



 COLUMBIA | CBIPS
Center for **B**uildings, **I**nfrastructure and **P**ublic Space

Ten Years After Research Green Building Group

Nancy Agrawal | Sheila Misheni | Lin Shi

2021 Spring

OUTLINE

Definition

Standards & Policy

Aspects of the Triple Bottom Line

Sustainable Design

International Vision

LEED



Definition

What is Green Building?

- A building that, in its design, construction or operation, reduces or eliminates negative impacts, and can create positive impacts, on our climate and natural environment.
- Green buildings preserve precious natural resources and improve our quality of life.
- Any type of building can be green buildings.

Design Features

- Efficient use of resources
- Use of renewable energy
- Pollution and waste reduction measures
- Re-use and recycling
- Good indoor environmental air quality
- Use of materials that are non-toxic, ethical and sustainable
- Consideration of the environment
- Consideration of the quality of life of occupants
- A design that enables adaptation to a changing environment

Design Factors

- Green buildings are shaped by different factors to suit their own markets
- Factors include:
 - Distinctive climatic conditions
 - Unique cultures and traditions
 - Diverse building types and ages
 - Wide-ranging environmental, economic and social priorities



Standards and Policy

Federal Policy

Reduce the carbon footprint of U.S. building stock by 50% by 2035

Spur the construction of 1.5 million sustainable homes and housing units.

Upgrade 4 million buildings and weatherizing 2 million homes over four years



Local Policy

ONE NYC



- Preserve and upgrade existing affordable housing using Energy Performance Contracts
- Increase the sustainability of City-financed and public housing
- Implement the Greener, Greater Buildings Plan (LL 84,85,88)

Source: nyc.gov, 2015

<http://www.nyc.gov/html/onenyc/downloads/pdf/publications/OneNYC.pdf>

Andrew Yang For NYC Mayor



- Scale up Community Retrofit NYC
- expand the CoolRoofs program
- require window screens “so people don’t have to choose between letting fresh air in and keeping bugs out”

Source: Andrew Yang For NYC, 2021

<https://www.yangfornyc.com/policies/our-environment>

Andrew Yang

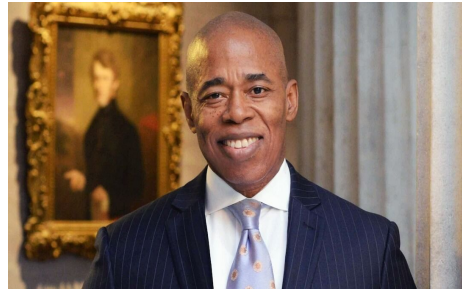


- Green New Deal for NYCHA
- Abolish NYCHA's carbon pollution by 2030 by eliminating and using 100% renewable energy
- Cooling as a right
- Accelerate retrofits

Yang for NYC 2021

<https://www.yangformy.com/policies/green-reinvestment-in-nycha>

Eric Adams



- Create a new rules and tax programs for urban farmers
- Place solar panels on City buildings.
- Invest in green art by commissioning artists to paint murals with paint that turns pollutants and harmful compounds into harmless nitrates and carbonates

Eric Adams 2021

<https://www.ericadams2021.com/PDF106>

Scott Stringer



- District scale clean energy projects
- Ban natural gas and oil use in new construction
- Implement fast-track green permitting to accelerate green construction

