



## Consensus

# **Green Buildings & Homes Underwriting Standards' Amendment for Productivity**

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# Green Buildings & Homes Underwriting Standards' Amendment for Productivity

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### **1. Sources / Referenced Standards for Overall Amendments**

- *Building Resiliency Task Force Report to NYC Mayor & Speaker*© (Urban Green Building Council 2013)
- *Measuring Code Compliance Effectiveness for Fire-Related Portions of Codes Final Report*, National Fire Protection Association and Fire Protection Research Foundation (2008)
- *Eaton Outline of Safety Underwriting Attributes* (2012)
- *Envision Sustainable Infrastructure Rating System & Guidance Manual*, Institute for Sustainable Infrastructure (2014)
- *Fire Safe Adaptable Home* (NAHB)
- *Fortified*© Home & Business Stds. (IBHS 2007-12). “*IBHS fortified structures cannot be designated in the following areas: low-lying barrier islands and coastal regions, close proximity to known seismic fault lines, close proximity to major levees, and steep slopes potentially subject to either erosion or wildfire.*” Fortified requires adherence to its compliance process including renewal after a designated term limit expires. Fortified accumulated by State the areas of peril defined with mandatory, strongly recommended and higher achievement level recognition by design and structural performance metrics for:
  - o Hurricane prone regions
  - o Tornado & Hail Regions
  - o High wind regions with windspeed maps
  - o Earthquake regions
  - o Wildfire
  - o Flood zones
  - o Severe winter weather
- *International Existing Building Code* 2009 Edition
- *MTS ANSI 2.0 Integrative Process Standard for Sustainable Structures & Communities* (2012)
- *Natural Hazards, UnNatural Disasters: The Economics of Effective Prevention* © (World Bank & UN 2010)
- *NFPA 72 National Fire Alarm Code* 2007 Edition
- *NFPA 70 National Electrical Code* 2011 Edition
- *NYC Plan NYC & Post Sandy Building Code* (2013)
- *Perkins+Will Resiliency Framing Issues*© (2014)
- *Resilience Scoring Utility* 2011 Edition
- *UN Sustainable Development Goals (SDGs), Key Summary Points - EGM on Science & SDGs* (Mar. 21, 2013)
- *Wall Street Due Diligence*© Peer-reviewed & Released at NYSE on Sustainable Investment Business Case & Dangerous Climate Risk (2009 & 2013)
- *Weathering the Storm: Building Business Resilience to Climate Change*©, Center for Climate and Energy Solutions (2013)

## **2. Background / Perspective / Valuation Goals & Principles for Overall Amendments**

Underwriting Defined: standards for raising capital for debt & equity including to issue bonds.

Resilient Defined:

1. Able to bounce back after change or adversity.
  2. Capable of preparing for, responding to, and recovering from difficult conditions.
- Syn.: TOUGH (New York City "Plan NYC" 2013)

The Australian mantra for adapting to climate change: Protect, Redesign, Rebuild, Elevate, Relocate and Retreat.

Resilient is also being defined as bouncing back from any extreme event which can include an internet crash, global epidemic, or climate change intensified events.

**For Purposes of This Standard, Resilient Means** both mitigation (carbon pollution reductions) addressing the need to prevent near term irreversible unmanageable dangerous climate change (climate bubble / crash), and adapting to the increasing intensified weather and climate events causing well-documented systemic damages to all economic sectors. This includes safety and acute and chronic events.

