

The background of the slide features a repeating pattern of overlapping squares. Each square is composed of a light gray outer border and a slightly darker gray inner square, creating a layered, architectural effect.

# TRANSFORMING BUILDINGS, INFRASTRUCTURE AND CITIES

*27<sup>th</sup> September 2017*



## APOORV VIJ

Senior Manager - Technical Development  
GBCI

As Senior Manager - Technical Development at GBCI, Apoorv supports project teams engaged in LEED, ARC, WELL rating and other GBCI programmes in the Asia Pacific region.



**GREEN BUILDINGS  
FOR EVERYONE  
WITHIN THIS  
GENERATION**







LEED

WELL

PEER

GRESB

SITES

EDGE

PARKSMART

ZERO WASTE

ICP



A photograph of a city skyline at dusk or dawn. The sky is a pale, hazy blue. In the foreground, there are several low-rise buildings with flat roofs and some rooftop structures. In the background, a dense cluster of skyscrapers rises, with many windows glowing with warm yellow light. A large, semi-transparent white circle is superimposed over the center of the image, containing the text.

LEED v4  
BETTER  
BUILDINGS  
ARE OUR  
LEGACY

# LEED v4 SYSTEM GOALS

---



Reduce contribution to **global climate change**



Enhance individual **human health**



Protect and restore **water resources**



Protect and enhance **biodiversity and ecosystem services**



