



COLUMBIA | CBIPS

Center for Buildings, Infrastructure and Public Space

RESEARCH PRESENTATION - PHASE III

CASE STUDIES

OF SUSTAINABILITY IN COMMERCIAL REAL ESTATE

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RELEVANT RECOMMENDATIONS

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RECAP & WAY FORWARD

WHAT IS COMMERCIAL REAL ESTATE



Overview of CRE, Current Market Analysis, Future Trends, Prospective Research Topics

Sustainability in CRE, Trends & Future Predictions, Case for ESG & Adoption Framework for CRE Companies



SUSTAINABILITY IN COMMERCIAL REAL ESTATE

CASE STUDIES OF SUSTAINABLE CRE



Case Studies and Interviews for Sustainability in New Buildings, Sustainable Retrofitting and PropTech for Sustainability

Key Learnings and Observations, Important Trends and Data, Making a Statement.



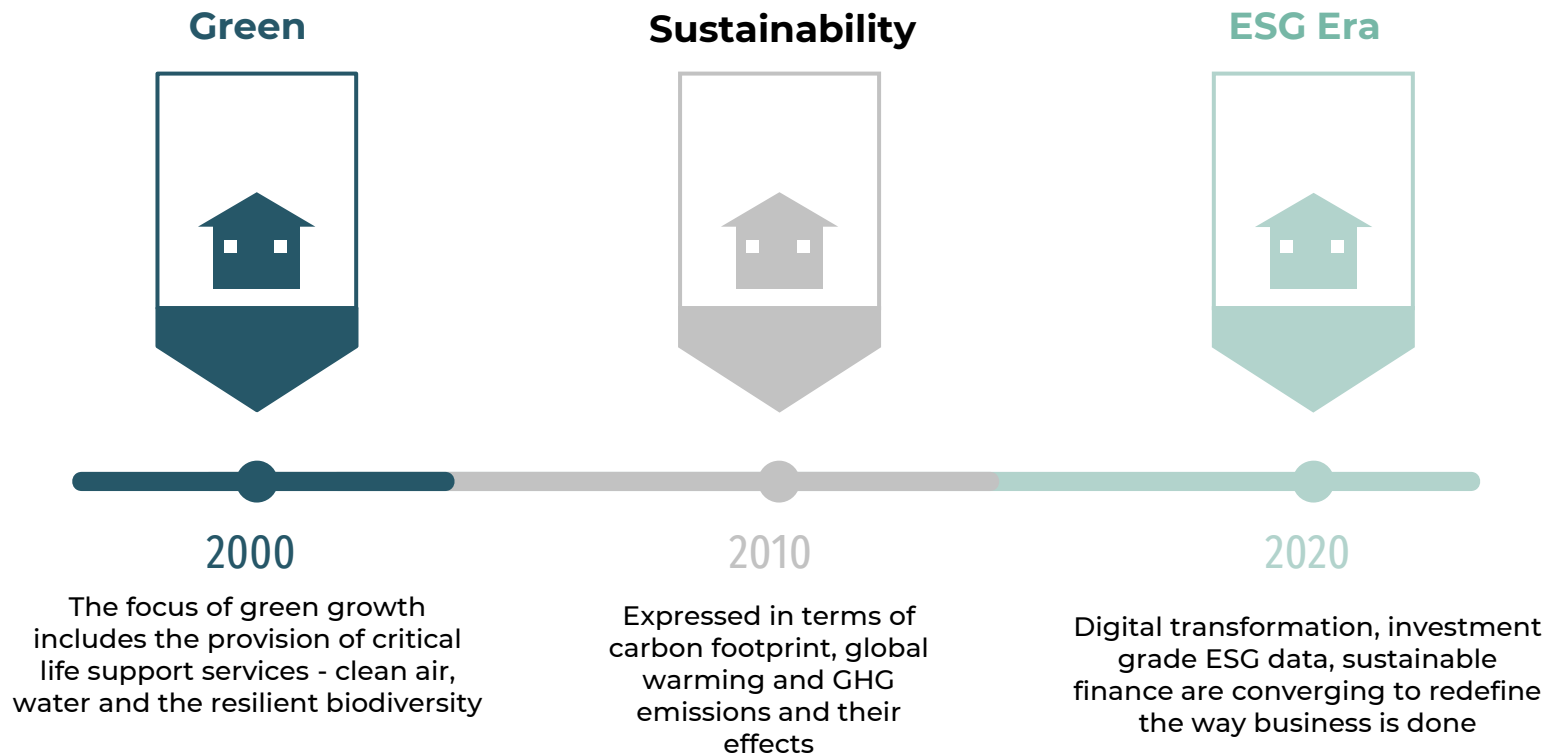
RESEARCH INFERENCES

RESEARCH RECOMMENDATIONS



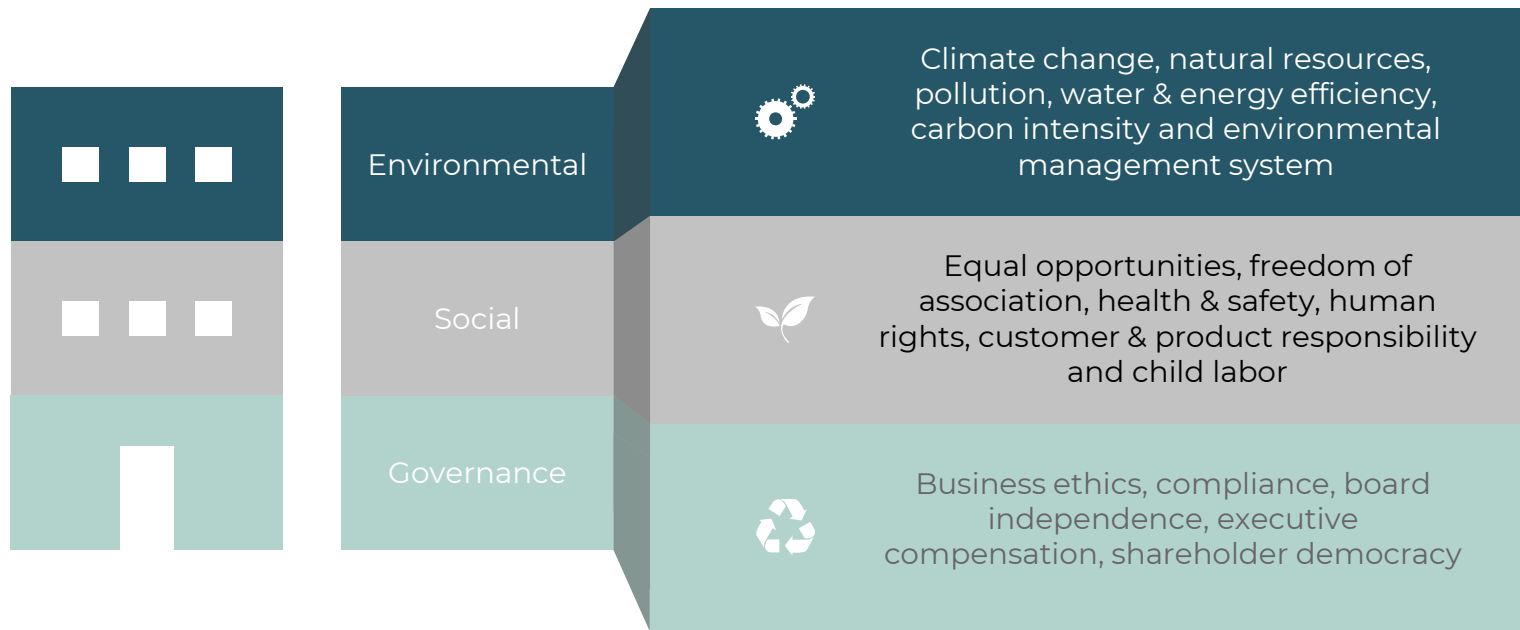
Outlining a way forward, suggestions for CRE companies and key frameworks for scoring and analysis.

EVOLUTION OF SUSTAINABILITY



ESG METRICS

A framework for analyzing companies and assessing how well they perform compared to their peers in terms of critical metrics.