Wall St. Due Diligence Released at NYSE on Added Sustainable Investment Value Documents:

- High probability of imminent irreversible unmanageable dangerous climate change without 18 gigaton climate pollution reduction in next 10 years estimated to cost \$2 trillion. This is called Climate Bubble / Crash. *Dangerous* climate change is a word of art referenced in the Kyoto Protocol and defined by leading climate scientists including Jim Hanson formerly of NASA, as the state of climate change when the Earth's atmospheric CO2 concentrations exceed 350 ppm. Levels as of October 14, 2014 are near 400 ppm and rapidly rising.
- JPMorgan publication states it is a high probability Black Swan event.
- Green building secondary financing market can provide the \$2 trillion because investors with over \$70 trillion in assets under management want to invest in green buildings / buy green building bonds. Green Bonds are vibrant \$20B+ market with all bonds quickly selling out.
- Secondary market is expected to create \$1 trillion private sector stimulus
- Leading investors, insurers and governments publicly document that ongoing systemic climate damages exists in all economic sectors caused by more intense and severe weather / climate events.
- Fluctuating Deaths, Rising Damages— 3.3 million deaths in the 40 years to 2010, Disasters can strike anywhere, & Damages are rising.

Peer-reviewed due diligence is comprised of over 30 reports, consensus standards, and investor surveys and was updated in 2013 by leading economists. The due diligence findings on added green property value including national statistically valid data were “baked into” the Underwriting Standards. For example, the due diligence showed that energy efficiency has substantially increased economic value by reducing operating costs. Accordingly, 40% of the Underwriting Green Value Score is energy efficiency.

#### Design, Construction & Valuation Principles & Goals:

- Even with the 18 gigaton climate pollution reduction in the next 10 years, severe weather / climate events will keep intensifying due to latent effect of climate pollution in the atmosphere and positive feedback loops / natural accelerators like: methane releases from decaying organic matter in unfrozen permafrost and ocean bottom methane hydrates, and cessation of ocean CO2 adsorption.
- The top priority is to prevent Irreversibility otherwise resiliency & safety are unmanageable.
- Resiliency design & construction is cost sensitive thus like rating systems, minimum prerequisites are required with recognition for superior performance above the minimum.
- Use of integrative process (IP) already incorporated into the Underwriting Standards substantially reduces construction costs and risk, thus the financial community encourages it to be a condition of financing. Higher achieving green + resilient design is only cost effective with IP.
- Address vulnerabilities to natural and manmade stressors in buildings, cities, communities, and design responses to them to help achieve stability + adaptability through the following goals:
  1. Provide Underwriting Achievement metrics reducing risk so insurers can write reasonably-priced risk-adjusted coverage again for climate change damages.
  2. Strengthen building, infrastructure, organization and community resistance to chronic stressors arising from a changing climate and resource drawdown
  3. Reduce physical risks posed by extreme weather events to building occupants, building systems, organizations, and communities
  4. Improve safety and stability during acute shocks from both manmade events and natural phenomena
  5. Maintain business, organizational and community continuity reducing interruptions including in the supply chain
  6. Reimagine & Rebuild the emotional, social, economic and physical systems to go beyond original conditions and standards to create stronger buildings, cities and communities.
- The built environment has a profound impact on safety, economy, health and productivity and is the largest industry.

### **3. Significance of Productivity**

Sustainability Victoria and the Kador Group (2009) write in their productivity evaluation of a green office space detailed in the last case study below:

*“The cost of labour accounts for up to 80%-90% of an office-based company’s total expenditure, overshadowing the cost of operating the building, including rent, energy consumption and other outgoings. Even a tiny increase in employee productivity would quickly pay back any increase in these other costs.”*

**4. Productivity Case Studies:** Case studies documenting green building productivity gains & return on investment (ROI)

**Case Studies Excerpted from *Health, Productivity, and the Triple Bottom Line*. Report on 297 productivity case studies, Carnegie Mellon University (2007).**

**Category:** Increased Outside Air and Health

**Study:** *Detection of Airborne Rhinovirus and Its Relation to Outdoor Air Supply in Office Environments*. (Myatt et al., Am. J. Respiratory & Critical Care Med., v.169, pp. 1187-1190 2004).

**Nature of Building:** Study of three office buildings

**Results:** 6.8% reduction in risk of exposure to airborne-transmitted rhinovirus for workers in offices with increased outside air reducing indoor CO2 concentrations

**Increased Economic Value:** Annual productivity savings of \$9/employee and ROI of 5%

**Category:** Increased Outside Air and Health

**Study:** *Hospital Ventilation and Risk for Tuberculosis Infection in Canadian Health Care Workers*, Menzies et al. (Annals Internal Med., 133(10), pp. 779-789 (2000)).

