Home Innovation
RESEARCH LABS™

DETERMINING EQUIVALENCY

COMPARISON OF THE NATIONAL GREEN BUILDING STANDARD AND LEED NC

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NATIONAL GREEN BUILDING STANDARD OVERVIEW

The National Green Building Standard (NGBS) is the first and only residential green building rating system to undergo the full consensus process and receive approval from the American National Standards Institute (ANSI). ANSI approval is important because it is third-party confirmation of balance, representation, openness, consensus, and due process in the standard's development process. The Consensus Committee that developed the first version of the NGBS was comprised of 42 individuals representing a variety of government agencies, municipalities, home building industry stakeholders, and non-profit organizations, including USGBC. The 2012 NGBS followed a similarly rigorous and inclusive development process.

The NGBS is also the first and solely residential green building standard to be one of the International Code Council's (ICC) suite of I-codes. As the industry standard for green residential development, it is embedded within the International Green Construction Code (IgCC) as an alternative compliance path for multifamily residential buildings and the residential portion of mixed-use buildings.

The NGBS was developed as a national residential green building rating system because previously developed programs were either not well suited for housing or too local in their scope and practices. Despite the impeccable development process and its reputable partners, which now includes ASHRAE along with ICC and NAHB, the NGBS has suffered from the misperception that it is not as stringent as USGBC's rating systems. This is simply not true.

The truth about the NGBS is that it is just as rigorous, if not more, than the LEED rating systems. Further, if we are to be successful in transforming the way we design, build, maintain and operate our buildings, homes and communities, we will need to provide architects, builders, remodelers, developers, engineers, building scientists, realtors, appraisers, financiers, homeowners, renters, government agencies, code officials, with a truckload of innovative, effective, affordable, tools to help them reach that goal.

LEED NEW CONSTRUCTION OVERVIEW

In contrast, USGBC's rating system development process suggests a consensus-based approach to development of its LEED rating system; however, it is not a true consensus standard. One must be a USGBC member to participate in the development of the LEED rating system. This factor alone would disqualify LEED from being accepted as a true consensus standard, because there is not openness in the development process. Furthermore, there is no necessarily any specific obligation to ensure balance among the stakeholders. USGBC is not accredited as a standards development organization, and LEED is not approved as a national standard by any national standards-making body.

NGBS VS. LEED NC SCOPE

The NGBS is designed specifically for residential construction, development, and renovation. LEED NC is intended for use by both commercial office buildings as well as multifamily buildings. While commercial buildings and multifamily buildings may share construction types and methods, occupancy matters, and, thus the NGBS is uniquely suited to residential occupancy.

CATEGORIES OF GREEN PRACTICES

The NGBS and LEED have practices in five identical categories: (1) Water Efficiency, (2) Energy Efficiency; (3) Sustainable Sites; (4) Resource Efficiency; and (5) Indoor Environmental Quality. LEED offers a separate category for Innovation in Design. The National Green Building Standard alternatively recognizes innovative green practices in each of its six categories. LEED also offers a section for Regional Priority. The National Green Building Standard provides greater flexibility for architects and developers to recognize regional priorities because the NGBS is a more expansive, flexible point system. The National Green Building Standard has a category for Building Operation, Maintenance, and Building Owner Education. LEED NC has no comparable category.

NGBS	LEED NC
6 categories of green practices: • Lot & Site Development • Resource Efficiency • Energy Efficiency • Water Efficiency • Indoor Environmental Quality • Operation, Maintenance, and Building Owner Education *(* Each NGBS category includes an innovative practices section.)*	7 categories of green practices: • Sustainable Site • Materials and Resources • Energy & Atmosphere • Water Efficiency • Indoor Environmental Quality • Regional Priority • Innovation in Design*

NGBS VS. LEED NC MANDATORY REQUIREMENTS COMPARISON

Both NGBS and LEED have mandatory practices that must be completed to attain certification at any level.

LEED NC has a total of 8 prerequisites. One of the LEED prerequisites is identical to NGBS mandatory practice (Minimum Energy Performance at the Certified/Bronze level). For 6 LEED prerequisites, NGBS has an identical practice that awards points toward certification. Only 1 LEED prerequisite is not exactly duplicated in the NGBS (Minimum Indoor Air Quality Performance), however, the NGBS has numerous practices intended to ensure improved indoor air quality.

