Improving Conditions for Green Building Construction in North America

Models for Local Government Support

December 2013

Commission for Environmental Cooperation

cec.org

Please cite as: CEC. 2013. *Improving conditions for green building construction in North America: Models for local government support*. Montreal: Commission for Environmental Cooperation. 53 pp.

This project report was prepared by Light House, O'Brien & Company and *Revitaliza Consultores* for the Secretariat of the Commission for Environmental Cooperation. The information contained herein is the responsibility of the author and does not necessarily reflect the views of the CEC, or the governments of Canada, Mexico or the United States of America.

Publication Details

Publication type: *Project Report*
Publication date: *December 2013*
Original language: *English*
Review and quality assurance procedures:
Final Party review: *August 2013*
QA12.27

Disponible en français – Disponible en español

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Table of Contents

List of Figures

List of Tables

List of Acronyms

AEGB	Austin Energy Green Building
AIRE	Arlington Initiative to Rethink Energy
ASHRAE	American Society of Heating, Refrigeration and Air Conditioning Engineers
BBC	Better Building Challenge
CalGreen	California Green Building Standards Code
CCEF	Connecticut Clean Energy Fund
CEEI	Community Energy and Emissions Inventory
CEFIA	Clean Energy Finance and Investment Authority
CEFIA	Connecticut Energy Finance Investment Authority
DC	development charge
DSM	demand-side management
ECAD	Energy Conservation Audit and Disclosure
EDAC	Economic Developers Association of Canada
EPBD	Energy Performance of Buildings Directive
EU	European Union
EUI	energy use intensity
FAR	floor [to] area ratio
GGBP	Greener, Greater Buildings Plan
GHG	greenhouse gases
GRI	Green Roofs Initiative
GRIDS	Growth Related Integrated Development Strategy
HVAC	heating, ventilation, and air-conditioning
IBRP	Innovative Building Review Program
ICLEI	Local Governments for Sustainability (originally: International Council for Local Environmental Initiatives)
IP	*impuesto predial*—property tax
IRS	Internal Revenue Service
ISN	*impuesto sobre nómina*—payroll tax
LCA	life-cycle cost analysis
LEED	Leadership in Energy and Environmental Design
LEED-EB	LEED for Existing Buildings
MNECB	Model National Energy Code for Buildings
MUSH	municipalities, universities, schools and hospitals
NABERS	National Australian Built Environment Rating System
NEMA	National Electrical Manufacturers Association
NYCEEC	New York City Energy Efficiency Corporation
PACE	Property Assessed Clean Energy
PCES	*Programa de Certificación de Edificaciones Sustentables* (Certification Program for Green Buildings)
QECBs	Qualified Energy Conservation Bonds
SGDP	Smart Growth Development Plan
TGS	Toronto Green Standard

Abstract

Among other factors, increasing uptake of green-building construction in North America requires access to financial capital, enabling policies, and a skilled workforce. As part of the report series, "Improving Conditions for Green Building Construction in North America," this report describes some of the most successful and innovative green building policies from jurisdictions across North America, analyzes key ingredients of their success, and presents a five-step policy framework model for the incorporation and use of those ingredients. The report highlights the importance of implementing multiple synergistic policies in order to promote widespread adoption of green building and realize its benefits, and the important role that public-sector leadership forms in the success of green building programs.

Executive Summary

This report outlines key elements of successful green building programs and policies, particularly those elements that governments can put in place, with a focus on improvements to existing commercial buildings. While it also encompasses new construction, it stops short of addressing measures that might require changes to building codes.

The report profiles some of the most successful and innovative green building policies from jurisdictions across North America. That analysis reveals nine essential ingredients that are often used within established programs, and five elements of newer, emerging programs. The ingredients of established programs are the following:

- Energy benchmarking
- Energy audits and retro-commissioning
- Incentives
- Certification
- Building labeling
- Education and marketing
- Leadership
- Financing
- Aligning interests

Elements of emerging programs include the following:

- Sustainable neighborhood planning—eco-districts and smart growth
- Green financing authorities
- Bundling of different elements into one policy instrument
- Greenhouse gas emissions tracking, reporting, and disclosure
- Challenge programs for “greenest,” most sustainable, or most livable city

Policymakers incorporate these ingredients through five critical steps:

1. Plan the program by assessing available resources and laying the groundwork with allies.
2. Design the program to achieve tangible, achievable, and specific objectives.
3. Implement the program.
4. Manage it, tracking its performance.
5. Review the results to inform possible modifications or future programs.

Using a range of successful programs as models, this report highlights the importance of implementing multiple synergistic policies in order to promote widespread adoption of green building and realize its benefits.

Foreword

Green building practices have the potential to save energy, save money, and improve the quality of human habitat across North America. They can also contribute to water conservation, more-efficient use of raw materials, and ecosystem health around the globe. The Intergovernmental Panel on Climate Change (IPCC) singled out the building sector as having the most cost-effective opportunities for reducing carbon emissions—in fact, many building-related opportunities are cost-neutral, or even cost-positive, to the building owner.

These benefits have made green building practices the fastest-growing trend in the building industry, but they still represent only a fraction of new construction, and the enormous stock of existing buildings has barely been touched at all. Even projects that are pursuing green strategies rarely go as far as they could, settling for marginal improvements in energy efficiency or introductory green certification when much more could be readily achieved.

In accordance with its mission of improving the natural environment by fostering collaboration among the three North American countries, the Commission for Environmental Cooperation (CEC) is exploring the barriers to more-widespread and deeper adoption of green building practices, and is identifying ways to overcome those barriers.

This work is guided by the Trilateral Green Building Construction Task Force, which includes members from Canada, Mexico, and the United States. Charged with following up on the issues raised in CEC's authoritative 2008 report, *Green Building in North America: Opportunities and Challenges*, the task force has led the Improving Conditions for Green Building Construction in North America project as part of the Cooperative Work Plan for 2011–2012.

This initiative seeks to identify opportunities and drive changes needed to support the construction of green buildings and green renovation of existing buildings in North America. As a central component of its work, the task force commissioned three reports to guide both public and private sector efforts in critical areas.

Covering financial mechanisms, education and training programs, and local government initiatives, the three reports identify challenges and recommend solutions for leaders in each of these areas. Each report addresses the particular needs and opportunities of a specific area, while complementing the others.

Financing is the lifeblood of any building project. Workforce skills and capabilities are essential to realizing the project. And local government policies are needed to raise awareness of the benefits of green building, encourage the creation of green projects, and represent the collective interest of each community in a built environment that supports the health and well-being of the public.

While the findings and recommendations of each report are noteworthy individually, collectively they point to a huge opportunity in the green building and public policy sector. As science fiction author William Gibson pointed out in *The Economist* in 2003, "The future is already here—it's just not evenly distributed." This observation is particularly apt in the realm of green building, where some cities and regions are implementing programs and seeing technology and design innovations that are well ahead of the rest of the North American continent. As a result, rather than inventing new approaches from scratch, we now have successful precedents to emulate and adapt—those examples are highlighted throughout these reports.

The three reports—one of which you are now reading—are further enhanced by several related initiatives from the CEC: a comprehensive online resource repository that provides, in one place, a library of relevant source materials; a guide to green building rating systems and programs in North America; and support for Mexico's adoption of the Energy Star benchmarking methodology.

This report, in conjunction with its two siblings and the other related projects, constitutes an important resource that financial organizations, local governments, and educational institutions can use to create their own effective green building initiatives. By connecting the specific interests of building owners and occupants with the common interests of communities, countries, and a whole continent, the CEC is bringing green building to the forefront as a solution we all can use.

Acknowledgments

The Secretariat of the Commission for Environmental Cooperation (CEC) extends its appreciation to the members of the Trilateral Green Building Construction Advisory Group and its experts' Task Force, and particularly to the Chair of the Task Force, Ann Edminster (Principal at Design AVEnues), for her leadership and support, as well as the staff at the CEC responsible for this report, including Benjamin Teitelbaum (Program Manager), Catherine Hallmich (Project Coordinator), and the editorial team composed of Johanne David, Jacqueline Fortson and Douglas Kirk.

Introduction

The greening of North America's building stock is an important element of the continental imperative to reduce energy consumption and greenhouse gas emissions. This report is intended to provide local governments with a menu of successful and innovative policy initiatives that have been employed to encourage improvements in existing buildings and new construction.

Local governments in Canada, Mexico and the United States all face challenges associated with deteriorating infrastructure, increasing demand for energy and material resources; managing waste; creating employment opportunities for citizens; cultivating "livable" communities, with integrated amenities; preserving local green spaces; and addressing the affects of climate change.

It is widely recognized that a critical factor to addressing these challenges is the "redensification" of urban areas, particularly through improvements to existing buildings and the development of "green" buildings, in the context of sustainable land use. Buildings in Canada, Mexico and the United States are responsible for a large portion of the continent's energy and water consumption, greenhouse gas emissions, and solid waste produced through demolition and occupant waste streams. Because existing buildings account for the vast majority of these values, governments of all stripes and at all levels are engaging in finding ways to intensify green building practices that improve the performance of existing buildings through increased energy efficiency and reduced carbon emissions, waste production and water consumption. A recent study estimates that America's energy use today is approximately half of what it would have been but for energy efficiency improvements over the past 40 years (ACEEE 2013). However, a 2010 National Academy of Sciences study points out that much greater savings are still possible (NAS 2010).

In 2008, the Commission for Environmental Cooperation published a report detailing the benefits of green building (CEC 2008). Recognizing these benefits, governments across North America have implemented thousands of policies over the past two decades, intended to encourage sustainable land-use and green building practices. These include policies aimed broadly at urban sustainability, and others focused more specifically on the "greening" of buildings. This report provides just a sample of some of the most successful and innovative efforts to date. Approximately 200 unique initiatives were identified at the outset and then narrowed down to 20 for greater exploration, through a detailed literature review and key stakeholder interviews.

The report is designed like a cookbook—setting out the ingredients of successful green building policy frameworks. The first chapter details the tried and tested "essential ingredients" found in many established green building strategies. The second chapter explores some of the new ingredients currently being explored by different levels of government, as well as innovative variations on existing

policies. The third chapter briefly canvasses the common techniques that governments have used in crafting their policy frameworks.

Chapter 4 examines some of the "recipes" of successful green building strategies developed by local governments, in order to consider the potential of a multiplier effect of a suite of policies and programs focused on the promotion of green building. The appendix provides more-detailed information about the specific green building policies considered in chapters 3 and 4.

Limitations

Given the wide range of policies and programs in existence, this report is aimed primarily at initiatives intended to support improvements in existing commercial buildings and, to a lesser degree, new commercial construction. While building codes and ordinances are identified as an important ingredient in the green building policy mix, this document does not provide examples of these policy instruments because they vary considerably across jurisdictions, and many local governments lack the jurisdiction to legislate in this area. A number of other policy instruments not directly associated with green building were also omitted, although it is important to recognize their contribution to the densification of green building. These include policies focused on livable communities, resource and emission taxes (e.g., carbon taxes), other tax policies (e.g., corporate depreciation escalators), funding programs for local governments, and property appraisal. Finally, consideration of private-sector strategies is also beyond the scope of this document.

The authors acknowledge the underrepresentation of Mexican policies in this report. While Mexico has been developing a number of initiatives to encourage sustainable building practices, some have been discontinued by successive governments, while others have yet to be fully realized, due to internal political dynamics. Several initiatives, such as the development of national norms (i.e., laws and regulations), and private-sector initiatives also fall outside the scope of this review.

Chapter 1: Essential Ingredients

A review of green building policies from across North America highlights ten common elements found in successful green building policy frameworks:

1. Benchmarking
2. Energy Audits and Retro-commissioning
3. Building Labeling
4. Incentives
5. Certification
6. Financing
7. Education and Marketing
8. Leadership
9. Aligning Interests
10. Codes and Ordinances

Municipalities recognized for successful green building strategies have adopted some or all of these elements through various policy mechanisms. To date, most have focused on energy efficiency, due to the overarching imperative to reduce GHG emissions and costs, for both government and industry. It is also relatively easy to assign key performance indicators to energy performance that are specific, measurable, attainable, relevant and time-sensitive (SMART). This section reviews nine of the common ingredients and provides successful examples of their application (building codes are not covered in this report).[1]

1. Energy Benchmarking

Benchmarking (or tracking) energy consumption is a foundational component of a comprehensive green building strategy, with many ancillary benefits. The building performance data obtained help in the design of policy instruments to encourage the retrofitting of existing buildings, as well as help to assess the ongoing effectiveness of existing energy-related green building policies. Two states and seven cities in the United States, including New York City and Austin, Texas, require all existing buildings above a specified total square footage to report energy consumption data annually. New York obtained a 75% participation rate in its first year, attributable to a strong communication and outreach program, while Austin reported a 67% participation rate, with 60% of participants providing enhanced reporting. Both cities attribute the less-than-complete participation to the fact that the policies are new, and to some

[1] Please see the report from USAID (USAID 2013) for more information about green codes in the US, Canada and Mexico.

challenges with the online reporting framework. Both programs are too new to comment on how the performance data has actually been applied in the design and review of green building policy.

2. Energy Audits and Retro-commissioning

Mandatory energy audits and retro-commissioning requirements generally accompany benchmarking requirements as a means of pinpointing performance deficiencies and rectifying them. Jurisdictions such as New York and Austin mandate energy audits every five or ten years as well as require buildings to undergo recommissioning—the application of a specialized commissioning process to existing buildings—to ensure building systems are functioning optimally. These programs are too recent to show results; however, the fact that they are mandated suggests these policies will experience uptake similar to that of the benchmarking policies in these jurisdictions. This requirement is also anticipated to generate significant employment opportunities for energy auditors and commissioning agents.

