DATE: December 14, 2010 STAFF: Brian Janonis John Phelan, Felix Lee *Pre-taped staff presentation: available at fcgov.com/clerk/agendas.php*	**WORK SESSION ITEM** **FORT COLLINS CITY COUNCIL**

SUBJECT FOR DISCUSSION

Update: Green Building Program, Proposed Building Code Green Amendments

EXECUTIVE SUMMARY

The goal of an ongoing Green Building (GB) Program is to increasingly align Fort Collins' built environment with community goals of reduced carbon emissions, reduced energy use and reduced water use. Staff has developed two proposed packages of Building Code Green Amendments for consideration by Council: one each for residential and commercial construction. Staff has also identified several practices that are not part of the recommended packages but are presented as options for Council feedback. The Building Code Green Amendments, through a combination of new, reinstated and refined provisions, support the integration of green building practices into mainstream construction, establish the broader scope of green building in code and advance the performance of buildings in specific areas.

The benefit cost analysis for the Building Code Green Amendments shows that:

- Initial construction cost increases are expected to be between one and four percent.
- The changes provide have benefits over the long term (utility and maintenance savings, increases in property valuation, improved health and productivity).
- The community-level benefits align with Fort Collins policy goals.

Additional City resources will be needed for implementation of the Building Code Green Amendments. Based on clear direction from Council at this work session, staff will prepare ordinance language for consideration in March 2011. Staff recommends that the revised codes go into effect January 1, 2012.

GENERAL DIRECTION SOUGHT AND SPECIFIC QUESTIONS TO BE ANSWERED

1. Does Council support moving forward with the Building Code Green Amendments packages (residential and commercial) as recommended by staff?

2. Which of the Green Amendments options, if any, does Council want staff to develop detailed recommendations?

3. Does Council want to proceed with the Building Code Green Amendments project with the proposed March 2011 adoption timeline or a revised schedule?

4. Assuming a version of these Building Code Green Amendments is adopted in 2011:

   - Does Council support the staff recommended date for the Code amendments to go into effect?
   - How will implementation resources for the Community Development and Neighborhood Services department be incorporated into the adoption process?

BACKGROUND / DISCUSSION

Implementation of a Green Building Program (GB Program) was identified as a City Council priority during the 2010/2011 Budget process. The Utilities department is leading the effort in close collaboration with the Community Development and Neighborhood Services. Green building has a strong policy basis with the 2008 Climate Action Plan, 2009 Energy Policy and 2009 Water Conservation Plan.

Areas commonly included under the "green building" umbrella include:

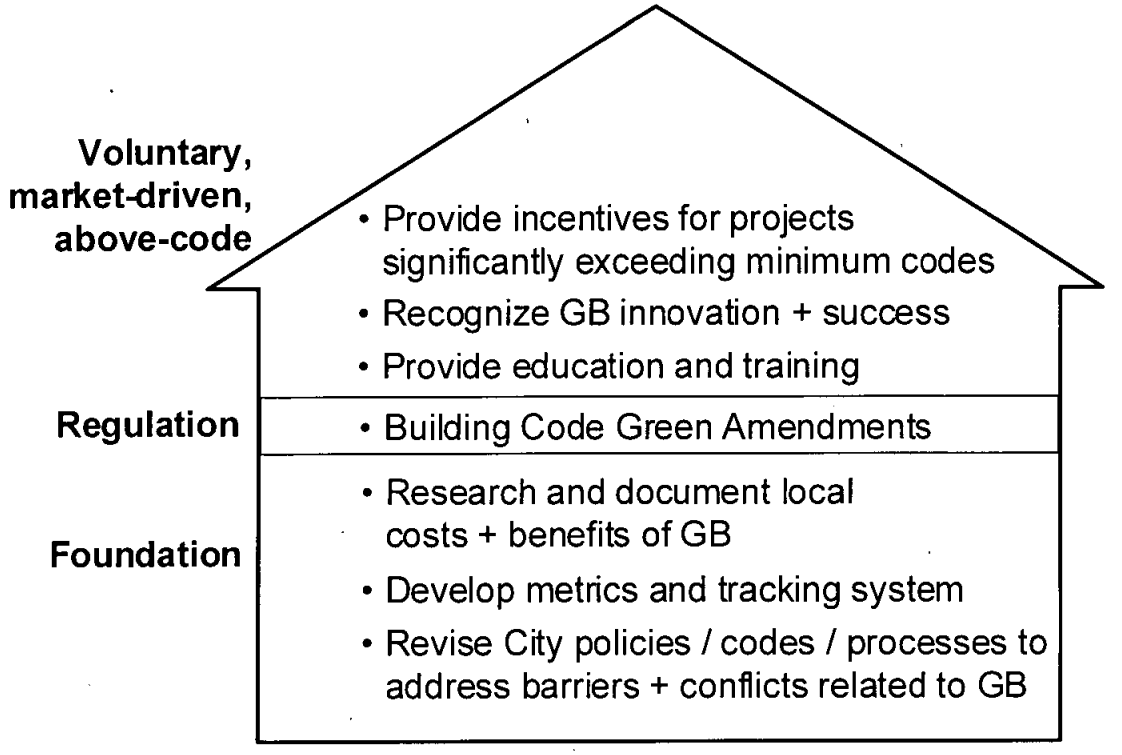
- Site and lot development
- Resource efficiency
- Energy efficiency
- Water efficiency
- Indoor environmental quality (healthy indoor air, thermal and visual comfort, acoustics)
- Operations and maintenance/owner education

Green Building Program Goal

The goal of an ongoing Green Building Program is to increasingly align Fort Collins' built environment with community goals of reduced carbon emissions, reduced energy use and reduced water use.

The GB Program will incorporate both regulatory and market-driven elements to accelerate the market transformation already underway, as shown in Figure 1. Council's direction to consider a code amendment ordinance during the first quarter of 2011 focused the efforts of GB Program work in 2010. Other aspects of the GB Program will continue to be developed in 2011 and beyond.

Figure 1: Green Building Program Elements



The GB Program was discussed by City Council at work sessions on January 12 and July 13, 2010. The process being used to develop the GB Program and the progress to date is documented by quarterly reports. Information related to the GB Program, prior City Council meetings and quarterly reporting is available at fcgov.com/gbp.

Fort Collins Green Building Market Continuum

Fort Collins already has many examples of green, high-performance buildings. The public sector has embraced high-performance building goals as shown by recently constructed projects by Poudre School District, City of Fort Collins, Larimer County and Colorado State University. There are also a number of private sector projects in both residential and commercial sectors that demonstrate high-performance green building.

However, these leading examples still represent a small fraction of new construction in Fort Collins. The continuum ranges from minimally Code compliant buildings to these leading examples of green building. Projects that go further towards "net-zero" and "restorative" buildings are largely still in the academic realm.

In addition to this continuum of "green" in building, there are similar continuums of knowledge, skill and commitment throughout the design and construction industries. Using a market transformation approach, the purpose of the GB program is to move the industry and the market "up the scale," recognizing that there are a wide range of starting points.

GB Program work to date has focused on developing a recommended package of GB practices for incorporation into Fort Collins Building Code. Codes represent the minimum acceptable community standards for design and construction of new buildings and renovations or additions to existing buildings. The Codes are the "push" which sets minimum standards, to be complemented by the "pull" elements of recognition and incentives.

Just as the recent adoption of the 2009 International Codes represents an incremental step in moving up the scale, the proposed Building Code Green Amendments represent next steps along the path of integrating green building practices into mainstream construction.

Green Building Program Development Process

The GB Program development work to date has involved:

- The core green building staff team from Utilities Energy Services and the Community Relations and Neighborhood Development department.
- The Green Building Program Advisory Committee, comprised of a broad spectrum of community stakeholders, such as the Fort Collins Chamber of Commerce, Fort Collins Board of Realtors and Northern Colorado Chapter of the US Green Building Council. This committee serves as a sounding board as the GB Program is developed. Members are asked to help with two-way communication with their constituencies about the effort. The GB Program Advisory Committee has met three times to date (April, July and November 2010). (See Attachment 6 for a list of members of this committee.)
- Two Technical Review Advisory Committees (TRAC), one each for the residential and commercial sectors, have been closely involved with Code development. Members were invited based on their technical and market expertise. Each TRAC typically has met twice a month from May through November 2010, culminating in each group convening separately for a final wrap-up on November 30 and December 1, respectively. (See Attachments 7 and 8 for a list of members of these committees.)
- A consultant providing analytical support.

Model Green Building Codes Review

Initial direction was for the City to adopt a "Green Building Code" as a supplement to the City's existing Building Codes. The intent was to review and potentially adopt one or more of the national model GB Codes or standards. Staff and the TRACs reviewed the National Green Building Standard (residential sector) and International Green Construction Code (commercial sector) for potential adoption in Fort Collins.

The conclusions of these reviews were that adopting a supplementary Green Building Code would not be an appropriate solution because:

- The City's existing Codes (Land Use Code, Building Code and City Code) already include many elements that support green building. The scope of the model GB Codes cuts across all of the existing Codes. Adoption of a supplementary green building code would create a large number of potential conflicts.

- The GB model Codes were largely created from points-based voluntary recognition tools which allow a highly complex set of optional combinations that would be available as "compliance paths" to applicants. The outcomes of such an approach would be highly variable from one building to the next.
- The International Green Construction Code is still in draft public review form.

At the July 13 Work Session, staff recommended to City Council that the effort shift from adopting model GB Codes to developing a strategic selection of effective amendments to further "green" the existing Building Codes. A majority of Councilmembers supported the recommendation.

In parallel, the Building Services department led an effort for City adoption of the 2009 editions of the International Code Council's "International Codes" (I-Codes), which are the predominant model codes used in the U.S. The 2009 I-Codes package was adopted by Council in September 2010 and became effective in October 2010. The 2009 I-Code requirements serve as the baseline for the proposed green amendments.

Community Outreach

In addition to the community involvement via the stakeholder committees, other community engagement activities have included:

- Web site. Information and opportunities to provide input are available via the project web pages at fcgov.com/gbp.
- Public meetings. All GB Program advisory committee meetings are open to the public. Meetings are listed on the project web site and City web calendar.
- Board, Commission and other stakeholder meetings. Staff presented updates to many of the City Boards and Commissions, as well as to several other stakeholder groups by request. (A summary of these meetings, along with comments received, is included as Attachment 9.)
- Public Open House. A public open house was held on November 17. (See Attachment 9 for a summary of feedback received.)

Green Amendments Proposal

With assistance from TRAC members, staff has developed two proposed packages of green building practices for consideration by Council: one each for residential and commercial construction. The applicability of individual green building practices to new construction, additions and alterations varies, and is described in the proposal descriptions outlined below. Staff has also identified four practices that are not part of the recommended packages but are presented in Attachment 3 as options for Council feedback.

The following information about the green amendments proposals is available on the GB Program web pages at fcgov.com/gbp:

- "Amendment-proposal-at-a-glance." These summary documents, one each for the residential and commercial proposals, list the proposed green building practices with brief descriptions. (See Attachments 1 and 2.)

- Green Building Practice Summaries. These documents provide additional information about each of the proposed practices. Topics addressed include applicability to new construction and existing buildings, benefits and costs, implementation issues, current practice and context.

Themes of the Proposed Green Building Practices

A number of cross-cutting themes guided the selection of measures reflected in the proposed amendments:

- Broad scope of green building. City Council directed staff to investigate practices that provide a range of benefits, not just those directly tied to City goals (energy, water, carbon) or that have the most favorable economic benefit for the building owner. Proposed amendments will improve health and safety, save energy, save water, divert construction waste from the landfill, improve occupant comfort and productivity and enhance durability of buildings.

