Green Building in Multifamily Affordable Housing: Impacts and Policies

Southface Building know-how for a sustainable future

Mission: Southface promotes sustainable homes, workplaces and communities through education, research, advocacy and technical assistance.

Established in 1978
Atlanta, GA
www.southface.org

Southface Building know-how for a sustainable future

- Commercial Sustainability Services
  - *Grants to Green*
- Residential Sustainability Services
  - *EarthCraft*
  - *Home Energy Rating System (HERS)*
- Community Sustainability Services
  - *Impact of Green Affordable Housing*
  - *City Energy Project*
- Policy
  - *Energy Efficiency for All (EEFA)*
- Communication and Development
  - *Sustainable Atlanta Round Table (SART)*
- Education and Training
  - *Building Energy Codes & Standards*
  - *BPI*

PROJECT GOALS

Impact of Green Affordable Housing

- Evaluate and Support Green Affordable Housing Policy & Planning
- Data Sharing
- Enhanced Understanding of Costs & Benefits
- Increased Adoption
- Appropriations & Budgeting

PROJECT DESCRIPTION
Impact of Green Affordable Housing

- MFAH Developers
  - AL, GA, NC & SC
- Recently Constructed or Rehabbed
  - 12 Months Occupancy Data
- Affordable - LIHTC Properties, HUD Subsidized, PHA, etc.
- Comparison Data Across Many Types of Developments
  - NC
  - Rehab
  - Family
  - Senior
  - LR/MR/HR
- Analyze and Evaluate Cost-Benefit (Triple Bottom Line) for All Stakeholders
  - Residents
  - Managers
  - Developers
  - HFA

PROJECT TIMELINE AND PROCESS
Impact of Green Affordable Housing

Task 1: Preliminary Analysis
7/2014-9/2014

Task 2: Partner Recruitment and Engagement
7/2014-2/2015

Task 3: Research Design
9/2014-2/2015

Task 4: Development Identification and Data Access
10/2014-8/2015

Task 5: Data Collection and Research Analysis
1/2015-8/2015

Task 6: Stakeholder and Industry Communications
7/2014-8/2015

PROJECT METHODS & DATA RESOURCES

Impact of Green Affordable Housing

- Peer Reviewed Literature
  - Internal
  - External
- Advisory Committee
- Development & Construction Costs
  - Cost Certifications
  - AIA G702
- Surveys (SurveyGizmo)
  - Development & Construction
  - Construction & Specifications
  - Property Management
  - Resident - HUD MF Sampling Rate
  - HFA

Table I. Calculation of Number of Units to Be Tested In Multi-family Developments.

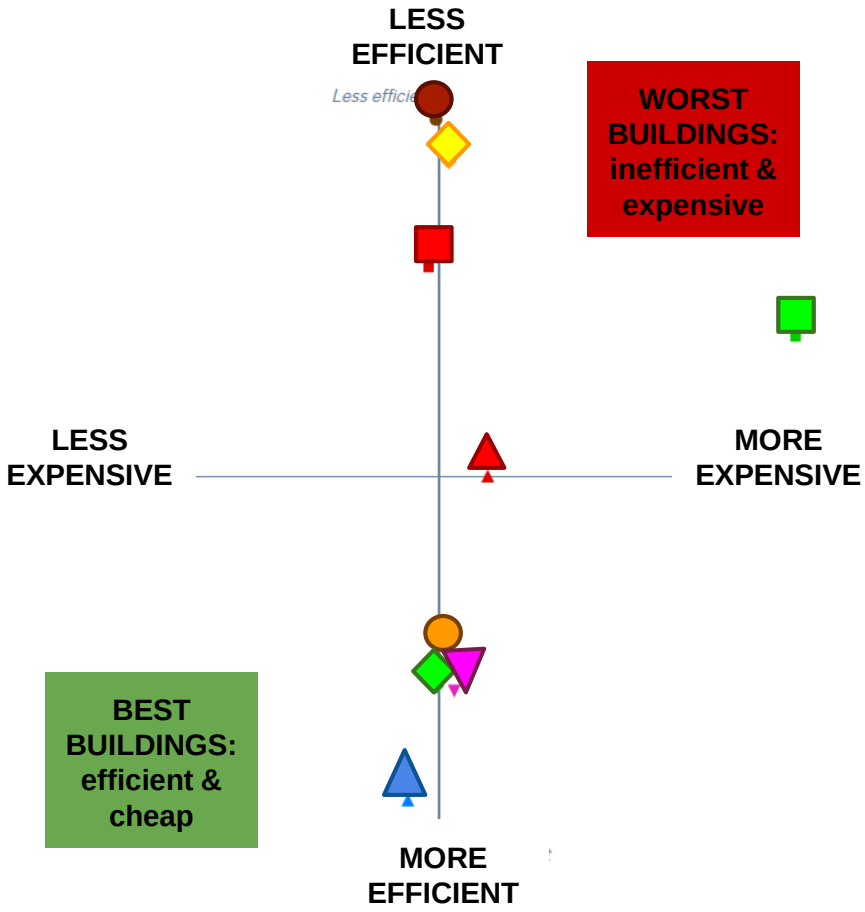
Calculation of the Number of Units to be Tested		
N[a]	k[b]	n[c]
20	0	20
40	1	31
60	2	38
80	3	42
100	4	45
200	9	51
300	14	54
400	19	55
600	29	56
1,000	49	57
1,500	49	86
2,000	49	115
2,500	49	144
3,000	49	174
3,500	49	203
4,000	49	232
4,500	49	261
5,000	49	290

[a]N = Number of Units in the Development;
[b]k = Maximum Allowable Number of Leaded Units;
[c]n = Number of Units to be Tested

PROJECT METHODS & DATA RESOURCES

Impact of Green Affordable Housing

- Operations & Maintenance Costs
  - Budget Reports
  - Financial Statements
  - Account Audits
- Utility Account Tracking - WegoWise
  - HUD MF Sampling Rate (in-unit)
- RSMeans
- County and State Health Data
- Comparative Statistical Analysis
- Qualitative Analysis