Promote **sustainable and regenerative** material cycles

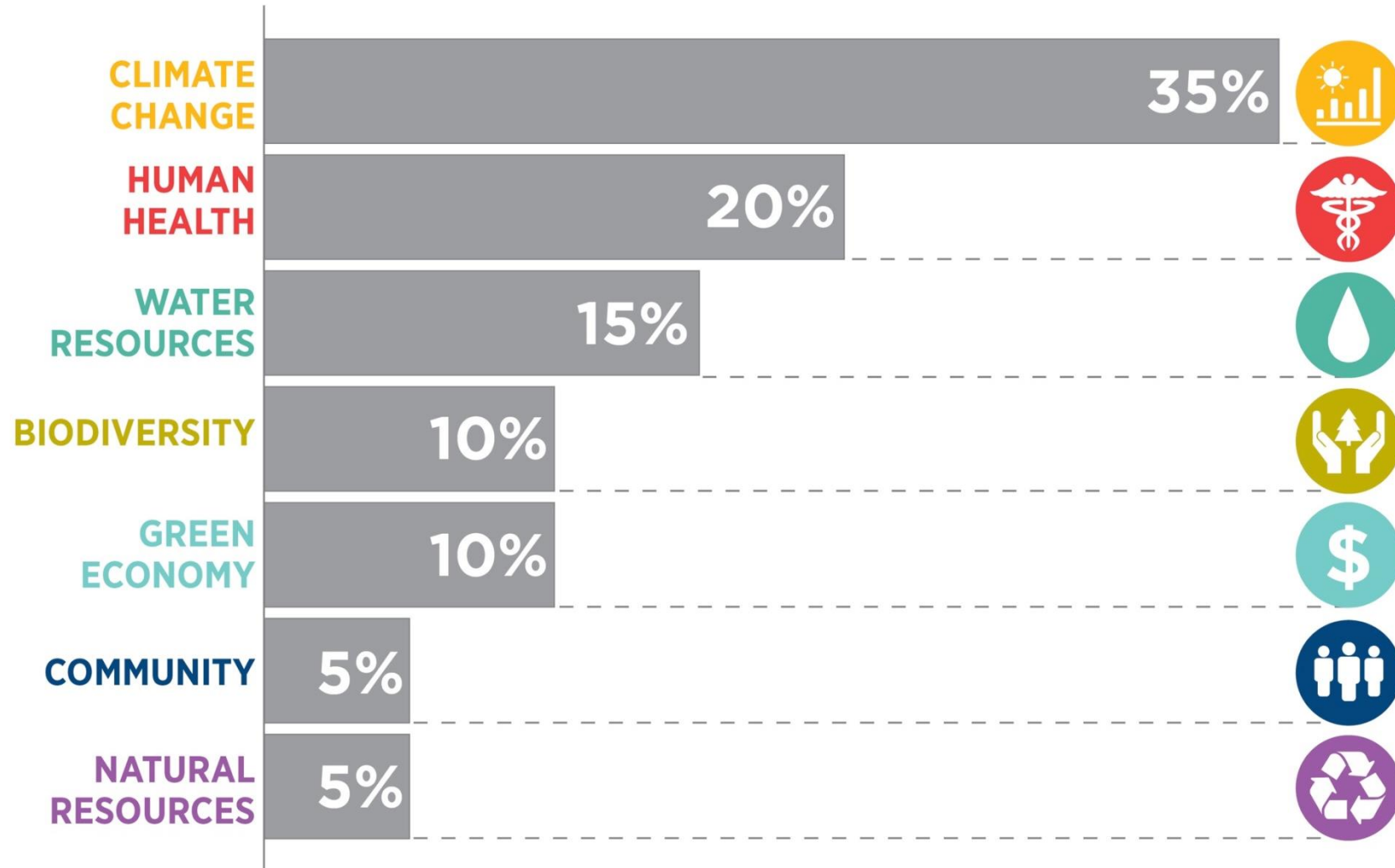


Build a **green economy**



Enhance **community quality of life**

# LEED v4 SYSTEM GOALS







» stronger energy performance

» better materials

» increased water efficiency

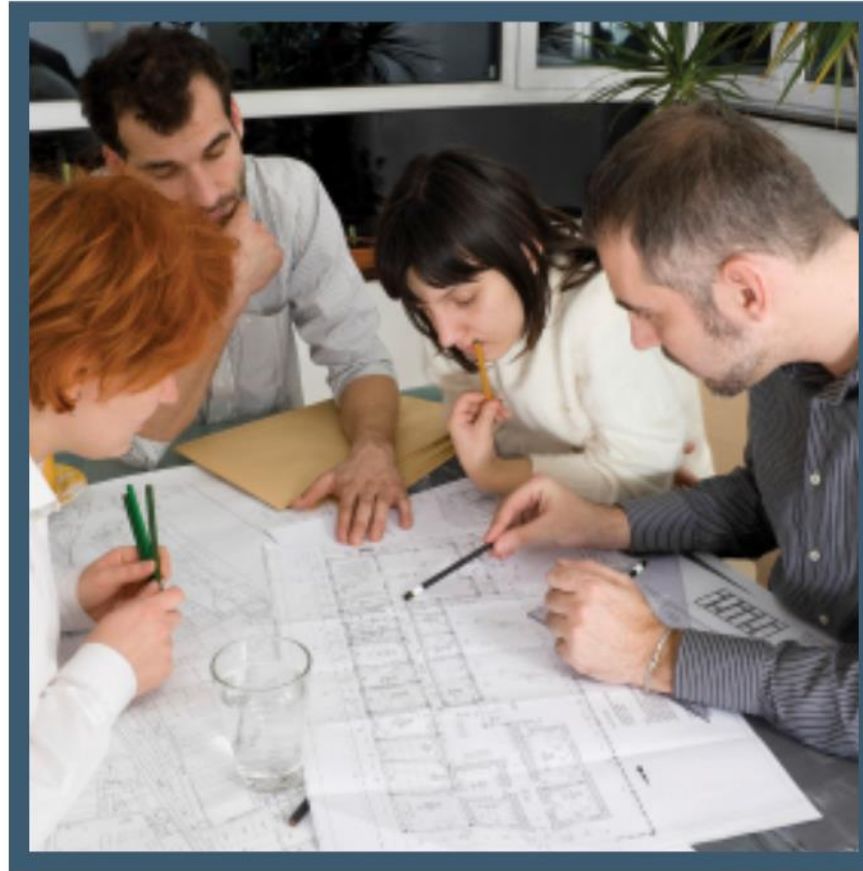
» accounts for human experience

**LEED** v4



LEEDv4 CREDIT:

## INTEGRATIVE PROCESS



IDENTIFY AND USE OPPORTUNITIES TO ACHIEVE SYNERGIES  
ACROSS DISCIPLINES AND BUILDING SYSTEMS





## LEEDv4 BD+C & EBOM PERFORMANCE-RELATED CREDIT: **DEMAND RESPONSE**

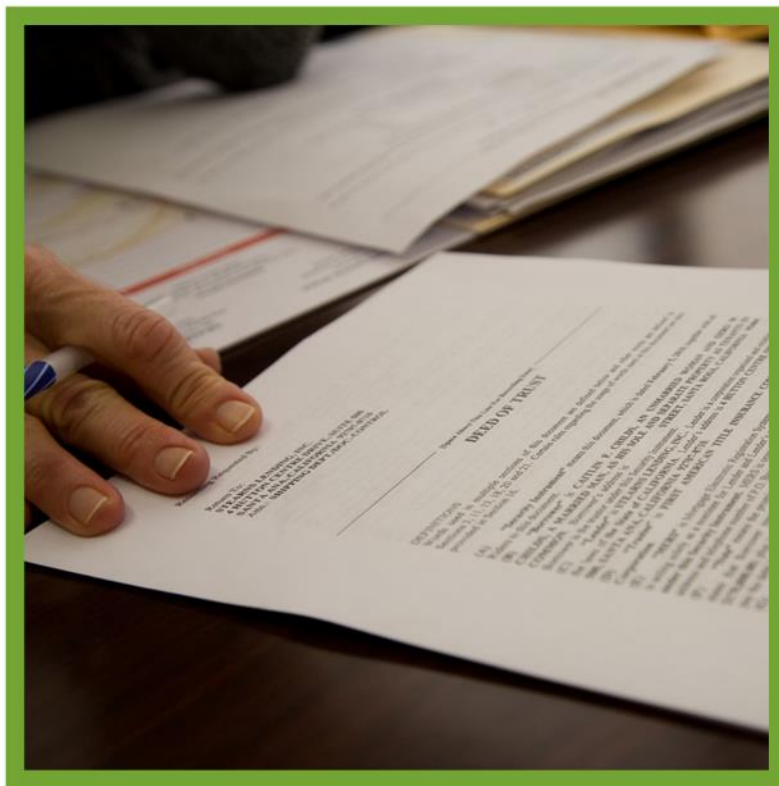


PARTICIPATE IN DEMAND  
RESPONSE PROGRAMS THROUGH  
LOAD SHEDDING OR SHIFTING



LEEDv4 BD+C & ID+C PERFORMANCE-RELATED CREDIT:

## BUILDING PRODUCT DISCLOSURE AND OPTIMIZATION - ENVIRONMENTAL PRODUCT DECLARATIONS



DISCLOSURE PATH



OPTIMIZATION PATH



155

# LAKE MILLS

## Elementary School

Appleton SHAW watchfire







P&ER<sup>TM</sup>

PERFORMANCE  
EXCELLENCE IN  
ELECTRICITY  
RENEWAL

**PEER** is a rating system  
for electricity generation,  
transmission, and  
distribution.





# DIVERSE STAKEHOLDERS WITH DIVERSE NEEDS



service providers



utilities



cities



businesses



regulators

PEER CATEGORIES





# Reliability and Resiliency

To ensure the reliable delivery of electricity and reduce interruptions and power quality issues.





