public and private entities.

“So everything was circumvented through the ZBA [Zoning Board of Appeals] and the building inspector had all of these latitudes so I ended up working intimately with building inspectors because they made the decision. They typically sit on the board of the ZBA and the ZBA which is volunteer members with very little experience most often they're looking to the building inspectors for a nod either yay or nay-- do we approve this? Do we not approve this? And if they didn't approve the 40B then it was basically shoved down their throat so it was an opportunity to stimulate that development.”
However, the sense of control through interpersonal relationship can backfire if the rules are not clear and expectations shift during negotiations.

“So, what ended up happening is that what really initially ignited a lot of development and construction slowly started to turn developers and builders off because they were becoming so tightly regulated on the profit that you could make so they were capping the profit and the developers fee and then they were also requiring third party forensics on the accounting so it became very costly and there were some cases believe it or not where builders had to go back and pay money in retribution for projects that they had that they felt weren't accounted properly. For example if they did a forensic analysis on your finances for the project and they ascertain that you collected 5% instead of 3% on the developer's profit, they could come back and say that you owe that money back to the municipality.”

Intention

The model of reasoned action suggests that these elements - background, beliefs, attitudes and norms – lead an individual to a specific intention, to intend to perform a behavior. In the case of green building policy, interviewees expressed intentions connected with practice change, and project success connected to green building policy. In some cases, the intention was to meet the policy.

“To talk through each and be like, ‘Look, you know, we can get 40 points pretty easily. You know, for a little bit more cost, we can get 50 and you get gold,’ “ “Well so far, the people have felt that the changes that they are being predicted can be accomplished.”

Some interviewees express the perspective of their companies, which have a competitive positioning to create green buildings that exceed policy requirements.

“We issued a corporate policy soon after I arrived to go LEED Silver or better in all new developments, barring unusual demands.”
In some cases, interviewees expressed their intentions toward green projects in the context of overall pride and personal connection with the buildings they are creating in their communities.

“I imagine that sustainability and resiliency will be a part of both of those projects. They’re both waterfront sites. And it’s something that’s very important to me, so I’m going to be pushing to include as much of that as I can.”

“Which we’re excited about, and it makes sense, it saves a lot of energy and it’s good for the environment, the whole thing.”

This comment extends our understanding about the lens through which developers perceive policy and make their day to day business decisions. In addition to the practices established by professional norms, developers are clearly incorporating the underlying values which they associate with their work as a contribution to society by improving the urban fabric.

Developer perspectives from background to behavior can be studied through the Theory of Reasoned Action model. In terms of background, although interviewees were drawn primarily from two distinct communities, there was diversity in terms of individual roles, company size and focus on different types of building projects. Nevertheless, common themes emerged. Statements indicating beliefs about the behavior of sustainable policy-compliant practice change suggest that developers pay attention to regulations, because there is potential that they are aligned with societal shifts, and that these shifts are indicators of a future market. At the same time, developers are skeptical and want proof of value in economic terms. The attitudes about
practice change incorporate awareness of changes in the production ecosystem, including an awareness that not all components of the ecosystem move at the same rate, or in the same direction. As the instigator of the project, developers perceive they are in control and are able to get what they require from the production ecosystem. However these individuals are likewise aware that there may be technical or economic limitations which can limit results.

This analysis of data with regard to the role of professional attitudes, behaviors and norms indicates that developers perceive policy change through the lens of professional training and identity, but background and personal values can impact the calculus of making positive decisions for their companies. In addition, developers are sensitive to the fact that policy change can signal market change, and this awareness can impact the willingness to change practices within their companies.
Research Question 3 – Response to Green Building Regulation

The third question delves into the response of real estate professionals to specific categories of green building policy. Data indicates that the requirements, implementation and assessment practices associated with each specific green building regulation impact the developer while being filtered through the elements of a larger production ecosystem. Increased motivation for practice change can be accomplished by activating the entire business network toward a common goal.

RQ3: In businesses which affect the urban built environment through property development and management, how do individuals respond to green building regulation?

Sub-question: “How do prominent categories of green building policy – permit streamlining, financial or tax incentives, building rating requirements, performance-oriented building codes, and benchmarking (building energy asset labeling/disclosure programs) – affect the way individuals practice their work?

In the initial analysis, open/substantive coding led to a focus on three prominent phenomena associated with the response to green building policy – “discovering opportunity”, “experiencing difficulty”, and “changing practices”. These phenomena defined the experiences articulated by interview subjects as they executed development projects lasting for several years through dynamic systems of policies and regulation. Codes emerged and were organized around key
factors which shed light on the way individuals respond to green building regulation – the conditions which caused the situation, the context for the situation, intervening conditions which might moderate or temper the situation, strategies which interviewees adopt in the situation, and ultimately, the consequences of the situation.

Discovering Opportunity

The phenomenon “discovering opportunity” emerged as interviewees described the process of becoming initially engaged with projects.

Causal Conditions

Having resources to invest and the need to produce results for stakeholders is fundamental to the business model of a real estate development company.

“Yeah, that is our business development, it’s just acquisitions. It’s not like we have annual revenue or expenses that we work on that way, it’s just a project or a holding company with several small projects. And each project is the next 3-5 years. So we try to do 1 or 2 a year. Sometime we do more, sometimes we do one, and we can do none if the market is horrible.”

The presence of investment resources aligns with the drive of the real estate developer to produce economic value through a unique skillset.

“So for me it’s an opportunity to be somewhat more daring because I have some equity to spend down.” “There’s something to me that’s really exciting about, like, making a deal.”
Context

The real estate marketplace is the context for opportunity discovery. The capability of identifying promising sites, then assessing the feasibility of project development, is a core competency for companies in real estate development, involving a range of social, market, financial and technical skillsets.

“We do it all at once... someone in our office will run zoning analysis, we’ll do some comp research. I’ll put the foremen together, we’ll call a few lenders, and we’ll do it all in a week to find out if this makes sense or not.” “Let’s take this company for example... they have a team of ... people assigned to specific geographies.. It’s their job to know everything that’s happening in this part of Brooklyn or whatever.. looking for opportunities. Sometimes you buy one thing from somebody and they tell your friend that has something else, and then you get to meet with their friend. Sometimes we buy things that are on the market. ...If something good is on the market and we want it, we’ll buy it and we’ll pay what it costs to get it.”

Intervening Conditions

Among these skills is awareness of policy changes and opportunities. Interviewees cited the prospect of so-called “green” financial incentives associated among factors which can positively impact project feasibility.

“So these projects in general, it’s just an extreme case because if you tried to just do it as a business decision without the tax credits, without the SRECs, without all the, you know, the incentives to make it work, it doesn’t work.” “On our hotel project, replacing the fan coils... there’s a big Mass rebate through the... energy rebate, which is... it’s just like $30,000. It’s not, like, a small amount of money.”

At the same time, policy requirements can affect the attractiveness of opportunities.
“You have to at least meet the standards, ... Does it deter development because it’s too stringent? I don’t know, I mean again I feel like when you’re building new class A buildings these days, these are inherently expensive buildings.” “That only high-end stuff or subsidized stuff gets built. I mean it’s the middle that gets squeezed out.”

Strategies

 Adopted strategies include seeking information and identifying resources to assist in resolving the question of feasibility.

“[the biggest challenge] is acquisitions. Because it’s the discipline and the management of acquisitions; we think we’re only gonna do 15 projects and we can’t afford to do 2 bad ones, and that process is not manageable” “[we quantify] based on experience and estimates. It's all estimating and you have to somehow put a value on that... [scenarios] absolutely. I think a lot of organizations have to take that into account.”

Consequences

The final result of employing strategies in the situation of “discovering opportunity” is that projects are assessed and prioritized.

“So it doesn’t factor into the spreadsheet. It factors into whether or not you’re actually going to be able to put a project forward if the client is going to be interested in the project.”

Summary of policy impact on Discovering Opportunity

Given the causal conditions, context, and intervening conditions for discovering opportunity, the elements which green building policy impacts are observed in both the context factor of market perception and in the intervening conditions where policy incentives or restrictions impact the value of opportunities. The presence of green building policies creates a potential strategy for
developers, who might be able to shift a project from infeasible to feasible through the additional financial resources offered by tax reductions or rebates. Green regulation will also factor in as trade-offs are assessed, in terms of additional costs or technical requirements. And the presence of regulation may be incorporated in early negotiations between developers and entitlement agencies which have the authority to approve or hold up a project. In the end, however, most interviewees pointed out that the response to the specific green building policy is analogous to the responses to other sorts of regulation, such as for historic buildings or special zoning requirements, not the primary consideration in assessing opportunity. Site location and the potential for improvement or reallocation of the building to more valuable use are the dominant factors in decisions about opportunity in real estate development.

“It starts with a piece of land and redevelopment site and what is the highest and best use of that property. “ “I have not seen [a decision to eliminate a site results from policy] happen. ... we’re already sort of sold on the site. I haven’t seen that where it’s a deterrent, personally.”
Experiencing Difficulty

When coding instances of cause and effect in the data, many observations touched on the challenges inherent in the real estate development process.

Causal Conditions

The sources of challenges in real estate span from economic conditions to resource and organizational constraints to physical complexities of urban environments. The need to procure
and manage the large volume of resources—financial, organizational and technical—to build a large commercial property in an urban environment represents substantial risk, even for organizations with deep experience and competency.

“Challenges, they’re all very different. Sometimes it’s laying out and costs driving it. Sometimes it is the mitigation which is extensive. Sometimes it is the height restriction that is put on there, which make it preclude going forward on it.”

“One of the biggest challenges is that it is really a 5-year project. From the time we acquired the land, got it permitted, get it built and get people moved in and the challenge there is, you’re subject to a lot of market risk, especially today. It seems like things can turn on a dime—something happens overseas, the stock market has a blip and all of a sudden nobody is buying anymore. So in the old days, real estate has always been known to be cyclical. I think those cycles have gotten a little tighter and a little more quick to run their waves.”

“You have a bank looking at our projects financial feasibility because it's so they have this magnifying glass on cost and it's the other challenges that land cost are getting higher and higher so that now you have construction direct cost going up. You have your land cost going up and a lot of projects are just not financeable. How do you balance that or drive that or mitigate that so that you have products that are financeable?“

Policy factors are a contributor to the condition of experiencing difficulty.

“And as things go the CITY AGENCY has a lot of smart people, sophisticated people but it’s really hard to do and it’s a real pain in the neck. And what it does is to distort building in the CITY and particularly in housing because things get so expensive.”

At the same time, interviewees acknowledged that being aware of coming changes and remaining closely connected to the agencies which govern projects increases the sense that the process is reasonable.
“Well I think that is all about predictability. And although CITY is difficult to work in - there are rules - and we have followed the rules and we have a reputation so we have never felt at risk on the permitting side. We also do our homework.” “Due to the number of regs and the amount of places where you could have any consistency, I would say it's pretty good. And I think that it's been pretty well integrated technologically so that everybody kind of knows what they're supposed to do, at least from the agency side.”

Context

Interviewees repeatedly discussed challenges and perceptions in terms of the fragmented ecosystem of professionals which completes the work of entitlement, financing, design, and construction for building projects.

“The industry itself is terribly structured. So essentially, architects will do work which is incomplete, which is unbuildable and that then goes out to the general contractor and the general contractor says this is terrific we’ll bid low on this and then we’ll make all our money on change orders. So the architect then has additional work. So essentially there’s a conspiracy of interest between the architect and the general contractor.“

“There’s so many different stakeholders and totally different levels of understanding different things and you were just investing from scratch each time what you were gonna talk about for each project?”

Green building policy, specifically the requirement to achieve or demonstrate a degree of sustainability as defined by a third party rating standard, such as the USGBC’s LEED, has had an impact on the interactions and responsibilities within the ecosystem.