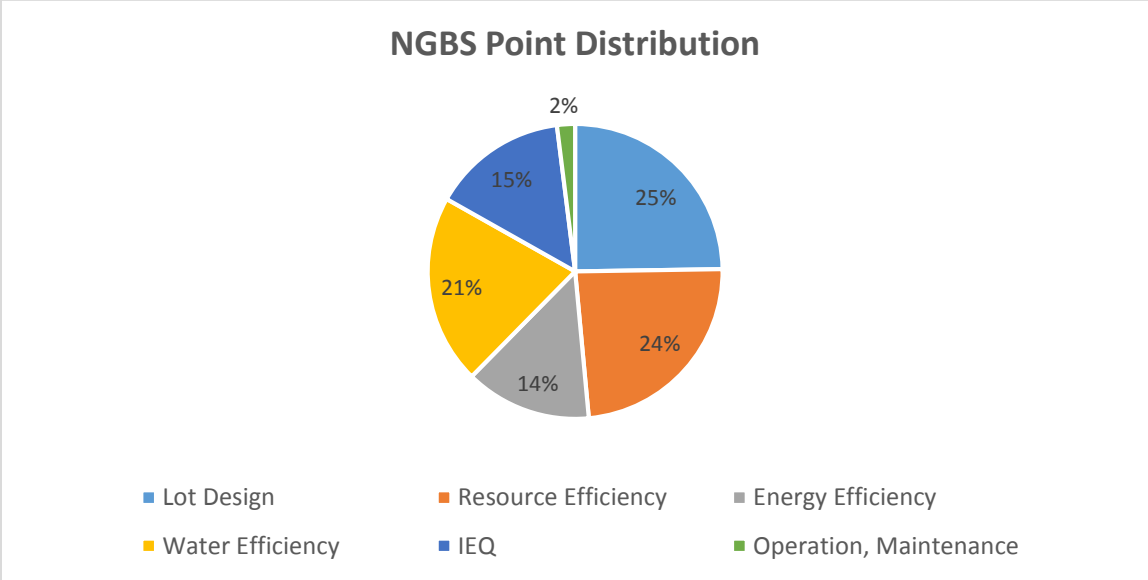
The NGBS has 13 Mandatory practices, 12 of which are not required by LEED. Some but not all of these NGBS mandatory practices are covered by LEED credits, with the notable exception being the NGBS mandatory practices for operation, maintenance, and building owner education.

NGBS VS. LEED CERTIFICATION REQUIREMENTS

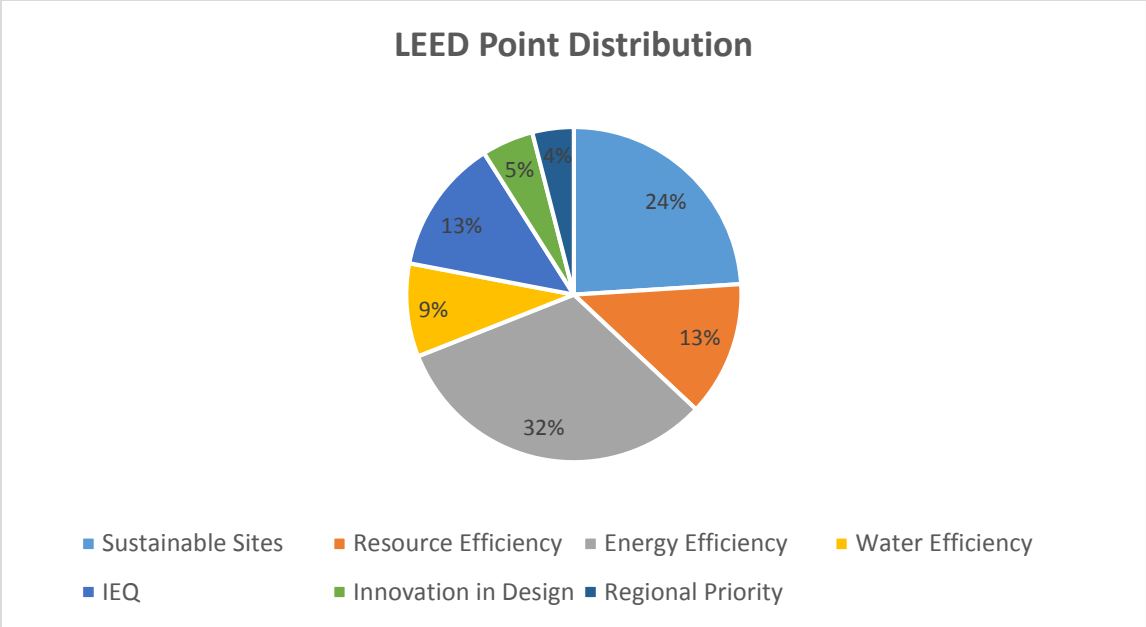
Both programs offer four levels of certification. NGBS offers Bronze; Silver; Gold; or Emerald. LEED has Certified; Silver; Gold; and Platinum.

Within the NGBS, no one category of green practices is weighted as more important than another. All projects must achieve a minimum point threshold in every category of green building practice to be certified at any level. The NGBS is the only national program with this level of cross-category stringency, making it the most rigorous and comprehensive green building rating system.

For LEED, buildings may attain points in any category to achieve the total points required for a given certification level; LEED does not require point minimums in every category of the rating system.



The chart above illustrates the percentage of points that are available in each NGBS catagory of green building practices. The chart below illustrates the percentage of points that are available in each LEED catagory of green building practices.



NGBS VS. LEED POINT THRESHOLDS

NGBS Table 303

Threshold Point Ratings for Green Buildings

Green Building Categories			Rating Level Points (1) (2)			
			BRONZE	SILVER	GOLD	EMERALD
1.	Chapter 5	Lot Design, Preparation, and Development	50	64	93	121
2.	Chapter 6	Resource Efficiency	43	59	89	119
3.	Chapter 7	Energy Efficiency	30	60	80	100
4.	Chapter 8	Water Efficiency	25	39	67	92
5.	Chapter 9	Indoor Environmental Quality	25	42	69	97
6.	Chapter 10	Operation, Maintenance, and Building Owner Education	8	10	11	12
7.		Additional Points from Any Category	50	75	100	100
		Total Points:	231	349	509	641

(1) In addition to the threshold number of points in each category, all mandatory provisions of each category shall be implemented.

