

THESIS

STAKEHOLDER IDENTIFICATION AND ANALYSIS OF ISSUES WITHIN A
MANDATORY GREEN BUILDING PROGRAM: CASE STUDY OF THE GREEN
POINTS BUILDING PROGRAM IN BOULDER, COLORADO

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In partial fulfillment of the requirements

For the Degree of Master of Science

Colorado State University

Fort Collins, Colorado

Spring 2005

COLORADO STATE UNIVERSITY

April 6, 2005

WE HEREBY RECOMMEND THAT THE THESIS PREPARED UNDER OUR SUPERVISION BY NATALIE SHERE ENTITLED STAKEHOLDER IDENTIFICATION AND ANALYSIS OF ISSUES WITHIN A MANDATORY GREEN BUILDING PROGRAM: CASE STUDY OF THE GREEN POINTS BUILDING PROGRAM IN BOULDER, COLORADO BE ACCEPTED AS FULFILLING IN PART REQUIREMENTS FOR THE DEGREE OF MASTER OF SCIENCE.

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ABSTRACT

STAKEHOLDER IDENTIFICATION AND ANALYSIS OF ISSUES WITHIN A MANDATORY GREEN BUILDING PROGRAM: CASE STUDY OF THE GREEN POINTS BUILDING PROGRAM IN BOULDER, COLORADO

As green building becomes more widely accepted, governmental entities are working to implement green building programs. The case study described in this research is of the Green Points Building Program (GPBP), a mandatory residential building requirement enacted in Boulder, Colorado in 1997. This case study determined issues Boulder has experienced since enactment of the GPBP, and defines measures and adjustments the city might employ to improve the efficiency with which the GPBP operates. Identifying issues and potential solutions for the GPBP provides an in-depth description of one seven-year account of green building requirement, and can serve as a case study reference for municipalities seeking similar green building goals.

The qualitative research yielded descriptive results for the case study of Boulder, Colorado. The results of the research are based on expert interviews, a focus group with program-user feedback, a detailed review of literature and a descriptive data analysis, that identifies and defines effects resulting from green building requirement. Subsequently, solutions and/or measures that may successfully improve the program are presented. The results of this study describe Boulder's experience with green building requirement and may help to inform other municipalities that seek to implement or improve a residential green building program.

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Introduction

The growth and evolution of business, cities, governmental agencies, and the overall population places a high demand on land and building development. A number of individuals, business organizations, and governmental bodies look to the promise of green building and smart growth to help minimize and contain the negative effects that built environments often have on the natural environment. Many scientists, government officials, and other building professionals agree that the current rate of energy and material resource consumption exhibited by industrialized countries such as the United States of America cannot sustain this pattern of consumption for much longer without long term consequences for the planet. Construction and building design practices account for a large part of energy and resource consumption, so a fundamental change in these practices could have an adverse, corrective effect (Pearson, 1998). The promotion of the green building movement may enhance the general public's awareness and sensitivity for environmental responsibility.

If sustainable issues of planning were addressed prior to and during construction of buildings, the overall result would likely create development that is much more sustaining. Developing in a "greener" way is also a "smarter way", for its benefits are both environmental and economical (Arendt, 1999). Furthermore, if the consideration and use of sustainable design and building principles were legislated, the sustainability of land and building development would likely reverse or at least contain the negative effects the act of building has been shown to have on the environment. However, legislation and the processes inherent with legislated programs are sometimes

compromised by diversity and complication, often delaying, preventing or otherwise reducing the potential of new legal policies.

Legislation of Sustainable Building Practice

Laws exist on the federal, state, county and city or local levels. Essentially, nationwide laws are enacted by the United States Congress; statewide laws by each State's congress; and municipal ordinances and laws by city or county governments. Laws regarding building practice are outlined and regulated by building codes, and there are several approved sets of building codes that the construction industry, residential and commercial must abide by. Building codes often have not directly addressed environmental sustainability. However, a growing number of programs and incentives have been created by various governmental entities that promote sustainable building practices. While legislation of green building is still the exception, these programs and incentives express the growing community and governmental awareness of, and corrective need for, environmental health and safety problems created by poorly designed and constructed environments.

Federal and State Green Building Efforts

Many sectors of the United States government, including the Department of Energy (DOE), the Environmental Protection Agency (EPA) and the General Services Administration (GSA) have created and employed programs that encourage green building design and practice. The United States Green Building Council (USGBC) is a non-profit coalition of over 110,000 leading companies, and federal, state and local organizations, that seek to advance buildings that are "environmentally responsible, profitable, and healthy places to live and work." It provides national certification for

several levels of green buildings by using the LEED (Leadership in Energy and Environmental Design) rating system (United States Department of Energy [USDOE], 2005).