“To me the biggest development that it is, and I’ve been at so many of these meetings, so you have your kind of eco kickoff, where you’ll have probably 20 people if not more, all sitting around a table ...for the next 3 hours all we’re gonna talk about, even though I’m a contractor and I’m a structural engineer or whatever, we’re all here just to talk about eco and how do you organize that kind of conversation? We’ll that’s what LEED has done. They’ve framed it, it’s a project management tool, where they’ve said okay here are the 6 categories to look at. ... Its given us this framework to get everyone focused on, okay how do we get to 25% below using the
modeling standards that they’ve set up and why the energy model should be done differently or whatever. It doesn’t matter, but there has to be a way that kind of gets everyone talking about the same thing! And I think that’s LEED’s biggest achievement: the project management aspect of it and the brand aspect of it.”

Intervening Conditions

Although the production ecosystem and its fragmentation form the context for the category of “Experiencing Difficulty”, the competency of the ecosystem provides a moderating influence by contributing expertise. For example, interviewees mentioned the role that design teams play in leading the effort to identify innovative solutions and to negotiate compliance strategies with enforcement agencies.

“It really has to be the designer, the LEED consultant. ...Or even our group, the owners’ reps, to say, like, ‘Hey, have you considered, you know, different roof types?’ ..Have you considered, ..energy efficient design? Have you considered waterless urinals? ..Here [are] the advantages and this is what you’d get.”

The topic of competitive advantage arose as a means to address challenges. Interviewees spoke about competitive advantage in terms of competencies, experience and connections. In addition, a particular focus on green buildings was perceived as a competitive advantage by certain individuals who predicted increasingly stringent green building policy requirements in their marketplaces.

“I’m willing to take that expense because the benefit would be an economic one, it will be rented up sooner, maybe at a higher rent, maybe the same rent but I’ll be more competitive than my competition.” “I think we’re going to run out in Boston of anyone posting and saying it’s LEED Certified. You see some of it, people posting in the Seaport and saying "It's LEED certifiable". And come on, that means you're not even playing.”
Strategies

In the face of difficulties, interviewees expressed a number of strategies. Management of risk is a core competency in real estate development. Besides managing and tracking risk factors as a normal course of business, real estate developers are aware that leveraging financial incentives is an important resource. This includes green building policy incentives offered by utilities, tax incentives offered by jurisdictions, and incentives for conversion of brownfields, or for maintaining historic buildings.

“Brownfield Tax Credits, we take advantage of that... NSTAR offers incentives. ““There were buildings we would not have done if it wasn't for something called the historic tax credits.” “There are incentives that we look at when we are going through the analysis phase of one building versus another or CITY1 versus CITY2 or CITY3 versus CITY4, that the credits are typical on a tax abatement basis for occupying space in a certain area. Or they are tax abatements for an extended period of time, for employing a certain amount of people. “

Ultimately, interviewees understand that challenges are overcome by maintaining high levels of competency across economic, organizational and technical spheres with the aid of their consultants in the production ecosystem. Interviewees are aware that the real estate marketplace is subject to economic volatility, and that the entitlement environment in which they operate undergoes change as policymakers enact new regulations to positively impact the city. An important strategy in this context is agility, which translates into the willingness to change practices, innovate, or adopt new ways of working.
“So, we're just changing the rules that you play by. “ “I know now that the building codes are changing, but I'm talking about the hard ones, which are the retrofit. There are a number of firms in the .. area that retrofit residential buildings, the company I came from, which was COMPANY...and a lot of them went out of business, or are staggered by the loss of financial support because no one wants to do this apart from the true believers. “

“You don't always have that control so, again, it's predictability. If you understand it and you know it and you can anticipate it, then codes are codes and you've got to follow them so you got to suck it up and plan for it. The big thing is planning for it, not getting caught by surprise like not having all of your budgets done and then, ‘Oh my God, there was a code change that's going to cost us more money.' You have to anticipate.”

At the same time, interviewees are aware that regulations are not simply black and white. An important strategy is the ability to sit down with regulators and other key stakeholders to negotiate approvals for final results which might differ in some ways from a requirement of a policy, but which achieve the objectives.

“it has to follow regulations so that it meets code and there’s some negotiation in there in how it's going to meet that. And so there’s a huge premium associated with that.”

“We do have people that know the policy makers. And then we also are very in tune to the neighborhood. And it's easy for a policy-- if you are building something in the [...] neighborhood and the NEIGHBORHOOD people want this but they don't really care about the height even though AGENCY might have said, ‘You can't build any higher than this.’ ‘This is our neighborhood. We don't care about the height but we really need the new school.’ And we say, ‘Okay, we'll build the extra. We'll give money for a school if you give us the extra FAR.' It's a win-win. And from a policy thinker's stand point; if you're in my district and that's what you want, you have to do it. We went and found out what those concerns were. We didn't wait for the city to tell us. And that's where developers kind of, I think, can-- They don't do their homework. They don't understand the neighborhood they're building in and they leave it up to city hall. City hall, there's only so much they can do.”

Consequences
The consequence of applying these strategies to the difficulty experienced by interviewees is that their companies increase willingness to change practices, and prepare to launch initiatives or engage in new ways of working.

“Alright, let’s do an analysis. Let’s figure out what the premium is. Let’s figure out how long it’s going to take to realize that premium back and then what’s the savings from there.’ That’s how we're looking at things. It’s a little bit a longer term approach.“

**Summary of policy impact**

Based on interview data, green building regulation has an impact on the causal conditions which lead to the condition of “Experiencing Difficulty”, although many other factors – economic volatility or project complexity – outweighed the concerns expressed about policy impacts. A positive factor is that interviewees include policy awareness and the opportunity to leverage policy and negotiate flexible interpretations of rules in their strategies for responding.
Figure 10 - Policy Impact on Experiencing Difficulty
Changing Practices

Through the investigation of the conditions of “Discovering opportunity” and “Experiencing difficulty”, dynamic market and policy factors lead real estate companies to a position of confronting a condition of “Changing practices”. Ultimately, the core category of “Changing practices” emerged as the primary focus as this theoretical code subsumed the other theoretical codes associated with this research question.

Causal Conditions

Society places pressure on developers to participate in the improvement of the built environment through changing demand for more “green” building products.

“Let's say we're building an office building and we want LARGE GLOBALCOMPANY to come in. And you know LARGE GLOBAL COMPANY supports daycare. So you build a daycare onsite because you know they-- that's a big important thing for their employees. Or they don't encourage vehicles therefore, ‘Okay, great. We don't really need a big parking garage.’ And ‘We support sustainability.’ so they're not coming to a building that's not green. This is their company philosophy. So you look any of your major end users and all of them bought into, ‘We want to be green.’ They're being forced to be green. So it was a win-win. And that is when it really works. It's not when it's just the law but when the market wants it as well.”

However, the popular interest in “green” in terms of health or fashion does not always mean that customers are willing to pay more or translate into profitability.

“What we’re finding out is the contrary and that is tenants will love to have a green building but they’re not looking to pay a premium whether that’s an energy efficient building or non-energy efficient building.”
In this case, the compliance pressure from the regulatory authority forces real estate developers to change their practices, to push their consultants in the professional ecosystem to implement sustainable design and construction approaches.

“CITY LEED ORDINANCE brought the minimum level of the game up to a certain tier. So when you know that every developer is now thinking about this, it changes your competitive dynamic mindset. So it certainly added to the motivation to excel. Because you knew that every other building is probably LEED certified or LEED silver you are saying how are you going to be able to differentiate in that marketplace. If you're selling class A, by that point in time the marketplace of class A viewed it as a good housekeeping seal of approval, like getting Energy Star from an operating side. In terms of differentiation within the levels, you saw COMPANY adopting, you saw developers, at least long term hold developers, saying we just raised the bar.”

Context

As developers experience the condition of practice change, they are mindful of the context for new ways of work. Jurisdictions continue to revise and improve green building policies. In addition, policies to encourage green buildings interact with other policies driving accessibility, historic preservation, and a number of other community objectives.

“There’s so many. I guess the fundamental one is zoning. Zoning code has the biggest influence; it says what we can do from a density standpoint. The tax incentive programs that were around, .. had an impact on acquisitions criteria; you know, is my tax assessment going to be dramatically different if I’m in this zone or not? The preservation codes have certain benefits to them, the specific regulations on very specific issues from other agencies, AGENCY, the fire department, the utilities, and the ability to achieve certain things is always an impact. And those can be deal killers, if you can’t achieve certain things that you need. We’ve looked at sites that are brown fields, we’ve done a lot of remediation, there’s obviously a lot of different oversight there, we’ve done a couple different projects where AGENCY has had to sign off on some stuff, but those are safeguards; not incentives”
By providing incentives which increase project feasibility or reduce risk, policies can provide support for practice change.

“The other thing that we do participate in this is we have TIFs [tax incentives] so our TIFs aren't tied to any green. See a lot of the tax advantages that we have here-- we have historic tax credits which-- the historic tax credits are driven more by the historic preservation initiative than a green initiative. It's kind of like you can use that as a parallel example of-- we're taking advantage of the incentive and building within those restrictions.”

Intervening Conditions

The conditions which intervene to moderate or counteract the condition of changing practice include the fact that requirements shift, and new policies or practices put individuals in a position to make decisions without data from past experience. Professional norms for decision-making are flexible. However, these types of practice changes may be difficult to measure, plan or execute with traditional quantitative assessment approaches, such as cost-benefit or pro-forma analyses.

“It depends on what type of product you're talking about. It depends on the hold period. It depends on who the desired client is. Is it build to suit or spec? Depends on the marketplace uptake.”

“You won't see that. It doesn't show up in the pro-forma. It doesn't. You have to make the argument that doing it is going to get you clients that are either willing to pay more or clients that you wouldn't otherwise have access to.”
“We talk about values all the time which is you know we’re making our decisions from a development standpoint or data based on the value of the choice right in terms of dollars in terms of market perception in terms of what the right thing to do is and I would say a lot of the green strategies play into that.”

The work of real estate requires interviewees to execute projects and manage risk in challenging economic, market, physical and technical conditions. All of these factors interfere with the ability to change practices, since confronting these challenges in new ways, without the experience from past project, represents an increase in risk.

“So unless you could say we’re gonna see the premium in sales value point, and that means that you’d have to definitely communicate what that value was and they’d have to believe it, it’s hard to necessarily justify those without and again we had a big corporate commitment which helped, the culture and sort of the highest level of COMPANY was pushing for this stuff so that helps. But I wouldn’t say your average real estate investor. They’re not gonna reap the benefit and they have to convince someone else, whoever that may be, that’s gonna buy the building. And that’s gonna get risky.”

Strategies

Interviewees describe a number of strategies to deal with the condition of practice change. Even for firms which produce similar projects, such as companies which specialize in affordable
housing, interviewees observe that each real estate project is a unique situation requiring an ability to devise new solutions and solve unexpected problems.

“We build a high rise in CITY and we had all sorts of pre-sales but because of delays in construction, we missed the market by six months. People walking away from deposits because of what started to happen with the recession and so I saw that firsthand how that delay of six months impacted the viability of a project.”

At a fundamental level, openness to changing strategy is a part of the professional role of interviewees. Their jobs require them to continually evaluate and ameliorate risk, anticipate economic impacts, and to seek opportunities to leverage the resources available to complete successful projects.

“It’s layers, of what are the biggest issues? Then when you get those done, it’s what are the next biggest issues. Then you go down all the way until you’ve built it and people have moved in. The historic fill that probably wouldn’t hit the first round of big issues. But there’s contamination, there’s dirty phase 2, that’s just money. We can solve that, it’s not a deal killer. It’s not oh you can’t build this here, or oh there’s a train running underneath the land, so I can build on it; those are deal killers. Once we get past that, then things come in regarding contamination. What is it, what are the signs, talk to the engineer, then we put a ballpark number on it and decide; okay, it’s a million and a half dollars, now I have a bucket for that to solve the problem. I don’t know how or when yet, but at least there’s a dollar number. Then from there we analyze it further and see how much it’s really gonna cost, how much work is it gonna be, etc. Then you’re doing the work, the layers unfold of mitigating the risk.”

The developer will inevitably transfer some risk associated with practice change to the professional consultants in the production ecosystem. In fact, no practice change can occur
without the participation of these allied firms, including specialists with government connections who can streamline the process of gaining approvals.

“I think a lot of the burden comes down on the architect too.” “And to do this you hire somebody. We used CONSULTANT and they -- many of the people in it have been in city government and they walk you through this thing.”