3. Building Labeling

Building labeling provides the market with a simple, recognizable marker that acknowledges a building's achievement in some aspect of its performance, often tied to the attainment of some type of building certification. The marker is prominently displayed—typically near the building's primary entrance—for the benefit of occupants and potential owners and tenants. Labeling also provides marketing value to the building's owner and property manager.

Building-labeling programs in Europe, particularly Portugal and Ireland, have been very successful in intensifying green building. In 2002, the EU adopted the Energy Performance of Buildings Directive (EPBD) 2002/91/EC, which required all EU member states to establish and implement a building-energy labeling program for residential and commercial buildings above a certain size (1,000 square meters [m^2], or more than 10,000 square feet [ft^2]) (EU 2002). In May 2010, the EU adopted an updated directive (2010/31/EU), which provided more-detailed guidance for member states and notably removed the building-size threshold, thereby increasing the directive's scope. Under the revised directive, all new buildings in the EU, beginning in 2020, will have to consume "nearly zero" energy and will be expected to derive most of their energy needs from on-site or nearby renewable energy sources (EU 2010a). Australia's Building Energy Efficiency Disclosure Bill 2010 (National Australian Built Environment Rating System (NABERS)) requires commercial building owners and renters to disclose an energy efficiency rating (currently, only operational rating) to prospective purchasers and tenants when selling, leasing or subleasing with a net area of over 21,000 ft^2 (2,000 m^2) (EU 2010b).

Building-labeling programs have been slow to take hold in North America. There is no comprehensive building-labeling system in North America for existing buildings; however, both Canada and the United States have efforts underway to establish national building-labeling programs, and a number of pilot initiatives are underway at the state and local levels, as well as a few voluntary labeling regimes (e.g., LEED EB:O&M, Energy Star Buildings Label, and BOMA BESt [Canada]). It is estimated that a national

building-labeling program in the United States would result in a 20% savings in energy between 2014 and 2030 (ACEEE 2013).

4. Incentives

Historically, local governments have utilized financial incentives such as grants, loans and rebates for lighting, boiler replacements, onsite alternative energy generation and other green technologies, often provided by or in partnership with local utilities. While these types of incentives continue to form part of many green building policy frameworks, cash-strapped governments have introduced and refined a number of alternative incentives, such as tax rebates and density bonuses, which arguably have done more to further green building than traditional financial incentives. The success of incentive programs is dependent on a myriad of context-specific factors, including alignment with other incentives, market conditions, strong marketing programs, accessibility, and a compelling underlying business case. The LEED® (Leadership in Energy and Environmental Design) Grant Program in Hamilton, Ontario (

Table), received little uptake in 2009, but is expected to see broader success following reforms in 2011 intended to expand the geographic reach of the policy to include the entire urban area and make it applicable to all building types.

Mexico City's certification program for new and existing buildings—*Programa de Certificación de Edificaciones Sustentables* (PCES—Certification Program for Sustainable Buildings) (

Table)—is unique in offering both property tax and payroll tax deductions for buildings that achieve various targets under the certification regime.

Table 1 summarizes the various incentives offered under the Fiscal Code of Distrito Federal 2011. The property tax deduction has been the most popular with building owners interested in selling their property, however the payroll tax deduction has proven attractive to corporate employers.

Table 1: PCES Tax Incentives

Action	Agency Responsible	Tax Reduction Incentive
Art.130, section III, number 1	*Comisión de Recursos Naturales de la Secretaría de Medio Ambiente* (Corena—Natural Resources Commission of the Ministry of Environment)	80% IP*
Art.130, section III, number 2 (maximum 10% of construction)	*Dirección General de Regulación Ambiental* (DGRA—Department of Environmental Regulation)	30% IP
Art.276 (recycling and remanufacturing)		20%–40% ISN**
Art.276, 3rd paragraph (homes, rainwater, solar panels…)		Up to 20% of water payments
Art.277 (water and waste)		20%–40% ISN
Art.277 (acquiring technology for reducing greenhouse gas emissions)		10%–20% IP
Art.296, 296bis (33% green areas)	*Dirección General de Bosques Urbanos y Educación Ambiental* (DGBUEA—Department of Urban Forests and Environmental Education) / *Dirección de Reforestación Urbana, Parques y Ciclovías* (DRUPC—Department of Urban Reforestation, Parks and Bikeways)	10% and 25% IP

Source: *Gobierno del Distrito Federal*, Fiscal Code of the Federal District, 2011.

*IP: *Impuesto predial*—Property tax.

**ISN: *Impuesto sobre nómina*—Payroll tax.

The most common and successful incentive policies to date are those tied to green building certification. In the State of Virginia, Arlington County's Green Building Density Incentive Program (see Chapter 4) is one example of the impact that this policy combination can have in stimulating industry to intensify green building practices.

The US government's Energy Efficient Commercial Building Tax Deduction (Table) is the first federal tax policy directly aimed at greening buildings. Building owners receive varying levels of tax relief for installing or retrofitting one or more of three different building systems—interior lighting, HVAC systems (heating, ventilation, and air-conditioning), and building envelope (roofing, windows, insulation)—as well as achieving a 50% improvement over a reference building, based on the building standard ASHRAE 90.1-2001 (ASHRAE 2001). It is estimated that $600–700 million in claims have been made since the start of the program in 2005, along with $891 million in revenues, despite the economic slowdown in

2008. Revenues are estimated between $100–200 million/year until 2014/2015, should the program be extended beyond its current sunset date of 13 December 2013. It is also estimated that the program will generate 77,000 jobs.

Ongoing monitoring and review of incentives is also critical, as these often become obsolete with improved industry practice, enhancements to building codes, and changes in market conditions. In California, the City of Santa Barbara's Innovative Building Review Program (IBRP) (Table A-8)

) offers expedited permitting for projects meeting the City's certification requirements. Prior to 2008, the 5–7% of all building permits that went through the program saw a reduced entitlement process of approximately one month. However, changes to state building codes and the subsequent economic downturn have reduced the number of permits and processing time for all projects, making the incentives less attractive. Consequently, Santa Barbara is moving to align the IBRP with CalGreen (California Green Building Standards Code) and fine-tune its incentives.

5. Certification

One of the most common green building strategies has been the certification of buildings. Certification schemes traditionally exist outside of building codes and serve to set minimum industry-performance thresholds. In setting standards, many municipalities have adopted third-party certification frameworks, such as LEED®, while others, such as the cities of Austin, Toronto (see Chapter 4), and East Gwillumbury, Ontario, have elected to develop standards that reflect their specific sustainability objectives. For those creating a locally tailored standard, there is the added consideration of whether to set prescriptive or performance-based standards. The advantages and disadvantages associated with each approach—locally tailored versus third-party certification—are set out in Table 2.

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Table 2: Advantages and Disadvantages to Local Governments of Third-party Standards vs. Locally Tailored Standards

		Third-party Criteria (e.g., LEED)		Unique Prescriptive or Performance-based Criteria
Rationale	−	Third-party programs are not designed to serve as a proxy for policy. Generally, standards offer optional credits, making it difficult for local government to ensure priorities are aligned with public policy objectives.	+	Local stakeholders can participate in development from the very beginning to create a tailored set of criteria and increase buy-in.
Control	−	May limit the ability of a government to set locally relevant criteria because criteria are set by the third party. May also have insufficient scope. For example, LEED NC does not take a life-cycle approach to building performance. Some jurisdictions have addressed these shortcomings by enacting additional requirements.	+	Governing entity has control over the program.
Alignment	−	Third-party standards may not align with broader policy objectives. For example, may allow developers to avoid performance elements of interest to local government (e.g., energy efficiency).	+	Governing entity can tailor criteria to align with policy objectives.
			−	Developers and builders who operate across multiple jurisdictions may have to contend with multiple requirements, adding to their cost and resistance to adoption.
Scope	−	Local government typically has no control over the scope of the program, which is set by the third party, although participation in the standards development process is possible.	+	Government can set the policy's scope.
Administration	+	Local government is not responsible for administering the program.	−	Unique green building criteria are generally more costly to administer and some jurisdictions have found them difficult to apply across all building types.
Maintenance	+	Local government is not required to update the criteria.	−	Government must ensure the criteria remain current with Building Code requirements, emerging industry practice, and technologies.

Austin was the first US jurisdiction to develop its own green building certification framework, allowing the flexibility to introduce unique requirements such as mandatory follow-up inspections and wind/solar requirements. Using a tiered approach, the city is aiming to incorporate emission reduction requirements into its next certification system review cycle, which will incentivize onsite energy generation.

The City of Toronto began developing the Toronto Green Development Standard, the precursor to the Toronto Green Standard (TGS), in 2005 with a review of the green development requirements of more than 100 cities. To facilitate internal collaboration on the project, the city formed a green development working group made up of staff from all relevant municipal divisions. The city also consulted with external partners through a survey of developers, industry workshops, and extensive interviews with individual developers. In 2008, the city adopted a revised TGS largely because of a cost-benefit study that considered green building standards from the perspective of return on investment, lifecycle cost, and simple payback (Kesik and Miller 2008). The study took a long-term perspective, looking at such issues as the associated energy savings, the health costs related to air quality, and the avoidable expense of water and wastewater expansion.

Communities with unique green building certification frameworks (e.g., Mexico City; Berkeley, California; Austin, Texas; and East Gwillumbury, Ontario) have all recognized the need to move away from prescriptive standards to more performance-based requirements because this allows industry greater flexibility in how to achieve building performance objectives and is easier for governments to administer and audit. Inspection officers in Berkeley, California, found the prescriptive “check box” approach difficult to administer—given the variations in building types and technologies—both from an administrative perspective and in order to achieve policy targets (City of Berkeley representative interview 2010).

LEED has seen enormous growth in Mexico over the last three years, even without any government incentives. Clearly, while major international companies are taking the lead, LEED certification is spreading to many manufacturers who see the Mexican market as a market of continuous transformation toward green building. In 2010, there were only 11 LEED-certified buildings and another 80 in the process of being certified. In May 2013, there were 37 certified buildings and 260 in the certification process, with 60% of buildings applying for higher certification levels (USGBC 2013a). Mexico currently ranks 7th worldwide in LEED certification (USGBC 2013b). The number of accredited LEED professionals in Mexico has also seen a considerable rise in recent years. In 2010 there were only 24 accredited professionals. In 2013 there were 202 (GBCI 2013).

Generally speaking, certification frameworks have met with success when initially introduced as voluntary schemes coupled with incentives. Thresholds are increased over time in concert with building and energy codes, and only made compulsory once they have gained acceptance by industry leaders.

6. Financing

Reductions in government budgets have reduced the ability of local governments to offer traditional loan and rebate incentive programs to encourage green building practices. In response, local governments have been exploring alternative ways to finance these types of programs, as well as to offer financial support to their communities. The Toronto Atmospheric Fund is one example, established through an endowment to support GHG emission reduction programs, including building-retrofit initiatives.

One of the most innovative and successful financing mechanisms to date has been Property Assessed Clean Energy (PACE) programs. Los Angeles County's Commercial "Open Market" PACE program (Commercial PACE) (Table) is an example of a new breed of commercial PACE programs. The original PACE model provides property owners with a loan through a financial institution, underwritten by a government bond that is paid back over time through a special assessment on the business' property taxes, at a rate aligned with savings achieved from energy efficiency improvements. Commercial PACE builds on the traditional PACE model by offering property owners the ability to select the financial institution and contractors of their choice, including the institution that holds the first mortgage on the property. Although quite new, the program already has the participation of 81 of 88 municipalities in the County and the first application has just been finalized (N. Gonzalez Nestor interview 2013).

Despite early setbacks to PACE, state and municipal governments have continued working on ways to build PACE programs into their green building strategies. The experience of other PACE programs demonstrates the potential effectiveness of this policy tool. CaliforniaFirst, the largest PACE program in North America, has received 31 applications for commercial properties since its establishment in September 2012 (N. Gonzalez Nestor interview 2013). A review of US PACE programs in 2011 prior to the introduction of the CaliforniaFirst program found 71 projects had been approved and financed by the then four active commercial PACE programs. These 71 projects represent about $9.7 million in energy efficiency and renewable energy project investments. The review observed that the type of improvements financed varied by program. For example, the majority of projects approved by Sonoma County (CA) funded solar PV (photovoltaic) projects, while Boulder County's projects were predominantly focused on energy efficiency. While no definitive causal relationship can be established to explain these differing uptake patterns, it is likely, the review suggests, that complementary local incentive programs along with climatic considerations are primary contributors (CCI 2011). Sonoma County benefits from a number of State incentives targeting solar and renewables (e.g., California Solar Initiative, Self-Generation Incentive Program, and Feed-in Tariff Program), as well as local government incentives (e.g., City of Healdsburg PV Incentive Program). Boulder County offers loans for efficiency upgrades (Elevations Energy Loan Program) and a rebate program (EnergySmart Commercial Energy Efficiency Rebate Program), as well as additional incentives at the local level through municipal governments and utilities (e.g., Longmont Power and Communications: Commercial and Industrial Energy Efficiency Rebate Program) under a State-wide mandate requiring electric and natural gas

utilities to adopt demand-side management (DSM) programs that provide financial incentives for the purchase of efficient equipment and processes.

Similar financial tools have been developed to offset capital costs for low-income residential housing developments. Washington Green Communities Retrofit Loan Fund provides a $2 million financing pool to owners of multifamily affordable housing properties in Washington State, offering them affordable loans of roughly US$100,000 to retrofit existing energy systems (Builder's Counsel Blog 2013). Energy audits are performed to determine whether energy loads can be significantly reduced.