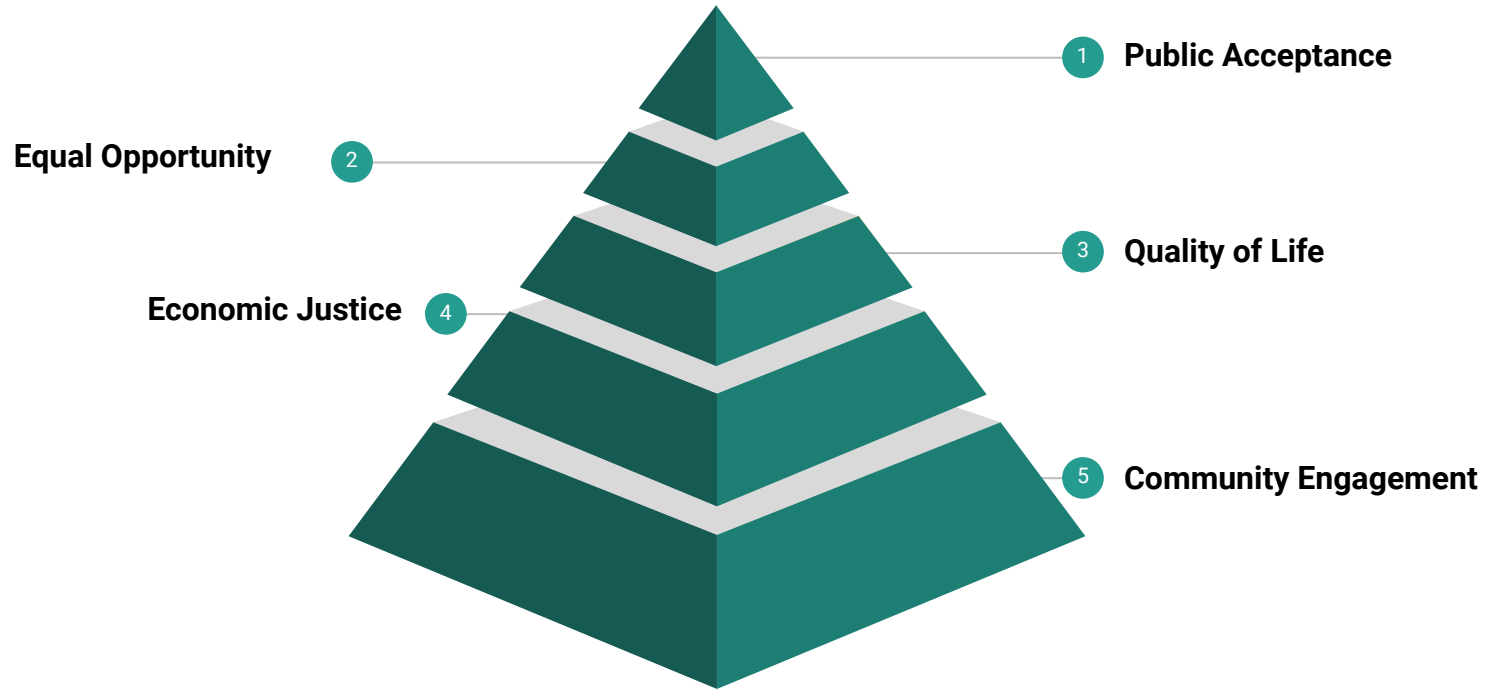
Stringer for Mayor 2021

<https://stringformayor.com/comptroller-stringer-issues-sweeping-climate-plan-as-first-part-of-mayoral-agenda-called-the-details-to-deliver/>

Green Building Financing



Social Impact



Local Law 97-NYC vs NYS

Local Law 97 places carbon caps on buildings starting in 2024 with the goal of reducing carbon emissions by 80% by 2050.

Cuomo's proposed Executive Budget for 2022 — would allow building owners to meet their emissions targets under Local Law 97 by buying credits for renewable energy produced elsewhere in the state.