- Leadership. The intent is for Fort Collins to accelerate the normal process by which green building practices become part of the Building Codes and incorporated into mainstream construction.

- Refine current Codes. The 2009 International Code package adopted in September 2010 includes important new elements as well as innovative local amendments adopted in previous Code cycles. The proposed green amendments refine the recently adopted Codes and reinstate several local amendments.

- Installed performance. The proposed Code amendments focus on ensuring that components and systems operate at rated performance by emphasizing critical installation details and testing to verify that performance standards are met.

- Systems approach. Buildings operate as systems. The performance of one component may influence a number of others, positively or negatively. Several of the proposed practices are based on important interrelationships and only make sense as a package.

- Lost opportunities. Many aspects of buildings are relatively easy and inexpensive to address during construction and difficult and expensive to address after completion. Several proposed measures are designed to capture these one-time opportunities.

- Reasonable steps. For several measures, the proposal targets achievable steps based on the available infrastructure. The objective of these changes is to catalyze infrastructure growth and, in turn develop capacity to support additional future steps

- Residential and commercial alignment. Where appropriate, the proposed amendments align requirements across the residential and commercial codes.

Residential Green Amendments Proposal

The residential green amendments proposal includes fourteen specific practices to be incorporated into the Fort Collins Building Code (Attachment 1). These practices are grouped by the common green building categories of resource efficiency, energy efficiency, water efficiency, indoor environmental quality, outdoor environmental quality and operations/maintenance/education.

An alternative description of these practices groups them by performance areas, following a "house-as-a-system" perspective. The bundles of measures described below work together to achieve the intended outcomes.

- **Building envelope performance**
  - Tight construction of the exterior building envelope to be resistant to outside air infiltration (exterior walls, windows, doors, roof-ceiling system, piping and vent penetrations).
  - Insulation installation standards
  - Fenestration (window) installation standards
- **Mechanical systems performance**
  - Heating/cooling system design
  - Commissioning of heating, ventilation and air conditioning systems
- **Electricity**
  - Thermal specifications for electric heat homes
- **Healthy indoor air**
  - Tight construction
  - Safer combustion appliances
  - Materials with low volatile organic compound (VOC) content
  - Controlled mechanical ventilation providing outdoor air to the building
- **Other GB practices**
  - Water-efficient fixtures
  - Construction waste recycling
  - "Dark-Sky" light fixtures
  - Owner education

Commercial Green Amendments Proposal

The commercial green amendments proposal takes a similar approach, including fourteen specific practices (Attachment 2). These practices are grouped in categories of resource efficiency, energy

efficiency, water efficiency, indoor environmental quality and commissioning/operations/ maintenance.

Using a "building-as-a-system" perspective, the following bundles of measures described below work together to achieve the intended outcomes.

- **Building envelope performance**
  - Tight construction
  - Insulation installation quality
  - Commissioning
- **Mechanical systems performance**
  - Commissioning of heating, ventilation and air conditioning systems
- **Energy savings**
  - Thermal specifications for electric heat buildings
  - Lodging guest room controls
  - Outdoor lighting controls
- **Indoor environment**
  - Materials with low volatile organic compound (VOC) content
  - Building ventilation systems flush-out
  - Acoustical control
- **Other GB practices**
  - Water efficient fixtures
  - Construction waste recycling
  - Energy assessments for existing buildings
  - Owner education

Green Amendments – Options for Council Consideration

Staff is asking Council for direction on four potential green building practices which are designated as options rather than part of the base green amendments proposal (Attachment 3). This is because each option is quite different in some way from the base package. Staff has not developed details around the options; they are presented as concepts. If the direction from Council is to move ahead on these options, the details will be developed for consideration of a green amendments ordinance in March 2011.

BENEFITS AND COSTS

Buildings complying with the proposed amendments will deliver additional benefits compared with buildings complying with the current Code. The objective of the benefits and costs analysis is to provide information for decision making that accommodates multiple perspectives. In principle, building better buildings implies an increase in initial costs which is balanced by long-term benefits. This section describes the scope, approach and results of the analysis completed to date.

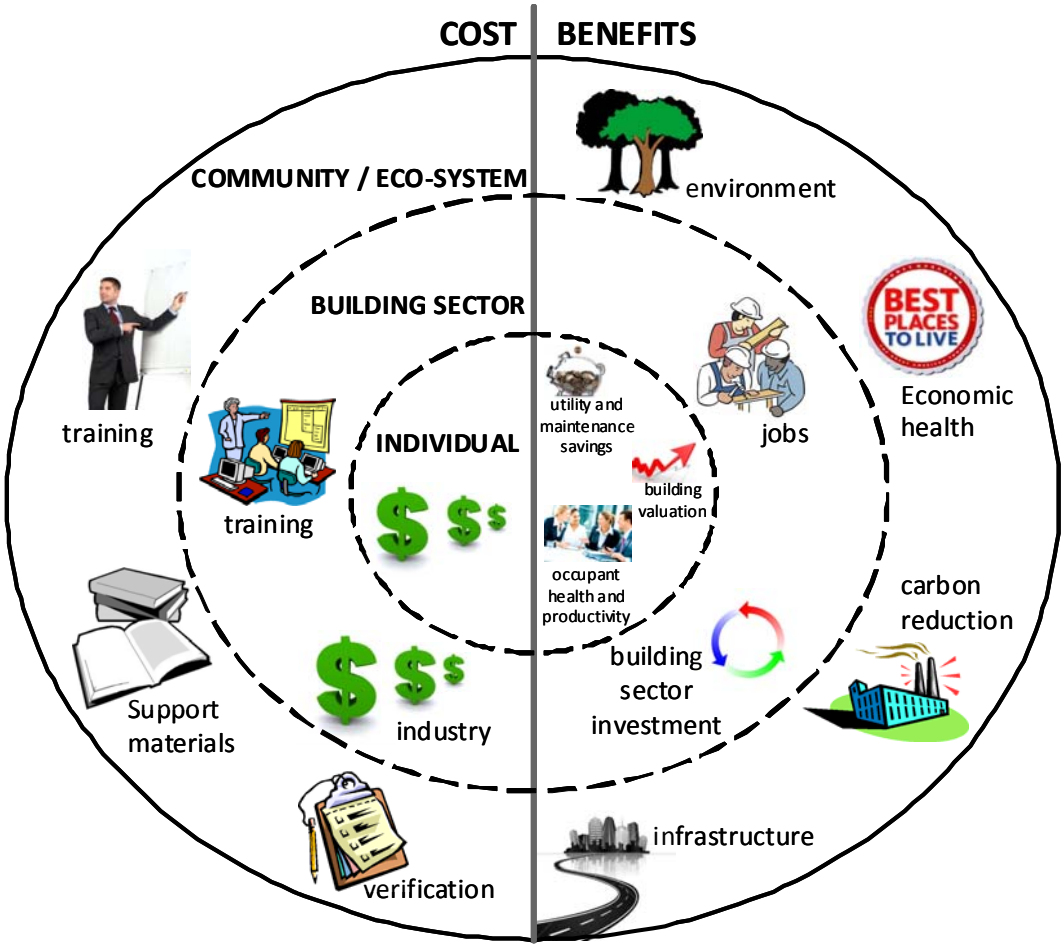
Scope of Benefit Cost Analysis

Benefits and costs are approached from a "triple-bottom-line" perspective, reflecting aspects of social, economic and environmental impacts. The focus of the benefit cost analysis to date has been on new construction.

As illustrated in Figure 2 (below), the benefits and costs are addressed at three inter-related scales, represented by concentric circles:

- Individual. A specific project, where the impacts are traced to an owner or buyer
- Building Sector. The building services industry, which includes design and construction professionals and equipment suppliers or vendors.
- Community/Ecosystem. Local, regional or global costs or benefits.
- Categories of costs are shown on left-hand side of the diagram; benefit on the right-hand side. The categories are described below.

Figure 2: Benefit Cost Analysis Graphic



Cost Categories (Figure 2)

- Individual, $ $ $. Increased initial cost to design/build a building. The "$" signs get smaller in the graphic to represent decreasing costs as the industry moves along a prototypical learning curve. This also represents the range of initial cost increases, depending on the starting point of the construction team.

- Building Sector, Training. The building sector will have costs related to training on new construction techniques and compliance requirements. These are near-term costs that will be amortized over many projects.

- Building Sector, $ $ $. Other building sector costs, such as buying new tools or obtaining and maintaining new certifications. These are primarily near-term costs that will decrease over time based on market development, competition and adaptation.

- Community, Supporting Materials. There will be pre-implementation phase costs born by the City to cover the development of support materials, staff training and subsidization of industry training.

- Community, Verification Costs. There will be implementation costs related to on-going enforcement and verification, quality assurance and program evaluation.

Benefit Categories (Figure 2)

- Individual Utility and Maintenance Savings. The green building amendments will lower utility costs for electricity, natural gas, water and wastewater. Several of the green amendments will result in reduced maintenance costs, which may accrue to the occupant and/or owner of the building.

- Individual Building Valuation. Green buildings are expected to command an increased value in the marketplace compared with conventional buildings.

- Individual Occupant Health and Productivity. The green building amendments will result "better buildings" from an indoor environmental perspective. This in turn results in improved occupant health and productivity.

- Building Sector, Jobs. The building sector will realize an increase in job activity for a given amount of construction activity. The green amendments support the expansion of related infrastructures, higher-level contractor skills, increased demand for green services and increased demand for green products.

- Building Sector Investment. The building sector will realize increased investment through the supply chain development cycle. Beyond the direct job impact described above, direct suppliers, indirect suppliers, products and materials vendors will develop and mature, resulting in reduced cost premiums over time.

- Community Economic Health. The green building amendments support the community's values, pride and identity as a vibrant, environmentally conscious place to live. The community's reputation as such also supports economic health as by attracting investment and local economic development.

- Community Infrastructure. The direct results of green building (reduced energy use, water use and waste) have indirect impacts on community infrastructure requirements, such as extending the life capacity of existing investments in power supply, water supply and landfills.

- Community Carbon Reduction. The direct results of green building (reduced energy use, water use and waste) contribute directly to the community's goals towards reduction of carbon emissions.

- Community/Eco-system Environment. The green building amendments reduce environmental impacts associated with construction (resource use, indoor and outdoor environmental quality).

The benefit cost analysis is able to quantify only a small number of the cost and benefit categories described above. The remaining costs and benefits can only be evaluated in a qualitative fashion.

For the categories included in the quantitative analysis, ranges of savings and costs were estimated for prototypical buildings. It is important to recognize that the quantitative analysis only tells part of the benefits and costs story.

Benefit Cost Analysis – Quantitative Approach

The staff green building team, with the support of a consultant, completed a quantitative analysis with the goal of characterizing the primary benefits and costs of the proposed green amendments on typical projects. The primary benefits are the reduced utility costs (electricity, natural gas, water and wastewater) and the primary cost is the increased initial cost of the measure. The analysis used a bottom-up approach based on calculations for each measure within the residential and commercial amendments proposal. The implementation costs of verification and enforcement also followed the approach of estimating the impact on each proposed measure.

Two prototype projects were used for the quantitative analysis:

- Residential. 1600 square foot ranch over full-finished basement, $250,000 sales price, financed with a 6%, 30 year mortgage

- Commercial. 15,000 square foot office building, 2 stories, $162 per square foot construction cost ($2.4M), 6% mortgage, $14,000 annual utility cost. The quantitative analysis focused on the core set of GB practices which would apply to a typical office building.