7. Education and Marketing

Education forms a large component of most green building policy regimes. In King County, Washington, the GreenTools Program offers a robust set of educational materials to support itself, including:

- LEED Supplement;
- Sustainable Infrastructure Scorecard;
- guidelines for operating and remodeling existing buildings that include training, analysis, city surveys, toolkits, etc.;
- instruction on life-cycle cost analysis (LCA);
- life-cycle cost analysis calculator; and
- links to third-party LCA software.

Marketing is closely related to education, in the green building context, and of great importance to the success of most programs. For instance, uptake of the US government's Energy Efficient Building Tax Deduction (Table) has increased over time, following industry-led marketing efforts. Through the National Electrical Manufacturers Association (NEMA), an education and awareness coalition was organized in 2005 offering seminars, webinars, information briefings, and educational materials to stakeholders (electrical contractors and distributors, architects/designers, specifiers, and the real estate community).

Some of the most innovative, successful, and cost-effective programs are those that manage to integrate marketing and education into the traditional development and retrofit process. Santa Barbara's IBRP (Table A-8) introduces its developers and contractors to the IBRP at the permitting stage. The program incentives draw developers into bi-weekly committee meetings facilitated by professional advisors, where participants can obtain free advice and brainstorm on ways to make their projects more sustainable. Prior to 2008, 5 to 7% of the county's total permit stream came through IBRP. Additionally, the county's green building program has inspired the developers of 15 commercial buildings, and four other county governments, to implement energy efficiency measures. While the program is currently being updated to align with California's new green building requirements, the IBRP has been a model for other communities, which have adopted its framework and sent their applicants to IBRP committee meetings in Santa Barbara. This local government collaboration is one way to share scarce resources.

8. Leadership

Public-sector leadership forms an important step in the success of green building programs. As major property owners and developers, local governments have the ability to shift industry practice just by applying green building standards to their own portfolios. For instance, it is quite common for local government to set policy requiring public buildings to meet a green building standard, before encouraging the private sector to achieve similar targets. This approach not only demonstrates leadership but also affords the government an opportunity to learn about how a policy will work and the impacts it will have on the private sector, as well as establishes a number of demonstration projects to better acquaint local industry with new practices. Cities such as Toronto, Austin (see Chapter 4), and Vancouver (Table) all set standards for public buildings before requiring the same of private buildings.

9. Aligning Interests

According to the Institute of Building Efficiency, established by an international provider of building operating systems, one of the main barriers to realizing energy efficiency gains in commercial buildings is the conflicting interests of landlords and tenants, also referred to as the “split incentive” dilemma. In a traditional commercial triple net lease scenario, the property owners do not want to pay the capital costs for energy efficiency upgrades because they cannot be sure they will be able to reduce energy consumption, which is typically dependent on tenant behavior. The tenants do not want to pay for the upgrades through increased operating charges because they do not own the capital improvements and may not realize any efficiency gains. Policies, such as PACE programs, have met with success in part because they address the issue of split incentives. In the case of PACE programs, property owners are able to defer payment of capital costs associated with an upgrade and pay for them with energy savings accrued over time (usually 15 to 20 years). As a result, property owners need not bear upfront costs or pass costs onto their tenants. Furthermore, financing generally attaches to the property, so both the cost and benefits are transferred upon sale of the property. While in their infancy, these programs—along with private-sector elements such as green leases, submetering, and greater communication and transparency between landlords and tenants—offer much promise.

Chapter 2: New Ingredients

Best practice in green building policy and programs is evolving as governments gain experience in this area and explore new approaches to encouraging the densification of green building. Some local governments have embraced a more holistic approach to green building, in which it is viewed in the context of sustainable land use planning. Other municipalities have taken the basic green building ingredients and spiced them up. This chapter highlights some of the new and innovative policy elements being tried by local governments from across North America. While this report identifies a number of new policy tools, it is by no means an exhaustive list. Space constraints and the policy variations make a comprehensive survey of policy options impractical.

1. Sustainable Neighborhood Planning: Eco-districts and Smart Growth

Sustainability plans, and energy or climate action plans are now common components of local government policy frameworks in all three countries. Some jurisdictions have taken different planning approaches, based on innovative analytical paradigms such as eco-districts, which look at smaller geographic regions, and smart growth, which employs longer time horizons.

The experiment of Portland, Oregon, with five neighborhood eco-districts, focuses planning at the neighborhood level. This approach, adopted in a number of European cities, is very much a learning process that has already experienced some tangible success. For example, the Lloyd EcoDistrict—the most robustly developed eco-district—has a full-time staff person, an active commercial energy efficiency retrofit program, and is promoting the city's Sustainability at Work program throughout the district (Table A-6).

The City of Yellowknife, in Canada's Northwest Territories, took a 50-year planning horizon in developing its Smart Growth Development Plan (SGDP) (Table A-11). A city-led consultation process engaged more than 10% of the city's population through focus groups, telephone surveys, design charrettes, and public meetings. The Plan incorporates a number of different initiatives, including a generous commercial property tax abatement program for green initiatives that promote densification of the downtown core and mini-district energy systems. Through its Development Incentive Program, the city has provided incentives to two multi-family residential developments in the downtown and is in the final design stages of a 24-unit, mixed-use, eco-housing development in the downtown. Significant amendments have been made to the city's zoning bylaw relating to downtown residential densification, and amendments are forthcoming to encourage secondary suites/laneway housing (accessory dwelling units). The city has also allocated more than $3 million in streetscaping/trail development since the plan was adopted, and more than $2 million in funding for land assembly projects for Smart Growth–related initiatives (50% in downtown and 50% in old-town waterfront). The SGDP helped to free up underdeveloped city-owned urban lands for sale, resulting in the increasing of land sales revenues by more than 100% between 2011 and 2012, to $10 million.

2. Green Financing Authorities

One very successful policy approach that is gaining momentum in North America is the idea of a dedicated financing authority to support green building and clean energy technologies. The State of Connecticut is the first jurisdiction in North America to establish a dedicated finance authority to support the installation of market-ready clean energy technologies. The Connecticut Energy Finance Investment Authority (CEFIA) (Table A-4), established in 2011 from a restructuring of the state's Clean Energy Fund, has accomplished significant achievements, including the following initiatives tied to existing commercial buildings:

- attracting nearly $4.7 million through its Clean Energy Communities program to support 20% energy savings by 2018 amongst 103 participating municipalities, and for the purchase of 20% of building energy from renewable sources;
- issuing a million-dollar loan to an independent colleges coalition to proceed with energy efficiency upgrades to be repaid through energy savings; and
- establishing the Smart-e loan program, providing $30 million in low-cost capital through credit unions and community banks to support energy efficiency upgrades, solar hot water, and renewable energy generation in low-income and affordable housing projects.

The Authority has also been the driver behind the state's PACE program, which has been adopted by 11 municipalities, with 24 more in the pipeline and eight capital providers prepared to finance.

3. Bundling

The next chapter looks at ways in which local governments have combined various policy ingredients to create a recipe to encourage green building. Some local governments have developed programs that bundle a significant number of different elements into one policy instrument. Similarly to Santa Barbara's IBRP, the City of Chicago's Green Permit Program (Table 3) rewards commercial projects with expedited permitting and reduced permit fees if they earn LEED certification, use certain green strategies or green technologies (e.g., solar panels, wind turbines, green roofs, geothermal systems) and meet one or more other upgrade requirements from a menu of options (City of Chicago undated).

Table 3: City of Chicago Green Permit Program Benefits and Requirements

Project Type	Benefit Tier 1	Benefit Tier 2
Benefit	Expedited permit (goal < 30 days)	Expedited permit (goal < 30 days) + partial permit fee waiver (up to $25,000)
Requirements for retail over 10,000 sq. ft. (footprint)	LEED Silver + Energy Star roof + 1 menu item	LEED Silver + 25% green roof + 2 menu items
Requirements for retail under 10,000 sq. ft. (footprint)	LEED Certified + 1 menu item	LEED Silver + 1 menu item
Requirements for Office buildings over 80 feet tall	LEED Silver + 50% green roof + 1 menu item	LEED Silver + 75% green roof + 2 menu items
Requirements for Office buildings under 80 feet tall	LEED Certified + 2 menu items	LEED Silver + 2 menu items

Source: Adapted from City of Chicago, undated.

The Green Permit Program, in conjunction with the City's Green Roofs Initiative and Green Roof Improvement Program, increased the number of green roofs in Chicago from 250 in 2006 to more than 400 in 2008, with a target of 6,000 commercial and residential green roofs by 2020, while stimulating the creation of 24 green roof companies in Chicago (Kazmierczak and Carter 2010, 116).

The Green Roofs Initiative (GRI) encourages installation of green roofs on both public and private new construction through grants and technical resources. The program's design offers a mix of incentives and requirements. Projects with more than 50% or 2,000 square feet (whichever is greater) of vegetation receive a density bonus. Green roof installation grants up to $5,000 are also available for small-scale commercial and residential properties. Chicago has also mandated any developer who receives city assistance (for example, to rehabilitate a brownfield site) to include a green roof. The GRI has resulted in the establishment of more than 80 green roofs across the City as of 2010, totaling more than 2.5 million square feet (Kazmierczak and Carter 2010, 113).

A commercial project in the Central Loop Area is eligible to receive reimbursement grants for up to $100,000 if it meets the following building design criteria:

- vegetated area covers more than 50% of the net roof area, including drought-tolerant plants (but no monocultures);
- has a green roof that is highly visible to surrounding buildings;
- includes a minimum two-year maintenance plan for the green roof; and

- has plans to monitor green roof's performance in terms of stormwater management and urban heat island mitigation (Kazmierczak and Carter 2010, 113).

4. GHG Emissions Tracking, Reporting and Disclosure

Many local governments in Canada and the United States have adopted greenhouse gas (GHG) reduction targets as part of their community sustainability frameworks. Mexico is registered in the Low Emissions Development Program and also has its own national, voluntary GHG program (*Programa GEI Gases Efecto Invernadero México*). While some emissions tracking and reporting regimes have been introduced as voluntary programs, British Columbia has gone further than any other jurisdiction in North America by establishing a Climate Action Charter (The Province of British Columbia, undated). Local governments that are signatories to the Charter (currently 180 of 188 in the Province) are required to track and report annually on community carbon emissions through Carbon Energy Emissions Inventories (Table A-1). This policy has many of the same benefits and challenges associated with mandatory energy benchmarking and disclosure policies.

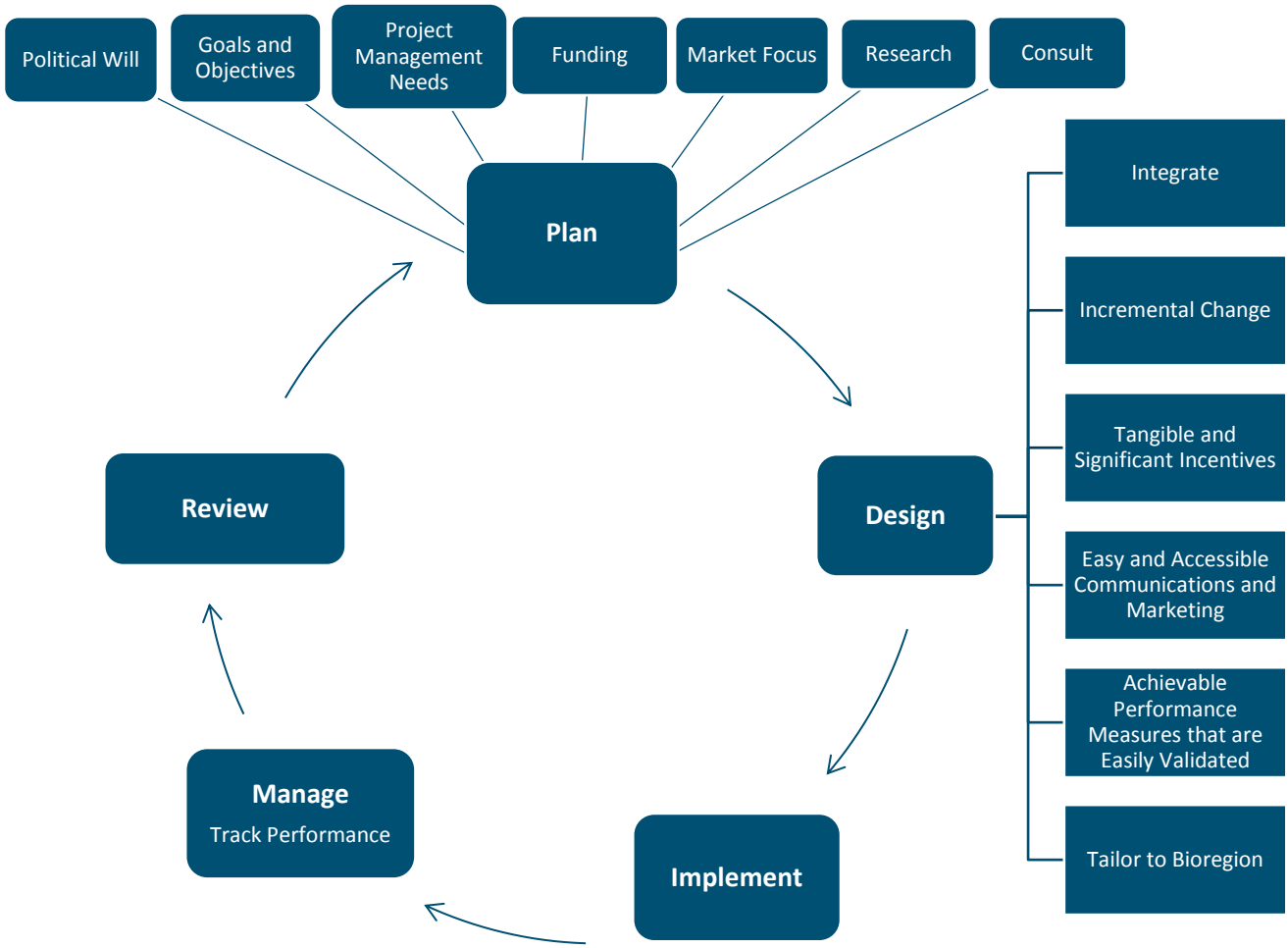
5. Challenge Programs

In the past few years, we have seen a number of municipalities, such as Chicago, Vancouver, and Austin, making the claim to being or intending to be the "greenest," "most sustainable" or "most livable" city in the country or in North America. Challenges of this sort are highly successful strategies for coalescing support for advancing green building objectives. The US Federal Government's Better Building Challenge (BBC) (Table A-10) is a broad, multi-strategy initiative as part of a larger Better Buildings Initiative (BBI), with goals of reducing the commercial and industrial sectors' energy intensity by 20%, lowering energy bills, reducing pollution, and growing domestic jobs. BBC currently has the participation of 48 commercial, 10 industrial, 37 community, 14 financial, and 3 utility allies along with various federal agencies. A total of 53 showcase projects representing 48 implementation models have been identified. Retrofit Chicago's Commercial Buildings Initiative is an example of a local government challenge program, with 14 buildings involved (as of June 2012). Representing 14 million square feet of commercial real estate, the program began as a Local Governments for Sustainability (ICLEI) initiative—the Green Business Challenge—with participating governments committing to reduce energy usage by 20% within five years.