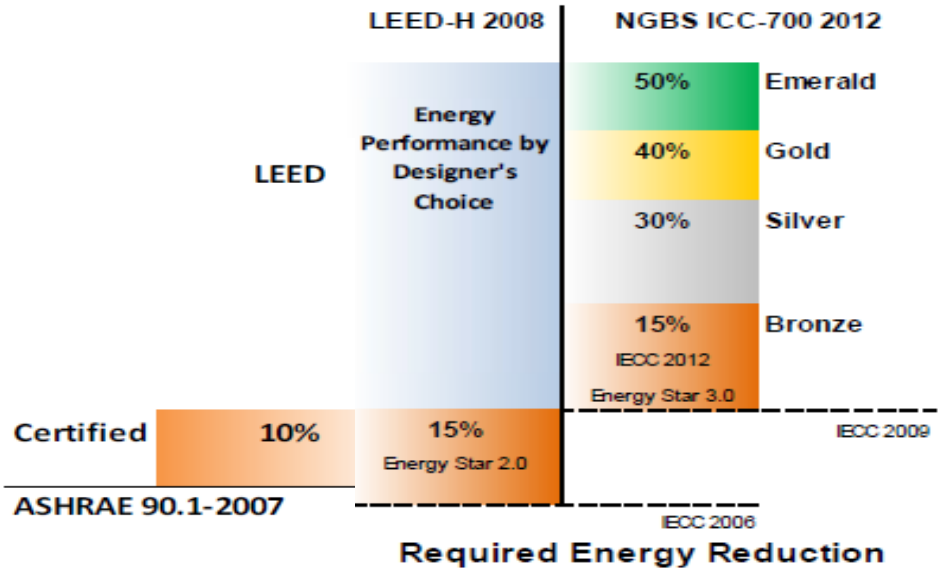
(2) For dwelling units greater than 4,000 square feet (372 m^2), the number of points in Category 7 (Additional Points from Any Category) shall be increased in accordance with Section 601.1. The "Total Points" shall be increased by the same number of points.

Certification via LEED is based on total points achieved out of the 100 available points.

Certified	40-49 points
Silver	50-59 points
Gold	60-79 points
Platinum	80 points and above

UNDERSTANDING THE IMPORTANCE OF POINT THRESHOLDS FOR ENERGY EFFICIENCY

The lack of minimum point thresholds for the categories means that a building can attain any level of certification under the LEED rating system (including the highest level, Platinum) and still be less efficient than an NGBS Bronze certified building (see chart below).



NGBS CERTIFICATION PROGRAM

Home Innovation Research Labs serves as an Adopting Entity and provides certification services to the NGBS. Home Innovation Labs is a 50-year old, internationally-recognized, accredited product testing and certification laboratory located in Upper Marlboro, Maryland. Our work is solely focused on the residential construction industry, and our mission is to improve the affordability, quality, performance, and durability of housing by helping overcome barriers to innovation. Our core competency is as an independent, third-party product testing and certification lab, making us uniquely suited to administer a green certification program for residential buildings.

NGBS VS. LEED NC VERIFICATION REQUIREMENTS COMPARISON

NGBS	LEED NC
Every NGBS project is required to be inspected at least twice by an independent, third-party Accredited Verifier. There is no self-certification. Practices must be visually inspected to receive points; documentation, photos, or written assertions are not allowed as alternatives.	Buildings are not required to be inspected on site for every point claimed toward certification. Documentation, photos, or written assertions are allowed in lieu of a visual inspection.

NGBS VERIFICATION: REQUIRES TWO MANDATORY INSPECTIONS

To be certified to the NGBS, every green project is subject to two independent, third-party verifications. Builders must hire an independent, accredited verifier who is responsible for visual inspection of every green building practice in the building. The verifier must perform a rough inspection before the drywall is installed in order to observe the wall cavities in every apartment, and a final inspection of every apartment once the project is complete. The required verification imbues a high level of rigor, continuity, and quality assurance to the program and to the projects that are certified.

Home Innovation Labs qualifies, trains, and accredits building professionals to provide independent verification services for builders participating in our NGBS Green Certification program. Verifiers must first demonstrate they possess experience in residential construction and green building before they are eligible to take the verifier training. Many of our verifiers are also HERS and/or LEED raters. Potential verifiers must complete comprehensive training on exactly how to verify every NGBS practice. After completing the training, verifiers must pass a written exam before receiving Home Innovation accreditation. Verifiers must have their accreditation renewed annually. Presently, there are approximately 200 Home Innovation accredited NGBS Green Verifiers nationally.

Home Innovation Labs reviews every rough and final inspection report to ensure national consistency and accuracy in the verification reports. Further, we regularly audit our verifiers and the verifications

they perform as part of our internal quality assurance program. Our staff members visit buildings seeking certification to assure verifiers are correctly performing their inspections.