WegoWise Dashboard

RESEARCH PARTICIPANTS

Green Development	Certification	Placed in Service Year	State	City	Urban/Rural	Construction Type	Gross SF	Number of Units	Resident Type	Building Type
Green 1	EarthCraft & ENERGY STAR	2012	GA	Cordele	Rural	Acquisition Rehab	31,352	46	Elderly	Low Rise
Green 2	EarthCraft	2012	GA	Rincon	Rural	NC	75,803	60	Family	Low Rise
Green 3	LEED	2011	GA	Atlanta	Urban	NC	202,343	156	Family	Low Rise
*Green HR	LEED	2014	GA	Atlanta	Urban	Historic Rehab	59,368	90	Supportive Housing	High Rise
Green 4	EarthCraft & LEED	2012	GA	Pooler	Rural	NC	69,075	50	Family	Low Rise
Green 5	EarthCraft	2013	NC	Charlotte	Urban	NC	111,000	110	Senior	Mid Rise
Green 6	EarthCraft	2014	NC	Charlotte	Urban	NC	103,300	74	Family	Mid Rise
Green 7	ENERGY STAR	2012	NC	Holly Springs	Rural	NC	74,444	64	Senior	Low Rise
Green 8	EarthCraft	2012	NC	Hudson	Rural	NC	40,720	40	Senior	Low Rise
Green 9	ENERGY STAR	2011	NC	Hudson	Rural	NC	47,784	40	Family	Low Rise
Green 10	ENERGY STAR	2012	SC	Greenville	Urban	NC	85,327	60	Family	Low Rise

RESEARCH PARTICIPANTS

Non-Green Development	Placed In Service Year	State	City	Urban/Rural	Construction Type	Gross SF	Number of Units	Resident Type	Type
Non-Green 1	2012	AL	Centre	Rural	NC	40,367	40	Elderly	Low Rise
Non-Green 2	2010	AL	Monroeville	Rural	NC	59,806	56	Elderly	Low Rise
Non-Green 3	2012	AL	Mobile	Urban	NC	57,613	51	Elderly	Low Rise
Non-Green 4	2011	AL	Gadsden	Rural	NC	46,630	40	Elderly	Low Rise
Non-Green 5	2011	AL	Montgomery	Urban	NC	109,232	96	Family	Low Rise
Non-Green 6	2011	SC	Charleston	Urban	NC	62,873	46	Family	Low Rise
Non-Green 7	2010	SC	Hardeeville	Rural	NC	59,543	50	Family	Low Rise

VIRGINIA CENTER FOR HOUSING RESEARCH AT VIRGINIA TECH (VCHR)

- Established by the Virginia Legislature in 1989 as the state's housing research center.
- An "an interdisciplinary study, research, and information resource on housing for the Commonwealth of Virginia."
- VCHR provides housing-related data services.
- Solving the nation's critical housing needs through national research related to housing affordability, sustainability, and innovative housing technologies.

PRELIMINARY FINDINGS- OUTLINE

- Featured Projects
- Total Costs
- Direct Costs
- Indirect Costs
- Development and Construction Survey
  - 48 responses
    - 26 complete, 22 partial
- Property Management Survey
  - 29 responses
    - 15 complete, 14 partial
- Resident Survey
  - 652 responses
    - 648 complete, 4 partial
- HFA Survey
  - 4 responses
    - Study States (AL, GA, NC & SC)
- WegoWise Data
  - 708 Meters
    - 574 Electric
    - 133 Water
    - 1 Nat. Gas

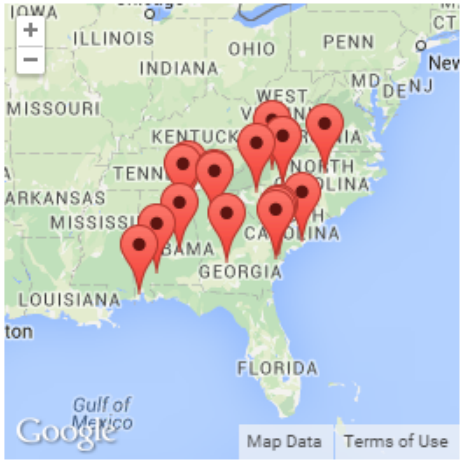
All Developments

Size

1,331,335 square feet in total
18 buildings
1,173 apartments
2,113 bedrooms

Export

Portfolio Characteristics
Utility Accounts



Green vs. Non-Green Average Development SF Costs Summary

Development Type	Total Cost / SF	Hard Cost / SF	Soft Cost / SF
Green	$94.55	$55.68	$38.87
Non-Green	$96.09	$54.54	$41.55
% Difference – Green vs. Non-Green	-1.61%	+2.09%	-6.46%

Green certified buildings in GA, NC and SC cost less to design and build than non-green alternatives in AL and SC.

Such a finding could suggest that green building processes have diffused into the industry and do not represent a price premium.

Hard costs - materials, labor and equipment directly used in the construction of the building

Soft costs - design and construction fees associated with the management of the development process

Green vs. Non-Green Average Detailed SF Cost Summary

Hard Costs:

Development Type	Substructure / SF	Shell / SF	Interiors / SF	Services / SF	Equipment & Furnishings / SF	Special Construction / SF	Other / SF
Green	$4.00	$20.45	$9.20	$15.42	$2.92	$2.40	$2.87
Non-Green	$4.50	$23.21	$8.08	$14.30	$3.66	$1.09	$0.00

Green developments are characterized by: lower substructure costs, lower shell costs, lower costs for equipment and furnishings.
Non-green developments are characterized by: lower interiors costs, lower services and lower special construction costs.

Soft Costs:

Development Type	*Contractor Services	Prof. Services	Pre-Dev.	Site Dev.	Construction Fin.	Permits and Fees	Developer Fee	Start-Up and Reserves
Green	$8.54	$4.02	$2.86	$11.46	$3.37	$2.16	$12.11	$6.36
Non-Green	$9.21	$3.85	$1.43	$20.36	$3.57	$3.55	$14.78	$4.74

Green developments are characterized by lower: Contractor Services (includes overhead, profit, and general requirements); Site Development; Construction Financing; Permits and Fees; Developer Fees.
Non-green developments are characterized by lower: Professional Services (includes architectural and engineering subcontracts, for example); and Start-up and Reserve Fees for the development.

Green vs. Non-Green Average Annual Development O&M SF Costs Summary

Development Type	Total O&M Cost / SF	Maintenance / SF	Utilities / SF	Administration / SF
Green	$2.79	$0.90	$0.49	$1.40
Non-Green	$2.42	$0.67	$0.55	$1.20
% Difference – Green vs. Non-Green	+15.07%	+33.89%	-11.71%	+16.92%

Anecdotally, education of maintenance staff and administration on technology of green buildings is needed.

Emphasis on energy efficiency is working.

Findings in this study suggest that the gap between green and non-green buildings is wider than simply education of managers, but includes cost as well.