Additionally, the U.S. Government operates the Building America Partner Program with the mission of producing communities of homes that use 30-50% less energy than conventional homes, and save 50% in construction time and waste. The program employs several laboratories and consultants while encouraging the development of technologies, processes and systems that are ecologically efficient. Also, the U.S.DOE Federal Energy Management Program (FEMP) aims to reduce the cost of government by advancing energy efficiency, water conservation, and the use of renewable energy sources within federal facilities. Executive Order 13123, Greening the Government Through Efficient Energy Management, directs the government to save taxpayer dollars and reduce emissions through improvements in energy management and usage (U.S.DOE, 2002).

Some state governments have developed comprehensive programs and incentives to promote more environmentally responsible building within their state. California's executive level Sustainable Building Committee designed a grant program to fund building design efforts, workshops and educational forums on sustainable building, in addition to creating guidelines to assist local governments in communicating their green building goals and requirements to design and construction bidders ("Minnesota Planning," *Perspectives*, 2002). New York Governor, George Pataki, signed the nation's first Green Building Tax Credit into law in May 2000, which is meant to offset some of the higher initial costs of high-performance buildings ("Minnesota Planning,"

Perspectives, 2002). These state efforts and incentives help encourage green building awareness and practice. However, due to city and county controls over the majority of building and development, it would be important to enact local level legislation to further increase the implementation of green building practices.

City Municipality Requirement of Green Building

Some progressive cities and counties have green building legislation in place. In Austin, Texas, the city government implemented a Green Building Program that requires more environmentally responsible, sustainable building in all city facilities. Since 1994, a builder or developer wishing to obtain a permit for building on any city project must first contact a city project manager regarding specific guidelines set forth by the Green Building Program for that project type and size. In 1994, the City Council of Austin, Texas enacted a set of municipal guidelines containing environmentally responsible building and development objectives (City of Austin Municipal Programs, 2002).

Furthermore, the City of Frisco, Texas has developed and implemented the first ‘codified’ residential Green Building Program in the state. As of 2001, every new home within the city limits must now be built to meet or exceed the minimum standards of the city’s green building program. Frisco’s program additionally and coincidentally works with the local utility provider to help make the green building requirements affordable for builders (“Frisco First,” *Environmental Building News*, 2001).

Communities such as Village Homes in Davis, California not only encourage the practice of sustainable building and development of land, but also use green building strategy as a marketing tool, and selling point to attract owners. The Eco Village in Loudoun County, Virginia is another example of a community that has policy measures in

place to ensure that the way in which land is developed is sustainable in nature. San Francisco, California has a mandatory green building program in place that applies to all city- or government-owned building projects. The municipality has also enacted other policies that regulate energy and material resource consumption with regard to development and building.

Boulder, Colorado's green building program is the focus of this research study of local legislation for green building. Chapter 7 Energy Conservation and Insulation Code, of Boulder's city building code, updated in November 2000, "encourages the conservation of scarce energy resources through the regulation of building construction standards to minimize energy consumption for heating, cooling, lighting, and ventilating structures, and through promoting building design which incorporates passive solar heating." It's one of several ways the citizens of Boulder have shown progressive attention to environmental concerns through legislation. Additionally, the City of Boulder Building Department has developed and implemented the Green Points Building Program (GPBP), by which all new residential building permit applicants are required to employ verifiable green building measures, to an extent dependent on the size of the construction, addition, or remodel project.

Details of the Green Points Building Program

The intent of the Boulder GPBP is to "encourage cost-effective and sustainable residential building methods to conserve fossil fuel, water, and other natural resources, promote the recycling of construction materials and reduce solid waste, enhance indoor air quality, and, in turn, make Boulder, Colorado, a more sustaining community" (Boulder City Building Department, 2001). The GPBP originates from the city's energy

code, called Energy Options program. Established in 1997, the GPBP allows builders to choose from a variety of green measures for implementation to meet program requirements. For each residential construction project seeking a building permit, the builder must document the necessary green building measures the project will utilize in order to obtain a permit from the city.

Depending on the size of a project, a set number of “green points” must be achieved. Points are obtained by satisfying criteria in categories such as land use, framing, electrical, solar, etc. Some measures are worth more points than others; for example, recycling construction debris is worth five points, using structural alternatives to wood is worth five points, employing solar-generated electricity is worth twenty points, (Boulder City Building Department, 1997). The list of measures that are assigned a point value is found in the City of Boulder Residential Building Guide: Green Points Program Guidelines, included in Appendix D. Also, any innovation or unlisted measure that a builder may wish to utilize can be presented to the building department and, if deemed environmentally beneficial, approved and assigned a point value for use in a building project.

