ERIN A.
HOPKINS

SUSTAINABLE PROPERTY MANAGEMENT

Although *sustainability*, as used in the real estate context, is about preserving the environment, it is about more than that. In sustainable property management, sustainability encompasses three spheres—environmental, social, and economic. Sustainable property management is about reconciling these three spheres throughout the operations and maintenance phases of the building lifecycle in such a way that a balance is achieved between economic development and the protection of environmental and social resources.

Sustainable Property Management explains how ecologically sustainable concepts may be implemented throughout the property management operation functions while also considering the other spheres of sustainability. It also incorporates the theme of sustainable building practices as a human science as well as a building science by highlighting motivations and impacts to various stakeholders. The author draws on industry examples to illustrate these concepts and provides many experiential activities through which students can apply these concepts.

This textbook is intended for students majoring in property management and real estate at both the undergraduate and graduate levels. It can be incorporated into an existing property management operations course or used for a stand-alone course focused on sustainable property management. It is available online for free in multiple formats and also as an affordable print edition.

LIBERAL ARTS AND HUMAN SCIENCES
APPAREL, HOUSING, AND RESOURCE MANAGEMENT
VIRGINIA TECH

In association with

VIRGINIA TECH PUBLISHING

Cover design: Kindred Grey
Cover image: Danist Soh via Unsplash
DOI: https://doi.org/10.21061/sustainable_property_management
ISBN: 978-1-957213-38-5

Sustainable Property Management

ERIN A. HOPKINS

PDF AND EPUB FREE ONLINE AT: https://doi.org/10.21061/sustainable_property_management

VIRGINIA TECH DEPARTMENT OF APPAREL, HOUSING, AND RESOURCE MANAGEMENT
IN ASSOCIATION WITH VIRGINIA TECH PUBLISHING
BLACKSBURG, VA

Suggested citation: Hopkins, Erin A. (2023). *Sustainable Property Management*. Blacksburg, VA: Virginia Tech Department of Apparel, Housing, and Resource Management. https://doi.org/10.21061/sustainable_property_management. Licensed with CC BY-NC-SA 4.0 https://creativecommons.org/licenses/by-nc-sa/4.0.

Publisher: This work is published by the Virginia Tech Department of Apparel, Housing, and Resource Management in association with Virginia Tech Publishing, a division of the University Libraries at Virginia Tech.

Virginia Tech Department of Apparel, Housing, and Resource Management
240 Wallace Hall (0410), 295 West Campus Drive, Blacksburg, VA 24060

Virginia Tech Publishing, University Libraries at Virginia Tech
560 Drillfield Drive, Blacksburg, VA 24061 USA
https://publishing.vt.edu | publishing@vt.edu

Peer review: This book has undergone single-blind peer review by four external reviewers and two students.

Accessibility statement: Virginia Tech Publishing is committed to making its publications accessible in accordance with the Americans with Disabilities Act of 1990. The Pressbooks (HTML), ePub, and PDF versions of this text are tagged structurally and include alternative text, which allows for machine readability.

Publication cataloging information:
Hopkins, Erin A., author
Sustainable Property Management / Erin A. Hopkins
Pages cm
ISBN 978-1-957213-38-5 (PDF)
ISBN 978-1-957213-39-2 (ePub)
ISBN 978-1-957213-40-8 (Pressbooks) https://pressbooks.lib.vt.edu/sustainablepropertymanagement
ISBN 978-1-957213-37-8 (Print)
URI (Universal Resource Identifier): http://hdl.handle.net/10919/112742
DOI https://doi.org/10.21061/sustainable_property_management

1. Sustainable development--Textbooks.
2. Real estate management--Textbooks.
   Title Sustainable Property Management
   HC79.E5

Disclaimers: The definition of *sustainability/sustainable development* is used under fair use from the United Nations Brundtland Commission. Trademarks and logos used within this publication are property of their respective owners and are used for illustrative purposes only.

Special thanks: This project was made possible in part by an Open Course Grant from VIVA, the Virtual Library of Virginia. Project management, graphic design, editorial, and publishing support was provided by the Open Education Initiative of the University Libraries at Virginia Tech.

Cover art: Danist Soh via https://unsplash.com/photos/n-3Pn7Ybe-s
Illustration and cover design: Kindred Grey

Contents

Introduction

Goals for this Book

This textbook aims to link sustainability to real estate and property management—both of which are inherently placed-based disciplines. It provides students with a holistic perspective that looks at how sustainable property management across property types contributes to human and ecological health while also considering financial impact. It aims to equip future property management leaders with both a holistic perspective on sustainable property management and knowledge to recommend specific strategies that make buildings more sustainable at both an asset level and company level.

About this Book

This textbook begins with an introduction to sustainable property management and discusses why a broader and measurable perspective is important to sustainable property management. Specific sustainable practices are then put forward for the maintenance and repair, risk management, marketing and leasing, and accounting and finance functions. The book concludes with health and well-being considerations for sustainable property management. There are chapter discussion questions and activities to aid students in processing and applying the information in each chapter.

Target Audience

This textbook is intended for university students majoring in property management and real estate at both undergraduate and graduate levels. It can be incorporated into an existing property management operations course or used for a stand-alone course focused on sustainable property management. Students who take this class will have a variety of backgrounds, including students who have never taken a property management or real estate course. It is available online for free in multiple formats and also as an affordable print edition.

Features of this Book

- Example-rich narrative
- Graphic elements that illustrate and reinforce concepts
- Linked online glossary (glossary appears at the end in PDF and print)
- Section-level videos
- Linked end-of-section references for additional reading
- Embedded navigation and image alt-text for screen readers
- Available free online, in PDF, and ePub; print is available at the vendor cost of production
- Adaptation and sharing permitted via the Creative Commons Attribution NonCommercial ShareAlike (CC BY-NC-SA 4.0) license
- Instructor community portal enables sharing of ancillary resources
- Register Your Use form allows instructors to opt in to receive book updates
- Errata and Report-an-error/Share-a-suggestion forms promote currency

The short introductions at the start of each chapter give students a brief overview of the chapter and its content. Illustrations and examples throughout the chapters foster deeper learning for students. Major terms that students need to know are hyperlinked with definitions. These terms and definitions are also provided in a glossary at the end of the book.

Impact

The hope for this textbook is that it enables a broader range of students (e.g., those with challenging financial situations) to have an equal opportunity in property management courses, as this is a textbook at no cost to students.

Also, it is hoped that this resource helps instructors at colleges and universities equip future property managers by introducing them to essential concepts regarding sustainable property management operations.

About the Author

Author

Erin A. Hopkins, PhD, serves as an Associate Professor of Property Management within the College of Liberal Arts and Human Sciences at Virginia Tech, where she teaches courses in property management operations and sustainability in the built environment. She has been awarded Virginia Tech's Teacher of the Week and has received recognition in Virginia Tech's "Thank a Teacher" program multiple times. She has twenty-three published journal articles and has served as an associate editor for the textbook *Practical Apartment Management* (7th ed.), *Journal of Green Building*, *Encyclopedia of the UN Sustainable Development Goals*, and *Encyclopedia of Sustainability in Higher Education*. She also serves on the Institute of Real Estate Management (IREM) Foundation's Board of Directors and IREM's Environmental, Social, and Governance (ESG) Advisory Council.

Editorial Team

Kindred Grey is the OER and Graphic Design Specialist at the University Libraries at Virginia Tech. She is a Virginia Tech graduate with majors in statistics and psychology. Kindred's creative abilities are demonstrated in the visual elements of the book: cover design, interior color palette selection, and creation of new figures. She designed with color contrast and accessibility in mind. Her contributions have resulted in a text that is accessible to a wider range of readers, that uses visual content to illustrate and more clearly convey conceptual information, and that is lucid and visually cohesive. Kindred transferred newly drafted text into the Pressbooks publishing software and followed through with the detailed work of formatting, editing, and proofreading.

Anita Walz is Associate Professor, and Assistant Director of Open Education and Scholarly Communication Librarian in the University Libraries at Virginia Tech. She received her MS in Library and Information Science from the University of Illinois at Urbana-Champaign and has worked in university, government, school, and international libraries for over twenty years. She is the founder of the Open Education Initiative at Virginia Tech and the managing editor of over twenty open textbooks adapted or created at Virginia Tech, many of which can be found here: https://vtechworks.lib.vt.edu/handle/10919/70959. For this textbook she collaborated on the project grant proposal, developed project workflows, provided day-to-day developmental oversight, coordinated external peer review, oversaw student review processes, and handled overall project management.

Acknowledgments

Sincere appreciation is expressed to Virginia's Academic Library Consortium (VIVA) for the grant awarded to support this project and the students and external peer reviewers for strengthening this textbook.

Thank you to Anita Walz for her project management assistance and Kindred Grey for her graphic design assistance for this project.

Contributors

Principal Investigator: Erin A. Hopkins

Co-Investigator: Anita Walz

Peer Reviewers

Dr. Andrew Carswell, University of Georgia

Dr. C. Kat Grimsley, George Mason University

Dr. Frederick Prassas, University of Wisconsin-Stout

Dr. Dina Marie Zemke, Ball State University

Student Reviewers

Jenna Hall

Sarah Warter

Instructor Resources

How to Adopt This Book

This is an open textbook. That means that this book is freely available and you are welcome to use, adapt, and share this book with attribution according to the Creative Commons NonCommercial ShareAlike 4.0 (CC BY-NC-SA 4.0) license, https://creativecommons.org/licenses/by-nc-sa/4.0. Note: All figures in this book are licensed under Creative Commons licenses. Please see the end-of-chapter references for license information for each figure before reuse.

Instructors reviewing, adopting, or adapting this textbook are encouraged to register at https://bit.ly/interest_sustainable_property_management. This assists the Open Education Initiative at Virginia Tech in assessing the impact of the book and allows us to more easily alert instructors of additional resources, features and opportunities.

Finding Additional Resources for Your Course

The main landing page for the book is https://doi.org/10.21061/sustainable_property_management.

This page includes:

- Links to multiple electronic versions of the textbook (PDF, ePub, HTML)
- Link for ordering a print-on-demand version
- Link to the instructor resource-sharing portal (https://www.oercommons.org/groups/resources-for-sustainable-property-management/13687/)
- Link to errata document (https://bit.ly/errata_sustainable_property_management)
- Link to report errors (https://bit.ly/report_error_sustainable_property_management)

Sharing Resources You've Created

Have you created any supplementary materials for use with this book such as presentation slides, activities, test items, or a question bank? If so, please consider sharing your materials related to this open textbook. Please tell us about resources you wish to share by using this form: https://bit.ly/interest_sustainable_property_management or by directly sharing resources under an open license to the public-facing instructor sharing portal: https://www.oercommons.org/groups/resources-for-sustainable-property-management/13687/.

Making Your Own Version of This Book

This book is hosted in PDF and ePub in VTechWorks http://hdl.handle.net/10919/112742 in HTML in Pressbooks https://pressbooks.lib.vt.edu/sustainablepropertymanagement. Note that the Pressbooks platform offers customization/remixing.

List of Abbreviations

- ADS—annual debt service
- BCR—benefit-cost ratio
- BRE—Building Research Establishment (United Kingdom)
- BREEAM—Building Research Establishment Environmental Assessment Method
- BTCF—before-tax cash flow
- CAA—Clean Air Act
- CAPEX—capital expenditures
- CDP—Carbon Disclosure Project
- CSA—community supported agriculture
- CSP—Certified Sustainable Property
- CSR—Corporate Social Responsibility
- DOE—US Department of Energy
- EGI—effective gross income
- EPA—United States Environmental Protection Agency
- EPP—environmentally preferable purchasing
- ESG—environmental, social, and governance
- GHG—greenhouse gas
- GRESB—Global Real Estate Sustainability Benchmark
- HVAC—heating, ventilation, and air condition [system]
- IAQ—indoor air quality
- IEQ—indoor environmental quality
- IPM—integrated pest management
- IREM—Institute of Real Estate Management
- LED—light emitting diode [lightbulbs]
- LEED—Leadership in Energy and Environmental Design
- LEED BD+C—LEED for Building Design and Construction
- LEED O+M—LEED for Operations and Maintenance
- NOI—net operating income
- NPV—net present value
- OPEX—operating expenses
- PV—photovoltaic [arrays and devices]
- REC—renewable energy certificate
- REIT—real estate investment trust
- RFP—request for proposal
- RICS—Royal Institution of Chartered Surveyors
- SBS—sick building syndrome
- SDG—United Nations' Sustainable Development Goals
- TRUE—Total Resource Use and Efficiency
- USGBC—U.S. Green Building Council
- VOC—volatile organic compounds
- WHO—World Health Organization

1. Introduction to Sustainable Property Management

Chapter Contents

Learning Objectives

- Explain the building lifecycle
- Define sustainable property management
- Identify the three spheres of sustainability
- Understand the role of real estate in sustainability
- Explain why sustainable property management matters
- Identify what's driving sustainable property management
- Describe the main barriers of sustainable property management

1.1 Introduction

Every building has a lifecycle that begins with the initial idea conception and continues all the way through to the building's eventual demolition, as illustrated in figure 1.1. **Green building initiatives**, defined as actions undertaken to minimize the environmental impact of a building, can be implemented throughout the **building lifecycle**. This textbook focuses on the operations and maintenance phase of the building lifecycle although there are certainly benefits in greening the building lifecycle in its entirety. **Property management** takes place during the operations and maintenance building lifecycle phase and includes functions such as human resources, relationship management, finance, accounting, maintenance, repairs, risk management, marketing, and leasing. So while greening property management functions cannot impact certain important aspects of the building, such as how the building is sited or built, it can impact the operations and maintenance phase, the longest phase within the building lifecycle.