Objective National Cost Average Validation- Green Detailed Hard Costs

	Substructure / SF	Shell / SF	Interiors / SF	Services / SF	Equip. & Furnish / SF	Special Const. / SF	Other / SF
Actual Green Cost:	$4.00	$20.45	$9.20	$15.42	$2.92	$2.40	$2.87
% of Total Cost:	6.99%	35.71%	16.06%	26.93%	5.11%	4.19%	5.02%
RSMeans Green Cost:	$3.87	$27.72	$24.80	$50.81	N/A	N/A	N/A
% of Total Cost:	3.61%	25.85%	23.14%	47.40%	N/A	N/A	N/A

- **Green buildings in our sample deviate considerably from the national average in all detailed cost categories of the buildings.**
- **We are in need of better data across the industry to support and define trends in the green building movement. As example, RS Means does not record data for certain parts of the building that are part of the QAP.**

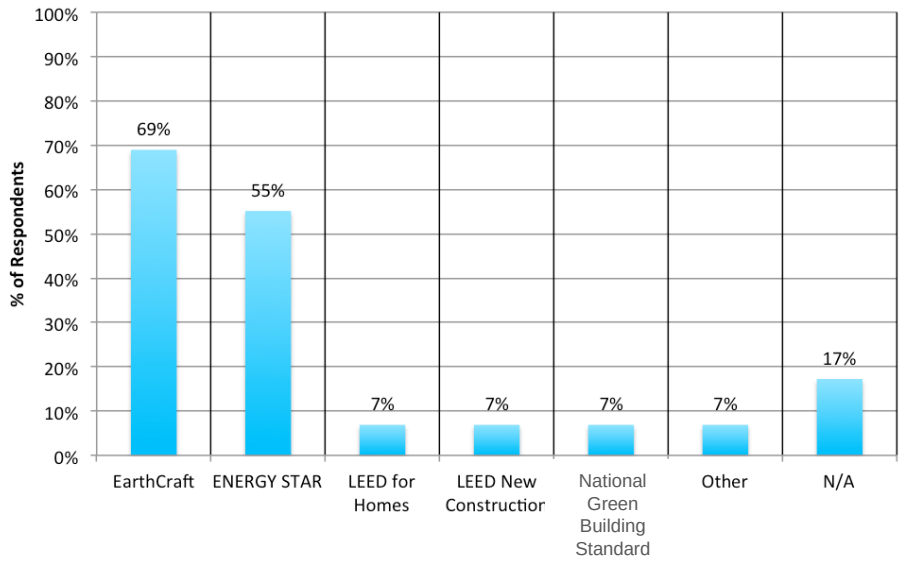
Objective National Cost Average Validation- Non-Green Detailed Hard Costs

	Substructure / SF	Shell / SF	Interiors / SF	Services / SF	Equip. & Furnish / SF	Special Const. / SF	Other / SF
Actual Non-Green Cost:	$4.50	$23.21	$8.08	$14.30	$3.66	$1.09	$0.00
% of Total Cost:	8.21%	42.32%	14.73%	26.08%	6.67%	1.98%	0.00%
RSMeans Non-Green Cost:	$4.01	$23.91	$22.96	$43.16	N/A	N/A	N/A
% of Total Cost:	4.26%	25.42%	24.41%	45.90%	N/A	N/A	N/A

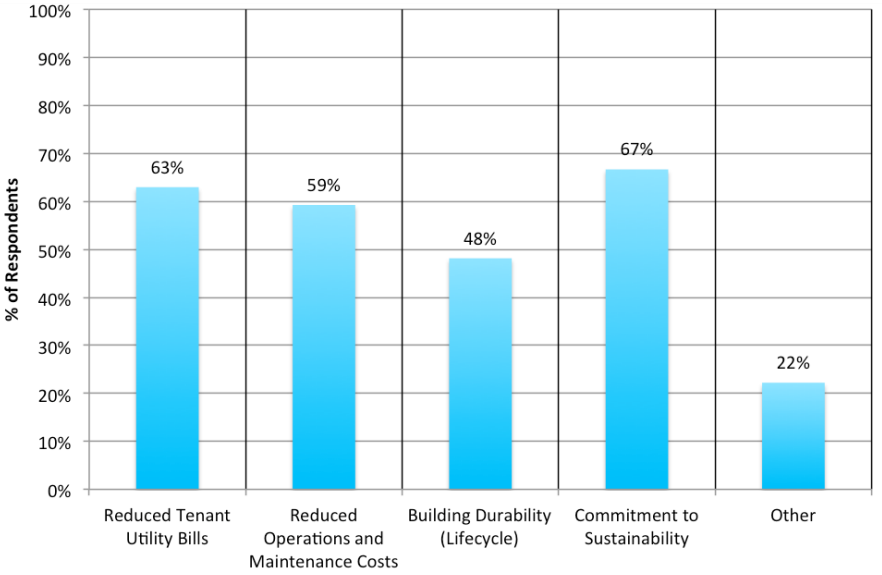
The green and non-green data in our sample do not vary widely in their deviation from national data. As a benchmark to national data, the low variability suggests consistency across the sample.

DEVELOPER/BUILDER SURVEY

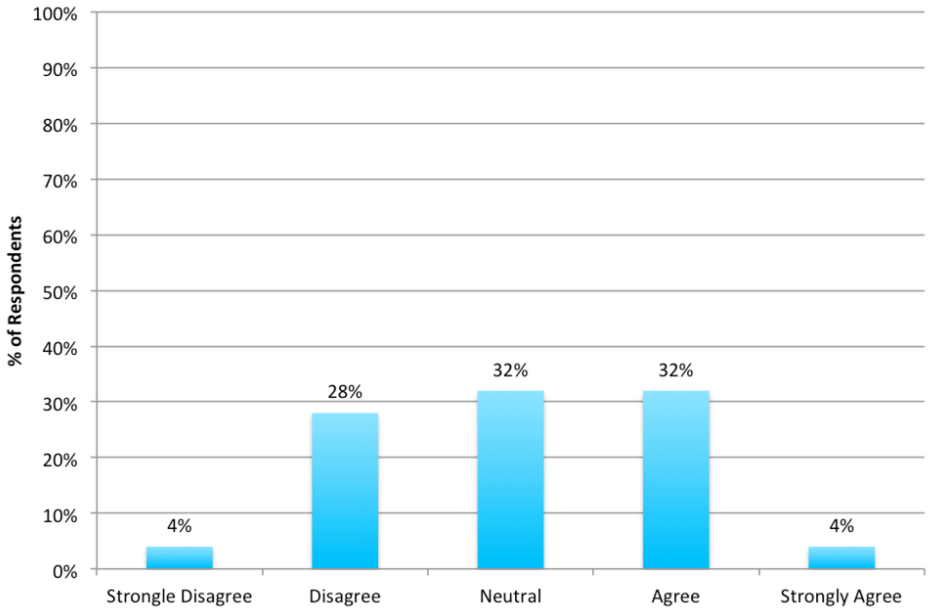
Affordable Developments Constructed to Above-Code Green Building Certifications:



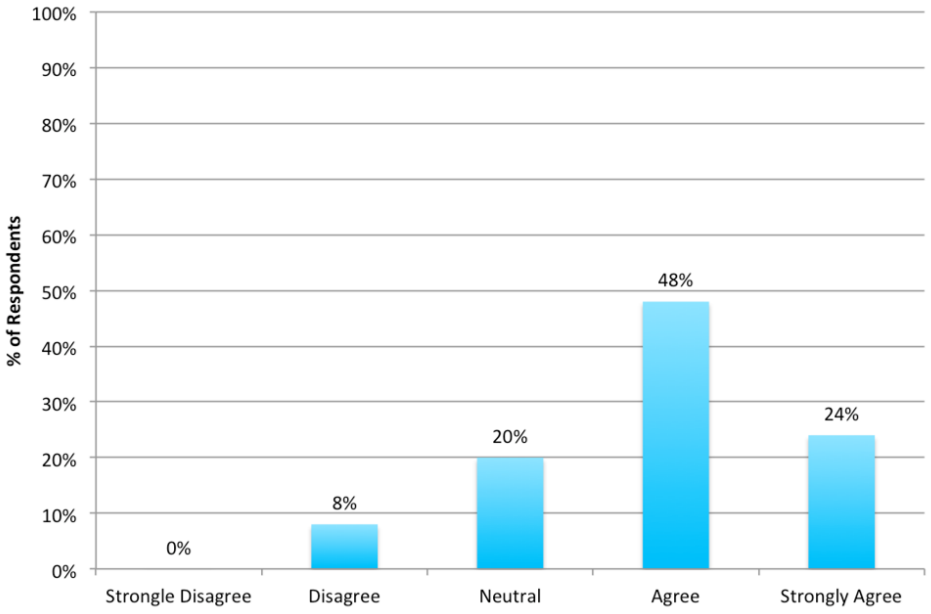
Primary Motivations for Implementing Green Technologies:



DEVELOPER/BUILDER SURVEY

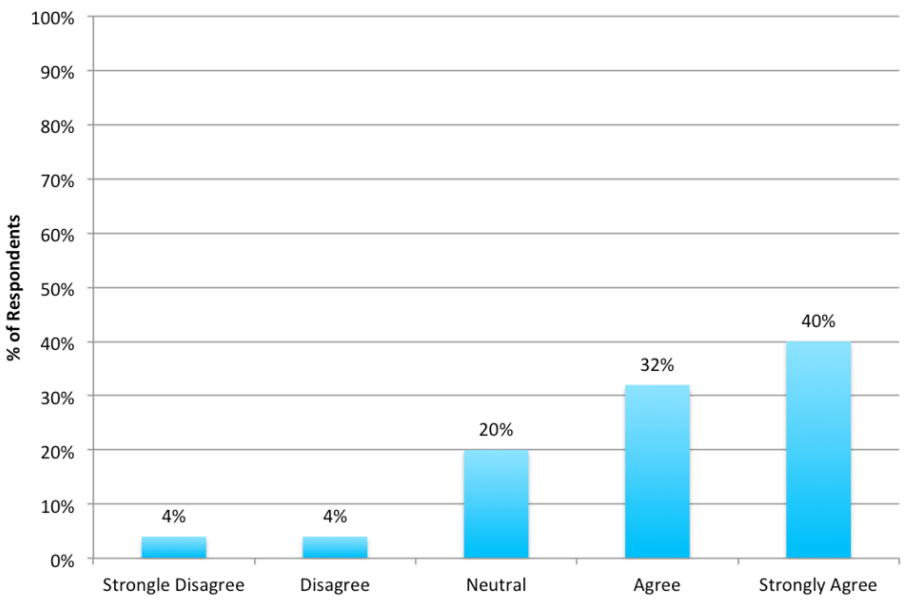


Above-Code Green Buildings Provide **Scope of Work Benefits** Over Energy-Code Compliant Buildings

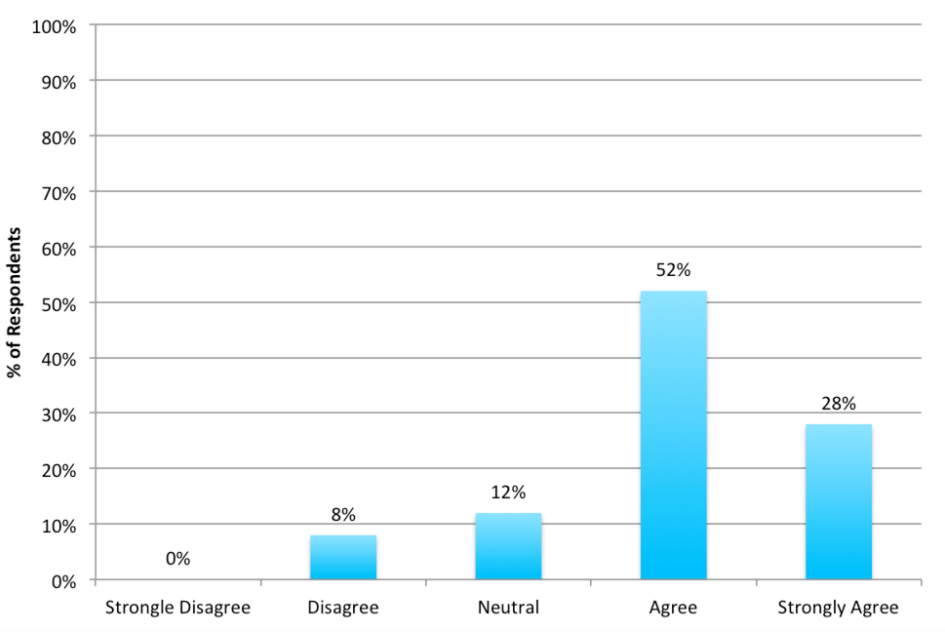


Above-Code Green Buildings Provide **Quality of End Product Benefits** Over Energy-Code Compliant Buildings