“And then from the business end of it, you know, there’s so many drivers, it’s like how many people are going to come into this? Like, what other, you know, sources of revenue are there for this place? How much money are we putting up front, you know, how much can we return to the investors? And that’s the stuff, to my point, it’s like, I wish I understood sort of... you know, I’m sure it’s not rocket science when you kind of like to get down to break it down, but really understood how all that stuff really kind of works together and how, you know, you have a lot of, like, variables. I could only imagine, if you had it in an equation...”

Consequences

Ultimately, the consequences of practice change are its impacts on the individuals and companies experiencing it, and the transformation it imparts on the urban fabric. For the interviewees, some expressed satisfaction in having successfully navigated changes, and described feeling that they were well positioned to be knowledgeable and competitive in a valuable skillset going forward in their careers.

“It was very interesting being a part of it because when it became a tool for developers to use it was so new to the planning departments and to the zoning departments that we actually learned about it together. So it was like this public, private partnership trying to understand the policy--so I remember vividly going through the municipalities and we were both-- both sides were learning how does this work?”
Figure 11 - Policy impacts on Changing Practices

Response to Green Building Policy Categories

Responses to specific policy categories varied, which makes sense given that some forms of green building policy have been part of the design and construction process for a long time, others have been in force for ten years, and others were not present as a factor in the two jurisdictions studied in the research.
Interviewees were asked about permit streamlining, but this policy option was not available in the jurisdictions studied so interviewees could only comment on their favorable interest if such an option were to be offered. It was not clear how the option would be assessed in terms of the cost to create a project that would comply and receive the benefit.

“I haven't seen it come up yet but I would [say] based on my experience in the industry-- any type of expedited permitting is advantageous to people because time is money, right? If you can expedite a permit and incentivize that through mandating green initiatives I'd say yes that's a pretty good policy.”

Tax or financial incentives received the most positive responses from interviewees. Clearly, this sort of green policy addresses risk and increases the feasibility that projects can go forward. If municipalities do not directly offer tax breaks for “green” projects, and many do not, developers made efforts to leverage other financial incentive programs offered at the state level through utility-providers. Independent groups, such as NYSERDA in New York or Mass Save in Massachusetts, were mentioned by several interviewees as import providers of incentive funding which impacted developer behaviors.

“Let me say though that beside the municipal stuff, there are programs of the state level, federal level we have used. The main one is photovoltaics is sort of too good not to do, huge subsidies”

“There so much going on ..I had no idea -- well, we had a boiler conversion which is part of our mortgaging and the cost is going up. So I said what if we got this offline and got separate financing. I had no idea that Mass Save would give us $500,000.”
Some green building ordinances require that projects be capable of certification under a third party rating system, (USGBC’s LEED program such as Boston’s Article 37\(^2\)\(^2\) or New York City’s Enterprise Green Communities criteria\(^2\)\(^3\)). These regulations sometimes take the form of zoning ordinances. The developer community, along with the production ecosystem of architects, engineers, contractors and allied professionals, has executed several generations of projects under these systems, leading to an increased understanding of the characteristics of successful projects, and knowledge about how to successfully gain approvals and complete development. The growth of such programs in large jurisdictions drives a perception of progress toward standardization, even if in fact the number of 3rd party green building rating regulations affecting private buildings may be but a small percentage compared with the number of potential jurisdictions in the country. (Kaplow, 2014)

“Look, you know, all our clients, before it was, like, you had to be LEED and understand LEED because, you know, whether it’s the policy in Boston that all state government buildings are LEED silver or it’s a policy that they have to be LEED certifiable or it needs some other standard, it’s already happening and we need to know that.”

The authority of jurisdictions to oversee building codes, regulations which govern how buildings are designed, constructed, renovated and maintained, has been a fundamental component of the development process since a construction code was implemented in the New York in 1862 following initial codes governing roof coverings and other aspects of design and

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construction safety prior in the 17th century. (Willenbrock, Manbeck, & Suchar, 1998)

Compliance with building codes is well-understood by real estate developers. Model codes focused on stringent use of energy (IECC) or green construction (IgCC) have become available through the International Code Council, a non-governmental organization which oversees the code development process for many standard codes internationally, including the widely adopted International Building Code (IBC)\textsuperscript{24}. Developers are well aware of codes and their impacts on projects, but detailed knowledge of codes and compliance strategy is often delegated to the architect.

“It’s really left to the design team. They’re coming up with the design and really have to be compliant with code.”

Interviewees accept the authority of the building code and, in some cases, value the clarity of the code as a means to achieve green building objectives.

“I think code is a great way to, like, for the city to mandate something. Forget incentives. Fine, we just want you to do it this way and you’re not going to get a permit if you don’t.”

“I feel like [the energy code] is evolving and there’s an update like every other day or something like that because they’ve found something different, that in a very broad sense, can reduce the consumption of energy whether it’s electrical, oil, gas... tone down the effect that sunlight has on an office to making suggestions and recommendations as far as construction materials are concerned. So I feel like there’s always a fair amount of motion in that space, and sometimes you really have to rely on those extraneous consultants to help stay on top of it.”

\textsuperscript{24} International Code Council  \url{http://www.iccsafe.org/CS/Pages/default.aspx}
Alternative codes, such as Massachusetts Stretch Code which was selectively adopted on a town by town basis by jurisdictions interested in the state’s sponsorship for sustainable programs, increase the complexity of the environment for projects.

“Everyone has to do Stretch Code now in CITY. Everyone has to do 20%. If you're trying to do the large scale buildings and you're trying to push the bar, then you have to go a little bit higher, right? And as we try to push it, the city’s going to push it up. I would say, for us, it doesn’t really affect us but not everyone is COMPANY, or PEER/COMPETITOR, right? There are the sort of the smaller guys that I think it affects more. And the guys that aren’t doing the huge buildings.”

Interviewees express awareness that the building code affects all projects, and as such, establishes a minimum standard for projects to protect health, safety and welfare of the community. Codes evolve in response to significant incidents which raise concerns about building practices.

“So the change to the 2014 code, some of the new code starts getting into energy-related issues. So, you know, it's changed a lot. It creates a bit of confusion. The Sandy breaks have changed a lot of things. It's really not necessarily energy-related, but it's incorporated. Now we're incorporating things like generators in new buildings that are of a certain height. Nothing's gotten easier.”

Interviewees express an awareness of the economic impact of codes and their potential effect on the feasibility of projects. There are concerns about the trend toward increasing stringency in the code and the risk of this trend increasing in the future.

“This year we have just instituted the latest International Energy Code... We’re only one of the four states in the country that have adopted it. And by statute we are required to update the International Energy Code into the international energy code every three years. ... But one has to be careful about, again, changing the codes to accomplish a policy and not being cognizant
about the impacts of cost. I mean, if you put something in there and it ends up being a premium cost, something that basic could stop a lot of projects from going forward.”

Some jurisdictions had adopted green building benchmarking at the time of this research, which required that owners report on the energy use in their buildings. Ten cities, two states and one county had benchmarking policies in effect, with others in pilot phase or under consideration (Institute for Market Transformation, 2013). Interviewees were not clear on the likely impacts, although most understand the objectives of benchmarking to increase the visibility of use and motivate practice change through transparency. Several interviewees expressed a positive response to the potential of benchmarking to impact practice behavior.

“I do think that it’s a good way to create structure in the industry because benchmarking I think is really, really important.”

“I mean, I think the average owner is going to have to pay attention to a more significant degree to their energy and water .. the idea is that it raises the level of significance. they know that it's going to be disclosed.

However, discussion about transparency over a building’s energy usage, and by implication, its efficiency, raised concerns about the value of a policy given the fact that energy usage is a complex result of the actions of two or more parties – the building owner and tenants.

“For instance, right now in CITY they have energy reporting. What they’re reporting primarily is the building expense for operating and they are advocating the tenant usage. Well that’s meaningless. I mean you can have a very efficient tenant and inefficient tenant. So to say that this average means nothing it doesn’t help the developer working with the tenant. So the utilities are not providing the information that gets it down to this.”
Some perceive a risk that benchmarking will highlight asset flaws, and ultimately lead to labeling or grading of buildings, meaning that assets may decline in value as a result.

“What do they think is going to happen if you label a building? What’s going to happen is that your rents will be discounted if you do not have a good rating, that your lenders will not give you as much money, when you sell the property you’re not going to get as much.”

The notion that green building policies like benchmarking are putting pressure on the existing stock of aging buildings was articulated by several interviewees. Some point out that development of new buildings which exceed the minimum standards of compliance with green building policy places competitive pressure on the existing building owners to renovate, something which is not always economically feasible.

“Now it could hurt also a lot of buildings that are older buildings .... Where on earth are they going to get the money to invest to bring up to a high level, to invest in that building and the rent even at a top of the line efficiency. It’s still going to be a class C building, but you’re going get maybe $22 a square-foot. It’s not going to work. So now what you’ve done is you almost take that class C property and condemn it, which drives up the cost of all the other properties because people don’t want to be there, go and see other places and well then you can tear down those buildings as well...historic buildings. By the way tearing down an old building is the least energy efficient thing that you can do.”

The research explored how policy requirements impact three important aspects of real estate development activity – in the discovery phase prior to project launch, during implementation when difficulties are invariable encountered, and throughout the lifecycle of business practice change.
Before projects are launched, alternative business opportunities are identified, assessed, and prioritized in terms of potential value and fit with the company’s capabilities and strategy. In the discovery phase of new building projects, incentives associated with regulatory compliance and the policy impacts on marketplace perception drive consideration of specific business strategies, such as allocating resources, trade-off calculations and rules.

As projects migrate into the implementation phase, regulations have an impact by imposing constraints, by shaping the nature of renovation and by increasing the risk of widening gaps between the inherent requirements of a project and the requirements which were added or imposed by regulation. These factors can increase the likelihood that the project will experience difficulty or obstacles to completion. This pushes companies towards a strategy of practice change, which is precisely the objective of green building policies, to reshape the practices of building design and construction to reduce climate impact. However, the fragmentation of the production ecosystem of independent companies which combine forces to create and renovate buildings is a countervailing force introducing headwinds which slow practice change.
Theory of Practice Change

Built environment innovation creates new models of human interaction, sustains social aspiration and economic health and can affect access to important natural resources. The objective of this research was to gain a deeper understanding of the impact of green building policy change and to study policy effectiveness through direct engagement with the targets of the policy, real estate developers. The real estate developer has an enormous impact on society by shaping environments in which we work and live. The policymaker aspires to transform the work of the developer, and as a result, the production ecosystem for the built environment, toward new means of practice.

The analysis of the qualitative data gathered from practitioners resulted in a theory about the way real estate developers experience public policy change specific to green building regulation. The data suggest that green building policy change is a mechanism for transformation of the entire production ecosystem, of which the real estate developer is an igniting element. The theory incorporates causal loop diagrams depicting perceptions of cause and effect in three developer business modes (“Discovering Opportunity”, “Experiencing Difficulty” and “Changing Practices”) and observations about the drivers of individual professional behavior, suggesting that developers perceive both policy and market interactions as they devise strategies to compete within a private marketplace governed by public regulations.

As real estate developers negotiate the risks associated with transforming the urban built environment, they are positive about the prospects for change and for the collaborative working relationship between company and public agency which enables successful project realizations.
Interviewees spoke about alignment of goals, in that developers and agencies share an interest in creating economic opportunity for the community. At the same time, both are aware that at times, they sit on opposite sides of the table. In order to understand the transformation of the entire ecosystem, and impacts that policy change can have in the future, this methodology should be expanded to create a holistic model incorporating the perspectives of other elements of the ecosystem which reveals the nature of practice change which each discipline is experiencing.

**Implications**

“I think real estate is one of those industries that has a symbiotic relationship with most municipalities. It’s difficult to enforce something arbitrarily in real estate, cause so much of, usually the tax pays for the city, but everything else comes from real estate.”