CREDIBILITY AND RIGOR OF THE NGBS COMPARED TO LEED

Several studies have been completed to demonstrate the affordability and/or rigor of the NGBS.

- *Green Home Building Rating Systems - A Sample Comparison* evaluates the costs and technical requirements of bringing two sample code-compliant production houses in different climate zones into compliance with the 2012 NGBS and LEED for Homes.
- AIA Cincinnati published a report comparing the 2008 NGBS and LEED for Homes that found the programs to be essentially equivalent in rigor, but the NGBS to be more affordable and easier to use.
- The Home Builders Association of Greater Chicago released an independently prepared report evaluating the additional costs required to elevate three sample code-compliant, urban, residential building types in the City of Chicago into compliance with the Chicago Green Homes Program (CGH), the 2008 NGBS, and LEED-H.

LEGISLATIVE AND REGULATORY PARITY WITH LEED

Since 2009, when it received its initial ANSI approval, the NGBS has been consistently considered as on par or more stringent than LEED as a green building rating system for residential projects.

- On the federal level, HUD recognizes the NGBS as on par with LEED. For example, in their funding notice for jurisdictions affected by Hurricane Sandy they cite the NGBS as an acceptable green building standard for reconstruction efforts.
- The US Department of Army recognized NGBS as a LEED equivalent for their military housing under construction at three military bases.
- Many states recognize, mandate, or incentivize NGBS certification through their Qualified Allocation Plan for the federal Low Income Housing Tax Credit Program.
- Between 2009 and 2012, NYSERDA provides financial incentives for residential buildings built in New York that were certified to the Silver level of either the NGBS or LEED.
- Delaware provides financial incentives for homes built to the Silver level of either the NGBS or LEED in its Green for Green program.
- In New Mexico, homes certified to either the NGBS or LEED can qualify for the generous State tax credit program.

To date, not a single jurisdiction has refused to recognize the NGBS as an alternative compliance path for any regulatory or incentive program where we have asked them to make an equivalency decision. For a more complete listing of where the NGBS has been recognized, please visit our online summary of incentives.

NGBS VS. LEED NC COMPARISON

Site Selection

LEED Ver. 3 Sustainable Sites		Possible Points: 26		NGBS Lot Design, Preparation, and Development		Possible Points: 295
Prerequisite 1	Construction Activity Pollution Prevention			503.3	Soil disturbance and erosion	15
				504.3	Soil disturbance and erosion implementation	43
Credit 1	Site Selection	1		501.1	Lot Selection	9
				503.7	Avoid environmentally sensitive Areas	4
Credit 2	Development Density and Community Connectivity	5		505.3	Increased density	11
				501.2	Alternative transportation – walkability and pedestrian access to community resources	9
Credit 3	Brownfield redevelopment	1		501.1(4)	Brownfield	9
Credit 4.1	Alternative transportation—Public transportation access	6		501.2(1)	Multi-modal transportation – public transportation access	4
Credit 4.2	Alternative transportation—Bicycle storage and Changing rooms	1		501.2 (4)	Alternative transportation—Bicycle use	5
Credit 4.3	Alternative transportation—Low-Emitting and fuel-Efficient vehicles	3				
Credit 4.4	Alternative transportation—Parking Capacity	2		505.1	Driveways and Parking Areas	16
Credit 5.1	Site Development—Protect or restore Habitat	1		503.1	Natural Resources	31
Credit 5.2	Site Development—Maximize open space	1				
Credit 6.1	Stormwater Design—Quantity Control	1		503.4	Stormwater Management – design: Quantity and quality	37
Credit 6.2	Stormwater Design—Quality Control	1				
Credit 7.1	Heat island Effect—Non-roof	1		505.2 (1)	Heat Island Mitigation - nonroof	5
Credit 7.2	Heat island Effect—roof	1		505.2(2)	Heat Island Mitigation - roof	5
Credit 8	Light Pollution reduction	1				
				502.1	Project Team, Mission Statement, Goals	4
				503.2	Slope Disturbance Minimization	25
				503.5	Landscape Plan to limit water and energy use and enhance natural environment	36
				504.1	On-site supervision to ensure green practices	4
				504.2	Trees and vegetation preservation	12
				505.4	Mixed Use Building	8
				505.5	Community Gardens	3

Prerequisites: LEED requires a Construction Activity Pollution Plan.
NGBS does not have any mandatory practices in the Lot Design Chapter.

Point Distribution: LEED 26 points are available
NGBS 295 points are available.

Analysis:

LEED and the NGBS include many identical practices. In fact, the NGBS includes a practice for each of the LEED Site Selection practices, with the exception of Credit 8 for light pollution reduction. The NGBS offers 7 additional practices not covered in LEED, including establishing a project team, mission statement, and written goals; minimizing the disturbance of slopes; landscape plan to limit water and energy use and enhance natural environment; onsite supervision during lot clearing; preservation of trees and vegetation; mixed use development; and establishing a community garden for residents.