DEVELOPER/BUILDER SURVEY



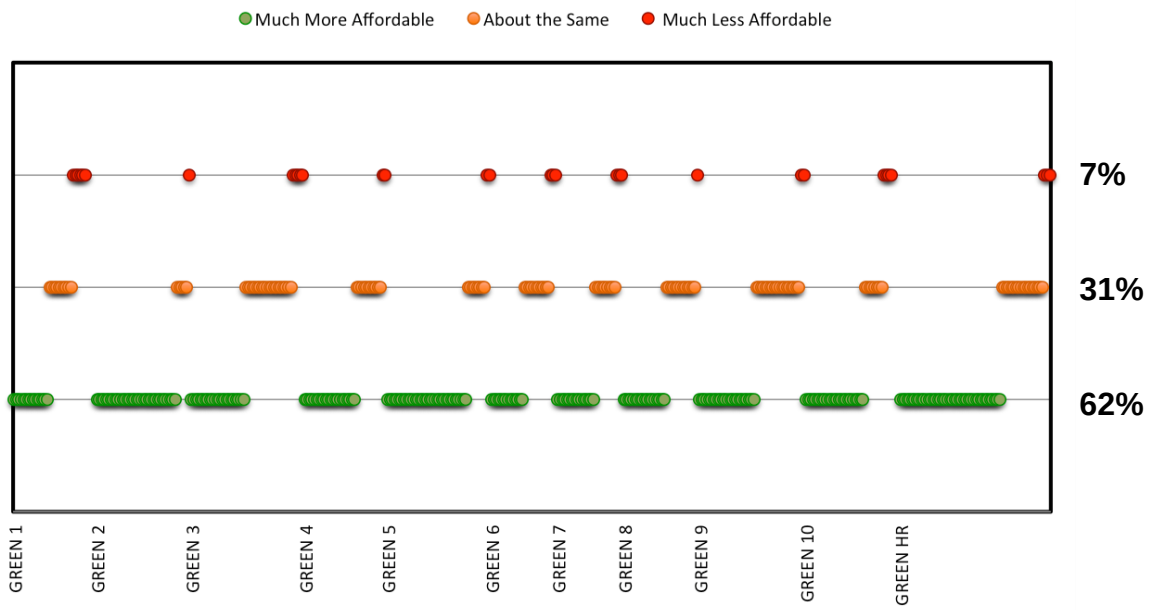
Resident Utility Allowances Should be Reduced with an Above-Code Green Building Certification



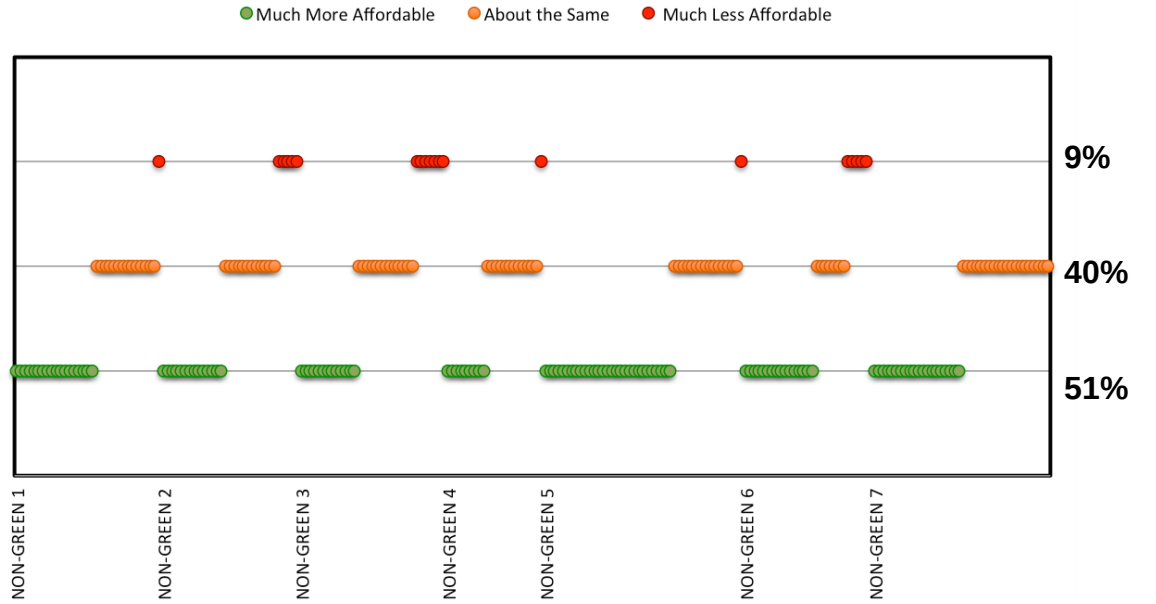
Above-Code Green Buildings **Help My Firm Achieve Its Objectives** and Missions

RESIDENT SURVEY

Current **Overall Affordability** Compared to Previous Home: **Green Developments**

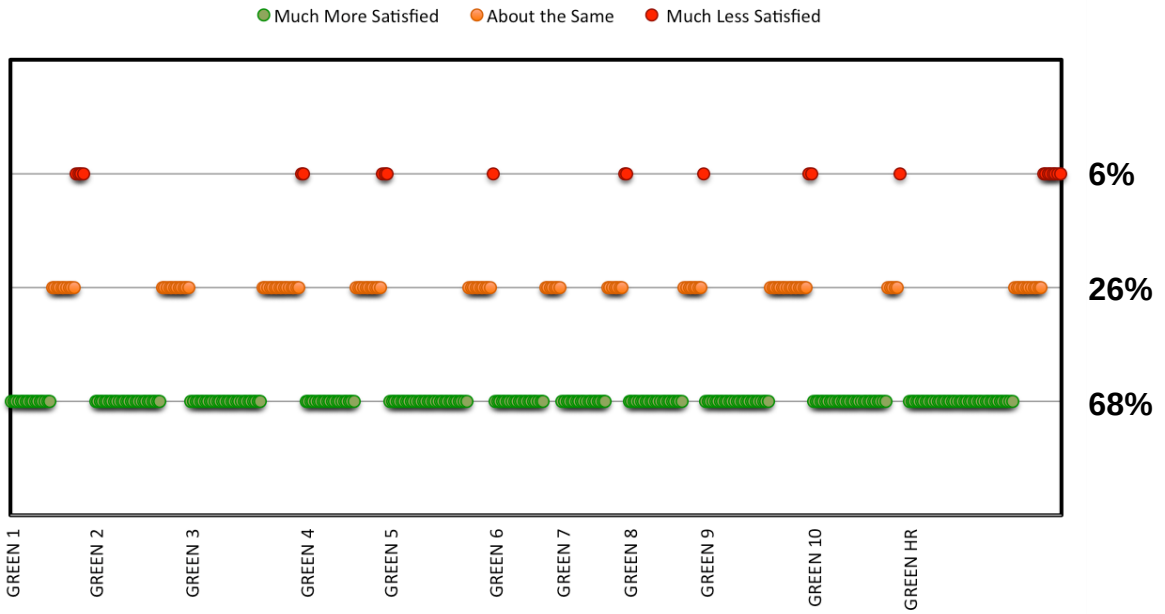


Current **Overall Affordability** Compared to Previous Home: **Non-Green Developments**