MAJOR MEASURABLES RELATED TO EFFICIENCY

Lighting

LED lighting is 75% more efficient than the conventional incandescent lights and LED lights with a sensors that turn off when no one is present in the room will help immensely in reducing the energy consumption

Renewable Energy

Shifting from conventional energy sources to renewable will be the most efficient way toward sustainability. More landlords are moving towards solar systems on their buildings and some large companies are generating electricity through wind mills to offset their energy consumptions

BMS

Efficient BMS helps in monitoring the performance of all the mechanical and electric system of the building



Chillers and Boilers

Depending on the use of the building, identify the suitable configuration of either VAV system with rooftop unit, Chiller and cooling tower with boiler or water source heat pump with a cooling tower that will result into maximum energy efficiency

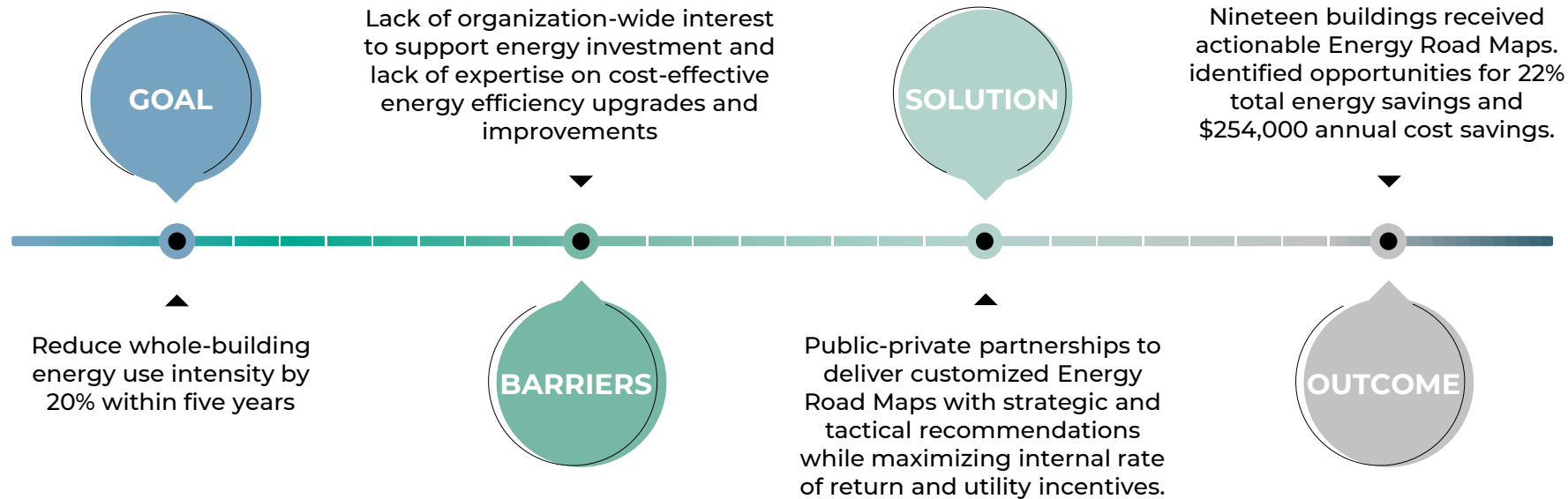
Windows

An efficient window will not only prevent the escape of cool air from the building but the added insulation will also reduce the energy consumption during cold weather

CASE STUDY I: Sustainable Retrofits

Retrofit Chicago Energy Challenge

The Retrofit Chicago Energy Challenge is a voluntary program designed to accelerate energy efficiency in the City's largest private and non-profit buildings to save money, increase asset value, drive economic development, and reduce emissions.



CASE STUDY I: Sustainable Retrofits

Energy Roadmap Development Process

1. Management
Kick-Off

2. Site Visits & Data
Collection

3. ECM Analysis

4. Initial
Recommendation
Review,
Discussion, and
Input

5. Revision,
Prioritization, and
Sequencing of
Recommendations

6. Final Review &
Energy Road Map
Presentation

CASE STUDY I:

Sustainable Retrofits

The Railway Exchange Building

Official Name: 224 South Michigan Avenue

Year Built/ Renovated: 1904/ 1984

Architect: Daniel Burnham

Building Height: 18 Stories

Typical Floor Size: 22,300 SF

Building Class: B

Original Purpose: Office space for Chicago Railroad Administrators and Employees (Workforce: 15,000)

Current Purpose: Design and Architecture Firms, Commercial Office Space, Restaurants & Retail



Source: Chicago Architecture Center, 2019, Wikipedia, 2021

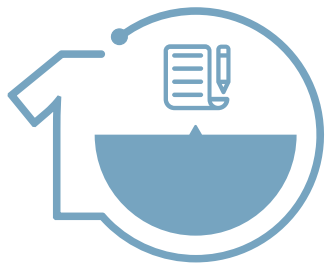
CASE STUDY I: Sustainable Retrofits

The Railway Exchange Building (Retrofit Chicago Initiative)