Issues and Tensions Associated with Legislation of Green Building

As demonstrated by the three cases (Austin, Frisco, and Boulder) mentioned above, the requirement of environmentally responsible building has been mandated by certain governmental entities. There appears to be benefits and advantages that result from this type of legislation. However, as with most proposed legislative endeavors, there can be potentially problematic issues that slow down or compromise the adoption and administrative processes.

Obstacles most often cited with regard to the adoption of green building legislation and practice include higher initial cost of green projects, a lack of education of green practices among building professionals, and the absence of time-tested methods and results, scientifically showing an advantage or benefit of utilizing green alternatives (products, processes or systems) that are inherent to green building practice. These issues will be discussed and illustrated through existing cases, but the greater point is that municipalities with such goals as sustainability and minimal environmental impact and resource consumption will often face these issues and others when developing a green building program. One such issue with regard to building and development is whether a green program should be voluntary or made mandatory.

A case study in Santa Monica, California found that a combination of mandatory and voluntary building practices worked well. Where a given practice or product had little or no capital cost impact to the building project, and was easily performed by designers or builders and easily inspected by city officials, that practice was made mandatory. Other practices that faced regulatory obstacles and their implementation could not easily be checked, were left as voluntary (Theaker & Cole, 2001). Overall, the recommended practices of Santa Monica's Sustainable City Program encourages sustainable development and green building within the city limits and is referenced in several city policies.

Eric Hove, of Oberlin College, did a comparative case study of two green building programs, a voluntary program containing green building 'options' that builders were encouraged to employ (Scottsdale, AZ), and a mandatory program requiring green building for every residential project (Boulder, CO, Green Points Building Program).

Hove made three important conclusions in his research regarding the issue of voluntary versus mandatory. The first conclusion was that Boulder's regulatory program produced more 'green built' units than the voluntary program of Scottsdale, Arizona. Secondly, though each program was designed around major program areas (such as site use, building envelope, etc.) local conditions produced variation in strategies and technologies employed. Lastly, 'green' technologies adopted by projects participating in his study tended to be those that had the least impact on construction costs (Hove, 2004, pg. 73-6). Hove further concluded that although both cities were affluent and had a history of progressive planning, the programs did not meet his expectation of being under strong development pressure. This may perhaps suggest that part of sustainable development is controlled and selective growth, though Hove drew no conclusions on this discovery.

Having significantly evaluated these two programs, Hove suggested that research in the area of program costs would contribute further to evaluation, which illustrates another very important issue associated with green building requirement. If some green technologies do, in fact, cost more than traditional practices (Thurmond, 2002, pg. 41) then to what extent can a municipality mandate green building without jeopardizing economic stability. Obviously, a builder or developer planning to sell a project upon completion cannot factor in whole life cycle costs of the project, and instead only the initial costs of construction. The root of this cost issue then apparently lies with owner demand, not municipal legislation or regulation of green building. Environmental and economical considerations need be considered together to allow decision makers to make informed value judgments. However, some decision makers are uninformed with regard to the environmental impact of a building (Bartlett & Howard, 200). In reference to a

study which proved estimators can and do overestimate the costs of utilizing energy efficient measures, or systems, and thus, underestimate life cycle cost savings for the building stated that “correct consideration of whole life cost or life cycle costs together with environmental impact will deliver true long-term value for the client and more sustainable development” (Bartlett & Howard, 2000).

Another issue related to legislating green building practice is the minimal information available related to green building codes. For a governmental body to mandate green building on every permitted project, a regulatory set of building codes acknowledging green building strategies would be useful. However, with almost every green building program enacted by a municipality, whether mandatory or voluntary, there has been corresponding educational programs and increased availability of information on green building practices, ideals, and techniques to aid participating designers, builders and developers.

Considering these obstacles, the awareness and practice of green building is growing. With the adoption of green building requirements or programs, cities each year create new policies to minimize the negatives effects of building and land development. Because green building legislation is still a relatively new endeavor, there appears to be a limited amount of research published that addresses the benefits and limitations of the legislated green building programs. This research project set out to determine the particular issues Boulder, Colorado faces with its mandatory green building program and, further, to determine the optimal strategies for dealing with the major issues. Perhaps with a better understanding of the major issues and potential solutions, Boulder and other

municipalities may be better positioned to achieve long-term sustainability for their green building programs.