The team recognizes that these are limited examples of the many types and sizes of buildings in the market. However, the purpose of the benefit cost analysis is to support the decision making process by evaluating the impact for these representative projects. The analysis also assumes that all first costs are passed directly to the "buyer" or "owner" of the building. Results are presented in units of direct dollars and percentage changes in initial cost, utility costs, energy savings, water savings, carbon emissions and verification. The monthly mortgage impact of the initial cost changes is also included.

Quantitative Results – Residential

Description	Range ($)	Range (%)	Notes
Initial Cost Increase	$2,500 to $5,000	1% to 2%	Percent of Construction Cost
Monthly Mortgage Impact	$15 to $30	1% to 2%	Percent of Monthly Payment
Annual Utility Net Savings	$50 to $175	2% to 7%	Percent of Utility Cost
Energy Savings	--	5% to 10%	Percent of Annual Use
Water Savings	--	5% to 10%	Percent of Annual Use
Carbon Savings	--	5% to 10%	Percent of Annual Emissions
Verification	--	0.6	City staff time for plan review and field inspection
Based on typical residential project. 1600 square foot ranch with finished basement (3200 square feet total), $250,000 price, 6% mortgage rate, $2,600 annual utility cost			

Quantitative Results - Commercial

Description	Range ($)	Range (%)	Notes
Initial Cost Increase	$30,000 to $100,000	1% to 4%	Percent of Construction Cost
Monthly Mortgage Impact	$180 to $600	1% to 4%	Percent of Monthly Payment
Annual Utility Savings	$1,800 to $3,450	13% to 25%	Percent of Utility Cost
Energy Savings	--	25% to 35%	Percent of Annual Use
Water Savings	--	20%	Percent of Annual Indoor Use
Carbon Savings	--	15% to 30%	Percent of Annual Emissions
Verification	--	0.23	Staff time for plan review and field inspection
Based on typical commercial project. 15,000 small office building, 2 stories, $162 per square foot construction cost ($2.4M), 6% mortgage, $14,000 annual utility cost			

Qualitative Benefit Cost Analysis

The consultant also reviewed published regional and national studies of green building benefits and costs relative to individuals as well as communities, economies and ecosystems. This research indicates there are many benefits associated with green, high-performing buildings, including energy and environmental awareness, economic health, community pride and the opportunity to hedge against utility rate increases.

The team did not attempt to translate these results to quantified local impacts due to the uncertainty of extrapolating national trends to local conditions. However, the team is confident that similar benefits can be realized at Fort Collins' scale. Highlights from the research include:

- Building Valuation
    - McGraw-Hill Construction report November 2010 Business Benefits of Green Buildings SmartMarket Report: Building & Occupant Performance Driving Green Investment in Existing Commercial Buildings, summary finding showed: +4% ROI, +5% building value & occupancy, -8% operating costs, +1% rental income. http://www.environmentalleader.com/2010/11/18/greenbuild-roundup-day-2-green-buildings-yield-substantial-financial-benefits
    - Doing Well by Doing Good, Center for the Study of Energy Markets, August 2009. This report based on statistical analysis of green buildings found: (1) systematic evidence that rents for green offices are about two percent higher than rents for comparable buildings located nearby; (2) Effective rents, i.e., rents adjusted for the occupancy levels in office buildings, are about six percent higher in green buildings than in comparable office buildings nearby. http://www.ucei.berkeley.edu/PDF/csemwp192.pdf
    - "Evidence of Rational Market Values for Home Energy Efficiency." Rick Nevins The Appraisal Journal, October 1998. Summary: "research indicates there should be

a $10 to $25 increase in market value for every $1 in a home's yearly energy savings." http://www.icfi.com/Markets/Community_Development/doc_files/apj1098.pdf

- Occupant Health and Productivity

  - Green Building Cost and Benefits, Gregory Kats, 2003. The Report recommends attributing a 1% productivity and health gain to LEED Certified and Silver level buildings and a 1.5% gain to Gold and Platinum level buildings. These percentages are at the low end of the range of productivity gains for each of the individual specific building measures - ventilation, thermal control, light control and daylighting - analyzed above. They are consistent with, or well below, the range of additional studies reviewed in the Report. http://www.usgbccolorado.org/downloads/articles/Kats-Green-Buildings-Cost.pdf

  - Doing Well by Doing Good, Center for the Study of Energy Markets, August 2009. This report based on statistical analysis of green buildings found: (1) A 1% increase in productivity (equal to about 5 minutes per working day) is equal to $600 to $700 per employee per year, or $3 SF per year; (2) A 1.5 % increase in productivity (or a little over 7 minutes each working day) is equal to about $1000 per year, or $4 to $5 SF per year; (3) The relatively large impact of productivity and health gains reflects the fact that the direct and indirect cost of employees is far larger than the cost of construction or energy. Consequently, even small changes in productivity and health translate into large financial benefits; (4) Assuming a longer building operational life, such as 30 or 40 years, would result in substantially larger benefits. http://www.ucei.berkeley.edu/PDF/csemwp192.pdf

Benefit Cost Analysis - Conclusions

While the quantitative analysis tells only a small part of the benefits costs story, a number of conclusions can be drawn from the research and analysis of the benefit cost analysis.

- One to four percent initial cost increases are within typical variance ranges for construction.
- The initial cost increases provide benefits over the long term (utility savings, maintenance cost reductions, property valuation, health and productivity).
- Near-term building sector costs will be balanced by long-term benefits.
- Additional City resources will be needed for implementation, verification and enforcement.
- The community-level benefits align with Fort Collins policy goals.

RISKS AND UNCERTAINTIES

Appraisal/Valuation

Staff is aware of potential challenges related to the proposed green amendments associated with valuation, appraisal, and underwriting. These challenges can be real for any building containing features which have not yet been widely implemented in the market. The challenges are not specific to Fort Collins or green building; they are national in scope and part of the challenges buyers face when trying to secure financing for a building they wish to build or buy.

The proposed green amendments are not unlike other Code updates that have occurred on a regular basis for many years. Typically, Code updates include increased requirements related to health, safety, and energy, many of which are not recognized by the marketplace. The most recent Fort Collins Code update went into effect in October 2010 and, for example, increased prescriptive insulation requirements for single family homes. Appraisal and valuation issues have not generally been an issue for previous code updates in Fort Collins.

Code Updates

As noted earlier, the City adopted the 2009 International Codes in fall 2010. The International Codes are updated on three year cycles, with the next version available in 2012. The building department is planning on a review and adoption process for the 2012 Codes, which should result in updated Building Codes going into effect by mid-2013.

While the 2012 Code update is not yet published, the current draft version includes measures that overlap in scope some of the measures in the proposed green amendments. As a result, some of the GB practices proposed herein will be accelerating the timeline for implementation here by approximately two years.

IMPLEMENTATION PLANNING

As an integral part of the Building Code Green Amendments proposal, staff is estimating the resources required to effectively implement the proposed green amendments. Implementation will require staff and funding resources from several departments. The following table outlines general City responsibilities by department:

Building Code Green Amendments: Implementation Roles and Responsibilities

Description	Community Development and Neighborhood Services	Utilities Energy Services
Development of verification procedures	Primary	Secondary
Development of support materials	Secondary	Primary
Training and Education (contractors, inspectors, public)	Secondary	Primary
Day-to-day implementation (plan review, field inspections, training)	Primary	Secondary
Monitoring and evaluation of the implementation process and results	Secondary	Primary

Implementation Resources

Community Development and Neighborhood Services (CDNS) provides processing of building permit applications, plan reviews and building inspections for all work associated with a building permit. Implementation of the proposed Green Building Codes would become a part of the aforementioned, which will increase the processing of applications, plan reviews and building inspections associated with a building permit. Staff anticipates, on average, a 23% (30 hours to 37

hours) increased workload for Commercial Permits and on average, a 61% (13 hours to 21 hours) increased workload for Residential Permits.

In order to maintain the existing level of service (LOS) for commercial and residential building permits and the associated work, CDNS will need to hire an additional 1.0 full time employee (FTE) Building Inspector and a 0.5 FTE Plans Examiner.

The December 11 Council special work session includes a discussion of resources for implementation of the Building Code Green Amendments. CDNS has estimated the negative impact on LOS if resources are not provided for implementation. For example, a residential plan review would increase from the existing LOS of approximately 18 days to approximately 29 days and a commercial plan review would increase from the existing LOS of approximately 28 days to approximately 34 days.

Pre-implementation Tasks

Prior to implementation of the green building amendments, a substantial effort will be required for the development of support materials, training for design professionals, contractors and builders and education for the general public.

The Utilities Energy Services budget for GB program development in 2011 and 2012 will support these pre-implementation needs.

Recommended Implementation Schedule

Adoption of Building Code Green Amendments is scheduled for consideration on March 1 and March 22, 2011. Based on this schedule and the pre-implementation activities described above, staff recommends that the Building Code Green Amendments go into effect on January 1, 2012.

GREEN BUILDING PROGRAM - NEXT STEPS

Building Code Green Amendments

- January through March 2011
    - Staff will develop ordinance language for the green building amendments based on Council feedback.
    - Another round of public outreach is anticipated for February 2011 to solicit recommendations to Council.
    - City Council consideration of the proposed amendments is scheduled for the March 1 and March 22 Council meetings.

Green Building Program – Continuing Development

The green amendments proposal under consideration by Council is one key element of the overall GB Program. In general:

- The regulatory components of the program will be the responsibility of the Community Development and Neighborhood Services department, with support from Utilities Energy Services.

- The voluntary above-code related aspects of the program will be the responsibility of Utilities Energy Services, with support from Community Development and Neighborhood Services department.

GB Program development will continue in 2011-2012 as described in the following table.

Green Building Program Development: Continuing Development

Description	Community Development and Neighborhood Services	Utilities Energy Services
Development of above-Code incentive and recognition program elements for projects which demonstrate high performance.	Secondary	Primary
Review and consideration of green development practices related to the Land Use Code.	Primary	Secondary
Future Code review cycles to include the green amendments adopted in 2011. In this way, the principles established by the current process will be carried forward and reviewed for best practices updates on a regular basis.	Primary	Secondary

ATTACHMENTS

1. Residential Building Code Green Amendments Proposal at a Glance
2. Commercial Building Code Green Amendments Proposal at a Glance
3. GB Amendment Options for Council
4. City Council Work Session Summary – January 12, 2010 re: Green Building ProgramUpdate
5. City Council Work Session Summary – July 13, 2010 re: Green Building Program Update
6. Green Building Program Advisory Committee Membership
7. Residential Technical Review Advisory Committee Membership
8. Commercial Technical Review Advisory Committee Membership
9. Public Comments Summary
10. Powerpoint presentation

Proposed Residential Code Green Building Amendments (Prescriptive)