Sponsoring/ Supporting Organizations: SOM (Skidmore, Owings & Merrill LLP), VOA Associates and Goettsch Partners

Initiative Start Date: Late 2011

SOM's Retrofit Chicago Framework



**Data Tracking
and Reporting**



**Building-Wide
Information
Sharing**



**Energy Savings
Actions**

CASE STUDY I: Sustainable Retrofits

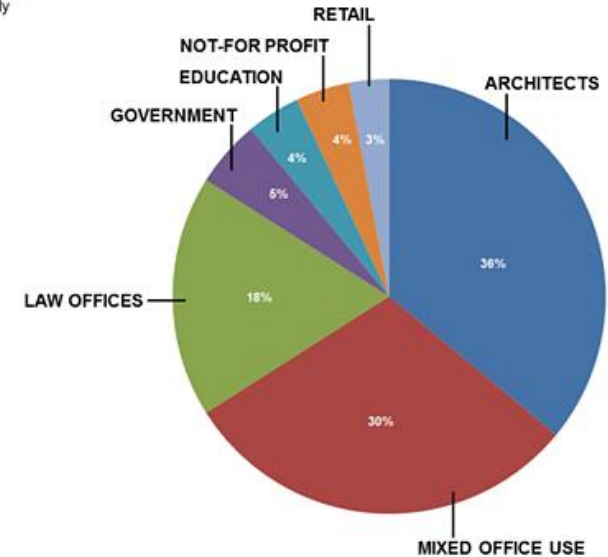
The Railway Exchange Building (Retrofit Chicago Initiative)

Data Tracking & Reporting

- Developed an action-oriented matrix to track transportation, water, energy, waste, and consumables initiatives
- Installed energy metering systems on most mechanical equipment to measure SOM's total EUI in real time
- Monitored total energy consumption, targeting computer, printer, and light fixture energy usage
- Recorded, organized, and charted energy usage levels to share across both the SOM office and with other 224 S. Michigan Avenue tenants.

Building's Tenant Mix

A diverse group of tenants occupy 224 S. Michigan Avenue. SOM, VOA, and Goettsch Partners are the only architecture firms in the building.



RETROFIT CHICAGO COMMERCIAL BUILDINGS INITIATIVE

Source: Retrofit Chicago, 2019, WBDG - Whole Building Design Guide, 2019

CASE STUDY I: Sustainable Retrofits

The Railway Exchange Building (Retrofit Chicago Initiative)

Building-Wide Information Sharing



Monthly meetings to discuss data findings and energy savings actions



Sharing of data and cost-effective strategies among participants



Special workshops for contracted IT departments, printing companies, and office operations staff



Discuss how to maximize energy consumption reductions



Create a benchmark system for all who want to participate in the program

CASE STUDY I: Sustainable Retrofits

The Railway Exchange Building (Retrofit Chicago Initiative)

Energy Savings Actions

- Encouraged SOM employees to shut down computers and printers when not in use
- Recalibrated light fixture dimmers and upgraded T12 fixtures to T8 electronic ballast fixtures to optimize energy savings
- Worked with printing partners to cut down on paper and toner consumption and to set all printing peripherals so that they achieve optimal energy savings

Computer Shut-down

SOM encouraged employees to shut down computers and printers when not in use. The firm also worked with printing partners to cut down on paper and toner consumption and to set all printing peripherals so that they achieve optimal energy savings.

Behavior

Education of users to turn off computer at the end of the day

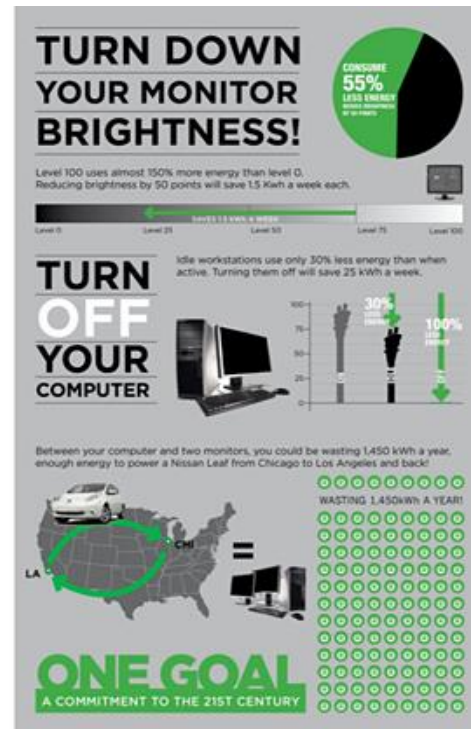
Localized

Software

Purchase of software with automated shut-off controls

Estimated Savings of
16%

RETROFIT CHICAGO COMMERCIAL BUILDINGS INITIATIVE



Source: WBDG - Whole Building Design Guide, 2019

CASE STUDY I: Sustainable Retrofits

The Railway Exchange Building (Retrofit Chicago Initiative)