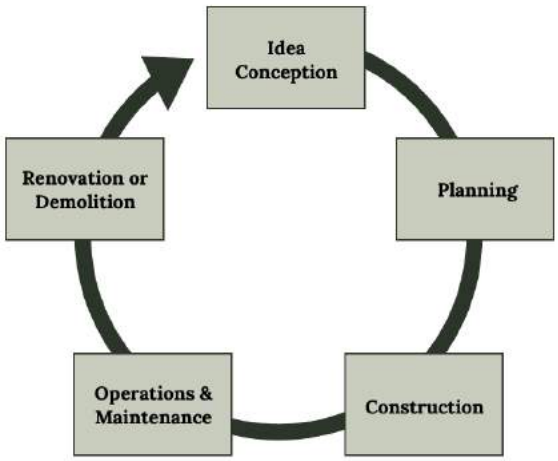

Figure 1.1: Building lifecycle.

The aim of green property management is to mitigate negative ecological effects associated with the building during the operations and maintenance building lifecycle phase. However, sustainable property management is a concept that incorporates the human and social elements of managing green buildings as well as the green buildings themselves. The term *sustainable*, which appears in the title of this book, is used specifically to convey the explicit relationships between humans, the ecological environment, and a building. In many cases, the building is seen as separate from the human, but humans create and manage buildings so they are an integral part when learning about sustainable property management.

This chapter introduces the term *sustainability*, what it means, and how it applies to property management. The chapter also describes the evolution of sustainable property management and introduces why sustainable property management matters. Of course, sustainable property management has many potential benefits, but there are also downsides and barriers, which must be acknowledged in order to understand why sustainable property management is not more pervasive across the property management industry.

1.2 What is Sustainable Property Management?

Sustainability, simply defined as the ability to meet current generation needs without compromising future generation needs, is on the rise across industries and the property management industry is no exception. Although sustainability, as used in the real estate context, is about preserving the environment, it is about more than that. In sustainable property management, sustainability encompasses three spheres—environmental, social, and economic (see fig. 1.2). **Sustainable property management** is implementing green building initiatives during the operations and maintenance phase of the building lifecycle, taking into account their environmental, social, and economic impacts with the goal of reconciling these three spheres in such a way that a balance is achieved between economic development and protection of environmental and social resources.

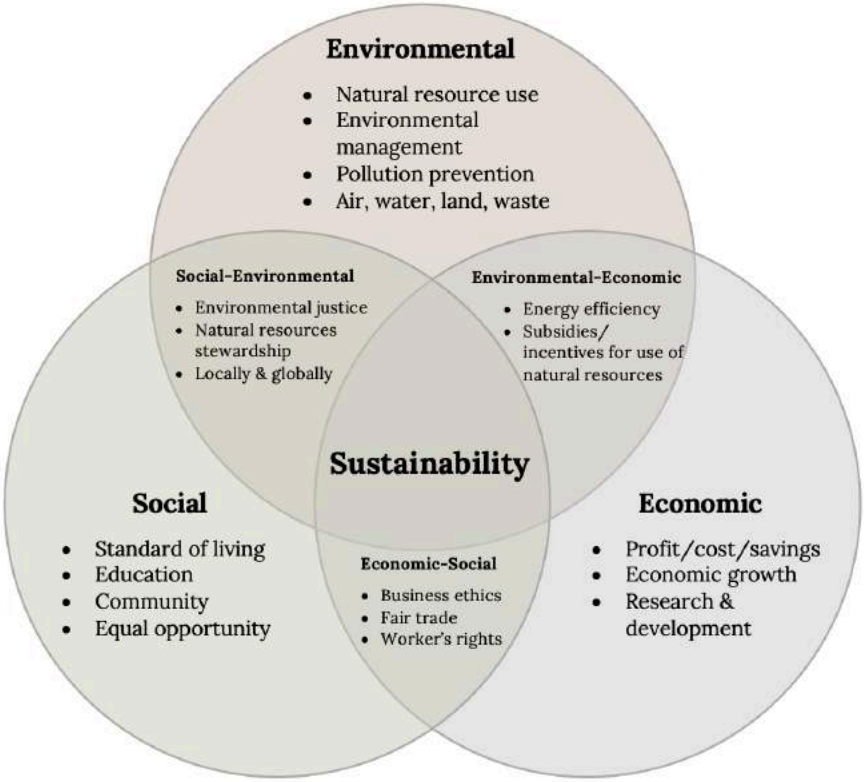

Figure 1.2: The three spheres of sustainability. Image description.

Example: Balancing the Three Spheres of Sustainability in Property Management

One example of balancing the three spheres of sustainability might be when a management company must decide what sort of cleaning practices to employ in a building. Cleaning products that are environmentally friendly might be more desirable for the Earth and human health, but they might also be more expensive, in which case cost must be balanced against the impact on the environment and the impact on human health. Another example is to suppose a new regulation requires all new carpet installations to be low-VOC (Volatile Organic Compounds) as these chemicals used in the carpet manufacturing process can pose a variety of health risks that negatively affect people and the Earth. For this reason, low-VOC carpeting is healthier to humans than high-VOC carpeting. Because of the regulation, Because of the regulation, tenants at all income levels have access to healthier indoor air quality. However, the carpet is expensive and, as a result, owners/managers may either (a) leave existing carpet in longer until it becomes overused and probably unhealthy, making tenants arguably worse off from a health perspective, or (b) pass the cost through to tenants, who are now financially worse off than they would have been in the absence of the new regulation. Note that there is no mechanism to force private sector owners/managers to lower the investment's required rate of return to subsidize the new carpet. Do you support the new regulation? Something to think about in this situation is the possibility of implementing a comprehensive sustainable building plan that overall is able to create net financial savings and therefore a positive financial impact on the rate of return, while also addressing human and Earth health.

Property companies obtain various third-party independent certifications to illustrate commitment to sustainable property management, as illustrated in table 1.1.

Professional Accreditations

Logo	Third-Party Green Building Accreditation	Organization that Developed Accreditation
	LEED Accredited Professional (AP) for Operations and Maintenance (O+M) Certification	U.S. Green Building Council (USGBC)
	LEED Green Associate Credential	U.S. Green Building Council (USGBC)

Building Certifications

Logo	Third-Party Green Building Certification	Organization that Developed Certification
	LEED Certification	U.S. Green Building Council (USGBC)
	Certified Sustainable Property (CSP)	Institute of Real Estate Management (IREM)
	ENERGY STAR® Building Certification	Environmental Protection Agency (EPA)
	Parksmart Certification Standard for Existing Structures	Green Business Certification Inc. (GBCI)
	Building Research Establishment Environmental Assessment Method (BREEAM) In-Use	Building Research Establishment (BRE)
	Green Star—Performance	Green Building Council of Australia

Table 1.1: A selection of global sustainable property management accreditations and certifications.

Arguably, the most widely used green building certification throughout the world is known as LEED—Leadership in Energy and Environmental Design. **LEED certification** for buildings was developed by the U.S. Green Building Council (USGBC), a private non-profit organization founded in 1993, to provide certification opportunities throughout the building lifecycle. This is why there are multiple LEED certifications, including LEED for Building Design and Construction (LEED BD+C) and LEED for Operations and Maintenance (O+M) (U.S. Green Building Council, 2020). The categories associated with the LEED O+M certification include location and transportation, sustainable sites, water efficiency, energy and atmosphere, materials and resources, indoor environmental quality, innovation, and regional priority. People can also achieve a LEED credential such as LEED Green Associate to demonstrate their overall knowledge in green building principles or LEED Accredited Professional (AP) to demonstrate advanced knowledge in green building principles in a specific LEED rating system such as LEED O+M.

The Institute of Real Estate Management (IREM) offers a Certified Sustainable Property (CSP) designation, which focuses exclusively on the operations and maintenance phase of a building. This certification addresses categories such as energy, water, health, recycling, and purchasing. The ENERGY STAR certification for buildings is offered through the United States Environmental Protection Agency (EPA) and, as the name implies, focuses strictly on the energy use of a building. Parksmart, a third-party certification that focuses on sustainable parking garages, offers a Parksmart Pioneer certification for existing parking structures that focuses on management, programs, and technology and structure design. Internationally, there are green building certifications such as the Building Research Establishment Environmental Assessment Method (BREEAM) In-Use certification that originated in the United Kingdom and focuses on the operational phase of the building lifecycle. The BREEAM In-Use certification focuses on management, health and wellbeing, energy, transport, water, resources, resilience, land use and ecology, and pollution. Originating in Australia, the Green Star—Performance certification is available for the operational phase of a building and its categories include management, indoor environment quality, energy, transport, water, materials, land use and ecology, emissions, and innovation.

By no means is the **green building management certifications** list in table 1.1 complete, but it provides a sampling of some of the prominent certifications. The larger point here is that sustainable property management certification is happening on a comprehensive and global scale. However, it's important to point out that just chasing a green building certification may not produce the desired sustainability results. This is because a green building certification is only as sustainable as its embodied concepts.

Section Videos

What is Corporate Sustainability?

[00:02:25] Network for Business Sustainability. https://youtu.be/ltBUjzuncQ4

What Is LEED?

[00:01:10] U.S. Green Building Council. https://youtu.be/tlVseOWToL4

Top 5 Reasons To Get ENERGY STAR Certification For Your Building

[00:03:19] ENERGY STAR. https://youtu.be/gwVkBcIjBho

Section Reference

U.S. Green Building Council. (2020). *What is LEED?* https://www.usgbc.org/help/what-leed

1.3 Why Sustainable Property Management Matters

Sustainable property management matters because building operation activities contribute to **greenhouse gas (GHG)** emissions. As of 2019, building operations represented 28 percent of global carbon dioxide emissions related to energy, representing the highest level ever recorded (United Nations Environment Programme, 2020). As seen in figure 1.3, energy and carbon dioxide emissions related to energy in residential buildings and non-residential buildings account for the largest single industry user of energy and emitter of carbon dioxide. This matters because carbon dioxide emissions, a type of greenhouse gas emissions, trap heat causing the Earth to become warmer (United States Environmental Protection Agency, 2021).

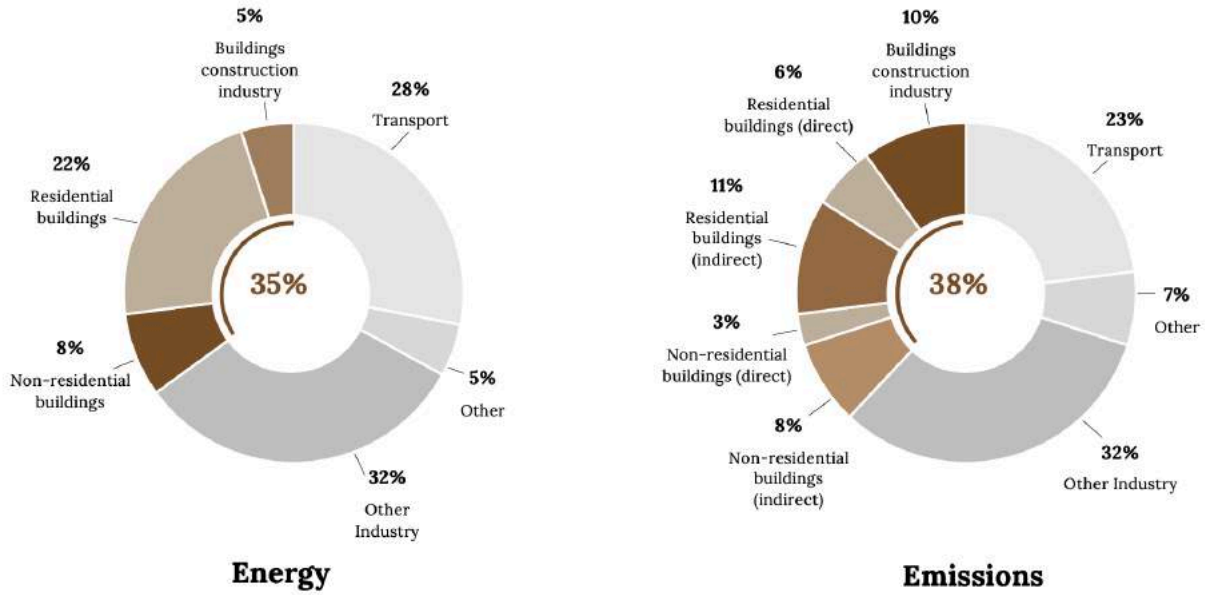

Figure 1.3: Global share of buildings and construction final energy and emissions (2019). Image description.

Climate change caused by greenhouse gas emissions has a number of negative effects on the Earth: shrinking water supplies, increasingly severe weather incidents, disruptions in food supply, and geographical changes to the Earth, to name just a few (Sciencing, 2021). These environmental changes not only negatively affect the environment, they also negatively affect society and the economy. As water and food are essential to human survival, a shrinking water supply and shift in food supply negatively affect human health and can increase the cost of procuring these essential supplies. Also, severe weather and rising tides that are changing the geography of the Earth affect the safety and well-being of society and incur significant costs to repair buildings and infrastructure.

Sustainable property management can reduce negative environmental externalities, which in turn can foster benefits in the social and economic spheres as well. As the three spheres of sustainability overlap, sustainable property management illustrates the concept of interdependence. For example, sustainable property management can foster a decrease in carbon dioxide emissions while also lowering energy and water costs and providing healthier indoor environments for a building's occupants. So while sustainable property management's focus is primarily on ecological sustainability drivers, the economic and social spheres cannot be ignored as these spheres are interrelated and dependent on each other.