This study supports the argument that policy is understood by individuals in impacted companies as a dynamic system of cause and effect which echoes through the production ecosystem of the built environment. One implication of this research is that practice changes which are the objectives of green building policy can be furthered by policy design and implementation which takes the dynamics of the production system into account. Although many jurisdictions consider cost and benefit in designing green building policy which drives practice change through tax incentives, schedule reductions, or other economic benefits, to be maximally effective policy must be designed and implemented so as to consider the impacts across the entire system of affiliated companies executing projects as well as the individual companies which comprise it. To this end, further research is needed to expand the Theory of Practice
Change espoused in this study by expanding the model to include perceptions of the complete set of participants in building development – architects, engineers, construction professionals, and facilities operators - and to integrate key metrics.

A second implication of the research is that availability of comprehensive and rigorous data can be a powerful tool to drive marketplace preference for sustainable building and increase policy compliance. This requirement for better information about policy effectiveness across the ecosystem over time suggests the need to deliver the insights from a rigorous model of dynamics for this particular ecosystem by providing a vehicle, such as a dashboard, which can measure, analyze and present relevant metrics to policymakers. For example, policymakers will benefit from understanding factors such as the readiness of each particular industry to deliver services to meet policy requirements for the overall system, so that policy implementation could incorporate the necessary training or readiness programs. Once policies are launched, insight on an ongoing basis can inform assessment and revision, and necessary adjustments can be made to ensure that practice change is progressing as planned. and to inform owners and occupants of buildings who might not yet be aligned toward community objectives for increased energy efficiency or carbon emissions reductions.

“You need the data first before you can improve. I'm all about sustainability but then in one regard, I think it's a very careful dance because you can collect this data and say, “Oh, all buildings should meet this.” Well, that has to push rents up, right? And they can only go so far.”
As policy change interacts with market factors to drive practice change through noted forces, the model can be applied to track and confirm that incentives and causes are driving effects as projected and to answer future questions, such as:

- How can policy shift to a focus on built environment outcomes vs. prescriptive approaches to technology opportunity and trends? Benchmarking is a step in this direction, but the next step beyond energy consumption may be to seek more detailed understanding of the parameters of reduced carbon emissions or increased resiliency and the ability to support human occupation at times of calamity.

- How can policy provide flexibility to reward projects and companies which go beyond compliance while at the same time allowing more lax interpretations as companies move toward higher levels of performance, i.e. to drive towards innovation such as net zero implementations or absolute reduction in municipal energy consumption?

- How can policy enable the production ecosystem to evolve in a more coordinated way, to achieve the benefits of the whole at a faster pace than the benefits of the individual elements?

A dashboard built upon this theoretical model could add useful insight about the way specific policies could be prototyped, then assessed after roll-out across the production ecosystem. By incorporating theories which illuminate the way practice change actions follow from the perceptions of all participants in the production ecosystem of the urban built environment, we will be able to drive corporate behavior toward more socially advantageous end
states as our cities navigate unanticipated environmental, economic and social situations going forward.

“Some of these older buildings, that’s a refuge for these smaller tech companies, for these smaller startups. And for a real estate investor/developer to them having to gut-renovate a building to raise—by the way, the city is not saying they’re going to do that but there has to be a reason why they want to collect data which by the way I’m all for the city collecting data. But, looking more long-term, where does that go? Not every building can be LEED platinum.”

A third set of implications from this research is linked to the evolution of the discourse of green buildings and climate action and the impact of the evolving discourse on the opportunity for innovation and new policy approaches. By understanding how developers process changes through their organizational actions and decision making processes, insight has been gained to support the development of new policies in the future. The opportunity to create a dynamic system model to represent the ecosystem and to quantitatively define its transformation could lead to new models for green building policy innovation. The potential impact of green imperatives and policies like benchmarking on the different categories of urban building stock is yet to be determined. While standard updates to building codes proceed in many jurisdictions on a regular basis and Boston and New York increase the stringency of green building regulations, the emphasis on climate action is shifting towards adaptation and resiliency. What would the impact of outcome-based policy driving toward net zero energy consumption, or the achievement of high scores on an emerging “resiliency index”? The theoretical model developed through this research provides a method for considering the impact of changes in discourse or technology or economics on the way regulations should be designed, implemented and assessed to greater
effect on the overall production ecosystem which drives the built environment in cities for future generations.

“We kind of want to drive around with our kids and our moms and be like, “that one and that one and that one” and be proud of it. We’re a development company, we’re a business, and we make decisions about making money but at the end of the day we’re really driven by the portfolio of things we’re going to do.”
Appendices

Interview Outline

Interviews consisted of open-ended conversations between the researcher and the interviewee, either in person or on the phone. In-person interviews took place in conference rooms within the interviewee’s place of work, or in a nearby location such as a coffee shop. At the outset, the interviewer clarified the purpose of the conversation and obtained permission to record the discussion and transcribe, which ensuring the interviewee of the confidentiality of the conversation. Each interview followed a script based on the structure of the list of specific questions (see below), but interviewees were free to add information or anecdotes which expanded the discussion when other noteworthy or relevant topics arose. In addition to specific observations about the way the development process unfolded in general, and on specific projects, the interviewee was encouraged to provide opinions about the nature and future of the market for real estate, and on the effectiveness, impacts and benefits of policy and the implementation process.

i. Mutual Introductions

ii. Review objectives of research, process and confidentiality of interview.

iii. Discuss interviewee background and current role.

iv. Discuss current projects under development.
   - Project objectives and obstacles
   - Success factors

v. Discuss the way development decisions are made in the company.

vi. Describe green projects completed by the company, if any.
vii. Discuss the nature of green building regulation in the jurisdiction where projects are developed.

viii. Discuss how projects have been impacted by green building policies, such as:
  - An accelerated permitting process?
  - Financial or tax advantage?
  - Requirement to comply with a building rating system? Which one?
  - Requirement to submit property to Building Energy Asset labeling program?
  - Requirement that projects conform to performance-based building codes?

ix. Discuss perspectives on future, anticipated trends, changes.

x. Discuss interactions with regulators, impacts on projects

xi. Conclusion and Wrap-up
Open Coding Charts

Open Coding I – Cause and Effect Factors

<table>
<thead>
<tr>
<th>Causes and Effects</th>
<th>Cause/Effect flag</th>
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<td>Design Practice Impact</td>
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<td>Economic Impact</td>
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<td>Impact within Ecosystem</td>
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<td>Innovation Impact</td>
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<td>Policy Impact</td>
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<td>Quality of Life Factors</td>
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<td>Research (suggestions for my project)</td>
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<td>Resource Factors</td>
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<td>Risk</td>
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## Open Coding II – Company Factors – Business Model, Challenges, Characteristics

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Open Coding IV– Ecosystem, Governance, Groups, Marketplace, Measurement, Policy Factors

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<td>Designer (Architect, Engineer)</td>
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<td>Entitlement Factors</td>
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<td>Evolution over time</td>
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<td>Green Building Policy – 3rd Party Rating</td>
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<td>GB Policy – Benchmarking, Rating, Disclosure or Labeling</td>
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<td>GB Policy – Energy or Green Code</td>
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<td>GB Policy – Financial Incentive</td>
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<td>Obstacles to Adoption</td>
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<td>Related Building Policy or Regulation</td>
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<td>Response to Regulation</td>
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**Open Coding V – Professional, Project Example, Sustainable Tactics Factors**

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<th>Professional</th>
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<td>Operations Maintenance</td>
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<td>Sustainable Operations</td>
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## Cause/Effect Chart

<table>
<thead>
<tr>
<th>Causal Link ID</th>
<th>Cause</th>
<th>Effect on Resource</th>
<th>Evidence</th>
<th>Description</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>140624-1A</td>
<td>Financial Resources (Openness to ) Risk.</td>
<td>+</td>
<td>So for me it’s an opportunity to be somewhat more daring because I have some equity to spend down.</td>
<td>Having financial resources available, cash or access to funding for innovation, to invest in practice change.</td>
<td>Being open to risk; Taking opportunity to innovate; (positive = willing to accept risk)</td>
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<tr>
<td>140624-1B</td>
<td>Ambition of Project Goals Demand for Technical Expertise</td>
<td>+</td>
<td>We setup a goal of building a building which would cut into use by 80% and we had architects who were very willing to say that they could do that and they could not -- we went to five architects. ... and so this became a Passive House building and we brought in German Engineers to help design it. So they can do it, no question. The architects -- the local architects who sort of bought on and that includes COMPANY were completely incapable of doing it and once they were dragged through it they weren’t capable of doing that in a cost effective way.</td>
<td></td>
<td>Change technical knowledge in community</td>
</tr>
<tr>
<td>140624-1C</td>
<td>Divergence of Project Goals from Policy Requirements and Cost</td>
<td>+</td>
<td>The architect or is it that Passiv House in general is hard to build, but they essentially overdesigned it in order to make sure they met it’s certification program and huge amount of superfluous work.</td>
<td>When client goals are not aligned with policy requirements, even if they are both aiming for the same result, developers face practice challenges.</td>
<td>Rigor of Requirements for design and construction of a specific project</td>
</tr>
</tbody>
</table>

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21 Direction (positive or negative)

22 Strength, Non-linearity
| 140624-1D | Ambition of Project Goals | Project Cost | - | So we were looking at Passive House pricing at 20% to 30% above what’s bankable. So that was a problem. | Ambitious goals for design and construction of a specific project will increase cost. |
| 140624-1E | Market Demand | Financial Return | + | But there is a market premium on any green building particularly Passiv Haus and there’s a premium because of low energy use. | Market demand for product |
| 140624-1F | Market Demand | Risk capacity | + | So essentially you’re adding whatever it is 10% to 15% to your return on investment, which on a leverage deal becomes a no risk because you’re doubling, tripling because you’re financing 80% then those gains become a no risk. So that’s the challenge of this project to actually do it and we’re doing okay, it is really tough. | Difficulty, Complexity or Untested Sustainable Design Solution Characteristics |
| 140624-1G | Ecosystem (In)Effectiveness | Financial and Other Resources | + | The other is that the industry itself is terribly structured. So essentially, architects will do work which is incomplete, which is unbuildable and that then goes out to the general contractor and the general contractor says this is terrific we’ll bid low on this and then we’ll make all our money on change orders. So the architect then has additional work. So essentially there’s a conspiracy of interest between the architect and the general contractor. And the way we dealt with that is pretty extreme which is to go over the whole thing. So the architect is hardly involved in bit of word and in a lot of ways neither is general contractor. We got full roster of subs and took -- after they had all their own subs then we took about 25% on for price. So these are enormous effects. And it’s a problem about how to build green building but there’s a problem about how to build buildings. And the two conspired with one another and for us it’s the green part that is the easier part, it’s the building part. | Owner bears increased cost, risk and responsibility in addressing the lack of alignment and expertise within the ecosystem that must execute the finished project (including most notably the architect and contractor). |
| 140624-1H | Technical Complexity | Project Cost (Resources to) | + | Well, the building | Owner bears increased cost, risk (Interactive effects) |
|  |  |  |  |  |  |
| 140624-11 | Program awareness (via Communication) | Engagement on the part of developers | + And I’m not sure where the money is coming from but I think they will provide, it’s through Mass Save. They will provide visibility, money and success as a unit. It doesn’t make sense for us to do but we are interested in it. Well the state will provide the funding but the city has been pushing it so they actually sent an email out to us saying you’re candidate for zero net energy why don’t you apply. So we went -- my engineer went to a meeting last week. | + | 10 |

| 140624-11 | Program Alignment with Technical and Financial Characteristics of Project | Design Alternatives Considered | + Well, in the case of zero net energy, the calculations that we did is we don’t have enough roof area to be 100% suppliers of our own energy. So instead we are going with Cogen. Now on Cogen what we think -- it wasn’t easy to find out is that Mass Save will provide up to $500,000 of loans. So they’re 6.5% loans but they’re taken out of your energy from bill payment. | + | 11 |
You’ve got the schools turning out all these kind of change and environmental people and they all go to work somewhere. And they go to where – a lot of them will want to go to work in government. So they create these mandates and systems which are partly good and partly pain in the neck. Once again, you cannot regulate without creating huge amounts of reaching. I mean this is very inefficient. And anybody who says you leave it to the market, or people’s moral commitment is just completely mistaken. You need regulation.

And as things go the CITY AGENCY has a lot of smart people, sophisticated people but it’s really hard to do and it’s a real pain in the neck. And what it does is to distort building in the city of Boston and particularly in housing because things get so expensive. That only high-end stuff or subsidized stuff gets built. I mean it’s the middle that gets squeezed out.