# Energy Efficiency & Environment

To assess the environmental impact of electricity generation and transmission, encourage adoption of clean and efficient energy.



# Operations, Management & Safety

To leverage value gap analysis to identify and eliminate financial waste, improve the safety of operation.



## Grid Services

To measure the support mechanisms provided by utility to customers & vice-versa their contribution to grid service.



# BENEFITS OF PEER



# RESILIENCY & SAFETY FOCUS





A photograph of a modern multi-story building with a combination of brick and glass facades. The building features large glass windows that reflect the sky. In the foreground, there is a curved glass structure, possibly a walkway or entrance canopy, and some greenery. The sky is blue with light clouds.

EXCELLENT RELIABILITY  
& POWER QUALITY





# ENVIRONMENTAL IMPACT REDUCTION





# WASTE ELIMINATION & VALUE STREAM IDENTIFICATION

A photograph of two men in a technical environment, likely a control room or server room. Both men are wearing white hard hats and safety glasses. The man on the left is wearing a white short-sleeved button-down shirt. The man on the right is wearing a dark blue polo shirt and khaki pants. They are both looking down at a brown clipboard held by the man on the right. The background is filled with complex electronic equipment, including racks of modules with circular ports and various cables. A white square ventilation grille is mounted on the wall to the right.

# CONTINUOUS IMPROVEMENT PLANNING





# CASE STUDIES



# University of Texas - Austin

A PEER certified campus



# Impact of PEER Strategies

---

## Challenges

Potential damage to sensitive equipment in Lab and Research facilities due to Power quality issues rising out of Variable speed drives (VSDs)

## PEER Strategies

Harmonic filters are used on a substantial portion of its VSDs. UT Austin now measures voltage swells, dips, & total Harmonic Distortion.

# Impact of PEER Strategies

---

## Challenges

Lack of risk-preparedness

## PEER Strategies

Risk Assessment done for critical equipment's & failure modes are identified.

# Impact of PEER Strategies

---

## Challenges

Improve efficiency and prevent the heat loss from CHP system

## PEER Strategies

Installation of duct burners between the gas turbine exhaust outlet and the Heat Recovery Steam Generator



# Impact of PEER Strategies

---

## Need

Reliability Improvement & Benchmarking

## PEER Strategies

UT, Austin has a SAIDI value of 10 minutes as compared to Austin Energy's SAIDI of 58, itself far better than the US average of 240.

# Chattanooga

A PEER certified municipal utility



# Impact of PEER Strategies

---

## Challenges

Outages caused due to tornadoes & frequent storms.

## PEER Strategies

EPB's distribution circuits have automated restoration along with intelligent hardware such as smart switches and auto-reclosers.

# Impact of PEER Strategies

---

## Need

Requires advanced communication network for data transfer & smart metering systems

## PEER Strategies

EPB installed a secured interoperable fiber optic network as primary means of communication to all smart grid systems.



# Impact of PEER Strategies

---

## Need

Reliability Improvement & Benchmarking

## PEER Strategies

EPB has 50% lower SAIDI as compared to state of Tennessee's average SAIDI.



**THE Sustainable  
SITES  
Initiative®**





Every project holds the potential to conserve, restore and create the benefits provided by **healthy ecosystems.**







Communities protecting  
open space reported  
savings of **\$200,000** per  
year in property damage  
caused by floods.







Capital cost savings  
ranged from **15 to 80%**  
with green infrastructure







Trees & other vegetation  
report savings ranging  
from **10-50%** on energy







Projects with trees &  
other green spaces  
increase property values  
by **3 to 15%** & increase  
rental rates by **7%**.





Studies have found a positive correlation between high-performing **landscapes** and overall **well-being**.







# The University of Texas at El Paso



Area: 11.57 acres  
Former Land Use: Greyfield

### Key Features:

- Pedestrian-oriented, accessible green spaces
- Vegetated bioswales
- Replacement of asphalt with native vegetation
- 641 quiet outdoor spaces for mental restoration
- 1884 seats for social interaction







# **National Renewable Energy Lab (NREL) Research Support Facility**



Area: 29.44 acres

Former Land Use: Greyfield

**Key Features:**

- Low-Impact natural storm water drainage
- Prairie restoration and Conservation of natural habitats on site
- Pedestrian LED Lighting
- Part of Net-Zero LEED Platinum Research Support Facility







Parksmart



**Parksmart** is the world's only rating system defining & recognizing sustainable practices in parking structure management, programming, design & technology.