12/3/2010

#	GB Practice	Description *	Intent	Applicability	Type**
	RESOURCE EFFICIENCY				
1	**Construction waste recycling**	• Submit recycling plan (who, what, where, how) before project begins • Implement recycling (non-landfill) for wood, metal, concrete and cardboard	Divert construction waste from landfill	New: Yes Addition: Yes Alteration: No	New
2	**Windows, skylights, doors: installation**	Increased detailing regarding integration of fenestration with exterior drainage plane	Reduce potential for exterior moisture damage	New: Yes Addition: Part Alteration: No	Refine
	ENERGY EFFICIENCY				
3	**Building envelope: thermal specifications for electric-heat homes**	More rigorous specifications for electric-heat homes (beyond 2009 International Residential Code (IRC) requirements): • Air sealing: 3.0 air changes per hour at 50 pascals (ACH50) (maximum) • Attics: R-49 (minimum) • Frame walls: R-20 cavity + R-5 sheathing (minimum) or equivalent • Crawl space walls: R-19 (minimum) • Windows: 0.30 U-factor (maximum)	Save energy and reduce peak electrical demand	New: Yes Addition: Part Alteration: No	Reinstate + Refine
4	**Basement windows: thermal specifications**	Basement windows with comparable performance to windows on main living levels	Set stage for energy-efficient, comfortable living space when basement is finished	New: Yes Addition: Part Alteration: No	Refine
5	**Air sealing: tight construction**	• Whole-building air leakage: 4.0 ACH50 maximum • Increased focus on effective sealing between house and attached garage • Performance testing required	Capture energy, comfort, durability and health benefits	New: Yes Addition: Part Alteration: Part	Reinstate + Refine
6	**Insulation: installation**	Insulation installed to the Residential Energy Services Network (RESNET) Grade I standard Exceptions for which RESNET Grade II is acceptable: • Rim joists • Exterior walls with continuous rigid insulating sheathing, R-5 minimum.	Install insulation so it delivers rated energy performance	New: Yes Addition: Part Alteration: Part	Refine
7	**Heating + cooling systems: design**	Added requirements for permit application: • Heating + cooling design load calculations include room-by-room loads • Air-Conditioning, Heating, and Refrigeration Institute (AHRI) matched evaporators, condensing units and furnaces (AHRI certificate required) • Document key design parameters	Design heating and cooling systems that satisfy comfort needs and perform in accordance with manufacturer specifications	New: Yes Addition: Part Alteration: Part	Refine
8	**Heating, ventilation, air conditioning (HVAC) systems: commissioning**	Performance testing of heating, cooling and ventilation systems, aligned with Air Conditioning Contractors of America (ACCA) 5 "Quality Installation" procedures. Systems operating out of tolerance compared with design specifications will be adjusted and re-tested until they pass.	Verify that HVAC systems perform as designed	New: Yes Addition: Part Alteration: Part	Refine + New
	WATER EFFICIENCY				
9	**Water-efficient fixtures**	Toilets, showerheads and lavatory faucets must meet Environmental Protection Agency (EPA) WaterSense® standards.	Save water and energy	New: Yes Addition: Part Alteration: Part	New
	INDOOR ENVIRONMENTAL QUALITY (IEQ)				
10A	**Safer combustion appliances: new construction**	Atmospherically vented combustion appliances (furnaces, boilers, water heaters, fireplaces) must be placed outside the thermal boundary of the house and pass combustion safety test. Performance testing required. (This requirement may also be met with safer combustion appliances: power-vented, sealed-combustion or direct-vent.)	Eliminate potential health and safety hazard of combustion products spilling into house	New: Yes Addition: Part Alteration: No	New
10B	**Safer combustion appliances: existing buildings**	Atmospherically vented combustion appliances must pass combustion safety test under "natural conditions." (Applies when combustion appliances are replaced and when other changes are made to house that may affect pressure balance in combustion appliance zone.)	Reduce potential health and safety hazard of combustion products spilling into house	New: No Addition: Part Alteration: Yes	New
11	**Low-Volatile Organic Compound (VOC) materials**	Interior materials meet maximum VOC emissions standards: • Sealants + adhesives • Resilient flooring • Paints, stains, varnishes and other site-applied finishes • Structural wood panels, hardwood veneer plywood, particle board, and fiber board • Prefabricated cabinetry • Insulation	Improve indoor air quality for construction workers and occupants	New: Yes Addition: Part Alteration: Part	New

12	**Whole-house ventilation**	Provide whole-house, controlled, mechanical ventilation system, designed to meet ASHRAE 62.2 requirements. Air handlers used to move ventilation air must be equipped with efficient blower motors.	Improve indoor air quality	New: Yes Addition: No Alteration: No	New
	OUTDOOR ENVIRONMENTAL QUALITY (OEQ)				
13	**Exterior lighting: fixture design**	Install "dark-sky friendly" exterior lighting fixtures	Increase security Reduce light pollution and light trespass	New: Yes Addition: No Alteration: No	New
	OPERATIONS + MAINTENANCE + EDUCATION				
14	**Building owner education**	Provide operations and maintenance manual for building owner	Educate owners about their home and other "green" choices they can make	New: Yes Addition: Part Alteration: Part	New

* Visit the City of Fort Collins Green Building Program web site (fcgov.com/gbp) for more information:
  - **Fort Collins Building Code Green Amendments** - context for this evolving proposal
  - **Expanded descriptions of each proposed green building practice**

** Classifies how the proposed amendment relates to the existing building code:
New: not previously addressed in Fort Collins code
Refine: already addressed in Fort Collins code; the amendment provides more detail or takes it further
Reinstate: similar provision existed in the Fort Collins code prior to fall 2010 update.

Optional Additional Green Building Practices (pending City Council direction)

#	GB Practice	Description	Intent
	RESOURCE EFFICIENCY		
A	**Certified wood**	Concept: Sustainable forestry-certified products for all tropical hardwoods and most dimensional lumber	Support sustainable forestry practices
B	**House size**	Concept: Increase required efficiency in some relationship with increasing conditioned floor area	Reduce resource footprint of larger homes
	ENERGY EFFICIENCY		
C	**Building envelope: thermal specifications for gas-heat homes**	Concept: Higher specifications for gas-heat homes beyond 2009 IRC requirements	Save energy
D	**Solar applications**	Concept: Renewable energy offsets at least X% of building energy use Possible alternative compliance options: • Require a corresponding increase in energy efficiency • Require participation (i.e. $$) in a community solar project to equal same level of offset	Reduce conventional energy use

Proposed Commercial Code Green Building Amendments (Prescriptive)

12/3/2010

#	GB Practice	Description*	Intent	Applicability
	RESOURCE EFFICIENCY			
1	**Construction & Site waste recycling**	• Submit recycling plan (who, what, where, how) • Implement recycling (non-landfill) for wood, metal, concrete and cardboard	Divert waste from landfill. Potential disposal cost savings	New: Yes Addition: Yes Alteration: No
	ENERGY EFFICIENCY + CONSERVATION			
2	**Energy Distribution Design Requirements**	Each electrical panel supplies only one of the following electricity use types - Heating, Ventilation, and Air Conditioning (HVAC), Lighting, building operations, or miscellaneous.	Provides means for measurement and verification leading to potential energy savings	New: Yes Addition: Part Alteration: No
3	**Building Envelope: Air Barrier**	Require continuous air and thermal barrier per The American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) standard 189.1. Appendix B	Saves energy, improves occupant comfort, improves building durability, reduces pest problems	New: Yes Addition: Yes Alteration: No
4	**Building Envelope: electrically heated buildings**	Higher specifications for electric-heat buildings beyond 2009 International Energy Conservation Code (IECC) requirements	Save energy, reduce peak electrical demand, improve occupant comfort	New: Yes Addition: Yes Alteration: No
5	**Building Envelope: Installed insulation standards**	Stud cavity insulation installed to Residential Energy Services Network (RESNET) Grade I standard. Additional standards for rigid and spray foam insulation.	Improves performance of insulation - energy savings, better occupant comfort, better building durability	New: Yes Addition: Yes Alteration: Yes
6	**Control of loads in Hotel/Motel guest rooms**	Lighting, switched outlets, and televisions will be controlled when guest rooms are unoccupied. HVAC set point will be relaxed by at least 5℉ when room is unoccupied.	Energy savings, operations and maintenance savings through increased equipment life	New: Yes Addition: Yes Alteration: Yes
7	**Outdoor lighting controls**	Reduce outdoor lighting by 50% 2 hours after business closes	Electric energy savings, CO2 reduction	New: Yes Addition: Part Alteration: No
8	**Energy assessments for alterations**	Energy assessments required prior to building alterations. No-cost assessment provided by Fort Collins Utilities.	Identify energy efficiency opportunities	New: No Addition: No Alteration: Yes
	WATER EFFICIENCY + CONSERVATION			
9	**Maximum fixture flow rates**	See table (based on Water Sense standard)	Water savings	New: Yes Addition: Part Alteration: Part

(continued on other side)

#	GB Practice	Description*	Intent	Applicability
	INDOOR ENVIRONMENTAL QUALITY (IEQ)			
10	**HVAC measure for Indoor Air Quality**	Protect ducts from contamination during construction Air handling system access & ability to clean and maintain No friable materials in air plenums	Avoid introducing contaminants into supply air and provide means for maintaining air quality.	New: Yes Addition: Yes Alteration: Yes
11	**Building flush-out**	Flush out building contaminants by operating at maximum outside air for a prescribed period of time based on ASHRAE 189.1, 10.3.1.4. Minimum Outside Air setting allowed during Fort Collins Utilities Coincident Peak.	Remove pollutants generated from outgassing of new materials	New: Yes Addition: Part Alteration: Part
12	**Low-Volatile Organic Compound (VOC) materials**	The following interior materials meet maximum VOC emissions standards: • Sealants + adhesives • Resilient flooring • Paints, stains, varnishes and other site-applied finishes • Structural wood panels, hardwood veneer plywood, particle board, and fiber board	Improve indoor air quality for construction workers and occupants	New: Yes Addition: Part Alteration: Part
13	**Acoustical Control**	Requirements for exterior-to-interior sound transmission, interior sound transmission, and HVAC sound levels.	Improves occupant comfort and by reducing noise disturbances	New: Yes Addition: Part Alteration: No
	COMMISSIONING / OPERATIONS + MAINTENANCE			
14	**Commissioning**	Provide Fundamental Commissioning per Leadership in Energy and Environmental Design (LEED) definition with addition of commissioning building envelope materials and assemblies.	Ensure that building systems are installed and operate per owner's intent	New: Yes Addition: Part Alteration: No

*Visit the City of Fort Collins Green Building Program web site (www.fcgov.com/gbp) for more information:

- **Fort Collins Building Code Green Amendments** - context for this evolving proposal
- **Expanded descriptions of each proposed green building practice**, including information about how each is proposed to apply to existing buildings

Optional Additional Green Building Practices

#	GB Practice	Description	Intent
	RESOURCE EFFICIENCY		
A	**Certified wood**	Concept: Sustainable forestry certified products for all tropical hardwoods and at least 85% of dimensional lumber	Support sustainable forestry practices
	ENERGY EFFICIENCY		
B	**Solar applications**	Concept: Renewable energy offsets at least X% of building energy use Possible alternative compliance options: • Require a corresponding increase in energy efficiency • Require participation (i.e. $$) in a community solar project to equal same level of offset	Reduce conventional energy use

GREEN AMENDMENTS – OPTIONS FOR COUNCIL CONSIDERATION

Staff is asking City Council for direction on four potential green building practices which are designated as options rather than part of the base green amendments proposal. This is because each option is quite different in some way from the base package. Staff has not developed details around the options; they are presented as concepts. If the direction from Council is to move ahead on these options, the details will be developed for consideration of a green amendments ordinance in March 2011.

OPTION A: CERTIFIED WOOD

Applicability
Residential and commercial buildings

Concept
A two tiered approach which would require sustainable forestry-certified products for:

- All tropical hardwoods, and
- Most dimensional lumber.

The two tiers described above could be implemented independently.

Why an option?
Unlike green building practices proposed in the base amendment package, there would be no direct local benefits of this practice. The primary benefits would be for the global ecosystem, most directly accrued by the forests and environments from which the timber is harvested.

Additional information
Certified wood practice rewarded in all of the major voluntary green building rating systems. Several organizations oversee certification systems that address sustainable forestry with varying degrees of rigor and comprehensiveness. Certified wood products are available at a cost premium.