**Nature of Building:** Multiple building study of 17 hospitals in Canada,

**Results:** 71% reduction in risk of tuberculosis for employees who worked in patient rooms with a ventilation rate greater than 2 air changes per hour (ACH), as compared to those who worked in rooms with a ventilation rate less than 2 ACH

**Increased Economic Value:** Annual health savings of \$58/employee and ROI of 300%

**Category:** Increased Outside Air and Health

**Study:** *Epidemiologic Observations of Operating Room Infections Resulting from Variations in Ventilation and Temperature*, Everett, WD and H Kipp, (Am. J. Infection Control, 19(6), pp. 277 –282 (1991)).

**Nature of Building:** One US military hospital

**Results:** a 69% reduction in hospital acquired infections among orthopedic and general surgery patients following a ventilation system upgrade that increased outside air exchange rates by 5-9 air changes per hour.

**Increase Economic Value:** Annual health savings of \$4,931 per bed and ROI of 1,517%

**Category:** Floor-based Ventilation+Increased Outside Air and Health

**Study:** *New Ventilation Systems at Select Schools in Sweden-Effects on Asthma and Exposure*, Smedje, G and Norback, D., (Archives of Environ. Health, 35(1), pp. 18-25, (2000))

**Nature of Building:** Multiple building study of 39 schools in Sweden, Smedje and Norback

**Results:** 69% reduction in the 2 year incidence of asthma among students in schools that received a new displacement ventilation system with increased fresh air supply rates, as compared to students in schools that did not receive a new ventilation system.

**Increased Economic Value:** Annual health savings of \$36 per student and ROI of 89%

**Category:** Increased Outside Air& Individual Productivity and Health

**Study:** *Temperature and Ventilation Effects on the Work Performance of Office Workers (study of a call center in the tropics*, (Tham et al., Proc. Healthy Buildings, Dec. 7-11, Singapore, 2003).

**Nature of Building:** Controlled Field experiment at a call center in a tropical climate

**Results:** 8.8% improvement in operator performance (a reduction in talk time) with an outdoor air supply rate of 22.7 liters per second/person, as compared to an outdoor air supply rate of 98 L/s/person, when indoor temperature is held constant at 24.5 degrees celsius.

**Increased Economic Value:** Annual health savings of \$14 per employee and 3,105% of ROI

**Category:** [Temperature Control & Individual Productivity](#)

**Study:** Using Advanced Office Technology to Increase Productivity- The Impact of Environmentally Responsive Workstations on Productivity and Worker Attitude.

**Nature of Building:** One Building

**Results:** 2.7% increase in productivity due to the use of environmentally responsive workstations, which provide occupant control of temperature, air supply, task lighting, and sound masking.

**Increased Economic Value:** Annual productivity savings of \$1,215/employee and 232% of ROI

**Category:** [Increased Outside Air & Individual Productivity](#)

**Study:** *Using Advanced Office Technology to Increase Productivity –The Impact of Environmentally Responsive Workstations (ERWs) on Productivity and Worker Attitude* (Kroner et al., Center for Architectural Research, Rensselaer Polytechnic Institute, Troy, NY, 1992)

**Nature of Building:** West Bend Insurance Co. Headquarters Building

**Results:** 2.7% productivity increase from individual workstations with temperature controls

**Increased Economic Value:** \$1215 annual productivity savings per employee and ROI of 232%

**Category:** [Temperature Control & Individual Productivity](#)

**Study:** *Human Perception, Productivity, and Symptoms Related to Indoor Air Quality*. Wargocki, P., Doctoral Thesis, Center for Indoor Environment and Energy, Technical University of Denmark.1998).