RESIDENTIAL



AIRPORTS



HEALTHCARE



OFFICE  
BUILDINGS



HOSPITALITY



MUNICIPAL



MIXED-USE



UNIVERSITY



# EXISTING GARAGES

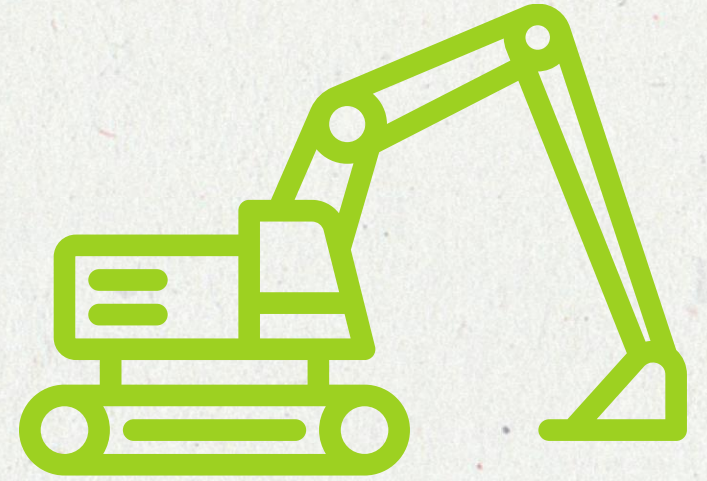
- Assesses & improves the triple bottom line performance
- Assures owners that parking asset managers & operators are state-of-the-art, high-performing managers
- Celebrates & recognizes forward-thinking facilities shaping tomorrow's sustainable mobility network
- Enables continuous improvement





# NEW CONSTRUCTION

- A design standard
- Ensures triple bottom line performance
- Recognition as a forward-thinking facility shaping tomorrow's sustainable mobility network
- A self-updating hedge against parking asset obsolescence.







---

**MANAGEMENT**  
**PROGRAMS**  
**TECHNOLOGY & STRUCTURE DESIGN**

# BANK OF AMERICA PLAZA

Los Angeles, CA

**Spaces:** 2,128

**Use:** 55-story office tower



Over 125% oversell of spaces through shared parking program



Ten level II electric vehicle charging ports available



Two hybrid carshare vehicles and 100 bicycle parking spaces available for patron use





# POST OFFICE SQUARE

Boston, MA

**Spaces:** 1,400

**Use:** Mixed



Eliminated use of all garage cleaning chemicals



Supports 1.7 acre park in Boston's financial district



Groundwater harvesting system that saves 2,000 gallons of potable water every day





A low-angle, upward-looking photograph of several modern skyscrapers with glass facades. The buildings are arranged in a way that creates a sense of height and scale, with lines converging towards the top of the frame. The sky is a pale, clear blue. The text "ALL CITIES IN" is overlaid in the center in a large, white, sans-serif font.

ALL CITIES IN





# LEED for Cities





# LEED for Cities:



- ✓ Supports continuous progress toward a better city & a higher quality of life
- ✓ Helps a city set performance goals & implement strategies to reach those goals
- ✓ Tracks performance data to measure progress towards those goals
- ✓ Leverages a wide range of rating systems, standards, protocols & guidelines

# THE BENEFITS:



- ▶ Demonstrate your city's commitment to sustainability, human health, economic prosperity & quality of life
- ▶ Educate residents & visitors on the importance of sustainability measures
- ▶ Support performance reporting and achievements at the city-scale
- ▶ Provide shared accessibility and continuity of data across teams and over time



# THE BENEFITS:



- ▶ Meet your city's CO2 emissions reduction targets & support your country in meeting its climate action goals
- ▶ Communicate your city's sustainability and quality of life performance consistently
- ▶ Identify policies that will reduce the impact & improve the performance of your city over time





## FLEXIBLE & SCALABLE PLATFORM:



- ▶ The performance score uses 14 metrics related to energy & carbon, water, waste, transportation, education, prosperity, equitability, health & safety
- ▶ Arc can also measure data on 250+ quantitative & qualitative parameters, for more detailed evaluation

- City provides data across 5 categories to generate score:

- Energy
- Water
- Waste
- Transportation
- Human Experience

# SCORING 1-100





# PERFORMANCE, SCORED.

Energy:

out of 33

Water:

out of 15

Waste:

out of 8

Transportation:

out of 14

Human Experience:

out of 20

**Base score:** out of 10

# Improve performance and certify to LEED for Cities:



Step 1: Register  
your city in arc



Step 2: Pre-certify



Step 3: Share data  
to receive a score



Step 4: GBCI review  
of data



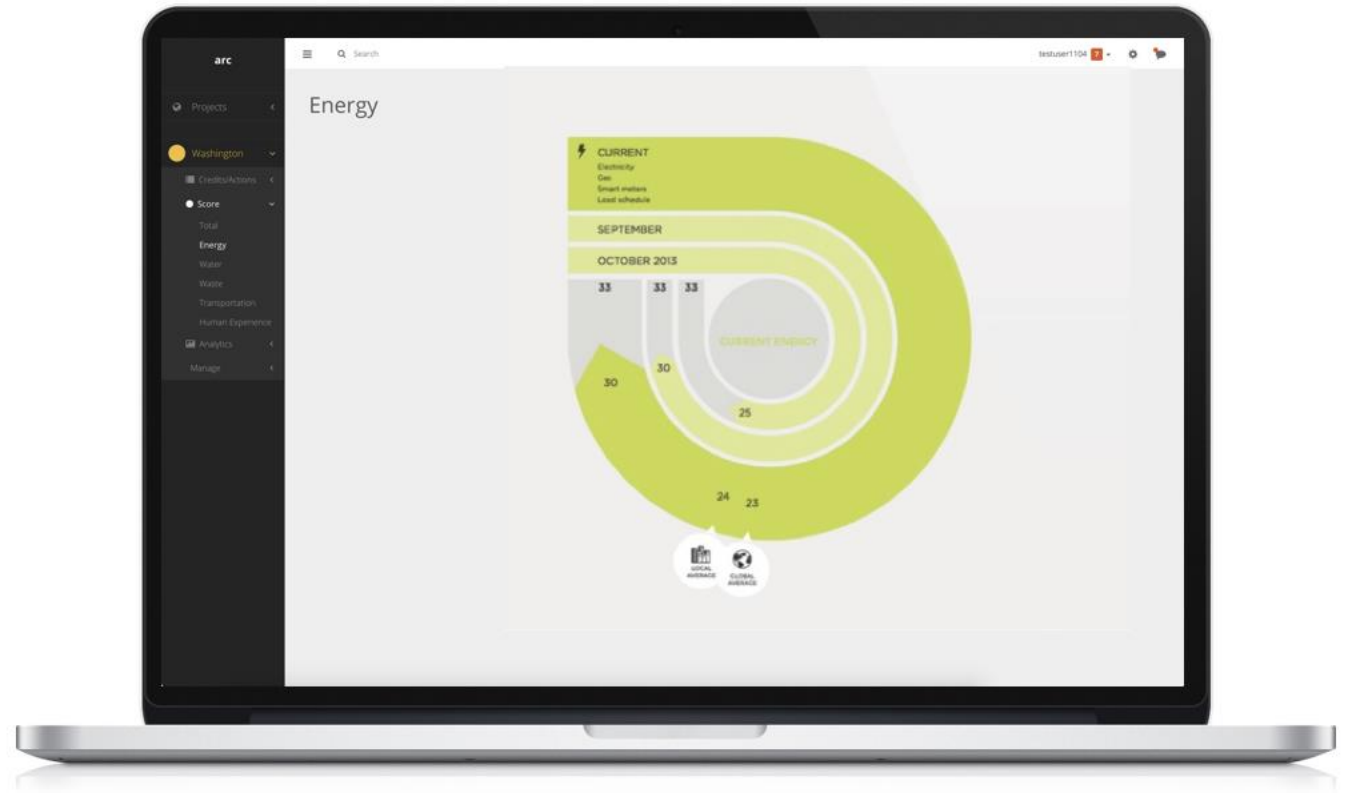
Step 5: Certify to  
LEED for Cities



# ENERGY

- GHG Emissions (CO<sub>2</sub> equivalent) - Tons/Year/Per Capita