Section Video

What Is Greenhouse Gas?

[00:01:16] TestTube 101. https://youtu.be/nI1iWrxO6Y8

Section References

Cairoli, Sarah. (2023, February 10). *Consequences of carbon emissions for humans.* sciencing.com. https://sciencing.com/consequences-of-carbon-emissions-for-humans-12730960.html

United Nations Environment Programme. (2020). *2020 Global status report for buildings and construction: Towards a zero-emission, efficient and resilient buildings and construction sector.* https://globalabc.org/sites/default/files/inline-files/2020 Buildings GSR_FULL REPORT.pdf

United States Environmental Protection Agency. (2021). *Sources of greenhouse gas emissions.* https://www.epa.gov/ghgemissions/sources-greenhouse-gas-emissions

1.4 Evolution of Sustainable Property Management

The idea of sustainable buildings was born out of the environmental movements of the 1970s and 1980s. In response to these movements, the United Nations established the World Commission on Environment and Development in 1983. In 1987, the *Report of the World Commission on Environment and Development: Our Common Future (also known as the Brundtland Report)* was published by the United Nations and contained a call to action for sustainable development in the **built environment**.

The growth of third-party green building certifications can be used as a proxy to gauge the increased level of stakeholder demand for sustainable buildings over time. Table 1.2 shows the year various green building certifications were introduced. This table only includes green building certifications that offer an option to certify existing buildings. The first green building certification system was introduced in 1990 by the Building Research Establishment (BRE) out of the United Kingdom. ENERGY STAR and LEED certifications, out of the United States, were also introduced prior to the turn of the century. Since 2000, many more green building certifications have been created as well as updates made to existing certifications. Although there is no global reference list, over six hundred tools that assess sustainability relating to at least one sphere have been identified worldwide, including thirty-eight green building labels (McCreadie, 2004; Reed et al., 2009).

Year	Label	Country
1990	BREEAM	United Kingdom
1993	ENERGY STAR for Buildings	United States
1995	ENERGY STAR for Homes	United States
1998	LEED for Building Design and Construction	United States
2001	CASBEE	Japan
2003	Green Star	Australia
2005	LEED for Existing Buildings	United States
2009	BREEAM In-Use	United Kingdom
2009	DGNB System	Germany
2009	BOMA 360	United States
2013	Green Star-Performance	Australia
2015	IREM CSP	United States

Table 1.2: Introduction of green building certifications that offer certification for existing buildings, by country and year of introduction.

When these certifications were first introduced, many of them focused on the building design and construction portion of the building lifecycle, with little or no thought given to the operations and maintenance of existing buildings. For example, while BREEAM was launched in 1990, the BREEAM In-Use certification for operations and maintenance was not created until 2009 (BREEAM, 2021). Additionally, LEED for building design and construction was introduced in 1998, but LEED for existing building operations and maintenance was not launched until the middle of the 2000s. Two notable exceptions to this focus on building design and construction during certification creation is ENERGY STAR for Buildings and ENERGY STAR for Homes, which focus strictly on the operations phase of the building lifecycle.

More recently, stakeholder demand has been a driver for increased **Environmental, Social, and Governance (ESG)** criteria reporting, which is a "set of standards for a company's operations that socially conscious investors use to screen potential investments" (Chen, 2021). The **Global Real Estate Sustainability Benchmark (GRESB)** assessment framework, founded in 2009, is used as an ESG benchmark for real estate assets. As of 2021, 117,000 real estate assets across 1,520 property companies, **Real Estate Investment Trusts (REIT)**, funds, and developers participated in the GRESB Real Estate Assessment, representing $5.7 trillion of assets under management ("The GRESB ESG benchmarks," 2021). (Chapter 2 provides further details on the GRESB Framework.) Companies can earn points for green building certifications as part of this benchmark, but **ESG reporting** embodies sustainability on a more holistic level, whereas green building certifications primarily address the environmental sphere of sustainability.

Example: Driver for Sustainable Building Demand

The Federal National Mortgage Association, also known as Fannie Mae, offers an economic benefit to multifamily properties with a recognized green building certification through preferential loan pricing.

Further details can be found at: https://multifamily.fanniemae.com/financing-options/specialty-financing/green-financing/green-financing-loans/green-building-certifications

Another factor driving the evolution of sustainable property management is technology. **Smart buildings**, made possible by advances in technology, have emerged with the goal of increasing building efficiencies as well as lowering operational costs. In smart buildings, building systems such as HVAC, lighting, and security are linked with real-time sensors that provide information to enable building automation and provide a comfortable atmosphere for building occupants. This also helps to better track operational data such as energy and water use.

Example: Evolution of Sustainable Property Management Driven By Technology

Lighting significantly influences the energy use of a building. Prior to some advances in technology, a method to encourage energy efficiency was to place a "Please turn off lights when not in use" label over the light switch to encourage occupants to turn off the lights when leaving the building space.

Figure 1.4: Original energy efficiency attempt.

Although you may still see some of these on light switches, technology advanced and motion sensors were then installed within some building spaces to automatically turn the lights off when the sensor detected no more movement within that particular building space.

Figure 1.5: Motion sensors.

Technology then took another leap and smart light bulbs were invented. This enabled occupants to set timers or manually turn off the lights in a building space using a smartphone. So now, lights can be automated from virtually anywhere in the world through a smartphone.

Figure 1.6: Smart light bulbs.

While technology continues to advance, the conservation and cost savings concepts remain the same as proven by this example.

Sustainable property management has evolved as a strategy to address environmental concerns affecting the Earth and people, while also focusing on profit by considering **net operating income (NOI)** through either reducing operating expenses and/or increasing revenues. Profit is still a main focus for companies, but the environment and people are also increasingly a focus. Furthermore, the increased demand for sustainability from various stakeholders such as investors and building occupants is driving the property management industry to respond and increasingly incorporate sustainable building practices into the operations and maintenance of the real estate asset.

Section Video

The Greening Of The Real Estate Industry

[00:04:14] Urban Land Institute. https://youtu.be/EyS0hfl1miM

Section References

BREEAM. (2021). BREEAM *in-use*. https://www.breeam.com/discover/technical-standards/breeam-in-use/

Chen, J. (2022). *What Is Environmental, Social, and Governance (ESG) Investing? Investopedia.com.* https://www.investopedia.com/terms/e/environmental-social-and-governance-esg-criteria.asp

GRESB. (2021, August 30). *The GRESB ESG benchmarks expand in 2021 to cover $6.4 trillion of assets under management despite global challenges from Covid-19.* https://www.gresb.com/nl-en/insights/the-gresb-esg-benchmarks-expand-in-2021-to-cover-6-4-trillion-of-assets-under-management-despite-global-challenges-from-covid-19/

McCreadie, M. (2004). *BRE subcontract: Assessment of sustainability tools. (BRE report No. 15961)* https://download.sue-mot.org/envtooleval.pdf

Reed, R., Bilos, A., Wilkinson, S., & Schulte, K. W. (2009). *International comparison of sustainable rating tools. Journal of sustainable real estate*, 1(1), 1–22.

UN. Secretary-General; World Commission on Environment and Development. (1987). *Report of the World Commission on Environment and Development: our common future* https://digitallibrary.un.org/record/139811

1.5 Barriers to Sustainable Property Management

The real estate industry has certainly made significant progress in adopting sustainable practices, but a number of barriers still stand in the way of further progress. This can be seen in figure 1.7. First is climate change denial. Despite the fact that the U.S. EPA acknowledges that human activities cause climate change, many people remain disbelievers (U.S. EPA, 2021). Because of this disbelief, sustainable property management practices may seem somewhat irrelevant to these disbelievers, as they do not believe humans are contributing to climate change on Earth. Furthermore, even if people do believe in human-based climate change, there is a strong reliance on hyperconsumption to sustain a modern convenient lifestyle in developed and developing countries.

Building owners and property managers may also be skeptical of consumer demand for these types of features. So this may make sustainable property management a non-priority in their business development plan and thus in their corporate image. Or alternatively, they may be **greenwashing** their company, which is a marketing tactic that portrays a property to be greener than it actually is. This can increase a company's corporate social image and the company can potentially acquire more business because of this image.

Some may also view the upfront cost to implement sustainable property management initiatives as too high a barrier even if there may be operating costs savings, such as reduced energy use. This is especially true if a new building is being built and the building owner does not intend to hold onto the real estate asset for a long period of time. This relates to the **payback period** of a capital outlay for a sustainable building initiative.

Example: Payback Period Barrier

If the building owner plans to hold the building for five years, and the payback period for a more energy efficient heating, ventilation and air conditioning (HVAC) system takes seven years to payback on the investment, the payback of the additional capital outlay for the more efficient HVAC system will not likely occur due to the payback occurring after the building is sold by that owner. This rings even truer for the **merchant builders** who sell their buildings immediately upon completion. An additional consideration is the lease structure, which differs among property types, that can further impede adoption of sustainable property management practices. Therefore, the upfront cost to adopt some sustainable building initiatives poses a barrier.

Even if an owner plans to hold onto a building for the long-term, a split incentive issue can arise in which either the landlord or tenant is not financially incentivized to invest in sustainable initiatives. For example, if the tenant pays their own utility bills, the property owner is not financially incentivized to provide energy efficient appliances and fixtures because the cost savings accrue to the tenant. The exception to this is if the cost savings that the tenants receive from these ecologically sustainable investments are fully capitalized into the rental rate. On the other hand, if the landlord pays for utilities, the tenant is not financially incentivized to save on utilities so they may keep their unit extra warm during the winter season and extra cool in the summer season.

Property owners and managers commonly find green building certifications too hard and too expensive to obtain. This is especially true for companies that lack the size or resources to fulfill the requirements of green building certifications. Additionally, there may be a lack of capital for implementation of certain sustainable building management initiatives. These barriers are evidenced by looking at the most prevalent green building certification system in the US, LEED. As of the end of 2015, there were only 34,000 LEED building certifications compared to the total U.S. building stock of 5,500,000, representing a certification rate of 0.7 percent (Yudelson, 2016). Yudelson (2016) also puts forward the barriers of bureaucracy, overblown benefit claims, and a narrow focus on obtaining points versus material results related to LEED certification.

Lack of knowledge and awareness as well as lack of availability of data also create barriers to sustainable property management practices. For example, the decision-makers may lack the understanding of how the initial **upfront costs** may generate savings down the line when implementing a sustainable property management initiative. Even if this is understood and the economic numbers make sense, the unwillingness of on-site staff to embrace these initiatives due to uncertainty, lack of training, or competing priorities can prevent these initiatives from coming to full fruition. Additionally, information asymmetry can occur because sustainable property management can mean very different things to different people. This can cause lack of investment in sustainable property management. Decision-makers may instead invest in initiatives that have a clearer quantitative benefit.

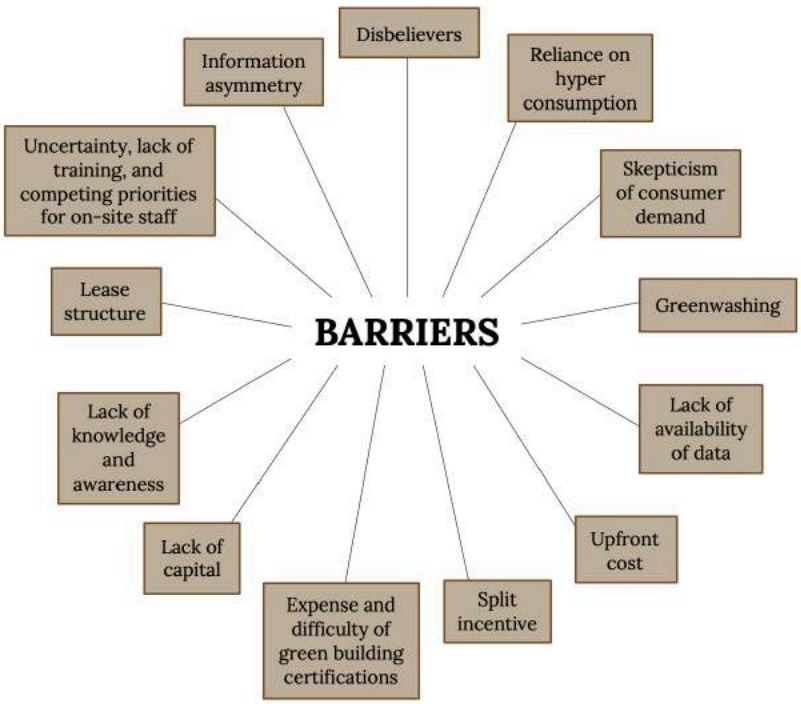

Figure 1.7: Sustainable property management barriers. Image description.

Section References

US EPA. (2021). *Climate change indicators in the United States.* https://www.epa.gov/climate-indicators

Yudelson, J. (2016). *Reinventing green building: Why certification systems aren't working and what we can do about it.* New Society Publishers.

1.6 Conclusion

Sustainable property management utilizes sustainable building initiatives during the operations and maintenance phase of the building lifecycle, taking into account the environmental, social, and economic impacts of these building initiatives. This is becoming more commonplace in response to demand for sustainability from multiple stakeholders. Sustainable property management is important because it can positively impact all three spheres of sustainability. Furthermore, as technology is advancing it is providing more opportunities for data benchmarking and reporting, which allows for more quantifiable data on the progress of sustainable building management initiatives and their impacts on the environmental, social, and economic realms. It is important to remember that sustainable building practices are as much of a human science as well as a building science because humans, not the building itself, create and manage buildings. As the evolution of sustainable property management marches on, there remain barriers that must be addressed in order to further increase implementation of sustainable building practices.