Chapter 3: Steps to Developing a Program

While green building policy continues to evolve, experience to date has revealed many techniques to ensure success. Figure 1 illustrates one plausible pathway for developing a green building policy framework and highlights a number of important elements that should be considered in the process. The list of considerations is not intended to be exhaustive, but reflects the collective experience of government programs consulted in the preparation of this report.

Figure 1: Policy Development Pathway



One Size Does Not Fit All

While many jurisdictions have adopted common policies and strategies to intensify green building, it is important to note that these approaches do not work for every situation. For example, the widespread adoption of LEED into building ordinances across North America in recent years has had mixed success. With its elective credit system, LEED was not designed to be a policy instrument and does not always meet a local government's environmental objectives. For that reason, some jurisdictions have adopted customized certification regimes (e.g., Toronto). Others have adopted LEED with additional mandatory requirements (e.g., City of Vancouver; see Table A-3). Within a certification framework, some have elected to go with a prescriptive approach, while others have opted for a performance-based regime.

Plan

Cooking up green building policies and programs necessitates planning and testing. As Figure 1 illustrates, planning involves a number of important steps, including setting goals and objectives, securing adequate program funding and political support, identifying project management requirements and the target market, and conducting market research and authentic stakeholder consultation. As with the City of Toronto, additional elements such as a cost-benefit analysis can help to identify optimal levels for various incentives. Robust planning approaches, like that followed by the City of Austin, also call for social impact assessments to assess the potential effects of any policy changes on communities, particularly low-income areas.

Ensure Political Will

The development of green building policy in Mexico has been affected severely by changes in political climate. Green building policy has the ability to cross all political lines, and a policy can be shaped to be acceptable to all political interests.

Consider Program Management Needs

While all local governments may not have the resources to manage contractors, municipalities like Austin, Texas, manage their inspection contractors and maintain a database of all inspection results.

Obtain Adequate Funding

Secure sufficient funding to develop and administer an initiative. Where needed, think creatively about establishing a sustainable funding mechanism. For example, policies encouraging diversion of construction waste are often funded through dedicating a modest percentage of tipping (disposal) fees.

Know Your Target Market

Create programs that address the needs of your target market. Knowing the sector you are targeting (commercial, institutional, industrial, multi-unit residential, MUSH [municipalities, universities, schools

and hospitals]) and the stakeholders within that sector which you are targeting (owners, developers, contractors, government, etc.) is vital to a program's success. That does not mean sacrificing public policy objectives, but rather structuring programs that meet both policy objectives and the needs of the market players. Voluntary programs with incentives provide a good starting point, but it is still necessary to fine-tune them to reflect market conditions. For example, while successful overall, the US Energy Efficiency Building Tax Deduction for single-system retrofits, at $0.60/ft2 has been found to be sufficient to incentivize lighting retrofits but not HVAC retrofits (see the discussion below on Toronto, Ontario). Initial estimates suggest that 80% of dollars spent were on lighting retrofits. However, HVAC designers have started to design systems that meet the energy efficiency requirements so that HVAC retrofits qualify for the deduction. It has also been found that it is much more difficult for existing building retrofits to meet the energy efficiency requirements than for new construction projects.

Design

With the necessary background elements covered, appropriate design of the green building policy framework is absolutely essential for success.

Make Change Incremental

A consistent attitude of all successful green building frameworks is an incremental approach to change, starting with public sector initiatives, followed by voluntary measures for the private sector coupled with incentives, and then solidified into mandatory requirements once there is broad industry acceptance.

Voluntary policies are highly effective at introducing green building concepts to the market and building support from industry leaders. Alignment of voluntary policies and programs with incentives has been found to enhance uptake by more than 10%. King County's GreenTools Program introduces each initiative as a voluntary pilot program before making it mandatory.

Austin, Texas—the first American jurisdiction to create its own green building rating standard—first introduced sustainable building guidelines for public buildings in 1994, followed by a voluntary rating system for commercial buildings in 1996, which was extended to multi-family and high-rise buildings in 1998.

Similarly, the Toronto Green Standard was first mandated in 2006 for new, municipally owned facilities, and made voluntary for private developments. In 2008, the revised two-tier structure was adopted: Tier 1 is mandatory for all development and Tier 2 is voluntary, tied to various incentives provided through the City's Better Buildings Partnership for New Construction. Similarly, the "carrot and stick" approach of minimum performance standards, coupled with incentives to reward superior achievement, has worked well to foster green building.

Make Incentives Tangible and Significant

To convey the message that green building is a desired objective of government, government must provide incentives that are both tangible and significant, even if this means focusing on one initiative over another. Formulating policy that attempts to reach too broadly risks generating a suite of ineffective initiatives.

Make Communications/Marketing Easy to Understand, Access and Implement

Green elements are just one of a myriad of considerations in any building project. Information about any program has to be set out clearly, be available where your target audience is going to see it, and be simple and quick to incorporate into the building process. Programs like Santa Barbara's IBRP (Table A-8) and the City of Chicago's Green Permit Program are good examples of the potential uptake of well-marketed voluntary programs. These programs offer an integrated lineup of green building elements that are presented at the permitting stage along with expert support to assist developers with implementation.

It is helpful to make program eligibility thresholds simple and widely applicable. The City of Austin determined early on that green building policy would apply to not only high-end building projects but to affordable housing as well, recognizing that green building can be cost-effective at all levels. Similarly, the City of Hamilton expanded the scope of its LEED Grant Program after several years to include the entire urban area and all types of buildings.

Marketing strategies can also follow different approaches. Some programs, such as Santa Barbara's IBRP, take a passive approach, acquainting developers with requirements when they come to obtain a building permit. Others, such as the US Energy Efficiency Building Tax Deduction, employ a more aggressive approach by communicating to industry through professional industry associations, industry media and other traditional marketing channels. The approach taken will depend on available resources, the type of initiative, target audience, and the rate at which the local government wants to achieve market penetration. For example, community consultation was particularly instrumental to the success of the BBC program (Table A-10). Even though mandated, a strong communication and marketing plan was required to obtain 75% compliance for New York's Energy Benchmarking Ordinance (see discussion of reasons for non-compliance in Chapter 1, section 1, above).

Set Performance Measures that Are Achievable and Easily Validated

Mandate clear, specific, and measurable performance goals rather than require the use of specific technologies or processes, and embed tracking and review protocols into the program's design. A performance-based approach provides greater flexibility for program participants, particularly energy efficiency policies that offer multiple pathways to achieving desired outcomes.

Setting building performance requirements that are achievable and easily validated is also important for creating program momentum and industry commitment. This is the rationale behind Toronto's revised,

two-tiered TGS, with the mandatory Tier 1 setting out clear and reasonable minimum performance measures.

Tailor Standards to the Bioregion

Creating a green development standard requires knowledge of the particular environmental issues faced by a local government. Performance measures can then be identified that best address those issues. The bioregional approach produced a workable, made-in-Toronto solution. However, for many smaller local governments, it may be more affordable to either adopt or modify third-party criteria.

Manage

Policies are often left to languish without proper resources, by cash-strapped local governments, and without proper monitoring to manage the policy and provide ongoing assessment.

Track Performance

Identify key performance indicators and have resources and systems in place to collect, manage, and analyze the data. Most policies and programs suffer from poor monitoring, making it difficult to assess their effectiveness and determine how to make improvements.

Review

In the State of Virginia, Arlington County's Green Building Density Incentive Program is an example of how important regular program review is to success, i.e., ensuring the policy remains relevant and continues to intensify green building practices. The program offers a density bonus to projects that obtain LEED certification and meet minimum energy requirements. Changes in building regulations, LEED requirements, and industry practice drive the requirement that the program be reviewed and updated every two to three years to ensure that it is not incentivizing the status quo. For example, various LEED provisions that used to qualify as incentives are now requirements, under the County's code.

In Austin, Texas, the municipality conducts focus groups every three to five years to identify where the public thinks they should be going, how initiatives have affected them, and how to improve the effectiveness of service to constituents.

Santa Barbara's IBRP is an example of how even a successful program requires constant review and updating to maintain its relevance. The voluntary program, first initiated in 1996, was extremely successful, with 5–7% of all permits going through the program. However, the program has not received much attention since 2002 and mandatory state requirements and industry practice have now surpassed the program's voluntary standards, while the economic downturn has reduced the attractiveness of the program's expedited permitting incentive. Santa Barbara is about to embark on a

process of revising the IBRP to align with state standards and offer incentives that are relevant to the current market.

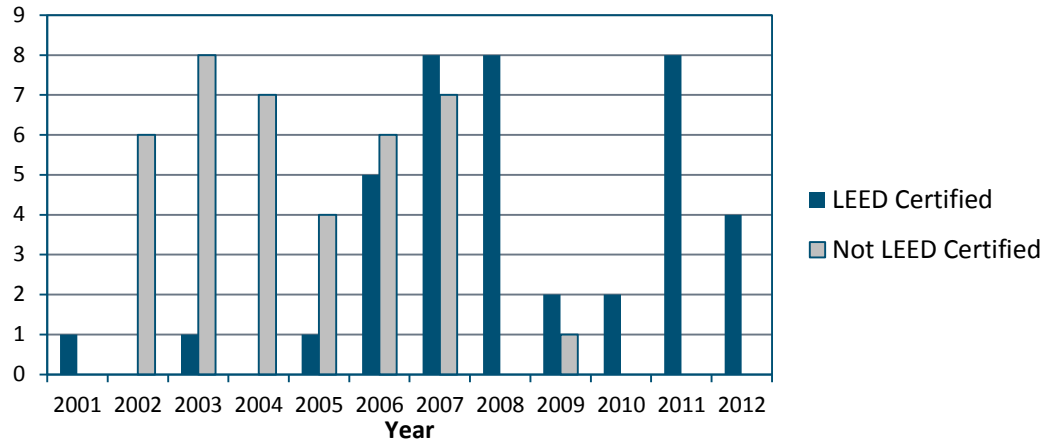
Chapter 4: Policy Frameworks

Creating the right mix of policies is a major challenge facing local governments in designing an effective program to encourage greening existing buildings. There can be a synergistic effect between policies, which can result in proportionately greater uptake from the mix than from the total of individual policies; however, the exact mix will vary by jurisdiction. This chapter describes some of the leading green building policy frameworks in North America—Arlington County (Virginia), Austin (Texas), King County (Washington), New York City (New York) and Toronto (Ontario)—to illustrate how, in each case, the whole is indeed greater than the sum of its parts.

Arlington County, Virginia

The cornerstone of Arlington County's green building framework is its Density Incentive Program (see **Error! Reference source not found.**). This voluntary program is an example of striking the right balance f incentives and focused requirements to achieve the desired outcomes. The program originally applied only to commercial buildings (1999) and was later extended to all building types (2003). Density bonus levels have been adjusted over time, to keep step with changing market conditions. In exchange for a commitment to certification to the LEED Silver level or higher and to a minimum level of energy savings (currently 20% above the baseline of building standard ASHRAE 90.1-2007, for commercial projects, and 18% above for residential projects, as defined under *LEED EA credit 1*—Optimize Energy Performance in the LEED 2009 rating system, projects may request a floor [to] area ratio (FAR) bonus (see Table 4). A FAR bonus is an increase in the amount of space a building is allowed to occupy on its plot of land. Each project is evaluated on a case-by-case basis. An additional 0.10 FAR bonus may be awarded to buildings that also commit to Energy Star building certification or LEED for Existing Buildings (LEED-EB) certification, both based on actual energy usage.

Figure 2: Arlington County Density Incentive Program: Number of Green Building Approvals in Arlington



Source: AIRE 2013.