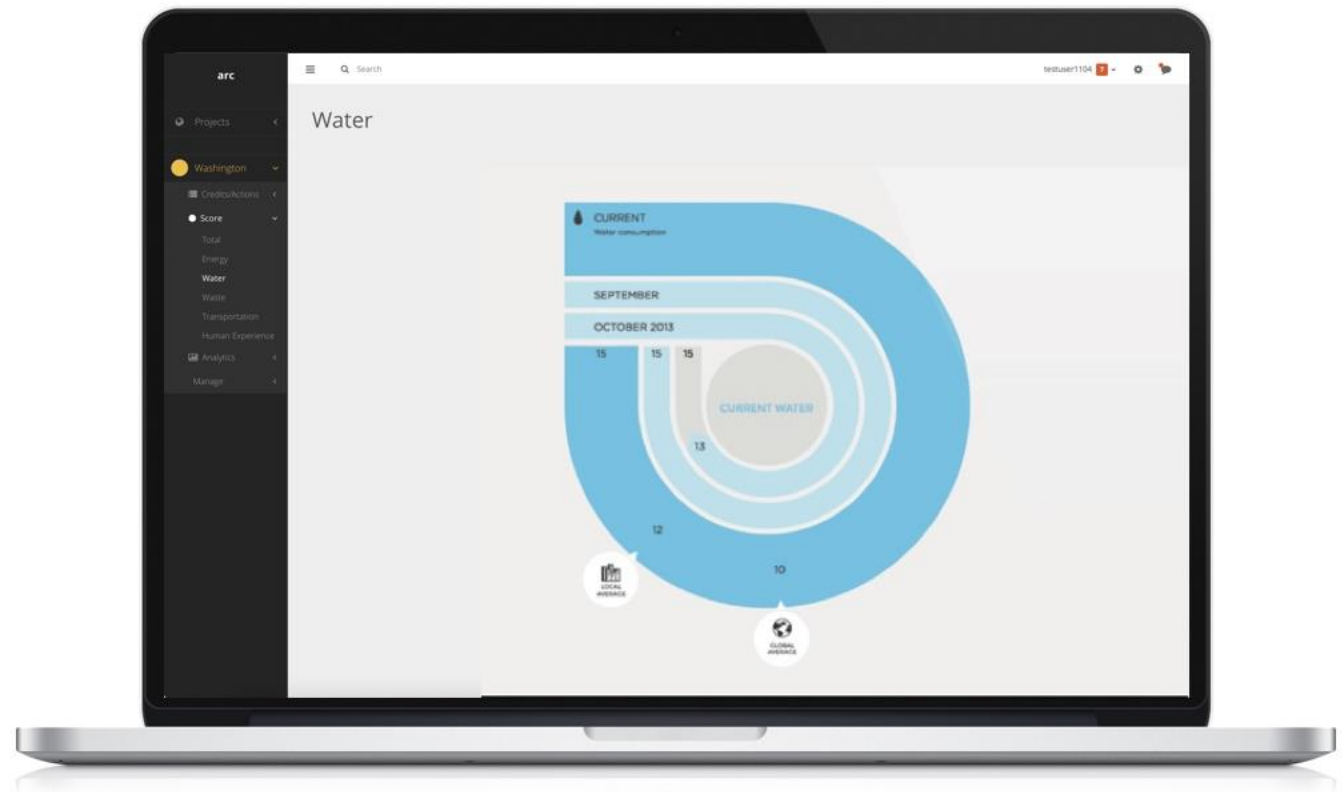
# ENERGY SCORE: 0-33



# WATER

- Water Consumption - Amount/Year/Person

# WATER SCORE: 0-15

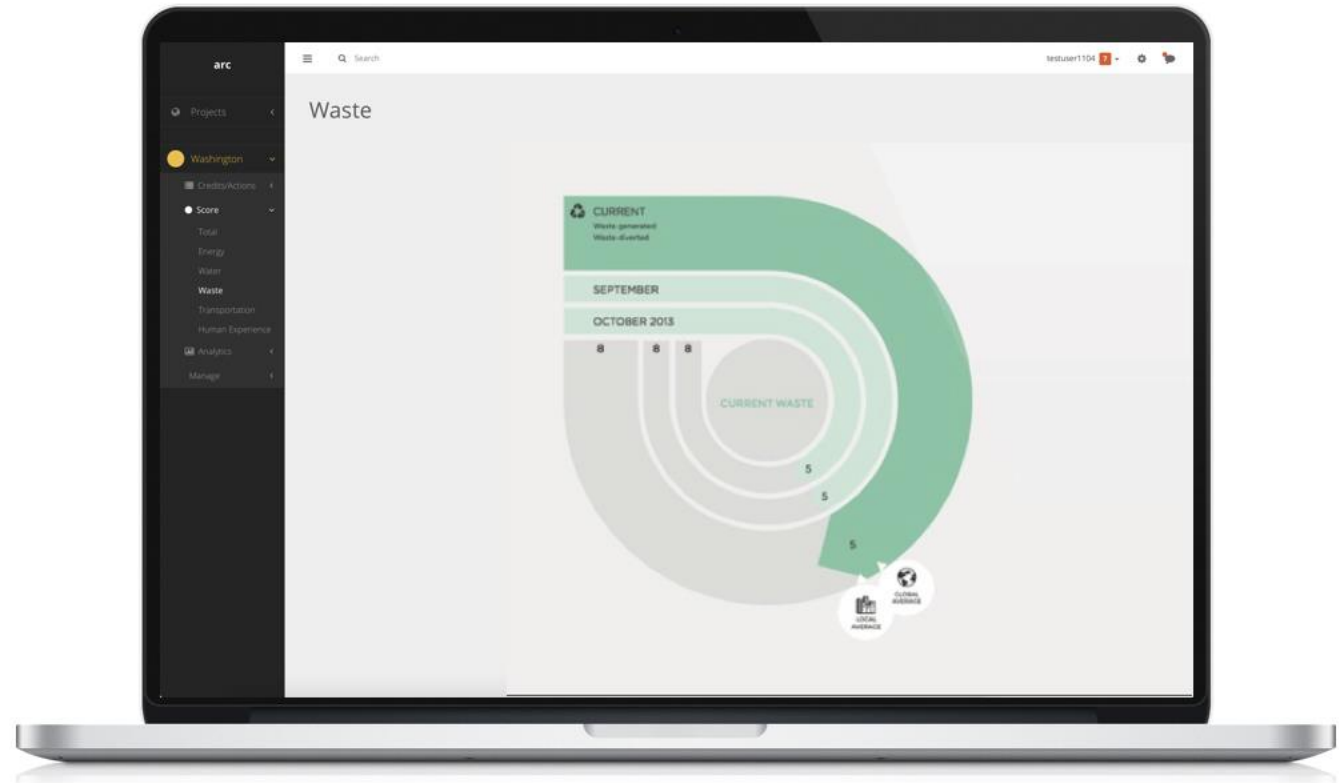




# WASTE

- Municipal solid waste generation intensity (Weight/Year/Person)
- Municipal solid waste diversion rate from landfill (%)