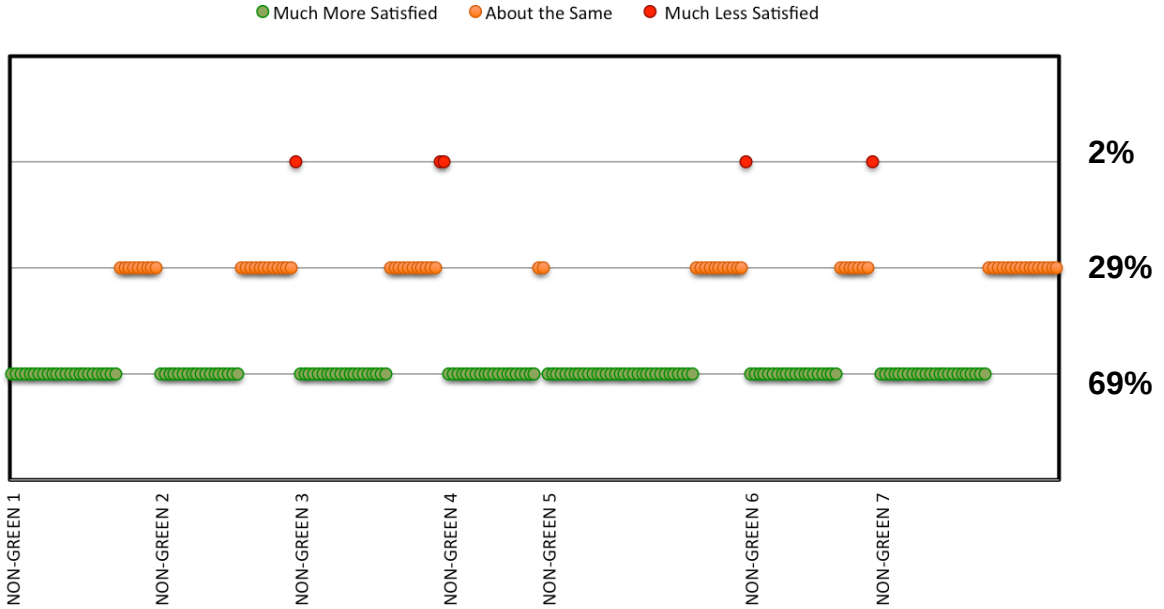


RESIDENT SURVEY

Current **Overall Satisfaction of Comfort and Affordability** Compared to Previous Home: **Green Developments**

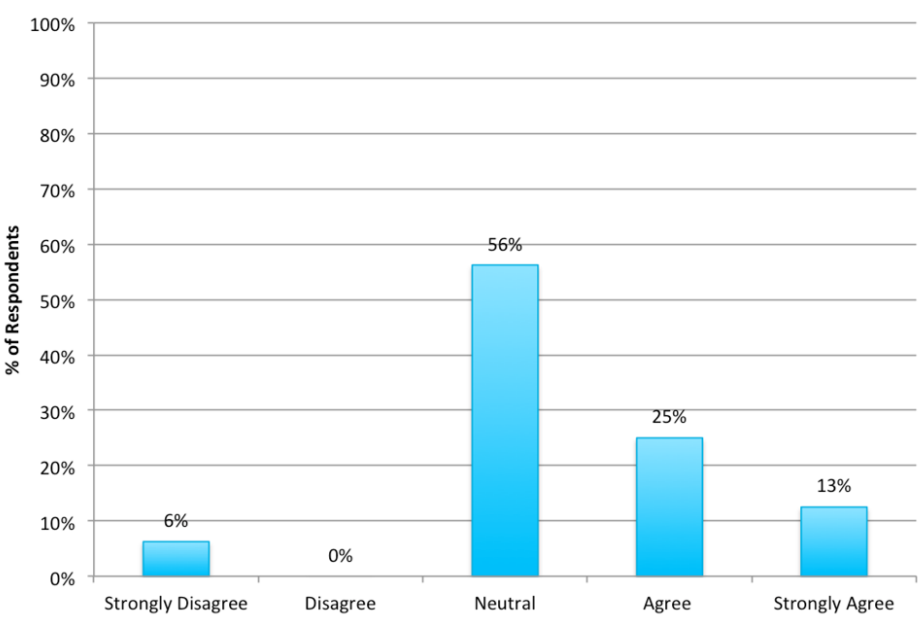


Current **Overall Satisfaction of Comfort and Affordability** Compared to Previous Home: **Non-Green Developments**

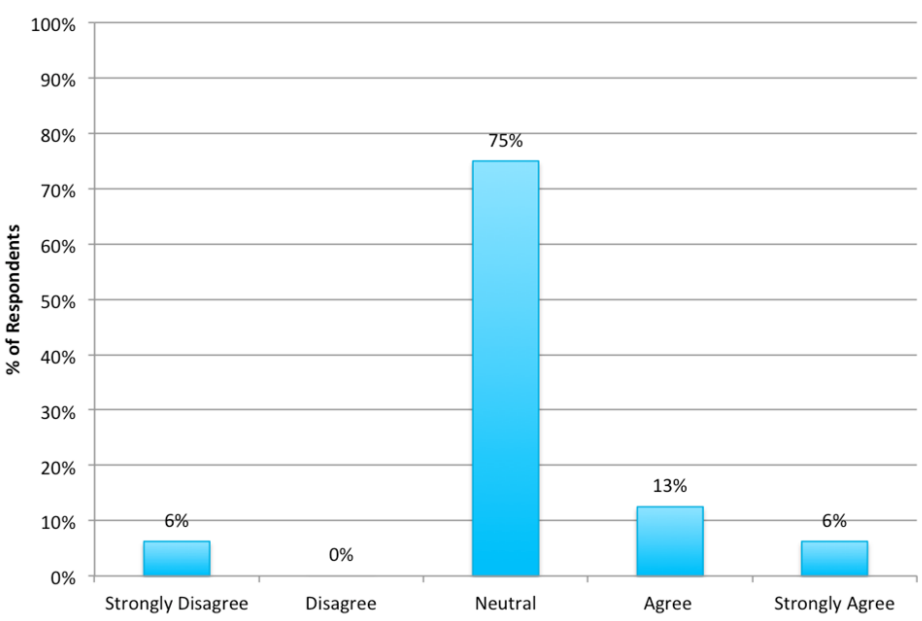


PROPERTY MANAGEMENT & ADMINISTRATION SURVEY

Comments:
"Because of rising utility costs, I cannot tell any difference."