**Nature of Building:** 40 Polaroid buildings

**Results:** 35% reduction in sick leave for employees with double the fresh outside air.

**Increased Economic Value:** Annual productivity savings of \$268 per employee & ROI of 418%.

**Category:** [Temperature Control & Individual Productivity](#)

**Study:** *Individual Microclimate Control: Required Range, Probable Benefits, and Current Feasibility*, (Wyon, D.P., Proceedings of Indoor Air 1996: 7th Internat. Confer. Indoor Air Quality and Climate, Nagoya, Vol. 1, pp.1067-1072).

**Nature of Building:** One Building

**Results:** Providing individual temperature control over a range of 10.8 degrees F results in performance improvements of 7% on typing tasks.

**Increased Economic Value:** Annual productivity savings of \$1,035 per employee and ROI of 129%

**Category:** [Temperature Control & Individual Productivity](#)

**Study:** *Indoor Temperature, Productivity and Fatigue in Office Tasks* (Tanabe S., Proc. Healthy Buildings, Lisbon, Portugal, pp. 49-56, 2006)

**Nature of Building:** One call center in Japan

**Results:** 2.1% improvement in operator performance with individual temperature control.

**Increased Economic Value:** Annual productivity savings of \$945 per employee and ROI of 118%.

**Category:** [Split Task & Ambient Lighting & Individual Productivity](#)

**Study:** *Productivity with Task and Ambient Lighting System Evaluated by Fatigue and Task Performance* (Nishihara, N. et al., Proc. Healthy Buildings, Lisbon, Portugal, pp. 249, 2006))

**Nature of Building:** One building at Waseda University in Japan, Nishihara

**Results:** 11% improvement on a triple digit multiplication task when subjects could control their task lights as compared to when they could not.

**Increased Economic Value:** Annual productivity savings of \$178 per employee and 57% ROI

**Category:** Seated Access to Views & Health

**Study:** *View Through a Window May Influence Recovery From Surgery* (Ulrich, R., Science, 224 (4647), pp.420-421, 1984)

**Nature of Building:** Pennsylvania hospital

**Results:** 8.5% reduction in post-operative stay for patients in a room with a view as opposed to a view of a brick wall

**Increased Economic Value:** Annual health savings of \$2,237 / bed & ROI of 45%

**Category:** Natural Ventilation & Health + Individual Productivity

**Study:** *Workplace Air-conditioning and Health-services Attendance Among French Middle-aged women: a Prospective Cohort Study* (Preziosi P., et al., Inter. J. Epidemiology, 33 (5), pp.1120-1123, 2004).

**Nature of Building:** Multiple building study

**Results:** 57.1% reduction in sickness absence among subjects with natural ventilation in their workplace, as compared to those with air conditioning.

**Increased Economic Value:** Annual productivity savings of \$85 per employee and 27% ROI.

**Category:** Daylight & Health

**Study:** *More Sunlight Reduces Length of Hospitalization in Bipolar Depression*, (Benedetti, F. et al., Journal of Affective Disorder, v.62, pp.221-223, 2001, 2001)

**Nature of Building:** Hospital in Milan, Italy

**Results:** 26% reduction in patient length of for patients in rooms with more direct sunlight

**Increased Economic Value:** Annual health savings of \$7,417 per bed & ROI of 771%

**Category:** Daylight & Health

**Study:** *Study of the Relationship Between Indoor Daylight Environments and Patient Average Length of Stay (ALOS) in Healthcare Facilities* (Choi, Joonho, Unpublished Master's Thesis, Department of Architecture, Texas A&M University. College Station, TX, 2005)

**Nature of Building:** Building case study of Inha University Hospital in Korea

**Results:** 41% reduction in average length of stay among gynecology patient and 26% reduction for surgery patients in bright (sunlit) rooms, as compared to those in rooms without bright sunshine.

**Increased Economic Value:** Annual health savings of \$10,115 per bed and ROI of 1,011%

**Category:** Daylight & Health

**Study:** *Health and Well-being Disorders in Air Conditioned Buildings; Comparative Investigations of the "Building Illness" Syndrome* (Kroeling, P., Energy and Buildings, 11(1-3): 277-282, 1988)

**Nature of Building:** Montefiore Hospital in Pittsburgh, PA

**Results:** 22% reduction in analgesic medication use among post elective spinal surgery patients in bright rooms who were exposed to more natural sunlight after surgery, as compared to patients located in dim rooms.