So then there are the bad guys and it’s everybody. I mean it’s the whole set of professionals, a lot of whom worked in government and are now -- I mean what does CONSULTANT bill? They bill $300 to $500 an hour. They always send two people when one person can do it.

Not that I can keep up, I’m just -- there so much going on that there are things that are going on that I just don’t -- haven’t heard about. I had no idea that -- well, we had a boiler conversion which is part of our mortgaging and cost is going up. So I said what if we got this offline and got separate financing. I had no idea that Mass Save would give us $500,000. So I just poked around the website.
<p>| 140623-3A | Growth which strains environmental resources | Infrastructure investment – or – access limitations | That’s right, and if it... But, I mean that’s... a lot of it’s driven... I mean, I guess it’s what comes first, but... like, for example, if the City’s like, “Look, our sewer system, our storm water sewer systems are tapped out,” you know, so no one else can tap into them, so that puts the burden on the actual developers to say, well now we have to have, you know, we’ll have to have infiltrators or, you know, great water system... or not great water but, you know, these different rainwater systems. | Policy to address constraints – increase access through conservation/ | 16 |
| 140623-3B | Policy stringency | Practitioner behavior; Evolution toward desired practices | But how do you give a certification on a building based on how it’s going to perform five years from now? It’s almost impossible. | Practitioners are aware of trends – trajectories in green building policy. This may have an effect of driving future-oriented behavior. Alternatively, This may drive industry members to capitalize on today’s standards in order to avoid future constraints. | Increasing strength of policy; belief that policies will become increasingly stringent over time | 17 |
| 140623-3C | Awareness of policy trend | Practitioner behavior | He sent an email and he said, “Look, you know, all our clients, before it was, like, you had to be LEED and understand LEED because, you know, whether it’s the policy in Boston that all state government buildings are LEED silver or it’s a policy that they have to be LEED certifiable or it needs some other standard, it’s already happening and we need to know that | Adoption of more sustainable practices can be driven by a perception of trend in the marketplace. The trend may be affected by policy changes or anticipated changes. | 18 |
| 140623-3D | Policies with financial incentives | Practice of specified behaviors. | so these projects in general, it’s just an extreme case because if you tried to just do it as a business decision without the tax credits, without the SRECs, without all the, you know, the incentives to make it work, it doesn’t work. Like, you would do what we just talked about and it would come out, like... We would lose money;... or we would make no money. | | 19 |</p>
<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
<th>Practice of specified behavior</th>
<th>Notes</th>
<th>Pages</th>
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<tbody>
<tr>
<td>140623-3E</td>
<td>Policies which accelerate payback period for specific technology</td>
<td>+</td>
<td>There’s other renewable energies that they don’t offer those same things. For one, they’re not going anywhere, you know?</td>
<td>20</td>
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<tr>
<td>140623-3F</td>
<td>Link between permitting authority and building policies</td>
<td>Practice of specified behavior</td>
<td>[The city building authority] has to go through a permit so they know through the permitting process, like, you have to apply for a permit. And that’s where they can really have their say. “Like, look, we’re not going to give you...A building permit unless you meet these standards” and like, honestly, then you send out, like, your city engineers or your transportation department and they’re going to say, like, “Look, you need...” The BRA would probably say, “You need this much parking or you need this little parking,” you know, because Permitting authority of jurisdictions is a mechanism to drive desired behaviors and adoption of new practices.</td>
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<tr>
<td>140623-3G</td>
<td>Degree of &quot;green&quot; in Personal Values</td>
<td>Practice of specified behavior</td>
<td>I feel like every entity, whether it’s, like, an institution like Harvard or it’s just a person who’s a developer, has, like, its own, like, sort of values. So, like, Harvard University has, like, these values that, you know, they’re willing to, you know, go beyond just straight up economics to make a decision. You know, they want to attract professors, they want to do whatever, and they... and that all goes into their decision makers. If values of organization are aligned with societal trends and “norms” about what behavior demonstrates alignment with values, then practices may change independent of policy. There are effects from the combination of policy (which sets the agenda for values change in society and organizations)</td>
<td>22</td>
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<tr>
<td>140623-3H</td>
<td>Presence of Social amenities</td>
<td>Demand for real estate</td>
<td>That you can have all that stuff in one spot and, you know, that’s going to keep people, like, really, really happy where they are.</td>
<td>23</td>
</tr>
<tr>
<td>140623-3I</td>
<td>Policies offering Financial Incentives</td>
<td>Practice of desired behavior</td>
<td>So that’s money. And then I know we’re talking about, on our hotel project, replacing the fan coils and there’s a big mass rebate through the... energy rebate, which is... it’s just like $30,000. It’s not, like, a small amount of money.</td>
<td>24</td>
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<tr>
<td>140623-3J</td>
<td>Cost of resources</td>
<td>Practice of desired behavior</td>
<td>+ Yeah, I say... I mean, I do because anything that has, like, the numbers involved, it is going to be that way, and a lot of, like, sustainability, like, look if you’re not creating waste, it’s really expensive to dispose of anything now, right? Say it’s $50 a ton and you can do something where you reuse it, you know, and you have the hard time finding it and you’re loading it, so you know, a lot of these ideas that are better for the environment are better for your pocket too because it’s expensive... like, you know, doing stuff that’s not environmentally friendly can be really expensive</td>
<td>Economic incentives in the marketplace can drive desired behavior if decision-makers make a direct connection to costs and can benefit directly from savings.</td>
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<td>140623-3K</td>
<td>Expertise of Ecosystem</td>
<td>Information to support decision making</td>
<td>+ Or even our group, the owners’ reps, to say, like, “Hey, have you considered, you know, different roof types?” right? Have you considered, like, anything energy efficient design? Have you considered waterless urinals? Like, anything, you know, “Oh yeah, what’s the deal with those?” “Well, you know, here’s the advantages and this is what you’d get</td>
<td>Better decisions? Options and Solutions which align with policy, performance goals of the project.</td>
</tr>
<tr>
<td>140623-3L</td>
<td>Enforcement</td>
<td>Compliance</td>
<td>+ To maintain some of these things and, you know, whether it’s... Like, look, you can... LEED could tell you to put, like, occupancy sensors on your lighting, right, but in reality, like, you can override them and just not do them. So, like, if there... there should be some way to kind of measure how much someone is, like, operating sustainably, not just building sustainably.</td>
<td>Mechanisms and resources to monitor compliance increases the adherence to policy requirements</td>
</tr>
<tr>
<td>140623-3M</td>
<td>Efficiency</td>
<td>Economic Opportunity</td>
<td>+ And, you know, so, like, you could say that on a small scale. Someone could say, like, “Look, we’ll come in and we’ll put efficient light bulbs in, we’ll pay for them and we just want a percentage of the savings,” and... so it does create opportunity for people who are, like, “Look, there’s money to be made in being efficient.” I mean, just like generating revenue from your projects</td>
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But I don’t think people always see that, and in some cases, like, think about it, like, if you’re a tenant like we are in this building, like you know, how are your utilities paid and maybe that needs to be restructured, where there needs to be a policy where it’s like, look, the tenants are responsible to pay for their energy consumption, not some... You have 10 tenants in a building and you pay a little piece of it or something, because then they’ll feel the pain and then they’ll be incentivized to, like, reduce it if you're a tenant we are in this building, company with control over resource usage does not accrue the benefit of reduction create disincentives for practice change.

That is... That’s a challenge. I mean, how does the... I think code is a great way to, like, for the city to mandate something. Forget incentives. Fine, we just want you to do it this way and you’re not going to get a permit if you don’t.

To see if we can separate the capital projects for energy efficiency projects outside the budget process. So you can say.. because if you throw an energy efficiency project in with new carpets, building out more cubes or more space for people, or replacing light bulbs or electrical equipment or whatever, it’s gonna take a back burner.

Those [other business priority] types of projects are always going to take paramount, because it’s directly for their business, you know, whereas unless you have a very strong CEO that mandates “We want to do it this way”, it doesn’t get done. It has to come from the top.

COMPANY has been public for 14 years. In 2000, right after it went public, right before the dot com crash, the stock price went up to $200. And ever since then it’s been between $15 and 30 for the last 14 years. It’s very similar to Cisco. Cisco’s had the same problem.

Yes. It’s just the way Wall Street looks at the business. They see it
140625-3D | Resource cost volatility | Availability of resources for practice change | + | UTILITY has different pricing on a kW basis in the summer. In summer months from May to October the price of the electricity is 16 cents per kW and in the winter it goes down to, like, 12. So we get, it would influence us to move it elsewhere. | 33 |

140625-3E | Innovation Risk | Availability of resources for Practice Change | - | The shorter the better. It's interesting, what I've found is the only energy efficient projects that really get through right now are if it's zero risk. Or immediate ROI. You know, there are not willing to take a 5 year payback. | Practice Change 34 |

140625-3F | Levels of approval hierarchy | Availability of resources for Practice Change | - | But I do know the process we went through in order to get that approved. Essentially we presented to my boss, which is the head of workplace strategy and planning, and he was intrigued enough to send it up the chain to his boss, the VP of Real Estate, and from there it went on to Finance. So there's just so many hoops. | 35 |

140625-3G | Degree of Closeness vs. Distance of cost-benefit link | Availability of resources for Practice Change | + | We've done as much as we can to make these things as efficient as possible, but we could certainly do more. Number one there's a disconnect between the owner of the energy spend | See diagram with 140623-3N 36 |

140625-3H | Degree of Influence of Corporation over Regulatory Agency | Flexibility in Negotiations about Practice Change Specifications | + | The city was a huge backer of that project. So they weren't going to give us any grief on, you know, any certain regulations. They knew it was going to be an extremely efficient building. There wasn't an incentive for them to give us grief on certain things. | 37 |

140623-9A | Increasing Real Estate Values | Availability of Resources for Practice Change | + | It falls on the uptakes for sure. Part of it was we started our business right before the financial crisis. There were a lot of interest in the minute you have them and I think having not hit the financial crisis you'll probably be in a different situation now but still being retrofit. | 38 |
| 140623-9B | Data about impact of Practice Change | Availability of Resources for Practice Change | + | There’s not a whole lot of data out there and that’s part of the challenge there’s not a whole lot of data out there about the value of when you’re selling an asset or leasing up an asset there’s not a lot of data around how much more value you get if you’ve gone through a retrofit or gotten a certification on your building or things like that. | 39 |
| 140623-9C | Energy Cost as Percentage of P & L Operating Costs for Project | Availability of Resources for Practice Change | + | And a lot of these big corporations have competing priorities. When you look at a balance sheet for a large corporate occupier or an investor client your energy is small line on the P&L. Maybe it’s 10% of the overall P&L or if you own a building the majority of your cost are going to be in labor, and going to be in taxes, real estate taxes just things like that. So energy -- although it’s significant it’s a small piece of it. And if you’re looking at a corporate occupier, it’s even a smaller sliver because they are looking at not only the buildings but their overall operation. So you’re looking at the manufacturing facility energy to piece of that but then you’ve got everything else that goes into the expense of you building a widget. | As economic factors which contribute to the Profit and Loss statement for a project shift due to market forces, the resources available for practice changes will be affected. | 40 |
| 140623-9D | Payback Period for a specific Practice Change | Willingness to change Practices | - | Yeah, it is. And right now the market the appetite in the market is don’t show me anything that doesn’t pay back in less than 24 months. So I don’t want to talk about chiller plant optimization all along let’s talk about solar that I have to own. I want to talk about things that going to pay back in 24 months or less. That’s operating changes, that’s making sure that the lights are off in places that are vacant. It might be doing a lighting retrofit that you’re changing from fluorescents to LED or something like that, maybe putting in some sub-metering so you can understand and control what your energy spend is. But that’s the appetite and I wish it were greater. I mean I [inaudible 00:09:39] building and the appetite was it is the ground up building to [inaudible 00:09:45] a building and it was -- I don’t | As payback periods lengthen for specific initiatives, decision makers are less likely to adopt them or provide resources to complete them. | 41 |
want to put anything in this building that doesn’t pay back in seven years or less. And that building is going to stand there for a hundred years. And this is all driven by economics. It’s driven by having to do quarterly reporting to the SEC. It’s driven by having to put your results out there on a regular basis if you’re a publicly traded company. So it’s all about -- as much as I think there’s an interest in doing good there really has got to be an economic value.

| 140623-9E | Appraisal and Underwriting awareness of Climate Action and Impacts | Willingness to Change Practices | + | Now the good part of all this conversation is that the market is fully starting to change and the appraisal community and the underwriting community that are going to be giving loans and all that kind of stuff they’re starting to get involved. So they’re all -- that’s going to help I think start to make changes where you’re going to be able to have an appraiser and looks of the building that’s got a LEED certification or brand certification or something should understand and quantify additional value.