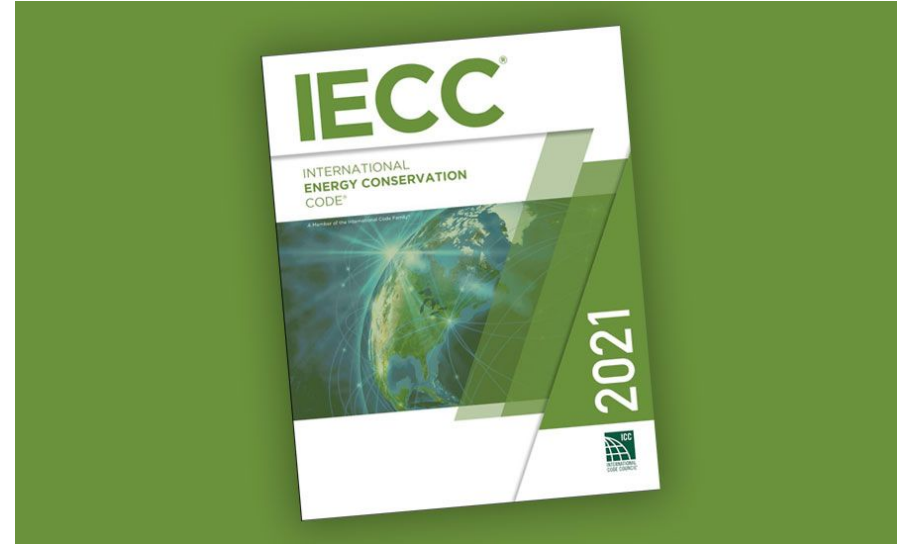
NYC Focus , February 2021 <https://www.nysfocus.com/2021/02/18/cuomo-override-nyc-climate-law/>

Green Building Codes-International Code Council vs Government Officials

In 2019 a new bloc of voters tilted the election of new codes to favor more aggressive mandates to improve energy efficiency

Industry groups such as the National Association of Home Builders appealed citing “voter manipulation”

ICC Appeals Board proposed to switch the energy code to an energy standard, a separate process that would circumvent government voting.



ENR , March 2021

<https://www.enr.com/articles/51333-international-code-council-approves-controversial-process-change>



Aspects of the Triple Bottom Line

Triple Bottom Line



Sustainable Economics

| | | |
|----|--|--|
| 01 | Risk Assessment | <ul style="list-style-type: none">• Development of regulatory response• Evaluation of public health,economics, social consequences |
| 02 | Life Cycle Cost Analysis | <ul style="list-style-type: none">• Initial cost, service cost,preventive maintenance cost,operating cost,disposal cost |
| 03 | Industry Outreach for Local Buisness | <ul style="list-style-type: none">• Supporting Local Economy |
| 04 | SRI - Sustainable Return on Investment | <ul style="list-style-type: none">• Performance measure used to evaluate the gains produced as a result of corporate sustainability initiatives relative to the amount of money invested in those initiatives. |

Sustainable Environment

Air and Water

- Air Cleaning Material and technologies
- Rain Water Harvesting.

Light and Nourishment

- use of led
- Net Zero Buildings at Net Zero Cost
- Smart Glass - Electrochromic and Thermochromic
- Electricity generating glass

Comfort and Mind

Building façades
Green spaces as mental balm
Triangulation

Four aspects of Energy Efficiency Building

- 1) Zero Energy Passive Building Design
- 2) Low Energy Building Material
- 3) Energy Efficient Equipment
- 4) Renewable Energy Technology