Table 4: Arlington County Density Incentive Program: FAR Bonus

Requirements			Proposed FAR Bonus	
LEED Level	Energy Efficiency			
	Office	Residential	Office	Residential
Silver	20%	18%	0.20	0.25
Gold	20%	18%	0.35	0.40
Platinum	20%	18%	0.45	0.50

Source: AIRE 2013

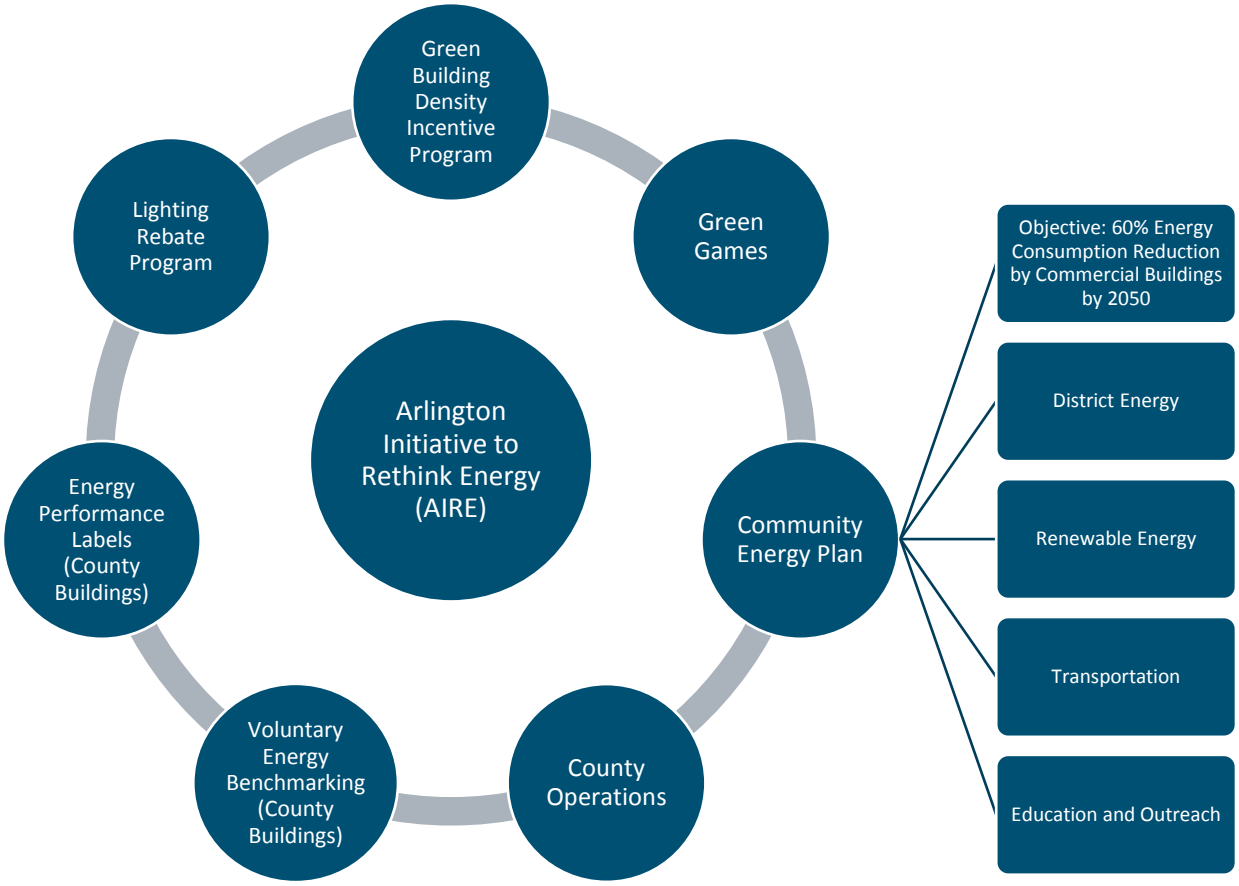
The minimum energy savings requirement was a program amendment created when the County realized that LEED did not guarantee better energy performance. The requirement is enforced through a security deposit provided by the developer prior to issuance of the Certificate of Occupancy. The amount of the deposit, calculated based on square footage multiplied by the average rental rate for space in the specific area of the County, defaults to the County if LEED certification and energy performance targets are not obtained. A second financial security deposit is posted for additional density offered in relation to Energy Star or LEED-EB certification. While the density bonus is designed to encourage LEED certification, care was taken to not make it so generous as to give density away where developers were going to meet LEED standards anyway because of market demand (J. B. Kelsch interview 2012). Affordable housing projects can submit EarthCraft certification, to receive Virginia Housing Development Authority support through a federally sponsored Low-Income Housing Tax Credit program (City of Arlington, undated).

As of June 2012, the County Board had approved 79 site plan buildings since the first LEED density bonus project was approved in 2001. Of these 79 buildings, 27 have been awarded additional density in exchange for an agreement to achieve LEED certification. Of these 27 buildings, seven have completed construction and achieved their LEED commitments in exchange for bonus density (energy savings requirements were not imposed until June 2012.) In addition, 12 buildings committed to LEED certification without receiving a density bonus. Several affordable housing developments have committed to completing green building certification through Arlington's Green Home Choice program or EarthCraft Virginia.

Arlington's green building regime is complemented by a community energy reduction program (Arlington Initiative to Rethink Energy—AIRE, see Figure 3) and a GHG reduction challenge program (Green Games). Green Games challenges local businesses and residents to improve their environmental performance in areas such as energy, transportation, waste, water, materials and employees and outreach. In the first year of the office-sector program, two-thirds of office-building participants achieved a reduction in energy use between 2010 and 2011, along with a 10% decrease in water usage, according to data submitted through Energy Star Portfolio Manager. Reported energy and water savings combined from all buildings in this first year represent US$2 million in avoided costs (Arlington Green Games 2012).

Arlington County is a good example of the evolving nature of green building programs and the need for ongoing review and reform. The County originally established a Green Building Fund that encouraged certification by charging developers a certification fee only if they did *not* obtain LEED certification. Funds were directed towards education and outreach. Today, the Fund has become virtually inactive because most new construction is obtaining certification due to market demand and the introduction of the Green Building Density Incentive Program.

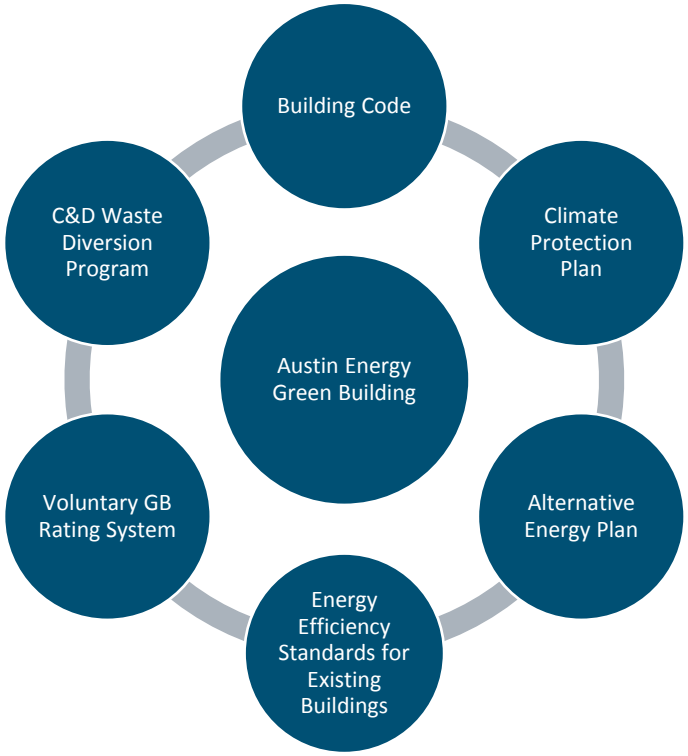
Figure 3: Arlington County's Green Building Framework



Austin, Texas

The City of Austin claims to have the most successful green building program in the United States. Established in 1990 for single-family homes, Austin Energy Green Building (AEGB) now includes custom voluntary green building rating systems for both commercial (1995) and multi-family buildings (1999), Climate Protection Plan, Building Code, Alternative Energy Program, Energy Efficiency Standards for Existing Buildings, and—most recently—mandatory energy benchmarking and auditing (Figure 4).

Figure 4: City of Austin Green Building Policy Framework



The AEGB rating systems include unique social equity provisions and are supported by guidebooks and scorecards. Points also are awarded for various practices, such as construction waste diversion, that align with other municipal programs and objectives. The city's construction and demolition (C&D) waste diversion program has encouraged the development of new business: 29 haulers and 50 recycling businesses since 2002 (AEGB 2011, 7).

The Energy Conservation Audit and Disclosure (ECAD) Ordinance (2009, revised in 2011) establishes tenant energy disclosure and audit requirements for residential multi-family buildings, as well as

benchmarking requirements for commercial buildings. The ordinance showed strong compliance in its first year (2011), as shown in Table 5.

Table 5: Austin ECAD Performance Indicators

Commercial	Multi-unit Residential
67% reported in first year	1,347 total properties covered by ordinance (properties may include more than one building)
40% provided minimum compliance reporting	574 apartment communities audited (53% of non-exempt properties)
60% provided enhanced reporting	4,309 individual apartment buildings audited
	~40% average duct leakage, evidence of the importance of retro-commissioning

The City's Climate Protection Plan sets ambitious targets for all new non-residential construction to be at least 75% more efficient than 2000 International Energy Conservation Code levels by 2015 and calls for enhanced incentives to support green building and carbon-neutral rating systems.

Austin has seen a multiplier effect through the integration of its diverse policy framework, evident most clearly in energy demand and savings. The city notes that the multiplier effect is not only the result of raising standards, but also of an attitudinal change amongst industry players as green building principles become more generally accepted (e.g., commissioning becoming standard practice).

Key elements of Austin's success are the piloting of all new initiatives and a focus on monitoring and enforcement through building inspections. The monitoring and enforcement component has been integrated into the City's green building rating standard. This has resulted in very little industry resistance, with industry becoming accustomed to the requirement and actually realizing financial benefit. AEGB reports a 90% public approval rating, attributed primarily to the performance of city staff (R. Morgan interview 2013).

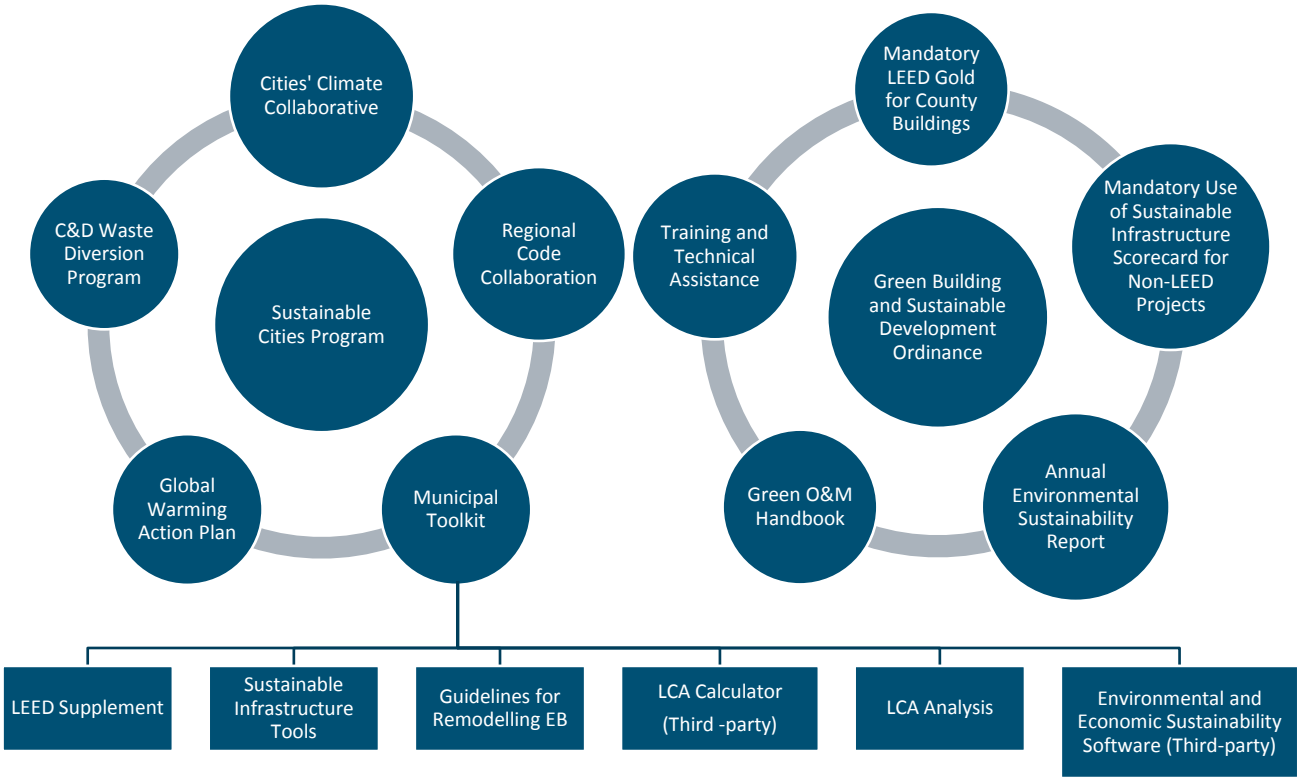
As a result of the City's policies, Austin has one of the lowest utility rates in the state and has maintained stable energy demand, avoiding the need to construct additional power plants (R. Morgan interview 2013). An added benefit has been increased administrative efficiencies and the provision of better city services through the effective integration of green building policies.