Definition of Terms

For this research study, there are particular terms used to illustrate and explain the research performed, that have various definitions within varying contexts. This section of definitions is provided to clarify what context these terms are being used in, and to define the terms within that context.

Sustainable- describes the degree to which a building or building measure taken will prolong the environment in which it takes place; it also describes the method for harvesting and using a resource so that the resource is not depleted, or damaged permanently.

Green building- used either as a verb or noun, refers to the implementation of environmentally responsible, or sustainable measures with regard to (a) building and all related aspects, throughout a building project.

Whole life cost- also termed life cycle cost/assessment, describes the total cost incurred by a building from concept to deconstruction; it takes into account embodied energy of materials, operational energy usage costs and energy generation for the entire existence of a building.

Legislation- describes the requirement by any judicial level of law or ordinance, to plan, develop or build according to guideline requirements set forth.

Management Dilemma

The management dilemma for each municipality seeking a greater level of sustainability is in determining proper balance, including the best green building program

to support its environmental, economic and sustainable goals. Furthermore, the dilemma is ongoing in most cases, needing updating and evaluation in response to changing conditions affecting the efficiency with which a building program runs. Logically, understanding the affect green building legislation will exhibit as a potential management solution for sustainability is key. This research addressed this dilemma, identified the stakeholders, and documents the process and typical decisions municipalities make as they work toward green building. When considering the demands placed on building and land development by population growth, resource conservation and alternative, more sustainable practices become important goals. Herein lies another dilemma; what solutions can be found through green building legislation to sustain land development and building for a municipality?

Limitations to the Study

While this dilemma is wide in range and asks many difficult questions, the research study has addressed two aspects, in an attempt to solve the dilemma. In the case study of Boulder, Colorado implementing the Green Points Building Program to mandate the use of sustainable building practices, the two issues that have been explored and analyzed are: issues (economic, administrative, or otherwise) experienced since enacting the Green Points Building Program and what solutions can be determined to address these issues by a group of key stakeholders. Interviews of building professionals, city personnel, and other key consultants and stakeholders serve the purposes of this case study in determining issues resulting from the GPBP. Subsequently, a focus group convened to determine the best course of action for Boulder to take to improve the GPBP by addressing those issues. Only those issues related to legislating and administering the

program have been addressed. However, various effects the program has produced within the city may be brought to light while determining the issues.

Statement of the Problem

This research inquiry addressed issues associated with legislation of sustainable building practice within governmental jurisdictions. Sustainable building legislation can be problematic due to several variables, which often lead to questions regarding legislative extent and/or intent with regard to green building; issues on which little research exists. For city, state, or federal governments to propose and enact building legislation, they must first be certain of the benefits, repercussions and overall impact that could result from such legislation. With respect to legislating green building practice, only limited results have been published. A few city municipalities have successfully implemented green building legislation; these cities could likely offer assistance to other cities seeking to implement green building programs.

Through conducting specific research similar to this research inquiry, issues may be more easily dealt with in new or updated programs. With evaluation of the GPBP's issues and determination of how best to address them, this case study determined a successful green building program model, specific to the goals of the City of Boulder, but useful to any municipality with similar goals.

Research Questions

For this case study to explore all the issues, it was necessary to ask questions that approached the topic from every angle. The research questions that were asked address one of three guiding constructs, which represent the different angles: implementation or enactment, administration, and improvement. The nature of the questions encourages full

and extensive exploration of answers and possible solutions, and, additionally, served the research case study. The questions proposed for this research study were as follows:

1. What issues, found to be problematic, are associated with legislation and/or regulation of green building?
2. What solutions can be determined by a group of experts/stakeholders to address the issues found to be problematic to the GPBP?

Answers to these questions are found in the Data Analysis sections of this thesis paper.

Initial Areas of Interest

This case study of issues associated with a mandatory green building program strived toward thorough exploration of issues, and consequently had some initial areas of interest. These initial areas of interest are represented by the following questions:

1. What political issues can be associated with enactment and/or operation of the GPBP?
2. What economic issues can be associated with enactment and/or operation of the GPBP?
3. What administrative issues can be associated with enactment and/or operation of the GPBP?
4. What compliance issues can be associated with operation of the GPBP?
5. For each issue found to be problematic, what best course of action can be determined to address it?
6. What updates to the GPBP are necessary to address and/or correct the identified issues?