One Vanderbilt

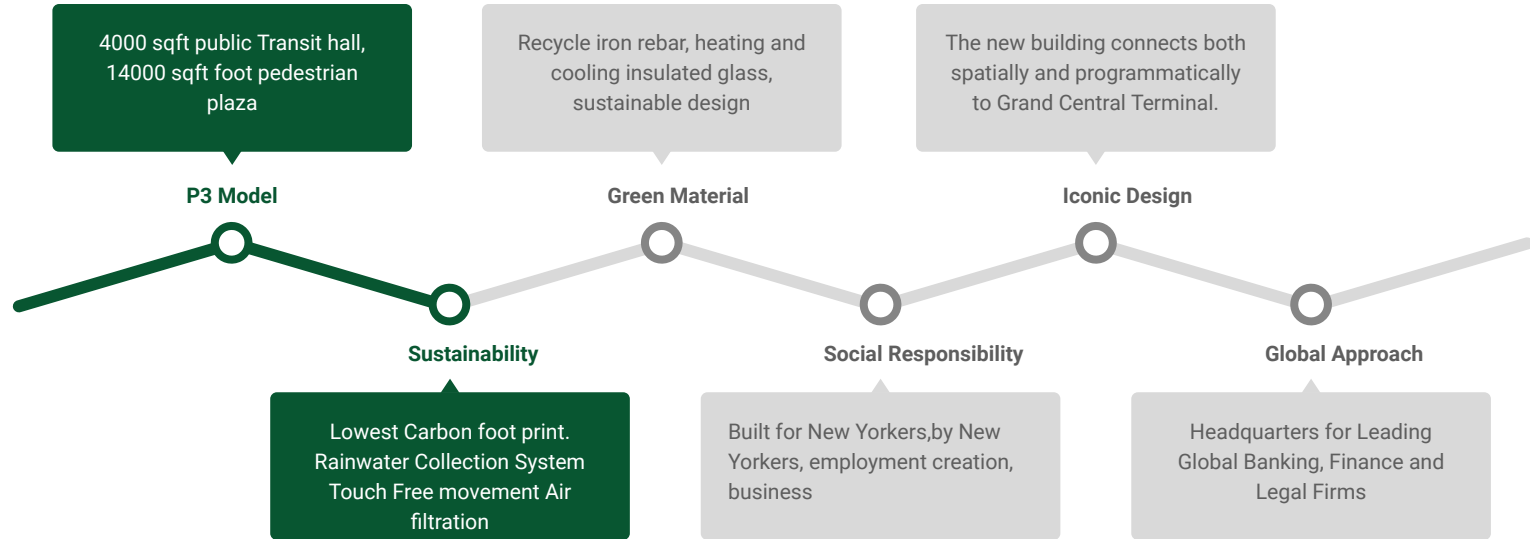
Area: 160722 m²

Year: 2020

Architects: KPF

LEED™ Certified 65-story







Sustainable Design

Emission in NYC

- 68% of emissions come from buildings
- Almost half of those emissions come from only 2% of buildings

To counter this, the city needs aggressive retrofits to make existing buildings more efficient.

The Green Buildings in NYC

The Hearst Tower

300 W 57th Street and 959 Eighth Avenue

The first officially "green" high-rise office building built in NYC

- Heat conductive limestone in the atrium
- Rain collecting on the roof to support the cooling system
- 85% recycled building materials.



The Green Buildings in NYC

One World Trade Center

285 Fulton Street

The tallest building in the Western Hemisphere

- Insulated spandrel skin
- Low-E glass coating

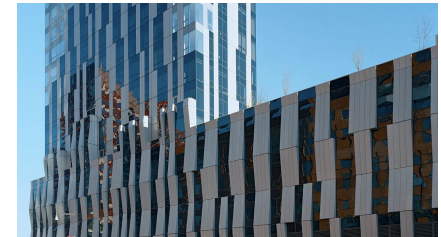


The Green Buildings in NYC

Toren

150 Myrtle Avenue

- Distinctive facade
- Rainscreen system
- Cogeneration plant



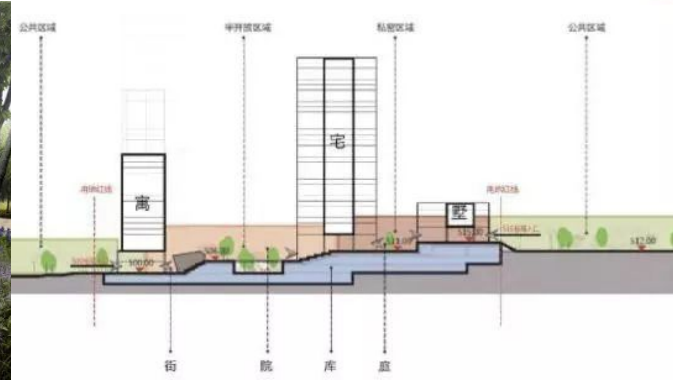


International Vision

T-Land - International Talent Living Space

Healthy Oriented Development (HOD)