Either you’re going to have lenders that are going to have financing options, so that if you’re going to do a retrofit you can get a lower interest rate lower or something like that. There’ll be more financial products available. It’s starting to happen but it’s just a slow uptake if there is someone with competing priorities. |

| 140623-9F | Benchmarking policy | Willingness to Change Practices | + | So basically this spreadsheet I’m putting together is because the client says I need to reduce my energy cost or I need to reduce my operating cost and come in and help me figure out how to do it. I’ll come in there and we’ll look at the building, we’ll look at opportunities, we’ll figure out what these projects are going to cost. We’ll do ROI calculations, we’ll bundle projects together and we’ll figure out which projects to be done and which order to maximize the energy saving. But the request is not going to come as frequently in a place where there’s not a requirement to benchmark a report then in a city that there is. | 42 |

| 140623- | Financial Increase | + | So it doesn’t factor into the spreadsheet. It factors into whether or | 43 |

| 44 |
not you’re actually going to be able to put a project forward if the client is going to be interested in the project. What rules on the spreadsheet is if there are incentives that a city or municipality or whatever is offering to offset or a utility to offset the initial upfront capital cost of a project.

+ So the long story short, the answer was a yes. So we evaluated 60 different projects in that building from an energy -- pure energy perspective and then modeled series of projects together and came out to basically eight projects that were done in that building that reduced the overall load on the building from a heat gain, from and efficiency so the load on the building was reduced and then the equipment was upgraded to make it more efficient and controls were put in place to be able to understand and really monitor and deal with the day to day energy use of the building. And we were able to reduce we worked 42% -- we’ve been able to reduce the energy cost by 42%.

Because this first conversation that you have with the client is what is your appetite for Return of Investment. So if everything like for one very important part that I built in New York everything has a seven-year payback. So if something -- if you ran the model and it payback in more than seven years it wasn’t even something that came up for decision night, it was taken off the table.

So it really is the return and it’s also what -- it’s the comment well I guess the return were taking to account the savings that they’re looking to achieve. So these are really financial decisions that are - - I’m not sure that we’ve all like big people doing the right thing for the environment, these are financial positions because at the end of the day we’re talking about people that own real estate and that real estate is an income producer for them. They’re not telling widget necessarily or even if they are they can reduce the cost of the real estate, the cost of that widget, the profit on that widget goes up.

It’s all about -- and if you’re talking to an individual investor and an owner of real estate that’s his or her source of income. So you’re
looking to maximize the value doing the flip to property they get the most amount of money with lease they can get the highest amount of rent and they are putting things in there to make sure that their occupancy is as high as it possibly can be. And that when tenants renew versus having vacancy and having to continually have listing activity in their building.

| 140623-9J | Number of days reduction over standard timeframes to receive permits (permit stream-lining) | Cost to complete project. | - | In Arizona, it has. We’ve got a couple projects in Arizona. Arizona it definitely has. I mean that’s for sure. And it depends on where you are too in the market because accelerating permitting doesn’t really make a difference maybe you get in two weeks earlier but there are other places where it’s significant. So, that’s definitely is helpful. Again, it’s the cash flow because it allows them to get started sooner if they already recognize cash flow -- positive cash flow and income on the property sooner |
| 140623-9Ka | Exposure of benchmark data indicating energy performance of building | Availability of resources for practice change. | + | Yeah, actually like -- actually in cities where there are requirements to benchmark, yeah. That’s a needle mover because all of a sudden you’ve got to go do something about your building. So if you don’t you get a fine. |
No, again it goes back to that is a requirement that drives the client to want to do the project.

So benchmark requirements make an owner say oh wow I got -- I just did my benchmarking I have an energy star score of 12 you’re not going to be published out there. I think I need to look at how to -- what’s going on in my building to get my answer that I’m wasting energy and my building is not efficient, what could I be doing here.

I mean energy codes if the national level are improving so the American Society of heating refrigeration and air conditioning, the electrical code, the lighting code, those are all being changed in the national level. So you’re going to start to see across the board that you got to meet on minimum ASHRAE standards and those are going to be higher now. Every couple of years those gaps increase so your performance of your building has to become more efficient to meet a base code.

US GBC is obviously super active in trying to move things forward. Oh gosh, ASHRAE basically every professional society. ULI is doing a lot, but I think you know they’re just reaching the owner and investors of real estate. They’re not as much on the corporate occupier or corporate owner side. I think Corenet is trying to get there but they’re not quite there. I think the benefit of ULI that you see is that they've got a lot of fact-based research and stuff like that that led to things.
| 140623-9N | Economic data and performance metrics | Attitude toward practice change | + Well it’s not necessarily in some implementing changes, it’s again in some of the decision making side. And what a -- the data that we more in the industry is -- and building itself, what the delta in the sell value because they have some sort of either upgrade, if they have deep energy retrofit, they’ve got a certification whether it’s energy Star or LEED or BREEAM what is the delta in the sale price. If all things being equal what is the delta if any in time that it’s on the market you want it sell. Did it sell more quickly? Again, all things being equal. From a leasing perspective, what are renewals like in a building with a certification or it’s not doing energy retrofit or something like that. Are there more renewals and are they more frequent return renewals? That’s the kind of data that a real estate investor would want to know...at the end of the day when the building sells and that owner is getting revenue what’s the impact? ...we just haven’t had enough data because the market has been stagnant. And it really isn’t until in the last few years that owners are feeling like they can start to sell ... Owners that have made investments in their building now those buildings are going on the market. So I’m hoping over the next five years or so that we’ll start to get some real data because buildings are selling. |
| 140820-1A | Market demand for sustainable recognition | Commitment, resources for adoption | + Well, I think the rental property that will have an effect, in the same way that the building labelling or being...some of it is all marketing. I’d say LEED.. it’s almost entirely marketing and not so much ... It’s just not a performance indicator, but it’s important to tenants, at least commercial tenants, I think. I think they are motivated by that to be in a building that they can talk about for the...that first meeting, “we are in this lovely building that does X, Y and Z and its LEED platinum and it does this that and the other thing”. It’s a wonderful conversation starter. |
| 140820-1B | Reliability of projections of financial, tax advantage | Availability of resources for practice change | is it something predictable? Are you making these decisions based on how predictable they are? And if it’s not predictable then you really can’t book the savings. Can you book the savings? Can you confirm that this permitting will be so fast that you could say that |
it will be...? Would you be able to take advantage of the reduced
time to move the project faster, complete it earlier? Or is this just
marketable money that you can’t predict, but you actually would
be able to book and then if you can’t predict it, then you can’t
plan. If you can’t plan, then you can’t save.

| 140504-2A | Physical and technical constraints on project (non-policy). | Feasibility of Practice Change | + / - | I’m looking at this model for PROJECT, which is a series of town
houses, which is essentially passive house standard. And what led
us there was the second story, its right by a bridge, it’s very noisy,
so we ended up with a very tightly constructed building which led
us to low energy usage which essentially led up to a passive house
typology. | If decision-maker is
aware of the options
and can see a smaller
gap to cross to reach
higher sustainability
levels, they may opt to
make the change. |
| 140504-2B | Market value of green rating (perceived impact on sales or rentals) | Promotion of Practice Change | - | But, I was saying to our LEED consultant weeks ago that I’m not
even gonna order the plaque, I don’t wanna put it up because I
actually don’t think its good for sales, we don’t really promote it.
It’s part of the ethos of why we’re doing it, but their stamp doesn’t
add any value for us. |  |
| 140504-2C | Moral pressure to incorporate sustainability | Willingness to Change Practices | + | In general, we pursue strategies that are energy efficient, but it’s
as an architect. We’re all LEED accredited professionals, it’s
something that makes sense, why wouldn’t you? But we’re not
doing it because we’re achieving any incentive anywhere, nor are
we doing it for long term ownership benefits for us, nor are we
doing it to promote it something, LEED platinum, gold etc. We’re
just doing it because it’s the thing to do | Implication that moral
norm is connected
with training or
cultural expectations
of architects. |
| 140504-2D | Mission and Values, personal connection to artifacts | Willingness to accept risk, invest in practice change | + | We’re weird because at the end of the day, we kind of want to
drive around with our kids and our moms and be like, “that one
and that one and that one” and be proud of it. We’re a
development company, we’re a business, and we make decisions
about making money but at the end of the day we’re really driven
by the portfolio of things we’re going to do. We’re only gonna do
11 or 12 projects, so it’s not like we can afford to have a shitty one,
so as far as criteria, obviously the project has to make sense. We
have debt that we assume, so that has to make sense to that
market. And what we would call a design focused market in the
city, and that’s what supports our work and people buy our stuff. |  |
But, it’s personal. If we think there would be something we could do that would be amazing and makes sense and people will want and we think we could get a lender to give us money for, and we’ll make some dollars out of it. We’ve definitely passed on a lot of stuff that’s been completely lucrative and mid-market vanilla garbage. We’ve also pursued some stuff that’s been fairly bananas, like a town house project that we have been rewarded for. We’re not the typical kind of institutional capital investor that’s looking for the boxes to be checked to make a certain yield on investments. We’re thinking more about the purpose and the place and why we’re choosing to spend time away from our families. I would say the opportunity to do something green is not a leading criteria.

| 140504-2E | Confidence, Achievement of successful outcomes | Willingness to accept risk, invest in practice change | + Initially, we have a lot more execution risk. Will we get debt from this? Will we be able to achieve this? Etc. and those are our concerns. We understand what those resources are looking for, as far as, “will I check this box for them”, and we know if we’ll be able to pursue to project based on that. We don’t necessarily need to do calls to lenders anymore. And the irony is, scale wise, the bigger it gets the easier it gets. There’s a certain level of professionalism with the resources around larger projects, and in general I think there’s more confidence around the table about executing and that makes it easier |

<p>| 140504-2F | Financial Incentives (tax reduction or density increase) | Availability of resources to invest in practice change | + To me the opportunity would be more if there were incentive based programs, that had to do with either taxes, or density, or tax credits or whatever, that would create a reason for someone to pursue the traditional ran damage or complexity that they might not be used to, because it’s the right thing to do. |</p>
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<tr>
<td>140504-2G</td>
<td>Tactics recommended by consultants (broker)</td>
<td>Willingness to invest in practice change</td>
<td>+ Because a lot of brokers just listen to brokers. Which is “what should I build here?” Oh you need this unit mixed, whether it’s residential or commercial, oh you need this size floor plan, this size ceiling height, you need these types of systems. They just tell them exactly what they’re doing then one of them says “great” and then they turn around to the architects and engineers and they say “I need this, I need this, I need this, I need this.” They’re just saying “the broker wants this, I’m gonna execute that.” They don’t have an opinion frankly, they’re saying I’m making the products, these are the people that sell the products, they’re saying it needs to be this, these are the people who make the product, make that.</td>
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<td>140705-1AA</td>
<td>New practice requirements</td>
<td>Need for expertise (and experts) specific to policy</td>
<td>+ People who specialize like all of a sudden you have this brand of consultants that became specialized in chapter 40B.</td>
<td>60</td>
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<tr>
<td>140705-1A</td>
<td>Policy complaints following implementation</td>
<td>Modifications to new practice requirements</td>
<td>+ It also goes to show you that policies evolve. That a policy, when it first comes out can end up looking very different later on because they do modify it. They do change it and so policies are something that you have to really understand and watch because they do evolve.</td>
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<td>140705-1B</td>
<td>Existing physical and technical opportunity (site or existing infrastructure)</td>
<td>Practice change, innovation</td>
<td>Exactly, but again they are challenges to that like we do have-- we have solar panels on building one but because of the wind loads they can’t be slanted. They’re old now. It’s probably antiquated in terms of latest technology, but we couldn’t capitalize on their benefit to the maximum efficiency because we have to lay them flat so believe it or not even though they cover a huge area in building one, they don’t really translate to reduce cost that. That’s again something you look at that. You say, “Oh, solar panels seem great” and then we went through the exercise and realized we can’t angle them the way we’re supposed to, to capture the sun rays we were supposed to. It’s going to undermine their ability to work effectively.</td>
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140705-1Ca | Market – desirability of properties translates into increase in demand | Consumption of the products of practice change | + | one of the things that we contend with here is even though we are so successful, we have challenges-- one of the big challenges is traffic. The more success you have, the more people come and the more cars and the more traffic so the MassWorks Grant would allow us to invest approximately four million dollars in improving the street. | Increase in demand for properties – desirability of products of practice change. Cost impact, also... (assuming supply/demand relationship) |