NGBS Chapter 5 is more process-oriented than the other NGBS Chapters, because environmentally-sensitive strategies differ depending on locale, topography, climate, and so on. Further, one of the biggest differences between LEED and the NGBS is the diversity of practices between the two rating systems. The NGBS was intentionally designed to apply to a wide range of residential sites, from the rural single-family home, to a neo-traditional neighborhood townhouse, to the high-rise apartment building. As a result, many NGBS Chapter 5 practices may not be relevant at all to a particular site seeking NGBS certification. An architect designing a downtown Miami apartment building, for example, will likely be able to claim NGBS points for increased density and public transportation access, but will not be able to claim points to slope disturbance minimization and many of the natural resource preservation points.

The NGBS requires that at least 18% of the total points toward Silver certification be attained from the Lot Design Chapter.

NGBS Table 303
Site Selection Threshold Point Requirements

Green Building Categories			Rating Level Points (1) (2)			
			BRONZE	SILVER	GOLD	EMERALD
1.	Chapter 5	Lot Design, Preparation, and Development	50	64	93	121
		Total Points:	231	349	509	641

Water Efficiency

LEED Ver. 3 Water Efficiency		Possible Points: 10		NGBS Water Efficiency		Possible Points: 248
Prerequisite 1	Water use reduction required					
Credit 1	Efficient Landscaping	4		503.5	Landscape Plan	
				801.6	Irrigation systems	14
Credit 2	Innovative wastewater technologies	2		802.1 OR 802.5	Reclaimed, gray, or recycled water OR	20
				802.2	Advanced wastewater treatment system	2
				802.3	Automatic Shutoff water devices	20
				802.4	Engineered biological system	20
Credit 3	Water use reduction	4		801.1	Indoor hot water usage	48
				801.2	Water conserving appliances	26
				801.3	Showerheads	24
				801.4	Lavatory faucets	9
				801.5	Water closets and urinals	20
				801.7	Rainwater collection	50
				801.8	Sediment filters	1

Prerequisites: LEED requires a 20% interior water use reduction
NGBS requires a building to achieve 39 points from the Water Efficiency Chapter.

Point Distribution: LEED 10 points are available
NGBS 248 points are available.

Analysis:

For Water Efficiency, LEED and NGBS overlap in intent and practices. LEED's water efficiency chapter is a design standard with a prerequisite for a 20% reduction in the water use baseline. NGBS is more prescriptive as to how building reduce water use and requires Silver certified building to achieve greater water savings than a Bronze certified building.

NGBS point assignments were intended to be relative to the expected amount of water savings. Assignment of points for practices in the NGBS Water Efficiency Chapter were based on four factors: cold water savings, hot water savings, energy intensity, and longevity of the appliance/fixture/technology. A review of typical household indoor and outdoor water usage was done to establish an idealized household using fixtures meeting current mandatory requirements for flow rates. Water savings (gallons) were estimated for each of the practices. Points were assigned to each practice relative to the amount of water saved. The point values were then adjusted based on energy intensity (using a national average) and longevity.

The NGBS requires that at least 11% of the total points toward Silver certification be attained from the Water Efficiency Chapter.

NGBS Table 303
Water Efficiency Threshold Point Requirements

Green Building Categories			Rating Level Points [1] [2]			
			BRONZE	SILVER	GOLD	EMERALD
4.	**Chapter 8**	Water Efficiency	**25**	**39**	**67**	**92**
		Total Points:	**231**	**349**	**509**	**641**

Resource Efficiency

LEED Ver. 3 Materials and Resources		Possible Points: 14		NGBS Resource Efficiency		Possible Points: 286
Prerequisite 1	Storage and Collection of recyclables			607.1	Recycling	6
				601.1	Limits on finished floor area	15
Credit 1.1	Building reuse—Maintain Existing walls, floors and roof	1-3		603.1	Reuse of Existing Building	12
Credit 1.2	Maintain Existing interior Nonstructural Elements	1				
Credit 2	Construction Waste Management	1-2		605.1	Recycled Construction Waste	6
				605.2	Onsite Recycling	7
				605.3	Recycled construction materials	6
Credit 3	Materials reuse	1-2		603	Reused or salvaged materials	13
Credit 4	Recycled Content	1-2		604	Recycled Content	6
Credit 6	Regional Materials	1-2		609.1	Regional Materials	10
Credit 6	Rapidly Renewable Materials	1		606.1	Renewable Materials	8
Credit 7	Certified wood	1		606.2	Certified wood-based products	7
				601.2-.9	optimize material usage & minimize waste	64
				602	Enhanced durability and reduced maintenance	67
				602.1.1.1	Capillary break or vapor retarder installed	Mandatory
				602.1.3.1	Exterior drain tile installed	Mandatory
				602.1.4.1(2)	Dampproof walls provided below grade	Mandatory
				602.1.4.2	Polyethylene sheathing in crawlspace	Mandatory
				602.1.7.1(2)	Insulation in cavities is dry	Mandatory
				602.1.8	Water resistive barrier is installed	Mandatory
				602.1.9(1)	Flashing is installed at all applicable locations	Mandatory
				6021.1.13	Ice Barrier	Mandatory
				602.1.14	All horizontal ledgers are sloped away	Mandatory
				602.4.1	Finished grade is sloped away from building	Mandatory
				606.3	Manufacturing Energy	6
				608	Resource Efficient Materials	9
				610	Lifecycle Analysis	15
				611.1	Manufacturer's environmental management system concepts	10
				611.2	Sustainable Products use	9
				611.3	Universal Design	10

Prerequisites: LEED requires buildings to have a place to collect and store recyclables. The NGBS incentivizes smaller units and thus overall building size through points, and penalizes larger units by requiring additional points to attain certification at any level.