OPTION B: RENEWABLE ENERGY REQUIREMENT

Applicability
Residential and commercial buildings

Concept
Require an on-site solar energy system that offsets at least X% of building energy use

Possible alternative compliance options:

- Require a corresponding increase in energy efficiency
- Require participation (i.e. $$) in a community solar project to equal same level of offset

Why an option?
Renewable energy systems tend to be a significantly more expensive approach to reducing fossil fuel use than other energy-efficient practices in the base proposal.

Additional information
Not all buildings can accommodate solar energy systems due to orientation, shading from trees and/or adjacent buildings, or architectural constraints related to the building's function. Alternatives are suggested to accommodate these situations.

OPTION C: REQUIRE HIGHER PERFORMANCE FOR LARGER HOMES

Applicability
Residential buildings

Concept
Require increased resource-efficiency in relationship to increasing conditioned floor area. Examples include those described under Option B above:

- Require an on-site solar energy system that offsets at least X% of building energy use.
- Require a corresponding increase in energy efficiency.
- Require participation (i.e. $$) in a community solar project to equal same level of offset.

Why an option?
This concept is expected to be quite controversial.

Additional information
All of the major voluntary green building rating systems, the newly released ENERGY STAR New Homes guidelines, and regulations in Boulder, Colorado and Santa Fe, New Mexico, include mandatory practices based on house size. Larger houses must meet more stringent energy-efficiency requirements or require renewable energy. The intent is to reduce the larger "resource footprint" that larger homes would have if they were built to identical standards as smaller homes. This concept was discussed with the Residential Technical Advisory Committee and briefly addressed in recent presentations to many City boards and commissions; stakeholders have strong views on the concept.

OPTION D: HIGHER THERMAL SPECIFICATIONS FOR GAS-HEATED HOMES

Applicability
Residential buildings

Concept
Require natural gas heated homes to meet higher thermal specifications than those in the recently adopted 2009 model code.

Why an option?
The base package of proposed green building practices puts more emphasis on installing components properly so that they delivered rated performance than on increasing the rated specifications. City Council may wish to also increase the thermal specification requirements. Prescriptive insulation requirements are expected to increase in the 2012 edition of the I-Codes.

Additional information
The base package includes a proposed requirement that electrically heated homes meet higher specifications for air tightness and insulation than those in the recently adopted 2009 model code. This is because electric resistance heat is about 2.5 times more expensive per delivered unit of energy than heat delivered from a natural gas furnace or boiler. For all homes, staff feels that the priority is to focus on installation details so that as-built performance of the building envelope matches rated performance (e.g. R-30 insulation is installed so that it delivers R-30 results); these basics should be addressed before requiring higher rated specifications.

City of Fort Collins

ATTACHMENT 4

Memorandum

DT: January 15, 2010

TO: Mayor and City Councilmembers

TH: Darin Atteberry, City Manager
Brian Janonis, Utilities Executive Director

FR: Patty Bigner, Utilities Customer and Employee Relations Manager
Doug Swartz, Utilities Energy Services Engineer
Felix Lee, Utilities Green Building Codes Project Manager

RE: Work Session Summary – January 12, 2010 re: Green Building Program Update

On January 12, 2010, City Council held a Work Session to discuss a proposed Green Building Program. All Council Members were present except Councilmember Poppaw. Staff members making presentations and answering questions were Brian Janonis, Doug Swartz, John Phelan, Felix Lee, (Utilities); and Mike Gebo (CDNS).

There was extensive discussion and many clarification questions regarding the Green Building Program. Each Council Member provided their individual perspective and feedback. Council generally is supportive of moving ahead with the proposed approach. The following issues were identified as important:

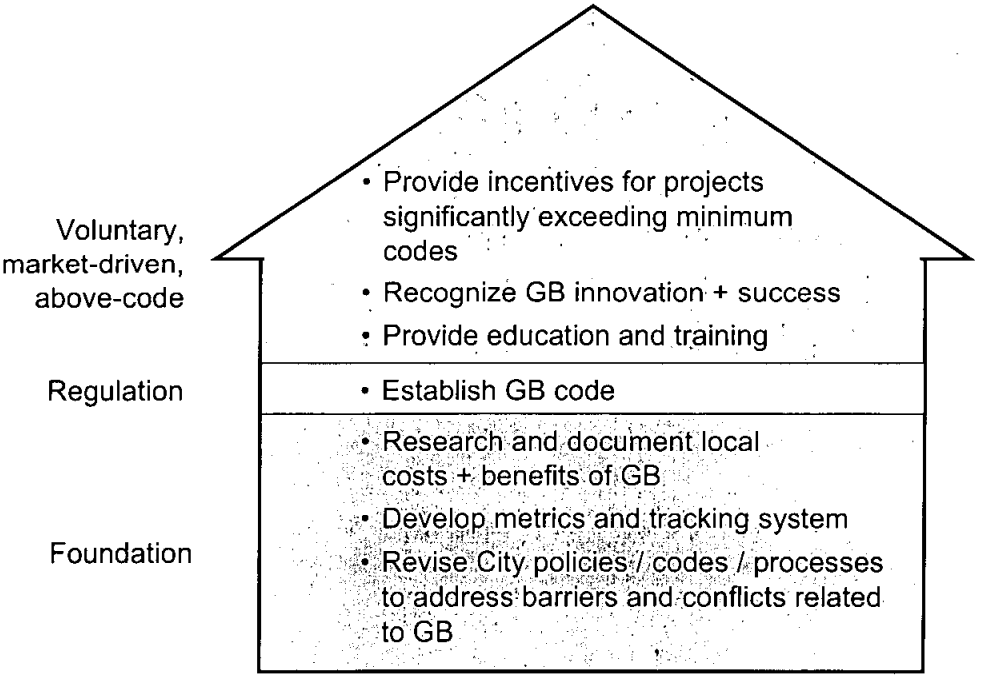
- **Integrated framework.** Council supports the market transformation design of the proposed plan, balancing voluntary, market-driven, above-code elements to "pull" the top end of the market while a green building code "pushes" the bottom end. They feel there is merit in the concept of using a single framework as the basis for both the regulatory and reward elements of the Green Building Program.
- **Interdepartmental coordination.** Council agrees that the integrated approach of the Green Building Program and the element addressing the removal of barriers from existing City codes / policies / processes will be a positive step in strengthening interdepartmental collaboration and consistent green building support across City work areas. The City Manager recognizes the need for top management to support these efforts.
- **Accountability.** Council supports the development of a substantive, results-oriented program with well-defined metrics that are tracked over time.
- **Economics.** Council requests staff provide information on costs and benefits when a green building code proposal is brought to Council, including initial, life-cycle, individual and public costs and benefits.
- **Points-based rating system.** There are varying perspectives among Council Members on pros and cons of a points-based rating system, such as the *National Green Building Standard*™, as the basis for a green building code. Some feel that the flexibility of such an approach, allowing different paths to a given performance level, is a benefit while others are concerned about the

potential to "game" the system and evade important features. All Council Members support staff moving ahead with a points-based system, carefully considering these concerns.

- **Local code amendments.** Council Members discussed issues related to the potential number of amendments that may be necessary to reflect local conditions and community values. On further discussion, the consensus direction to staff is to proceed on code development, with local amendments based on documented need.
- **Existing buildings.** Council wants clarifications about how a green building code would apply to existing buildings.
- **Timeline.** Council supports the proposed timeline. They understand that the commercial/industrial (C/I) green building code development will lag the residential code, because the model C/I standards have not yet been published. Staff will work to bring a proposed C/I code to Council on the same schedule as a residential code proposal.
- **Community engagement.** Council directed that staff broadly engage the community in the development of the Green Building Program, reaching out well beyond the stakeholders who will be directly affected.

Next Steps

- Continue development of Green Building Program, with quarterly progress reports beginning March 31, 2010.
- Green Building Program update at Work Session on July 13, 2010.
- City Council consideration of the adoption of a green building code, first quarter 2011.



ATTACHMENT 5

City of Fort Collins

Memorandum

DATE: July 15, 2010

TO: Mayor and City Council Members

THRU: Darin Atteberry, City Manager
Brian Janonis, Utilities Executive Director

FROM: Patty Bigner, Utilities Customer and Employee Relations Manager
Doug Swartz, Utilities Energy Services Engineer
Felix Lee, Utilities Green Building Codes Project Manager

RE: Work Session Summary – July 13, 2010 re: Green Building Program Update

On July 13, 2010, City Council held a Work Session to discuss an update on the development of the Green Building Program. All Councilmembers were present. Staff members making presentations and answering questions were Utilities staff Patty Bigner, Doug Swartz, John Phelan, and Felix Lee.

There was extensive discussion and many clarification questions regarding the Green Building Program. Each Councilmember provided their individual perspective and feedback. Council supports moving ahead with the approach proposed by Staff, with the exception of timeline. Major points of discussion were:

- **Integrated framework.** Council supports the market transformation approach of the Green Building Program, balancing voluntary, market-driven, above-code elements to "pull" the top end of the market while a green building code "pushes" the bottom end.
- **Green building code.** Council supports integrating mandatory green building practices into existing City regulations rather than establishing a standalone green building code. Councilmembers have varying perspectives on the scope of the green building code enhancements and degree of push they provide.
- **Costs and benefits.** Council would like to see a costs and benefits analysis of the proposed green building code enhancements. The costs and benefits should be considered from a Triple Bottom Line perspective.
- **Resources.** Council needs more specific information about the proposed elements of the Green Building Program, with estimated resource needs, before they can address resource availability. Additional resource requests should come through the Budgeting for Outcomes process.
- **Timeline.** Council would like another Work Session on this topic in late 2010 and a final green building code proposal for consideration no later than the end of February 2011.

City of Fort Collins

Next Steps

- Continue development of Green Building Program, continuing quarterly progress reports.
- Green Building Program update at Work Session on December 14, 2010.
- City Council consideration of the adoption of green building code enhancements, First and Second Readings completed, first quarter 2011.