Above-Code Green Buildings Are **More Energy Efficient** Than Energy-Code Compliant Buildings

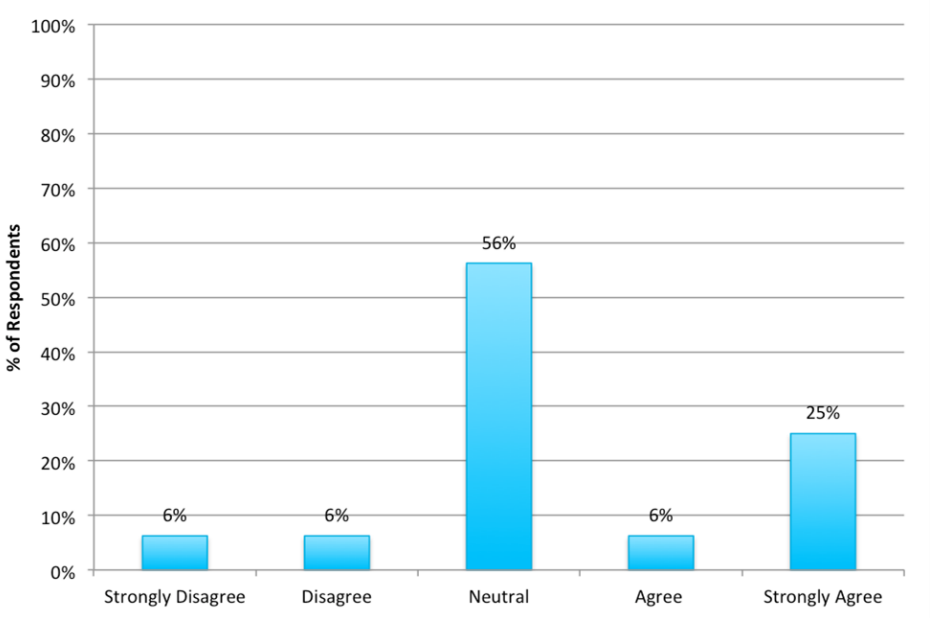


Above-Code Green Buildings Are **More Water Efficient** Than Energy-Code Compliant Buildings

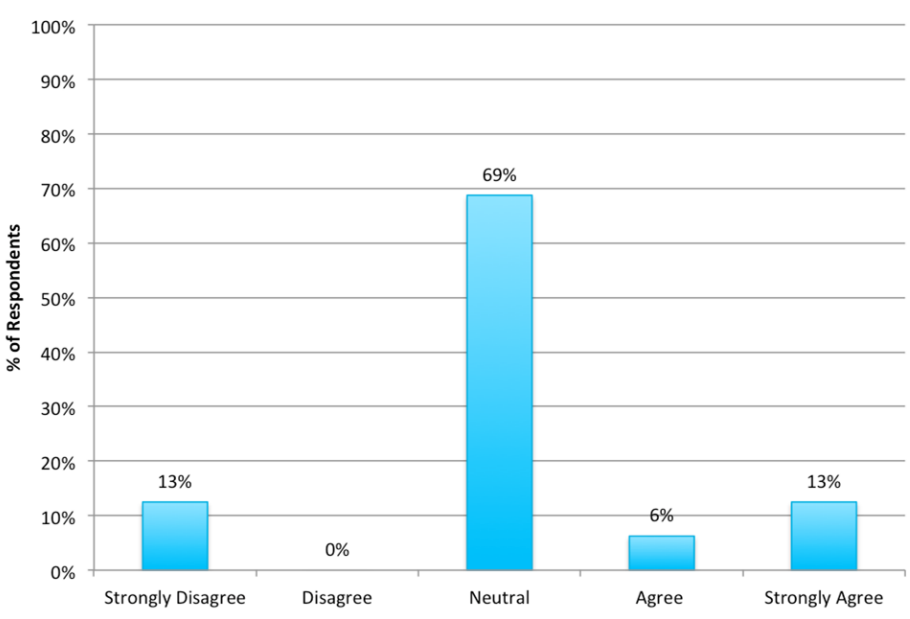
PROPERTY MANAGEMENT & ADMINISTRATION SURVEY

Comments:

"We do see some savings on the systems but it's hard to determine if it's simply because they're newer units (and by default more efficient) or if it's because it's the specifically high efficient units."



Above-Code Green Buildings **Have Lower Utility Costs** Than Energy-Code Compliant Buildings