Project Results

Slashed total energy consumption by 10%, putting the building well ahead of the five-year, 20% energy usage reduction goal.

Building-wide monthly meetings have become one of the most effective tools. Helped attain Gold certification under the LEED Existing Buildings rating system.

Developed a Strategies Matrix that outlines the individual parameters that, when analyzed as a whole, project a complex picture of the building's energy usage.

Helped belay beliefs that energy reduction can only be achieved by taking costly, intensive measures. Motivated tenants with established energy savings initiatives to re-evaluate their efforts, pushing them to find additional reductions.



CASE STUDY II: 151 W 42nd St, New York, NY

- Owned and operated by The Durst Organization, built in 1999 was identified as first green skyscraper in United States
- Underwent a retrofit project that upgraded the following parts of the building:
 - i) New BMS
 - ii) Replaced the original gas-fired absorption chillers with new Multistack electric chillers and condensing hot water boilers
 - iii) New centralized air heating system
- Primary reason: the existing system was at the end of its useful life cycle and thus, it motivated the management to undergo this sustainable retrofit program
- Major challenges:
 - i) Retrofit was carried out while the building was at full occupancy and most of the work was on top of the building relating to the chillers and boilers with a tenant right below the floor
 - ii) Additional electric services needed to be brought up because the new electric chillers were replacing gas-fired absorption chillers
- Energy consumption went down significantly since the retrofit was completed

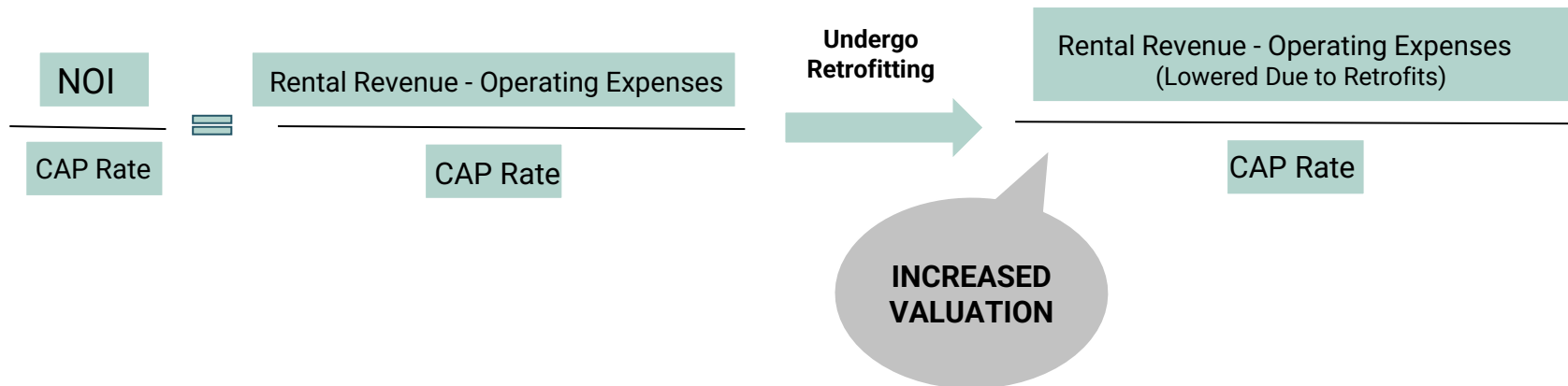


Conclusion:

- Owners how are planning to hold the building for a long period of time are likely more motivated in performing the retrofit program due to the longer payback period.
- Owners are most motivated to undergo retrofit upgrade at the end of the useful life of the equipments