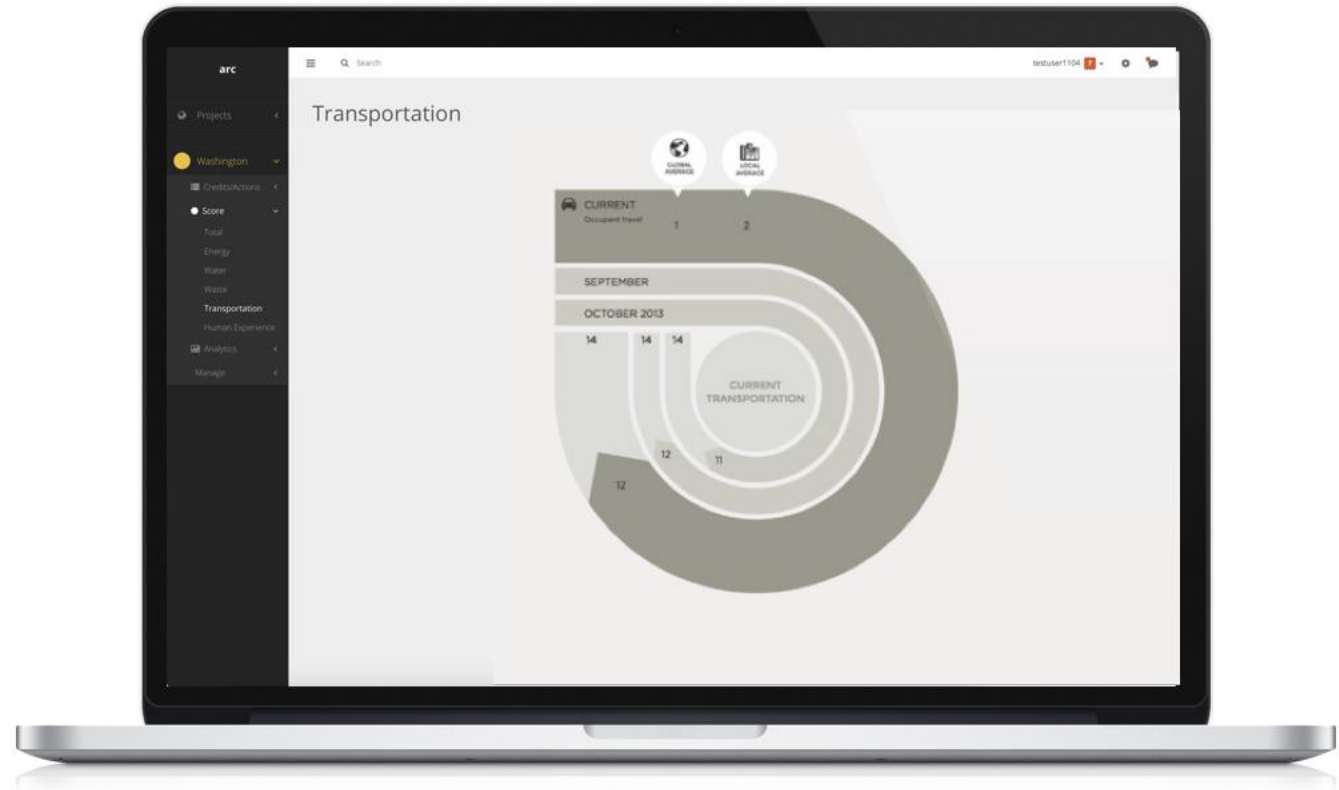
## WASTE SCORE: 0-8



# TRANSPORTATION

- Distance traveled in individual vehicles daily

## TRANSPORTATION SCORE: 0-14

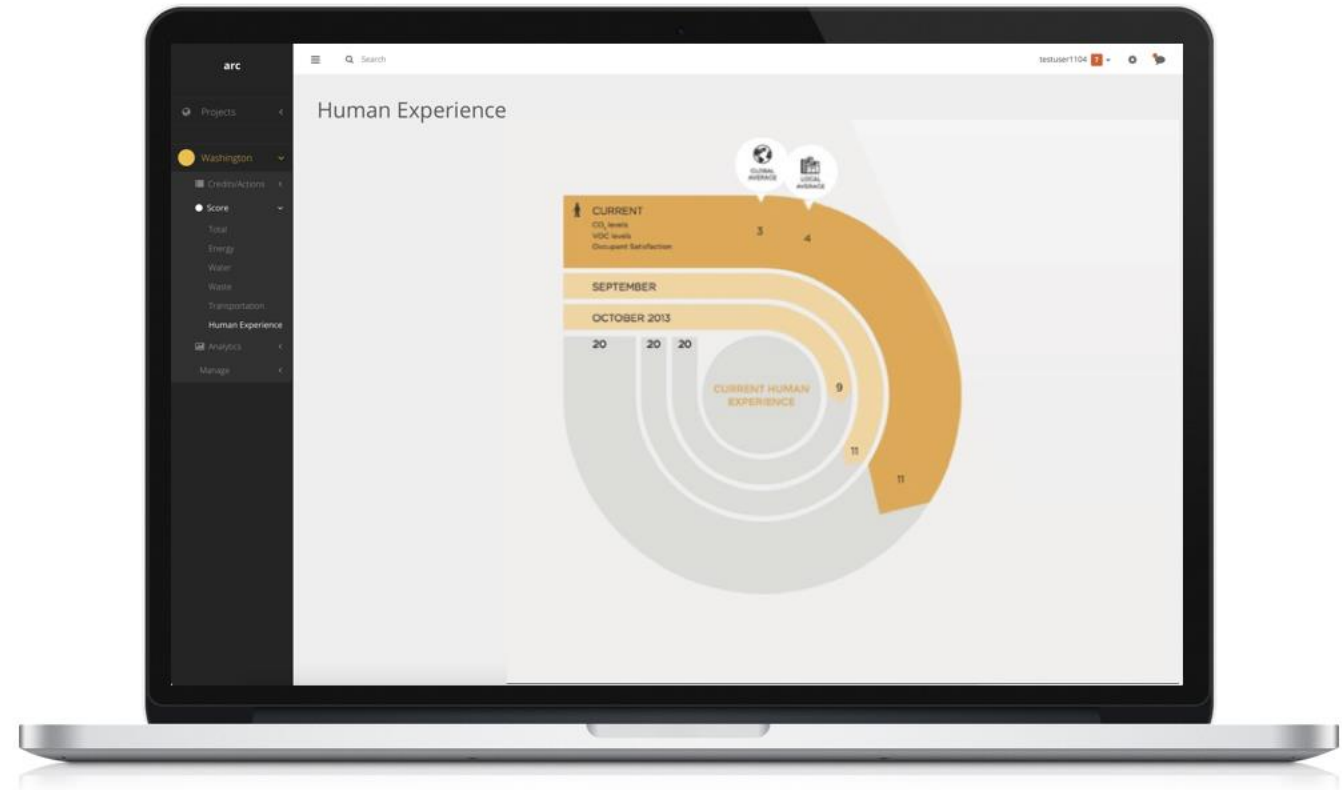




# HUMAN EXPERIENCE

- Population with (at least) High School Degree, Unit: % of Population 25 Years And Over
- Population with (at least) Bachelor's Degree, Unit: % of Population 25 Years And Over
- Median gross rent as % of household income
- Gini coefficient (for income distribution)
- Median household income (USD per year)
- Unemployment rate (%)
- Median air quality index
- Air quality days unhealthy for sensitive groups (Days/Year)
- Violent Crime (per capita per year)

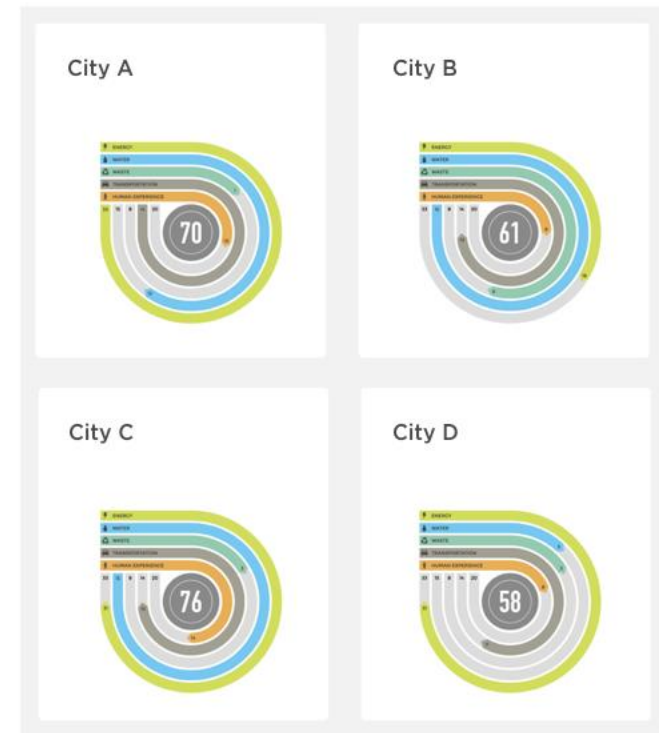
## HUMAN EXPERIENCE SCORE: 0-20



# OPEN & INTEGRATED

## STRATEGIES

LEED, PEER, SITES, WELL,  
EDGE, GRESB, Parksmart, City  