Discussion Questions

1. How would you define sustainable property management?
2. What are the three spheres of sustainability? Provide an example of each sphere as it relates to sustainable property management.
3. Try to identify one or two sustainable property management practices at work in the buildings you occupy. What are they and do you think they have been successful?
4. Why do you think companies focus mostly on the economic sphere and not always the social and environmental spheres when considering sustainable property management initiatives?
    a. What do you think would be effective incentives for companies to focus on for social and environmental spheres and not just the economic sphere of sustainability?
5. How might you try and incorporate sustainable property management into your business development plan?
6. Would you consider sustainable property management practices important to you? Why or why not?
7. What is your key takeaway from this chapter? In which section did you find it?

Activities

1. Go to https://www.nmhc.org/research-insight/the-nmhc-50/top-50-lists/2021-top-manager-list/ and choose three property management companies from this list. Review each of the three companies' websites and report on the following:
    a. Are each of the three companies addressing sustainability on their websites?
    b. If so, which spheres of sustainability are they addressing and what examples do they provide related to each sphere?
    c. What do you think they may be missing the mark on in regards to sustainability?
    d. Were you surprised by your findings? Why or why not?
2. Research the pros and cons of green building certifications and report your findings on one page.

Figure References

Figure 1.1: Building lifecycle. Kindred Grey. (2023). CC BY 4.0.

Figure 1.2: The three spheres of sustainability. Kindred Grey. (2023). Adapted from Investigation of the Philosophy Practised in Green and Lean Manufacturing Management, by A. Aminuddin and M. Nawawi, 2013, *International Journal of Customer Relationship Marketing and Management*, 4(1) (DOI:10.4018/jcrmm.2013010101). Copyright 2013 by the International Journal of Customer Relationship Marketing and Management. Adapted under fair use.

Figure 1.3: Global share of buildings and construction final energy and emissions (2019). Kindred Grey. (2023). Data from *United Nations Environment Programme 2020 Report*. CC BY 4.0. https://globalabc.org/resources/publications/2020-global-status-report-buildings-and-construction).

Figure 1.4: Original energy efficiency attempt. Kindred Grey. (2023). CC BY 4.0.

Figure 1.5: Motion sensors. Z22. (2014). *Motion sensors* [photograph with adjusted color]. https://commons.wikimedia.org/wiki/File:Light_switch_with_passive_infrared_sensor.jpg. CC BY-SA 4.0.

Figure 1.6: Smart light bulbs. Jefferson William. (2019). *Smart light bulbs* [photograph]. Public domain. https://flic.kr/p/2hKtK3k

Figure 1.7: Sustainable property management barriers. Kindred Grey. (2023). CC BY 4.0.

Image Descriptions

Figure 1.2: 3 overlapping circles (Venn Diagram). Circle 1: Environmental – natural resource use, environmental management, pollution prevention, air/water/land waste. Circle 2: Economic – profit/cost/savings, economic growth, research and development. Circle 3: Social – standard of living, education, community, equal opportunity. Circle 1&2 overlap: Environmental-Economic – energy efficiency, subsidies/incentives for use of natural resources. Circle 2&3 overlap: Economic-Social – business ethics, fair trade, worker's rights. Circle 3&1 overlap: Social-Environmental – environmental justice, natural resources stewardship, locally & globally. All 3 circles overlap: Sustainability. Return to figure 1.2.

Figure 1.3: 2 pie charts. Left: Energy. 8% Non-residential buildings, 22% residential buildings, 5% buildings construction industry, 28% transport, 5% other, 32% other industry. Right: Emissions. 8% Non-residential buildings (indirect), 3% Non-residential buildings (direct), 11% residential buildings (indirect), 6% residential buildings (direct), 10% buildings construction industry, 23% transport, 7% other, 32% other industry. Return to figure 1.3.

Figure 1.7: Barriers: Disbelievers, reliance on hyper consumption, skepticism of consumer demand, greenwashing, lack of availability of data, upfront cost, split incentive, expense and difficulty of green building certifications, lack of capital, lack of knowledge and awareness, lease structure, uncertainty/lack of training/ competing priorities for on-site staff, information asymmetry. Return to figure 1.7.

2. The Three Spheres of Sustainable Property Management

Chapter Contents

Learning Objectives

- Explain why the environmental sphere is important in sustainable property management
- Explain why the social sphere is important in sustainable property management
- Explain why the economic sphere is important in sustainable property management
- Recognize the interdependence of sustainable property management spheres
- Describe why a broader and measurable perspective is important to sustainable property management
- Describe the ESG framework for property management

2.1 Introduction

Sustainable buildings are more than brick and mortar that operate independently. They impact the level of negative environmental externalities that will be produced from the construction, operations and maintenance, and renovation of built space; how humans will navigate and use the space; and how companies will make profit off of the building space. Chapter 1 introduced the concept of sustainable property management and its three spheres. Chapter 2 provides more detail on these three spheres and why each one is important. The inclusion of all three spheres provide a broader perspective to understanding sustainable property management. The environmental, social, and governance (ESG) framework is also put forward in detail in this chapter to provide a framework for this broader perspective.

2.2 The Environmental Sphere

The environmental sphere of sustainability is about addressing the built environment's impact on the ecological environment. The consequences of the built environment on ecological degradation are exemplified through increased carbon (a greenhouse gas) emissions and the resulting rising temperatures, and melting ice sheets and rising seas. One way to measure the impact of our actions on the Earth is to calculate the **carbon footprint** of the action. Carbon footprint, according to Oxford Learners dictionary, is "a measure of the amount of carbon dioxide that is produced by the daily activities of a person or company" (Oxford Learners Dictionary, n.d.). As the Earth does not have an active voice other than exemplifying ecological degradation, building consumers advocate for the Earth when they demand sustainable building initiatives, and decision-makers within property companies advocate when they implement sustainable building policies.

> The **Paris Agreement**, an international agreement on climate change with the aim of limiting global warming, has accelerated prioritization of decreased greenhouse gas (GHG) emissions.

While some U.S. state governments are beginning to require GHG reporting for certain entities, it can be beneficial to get ahead of the requirement curve and calculate building GHG emissions for all real estate assets owned and/or managed. There are various methods to measure a building's carbon footprint such as the **Greenhouse Gas Protocol**, an international standard that helps account for, report, and mitigate GHG emissions in a standardized framework. As the most widely used GHG emissions tracking tool, 90 percent of Fortune 500 companies use this framework for reporting to Carbon Disclosure Project (CDP), a non-profit company that runs the global disclosure system to manage environmental impacts (World Resources Institute, 2021).

There are three GHG emissions scopes based on proximity and control over emissions:

- Scope 1 measures direct emissions from a company's activities
- Scope 2 measures indirect owned emissions based on purchased energy from a utility provider
- Scope 3 measures indirect not owned emissions that occur in the product lifecycle

Once measured, a building's carbon footprint can be benchmarked against similar buildings to get a sense of how the building performs in relation to its peers. Once measuring and **benchmarking** are completed, management and mitigation of GHG emissions are possible.

Real estate asset **stakeholders** must also consider the part of the Earth and current landscape they are operating within, as property management is inherently a place-based discipline.

Example: Place-Based Property Management Consideration

Figure 2.1 illustrates increased temperatures in the southwestern United States, a relatively dry region. These increased temperatures can drive evaporation and make this relatively dry region even drier. This makes water conservation an important issue in this region. Also, the context of where the real estate asset is located must be taken into consideration. If the real estate asset is located in an urban context, there may be more opportunities to take advantage of public transportation opportunities to reduce carbon emissions versus a suburban real estate asset that is located in a car dependent community with little to no public transportation opportunities available.

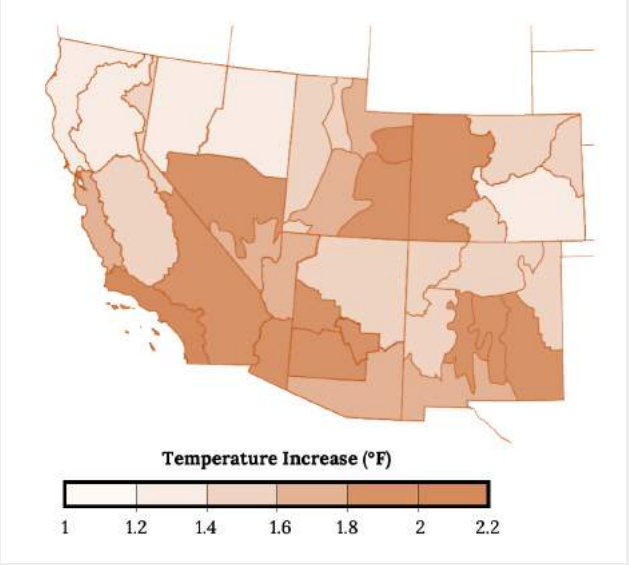

Figure 2.1: Temperature increases in the southwestern United States (2000-2020). Image description.

Section Video

What is a CARBON FOOTPRINT? How to calculate and reduce it? | Climate change

[00:07:15] Sustainability Illustrated. https://youtu.be/bYb7YLsXvzg

Section References

Oxford Learners Dictionary. (n.d.). *Carbon footprint*. https://www.oxfordlearnersdictionaries.com/us/definition/american_english/carbon-footprint

World Resources Institute. (2021). *Greenhouse gas protocol.* https://www.wri.org/initiatives/greenhouse-gas-protocol

2.3 The Social Sphere

The social sphere of sustainability is about addressing the built environment's impact on society. Buildings are built and run by human ideas and design, not by themselves. Even with building automation, if the automation fails humans have to go and fix the problem. So while the building itself is indeed tangible, the operations of the building and the impact on humans are interdependent on each other. Think about a stay you may have had at a hotel, hospital, or even an apartment. The facility itself may have been nice and looked nice, but it is likely that the people you interacted with are what truly made your stay pleasant or unpleasant. For example, were they friendly when you checked in and responsive if you brought to their attention any operations or maintenance issues of the facility? Therefore, sustainable property management is also about people as they create the building experience and make the building run in a certain way.

There is a significant disparity across people when it comes to accessing the benefits of sustainable buildings. It has been shown that socioeconomic status significantly affects the adoption of sustainable buildings (Zhou, 2016). **Environmental privilege**, which allows groups with power to construct and use environmental amenities for themselves and deny those amenities to less privileged groups, showcases place-based inequities. Therefore, **environmental justice** is an important concept to think through regarding **diversity** and **inclusion** ramifications on people, as property management is an inherently place-based discipline. As defined by the United States EPA, environmental justice is "the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income, with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies" (U.S. Environmental Protection Agency, 2023). Furthermore, since low-income households experience more than double the **energy burden** of the median U.S. energy burden, and three times the energy burden than higher income households, the energy efficient

features of sustainable buildings can be proportionately more beneficial for these households and increase diversity among users of sustainable buildings (Drehobl & Ross, 2016).

The social sphere of sustainability relates to **Maslow's hierarchy of needs** as illustrated in figure 2.2, because personal lower-level needs related to standards of living need to be addressed before addressing higher-level needs. For example, the lower-level need of alleviating suffering from being too hot needs to be met first through access to air conditioning. If access to air conditioning is not readily available, people will be focused on acquiring air conditioning, not on the environmental degradation impacts from the air conditioning unit, even if the air conditioning technology being used is from a generation ago and is far worse for the ecological environment.

Figure 2.2: Maslow's hierarchy of needs.

Universal design is another important concept to think about when it comes to accessibility of sustainable buildings. According to the National Disability Authority, universal design is "the design and composition of an environment so that it can be accessed, understood and used to the greatest extent possible by all people regardless of their age, size, ability or disability" (National Disability Authority, 2020). Building ownership and management have a responsibility to follow certain laws to ensure people of all abilities have access to sustainable buildings and the associated occupant benefits. There is also an opportunity to showcase commitment to diversity and inclusion by going above and beyond these laws to ensure increased sustainable building accessibility, such as adding information about the building accessibility features on the building webpage, having a link on the building webpage to report physical or digital barriers within and around the building, and including people with disabilities in property management operations and maintenance decisions.

Section References

Drehobl, A. & Ross, L. (2016, April). *Lifting the high energy burden in America's largest cities: How energy efficiency can improve low income and underserved communities.* https://www.aceee.org/sites/default/files/publications/researchreports/u1602.pdf

National Disability Authority. (2020). *What is universal design.* http://universaldesign.ie/What-is-Universal-Design/

United States Environmental Protection Agency. (2023). *Environmental justice.* https://www.epa.gov/environmentaljustice

Zhou, T. (2016). *Socioeconomic attributes' relationship to green commercial office buildings.* Journal of Environmental and Resource Economics at Colby, 3(1), 12.

2.4 The Economic Sphere

The economic sphere of sustainability is about addressing the built environment's impact on profit. **Profit** is a central goal of an investment property and a necessity for building operation continuity. Although environmental and social impacts are becoming more of a focus, the main driver of most property management businesses remains the financial health of its building assets under management. Profit affects all building asset stakeholders including investors, owners, the property management company, the employees, vendors, tenants, and the community. Profitability can impact owner returns, access to financing, level of investor interest, capital that can be invested into the property to increase its appeal to prospective tenants, and business growth, to name a few. Profit fosters economic sustainability through decisions to ensure both short-term and long-term profitability as well as efficient uses of resources.