Point Distribution: LEED 14 points are available
NGBS 286 points are available.

Analysis:

The NGBS Resource Efficiency chapter is much more robust than the LEED chapter.

First, the NGBS penalizes buildings with large units. NGBS requires that buildings with oversized units attain additional points to achieve certification at any level.

Second, the NGBS has numerous practices that are intended to address the quality of construction materials as well as practices to enhance durability and reduce maintenance. With regard to the first category, the NGBS awards points to various practices that reduce the materials necessary to construct the building and that minimize waste. With regard to the latter category, the NGBS offers multiple practices that are designed to manage moisture. Moisture not only impacts the long-term performance of materials but also can adversely affect indoor air quality. LEED does not include similar practices on this important topic. Buildings must have a capillary break and vapor retarder installed. Foundation drainage is required when there is habitable and useable spaces below grade. Damp-proof walls are required for walls below the finished grade. Insulation in cavities must be dry when enclosed by drywall. A water resistive barrier and/or drainage plane system is installed behind exterior veneer and/or siding. Flashing is mandatory in a number of locations. Tile backing materials must be installed under tiled surfaces in wet areas. All horizontal ledgers must be sloped away to provide gravity drainage. The finished grade of all sides of the building must be sloped to facilitate drainage away from the building.

In addition, the NGBS Resource Efficiency Chapter includes a number of innovative practices designed to promote the use of life cycle analysis, certified sustainable products, universal design so that residents can age-in-place, and products from manufacturers with registered environmental management system.

The NGBS requires that at least 17% of the total points toward Silver certification be attained from the Resource Efficiency Chapter.

NGBS Table 303
Resource Efficiency Threshold Point Requirements

Green Building Categories			Rating Level Points (1) (2)			
			BRONZE	SILVER	GOLD	EMERALD
2.	Chapter 6	Resource Efficiency	43	59	89	119
		Total Points:	231	349	509	641

Indoor Environmental Quality

LEED Ver. 3 Indoor Environmental Quality		Possible Points: 15		NGBS Indoor Environmental Quality		Possible Points: 173
Prerequisite 1	Minimum Indoor Air Quality Performance					
Prerequisite 2	ETS Control			901.14	Non-smoking areas	2
Credit 1	Outdoor Air Delivery Monitoring	1				
Credit 2	Increased ventilation	1		902.1.1(1),(2)	Spot Ventilation – baths, clothes dryers	Mandatory
				902.1.1(3) & 902.1.3	Kitchen ventilation	16
				902.1.2	Auto ventilation – bathroom	11
				902.1.4	Energy Star Fans	12
				902.2.1	Building Ventilation	Mandatory (if max. air infiltration rate is < ACH50) 8
				902.3	Radon Control	10
				902.5	Central Vacuum	3
				904.2	Enhanced Kitchen ventilation	2
Credit 3.1	Construction Indoor Air Quality Management Plan—During Construction	1		902.4	HVAC system protection	3
Credit 3.2	Construction Indoor Air Quality Management Plan—Before occupancy	1		902.2.2	Ventilation airflow testing	4
				903.2.3	MERV Filters	3
Credit 4.1	Low-Emitting Materials—adhesives and sealants	1		901.10	Interior adhesives and sealants	8
Credit 4.2	Low-Emitting Materials—Paints and Coatings	1		901.9	Interior Architectural Coatings	9
Credit 4.3	Low-Emitting Materials—flooring systems	1		901.6(1)	No carpet adjacent to water closets & bath fixtures	Mandatory
				901.6(2)	Carpets	8
				901.7	Hard-surface Flooring	6
Credit 4.4	Low-Emitting Materials—Composite wood and agrifiber	1		901.4(1)	Wood materials compliant w/ DOC PS 1 and/or DOC PS 2	Mandatory
				901.4(2)-(6)	Wood materials – low emitting	10
Credit 5	Indoor Chemical and Pollutant source	1		902.6	Living space sealed	Mandatory
				901.3 (1) (a)	Sealed and gasketed doors to the garage	Mandatory 2
				901.3 (b)	Continuous Air Barrier	Mandatory
				901.3	Detached garage/no garage	10
				901.13	Building entrance pollutants control	2

				901.2	Fireplaces, stoves, and inserts comply with various requirements	Mandatory
				901.5	Cabinets – low emitting	5
				901.8	Wall coverings – low emitting	4
				901.11	Insulation – low emitting	4
				901.1.1 or 901.1.3	Natural draft location or power/direct vent	10
				901.1.2	Air handling location	5
				901.1.6	Heat pump location	5
				901.12	Carbon Monoxide alarms	4
Credit 6.1	Controllability of systems—Lighting	1			Not relevant to residential	
Credit 6.2	Controllability of systems—thermal	1		704.3	Return ducts and transfer grilles	5
Credit 7.1	Thermal Comfort—Design	1				
Credit 7.1	Thermal Comfort—verification	1			Residential projects are not eligible for this credit.	
Credit 8.1	Daylight and views—Daylight				Not relevant to residential	
Credit 8.2	Daylight and views—views				Not relevant to residential	
				903	Moisture Management	15
				904.1	Humidity monitoring	2

Prerequisites: LEED requires compliance with ASHRAE 62.1 for mechanically and naturally ventilated spaces and for environmental tobacco smoke control.