King County, Washington

King County began developing its green building strategy more than 20 years ago—before "green building" was identified as a concept. The County's GreenTools Program takes a whole-systems approach, developing policy that addresses the life cycles of both buildings and infrastructure, as well as the relationships between both types of facilities and the rest of the urban environment (see Figure 5). The program has evolved over time and includes a range of policy instruments. The primary policy instrument is its Green Building and Sustainable Development Ordinance, which incorporates a number of the successful green building strategies.

Twenty-five percent of new multi-unit residential buildings constructed in 2012 achieved Built Green levels ranging from 3-Stars to 5-Stars. Forty buildings achieved LEED certification in 2011. The success of the voluntary certification component for new private-building stock is due, in part, to the array of support and incentives offered through King County, as well as to public awareness that has been nurtured over years of public education and outreach. King County offers a range of technical assistance to developers, including eco-charrette facilitation, green materials consultation, and green building practice-specific trainings (e.g., integrative process; commissioning; and life-cycle cost analysis). With 91% compliance under the current ordinance, King County is contemplating updates to its ordinance in 2013 to require new construction of every County-owned building to achieve a LEED Platinum rating and to incentivize certification under the Living Building Challenge, and for existing buildings to achieve LEED Gold certification (P. Southard interview 2013).

Figure 5: King County Green Tools Program



King County also has implemented a comprehensive construction and demolition waste diversion program, with a host of tools and support services, including a recognition program and cost/benefit calculator. Program uptake to date has been approximately 50% (P. Southard interview 2013).

The Green Building and Sustainable Development Ordinance operates in conjunction with the County's Sustainable Cities Toolkit, providing fast and simple tools and mechanisms for municipal staff to use in merging green building and climate change programming, including the Cities Climate Collaborative and the harmonization of regional building codes. Introduced in 2007, the toolkit has been instrumental in increasing the number of municipalities engaged in green building activities, from two formal programs in in 2006 to eight formal programs and green building activity within all 39 municipalities in the County as of 2011 (P. Southard interview 2013). The County expanded the Sustainable Cities Toolkit to include a Green Building Task Force comprised of representatives from each geographical quadrant of the 2,000-square-mile county and a Regional Code Collaboration network expanding beyond its borders. Operationally, King County does not have an office of sustainability but, rather, has an integrated Green Building Team, with representatives from all County divisions with capital assets, and a GreenTools Strategic Initiative that integrates all program areas for internal and external outreach and education.

New York City

New York City's green building strategy comprises a unique suite of policy instruments known as the Greener, Greater Buildings Plan (GGBP). The GGBP is an internationally recognized, nation-leading energy efficiency policy package designed to ensure that information about energy is provided to decision-makers and that the most-cost-effective energy efficiency measures are pursued. The GGBP consists of four pieces of regulation, supplemented by job-training opportunities and a financing entity called the New York City Energy Efficiency Corporation (NYCEEC), which targets large, existing buildings that collectively represent 1.8 billion square feet of built space (Figure 6). The four laws are as follows:

- Local Law 84, Benchmarking—Annual requirement to benchmark energy and water consumption.
- Local Law 85, NYC Energy Conservation Code (NYCECC)—New York City's local building energy code.
- Local Law 87, Energy Audits and Retro-commissioning—Requirement to conduct an energy audit and perform retro-commissioning once every 10 years.
- Local Law 88, Lighting and Submetering—By 2025, lighting in non-residential spaces must be upgraded to meet code, and large commercial tenants must be provided with electrical submeters (City of New York 2012).

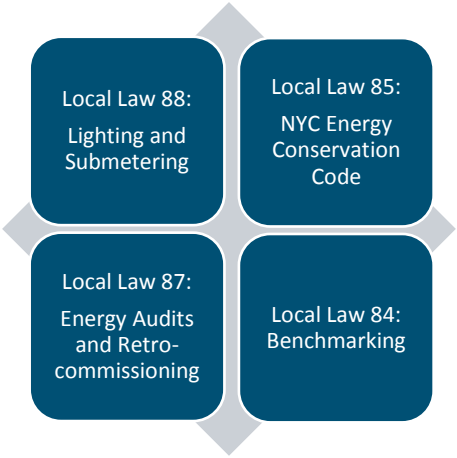
It is estimated that this suite of policies will "reduce citywide GHG emission by roughly 5%, result in a net savings of $7 billion, and create roughly 17,800 jobs by 2030" (City of New York 2012, 7).

Local Law 84 achieved nearly 75% compliance in its first year, attributed to an extensive outreach and public education effort. The energy benchmarking data collected was released in the City's first benchmarking report (2012), representing the largest collection of benchmarking data ever gathered for a single jurisdiction. The data assembled provide unprecedented opportunities to estimate the potential for cost-effective citywide energy reductions, to assess how various parameters (such as age, fuel type, or location) affect energy use in the City's building stock, and to enable the private sector to apply the information when choosing the highest-impact investments, in order to gain more efficiencies. One of the interesting findings of the 2012 report is that asthma rates in neighborhoods correlate with median source energy-use intensity (EUI) in multifamily buildings. Neighborhoods with higher median EUIs, and thus less efficient buildings, have higher asthma rates in general.

New York City's GHG Emissions Reduction Strategy is one example of how leadership can serve as an incentive for energy savings. NYC has set a goal of reducing GHG emissions from public sources by 30%, from 2005 levels, by 2017. The mayor then issued a Carbon Challenge to the private sector to match the municipality's targets. To date, 30 universities and hospitals, 40 Broadway theatres, and ten major corporations have taken up the challenge, representing 140 million square feet of space and nearly 4% of the City's total emissions. Five universities and hospitals have already met the challenge, with universities having reduced their emissions by 13% overall over five years, and hospitals having reduced their emissions by 6% over the past three years. The City will achieve a 1.3% reduction in citywide

emissions if all current participants meet the challenge, assuming no change in baseline square footage. Plans are also in progress to expand the challenge to include residential co-operatives and condos (PlaNYC 2013).

Figure 6: New York City Green Building Policy Framework



While many local governments may dismiss New York as a unique jurisdiction because of its size, density and high percentage of buildings, New York's efforts are important as one of the few examples where a jurisdiction has mandated the key ingredients of a green building policy strategy (i.e., benchmarking, auditing and recommissioning), along with a dedicated energy code, supporting incentives, and annual reporting of key performance indicators, to help assess the impact of these elements on energy performance and emission reduction. New York City released its first building-energy benchmarking report in 2012, which shows promise for a better understanding of the impact of policies on building performance in the future.

Toronto, Ontario

Toronto's Better Buildings Partnership provides a mix of expertise, resources, and financial assistance to implement energy efficiency measures in existing buildings and new construction projects. As of December 2012, the program reports having completed "1,972 projects representing 440 million square feet, creating 29,000 person years' worth of jobs, generating $655 million in economic activity, and saving $59 million in annual costs and 444,000 tonnes of cumulative CO_2 emissions" (City of Toronto 2013). Condominiums have achieved 27.9 to 45.7% greater efficiency than the levels outlined in the Model National Energy Code for Buildings (MNECB), while office buildings have achieved 30.5 to 63.7% greater efficiency.

Toronto has also developed its own two-tiered green building certification framework for new construction. The Toronto Green Standard takes a bioregional approach to green development, where a region is defined by natural, ecological boundaries rather than traditional jurisdictional boundaries (see Figure 7Figure 7). Based on LEED-NC, TGS Tier 1[2] sets mandatory minimum standards required in order to obtain a building permit, while Tier 2[3] is voluntary and incorporates a number of novel elements, including performance measures for bird-friendly development because the city is located on a migratory bird flyway. Developers that meet Tier 2 are eligible for up to 20% rebates on development cost charges.

Of the developments in the TGS database, 51 are expected to achieve energy efficiency levels 25% better than those outlined in the MNECB. Payback periods for buildings that meet TGS specifications range from 5 to 7 years, with overall returns on investment ranging from 20% to 30%. These benefits are achieved even without considering the full economic, social, and environmental benefits of green development, such as reduced need for infrastructure expansion. The combined impacts of BBP and TGS to date are significant (Federation of Canadian Municipalities 2009):

- Anticipated municipal savings of $1.2 billion in infrastructure expansion and health care costs over the next 25 years.
- Anticipated reductions of CO_2-equivalent emissions by approximately 3,500 tonnes for multi-unit residential buildings and 3,000 tonnes for office buildings.

Toronto is also the first jurisdiction in North America to mandate green roofs. The Green Roof Bylaw4 implemented in 2010 requires a percentage of roof area on all new buildings with a gross floor area of more than 2,000 square meters to be vegetated. The Eco Roof Incentive Program5 aligns with the Green Roof Bylaw and the TGS, providing $50 per square meter, up to $100,000, for green roofs (and $2 to $5 per square meter for cool roofs) on new and existing commercial, institutional, and industrial buildings. After its first year, the combined initiatives produced the following results (Saneinjad, undated):

- 1.2 million square feet (113,300 square metres) of new green roof space planned on new commercial, institutional, and multi-unit residential developments; and
- an estimated minimum total of 20 person-years of new green employment and 19 person-years of greened existing employment, to date.

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[2] See City of Toronto, <www.toronto.ca/planning/environment/greendevelopment.htm>.

[3] See City of Toronto, <www.toronto.ca/planning/environment/developerinfo.htm>.

[4] See City of Toronto, <www.toronto.ca/legdocs/municode/1184_492.pdf>.

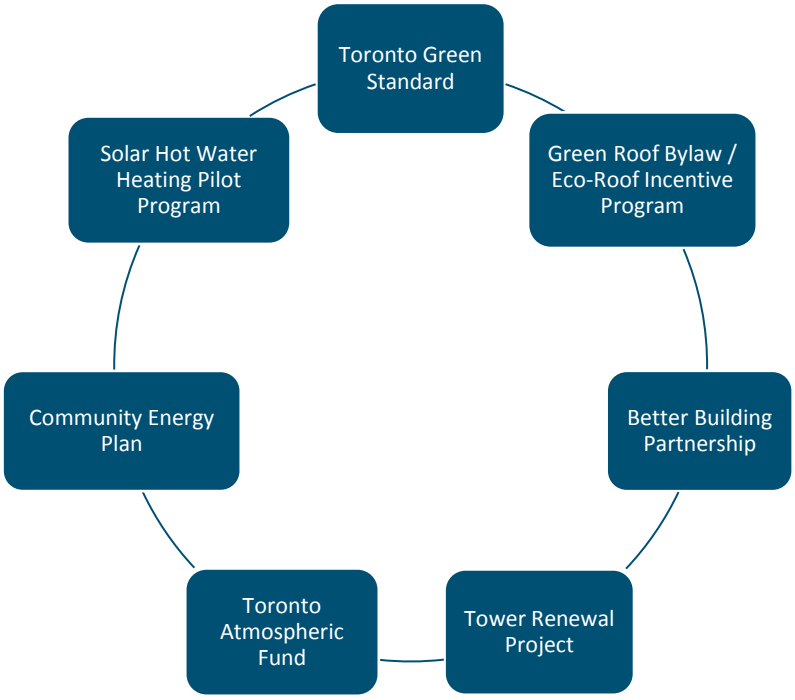
[5] See City of Toronto, <www.toronto.ca/greenroofs/>.

The initiatives are anticipated to generate:

- a minimum of 80 person-years of employment annually, or more than 125 full-time jobs related to manufacture, design, installation, and maintenance;
- reduction of more than 435,000 cubic feet of storm water each year (equivalent to approximately 50 Olympic-size swimming pools);
- tangible reduction of the urban heat island effect;
- annual energy savings of over 1.5 million kWhs for building owners;
- improved air quality;
- extension of the waterproofing life expectancy, which saves building owners money and reduces landfill waste;
- aesthetic improvements and new recreational opportunities on accessible green roofs;
- support for biodiversity, particularly birds, bees and other beneficial insects, and plants; and
- new opportunities for urban agriculture.

Other Toronto programs include a Solar Hot Water Heating Pilot Program, a Community Energy Plan that includes Deep Lake Water Cooling (Enwave), Peaksaver, and Weather-Wise Partnership (2011).

Figure 7: City of Toronto Green Building Policy Framework



Finally, Toronto's Tower Renewal Program is a unique voluntary endeavor to support major retrofits of private residential towers in the City. Toronto has the second-largest number of residential towers in North America (after New York City), the majority of which were built in the 1960s and 1970s. Faced with multi-million-dollar retrofits for each building, the program is establishing financing through Credit Enhanced Capital Pools,[6] establishing a "preferred supplier list" to promote local procurement of goods and services associated with the retrofit projects, and developing training and employment programs as well as a construction waste program.

[6] See City of Toronto, <www.toronto.ca/city_manager/pdf/tr_implementation_book.pdf>.

Appendix – Ingredient Details

The purpose of this section is to provide more-detailed information about the specific green building policies considered in chapters 3 and 4. The summaries are based on information obtained from printed literature, as well as interviews with those responsible for the development or implementation of the policy.