In 1970, Milton Friedman, a well-known American economist known for his strong belief in free-market capitalism, wrote an article titled "A Friedman Doctrine—The Social Responsibility of Business Is to Increase its Profits." In this article, he argues that the priority of business executives should be to make money for the **shareholders**, and social responsibilities should not cut into this money-making priority (Friedman, 2007). He does note that it should personally be the employees, customers, or stockholders that choose to spend their money on certain social issues if that is what they would like to do, and that it is a government function to impose taxes as agreed by the preferences of the public to spend on various programs.

The philosophy of Milton Friedman aligns with what is known as shareholder capitalism. Figure 2.3 lays out the tenet of shareholder capitalism where the key stakeholder is the shareholder and the social responsibility of the company is seen as increasing company profits. On the other hand, Howard Bowen, also an American economist, wrote the book titled *Social Responsibilities of the Businessman* in 1953 which laid the foundation for **corporate social responsibility (CSR)**. CSR is a business model that takes into account the economic, social, and environmental impacts the corporation has on multiple stakeholders versus solely the owners of the company.

Figure 2.3: Shareholder versus stakeholder capitalism. Image description.

The philosophy of Howard Bowen aligns with the idea of stakeholder capitalism as depicted in figure 2.3. This is where corporations are focused on serving the interests of all their stakeholders equally with the social responsibility seen as increasing the well-being of people and the Earth. CSR gained traction in the United States in the 1970s as evidenced with the policy statement issued by the Committee for Economic Development. In this policy statement, the changing social contract between businesses and society is discussed with the idea that there are broadened expectations of businesses, as they exist because of public consent and should serve the broader needs of society as well (Committee for Economic Development, 1971). By the beginning of the twenty-first century, most large companies in the U.S. had created CSR policies (Madrakhimova, 2013).

The goals of CSR policies have been to hold companies accountable for their actions. However, as stakeholders have been increasingly demanding more transparency of companies in the economic, social, and environmental dimensions, it has been difficult to compare CSR efforts across companies due to the lack of standardization in reporting. Also, companies have been criticized for marketing CSR efforts based on empty claims or for doing something once and not following up the CSR effort consistently. These issues have spurred the creation of the ESG framework, which prioritizes reporting, and standardizes and quantifies these types of efforts by companies to make sure initiatives are actually happening and continue to happen.

Section Video

Corporate Social Responsibility (CSR) Definition

[00:01:37] Investopedia. https://www.investopedia.com/ask/answers/011215/what-are-top-trends-corporate-social-responsibility.asp

Section References

Committee for Economic Development. (1971). *Social responsibilities of business corporations.* https://www.ced.org/pdf/Social_Responsibilities_of_Business_Corporations.pdf

Friedman, M. (2007). The social responsibility of business is to increase its profits. In *Corporate ethics and corporate governance* (pp. 173–178). Springer.

Madrakhimova, F. (2013, June). *History of development of corporate social responsibility*. Journal of Business and Economics, 4(6), 509–520. http://www.academicstar.us/UploadFile/Picture/2014-6/201461410571606.pdf

2.5 The Interdependence of Sustainable Property Management Spheres

Individual sustainability spheres do not exist alone but in a system where they are interdependent on each other. An action within one sphere will affect other sustainability spheres. **Systems theory**, which is a framework that was developed in response to the increasing complexity of problems in the world, can be applied to sustainability in the property management context, as systems theory is a "way of thinking that allows for the study of interconnections among systems and accounts for the nature of 'open systems' which interact with their environments" (Montuori, 2011, p. 414). In other words, there is interdependence in sustainable property management with the idea that various stakeholders and buildings operate in an open system and they all influence and interact with each other. Table 2.1 provides various interdependency examples of sustainable building interventions across property types to further illustrate this concept as well as to illustrate that positive, neutral, and negative impacts may vary across spheres.

Intervention	Environmental	Social	Economic
Install LED lights in building lobby (all product types)	**Positive (+)** By using less energy, LED bulbs help reduce consumption	**Neutral (~)** These lights are always on, so tenants don't have to wait for the LED to warm up and will likely not notice the difference	**Positive (+)** LED lights are more expensive to purchase but are efficient and will reduce energy bills over time
Install motion sensing lights along exterior walkway from parking lot to building (apartment)	**Positive (+)** By using less energy, motion activated lighting helps reduce consumption	**Negative (–)** Lack of sufficient, continual lighting creates a safety risk as someone could wait for the lights to shut off and then ambush an unsuspecting resident; even if lights turn on at the last minute, there isn't sufficient time for the resident to react. Similar problem if the lights fail to activate	**Positive (+)** Energy bills will be reduced as the lights will not operate continually
Reduce run time for subsurface garage fans; shut off from 1 am–4 am (office building)	**Positive (+)** By running for fewer total hours, the fans will use less energy and help reduce consumption	**Neutral (~)** Most office tenants will not be using the garage during this time and will be unaffected	**Positive (+)** Energy bills are reduced by shutting off the fans for several hours overnight
Upgrade amenities by installing a coffee and snack station in the lobby (office)	**Negative (–)** The new amenity represents an increase in energy usage, particularly if snacks are offered through a vending machine; coffee is likely purchased in bulk with price as the determining factor and may not be sourced sustainably	**Positive (+)** People benefit from placemaking initiatives and health is improved through shared interactions, a place for community	**Positive (+)** A nominal usage fee will cover the cost of offering this amenity and provide additional profit

Table 2.1: Sustainable intervention interdependency examples.

2.6 A Broader and Measurable Perspective

ESG reporting, introduced in chapter 1, provides a broader and measurable perspective for stakeholders of property management companies interested in sustainability. Shareholders are increasingly demanding this transparency to make investment decisions because it matters to them as a way to ensure long-term financial performance. Consumers are also increasingly demanding this type of reporting to make purchasing decisions. Additionally, employees are increasingly using this type of reporting when deciding which companies they want to work at based on their priorities. Some countries and institutional investors require ESG reporting.

Example: Mandatory ESG Information Disclosure

As of 2017, mandatory disclosure of ESG information is required in twenty-five countries such as Australia, Italy, South Africa, and the United Kingdom (Krueger et al., 2021). The World Economic Forum's International Business Council has collaborated with the world's largest accounting firms, like KPMG and Ernst & Young, to launch the Measuring Stakeholder Capitalism Initiative in 2019 whose goal is to improve and standardize ESG reporting (World Economic Forum, 2021). The United States does not currently require mandatory disclosure of ESG information, but many feel this requirement is imminent. Furthermore, states and municipalities within the United States are beginning to require ESG reporting. Illinois passed the Sustainable Investing Act, which became effective in 2020, that "requires all public or government agencies involved in managing public funds to 'develop, publish, and implement sustainable investment policies applicable to the management of all public funds under its control.'" (Zaidi, 2019). Additionally, certain states and cities such as California, Boston, Chicago, New York, and Seattle have added regulations to their pension systems to further sustainable investment (Zaidi, 2019).

ESG reporting is becoming increasingly prevalent globally (it is estimated that as of 2018, ESG is integrated into $17.5 trillion of professionally managed assets including public equity, fixed income, and real estate sectors [Global Sustainable Investment Alliance, 2018]) and is also becoming more common in assessing real estate performance. **Global Real Estate Sustainability Benchmark (GRESB)**, the framework introduced in chapter 1 and used to assess and standardize ESG performance in the real estate industry, jumped from approximately 750 participant members in 2016 to approximately 1,000 participant members as of 2020 who reported on their ESG efforts. Figure 2.4 illustrates a sampling of key ESG issues according to the Principles for Responsible Investing, a leading global proponent of responsible investment.

Figure 2.4: A sampling of key ESG issues. Image description.

The GRESB framework is the ESG reporting benchmark used for real estate assets. There are three assessment components within the GRESB Real Estate Assessment: management, performance, and development. The management component gathers ESG information at the organizational level, while the performance component gathers ESG information about asset portfolio performance, and the development component gathers ESG information during design, construction, and major renovations. The GRESB Development Benchmark consists of the management and development components and is used for development projects, while the GRESB Real Estate Benchmark consists of the management and performance components and is used for standing investments.

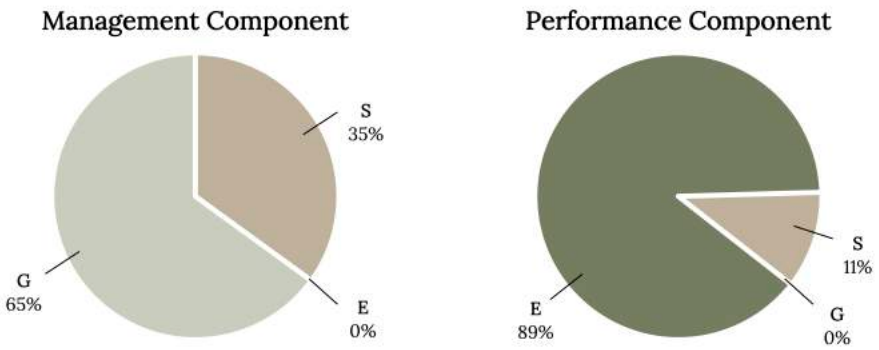

Figure 2.5: GRESB ESG components and weightings for building operators.

For the purposes of this textbook, the focus is on the GRESB Real Estate Benchmark since this benchmark focuses on existing real estate assets. Within this GRESB Real Estate Benchmark, there are 30 points attached to the management component and 70 points attached to the performance component for a total of 100 possible points (GRESB, n.d.). Figure 2.5 illustrates that 65 percent of the management component points focus on governance criteria while the remaining 35 percent of the management component points focus on social criteria. For the performance component, 89 percent of the points are focused on environmental criteria while 11 percent are focused on social criteria. Figure 2.6 displays the aspects within each component and the points associated with each respective aspect. Specifically under the management component, leadership, policies, reporting, risk management, and stakeholder engagement are aspects, while risk assessment, targets, tenants and community, energy, GHG, water, waste, data monitoring and review, and building certifications comprise the performance component. Therefore, sustainable buildings support this ESG reporting, which is more in demand, while also being influenced and influencing other factors affecting the ESG ecosystem.

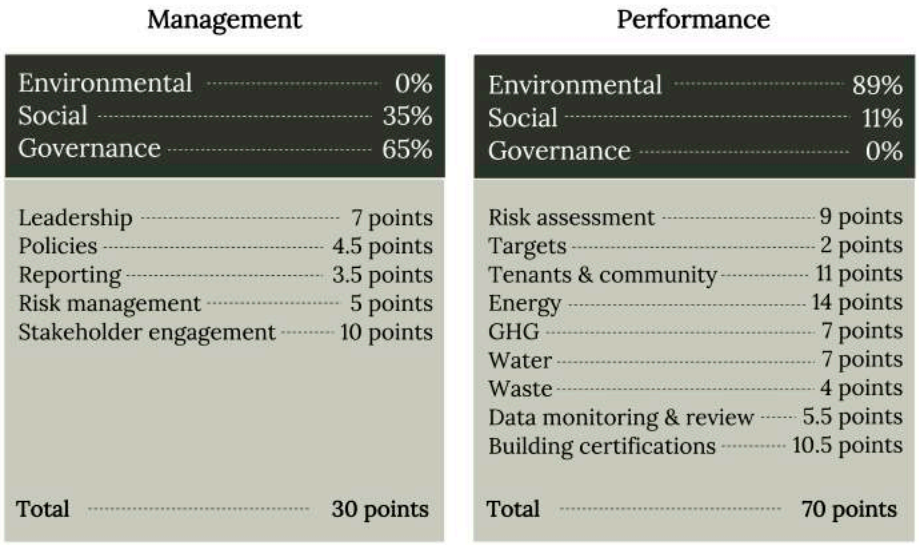

Figure 2.6: GRESB ESG components and associated aspects for building operators. Image description.

Example: Sustainable Property Management ESG Report

Figure 2.7: Components of 2020 ESG report from Mill Creek residential trust. Image description.

Relating ESG issues to sustainable property management, figure 2.7 illustrates the components of a 2020 ESG Report example from Mill Creek Residential Trust, an owner and manager of multifamily rental real estate (Mill Creek Residential, n.d.). Within section 1, Mill Creek ESG, the company's core values are defined and five stakeholder groups are identified and composed of partners, residents, associates, neighbors, and global society. Also, seven ESG focus areas are defined including resident experience, environmental performance, certifications, associates, innovation, risk and crisis management, and neighbors. Topics included within these ESG focus areas are the well-being of residents and associates, energy and water use, LEED certifications, ethics and diversity of associates, data security, charitable giving, and local relationships.

In section 2, Mill Creek Communities, the resident experience component contains topics such as fair housing, transportation and active design, sustainable building best practices, acoustical design standards, renovations, smart and sustainable homes, promise and peace of mind guarantee, and resident feedback. The environmental performance component topics include design energy efficiency, renewable energy, operating energy and water use, carbon footprint, and net zero energy, water, and waste. The certifications component discusses the green building certifications the company utilizes in their business. In section 3, Mill Creek Residential, the associates component is comprised of culture and ethics, learning and development, health and safety, and diversity, equity and inclusion. The innovation component includes information on the innovation committee and ESG leadership. The risk and crisis management component discusses crisis preparedness, their Covid-19 response, data security and data privacy, water and fire protection, fire amenity safety, risk management performance, and climate resilience. The last component of the report is about neighbors and includes the topics of local relationships and charitable giving.