- Nature-based landscape
- Public transportation as the priority
- Convenient life
- Community interaction



Beijing Olympic Village (LEED Gold Award)

Centralized solar heating system

- Efficient vacuum tube - reflective coating
- Effective collector area: 4316m²
- Collection efficiency: 83.5%

Solar wall system

- Solar wallboard: steel or aluminum panel with special tiny holes and high-efficiency heat coating
- Heat the outdoor fresh air
- Pump warm fresh air into rooms

Roof garden

- Use the heat collection board as flower racks

Combine solar energy and wind energy

- Ensure night illumination



Photo Credit: Xiaoguang Luo, a reporter of Xinhua News

Beijing Olympic Village

Green materials

- High-strength steel and high-performance concrete - less steel and cement - less contaminants
- Hollow lightweight wallboard, composite wallboard - less building weight
- Flyash blocks, steel slag bricks - reuse the industrial waste

Resources recycle and reuse

- Use construction wastes to backfill

Predesign for transformation into ordinary apartment after Olympic Games

- Avoid a lot of demolition
- Use reusable gypsum as partitions

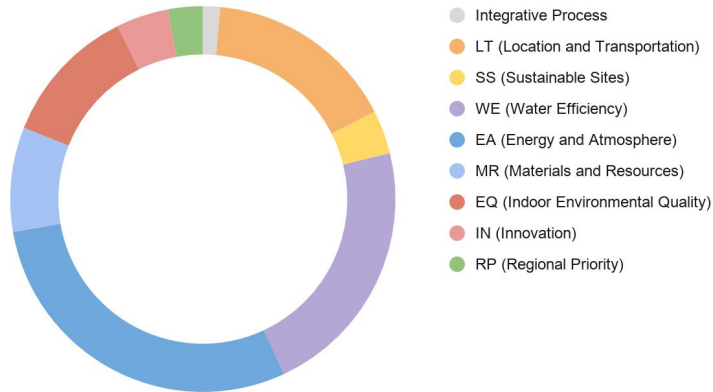
Comparison

LEED v4.1

<https://build.usgbc.org/singlefamilyclean41>

USGBC (U.S. Green Building Council)

Index proportion - LEED for Residential Single Family Homes



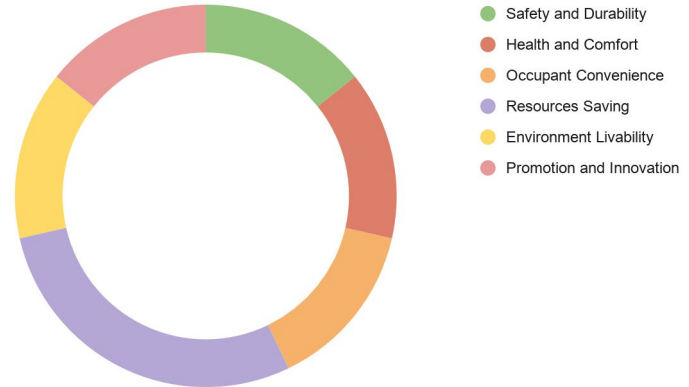
Evaluation Standard for Green Building (ESGB)

绿色建筑评价标准 (GBT 50378-2019)

http://www.mohurd.gov.cn/wjfb/201905/t20190530_240717.html

MOHURD (Ministry of Housing and Urban-Rural Development of the PRC)