140705-1Cb | Consumption increase | Pressure to incorporate more practice change to offset impact | + | that's cost benefit analysis-- huge upfront cost especially for systems that we have. We have a lot of very, very old systems so as we go and we replace and improve our systems it's easier to integrate technology and like even get a meter reader, but to just go out of the gate and start to do that-- the capital outlay would be huge. | |

140705-1D | Age or challenging condition of existing building | Cost of specific practice change implementation | + | CITY is not out there waving a flag saying, "Oh, yeah let's be more stringent" because they're struggling right now to-- they need to provide incentives for people to come here. | Municipality's degree of economic health (growth, jobs, tax revenue to support services) |

140705-1E | Municipality’s degree of economic health | Political capital to increase stringency of requirements | + | + | Municipalities mandate commitment to adopt practice change. | + | I'm assuming you're talking about Article 37. It brought the minimum level of the game up to a certain tier. So when you know that every developer is now thinking about this, it changes your competitive dynamic mindset. So it certainly added to the motivation to excel. Because you knew that every other building is probably LEED certified or LEED silver you are saying how are you going to be able to differentiate in that marketplace. | Increasing minimum standards affects all competitors, increases expectations |

140720-1A | Green building mandate | Minimum standards – Expectations and competition | + | I oversaw Green building LEED EB policy for the company. It was interesting to see in San Francisco because if you couldn't get Gold then it was better not even to try to get Certified, right, because everything that was Class A that went through the LEED EB process was getting Gold or Platinum. So you don't want to go through |

140720-1B | Green building mandate | Developer commitment to adopt practice change. | + | Increasing minimum standards affects all competitors, increases expectations. Requirements for |
that and get a Silver, because it’s like "I'm taking a class to get a D?" It's like, just don't take the class and tell anyone you just didn't have the time of something, right? So you do see those, so inherently when policies make everyone play, it's gonna raise the bar for the folks who want to differentiate. I think Boston is the same thing. If you see a top tier developer building to anything less than Gold you're saying "What are you doing? Are you new at this?" This isn't that hard.

Yeah, well I think there’s, what it does by putting it into code. So, by saying everything has to be LEED silver compliant, that means oh if I want to be a leader I can't be LEED silver anymore, I gotta be better than LEED silver. If you’re aiming to be a leader, which is most class A developers they want to outperform other people and be the best tenants etc, they know now in Boston that's the minimum and we can’t just be the minimum. So kind of the marketplace layers on top of the regulatory and kind of pushes everything up.

| 140720-1C | Demand from major tenants (influential customers) | Developer commitment to adopt practice change. | I saw people posting in the CITY REGION and saying "It's LEED certifiable". And come on, that means you're not even playing. You know, and the market is getting smarter and smarter, what does that mean? Certainly major tenants are saying "what level of LEED?" When PROJECT was signed, the major tenant was very interested in it being LEED Gold or better. and that was a commitment that both parties made. So they're not to go to somebody that says "Oh, we're going LEED certifiable." I mean, come on. It does raise that bar and I think it's going to continue to raise the bar. |
| 140720-1D | (Municipality) Commitment to climate action | Adoption of Standards, Regulation | The prime driver was climate change action and environmental stewardship. This was a means to an end. That said, we have clearly made citywide economic competitiveness as a prime reason for doing this. Links to other priorities including economic development |
| 140720-1E | Developer requirements | Technical innovation, | No. In this case we were pushing them. They were not bringing. We were pushing them to find ways of getting.. |
| 140720-1F | Degree of openness of policy structures in place at federal, state, municipal level | Policy innovation flexibility, opportunities for policy innovation | No, Massachusetts is a uniform code state. And that’s very important to recognize...some states give a local jurisdiction to the code. Massachusetts is not one of them. So Article 37 very specifically is a zoning article, not a building code. I don’t think it [accelerated permitting] actually works. In a place like Boston there is no process, there is no accelerated... There is no way of putting you at the front of the line, because you’re committing to green and I would never want to do that and have them fail at the back end. Because it’s like everybody will make the promise and from my perspective I’d be more interested in looking at financial incentives on the back end if you hit your targets rather than... and frankly the permitting time is not at all dictated by things that are in the city’s direct control for major projects. It’s all dictated by the committee process... |
| 140720-1G | Public awareness of building performance | Willingness to invest in practice change | Well it means that it’s not just the promise of design to perform a certain way. It’s that you actually have to .. you’re going to be disclosing your energy and water performance. so ... I mean, I think the average owner is going to have to pay attention to a more significant degree to their energy and water .. the idea is that it raises the level of significance. they know that it’s going to be disclosed. *(Does it provide the kind of financial or economic motivation to make changes that didn’t exist before? Is that the objective?)* |

The structure of the building code may limit flexibility in the design and adoption of policies. Through disclosure to public agencies. Theory behind benchmarking ordinances. See also 140623-9F, 140623-9Ka and Kb
That’s the theory behind it. It’s all existing buildings. It’s not new development. You’re supposed to be familiar with it.

240 million square feet are covered by it in Boston, so every building that’s over 35000 square feet or 35 units by the end of 2017 has to disclose their energy and water usage.

| 140720-1H | Industry experience | Willingness to innovate with new policy | + The first question you’re going to get skeptical city councilors or administrative leadership is “Who else has done this and how does it work?” That may exist in the private sector, but in the public sector very few folks want to be first in trying something. If it’s a big change you want to say “what has happened elsewhere?” | Example implementations in other Communities; Information about analogous policies in marketplace (positive, workable solutions from other cities) | 74 |
| 140525-1A | Individual attitude about green buildings | Willingness to Change Practices | Sure, yeah, so those are already underway. And if you look at COMPANY on the web, you’ll see a lot of those clear expressions of kind of what their goals are and stuff like that in terms of the performance of their buildings. So, they have you know a policy stating their signatories to various agreements and things like that. And so then, now I work for this company, for COMPANY, doing real estate development as well. I’m working primarily on 2 major projects here in Brooklyn that are in very early stages of land development. And I imagine that sustainability and resiliency will be a part of both of those projects. They’re both waterfront Brooklyn sites. And its something that’s very important to me, so I’m going to be pushing to include as much of that as I can, but I wouldn’t say that COMPANY has a particular focus on it, the way PREVIOUS COMPANY did. | Disposition to approve or advocate for sustainable features on project | 75 |
| 140525-1B | Risk, exacerbated by fragmentation | Willingness to adopt practice change, to | - I think you need to get even beyond that. Obviously, having those people helps a huge amount cause they’re kind of the directors of the process and are pulling people in and are demanding things of | Anticipated level of concern about the impact of errors or | 76 |
innovate.

the consultants, but let’s say so PREVIOUS COMPANY is also a contractor, in this example. And so, how creative the actual project managers are that are coming to the table as a contractor and working with you in finding cost effective ways to execute what you need to execute and are kind of just sitting there saying, “Nah, that’ll cost you 30% more.” And will not work with you or try and be creative and come up with solutions, so that can cause a problem. It happens at every level, the mechanical engineer, is they’re super conservative. They don’t wanna bother to try something different because it might fail, and then he’ll be in trouble.

Right, there’s kind of a silo-ing, just like when you price something in construction; there’s different divisions for different trades and then you know, how you kind of take this integrated approach to understand the balance of one verse another.

I think another classic example of that is an argument I got into over multifamily buildings. Where do you run a central systems for the entire multifamily building or does each unit have its own package system that runs to the exterior wall and is vented rather than vertically exhausting in one central system? Because if you think about the number, because then you think about, well if you’re running it into the apartment then you’re building an extra soffits and then you have to actually bring in carpenter figures as well, because then it’s about, so the levels become very complicated and then you really have to assess the true cost of running each duct out the wall verses having the central system and a lot of people, outside the northeast primarily, in the northeast we usually use central systems, which gets at the issue of how much of that is just based on tradition verses anything else? They’re just like this is the way we always do it, why am I gonna exert myself? Central systems are more expensive than these individual package units that fit in each apartment, but there’s all sorts of maintenance issues, and then you get into the operational side of things; like well what does it cost to pay the
| 140525-1D | Expectations of Asset Value | Willingness to invest in practice change | So we were supposedly making all of these investments that have long term pay back, but we weren’t going to reap the benefits of it cause we were selling the building as soon as it was done. So, if it had a 7-year pay back, which might be fine for a typical pension fund that can hold a building for 20 years, that’s not [PREVIOUS COMPANY’S] model. So unless you could say we’re gonna see the premium in sales value point, and that means that you’d have to definitely communicate what that value was and they’d have to believe it, it’s hard to necessarily justify those without and again we had a big corporate commitment which helped, the culture and sort of the highest level of PREVIOUS COMPANY was pushing for this stuff so that helps. But I wouldn’t say your average real estate investor. They’re not gonna reap the benefit and they have to convince someone else, whoever that may be, that’s gonna buy the building. And that’s gonna get risky. | 78 |

| 140525-1E | Demonstration of economic benefit on operating costs | Willingness to invest in practice change | Another thing is, this is the other big one, especially in office, is this kind of pie chart of like, if this is, so all of what we’ve been talking about are circling cost and things and energy and water efficiencies, but a more kind of potentially persuasive argument is that if you look at you know the cost that it takes to run a building or a business. So you have basically this giant percent of the pie, lets say 80% that is people; that is salaries. So everything that we’re talking about is actually this tiny little sliver here, of my actual operational costs running this office space. So, even if I said: “Oh my gosh, you’re gonna save 30% on your energy bill”, their energy bill is this tiny little sliver of the pie of running their business. What could be much more effective is anything you can do that is a sustainability investment, that you can convince them affects the 80% of their outlet. Are people gonna be more productive at work because their breathing fresher air and they have natural light? Are they going to have fewer sick days? Are they going to be engaging in teamwork because the acoustical | 79 |
property of the space makes it easy for them to do so? All those sorts of things, and then how do you do a cost benefits analysis of that? That’s kind of uncharted territory

| 140525-1F | Financial Incentives | Perception of importance of practice change | [ Incentives] would very much motivate people to say cause it’s kind of like an external source that says its important. Like if the state thinks it’s important enough to spend money on it, then cool, I don’t have to think about it. I’ll just spend money on it, right? So, I think when there are, but they also have to meaningful enough incentives. Like if someone is building a 150 million dollar building and you’re telling him he can get 10,000 dollars back for something, they’re probably not gonna waste the effort. It has to be a significant enough incentive to feel like it’s making an impact on your budget.

| 140525-1G | Policy scale and complexity | Willingness to invest in practice change | Because I believe in the integrated approach, of like let’s look holistically at how this building performs and how these systems interact, but with the simplicity approach it’s just much easier to say buy the highest performing chiller and you’ll get x dollars back. Cause then people don’t have to put out that much effort, there’s not that ambiguity; they can underwrite it from day 1 and say oh well, high performing chiller on the market, I get x dollars, and the premiums only this, so fine. We’ll just have to keep it in the budget, you know?