Green Building Program Advisory Committee Members

Organization/Company	Representative
American Institute of Architects/Colorado North	Fred Roberts
Appraisal Institute/Colorado Chapter	Marge Moore
Community for Sustainable Energy	Andrew Michler
CSU-Institute for the Built Environment	Brian Dunbar
Fort Collins Board of Realtors	Todd Gilchrist
Fort Collins Chamber of Commerce	Ann Hutchinson
Fort Collins Housing Authority	Mike Salza
Fort Collins Sustainability Group	Andrew Michler
International Facilities Management Association	Matt Horner
Northern CO Commercial Assoc. of Realtors	Peter Kast/ Joshua Guernsey
Home Builders Association of Northern CO	Bob Peterson
Northern Colorado Renewable Energy Society	John Fassler
Poudre School District	Mike Spearnak
Rocky Mountain Sustainable Living Association	Kellie Falbo
Sierra Club/Poudre Canyon Group	Shane C Miller
USGBC-Northern CO branch	Bill Hofmann
Individuals	
Everitt Companies	David Everitt
Sage2	Bill Franzen
Involved citizen	Mark Wanger
Boards and Commissions	
Affordable Housing Board	Mike Sollenberger
Air Quality Advisory Board	Rich Fisher
Building Review Board	Alan Cram
Commission on Disability	Mike Devereaux
Economic Advisory Commission	Stu MacMillan
Electric Board	John Graham
Landmark Preservation Commission	Bud Frick
Natural Resources Advisory Board	Glen Colton
Planning & Zoning Board	Andy Smith
Water Board	Phil Phelan
City Management	
Neighborhood & Building Services	Steve Dush

Economic Development	Mike Freeman
City Manager's Office	Helen Migchelbrink
Natural Resources	John Stokes
Fort Collins Utilities	Patty Bigner
Fort Collins Utilities - Light & Power	Steve Catanach
Fort Collins Utilities - Water	Jon Haukaas
Fort Collins Utilities - Water	Kevin Gertig
Advance Planning	Joe Frank
Operations Services	Ken Mannon
Neighborhood and Building Services	Mike Gebo

Residential Technical Review Advisory Committee Membership

Member	Company	Expertise
Jeff Schneider	Armstead Construction	Builder / new + remodel
Gil Paben	Aspen Construction	Builder / new + remodel, radon mitigation contractor
Rob Sabin	Aspen Homes of Colorado	Builder / production homes
Alex Blackmer	The Atmosphere Conservancy	Energy efficiency + renewable energy, custom builder
Chadrick Martinez	Care Housing, Inc.	Affordable housing developer and owner
Dana McBride	Dana McBride Custom Homes	Architect and builder / custom homes
Michelle Jacobs	Fort Collins Board of Realtors	Real estate
Bob Hand / John Sailer	Habitat for Humanity	Affordable housing builder
Gordon Winner	HighCraft Builders	Remodel contractor
Laura Barrett / Mark Benjamin	Institute for the Built Environment	Green building education and consulting (students)
Larry Buckendorf	J&J Construction of Northern Colorado	Developer and builder / production homes
Michael Bello	Larkspur Homes, LLC	Builder and project manager
Rob Ross	Merten Design Studio	Project architect
Neil Kaufman	National Center for Craftsmanship	Deconstruction and training
Dennis Sovick	Sovick Design Builders	Designer and builder / custom homes + remodel
Lara Williams	The Green Team Real Estate	Real estate
James Mitchell	The Group Real Estate	Real estate
Linda Ripley	Vaught-Frye-Ripley Design	Master planning + landscape architecture
Terence Hoaglund	Vignette Studio	Developer / landscape architect / designer / builder

Commercial Technical Review Advisory Committee Membership

Member	Company	Expertise
Brad Massey	Aller Lingle Massey Architects PC	Architect
Steve Steinbicker	Architecture West	Architect
Corey Rhodes	Beaudin-Ganze Consulting Engineers	Mechanical Engineer
Rick Coen	Bella Energy	Solar
Gino Campana	Bellisimo Inc.	Construction Management
Angela Milewski	BHA Design	Landscape Design/LEED
Josh Guernsey/ Peter Kast	Brinkman Partners	Real Estate
Doug Dohn	Dohn Construction	Construction Management
Greg Fisher	Fisher Architecture	Architect
Josie Plaut	Institute for the Built Environment	LEED/Green Building
Jeff Giles	Nolte & Associates	
Pete Hall	PSD	Green Building/ Operations
Sandy Willison	Starwood Construction Mgmt	Construction Management
Matt Horner	Trane	HVAC Systems & Controls/Facility Management

Building Officials*

Jurisdiction	Representative
Larimer County	Tom Garton
Safe Built	Russ Weber
City of Longmont	Chris Allison
City of Fort Collins	Russell Hovland

* Building Officials are invited to attend both residential and commercial TRAC meetings.

Green Building Program (GBP) – Building Code Green Amendments (BCGA)
Public Comments Summary
7/14/2010 – 12/2/2010

Below is a summary of public comments from:

9/18/10	Sustainable Living Fair
10/26/10	Business Environmental Program Series "Greening the Fort"
11/10/10	Landmark Preservation Commission
11/12/10	Downtown Development Authority
11/12/10	Planning & Zoning Board
11/15/10	Air Quality Advisory Board
11/17/10	Economic Advisory Committee
11/17/10	Green Building Program Community Open House
11/17/10	Natural Resources Advisory Board
11/18/10	Building Review Board
12/1/10	Electric Board
12/2/10	Affordable Housing Board
	Other general public comments to staff

**Staff also will be meeting with the:

12/6/10	Water Board
12/10/10	Chamber of Commerce Legislative Committee

Appraisals

- Currently, local residential appraisers are not giving value to energy improvements on homes; some consider comparables with similar energy-saving features in houses sold, but experience is that most do not. Residential appraisals must conform to guidelines established by underwriters and currently the guidelines do not recognize the value of energy efficient or other 'green' attributes. This ultimately affects the buyers' ability to borrow, permitted only to borrow on 80 percent of the 'appraised' value which currently *excludes* the added value of energy-efficient and/or 'green' features.
- Would like to see the City take a leading role in educating the local lending and appraisal industries and promoting change to this process.
- Commercial appraisers' process is different in that they include narrative analyses that illustrate specific attributes and their added value to the base cost of the building.
- A homeowner who refinanced their home, with 'green' features as upgrades, experienced lack of knowledge by the appraiser on the value of the upgrades in the home.

Benefits

- Be sure to consider the environment and triple-bottom-line benefits.

Costs

- Provide a Costs and Benefits Analysis of BCGA.
- Specifics of costs to builders/developers to build in compliance with BCGA?
- Concern that increased construction costs of BCGA drive builders and projects out of community.
- Concern costs will make Fort Collins housing unaffordable.
- Request for a broad-based assessment on return on investment (ROI) and utility savings.
- Who will pay for any costs associated with additional inspections? Will that cost be passed to home owners through increased inspection fees or spread to all taxpayers? Why was a 1,600 sq. ft. ranch home with full basement chosen as the prototype sample home when the more typical starter home is multi-story and less expensive to build?

Current economy

- Concern about the current downtrend for building industry – very limited number of new projects and lenders not making construction loans (new regulations require lenders to hold 10% of loan value they sell on secondary market for accountability to loan originators).
- Concern about added costs to comply with BCGA in a poor economy.
- Concern about large amount of vacant retail space and impact of BCGA.

Disclosure at point-of-sale

- Is this like the radon ordinance?

General

- Supportive of the direction the City is headed with proposed green amendments.
- Positive response to integrating amendments into existing codes.
- No good builder will oppose more rigorous City inspections.
- Will higher green standards for new homes decrease the market value of existing homes?

Education and resources

- Request that City provide ongoing education and resources for public.
- Request that City provides resources for homeowners specifically via an Operations and Maintenance manual.
- Request that City provide ongoing education to homeowners who want to renovate or build additions.
- Ongoing education and training is a very important element once BCGA implemented.
- City should provide BCGA guideline resources for construction industry professionals and public alike.
- Importance of educating appraisal and lending industry professionals on the economic benefits of green building, especially as related to residential.

Effective date

- Timeline for implementation?
- What is the last possible date a building permit can be obtained to comply with current codes, and not required to comply with BCA?
- Consider an effective date past 2012 in light of poor building industry economy.
- Supportive of reduction of energy consumption and impact of resources and elements of proposed BCGA; however, suggestion was made to strongly consider implications of additional costs in poor economy when establishing an effective date.

Electric heat v gas heat on large projects

- Develop disincentives for large projects using electric heat – creates a disconnect between goals of Climate Action Plan and energy-efficiency building codes.

Existing buildings

- Application to existing buildings?

Goals of Climate Action, Energy and Water Conservation Plans

- Concern about a proposed large multi-family project using all electric heat and how that it fits into City policies relating to energy conservation and green building goals.

Historic Buildings

- Application to historic buildings?
- Application to façades of downtown historic properties?

Inspections/verification

- Develop process for feedback from 3rd party inspectors to City staff so staff is aware of any issues.
- Will current City inspectors be trained on new amendments and are they currently trained in multi-disciplines of inspections?

Insured values v costs to rebuild in compliance with new codes

- Owners need to be educated about insurance values and increased costs with rebuilding to new codes – noting experience with recent Boulder fire losses.

Jurisdictional coordination

- Suggest the City, Larimer County and other jurisdictions within county all adopt the same building codes and green amendments for consistency and ease for builders/developers.

Performance testing

- Who will be performance testing the equipment and systems?
- How will HVAC commissioning affect issuance of a Certificate of Occupancy?

Provisions – proposed

Certified wood

- Which agency has been chosen as certifier?
- Outreach needed to local building material suppliers to carry certified wood.

Construction waste management and recycling

- Positive experience with recycling construction wood waste, economically more feasible than landfill fees.
- Negative experience recycling other construction waste due to noncompliance of subcontractors—even when signage is both in English and Spanish.
- Issue with residents dumping trash in construction dumpsters.
- Suggest to also considering a deconstruction plan requirement for projects over a set size tearing down an old structure for new construction in its place. The mandatory aspect would be development of a plan for educational purposes and a credible guideline if the owner decided to deconstruct – not mandating structures be deconstructed. The City could develop a form, or owner could use a 3rd party.

House size

- What about commercial building size regulations?
- Why should there be any correlation with house size?
- For a large lot that could be subdivided into two lots: On the total parcel an 8,000 square foot house could be built. On the subdivided parcel, two 4,000 square foot houses could be built. Does the first option require meeting stiffer requirements? What are they?

Indoor lighting

- Include an after-hours lighting requirement for businesses in addition to outdoor.

Landscaping

- New requirements integrated into Land Use Code?

Ventilation

- Include requirements for stairwells.

VOCs

- Is the City liable for new class of VOCs released into the indoor air other than what's prescribed in proposed BCGA?
- Documentation via an affidavit needed for compliance with VOCs.

Provisions – suggested additions

- Suggest adding metering for multi-family projects.

Staff Resources

- What additional staff resources will be needed to administer BCGA?
- Raise permit fees to pay for additional staff required to administer BCGA.
- Consider additional staff time for documenting and preparing for an increase in appeals to the boards (most notably the Building Review Board).

Uniform Code for Building Conservation

- Will this be integrated into BCGA?

Unintended consequences of BCGA

- Be careful of 'unintended' consequences of the BCGA.

Voluntary elements of the Green Building Program

- Provide more information on the voluntary GBP elements, such as the response to the Home Efficiency Program and impact of the Home Energy Reports.

Green Building Program and Building Code Green Amendments

City Council Work Session
December 14, 2010

Purpose of Work Session

- Review recommended packages of Building Code Green Amendments for residential and commercial sectors
- Review implementation plans and continuing development of the Green Building (GB) Program
- Receive City Council feedback and direction

2

Guidance Sought

- Does Council support moving forward with the Building Code Green Amendments packages (residential and commercial) as recommended by staff?
- For which of the Green Amendments options, if any, does Council want staff to develop detailed recommendations?
- Does Council want to proceed with the Building Code Green Amendments project with the proposed March 2011 adoption timeline or a revised schedule?

3

Guidance Sought

- Assuming a version of these Building Code Green Amendments is adopted in 2011:
  - Does Council support the staff recommended date for the code amendments to go into effect?
  - How will implementation resources for the Community Development and Neighborhood Services department be incorporated into the adoption process?

4

Presentation

- Background and GB Program Elements
- Building Code Green Amendments - Outcomes
- 2010 GB Program Development
- Building Code Green Amendments - Packages
- Benefit Cost Analysis
- Implementation Planning
- Building Code Green Amendments – Options
- Next Steps and Schedule

Green Building - Opportunities

- Site and lot development
- Resource efficiency
- Energy efficiency
- Water efficiency
- Indoor environmental quality
- Outdoor environmental quality
- Operations, maintenance, education

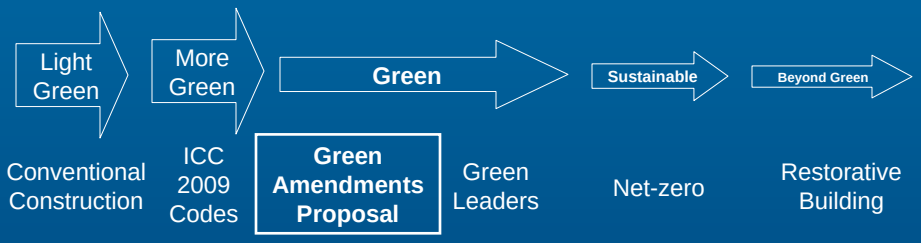
Green Building Program Goal

The goal of an ongoing Green Building Program is to increasingly align Fort Collins' built environment with community goals of reduced carbon emissions, reduced energy use and reduced water use.