NGBS has 11 Mandatory practices that relate to pollutant source controls (i.e. fireplaces and direct heating equipment; solid fuel-burning appliances; attached garages; wood materials; and carpets), and pollutant control (spot ventilation, building ventilation when measured air infiltration rate is low; radon control, and living space contaminants.)

Point Distribution: LEED 15 points are available

NGBS 173 points are available.

Analysis:

The IAQ sections in LEED and the NGBS largely overlap with regard to intent and practices. LEED has a prerequisite for environmental tobacco smoke control, while the NGBS awards 2 points to buildings that control tobacco smoke. NGBS offers 5 additional practices designed to control pollutant sources that are not available in LEED. In addition, LEED offers a number of IEQ practices that are either not eligible for residential projects (credit 7.1) or are not relevant to residential projects (For example Credit 6.1 – residents will always have control over lighting in their units as opposed to occupants in a commercial office building for whom this Credit was designed to affect).

The NGBS requires 12% of the total points toward Silver certification be attained from the Indoor Environmental Quality chapter.

NGBS Table 303
IEQ Threshold Point Requirements

Green Building Categories			Rating Level Points [1] [2]			
			BRONZE	SILVER	GOLD	EMERALD
5.	**Chapter 9**	Indoor Environmental Quality	**25**	**42**	**69**	**97**
		Total Points:	**231**	**349**	**509**	**641**

Energy Efficiency

LEED Ver. 3 Energy and Atmosphere		Possible Points: 35		NGBS Energy Efficiency		Possible Points: 165
Prerequisite 1	Fundamental Commissioning of Building Energy systems			704.5	Installation and performance verification	24
				704.4.2	[See below]	
Prerequisite 2	Minimum Energy Performance			701.1	Minimum Energy Performance	Mandatory
				701.4.1	HVAC Systems sizing	Mandatory
				701.4.2	Duct system sealed, sized appropriately, and no supply ducts in building cavities.	Mandatory
				701.4.3	Insulation and air sealing are verified, and inspected or tested. Fenestration air leakage and recessed lighting specs.	Mandatory
				701.4.4	High Efficacy Lighting	Mandatory
				701.4.5	Boiler Supply Piping insulation	Mandatory
Prerequisite 3	Fundamental Refrigerant Management			704.4.2	Performance verified by HVAC contractor	3
Credit 1	Optimize Energy Performance	1-19		702.2.2	Performance Path	100
Credit 2	On-site renewable Energy	7		705.5	On-site renewable energy **1 point per 100 W of system rating per 2,000 sq. ft. total conditional area of building*	1*
Credit 3	Enhanced Commissioning	2				
Credit 4	Enhanced Refrigerant Management	2				
Credit 5	Measurement and verification	3		705.1	Energy consumption control	7
Credit 6	Green Power	2		705.2	Renewable Energy Service Plan	6
				704.2	Lighting: Occupancy sensors, TDD, hardwired outlets	5
				704.4.1	HVAC Design	1
				704.4.3	Sealed air handler	4
				704.5.3	Insulating hot water pipes	1
				705.3	Smart appliances and systems	2
				705.6	Parking garage efficiency	2
				704.3	Return Ducts	5
				705.4	Pumps	4

Prerequisites: LEED has two EA prerequisites: building commissioning and minimum energy performance.

NGBS has a mandatory practice for minimum energy performance. The NGBS has three practice areas (with compound requirements) that are intended to ensure the project's energy-related systems are installed and commissioned according to the owner's project requirements, basis of design and construction documents.

Point Distribution: LEED 35 points are available

NGBS 165 points are available.

Analysis:

The NGBS is significantly more stringent than LEED with regard to minimum energy performance at all certification levels. In particular, NGBS Silver is designed for buildings to attain a 25% energy reduction, while a LEED Silver certified building can merely be 10% more energy efficient.

The NGBS and LEED Ver. 3 offer the option of selecting either a Prescriptive Path or Performance Path for compliance with minimum energy efficiency requirements. LEED requires a **10% improvement** in the building performance rating for new buildings for all four certification levels (i.e. LEED Platinum certified buildings may only achieve a 10% energy improvement despite receiving the highest certification level in that rating system.) In contrast, the NGBS requires a **15% reduction** in energy use for the lowest level of certification (Bronze) and successively higher levels of energy performance for the four levels of certification, see below. The baseline for energy computation of the required 15% savings is the energy consumed by heating, cooling, service water heating, and including lighting, appliances, and plug loads for a building designed to exactly meet 2009 IECC code minimums.