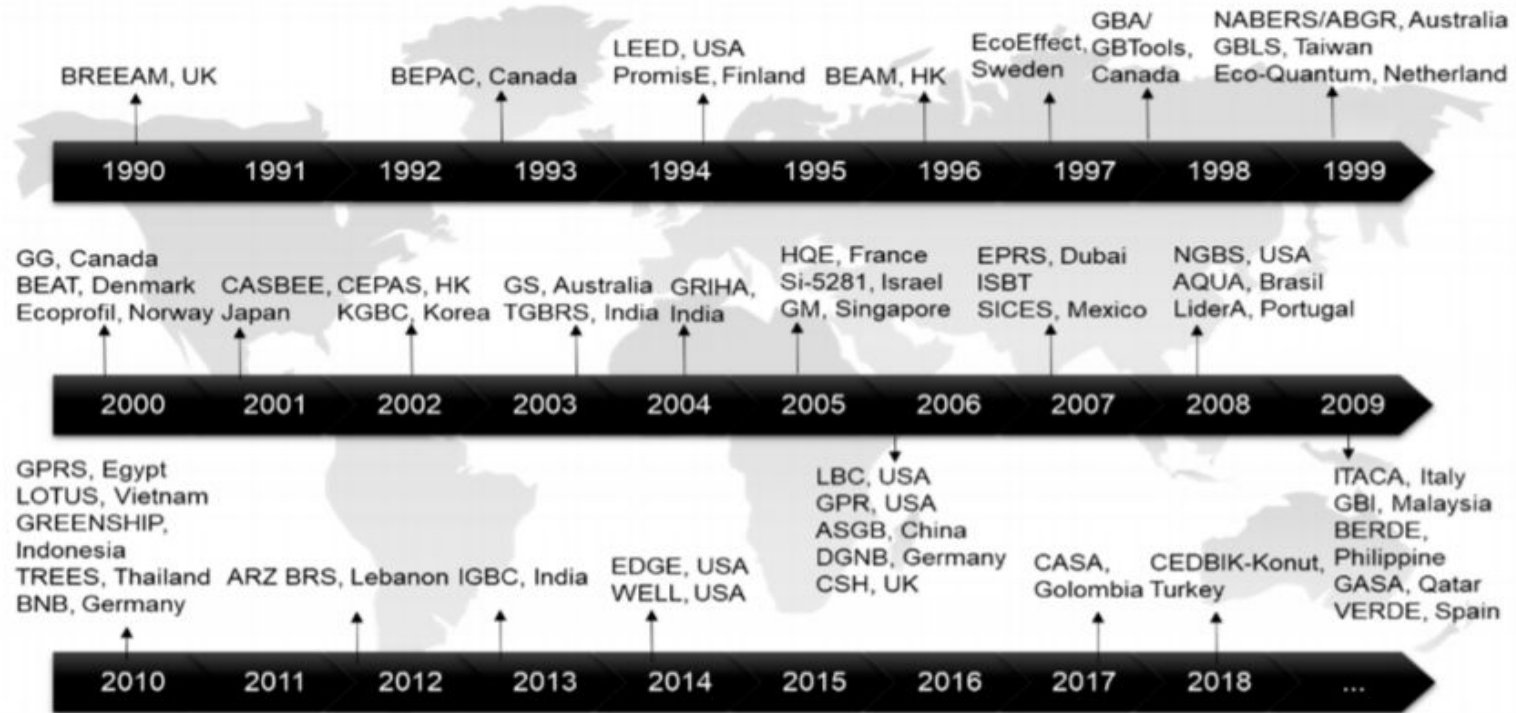
Index proportion - ESGB for Civil Buildings





LEED

Timeline of Green building rating system



file:///C:/Users/nancy/Downloads/sustainability-11-05385.pdf

| | |
|---|-----------------------------------|
| GREEN BUILDING DESIGN & CONSTRUCTION | LEED FOR NEW CONSTRUCTION |
| | LEED FOR CORE & SHELL |
| | LEED FOR SCHOOLS |
| | LEED FOR HEALTHCARE |
| | LEED FOR RETAIL |
| GREEN INTERIOR DESIGN & CONSTRUCTION | LEED FOR COMMERCIAL INTERIORS |
| | LEED FOR RETAIL INTERIORS |
| GREEN BUILDING OPERATIONS & MAINTENANCE | LEED FOR EXISTING BUILDINGS |
| GREEN HOMES DESIGN & CONSTRUCTION | LEED FOR HOMES |
| GREEN NEIGHBORHOOD DEVELOPMENT | LEED FOR NEIGHBORHOOD DEVELOPMENT |