**Increased Economic Value:** Annual health savings of \$28 per bed and 3% ROI

**Category:** [Daylighting & Individual Productivity + Energy Savings](#)

**Study:** *Daylighting & Productivity at Lockheed* (Thayer, Burke Miller, Solar Today, Vol.9, 1995); & *Greening the Building and the Bottom Line*, peer-reviewed by US Green Building Council Members, (Romm, Joseph I. and Browning, William D., <http://www.rmi.org/images/other/GDS-GBBL.pdf> 1995)

**Nature of Building:** Lockheed Employee Building 157, Sunnyvale, California

**Results:** 15% reduced absenteeism due to the daylighting design, which integrates layout, orientation, window placement, type of glazing, light shelves, and ceilings

**Increased Economic Value:** \$180 / employee productivity savings, \$87 per employee Annual energy savings and ROI of 39%

**Category:** [Natural Ventilation & Health + Individual Productivity](#)

**Study:** *The Impact of Different Ventilation Levels and Fluorescent Lighting Types on Building Illness: an Experimental Study* (Sterling, E & Sterling T., Canadian J. Public Health, Vol. 74, Nov./Dec. 1983).

**Nature of Building:** Vancouver, BC building

**Results:** 3.2% reduced absenteeism for building with operable windows and natural ventilation as opposed to sealed building with air conditioning

**Increased Economic Value:** Annual productivity savings of \$1438 / employee & ROI of 288%

**Category:** [Productivity Benefits](#)

**Study:** 2003 study by the Heschong-Mahone Group

**Nature of Building:** One building, a call center

**Results:** 6% improvement in call center average handling time for workers with the highest rate views, as compared to workers with no view at all.

**Increased Economic Value:** (none provided)

***Greening the Building & the Bottom Line, Romm & Browning, Rocky Mountain Institute, peer-reviewed by US Green Building Council Members (1995)***

*"This paper documents eight cases in which efficient lighting, heating, and cooling have measurably increased worker productivity, decreased absenteeism, and/or improved the quality of work performed. They also show that efficient lighting can measurably increase work quality by reducing errors and manufacturing defects."*

Eight green building cases studies show 8%-20% gains in Productivity:

- Reno Post Office lighting retrofit with 6% increase in processing rate
- Boeing lighting retrofit with 20% reduction in manufacturing defects
- Hyde Tools lighting retrofit with improved product quality worth \$25k/yr.
- Pennsylvania Power & Light lighting retrofit
- Lockheed Building 157 daylighting & energy efficiency with 15% rise in productivity & 15% reduction in absenteeism

- West Bend Mutual Insurance lighting & individual controls with 16% increase in claims processed
- Wal-Mart 20% increased sales in St. Louis Store based on report of BSW Project Manager, leading to Wal-Mart decision to put skylights in stores.
- ING Bank daylighting and building retrofit

### **NMV Bank, the Netherlands Case Study (Rocky Mountain Institute 1992).**

The Bank was about the 12 largest in the Netherlands and decided to improve its brand and reputation by constructing its corporate headquarters as a green building. All windows were operable and there was substantial daylighting including in the basement reflected from skylights and helixes from the top floor. Banisters running down the stairwells contained running water.

About six months after the building was occupied, the building managers noticed that building energy use was higher than projected. After review of the data, it was determined that the added energy use was from employees staying in the building longer during the week after closing hours and coming in more on weekends.

### **Herman Miller Greenhouse Furniture Assembly Facility, Zeeland, MI (US Green Building Council & Herman Miller, 1998).**

This was a study of productivity gains from moving from a Class A corporate office building to a LEED Certified green office building and assembly facility with substantial daylighting and fresh outside air.