The system has allowed, it has basically created this whole area of people that otherwise couldn’t engage in sustainability at all, it created a system that was easy enough for them to understand. And it was like a brand identity, something like you could get a plaque on the front of your building, I did this, its lead gold, and you didn’t have to do anything else and people kind of understood what that meant, and sure the super sophisticated people are more skeptical of how things were accomplished but I don’t think people are at that level yet.

| 140525-1H | Ability of Willingness to | I think there’s a potentially large negative impact of it, and that is, | Acceptance of | 82 |
benchmarking framework to reflect differentiation in real estate assets.

invest in practice change

so there was that whole article, which you probably read, about backlash over the Bryant Park Bank of America Tower, which is right up here 2 blocks. So, somebody chose well the Bank of America tower was built. And really, that’s DEVELOPER, you know a long time owner, whose been committed to this stuff for a very long time. But they also marketed very heavily as the world’s biggest LEED platinum tower, right? And now we have this reporting requirement for benchmarking. So you can say how many kilowatt-hours does that building use and then compare it to the empire state building, which is where my old office used to be, PREVIOUS COMPANY. And, they were like oh my gosh the Empire State Building uses so much less, this 1930s building, uses so much less than this state of the art super green building. But what it doesn’t take into account is so the empire state building has I think a 50-elevator core. So like here’s your footprint building, and then here’s your elevators. Okay, so you’re really only using this much space as for Bank of America, I don’t know the exact floor plan but its very efficient, so you probably have a core like this and there’s this much space per floor that can be used. And then they have like training floors where you have rows of people sitting like this. And they’re there, what, 15 hours a day, plus, with 6 screens, because that’s their work. But in here, you have a lot of odd, kind of random companies, not for profits, that work 9-5 at most, and it’s not super dense. They each have a lot more square foot per person. It’s really like apples and oranges in terms of like what’s happening in the building, and that’s driving a lot of the consumption of the energy. And so, what CONSULTANT was proposing, was trying to do some sort of way taking the total energy use and dividing it by economic output or something to get to this number of really what the impact is of the building.

140525-11 Zoning Policy Site Selection NO Yeah so, basically you’re picking a site because it’s the right site, you’re driven because it’s the right location, first and foremost. And you think it’s gonna do well, and you think you can get it for the price you wanna pay in that area. All of this other stuff about like zoning restrictions and code requirements and stuff like that is kind of secondary things to location and price. And then everything comparisons and willingness to invest in practice change to achieve improved results.

Policy is a minimally influential factor in site selection. Other consideration outweigh policy concerns (market and
else, I mean you need to know that, you need to have done your due diligence to know that it doesn’t knock it out of feasibility but, any zoning is gonna be more important than like what you’re setback requirements are and things like that, than to worry about energy zone compliance and what the costs that are associated with that.

<ADD from audio 140820-2 and 140820-3 after Sep 23>

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<thead>
<tr>
<th>Causal Link ID</th>
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<th>Effect on Resource</th>
<th>Evidence</th>
<th>Description</th>
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<td>New Practice requirements</td>
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<td>Demand/Supply impacts, Opportunity and modification (does it reduce need or access for other kinds of knowledge?)</td>
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<tr>
<td>TBS</td>
<td>New Practice requirements</td>
<td>Need for new products and services</td>
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NOTE – Cause and Effect (endogenous i.e. affecting or experienced directly) vs exogenous (perceived as a characteristic of the system)

Note – how do these C/E points map to the Reasoned Action components? Expanded model? Or the Tech Acceptance? Or other models?
Cause/Effect Diagrams

Cause/Effect Diagrams 140624-1 p1/2

1406241A: Financial Resources $\rightarrow$ Capacity for Risk

1406241B: Ambition of Project Goals $\rightarrow$ Demand for Technical Expertise

1406241C: Policy Requirements $\rightarrow$ Differences btw Project Goals and Policy Requirements $\rightarrow$ Project Requirements $\rightarrow$ Project Cost

1406241D: Ambition of Project Goals $1 \rightarrow$ Project Cost 1

1406241E: Market Demand $\rightarrow$ Return on Investment $\rightarrow$ Financial Resources 1

1406241F: Market Demand 1 $\rightarrow$ Risk Capacity

1406241G: Ecosystem Effectiveness $\rightarrow$ Financial and other Resources

1406241H: Design Technical Complexity + Process Complexity $\rightarrow$ Project Complexity $\rightarrow$ Project Cost 2
Requirements for Practice Change → Need for Experts (Expertise) → Policy Requirements 1 → Policy Implementation → Feedback (Complaints, Suggested Modifications) → Policy Revision

Opportunity to Improve Property → Adaptation Limitations

Pressure to Ameliorate Growth → Market Demand 2 → Production of Products incorporating Practice Change

Age of Existing Building → Cost of Practice Change

Economic Strength of Municipality → Political Capital, Feasibility of Increasing Requirements
Causal Loop Diagrams for GT Category 1 – DISCOVERING OPPORTUNITY
Causal Loop Diagrams for GT Category 2 – EXPERIENCING DIFFICULTY
Causal Loop Diagrams for GT Category 3 – CHANGING PRACTICES – Policymaker Aspects
Causal Loop Diagrams for GT Category 3 – CHANGING PRACTICES – Developer Aspects – (continued from previous page)
Grounded Theory Core Categories

Grounded Theory Category 1 – DISCOVERING OPPORTUNITY
Diagram for GT Category 2 – EXPERIENCING DIFFICULTY

CONTEXT
- Fragmented production ecosystem

CAUSAL CONDITIONS
- Infrastructure limitations
- Resource limitations
- Organizational limitations
- Regulatory Constraints
- Policy Pressure to Renovate
- Project vs. Policy Requirements Gap

CATEGORY / PHENOMENON
Experiencing Difficulty

INTERVENING CONDITIONS
- Company Competency
- Ecosystem Competency
- Competitive Advantages

STRATEGIES
- Aligning Incentives
- Planning for Practice Change
- Negotiating Flexible Interpretations of Rules

CONSEQUENCES
- Launch of Practice Change Initiatives
Diagram for GT Category 3 – CHANGING PRACTICES
**Reasoned Action Factors**

**TRA factors - Attitude**

Waste reduction is a good strategy because it is good for the environment (140623-3J)
There is a market premium for green building (140624-1E)
Demand for product reduces market risk (140624-1F)
Green buildings are good for society (140623-3G)
Data will show the positive impact of practice change (140623-9N)
Green buildings are the right thing to do (140504-2C)
About the value of third party rating systems:
  - Pro - LEED engages tenants and the marketplace (140820-1A)
  - Con - A third party rating stamp adds no value for us (140504-2B)
Belief in the need for sustainable built environment increases willingness to change practices (140525-1A)
Holistic problem-solving optimizes solutions (140525-1G)

**TRA factors - Normative Belief**

Transfer of concepts from schools to government drives policy interest (140624-1K)
The amenities sought by the market are understood (140623-3H)
Resource costs and volatility can drive practice change (140625-3D)
Aggregated data about projects and outcomes will support practice change (140623-9B)
**TRA factors - Subjective Norms**

Population growth endangers access to infrastructure in the future (140623-3A)
Projects can't work without the financial incentives (140623-3C)
Priorities follow leadership plans to drive positive company performance (140625-3B)
Shorter payback times are a professional objective (140625-3E)
Improving economy will increase real estate values and project benefits (140623-9A)
Market acceptance of practice change is indicated by new appraisal and underwriting methods (140623-9E)
Disclosure of building efficiency will push owners to be more efficient (140623-9F, 140623-9Ka, 140623-9Kb)
Project feasibility hinges on incentives (140623-9G)
Return on Investment must be applied to justify practice change (140623-9I)
Accelerating permit processing has an impact on project cash flow (140623-9J)
The base building codes are becoming more stringent and projects must be more efficient in the future to comply (140623-9L)
Activity in professional groups shows that the industry is moving toward new practices (140623-9M)
Incentives create moral support for practice change (140504-2F)
Important groups in the production ecosystem (brokers) drive demand for specific practices (140504-2G)
Degree of economic health drives appetite for practice change (140705-1E)
Regulations, like zoning ordinances, raises the standards for practice across the entire marketplace (140720-1A, 140720-1B)
Market awareness of practice change benefits increases demand (140720-1C)
Practice changes are linked to other social priorities, such as economic development (140720-1D)
Disclosure can drive market awareness and demand for practice change (140720-1G)
Policy change is linked to track record of implementation in peer communities (140720-1H)
Impact on other business factors - productivity of employees, etc - may have greater impact that energy savings (140525-1E)
Regulation at municipal or state levels can signify importance of practice change (140525-1F)

Third party rating systems simplified the process and reduced the barriers to entry for practice change (140525-1Ga)

**TRA factors - Belief about Control**
**Confidence**

The production ecosystem offers expertise to solve the project problems (140623-3K)

Regulatory agency seeks benefits from the project (140625-3H)

Reliable financial projections provide resources for practice change (140820-1B)

**Concerns**

Production ecosystem is inefficiently structured (140624-1G)

Regulatory complexity makes predictions difficult (140624-1H)

Regulatory complexity will increase the cost of real estate (140624-1L)

Projects will require expensive expertise (140624-1M)

Lack of control over future regulatory stringency (140623-3B)

It is difficult to control building occupants who influence efficiency (140623-3L)

Company leads' or investors' financial scrutiny limits practice changes (140625-3C)
**TRA factors - Perceived Behavioral Control**

**Confidence**

Codes are a well-understood and strong mechanism to drive practice change (140623-3O)
Specialized expertise arises to serve practice needs (140705-1AA)

Developers can drive practice change in the production ecosystem (140720-1E)

**Concerns**

Difficulties in assembling a competent team (140624-1B)

Lack of integration in production ecosystem prevents solutions optimization (140525-1B, 140525-1C)
Challenging technical requirements challenges (140624-1C)

Cost premiums (140624-1D)

Owner organizations may prioritize mission critical business initiatives over practice change initiatives (140625-3A)
Layers of organizational hierarchy reduce the speed and resources (140625-3F)

Split incentives challenge measurement of specific practice changes (140625-3G)

Resource costs, especially energy, must be large to make a case for practice change (140623-9C)
Companies have limited appetite for practice change with longer payback periods (140623-9D)
Policies will change over time, are somewhat unpredictable (140705-1A)
TRA factors - Perceived Behavioral Control, ctd.

- Technical solutions can't always be applied, since existing buildings and project sites have unpredictable anomalies (140705-1B, 140705-1D)
- Market dynamics can impact demand and requirements (140705-1Ca, 140705-1Cb)

- Specific practice change oriented regulations may encounter limitations, must be compatible with existing policy frameworks (140720-1F)
- Impact of the way asset is assessed and managed - hold period and expected sales appraisal value may limit practice change (140525-1D)
- Need for reliable data to suggest appropriate practice change strategies and build confidence (140525-1H)

TRA factors - Intention

Plan financial resources to offset risk (140624-1A)
Applying support resources to realize practice changes (140624-1I)
Stay current so that the project can benefit from up-to-date knowledge (140624-1N)
Negotiate to satisfy requirements of building authority (140623-3F)
Incorporating practice change requires a strategy for split incentive problems (140623-3M)
Practice change creates opportunities (140623-3N)
Realize opportunities by keeping an open mind about design alternatives (140504-2A)
Create built environment which is a source of personal pride (140504-2D)

TRA factors - Behavior

Applying support resources to realize practice changes (140624-1J)
Implementing alternative design options
Adopt the practice changes which accelerate payback (140623-3E)
Change practices when rewarded by funding or savings (140623-3I)
Identify solutions and apply portfolio strategies to selecting the best options (140623-9G)
Building success on progressive achievements (140504-2E)
Professional practice is driven foremost by practical considerations (product, location, feasibility) and regulatory compliance is a secondary issue (140525-1I)
## Real Estate Impacts Policy Summary – 50 largest U.S. cities

<table>
<thead>
<tr>
<th>SHWEC inventor y</th>
<th>Bldg/Energy Code</th>
<th>Financial/tax</th>
<th>Green bldg Rating</th>
<th>Stream-lining</th>
<th>Bench-marking, disclosure</th>
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including green codes
### Real Estate Impacts Policy Summary – 50 largest U.S. cities, ctd.

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Bibliography


The U.S. Mayors Climate Protection Agreement. (2005).