MAJOR ADVANTAGE OF RETROFITS

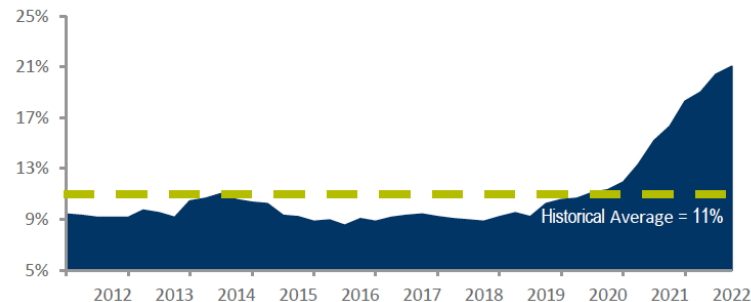
- Utilities cost approximately \$4/SF in expenses and generally utility comprises 25% of the operating expenses
- Any reduction in utilities will directly increase the NOI and thus, the property will get better valuation on the cap rates basis after the savings start to monetize



STRATEGIES DURING TEMPORARY VACANCY

- Vacancy for Q1 2022 was 21%
- Current New Absorption is -1.7 M SF and the average asking rent is \$70.72/SF but this is for the overall asset class and not according to the building classification
- With record high vacancies, this time may be used by building owners and personnel to reflect on and review their present operating methods in order to discover areas where they might be improved. Empty buildings provide us with a chance to address sections or equipment that are often neglected
- Schedule- or timer-based controls for lighting and HVAC systems, for example, are one of the most simple and low-cost strategies that buildings may use
- Many professional-programmed central BMS systems already feature intricate timed setbacks and other occupancy-based controls to improve energy efficiency, but what about the more basic, local controls present in thousands of Class B and C buildings?
- For achieving NYC's Carbon Neutral goal, government should start working on incentivising owners who undergo retrofit projects through some subsidies with the equipments to promote the widespread adoption of efficient equipments by the building owners

OVERALL VACANCY



CASE STUDY III: The Edge, Amsterdam, Netherlands

- Completed in 2014, 40,000 sq m area, designed by PLP Architecture and developed by OV Real Estate
- It has been acknowledged as the most sustainable and the smarties office building
- It received 98.36% on BREEM (Building Research Establishment Environmental Assessment Method)
- Major tenants include: Deloitte, AKD, Henkel, Sandvik, Edelman
- Notable features:
 - i) Designed in a way to receive maximum advantage of sunlight
 - ii) The Edge's heating and cooling are controlled in a sustainable manner. As a result, two groundwater sources, one for cold water and the other for warm water, are located 130 meters beneath. Depending on the internal and external climate, these so-called aquifer thermal energy storage pumps push warm or cold water into or out of the structure. Self-generated solar electricity powers the installation pumps. As a result, The Edge makes the best use of all sustainable options.
 - iii) Tenants can regulate the light as well as temperature through an application
 - iv) Uses solar power generated from the panels placed on the roof and the south facing facade



Conclusion:

- Sustainable workplaces attracts more workforce as well as tenants. Deloitte says people approach them because they want to work in the Edge

MEASURABL



ESG platform built for commercial real estate with nearly 11 billion square feet of owned and corporate-occupied real estate across 80 countries subscribed to its platform.



Measurabl has established itself as the industry-standard for measuring, managing and disclosing real estate ESG performance.



Measurabl offers a wide range of features and functionality to power sustainability measurement, management, and reporting across your entire real estate portfolio.

ADVANTAGES OF TOOL ADOPTION



**Automated Utility Data
Collection and
verification**



Physical Climate Risk



Cohort Insights



**Seamless ESG
Disclosure**



**Sustainable Building
Management**



**Document
Repository**



**Carbon Emissions
Calculation**



**Target
Setting**

CASE STUDY IV: Digital Realty Trust

- Digital Realty supports the data center, colocation and interconnection strategies of customers across the world.
- They company focuses on sustainable design of its real assets to minimize environmental impact.
- Major challenges:
 - i)** The company began to collect much of its environmental data and manually analyze on spreadsheets.
 - ii)** The company identified several gaps in its ESG data that would need to be filled.
 - iii)** The environmental team needed a more sophisticated means to collect ESG data from a variety of sources, as well as review and improve the coverage and quality of the data.
- Along with its ESG performance data, Measurabl's platform has offered the team a single place to track projects, certifications, and KPIs such as raw data, change, and progress percent.
- Measurabl's search functionality, for example, has made it simple for the team to double-check information about energy performance, ongoing improvement projects, and so on.