Table A-1: Community Energy Emissions Inventory

Jurisdiction	British Columbia, Canada
Level of Government	State/Provincial
Population	4,400,000
Year Initiated	2007
Description	The Province of British Columbia is the only jurisdiction in North America that maintains an inventory of energy consumption and community carbon emissions. The Community Energy and Emissions Inventory (CEEI) requires all municipalities that are signatories to the Province's *Climate Action Charter* to report out on energy consumption and greenhouse gas emissions from community activities in on-road transportation, buildings, and solid waste. Currently, 180 of 188 municipalities are Charter signatories. This top-down initiative was developed in consultation with local municipalities and is undergoing continuous improvement. Municipalities indicate that the tool has been helpful in setting reduction targets for different sectors and for tracking progress. Inventories are publicly disclosed on a dedicated website and are being shared with industry experts around the world. The CEEI has assisted the government, utilities and Crown Corporations with measuring performance and progress in meeting emission reduction targets, as well as establishing energy plans, identifying opportunities for sewer heat recovery, district energy systems, and related policy development.
Innovative Elements	• Carbon emissions tracking using a consistent framework. • Public disclosure of all municipal carbon emissions inventory data.
Achievements	• Participation of nearly all municipalities in the province. • Benchmarked energy consumption and carbon emissions.
Additional Benefits	• Better overall management of energy and emissions. • Instrumental in helping to develop energy plans, identify energy reduction opportunities, business opportunities and the introduction of alternative energy strategies.
Similar Policies /Programs	For other GHG emissions reporting frameworks, see The Climate Registry.

Table A-2: LEED Grant Program

Jurisdiction	Hamilton, Ontario, Canada
Level of Government	Municipal
Population	670,580
Year Initiated	2008
Description	Under the LEED Grant Program, the City of Hamilton shares (50/50) the incremental construction cost, consultation, energy modeling and certification fees with the applicant to achieve LEED certification. Grants are calculated on the basis of the LEED rating achieved. The grant is provided for up to five years and not exceeding 75% of the municipal realty tax increase during the term of the grant. The purpose of the LEED Grant program is to encourage private-sector investment in sustainable land development and building practices and to help offset the additional costs of a LEED-certified project against future taxes payable on the site that result from development or redevelopment. The program was originally conceived to assist in the sustainable development of employment lands, but was expanded in 2010 to the entire urban area and all building types.
Innovative Elements	Provision of an up-front property tax grant (rebate) for compliance with green-rating standard.
Achievements	• Since its inception in 2008, the program has received four applications. The reason for low uptake levels to date is not clear. Ongoing dialogue with property owners, businesses, the development industry and contractors suggest that there are a number of projects that have or are in the process of incorporating many energy-efficient, sustainable and "green" initiatives, but that have not pursued or will not be pursuing LEED certification, with the most common reasons for not pursuing the certification being: additional costs, lack of resources, and additional reporting. Challenges exist for developers to assess the incremental costs associated with obtaining LEED certification and the City is working to assess the appropriate level of incentive. • Program has been successful in garnering national attention and affecting the changing image of the City of Hamilton as well as having played a role in the attraction and retention of new and existing companies to Hamilton. • Received EDAC/RBC Financial Group Economic Development Achievement of the Year Award from the Economic Developers Association of Canada (EDAC), in 2011.
Additional Benefits	• Efficiencies created through perceived reduced operations and maintenance costs, specifically with respect to hydro and other energy related uses.
Similar Policies /Programs	Many programs offer incentives for achieving green rating standards. Examples include: • Arlington County's Green Building Density Incentive Program, and • Town of Caledon, Ontario's Green Development Pilot Program, which offers to developers which undertake new commercial and industrial projects that qualify for local Development Charge (DC) a discount on that charge, if they achieve a range of green technology measures and/or LEED certification.

Table A-3: Green Building Policy for Rezonings

Jurisdiction	Vancouver, British Columbia, Canada
Level of Government	Municipal
Population	603,502
Year Initiated	2010
Description	The Green Building Policy for Rezonings requires all new re-zonings in the City of Vancouver to be equivalent to LEED Gold. The policy does not specify a specific certification (e.g., Gold, Platinum, etc.) must be achieved, but rather requires submission of evidence that the certification has been applied for with the appropriate agency to achieve Gold-level certification. Specifically, new construction projects must commit to achieving a minimum 63 points (LEED Gold), with a minimum of 6 optimized energy performance points, 1 water efficiency point, and 1 storm water point. Buildings are required to register in the LEED program and demonstrate to the City at all three levels of permitting that the project is on track to achieve 63 points. Upon receiving an occupancy permit, projects are further required to submit proof of application for LEED certification and may be required to send a copy of all certification materials to the City if requested. The verification of requisite number of credits, or points, is done via the City's permitting process, to ensure that when the applicant files the paperwork both the applicant and the City have full confidence that the project will achieve Gold Certification. While the City initially wanted to mandate LEED Gold certification, the policy ultimately called for equivalency because developers expressed concerns about delays in obtaining certification from the Canada Green Building Council, and consequent potential conflicts with new-home warranty provisions and other Provincial consumer protection legislation. The City's intention is that the policy is to be part of a suite of 10–20 policies, including building-code updates, financing, education/capacity, and building labeling, fulfilling its carbon-neutral strategy under the City's Greenest City Action Plan.
Innovative Elements	• LEED Gold standard for new construction. • Municipal compliance review of filings for LEED certification. • Through informal re-zoning negotiations, the City often provides equal credit to offset premiums associated with seeking certification (estimated at approximately 5%).
Achievements	Policy is mandatory for all new construction, but no performance data are publicly available to date.
Additional Benefits	• Assist in reducing building-related greenhouse gases, energy consumption, potable water use, storm water runoff, harmful indoor air quality, and material waste. • Will increase the number of third-party-certified "green buildings" in the Vancouver market, with the intended consequence of transforming the local real-estate market to one that demands improved environmental performance of its buildings and inspires more innovation in green building design. • Built trust between government and industry through consultation and engagement • Held GHG emissions steady instead of at forecasted 33% increase.

	• Optimized demolition permits. • Major Vancouver developer has committed to only build LEED Gold buildings. • Unforeseen overall positive effect on the development approvals process. • Local industry is better able to compete in the global market.
Similar Policies /Programs	Many communities have mandatory LEED requirements for new construction, although most set a LEED Silver standard. Greensburg, Kansas, has imposed a LEED Platinum standard for all new construction, although the context for that policy is quite unique.

Table A-4: Clean Energy Finance and Investment Authority (CEFIA)

Jurisdiction	Connecticut
Level of Government	State/Provincial
Population	3,590,347
Year Initiated	2011
Description	The Clean Energy Finance and Investment Authority (CEFIA), the successor organization to the Connecticut Clean Energy Fund (CCEF), invests its resources in an array of enterprises, initiatives and projects aimed at deployment of commercially available clean-energy technologies, as well as the development and implementation of strategies that lower the cost of clean energy to make it more accessible and affordable to consumers and reduce reliance on grants, rebates and other subsidies and move toward innovative low-cost financing of clean energy deployment. CEFIA is part of a broader state-wide initiative—Energize Connecticut—bringing various energy programs under one umbrella. The vision of the Clean Energy Finance and Investment Authority is to help ensure Connecticut's energy security and community prosperity by realizing its environmental and economic opportunities through clean energy finance and investments. Its stated mission is to support the Governor and legislature's strategies to achieve cleaner, cheaper, and more-reliable sources of energy of through clean-energy finance. CEFIA uses limited public dollars to attract private capital. CEFIA's programs are funded from a variety of sources, including a surcharge on residential and commercial electric bills, Regional Greenhouse Gas Initiative auction allowance proceeds, federal funds and grants, private capital in the form of contracts entered into with investors, and other sources. One of CEFIA's statutorily mandated programs is the Condominium Renewable Energy Grant Program, which provides incentives and financing for clean energy sources, including solar energy, geothermal energy and fuel cells or other energy-efficient hydrogen-fuelled energy, for residential condominium associations and residential condominium owners. Additional other related programs include the following: • The Commercial Clean Energy Financing Program, which finances clean energy projects in the private and public sector, including support for the implementation of Commercial Property Assessed Clean Energy (C-PACE) and creation of a Clean Energy Solutions initiative to provide technical assistance and low-interest loans to businesses that have a strategic importance to the Department of Economic and Community Development. • Feasibility Studies to assist commercial and industrial end-users and developers in assessing the technical and economic feasibility of using complex clean-energy systems. • Supporting a number of innovative community marketing and outreach programs.
Innovative Elements	• Leveraging public resources to attract private capital to support market for commercially available clean-energy technologies. • Dedicated financing authority tasked with mobilizing capital to deploy clean-energy technologies.

	• Ability to offer financing at reduced cost to borrower.
Achievements	Although CEFIA has only existed in its current form for under two years, it has realized significant achievements related to commercial green building: • Clean Energy Communities: CEFIA helped to attract nearly $4.7 million for Connecticut to dramatically increase energy savings actions within communities and decrease the non-hardware costs associated with solar photovoltaic systems. The 103 participating municipalities pledge to reduce building-energy consumption by 20 percent by 2018; purchase 20 percent of building energy from renewable sources by 2018; and achieve certain milestones along the way. Towns earn points toward Bright Idea Grants and clean energy systems. • Campus Efficiency Now Program—issued a million-dollar loan to independent colleges coalition to proceed with energy efficiency upgrades to be repaid through energy savings. • Smart-e loan program—$30 million in low-cost capital through credit unions and community banks to support energy efficiency upgrades, solar hot water, and renewable energy generation in low-income and affordable housing projects. • Establishment of C-PACE program—11 municipalities have adopted the program, with 24 more in the pipeline and eight capital providers prepared to finance.
Additional Benefits	Additional general achievements include the following: • Better use of limited resources. • Better opportunity to support long-term goals (clean energy, economic development). • Reduced reliance on up-front incentive model, allowing participants to achieve grid parity, thereby eliminating the need for incentive programs at all. • Creating competition amongst developers and financial institutions, to drive down costs and bring the best products to the market place. Inspired discussion around creation of similar programs in other states (e.g., New York Green Bank).
Similar Policies /Programs	UK's Green Bank Florida Green Finance Authority

Table A-5: Los Angeles "Open Market" Commercial Property Assessed Clean Energy (PACE) Program

Jurisdiction	Los Angeles County
Level of Government	County/Region
Population	9,818,605
Year Initiated	2012
Description	Los Angeles County's PACE program was established under California's Energy Upgrade California program enacted in 2008. As with all PACE programs, commercial, industrial and multi-family property owners may obtain financing for renewable energy retrofits through third-party financing underwritten by a municipal bond, which is repaid over time through energy cost savings through a voluntary contractual assessment on the property tax bill. However, LA's "open market" program represents a new generation in PACE programs where property owners can negotiate project-specific financing terms with the investor(s) of their choice.
Innovative Elements	• Allows property owners to negotiate financing with an investor of their choice. • Unique process for PACE programs—creating financial assessment district, legal constituting documents, program partner agreements, public-facing documentation. • Backload costs: Application fee ($250) moved to final application stage.
Achievements	• 81 of 88 municipalities have opted in to the program. • Just received first final application. • CaliforniaFirst (statewide PACE program) had 31 applications. Prior to the establishment of CaliforniaFirst and Los Angeles County's Program, a 2011 national review of PACE programs found the following (Clinton Climate Initiative 2011): • 71 projects had been approved and financed by the then four active commercial PACE programs, representing about $9.7 million in energy efficiency and renewable energy projects investments. • The improvements financed have varied by program. For example, the majority of financings approved by Sonoma County will or have funded solar PV projects, while Boulder County's projects are predominately energy efficiency. This may be due to climate, local incentive structures, or other factors. • In 2011, there were an additional 13 PACE programs in the design and planning stages.
Additional Benefits	• In a high-vacancy environment like Los Angeles County, it provides property owners with the ability to potentially attract new tenants, using operational savings. • Lower dependency on grid. • Lower utility bills. • Decreased demand on utility infrastructure (e.g., power plants). • Funding for up to 100% of installed project costs. • Lower financing rates than those of other products in the market. • Longer financing terms than would otherwise be possible. • Enables projects to be cash-flow positive in year one. • May allow for favourable accounting treatment.