For the NGBS Energy Efficiency Prescriptive Path, the point ranking was performed based on simulated energy savings relative to the 2009 ICC IECC using a software analysis developed through the National Renewable Energy Laboratory, called BEopt. For the purpose of assigning points to energy saving practices one point was equated to 0. 5% of whole house energy use (therefore 2 points roughly equal one percent savings). Many of the Energy Efficiency practices have varying point values based on climate zone.

For the NGBS Performance Path architects/builders must perform a documented analysis using approved software to earn 1 point for each 0.5% energy savings. Buildings must earn 60 points in the Energy Efficiency section to attain the Silver Certification level.

The NGBS Prescriptive Path's 30-point minimum is intended to target 15% savings for the building relative to the 2009 IECC/ASHRAE 90.1 envelop baseline and including lighting, appliances, and plug loads for the Bronze certification level, and successively higher for certification levels above Bronze.

The NGBS offers additional practices that LEED does not that are more applicable to residential occupants, such as smart appliances and occupancy sensors.

The NGBS does not require building commissioning as per LEED, however, the intent of many of the NGBS practices is to ensure the project's energy-related systems are installed and calibrated according to the owner's project requirements, basis of design and construction documents.

The NGBS requires 17% of the total points toward Silver certification be attained from the Energy Efficiency chapter.

NGBS Table 303
Energy Efficiency Threshold Point Requirements

Green Building Categories			Rating Level Points (1) (2)			
			BRONZE	SILVER	GOLD	EMERALD
3.	**Chapter 7**	Energy Efficiency	**30**	**60**	**80**	**100**
		Total Points:	**231**	**349**	**509**	**641**

Operation, Maintenance, and Building Owner Education

NGBS Operation, Maintenance, and Building Owner Education		Possible Points: 21
1002.1	On-site training is provided to the responsible party(ies) regarding equipment operation and maintenance, control systems, and occupant actions that will improve the environmental performance of the building.	8
1003.1	Building Construction manual with list of green building features in building and warranty, operation, and maintenance instructions for all equipment, fixtures, appliances, and finishes.	Mandatory + 4 Points Max
1003.2	Operations Manual are created and distributed to responsible parties	Mandatory + 5 Points Max
1003.3	Maintenance Manual created and distributed	Mandatory + 4 Points Max

Prerequisites: LEED does not have a comparable stand-alone section to ensure that buildings are operated and maintained to preserve the benefits of the green features.

NGBS requires all certified multifamily buildings to develop and distribute a construction manual, an operations manual, and a maintenance manual to their responsible parties (property management company, building maintenance team, equipment maintenance team, and tenant). Further, to facilitate exchange of information in the event of future transfer of ownership and/or management at least one responsible party must receive all three manuals.

Point Distribution: No LEED points are available.
NGBS 21 points are available.

Analysis:

The impact of the building on the environment does not end with construction. Poor operational and maintenance practices can offset many of the efforts that a designer and builder invested in a green apartment building. This NGBS section provides building owners with educational and technical resources to take advantage of the building's green features and to further minimize the environmental impact of the building over its lifetime. Building owners can ultimately benefit from reduced utility bills, reduced maintenance costs, improved comfort and indoor air quality, enhanced living standards, and increased value.

The NGBS requires 3% of the total points toward Silver certification be attained from the Operation, Maintenance, and Building Owner chapter.

NGBS Table 303
Operation, Maintenance, and Building Owner Education Threshold Point Requirements

Green Building Categories			Rating Level Points (1) (2)			
			BRONZE	SILVER	GOLD	EMERALD
6.	Chapter 10	Operation, Maintenance, and Building Owner Education	8	10	11	12
		Total Points:	231	349	509	641

Additional LEED Categories

LEED NC has a stand-alone chapter on Innovation in Design. In contrast, the NGBS recognizes and rewards innovative green practices in each of the green building categories as opposed to a separate chapter. LEED also assigns a point to projects that use a LEED AP on the project team. The NGBS does not reward any specific professional designation. Last, LEED specifically awards points for regional priority. The NGBS does not have a similar category. The Consensus Committee believed that the NGBS's expansive point-based system allowed projects to recognize regional priorities by the practices they select to earn points toward certification. As a result, we typically see projects in the Southwest implement additional water saving practices while buildings in the Northeast typically emphasize additional energy efficiency practices.

Innovation in Design		**Possible Points: 6**
Credit 1	Innovation in Design	1-5
Credit 2	LEED accredited Professional	1

Regional priority		**Possible Points: 4**
Credit 1	Regional Priority	1-4

CONCLUSION

As demonstrated above, the National Green Building Standard is clearly equivalent to LEED NC when individual green categories are compared, and far more stringent than LEED NC with regard to both the level of environmental performance as well as comprehensiveness of green practices as demonstrated by the minimum point threshold requirements for each category of green building practices. If the objective is to facilitate green, high performance buildings, acceptance of the NGBS as a choice for residential projects is an effective means to that end.

Furthermore, because the NGBS and Home Innovation's certification program were developed specifically for residential construction it is uniquely suited as a green building standard for multifamily construction. Until the NGBS Green certification was released, residential construction lagged in green building certification. Now builders and municipalities alike have a credible and rigorous green certification program to promote for low and high-rise residential buildings.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