Other Drivers for Green Building

- Create better buildings
  - For people
  - Lower operations and maintenance costs
  - Higher future value
- Avoid lost opportunities
- Continue FC leadership role
  - Energy efficiency, clean energy, high-performance buildings

Green Building Continuum



Conventional Construction

ICC 2009 Codes

Green Amendments Proposal

Green Leaders

Net-zero

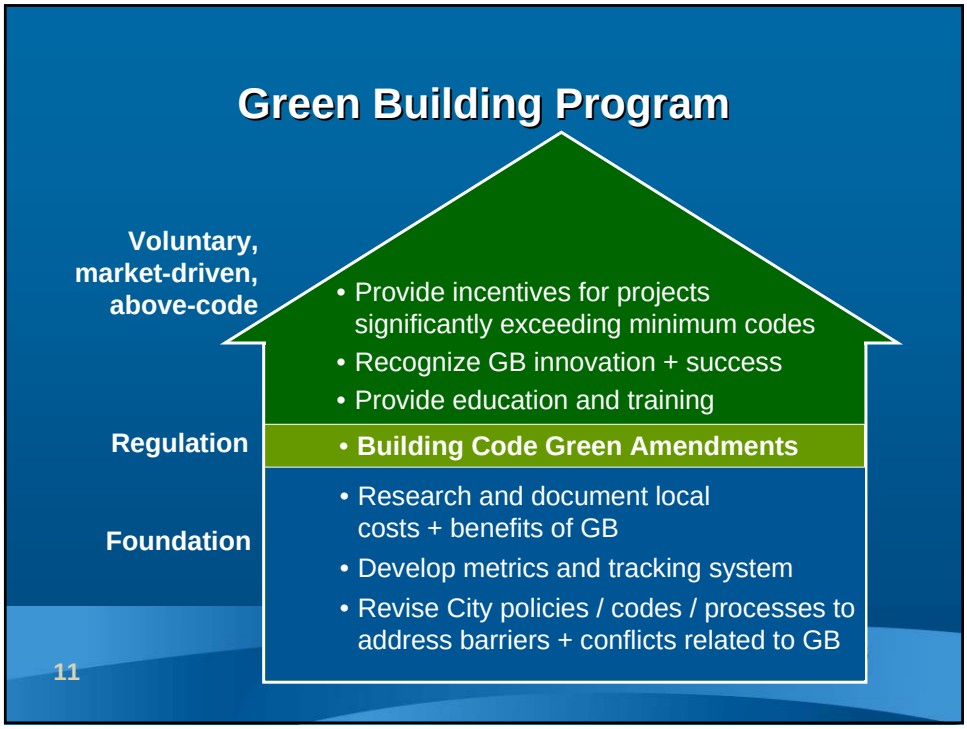
Restorative Building

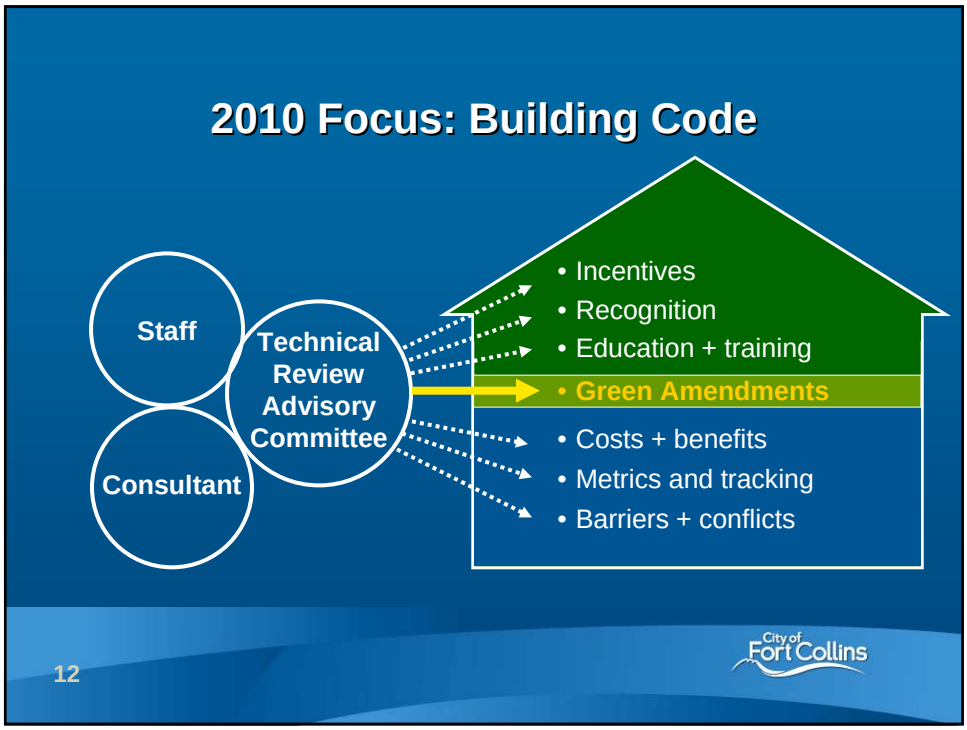
9

Green Amendments - Outcomes

- The Green Amendments are the next steps towards making GB practices mainstream, by:
  - Establishing GB practices in code
  - Advancing the performance of buildings
- Building Code Green Amendments – part of a larger picture
  - Implementation support
  - Above-code elements (recognition and incentives)
  - Regular code updates

10


Green Building Program
Voluntary, market-driven, above-code
• Provide incentives for projects significantly exceeding minimum codes
• Recognize GB innovation + success
• Provide education and training
Regulation
• Building Code Green Amendments
Foundation
• Research and document local costs + benefits of GB
• Develop metrics and tracking system
• Revise City policies / codes / processes to address barriers + conflicts related to GB
11


2010 Focus: Building Code
Staff
Technical Review Advisory Committee
Consultant
• Incentives
• Recognition
• Education + training
• Green Amendments
• Costs + benefits
• Metrics and tracking
• Barriers + conflicts
12
City of Fort Collins

Building Code Green Amendments

Baseline: CFC building code (2009 I-Codes)

- Residential (SF & MF): New, additions, alterations
- Commercial (MF > 3 stories): New, additions, alterations

GB Program - Scope

Community Engagement

- Advisory Committee Meetings (public)
- Boards and Commissions
- Web Site
- Open house
- Events and presentations

Green Amendments - Documentation

- Code proposal “at-a-glance”
  - Commercial
  - Residential
- Green building practice summaries
  - Details for each line item
  - Applicability, cost, benefits, background, verification, etc.
  - fcgov.com/gbp

Green Amendments - Themes

- Breadth of green building (TBL)
- Lost opportunities
- Installed performance
- Systems approach
- Reasonable steps
- Refine I-Codes
- Residential and commercial alignment

17

Residential Green Amendments Recommended Package

Mechanical systems performance
- Heating/cooling system design
- HVAC commissioning

Electricity
- Thermal specs for electric-heat homes

Building envelope performance
- Tight construction
- Insulation installation
- Window installation

Indoor environment
- Tight construction
- Safer combustion appliances
- Low-VOC materials
- Controlled ventilation

Other GB practices
- Water-efficient fixtures
- Construction waste recycling
- “Dark-Sky” light fixtures
- Owner education

18

Commercial Green Amendments Recommended Package

Mechanical systems performance
- HVAC commissioning

Energy savings
- Thermal specs for electric-heat buildings
- Lodging guest room controls
- Outdoor lighting controls

Building envelope performance
- Tight construction
- Insulation installation
- Commissioning

Indoor environment
- Low-VOC materials
- Building flush-out
- Sound transmission

Other GB practices
- Water-efficient fixtures
- Construction waste recycling
- Energy assessments for existing buildings
- Owner education

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Benefit Cost Analysis

- Scope of analysis
  - Individual
  - Building Sector
  - Community / Eco-system
- Prototype projects
- Project level BC results (quantitative)
- Community level BC results (quantitative)
- Community qualitative elements
- Benefit cost analysis graphic
  - Review of categories