	• Allows for equitable sharing of costs and savings with current tenants, and future owners.
Similar Policies /Programs	CaliforniaFirst Connecticut C-PACE

Table A-6: Portland EcoDistrict

Jurisdiction	**Portland, Oregon**
Year Initiated	2010
Population	587,865
Description	An eco-district is essentially a neighborhood working together on things like waste management, transportation, renewable energy, energy efficiency and even district heating and cooling, toward overall better sustainability. Portland's initiative involves five eco-districts. The objective is to create a coherent and comprehensive sustainability and innovation strategy at the neighborhood level, linking buildings with infrastructure and local economic development and service provision, as a means of accelerating sustainable development at the neighborhood level and of developing projects and metrics to support better delivery. The challenge is how to apply larger-scale initiatives at the local level to operationalize those policies and programs. A process management tool has been developed involving a four-step process: district organization, organizational roadmap, project development and district management. A 75-person technical advisory committee supports the program. In October 2012, City Council reclaimed control of the project from the non-profit Portland Sustainability Institute (POSI), which was charged with running the pilot EcoDistrict program in 2009.
Innovative Elements	• Neighborhood approach to developing and implementing sustainability strategies.
Achievements	• While the initiative is a work in progress, each of the five eco-districts has achievements to date, including the following building-related outcomes: • Growing Gateway EcoDistrict is continuing to work with POSI on a detailed "business plan" for its activities and is looking at ways to deploy energy efficiency programs at a community level. • Foster Green EcoDistrict is also continuing PDC-funded work with POSI to refine its plan. The eco-district will focus on improving the energy-efficiency and sustainability practices of the Southeast Foster Boulevard commercial strip. • SOMA-PSU EcoDistrict is promoting the city's energy efficiency program for commercial buildings—the Kilowatt Crackdown—to building owners in the neighborhood. • Lloyd EcoDistrict is the most robustly developed eco-district, with a full-time staff person, an active commercial energy efficiency retrofit program and the promotion of the city's Sustainability at Work program.
Additional Benefits	• Greater ability to integrate strategies at a neighborhood level. • Percentage of revenues from neighborhood stays in the neighborhood (e.g.,

	conservation projects, parking revenues). • Greater efficiencies in building operations. • Increased brand value tied to property assets because of the attractiveness of the neighborhood. • Increased community interest in programs.
Similar Policies /Programs	• Stockholm (Hammarby Sjöstad) (Sweden) • Hanover (Germany) • Freiburg im Breisgau (Vauban, Freiburg) (Germany) • Malmö (BO01) (Sweden) • London (BedZED) (United Kingdom) • Grenoble (De Bonne and Blanche Monier) (France) • Dongtan (China) • EVA Lanxmeer (Netherlands) • Amsterdam Noord (Netherlands) • FortZED (Fort Collins, Colorado)

Table A-7: Energy Efficient Building Tax Deduction (IRS179D)

Jurisdiction	United States of America
Level of Government	Federal
Population	315 million
Year Initiated	2005
Description	The Energy Efficient Building Tax Deduction policy emanates from the Federal Energy Policy Act of 2005. The first-of-its-kind federal tax deduction provides building owners with an incentive to improve new buildings and retrofit existing buildings. The program incents 3 buildings systems for building owners: interior lighting, HVAC systems, and building envelope (roofing, windows, insulation). Building owners can deduct up to $\$1.80/ft^2$ on federal taxes as long as they upgrade all 3 systems and achieve a 50% improvement over a reference building, based on building standard ASHRAE 90.1-2001. There is the option to upgrade 1 or 2 of the 3 systems at a lesser rate (e.g., $\$0.60/ft^2$ for only interior lighting upgrades on some building floors.) Eligible buildings include condos, co-ops and commercial buildings, but not low-rise residential buildings that are 3 stories or less. Program has Congressional approval until the end of 2013, with efforts underway to extend it further. Energy modeling program software is provided for applicants to confirm compliance with 50% energy efficiency improvement. The policy's primary objectives are to increase the number of building renovations and sales of energy-efficient products, stimulate job creation in the retrofit market, and improve building sustainability.
Innovative Elements	• National federal income-based tax incentive recognizing whole-building upgrades.
Achievements	• The Internal Revenue Service (IRS) has not released any analysis of what the existing tax deduction program has achieved since 2005. One tax consultant advising building owners estimates $600–700 million in claims since the start of the program. Congress' Joint Committee on Taxation has estimated revenue at $891 million over 10 years. If the tax deduction is extended past 2013, the estimated revenue is between $100–200 million/year until 2014/2015. At this time there will be increased revenue of $10–15 million/year because building owners can deduct energy costs on their tax returns, so if their buildings are more energy-efficient, they retain more leasing revenues and are taxed more. • Uptake has been affected by the recession, especially with respect to new construction. • Certain entities (e.g., non-profits) do not file taxes and therefore are not eligible, although the designer of the upgrades can claim the deduction. Regardless, uptake has been below expectations. Consideration is being given to change this. • Program uptake has increased over time, with greater market awareness and as developers learn to work with the deduction. Estimates indicate that 80% of dollars spent initially involved lighting retrofits. The incentive has spurred improvements in HVAC design to comply with the 50% efficiency gain requirement for eligibility to claim the tax deduction. The partial deduction is not enough to encourage the building envelope retrofits by themselves; the incentive only makes sense in the context of a larger, building re-modeling program where, for example, the walls are already

	gutted. • Program was well designed for new construction program that could comply with the $1.80/ft^2 requirements. • Data is not available to identify whether heating, cooling, or hot water retrofits are the most popular.
Additional Benefits	• It is estimated that IRS 179D will result in the creation of approximately 77,000 jobs. • Proposed reforms to the program include: ○ benchmarking building performance against its pre-retrofit performance, not energy codes; ○ providing tiered tax deductions for energy efficiency improvements over 50%; and ○ tying a portion of the deduction to actual energy savings.
Similar Policies /Programs	None in North America.

Table A-8: Innovative Building Review Program (IBRP)

<table>
<tr><th>Jurisdiction</th><th>Santa Barbara, California</th></tr>
<tr><td>Level of Government</td><td>County/Region</td></tr>
<tr><td>Population</td><td>423,895</td></tr>
<tr><td>Year Initiated</td><td>1993</td></tr>
<tr><td>Description</td><td>
The Innovative Building Review Program (IBRP) is a free program that advises developers on how to make their developments more energy efficient. For participants that reach one of three target levels, IBRP also includes a number of incentives:

Expedited review of development's plan check.
50% reduction on the energy plan-check fee.
Other incentives, available depending on the target level reached.

To reach a target, a development must exceed Title 24 (California Energy Efficiency Standards) by a certain percentage and include additional energy-efficient features outside the purview of Title 24 (e.g., recycled building materials, drought-tolerant or native plants, alternative energy systems). The Energy Efficiency Menu lists a number of energy-efficiency features to choose from. Each feature is assigned points. The point total and the percentage improvement upon Title 24 are used to determine the target achieved.
<table>
<tr><th></th><th>Energy Efficiency Requirements</th><th>Incentives</th></tr>
<tr><td>Target 1</td><td>Residential: 20% beyond Title 24 and 5 points

Non-residential: 5% beyond Title 24 and 5 points</td><td>Expedited processing by the Building and Safety Division (average 30-50% time reduction in plan review)</td></tr>
<tr><td>Target 2</td><td>Residential: 30% beyond Title 24 and 12 points

Non-residential: 15% beyond Title 24 and 12 points</td><td>Expedited processing by the Building and Safety Division
Energy plan review fee reduced by 50%
Eligible to use the IBRC logo for marketing</td></tr>
<tr><td>Target 3</td><td>Residential: 40% beyond Title 24 and 30 points

Non-residential: 25% beyond Title 24 and 30 points</td><td>Expedited processing by the Building and Safety Division
Energy Plan check fee reduced by 50%
Eligible to use the IBRC logo for marketing
Resolution of Commendation from the County Board Supervisors</td></tr>
</table>
Source: Santa Barbara County Planning, <www.sbcountyplanning.org/projects/ibrp/documents/E-ETargetMenu5.pdf>.

In partnership with a local credit union, Santa Barbara County has leveraged 1 million dollars in grant funds to establish a loan loss reserve as part of the IBRP. Homeowners can now get loans with interest rates as low as 5.9%, along with a 15-year repayment period with no pre-payment penalty. The loans are unsecured, which allows for quick pre-approval and no impact on home equity. The County's loan loss reserve can cover up to 90% of the lender's loss in the event of a default, up to 5% of the total loan portfolio. As a
</td></tr>
</table>

	result, the County has made at least $20 million in capital available to homeowners.
Innovative Elements	• Suite of incentives tied to performance-based measures used to encourage developers to engage in green building education and free design consultations.
Achievements	• On average, 5–7% of the County's total permit stream comes through IBRP. Throughout the first eight years of the program (1994–2002), over 1,000 units achieved an IBRP Energy Efficiency target. • Over the last 10 years, approximately 1,200 residential units and additions have come through the County program. • County staff has noted that green building is becoming more accepted and commonplace; in the last two to three years, over 30 awardees were participating in IBRP at the Target 3 level. • Additionally, the County's green building program has inspired the developers of 15 commercial buildings and four other county governments to implement energy efficiency measures.
Additional Benefits	
Similar Policies /Programs	City of Chicago Green Permit Program

Table A-9: ***Programa de Certificación de Edificaciones Sustentables*** **(PCES)**

Jurisdiction	**Mexico City, Mexico**
Level of Government	Federal District
Population	8.84 million
Year Initiated	2009
Description	PCES is a pilot voluntary three-tiered certification program supported by various economic incentives established under Mexico's Green Plan. It aims to promote and encourage the reduction of emissions and the efficient use of natural resources in the design and operation of residential and commercial buildings in Mexico. Specifically, the program addresses four areas: I. climate change and energy; II. reduction in water usage, and increased reuse and treatment; III. proper waste management, and IV. green citizenship and cooperation. Operationally, it unified several independent environmental programs (sustainable transportation, sites, parks) that were being developed by the Urban Commission and Environmental Office, in order to promote them better. PCES also helps to get developers to conform to current legislated building requirements. Certification under the regime is supported by a number of financial incentives. Buildings certified through the program are eligible to receive reductions on local property and payroll taxes: • Property tax reduction up to 30% if building owners demonstrate to the

	Environmental Office the application of sustainable systems.
	• Payroll tax reduction, according to the following:
	  • Reprocessing/recycling of 33%–44% of solid waste = 20% payroll tax deduction.
	  • Reprocessing/recycling of 45%–59% of solid waste = 30% payroll tax deduction.
	  • Reprocessing/recycling of 60%–100% of solid waste = 40% payroll tax deduction.
	Rather than adopting LEED, Mexico developed this unique framework because LEED has no local criteria and takes for granted the existence of water and waste management infrastructure, which are different in Mexico.
	The first version of PCES published was ambiguous. The second version is expected to be released before June 2013, following delays at the political level.
	Certified projects to date have experienced a 1–2% increase in capital costs for certified buildings, although they also report reduced operational costs.

Innovative Elements	• There are no associated registration fees. • Consultant fees are approximately half those for LEED. • Payroll tax deduction incentive.
Achievements	As of 2013, 44 buildings had been registered and 8 certified.
Additional Benefits	
Similar Policies /Programs	None

Table A-10: Better Buildings Challenge

Jurisdiction	USA (Federal)
Year Initiated	2011
Population	315 million
Description	The Better Buildings Challenge is a broad, multi-strategy initiative facilitated through the US Department of Energy, with goals of reducing by 20% the commercial and industrial sectors' energy intensity, catalyzing revolutionary change in energy use across US buildings, and making a permanent impact on lowering energy bills, reducing pollution and growing domestic jobs. The program's four pillars are: • developing innovative, replicable solutions with market leaders; • making energy-efficiency investment easier; • developing a skilled clean-energy workforce; and • federal leadership by example. To support Challenge participants, 14 financial institutions have committed to deliver nearly $2 billion in financing for energy-efficiency upgrades. The 14 financial allies have committed to financing across the following mechanisms: insurance, ESPC (certificate of

	participation), tax-exempt leases, re-investment of equity, distributed-generation contracts, bonds (SEU, school construction, energy conservation), energy service agreements, and commercial PACE programs. The Better Buildings Challenge has initiated a number of market solutions support mechanisms, including the 200-member Better Buildings Alliance; Better Plants Program; Better Buildings Case Competition, for university students; Commercial Building Energy Asset Scoring Tool; publicly available Buildings Performance Database, which measures and compares consumption; consumer energy tool Green Button; DOE 50-state Data Access Map; memorandum of understanding with The Appraisal Foundation (guides for building appraisals); Centres for Building Operations Excellence (operator training); and a Presidential Memorandum (Federal Buildings Retrofits).
Innovative Elements	• Performance-based contracting using long-term energy savings to pay for upfront costs. • Program scope is comprehensive, connecting building sectors with financial and utility partners.
Achievements	BBP's achievements related to green building include the following: • Participation from 48 commercial, 10 industrial, 37 community, 14 financial, 3 utility allies and various federal agencies. • A total of 53 showcase projects and 48 implementation models identified. • Federal agencies have identified $2 billion in energy upgrade projects and awarded $400 million in construction contracts, paid for by long-term energy savings. • Better Plants Program includes 100 manufacturers and 1400 plants, equal to 5% of total US manufacturing footprint. Partners have saved 45 trillion BTUs of energy and $240 million, to date. • 120 Qualified Energy Conservation Bonds (QECBs), totaling $730 million, have been issued in the last 3 years, mostly toward energy efficiency projects. Public schools and higher education facilities have constituted 25% of all projects. Additional general achievements include: • improved federal incentive mechanisms, including the Energy Efficient Building Tax Deduction (IRS 179D) and Qualified Energy Conservation Bonds (QECBs); and • developing leaders in each sector who act as models and case studies for others.
Additional Benefits	
Similar Policies /Programs	

Table A-11: Smart Growth Development Plan

Jurisdiction	Yellowknife, Northwest Territories
Year Initiated	2007
Population	19,234
Description	The Smart Growth Development Plan is a 50-year growth and development strategy based on the following 10 smart-growth principles: ○ Community Collaboration ○ Fairness and Equity ○ Placemaking ○ Housing ○ Open Space and Natural Areas ○ Redevelopment and Reinvestment ○ Development Form ○ Transportation ○ Promote Clean Energy ○ Regional Awareness The Plan is composed of up to 150 policies, including the Smart Growth Development Incentive Tax Abatement for downtown new-build or adaptive reuse, industrial relocation, brownfield redevelopment, LEED, and heritage preservation.
Innovative Elements	• Long-term, smart-growth planning. • Dedicated financial incentives for developers.
Achievements	Smart Growth Development Plan achievements related to green building include the following: • City is designing a 24-unit, LEED-targeted, carbon-neutral eco-housing project in the downtown. • Allocated $3 million in streetscaping/ trail development, and established significant pedestrian networks. • Allocated $2 million in funding for land assembly projects, 50% in downtown and 50% in old-town waterfront. • Amendments to zoning bylaw to encourage downtown residential densification, secondary suites and laneway housing. • Garnered $10 million in land sales revenue in 2012, more than 100% increase over 2011.
Additional Benefits	
Similar Policies /Programs	City of Hamilton Growth Related Integrated Development Strategy (GRIDS) Plan It Calgary

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