The study determined that normally corporate moves from one building to another result in about a 30% downtime / productivity loss during the month or so period of the move. However, for this move there was no downtime. Employee satisfaction was similar to the NMV Case Study described earlier.

### ***Skylighting & Retail Sales (Pacific Gas & Electric & Heschong Mahone Group 1999)***

A controlled statistical evaluation of 108 retail stores where two thirds had skylighting and one-third did not, showed a 40% increase in sales for stores with skylighting, and an 11% increase in gross annual sales for converting all stores in the chain to skylighting. There was a 99% statistical certainty due to multivariate regression analysis allowing for the control of the influence of other variables.

Background Note: Walmart's green architect BSW with the Rocky Mountain Institute in the early 1990's led the development of skylighting in its St. Louis green prototype store finding a 20% increase in retail sales for the section of the store with skylighting. Soon thereafter, Walmart expanded skylights to most of its stores followed by other big box retailers.

### ***Green Buildings Drive Employee Productivity (Jones Lang LaSalle 2011).***

In addition to well recognized occupant productivity gains due to increased daylighting, lighting, outside views, thermal comfort and fresh outside air, this report lists additional green building attributes likely enhancing productivity:

- Overall work environment
- Reduced toxic emissions from materials
- Acoustics
- Humidity

***Employee Productivity in a Sustainable Building Pre- and Post-Occupancy Studies in 500 Collins Street, (Sustainability Victoria and the Kador Group 2008)***

500 Collins Street, Victoria, Australia, is a Green Star Certified Building by the Australia Green Building Council. Statistically significant results were obtained by comparing tenant performance before and after the move within the building to green retrofitted space. Productivity gains measured from sick leave records and secretary typing speed were:

- A 39% reduction in average sick leave days per employee per month: from 0.46 days before the move to 0.28 after the move.
- A 44% reduction in the monthly average cost of sick leave (senior staff's sick leave fell more than that of support staff).
- A 9% improvement in the average typing speed of secretaries, and a significant improvement in overall accuracy.

*“Significant, non-work related health incidents prior to the move were removed from the leave data so that the focus was on short term sick leave, more likely to be work-related.”*

*“The length of time between pre- and post-measurements, and the consistency of the results across many indicators, make the sustainable refurbishment a more likely explanation [of the productivity gains].*

*“Given that business is ultimately about making judgments based on best available information, the link shown here suggests that sustainable office accommodation is a good business choice. It is also consistent with international trends that link a sustainable approach to business to superior long term profitability.”*

#### **4. Green Value Score Recognition of Productivity for Green Properties**

Based on the preceding extensive data documented productivity gains especially for green buildings with enhanced daylighting, outside fresh air flows, improved thermal comfort, improved outside views, productivity is now 5% of the Green Value Score where the property achieves the daylighting and increased outside air flows as documented in the commissioning reports for:

- Commercial attributes 10-18 in the Appendix below
- Homes attributes 8, 19-21 in Appendix below

Productivity gains are a major reason why owner-occupiers like corporate headquarters are early green building adopters.

Productivity gains are a major component of increased cash flow for green buildings through improved tenant lease-up and retention, and increased value for homes through faster sale and resale. Green homes were documented as 9% more valuable in California in a statistically controlled 2011 study by the Berkeley Haas School of Business.

## GREEN VALUE SCORE FORMULA

For Green Properties

National Consensus *Green Property, Safety, Resiliency & Infrastructure Underwriting Standards*©

	Score	Value Ratio	Adjusted Score
ENERGY STAR or HERS Score		40%	
Green Property Underwriting Standard Score		35%	
LEED Rating or GreenPoint RATED	NONE	0%	
	GOLD	5%	
	PLATINUM	10%	
Productivity Gains from Achieved Attributes		7%	
Climate Neutral Operations Certified	YES	20%	
	NO	0%	
<b>GREEN Value SCORE</b>		100%	