ESG reporting has been shown to provide benefits to multiple stakeholders. In locations where ESG reporting requirements are mandatory, availability and quality of ESG reporting for consumers is increased, negative ESG incidents decrease, earning forecasts by analysts become more accurate, and stock price crash risk declines (Krueger et al., 2021). Companies also participate in ESG reporting to comply with regulatory agreements, strengthen their corporate reputation, illustrate their management of risk, and answer the call for investor disclosure requests (HXE Partners, 2021). Furthermore, at companies that voluntarily incorporate environmental and social policies, stock market and accounting performance are higher than peers' (Eccles et al., 2012). While there are obstacles to incorporating ESG reporting, such as the measurement complexity of some ESG performance as well as information on ESG metrics originating from multiple systems across the company, there is certainly a business case for ESG reporting from multiple stakeholder perspectives (Boffo & Patalano, 2020; PWC, 2021). However, because one of the key responsibilities of property managers is to operate the asset in accordance with the goals of ownership, or to counsel the ownership entity that its goals are unrealistic or inappropriate in the marketplace, it would be difficult for property management to incorporate these ESG concepts without ownership buy-in.

Section References

Boffo, R., & Patalano, R. (2020). ESG Investing: Practices, progress and challenges. OECD Paris. https://www.oecd.org/finance/ESG-Investing-Practices-Progress-Challenges.pdf

Eccles, R. G., Ioannou, I., & Serafeim, G. (2012). The impact of a corporate culture of sustainability on corporate behavior and performance (working paper 17950). National Bureau of Economic Research. http://www.nber.org/papers/w17950

Global Sustainable Investment Alliance. (2018). 2018 Global sustainable investment review. http://www.gsi-alliance.org/wp-content/uploads/2019/03/GSIR_Review2018.3.28.pdf

GRESB. (n.d.). 2021 Real estate reference guide. https://documents.gresb.com/generated_files/real_estate/2021/real_estate/reference_guide/complete.html

HXE Partners. (2021). Our services. https://www.hxepartners.com/services

Krueger, P., Sautner, Z., Tang, D. Y., & Zhong, R. (2023, January 7). The effects of mandatory ESG disclosure around the world. [European Corporate Governance Institute Finance Working Paper no. 754/2021 and Swiss Finance Institute Research Paper no. 21–44]. https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3832745

Mill Creek Residential. (n.d.). 2020 Environmental social governance. https://millcreekplaces.com/2020-esg-report/

Montuori, A. (2011). Systems approach. Encyclopedia of Creativity, 2, 414–421.

PWC. (2021, October 6). Getting serious about diversity and inclusion as part of your ESG reporting. World Economic Forum. https://web.archive.org/web/20211006044604/https://www.pwc.com/us/en/services/audit-assurance/library/diversity-equity-inclusion-reporting.html

World Economic Forum (2021). Accelerating public-private collaboration towards a global solution for non-financial reporting. https://www.weforum.org/stakeholdercapitalism/about

Zaidi, A. (2019, October 4). Insight: States take lead on ESG investment regulations while feds stand still. Bloomberg Law. https://news.bloomberglaw.com/banking-law/insight-14

2.7 Conclusion

The built environment, as well as individual real property assets, affect all spheres of sustainability. The results of this impact are powerful and highly interrelated, both at the global and individual levels. As a result of this inherent interdependency, sustainable property management is a critical component of modern environmental progress, the health and well-being of society, and corporate profitability. The importance of the decisions of property managers in sustainable building operations cannot be overstated.

ESG reporting fosters inclusion of environmental, social, and economic spheres and provides a broader perspective. The increased demand from stakeholders for ESG disclosure makes the business case for sustainable property management from multiple stakeholder perspectives. It also allows companies to take ownership and accountability of their actions on society and the Earth versus keeping a grasp on a narrower view of business. As we are all interdependent on each other, the mentality does not have to be "them" versus "us," as this interdependence is universal as a human condition.

Discussion Questions

1. How else can you apply Maslow's hierarchy of needs to sustainable property management?
2. Do corporations have a responsibility to environmental and social causes? Why or why not? Based on your response, do your views align more with economist Milton Friedman or Howard Bowen?
3. Is sustainable property management an issue of ethics? Why or why not?
4. What is your key takeaway from this chapter? In which section did you find it?

Activities

1. Download an ESG report from a property management firm. Three examples include:

   BentallGreenOak's 2020 Corporate Responsibility Summary Report. https://www.bentallgreenoak.com/sustainable-investing.php

   Gables Residential 2020 Corporate Citizenship Report. https://issuu.com/gablesresidential/docs/gables_ccr_2020_-_the_importance_of_home_-_final_d?fr=sZjBmMjIwNDg0Mw)

   Mill Creek 2020 Residential ESG Report. https://millcreekplaces.com/2020-esg-report/

   After downloading and reviewing the report, answer the following questions:

   a. What are some ESG efforts you see as innovative and what are some ESG efforts you see as commonplace and why?
   b. What ESG efforts do you feel this company is strong in, and what efforts are weak? Why
   c. What can this company do to strengthen its weak points in ESG reporting?

Figure References

Figure 2.1: Temperature increases in the southwestern United States. Kindred Grey. (2023). Data from *A closer look: Temperature and drought in the Southwest.* EPA. (2021). (https://www.epa.gov/climate-indicators/southwest#ref2) CC BY 4.0

Figure 2.2: Maslow's hierarchy of needs. Kindred Grey. (2023). CC BY 4.0

Figure 2.3: Shareholder versus stakeholder capitalism. Kindred Grey. (2023). Includes Money Bag by leograph.com, from The Noun Project. Noun Project (Noun Project license) Includes Csr by Hilmy Abiyyu Asad, from The Noun Project. Noun Project (Noun Project license). CC BY 4.0

Figure 2.4: A sampling of key ESG issues. Kindred Grey. (2023). Adapted from Environmental, social and governance issues. *Principles for Responsible Investment.* https://www.unpri.org/sustainability-issues/environmental-social-and-governance-issues. Includes Government, by Adrien Coquet, from *The Noun Project*. Noun Project (Noun Project license). Includes group, by Gregor Cresnar, from *The Noun Project*. Noun Project (Noun Project license). Includes Tree, by Guilherme Furtado, from *The Noun Project*. Noun Project (Noun Project license). CC BY 4.0

Figure 2.5: GRESB ESG components and weightings for building operators. Kindred Grey. (2023). Data from *GRESB Real estate assessment reference guide*, 2021. (https://documents.gresb.com/generated_files/real_estate/2021/real_estate/reference_guide/complete.html). CC BY 4.0

Figure 2.6: GRESB ESG Components and associated aspects for building operators. Kindred Grey. (2023). Data from GRESB *Real estate assessment reference guide*, 2021. (https://documents.gresb.com/generated_files/real_estate/2021/real_estate/reference_guide/complete.html). CC BY 4.0

Figure 2.7: Components of 2020 ESG report from Mill Creek Residential Trust. Kindred Grey. (2023). Adapted from *Mill Creek ESG 2020 report*. https://millcreekplaces.com/2020-esg-report/. CC BY 4.0.

Image Descriptions

Figure 2.1: Temperature map showing southwest U.S. states; values range from 1-2.2 degrees Fahrenheit. Largest temperature increases in southern CA, central Arizona, southern New Mexico, southern Nevada, eastern Utah, and western Colorado. Return to figure 2.1.

Figure 2.3: Milton Friedman's shareholder capitalism: company shareholder is prioritized; social responsibility is to increase company profits. Howard Bowen's stakeholder capitalism: all stakeholders are prioritized; social responsibility is to increase well-being of people and the planet. Return to figure 2.3.

Figure 2.4: Environmental: sustainable land use, plastics, water, fracking, methane, biodiversity. Social: human rights and labor standards, employee relations, conflict zones. Governance: tax avoidance, executive pay, corruption, director nominations, cyber security. Return to figure 2.4.

Figure 2.6: Left: Management (E is 0%, S is 35%, G is 65%). Total points: 30. Leadership: 7 points, policies: 4.5 points, reporting: 3.5 points, risk management: 5 points, stakeholder engagement: 10 points. Right: Performance (E is 89%, S is 11%, G is 0%). Total points: 70. Risk assessment: 9 points, targets: 2 points, tenants & community: 11 points. Energy: 14 points. GHG: 7 points. Water: 7 points, waste: 4 points, Data monitoring & review: 5.5 points, Building certifications: 10.5 points. Return to figure 2.6.

Figure 2.7: From top to bottom. Cover page. Letter of Introduction by CEO. 1) Mill Creek ESG: 1.1 Company overview, 1.2 Guiding principles, 1.3 ESG integration. 2) Mill Creek Communities: 2.1 Resident experience, 2.2 Environmental performance, 2.3 Certifications. 3) Mill Creek Residential: 3.1 Associates, 3.2 Innovation, 3.3 Risk and crisis management, 3.4 Neighbors. Return to figure 2.7.

3. Stakeholder Motivations for Sustainable Property Management Practices

Chapter Contents

Learning Objectives

- Identify key stakeholders in sustainable property management operations
- Identify motivations for building owners to adopt sustainable property management practices
- Identify motivations for property management companies to adopt sustainable property management practices
- Identify motivations for tenants to adopt sustainable property management practices
- Identify motivations for vendors to adopt sustainable property management practices
- Identify motivations for communities to adopt sustainable property management practices

3.1 Introduction

Various stakeholders significantly influence sustainable property management implementation. By understanding their motivations for sustainable building operations, an appropriate strategy can be devised that addresses their particular needs. Motivations can vary among stakeholders, so it is important to develop the **sustainable property management plan** based on the goals that are important to that particular stakeholder. This chapter identifies key stakeholders in sustainable property operations as illustrated in figure 3.1 and some common motivations for each stakeholder. Collaboration among stakeholders is key during this process of getting everyone on board with a sustainable property management plan.

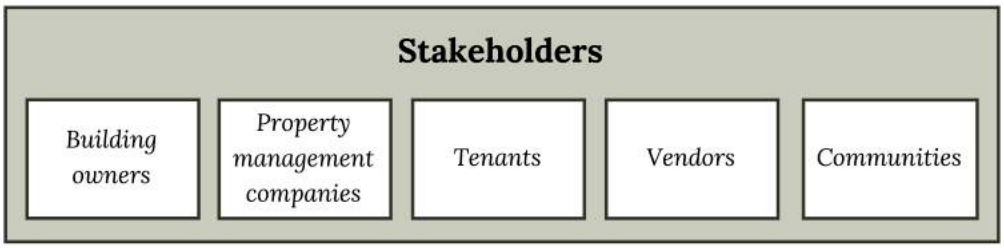

Figure 3.1: Key stakeholders in sustainable property management operations.

3.2 Building Owners

The **building owner** typically holds the most influence over sustainable building initiative decisions. Although property management companies occasionally come to building owners pitching sustainable property management initiatives, more building owners influence property management companies to adopt sustainable building practices at this point and time. Figure 3.2 depicts common motivating factors for pursuing sustainable building initiatives from a building owner perspective.

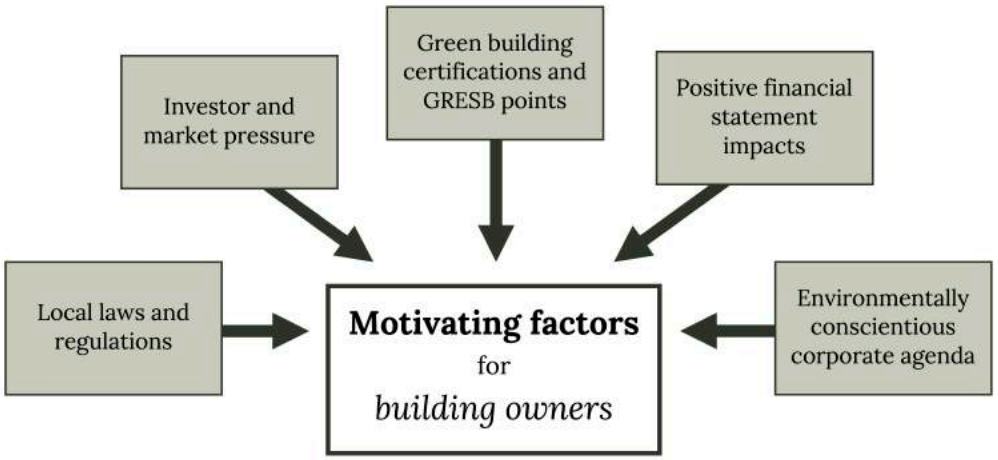

Figure 3.2: Common motivating factors for building owners. Image description.

Local laws and regulations motivate building owners to engage with sustainable property management. The Clean Energy Omnibus Amendment Act of 2018 enacted in Washington DC is an example where commercial and multifamily buildings under a certain energy threshold must improve their performance by 20 percent over a five-year compliance period or undertake other prescriptive measures (Department of Energy & Environment, n.d.). This mandates that building owners engage with sustainable building management practices. Some building owners also experience pressure from investors and the marketplace to implement ESG policies, as well as face reporting requirements based on these implemented ESG policies. Some investors and consumers simply will not invest with a building owner that does not have ESG policies and procedures in place. This is evidenced by the results of the PricewaterhouseCoopers (PwC) 2021 Global Investor ESG Survey where 49 percent of respondents "express willingness to divest from companies that aren't taking sufficient action on ESG issues" (PriceWaterhouseCoopers, 2021).

One popular method that building owners use to incorporate ESG policies are green building certifications and the GRESB framework. These frameworks can assist building owners to more easily engage in sustainable property management practices by providing a pathway toward sustainable property management at the real estate asset level and organizational level. These certifications also provide an opportunity for asset distinction and enhanced market image. They may even be a recruiting tool, especially for younger generations who may be more aligned with sustainable building concepts.