Methodology

Research Tradition

An exploratory level descriptive case study was conducted for inquiry into the research questions outlined in the previous section. The qualitative research, exploring issues resulting from the Green Points Building Program and the corresponding best methods for addressing them, used both in-depth interviewing (some elite or expert) and focus group discussion. The case study of Boulder, Colorado's Green Points Building Program utilized a two-stage design exploration technique composed of interviews to identify any problematic issues, and a focus group to determine what can or should be done to address the issues.

Sample

The sample selected for the overall case study of green building legislation is the Green Points Building Program of Boulder, Colorado. Because it is one of the first and oldest legislative green building programs to require green building of every residential construction project within its' city limits, the Boulder program serves as an established and functioning building program readily available for this case study. This case study queried two sample groups in determining both interviews and focus group participants:

1. City personnel, participating via interview and/or focus group, selected based on research goals regarding enactment and operation of the GPBP, including but not limited to any person involved with the administration of the GPBP.

2. Key GPBP stakeholders and/or building professionals, participating via interview and/or focus group, selected based on involvement with program design and operation, including but not limited to any person involved with the GPBP.

The selection of participants for participation in either interview or focus group was contingent on this intention: each of the two sample groups was to be represented in the interviewing process and focus group discussion. The researchers contact with the Office of Environmental Affairs, City of Boulder provided an extensive contact list for potential participants from each sample group. The researcher contacted potential participants based on the intentions of this study to have a balanced representation of all sample groups for both interviewing and the focus group discussion.

Data for this research was collected from ten (10) interview participants and eleven (11) focus group participants. These professionals were all associated in some way with the Green Points Program and their professions included, but were not limited to: architects, city building inspectors, consultants, builders, and city project specialists. The data collected took the form of verbal responses and discussion related to the research questions of this study.

Procedures

Thirteen potential participants were sent introduction and consent letters with the intention of gaining ten confirmed agreements to participate via interview. Eleven different potential participants were sent introductory and consent letters for participation via focus group discussion.

After all interview consent letters were signed and returned to the researcher, scheduling of interviews began, order and timing being determined by the participant's

schedules and availability. All descriptive results from interviews eliminated the use of names and professional titles, to protect the confidentiality of participants. The series of interviews yielded a list of issues, organized and categorized by nature and frequency of response. This list of issues, numbered to protect the confidentiality of the interviewees, determined the agenda for the focus group.

After all interviews had been conducted and all responses had been tabulated and translated, the group of focus group participants met to discuss the list of issues. The group spent a given amount of time on each issue, determining two things: 1) what could be done about the issue, and 2) what, if anything, should be done with regard to updating the GPBP to address the issue.

Conclusions reached for each issue, at the end of its allotted time, were summed aloud by the researcher/focus group coordinator for later reporting. Participant confidentiality was protected in the report of conclusions drawn in the focus group discussion.

Instrumentation

The interview schedule of questions served to answer research question 1, found in the previous section titled 'Research Questions'. The interview schedule of questions is representative of the initial areas of interest of this research and is listed in Appendix B. Each interview lasted between fifteen and thirty minutes, allotting at least three minutes for response to each question. Every interview in its entirety was tape recorded to ensure complete and correct translation of responses. The responses are reported simply as list of problematic issues identified within, or described by the responses, though extensive translation of interviews is found in Appendix C.

The focus group portion of this research project addressed only question 2 listed in the 'Research Questions' section of this thesis. The researcher/focus group coordinator structured the agenda of the focus group based on frequency of common responses and nature of responses. Time increments were allotted to each issue, allowing at least five minutes for each, and no more than 20 minutes for one issue. The allotted time for each issue was determined based on the nature of the issue, how many sub-issues the issue encompassed, and the frequency with which the interviews yielded reference to the issue. The focus group was conducted in the open forum type and tape-recorded for translation into data at a later date. The Focus Group Introduction, format and agenda pages can be found in Appendix B.

Form of Data Collected

The results and analysis of data collected for this research project is in the form of lists. Within the Results sections of this thesis, one list summarizes all issues offered by interview participants during the interviews; the second list summarizes all potential resolutions or responses to those issues, which were offered by the focus group.

Within the Data Analysis sections of this thesis, one list, taken to the focus group to serve as the format of discussion, concisely represents issues brought to light in the interviews, and was arrived at by simple analysis and reorganization of the complete 'results' list of all issues. The complete list of issues determined by interviewing was organized according to frequency of a given response and overall significance to the success of the GPBP. This formatting allowed for larger issues with sub-issues to be discussed in that manner. Furthermore, time allotments for each issue were then determined based on the depth of discussion anticipated and necessary for each issue.