# **Appendices**

## **1. Perkins+Will Resiliency Checklist©**

## **2. Green Building Underwriting Standards' Revenues, Expenses & Intangibles**

### **COMMERCIAL**

Revenues / Expense Reduction (some attributes are revenues, some expense reduction, some both but no double counting)

1. Energy Star / HERS Score / ASTM BEPA Standard result
2. Energy Star Certification
3. Climate Neutral Certified
4. Site Selection / Sustainable Sites: avoiding floodplains & wetlands
5. Development density / connectivity: redeveloped sites
6. Public transportation access
7. Water use reduction / Water efficiency / EPA Water Sense
8. Water efficient landscaping
9. Onsite Green-e Power
10. Outdoor air monitoring: ventilation system performance
11. Ventilation effectiveness: increasing outdoor air in the structure
12. IAQ Management Plan
13. Measurement & Verification: optimization of building energy / water over time
14. Adhesives & Sealants: reduced VOCs
15. Paints & Coatings: reduced VOCs
16. Composite Wood: no added formaldehyde
17. Chemical / Pollutant Control: improved indoor air quality
18. Daylight & Views
19. Green roof / heat island
20. Reducing Heat Island Effect
21. Stormwater management: reducing rate & quantity
22. Underfloor air: controllability of systems & thermal comfort
23. Integrative Process
24. Commissioning
25. Enhanced Commissioning
26. Recycling

### **Intangibles**

1. LEED Rating
2. Mandatory Onsite Recycling (MR Prerequisite)
3. Building Reuse (MR 1)
4. Construction Waste Recycling (MR 2)
5. Resource Reuse (MR 3)
6. Local / Regional Materials (MR 5)
7. FSC Certified Wood (MR 7) (see Sustainable Manufacturing Underwriting Standard)
8. SMaRT Certified Sustainable Products (LEED Innovation / Interpretation Credit and Climate Neutral Credit) (see Sustainable Manufacturing Underwriting Standard)

9. Light Pollution Reduction (SS 8)
10. Open Space Restoration

## HOMES

Revenues / Expense Reduction (some attributes are revenues, some expense reduction, some both)

1. Energy Efficiency Strategies Employed / HERS Score / Energy Star Certification
2. Energy Star Certification
3. Climate Neutral Certification
4. Energy Reduction: HVAC / Hot Water / Appliances
5. Home Orientation for Natural Solar Gain Efficiencies
6. Onsite Renewable Energy
7. Water Efficiency / Use Reduction
8. Non-Toxic Pest Control
9. Preferred Location and Infrastructure Stability
10. Community Resources and Public Transportation
11. Improved Durability
12. Integrative Process
13. Commissioning
14. Site Selection
15. Heat Island Reduction
16. Homeowner Education
17. LEED for Neighborhood Development Certification
18. Access to Open Space
19. LEED Low-VOC Materials
20. ENERGY STAR IAQ Verification
21. Indoor Environmental Quality / Ventilation / IAQ Effectiveness
22. Reduced Site Disturbance / Tree Protection

## Intangibles

1. FSC Certified Wood (LEED-MR 7) (see Sustainable Manufacturing Underwriting Standard)
2. SMaRT Certified Sustainable/EPP Products (LEED Innovation / Interpretation and Climate Neutral) (see Sustainable Manufacturing Underwriting Standard)
3. Local / Regional Materials (LEED-MR 2)
4. Construction Waste (LEED-MR 3) (prerequisite: construction waste planning leads to reduced costs to builder, and to homeowner for construction costs if passed through)
5. Previously Developed (LEED-LL 3) (reduced costs to builder and to homeowner for construction costs if passed through)
6. Erosion control, minimized site disturbance, stormwater runoff (LEED-SS 1.1, SS 1.2, and SS 4)
7. Landscaping: no invasive species (LEED SS 2.1)
8. Ensure use of refrigerants that do not cause ozone layer depletion and climate change (LEED-EA 11)
9. Material Efficient Framing (LEED-MR 1) (framing order waste factor limit results in reduced costs to builder and to homeowner for construction costs if passed through)
10. LEED or GreenPoint Rating