Conclusion:

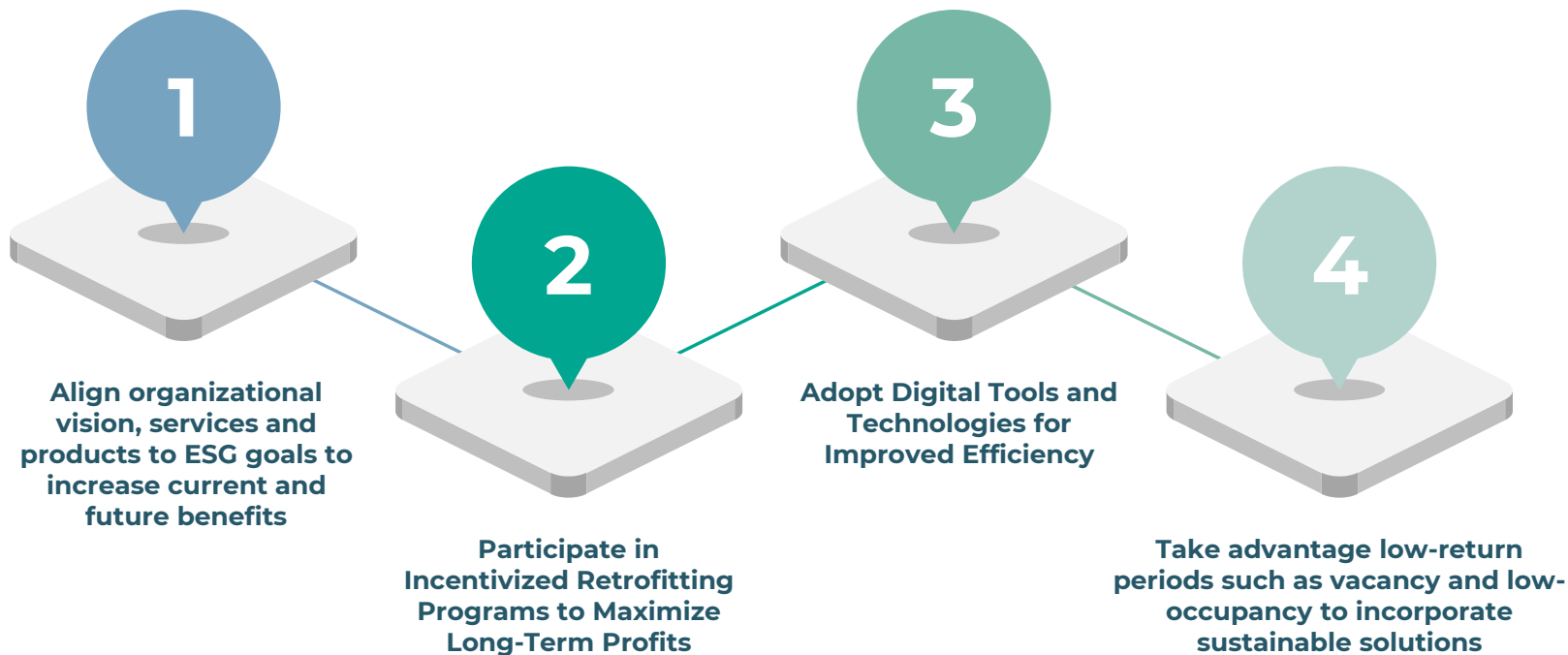
- Measurabl has helped Digital Realty improve its data coverage and quality and has streamlined its ESG reporting.
- More than 30 of Digital Realty's US properties have earned ENERGY STAR certification.
- Digital Realty has become the largest REIT issuer of green bonds, with a total of €4.6 billion issued since 2015.

CASE STUDY IV: Digital Realty Trust

- Further Goals:
 - i)** In the future, Digital Realty will use the Science-Based Target Initiative (SBTi) to set a carbon reduction objective, taking a holistic approach to lowering emissions across all of its business activities.
 - ii)** The company has set ambitious targets to reduce greenhouse gas emissions.
- Recommendations:
 - i)** Different people would have different opinions and importance for the ESG metrics and factors. So there is always a compromise around how the ESG framework is going to be applied.
 - ii)** The company has to set a goal and understand the overall mission of the company. Everyone needs to share a common vision and work towards a more sustainable future with the help of these ESG initiatives and tools.



RELEVANT RECOMMENDATIONS



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