Protocol Society, STAR,  
Bioregional, Climate Positive,  
ICLEI, Carbon Disclosure  
Project, China EcoCity,  
ISO37120 ...







## DC: THE WORLD'S FIRST LEED PLATINUM CITY



#1

In LEED certified square footage per capita of **any state in the country**

#2

In number of **LEED certified projects in a city**

546

LEED certified residential projects representing **6,418 residential units**

1st

Major League Baseball stadium to earn LEED certification: **Nats Park**

858

LEED certified commercial projects, representing **153,436,465 certified square feet**

>2000

Commercial projects currently **certified and registered**



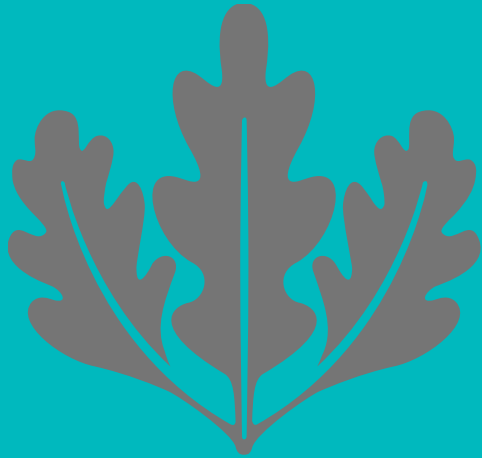
GOVERNMENT OF THE  
DISTRICT OF COLUMBIA  
MURIEL BOWSER, MAYOR



octo



# Thank You



[usgbc.org](http://usgbc.org)  
[gbci.org](http://gbci.org)

[avij@gbci.org](mailto:avij@gbci.org)