Some business owners who may not necessarily care about sustainable building concepts engage with these concepts due to the potential positive financial statement impacts. For example, there is a law in Virginia that allows local jurisdictions to offer a reduced local property tax rate for buildings that reach a specific energy efficiency threshold (Database of State Incentives for Renewables & Efficiency, 2020). Historically, research has found that eco labels have economic benefits such as higher rents, higher occupancy, and increased sales prices. Specifically, green certified buildings garner 2.5–8.9 percent higher rents, increased occupancy rates of 3–11 percent, and 5.76–26 percent higher sales price in the commercial sector (Eichholtz, Kok, & Quigley, 2010; Fuerst & McAllister, 2009, 2011; Miller, Spivey, & Florance, 2008; Reichardt, Fuerst, Rottke, & Zietz, 2012; Stanley

& Wang, 2017; Wachter, n.d.; Wiley, Benefield, & Johnson, 2010). Research has also generally shown operating cost savings such as greater energy and water efficiency in green buildings compared to conventional buildings (Hopkins, 2016). That is not to say that all green certified buildings act in this manner. For example, research has also found some green certified buildings consume more energy than non-certified buildings (Menassa, Mangasarian, El Asmar, & Kirar, 2011; Newsham, Mancini, & Birt, 2009; Oates & Sullivan, 2011). This showcases building variability and the need to assess each building for the appropriate green building initiatives based on its features. Some building owners also adhere to an environmentally conscientious corporate agenda to tap into their desire to "do good" for the environment. This type of agenda engages building owners with sustainable property management to keep them on the path of being more environmentally friendly.

It should be noted that there are barriers to sustainable property management initiatives from the perspective of the building owner. The uncertainty in time and cost to implement sustainable initiatives as well as the lack of market demand in some markets create a disincentive for property owners to invest in sustainable measures (Kriese & Scholz, 2011; Kyrö et al., 2012; Miller & Buys, 2008). Another deterrent faced by building owners is the investment in energy efficient appliances and fixtures if the tenant pays for their own utilities and the tenants' cost savings are not fully capitalized into the rental rate (Blumstein et al., 1980; Davis, 2011; Klein, Drucker, & Vizzier, 2009; Economidou, 2014).

Section References

Blumstein, C., Krieg, B., Schipper, L., & York, C. (1980). *Overcoming social and institutional barriers to energy conservation*. Energy, 5(4), 355–371.

Database of State Incentives for Renewables & Efficiency (2020, June 29). *Local option—Property tax assessment for energy efficient buildings.* https://programs.dsireusa.org/system/program/detail/2983

Davis, L. W. (2011). Evaluating the slow adoption of energy efficient investments: Are renters less likely to have energy efficient appliances? In D. Fullerton and C. Wolfram (Eds.), *The design and implementation of U.S. climate policy* (pp. 301–316). University of Chicago Press.

Department of Energy & Environment (2023, February). *Clean energy DC omnibus amendment act.* https://doee.dc.gov/service/clean-energy-dc-act

Economidou, M. (2014). *Overcoming the split incentive barrier in the building sector* (workshop summary). Publications Office of the European Union. https://publications.jrc.ec.europa.eu/repository/handle/JRC90407

Eichholtz, P., Kok, N., & Quigley, J. M. (2010). *Doing well by doing good? Green office buildings.* The American Economic Review, 100(5), 2492–2509.

Fuerst, F., & McAllister, P. (2009). *An investigation of the effect of eco-labeling on office occupancy rates.* Journal of Sustainable Real Estate, 1(1), 49–64.

Fuerst, F., & McAllister, P. (2011). *Green noise or green value? Measuring the effects of environmental certification on office values.* Real Estate Economics, 39(1), 45–69.

Hopkins, E. A. (2016). *An exploration of green building costs and benefits: Searching for the higher ed context.* Journal of Real Estate Literature, 24(1), 67–84.

Klein, J., Drucker, A., & Vizzier, K. (2009). *A practical guide to green real estate management*. Institute of Real Estate Management.

Kriese, U., & Scholz, R. W. (2011). *The positioning of sustainability within residential property marketing.* Urban Studies, 48(7), 1503–1527.

Kyrö, R., Heinonen, J., & Junnila, S. (2012). *Housing managers key to reducing the greenhouse gas emissions of multi-family housing companies? A mixed method approach.* Building and Environment, 56, 203–210.

Menassa, C., Mangasarian, S., El Asmar, M., & Kirar, C. (2011). *Energy consumption evaluation of U.S. Navy LEED-certified buildings.* Journal of Performance of Constructed Facilities, 26(1), 46–53.

Miller, E., & Buys, L. (2008). *Retrofitting commercial office buildings for sustainability: Tenants' perspectives.* Journal of Property Investment & Finance, 26(6), 552–561.

Miller, N., Spivey, J., & Florance, A. (2008). *Does green pay off?* Journal of Real Estate Portfolio Management, 14(4), 385–400.

Newsham, G. R., Mancini, S., & Birt, B. J. (2009). *Do LEED-certified buildings save energy? Yes, but....* Energy and Buildings, 41(8), 897–905.

Oates, D., & Sullivan, K. T. (2011). *Postoccupancy energy consumption survey of Arizona's LEED new construction population.* Journal of Construction Engineering and Management, 138(6), 742–750.

PricewaterhouseCoopers. (2021, October 28). *Companies failing to act on ESG issues risk losing investors, finds new PwC survey.* https://www.pwc.com/gx/en/news-room/press-releases/2021/pwc-esg-investor-survey-2021.html

Reichardt, A., Fuerst, F., Rottke, N., & Zietz, J. (2012). *Sustainable building certification and the rent premium: A panel data approach.* Journal of Real Estate Research, 34(1), 99–126.

Stanley, J., & Wang, Y. (2017). An analysis of LEED certification and rent effects in existing U.S. office buildings. In N. E. Coulsen, Y. Wang & C. A. Lipscomb (Eds.), *Energy Efficiency and the Future of Real Estate* (pp. 99–136). Palgrave Macmillan.

Wachter, S. (2013). *Valuing energy efficient buildings.* http://www.cbei.psu.edu/wp-content/uploads/2016/07/Valuing-Energy-Efficient-Buildings.pdf&sa=D&source=docs&ust=1678218728093622&usg=AOvVaw18xZwhvX7Lq2RkxnhORSqD

Wiley, J. A., Benefield, J. D., & Johnson, K. H. (2010). *Green design and the market for commercial office space.* The Journal of Real Estate Finance and Economics, 41(2), 228–243.

3.3 Property Management Companies

Figure 3.3 illustrates some common motivating factors for pursuing sustainable building initiatives from a **property management company** perspective.

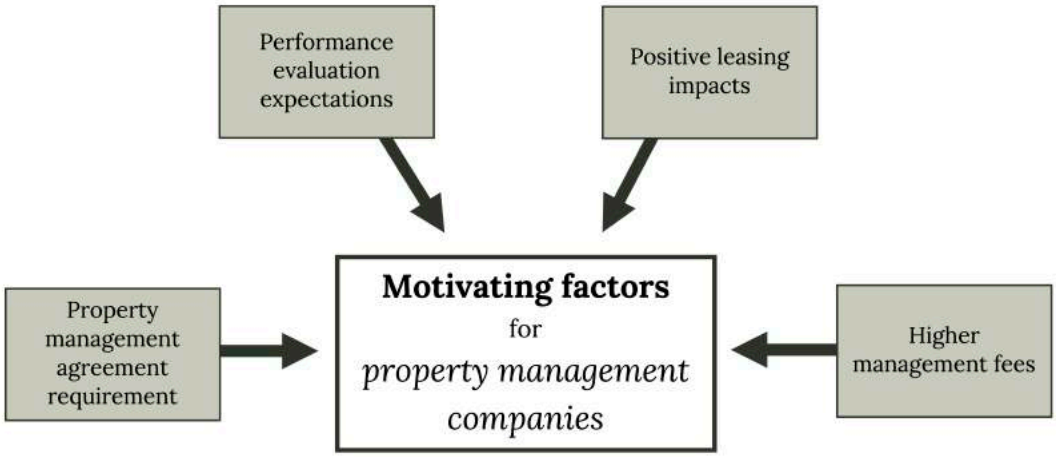

Figure 3.3: Common motivating factors for property management companies. Image description.

In some cases, there are sustainable property management responsibilities outlined in the **management agreement**. Examples may include the requirement of ENERGY STAR Portfolio Manager reporting, and managing maintenance in a way that optimizes energy efficiency, such as wiping down coils at specific intervals to optimize efficiency, avoiding heating pools above 79 degrees to minimize evaporation, or only using LED light bulbs when light bulbs need to be replaced. It can be helpful for property managers to create and regularly update a sustainable property management plan that incorporates these responsibilities as well as other items deemed important by various stakeholders to run the property more sustainably while also aligning with property ownership goals.

The incorporation of conservation practices into performance expectations and/or annual performance evaluations is another motivating factor for property management companies to engage with sustainable property management principles. If sustainable property management concepts are part of performance expectations and subsequent performance evaluations, employees will very likely take these concepts seriously and work toward implementation throughout the property. While sustainable property management responsibilities are not widely incorporated into the management agreement and the employee evaluation process just yet, it is something to consider in order to increase sustainable property management practices at the real estate asset.

There are also potential positive leasing impacts for buildings that are managed in a sustainable manner. Showcasing sustainable initiatives can potentially make units easier to lease and make the building more in demand in a market that views sustainable building practices as important. Sustainable property management

can also translate into higher property management fees due to this increase in lease activity. This is because property management fees are commonly based on rental income figures. Property owners can also incentivize property managers to reduce operating costs through sustainable measures by basing the management fee on operating expenses as well.

While it is true that property managers have a plethora of responsibilities and this may seem like "just one more thing to do" in some cases, effectively embedding sustainable property management responsibilities into property management operations can benefit the property manager from a marketing, financial, risk management, and maintenance perspective. In reality, these practices can help them in their jobs and may help them to achieve certain thresholds for financial incentives and bonuses. However, barriers to engagement with sustainable practices persist in the property management industry, such as trepidation about new sustainable technologies and the lack of systems to properly evaluate the costs and benefits of sustainable building measures (Epstein & Roy, 2003; Pinkse & Dommisse, 2009).

Section References

Epstein, M. J., & Roy, M. J. (2003). *Making the business case for sustainability.* Journal of Corporate Citizenship, 2003(9), 79-96.

Pinkse, J., & Dommisse, M. (2009). *Overcoming barriers to sustainability: An explanation of residential builders' reluctance to adopt clean technologies.* Business Strategy and the Environment, 18(8), 515-527.

3.4 Tenants

Figure 3.4 depicts various common motivating factors for pursuing sustainable building initiatives from a **tenant** perspective.

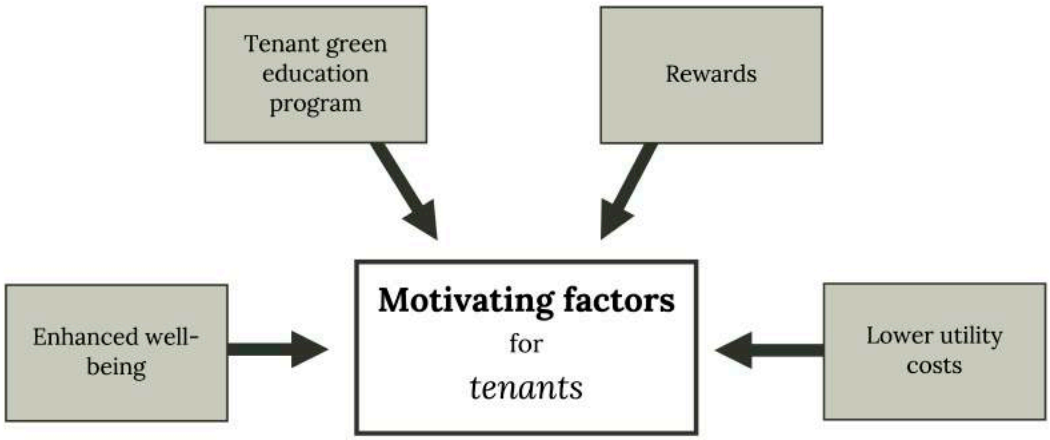

Figure 3.4: Common motivating factors for tenants.

Enhanced well-being is a motivating factor for tenants to engage with sustainable property management practices. Examples of tenants engaging with sustainable property management practices for well-being purposes include taking advantage of physical, mental, and social health opportunities at the building, waiting to run the dishwasher or do laundry until there is a full load to save on utility costs, and not smoking. **Tenant education programs** can help tenants learn about ways to incorporate sustainable property management practices on a regular basis. Program examples include a handbook for tenants, programming on site for tenants, as well as signage throughout the property. Content can be created by the property management firm or drawn from other sources such as Better Buildings, an initiative of the U.S. Department of Energy (DOE). Information about how each initiative helps meet goals for all three spheres of sustainability fosters action on the part of the tenant. Also, statistics can help motivate tenants to act. For example, instead of just asking tenants to unplug their appliances and devices while not in use, the statistic that **plug loads** can account for 30 percent of building energy, and equating this percentage to money saved and GHG emission reductions, can be used (EPA, n.d.). A tenant education program can also include real-time energy and water monitoring, as illustrated in figure 3.5, to help engage tenants in reducing their consumption.

Figure 3.5: Real-time building energy monitoring example.

Rewards are another tool to engage residents in sustainable property management practices. For example, contests relating to reducing consumption can be part of the real-time monitoring building display and rewards given for reaching certain goals. Recycling campaigns can also be implemented with rewards such as a gift card, free food, or a reusable water bottle when certain recycling thresholds are met. Recognition can also be used as a reward if there are limited funds available. Lower utility costs also motivate tenants to engage with sustainable property management principles. Partnering with tenants to educate them on how to reduce their utility bills through sustainable practices can help the tenant save money, reduce GHG emissions, and foster relationships between the tenant and property manager.