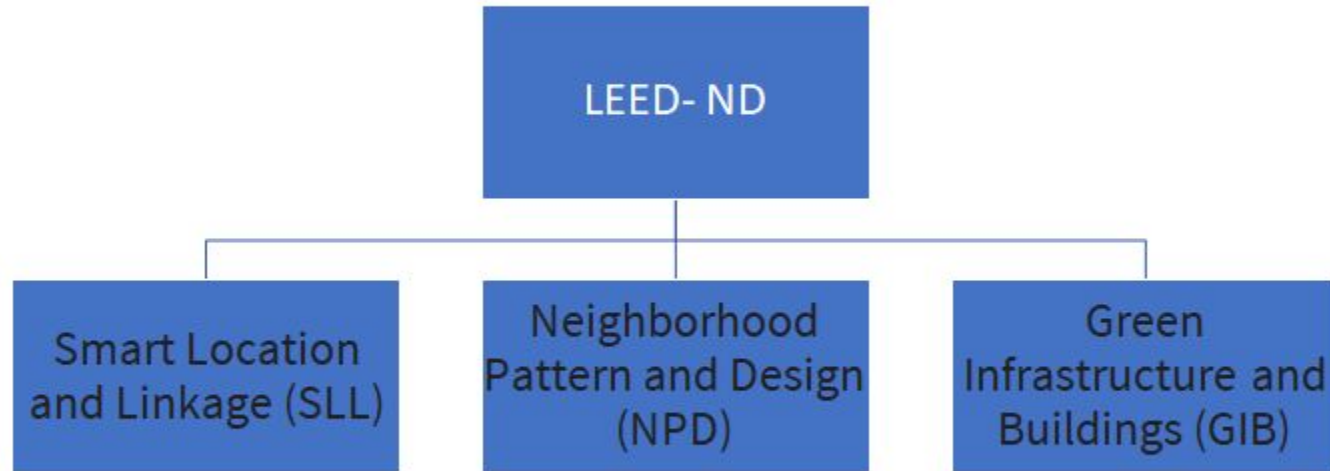
LEED-
ND
Benefits

Scale

Comprehensiveness and
synergy

Longevity

LEED- ND categorisation of prerequisites



Certification requirement for professionals

| Countries | Standard | Professionals | Education | Working Experience | Training Course | Examination | Extra Credits |
|----------------|-------------|---|-----------|--------------------|-----------------|-------------|---------------|
| America | LEED | LEED GA LEED AP | ○ | ○ | ○ | ● | ● |
| | GPR | Certified GB Professional (CGBP) | ○ | ○ | ● | ● | × |
| | EDGE | EDGE Expert | ○ | ○ | ● | ● | × |
| | WELL | WELL AP | ○ | ○ | ○ | ● | × |
| United Kingdom | BREEAM | BREEAM Assessor BREEAM AP | ● | ● | ● | ● | × |
| Germany | DGNB | DGNB Registered Professional DGNB Auditors DGNB Consultant | ● | ● | ● | ● | × |
| France | HQE | HQE Référents | ● | ● | ● | ● | × |
| Australia | NABERS/ABGR | Accredited Assessor | ○ | ○ | ● | × | × |
| | GS | Accredited Professional | ○ | ○ | ● | ● | ● |

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Ranking for states for green professional workforce

| The Ranking | State | The Ranking | |
|-------------|------------|-------------|--------------|
| 1 | California | 6 | Massachutes |
| 2 | New York | 7 | Virginia |
| 3 | Texas | 8 | Colorado |
| 4 | Florida | 9 | Washington |
| 5 | Illinio | 10 | Pennsylvania |

California has 26,906 LEED professionals

Staff, BF. "Massachusetts Ranked Tops For LEED Green Building." *Business Facilities - Area Economic Development, Site Selection & Workforce Solutions*, 9 Feb. 2021, businessfacilities.com/2021/02/massachusetts-ranked-tops-for-leed-green-building/.

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- Photo Credit: AECOM

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