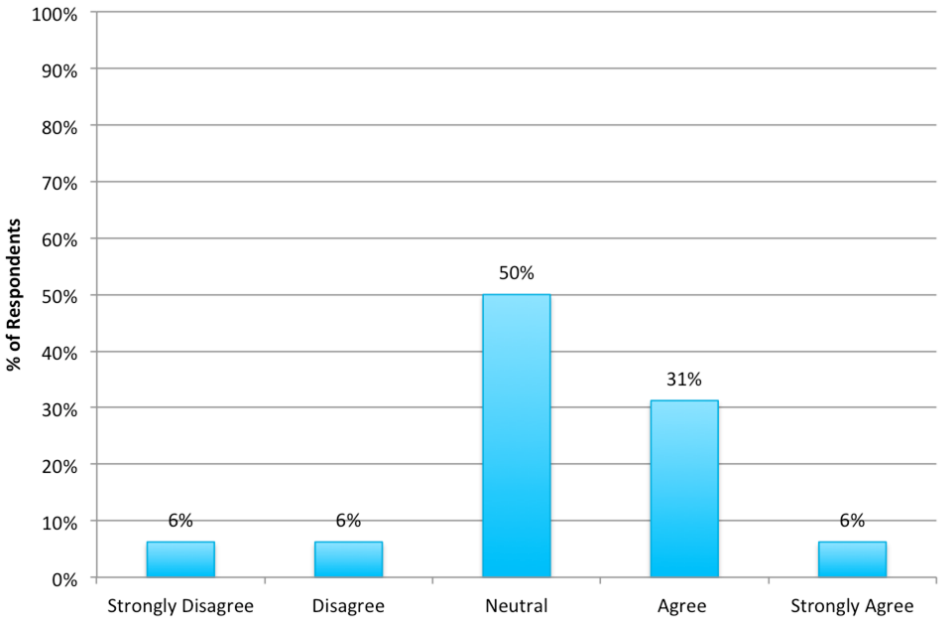


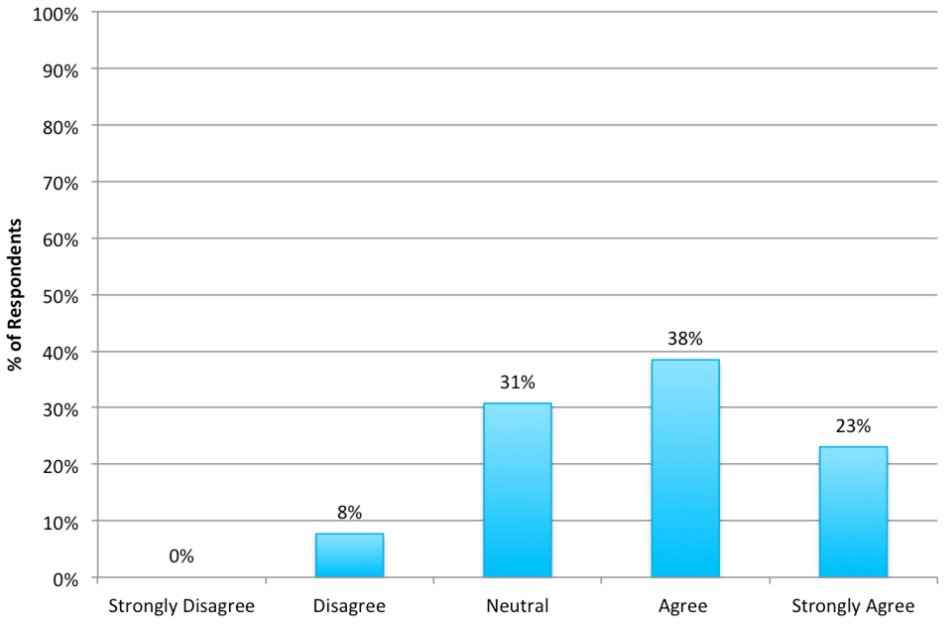
Above-Code Green Buildings Have **Lower Utility Costs** Than Energy-Code Compliant Buildings, **And Allow For Reduced Utility Allowance**

PROPERTY MANAGEMENT & ADMINISTRATION SURVEY

Comments:

"Inability of users to operate their unit's system is one of the most notable headaches of an initial lease up with a high efficiency system."





Above-Code Green Buildings **Require a Greater Level of Resident Education** Than Energy-Code Complaint Buildings

Above-Code Green Building Certification Programs **Increase Staff Knowledge and Ability to Verify Construction and Development Specs** Than Energy-Code Compliant Buildings

WEGOWISE

wegowise Dashboard

Portfolio Summary

All Energy | Water | Electricity | Natural gas | Fuel oil

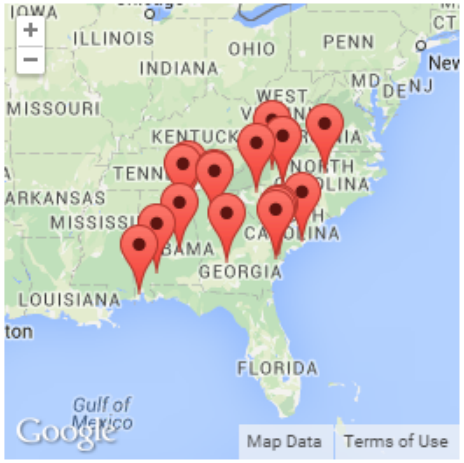
All Developments

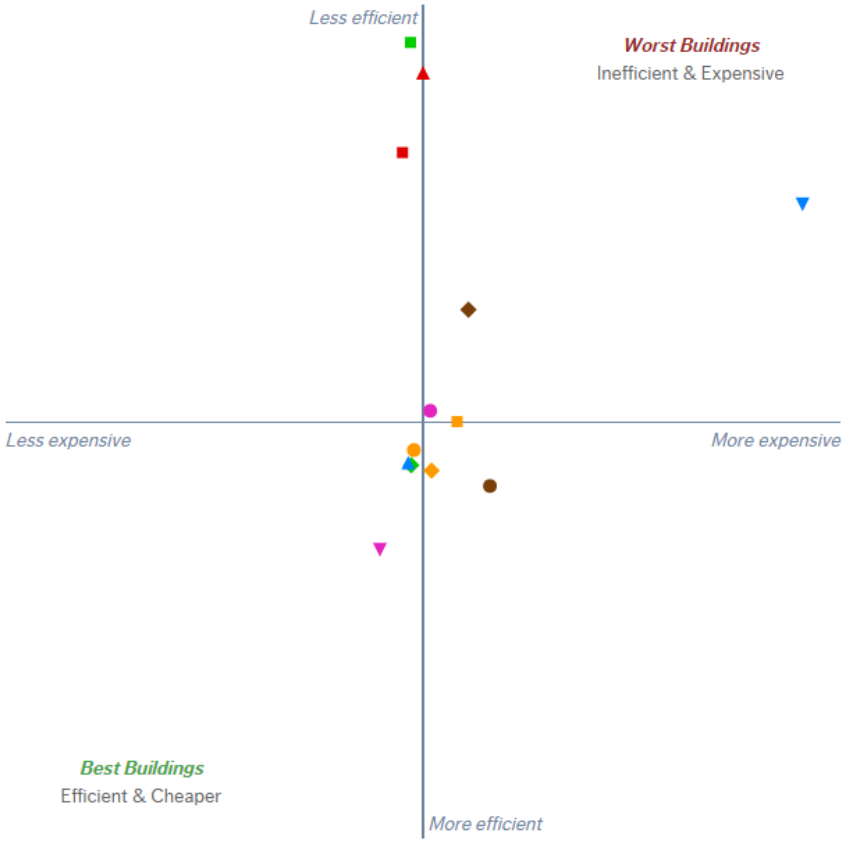
Size

1,331,335 square feet in total
18 buildings
1,173 apartments
2,113 bedrooms

Export

Portfolio Characteristics
Utility Accounts





IMPACT OF GREEN AFFORDABLE HOUSING REPORT

The final report will be released in September 2015

Please contact Alex Trachtenberg with any inquiries

atrachtenberg@southface.org
404-604-3592

COMMUNITY
HOUSING PARTNERS

Mission: To create homes and communities that are healthy, sustainable, and affordable

- Established in 1975
- Headquarters in Christiansburg, VA with offices in Richmond, VA and Inverness, FL
- Owner of nearly 6,000 apartments in over 100 properties in Virginia, North Carolina, Florida and Kentucky.
- Over 60 projects financed by LIHTC (9%)
- Populations served include family, seniors and special needs

COMMUNITY
HOUSING PARTNERS

- Long-term commitment to green building and design
- First EarthCraft certified multifamily rehab in Virginia-2007
- Twelve CHP properties with over 1,000 apartments have received EarthCraft certification
- CHP's Richmond office building one of first in Virginia to receive EarthCraft Light Commercial certification
- Served as architect and/or general contractor on nearly 20 EarthCraft certified multifamily properties for other owners

COMMUNITY
HOUSING PARTNERS

Lessons learned:

- Initial commitment based on mission
- Early expectation of energy savings based on the anticipated performance of finished product
- Difficulty in developing and implementing methodology to measure savings
- Study by Virginia Tech Center for Housing Research and Housing Virginia in 2014 first demonstration of correlation between EarthCraft certification and savings
- Importance of initial and ongoing resident training
- Anecdotal evidence of energy savings to residents resulting in modest asset building and reduced rent delinquency

Questions?

Southface Building know-how for a sustainable future