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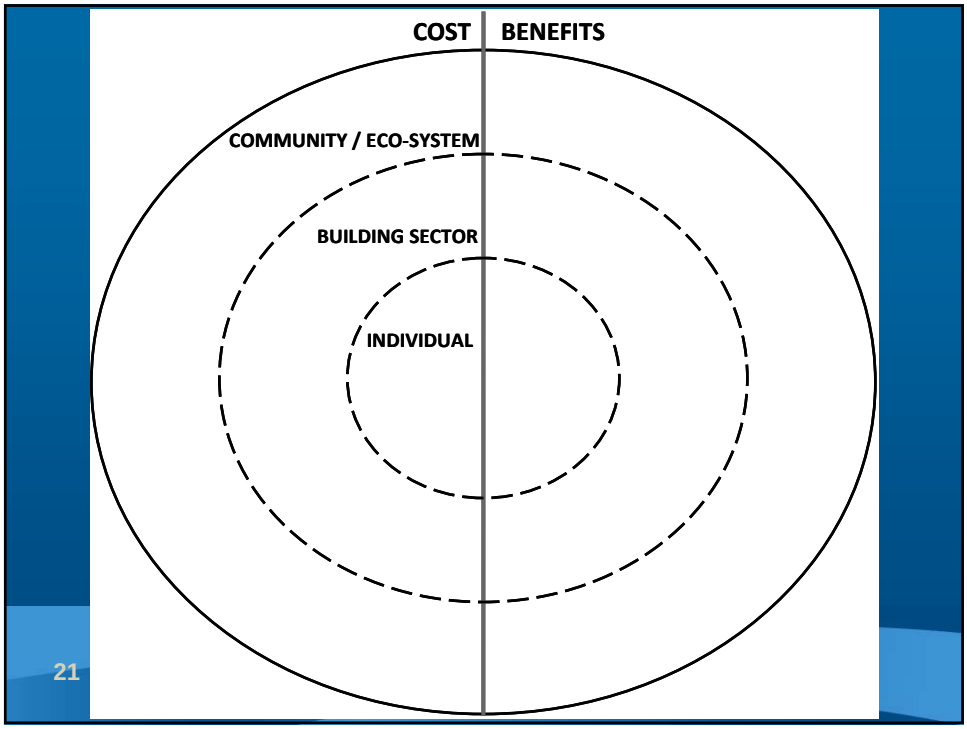
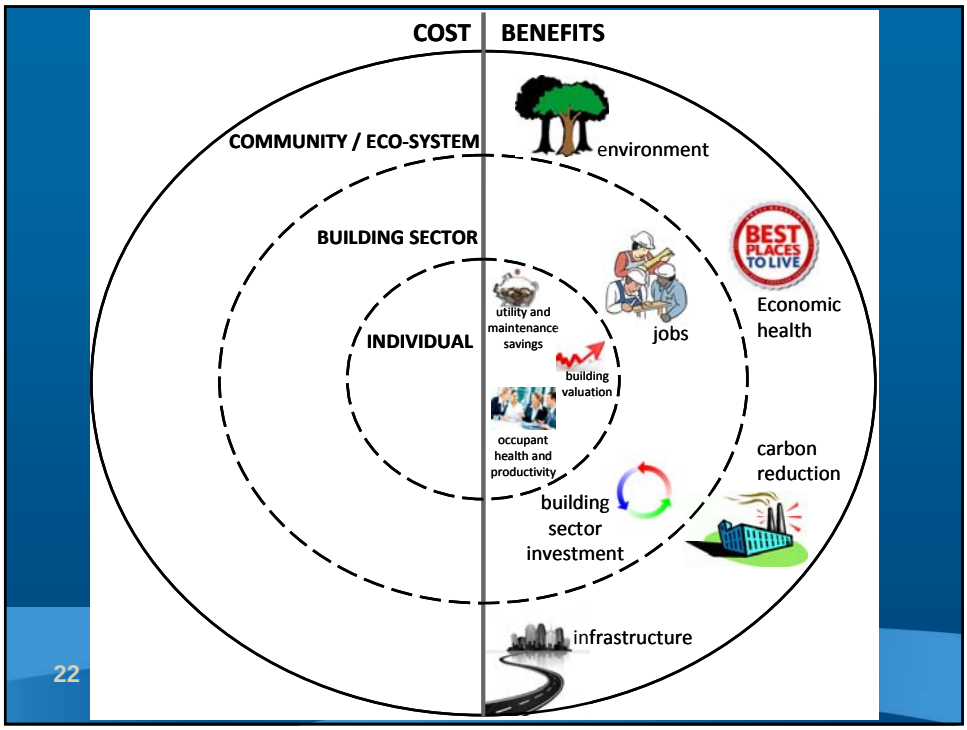
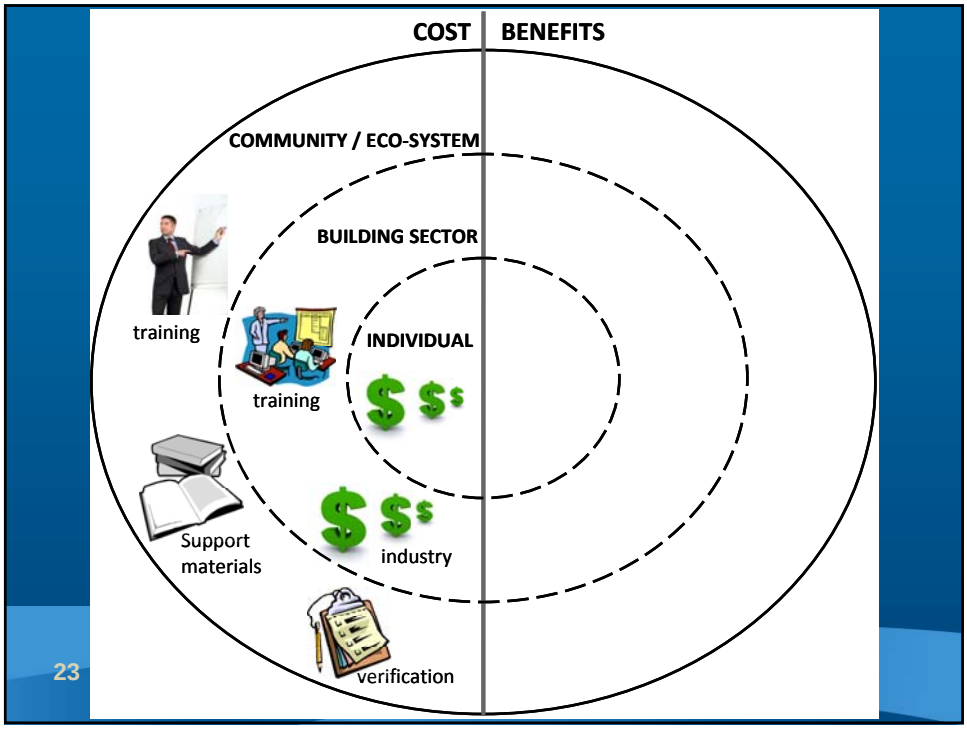
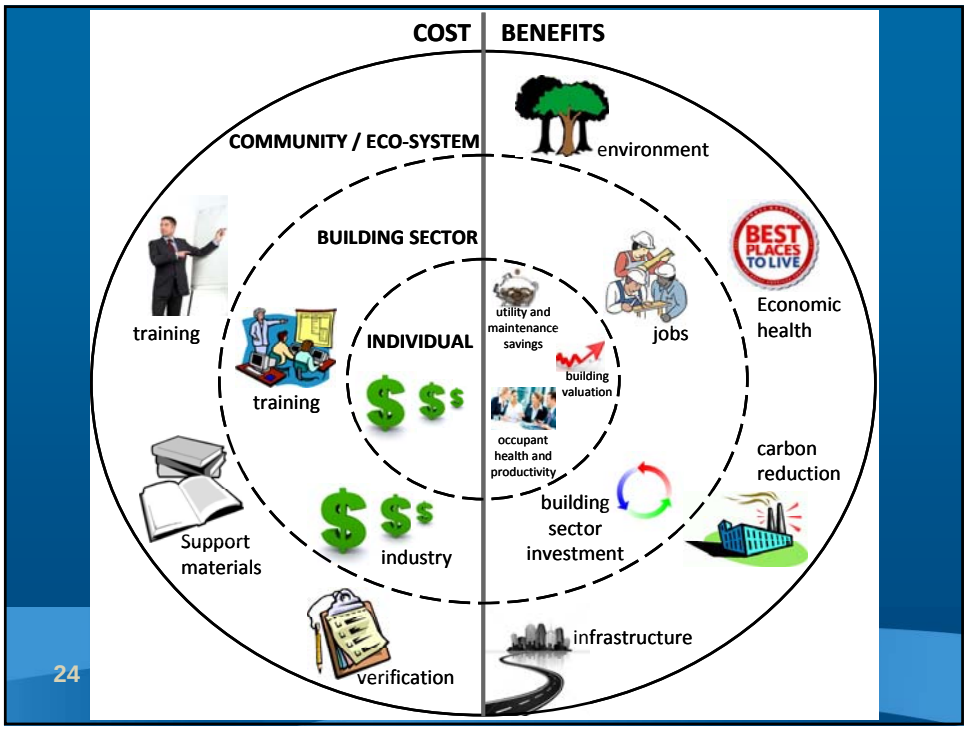

COST
BENEFITS
COMMUNITY / ECO-SYSTEM
BUILDING SECTOR
INDIVIDUAL
21


COST
BENEFITS
COMMUNITY / ECO-SYSTEM
environment
BUILDING SECTOR
INDIVIDUAL
utility and maintenance savings
jobs
BEST PLACES TO LIVE
Economic health
building valuation
occupant health and productivity
carbon reduction
building sector investment
infrastructure
22


COST
BENEFITS
COMMUNITY / ECO-SYSTEM
BUILDING SECTOR
INDIVIDUAL
training
training
Support materials
industry
verification
23


COST
BENEFITS
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environment
BUILDING SECTOR
INDIVIDUAL
training
training
utility and maintenance savings
jobs
Economic health
building valuation
occupant health and productivity
carbon reduction
building sector investment
Support materials
industry
infrastructure
verification
24

Benefit Cost – Prototype Projects

- Residential. 1,600 square foot ranch over full finished basement, $250,000 sales price, financed with a 6% 30 year mortgage, $2,600 annual utility cost
- Commercial. 15,000 square foot office building, 2 stories, $162 per square foot construction cost ($2.4M), $14,000 annual utility cost

Benefit Cost – Project Results Residential Package

- Initial cost increase
  - 1% to 2% of construction cost, or $2,500 to $5,000
  - Monthly mortgage impact, $15 to $30
- Utility cost savings
  - 2% to 7%, or $50 to $175 annually
- Energy, water and carbon savings
  - 5% to 10%

Benefit Cost – Project Results Commercial Package

- Initial cost increase
  - 1% to 4% of construction cost, or $25,000 to $100,000
  - Monthly mortgage impact, $180 to $600
- Utility cost savings
  - 13% to 25%, or $1,800 to $3,450 annually
- Energy savings, 25% to 35%
- Water savings (indoor), 20%
- Carbon savings, 15% to 30%

Benefit Cost – Community Results Quantitative

- Use Benefit Cost Ratio to express quantitative results
- Conservative assumptions based on national studies
- Benefits
  - Building Valuation
  - Economic Health
  - Building Utility Savings
  - Eco-system (carbon)
  - Occupant Health and Productivity
- Costs
  - Initial Cost Increase
  - Verification (plan review and inspection)
  - Training and Education

Benefit Cost – Community Results Quantitative

- Benefit Cost Ratio Results
  - Residential amendments package, 1.3
  - Commercial amendments package, 1.6
  - Combined amendments package, 1.5

Benefit Cost – Community Results Qualitative Benefits

- Community Leadership
  - Efficiency, clean energy, “best place to live”
- Reduced Infrastructure Impacts
  - Electric and water systems, landfill
- Other Environmental Benefits
  - Reduced resource use, “dark sky”

Benefit Cost Analysis - Summary

- One to four percent initial cost increases are within typical variance ranges for construction.
- The initial cost increases provide both individual and community long-term benefits.
- With conservative assumptions, analysis shows positive benefit-cost ratio

GB Amendments – Implementation Roles and Responsibilities

- Collaborative implementation
  - Community Development and Neighborhood Services (CDNS)
  - Utilities Energy Services (Utilities)
- CDNS
  - Verification procedures
  - On-going code implementation (plan review, field inspection)
- Utilities
  - Training, education, support materials
  - Evaluation of results

GB Amendments – Implementation Resources

- CDNS estimated time increases for plan review and field inspection
  - Residential, 8 hour increase per project
  - Commercial, 7 hour increase per project
- CDNS staffing requirements to maintain Level of Service
  - 1.0 FTE Building Inspector and 0.5 FTE Plans Examiner
- Utilities
  - Resources are included in 2011/2012 budget for pre-implementation and GB program development

GB Amendments – Implementation Recommended Schedule

- Pre-Implementation Tasks
  - Training and education
    - Contractors, design professionals, City verification staff
  - Support Materials
  - Verification procedures
  - Hiring and training CDNS staff
- Recommended effective date for GB amendments
  - January 1, 2012

Green Amendments - Options

- See Agenda Item Summary Attachment 3
  - Option description, applicability, rationale for option, additional information
- Option A – Certified Wood
- Option B – Renewable Energy Requirement
- Option C - Require Higher Performance for Larger Homes
- Option D –Higher Thermal Specifications for Gas-Heated Homes

GB Program – Continuing Development

- Collaborative development between CDNS and Utilities
- Primary objectives
  - Implementation of green amendments
  - Development of above-code GB program elements
  - Consideration of Land-Use Code related GB practices
  - On-going code review cycles to align with International Codes updates

GB Amendments - Next Steps

- Dec 14, 2010: Definitive direction from Council on recommended packages of green amendments and options
- January and February 2011
  - Develop ordinance language based on Council direction
  - Outreach to Boards and Commissions for recommendations
- March 2011: Council adoption

Building Code Green Amendments Summary

- Recommended packages make sense as the next steps to mainstream GB practices.
- Initial cost increases are within typical variance ranges for construction.
- GB amendments provide net long-term benefits at both individual and community levels.
- Additional City resources will be needed for implementation and verification.
- The community-level benefits align with Fort Collins policy goals.

Guidance Sought

- Does Council support moving forward with the Building Code Green Amendments packages (residential and commercial) as recommended by staff?
- For which of the Green Amendments options, if any, does Council want staff to develop detailed recommendations?
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Questions

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