Of course lower utility bills is only a motivating factor if the tenant pays for their own utilities. In some cases, the building owner pays for the utilities so this motivating factor would be irrelevant. There are also other barriers to tenant engagement. For example, a busy single parent working two jobs may not reasonably have the time to unplug unused appliances or follow other green tenant practices; similarly, it may not be safe or even physically possible for elderly residents in a retirement community apartment tower to reach down to unplug things.

Section Reference

EPA (n.d.). 8 *Great strategies to engage tenants on energy efficiency.* https://betterbuildingssolutioncenter.energy.gov/sites/default/files/attachments/8-Great-Strategies-to-Engage-Tenants.pdf

3.5 Vendors

Property **vendors** include contractors and suppliers. Figure 3.6 illustrates some common motivating factors for pursuing sustainable building initiatives from a vendor perspective.

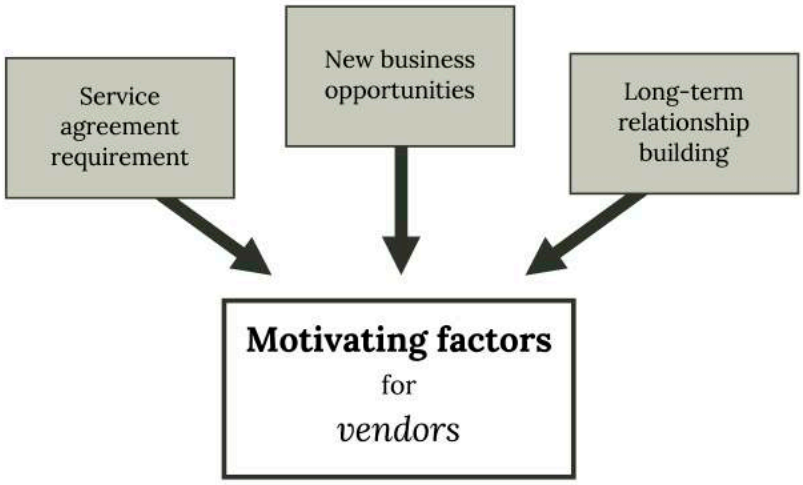

Figure 3.6: Common motivating factors for vendors.

The property owner may require vendors adhere to certain sustainability standards for operations at the property. These requirements can be detailed out in the service agreement between the property manager, who acts as an agent for the building owner, and the vendor. For example, there can be a clause in the landscape service agreement that the blade on mowers be raised to a certain level to allow longer grass, which makes it more drought-resistant. The grass height can occasionally be measured to ensure that the vendor is in compliance with the agreed-upon mower level per the service agreement. For supplies, the vendor service agreement can have a clause that only allows the property manager to select office products from a sustainable item list. This may include recycled paper and compostable cups. It's important that there is someone on the property management team dedicated to regularly reviewing and enforcing the terms of these service agreements to ensure compliance with sustainability standards.

Considering the increased demand from investors and the market for sustainable building initiatives, there may be new business opportunities for vendors by offering supplies and services that are more sustainable. The creation of programs to address customer demands for sustainable services and products can help vendors gain a competitive edge, while vendors not willing to offer more sustainable services and products stand to lose business. However, it may cost vendors more to offer these sustainable materials and methods. Additionally, since some vendors may not be willing to offer these services, the owner/manager may be left with higher costs and/or fewer vendors to select from, which may impact cost or timeliness of deliveries. One way to address these barriers is for the property manager to negotiate a long-term contract based on collaboration to help counteract any higher costs and timeliness issues. By working with property personnel, vendors can

collaborate on how to embed more sustainable practices into business operations through economies of scale and an agreed-upon timeline. This can also help align values and beliefs and lay a foundation for a long-term working partnership.

3.6 Communities

Wider community members are motivated to engage with sustainable property management principles for various reasons. Figure 3.7 lays out some common reasons for community engagement.

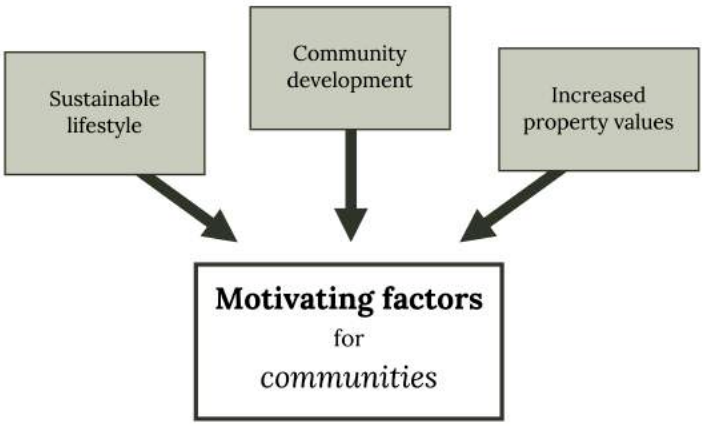

Figure 3.7: Common motivating factors for communities.

A sustainable lifestyle is increasingly becoming important to people, especially younger generations. Not only does this include ecologically sustainable practices such as recycling, minimizing single use plastics, and shopping local; it also focuses on economic opportunity through ethical sourcing, holding corporations accountable for their actions by boycotting or quitting from companies that appear irresponsible, and saving money by driving less, shopping from thrift stores, and minimizing **hyper-consumerism**. Engaging community members who find a sustainable lifestyle important can further sustainability efforts at the property and wider community as they can provide innovative ideas and extra support to get others on board with sustainability efforts. The wider community is also motivated to engage with sustainable property practices because they see that it can help with community development. For example, they may get involved to help the property set up farmers' markets, a community garden, community yoga, service projects, a running club, a community compost bin, and green spaces, which help enhance the quality of the community. They can also educate and enlist the support of the community for initiatives that the community may at first consider negative externalities, such as installation of solar panels that will create a glare for surrounding properties. These collaborations among various community members can help the community and property thrive economically, socially, and environmentally by potentially increasing property values, building social relationships, and mitigating negative ecological externalities of the built environment.

There may be barriers to engagement by the community. For example, a composting area may produce an offensive smell, which the community may consider a negative externality. Another example is neighbors who oppose a farmers' market because it causes nonresidents to park in their parking spaces when visiting the farmers' market. When barriers like these arise, it is important to look for compromises and joint solutions that meet the needs of different stakeholders, but without disrespecting their right to opinions about the built environment. In the case of the farmers' market example, the property manager could agree to somehow police parking violations as part of their programing efforts, although it should be noted that there is operational time and cost associated with this solution.

3.7 Conclusion

This chapter outlined various motivations for implementing sustainable property management practices. As can be seen, collaboration among various stakeholders is essential for a successful sustainable property management program at the property. Collaboration occurs through mutual respect and understanding of motivations while working toward compromises and joint solutions. This type of collaboration cultivates relationships among stakeholders and the desire to be good corporate and community citizens.

Discussion Questions

1. What other factors may motivate key stakeholders in adopting a sustainable property management plan? And why is it a motivating factor for that particular stakeholder?
2. As a building occupant, what sustainability features, if any, are important to you?
3. Do you think sustainable property management operations will become a requirement in the future? Why or why not?
4. What is your key takeaway from this chapter? In which section did you find it?

Activities

1. Watch the following video: https://www.youtube.com/watch?v=TWOVY1Q_otA. After watching the video, in one paragraph discuss how Bob Willard's presentation can be applied to the property management field.
2. Use the link below to access the Database of State Incentives for Renewables & Efficiency: https://www.dsireusa.org/
    a. Enter your zip code on the homepage to find incentives for renewables and efficiency in your area
    b. From the list provided, choose an incentive and answer the following:
        i. Name of the incentive
        ii. State/Territory of the incentive
        iii. Category of the incentive
        iv. Policy/Incentive Type
        v. When it was created
        vi. When it was last updated
        vii. The goal of the incentive

Figure References

Figure 3.1: Key stakeholders in sustainable property management operations. Kindred Grey. (2023). CC BY 4.0.

Figure 3.2: Common motivating factors for building owners. Kindred Grey. (2023). CC BY 4.0.

Figure 3.3: Common motivating factors for property management companies. Kindred Grey. (2023). CC BY 4.0.

Figure 3.4: Common motivating factors for tenants. Kindred Grey. (2023). CC BY 4.0.

Figure 3.5: Real-time building energy monitoring example. Grand Canyon National Park. (2013). Lobby video display [photograph]. https://flic.kr/p/dMHdJq. CC BY 2.0.

Figure 3.6: Common motivating factors for vendors. Kindred Grey. (2023). CC BY 4.0.

Figure 3.7: Common motivating factors for communities. Kindred Grey. (2023). CC BY 4.0.

Image Descriptions

Figure 3.2: Motivating factors for building owners: local laws and regulations, investor and market pressure, green building certifications and GRESB points, positive financial statement impacts, environmentally conscientious corporate agenda. Return to figure 3.2.

Figure 3.3: Motivating factors for property management companies: property management agreement requirement, performance evaluation expectations, positive leasing impacts, higher management fees. Return to figure 3.3.

4. Sustainable Building Maintenance and Repair Practices

Chapter Contents

Learning Objectives

- Describe pathways to increase energy efficiency
- Describe pathways to increase water efficiency
- Describe pathways to increase indoor environmental quality
- Describe pathways to waste management
- Describe pathways to increase site sustainability

4.1 Introduction

Maintenance and repairs are continual functions throughout the operations phase of the building lifecycle. Proper maintenance and prompt repairs extend the life of building equipment and keep the property running efficiently. Making these functions more sustainable can further the efficiency and effectiveness of the building systems while also lowering operational costs, decreasing ecological disturbances, and increasing building occupant comfort. This holistically increases sustainability at the property. Sustainable concepts including energy efficiency, water efficiency, indoor environmental quality, waste management, and site sustainability considerations are covered in this chapter as well as some best practices.

4.2 Energy Efficiency

Energy efficiency is a fundamental concept for increasing the sustainability of a property. Higher amounts of greenhouse gases are emitted from buildings that use **nonrenewable energy** inefficiently. This not only harms the ecological environment to a greater degree, but also creates higher bills for the landlord and building user.

In 2020, residential and commercial buildings in the United States consumed 40 percent of total U.S. energy consumption (U.S. Energy Information Administration, 2022). Figure 4.1 and figure 4.2 illustrate the major end uses in commercial and residential buildings. Lighting, refrigeration, ventilation, and cooling consumed the most electricity in commercial buildings while air conditioning, space heating, water heating, and lighting consumed the most electricity in residential buildings. Strategies to make buildings more energy efficient involve reduction of greenhouse gas emissions by lowering energy use from traditional sources such as fossil fuels or by transferring over to renewable energy. These efforts can bring the building closer to **net zero energy**, where a building generates as much energy as the building consumes, or **net positive energy**, where the property generates more energy than the building consumes. However, it is more difficult to achieve net zero energy and net positive energy solely from building operations without first considering this goal during the building design and construction process.

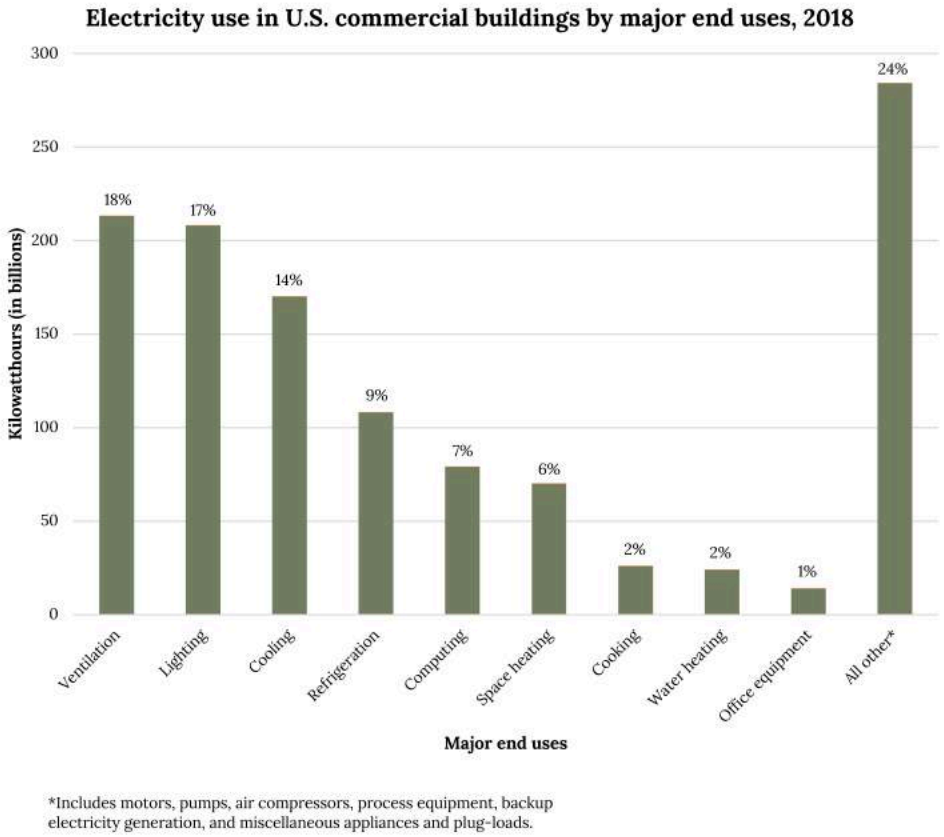

Figure 4.1: Electricity use in U.S. commercial buildings by major end use (2018). *Image description*.

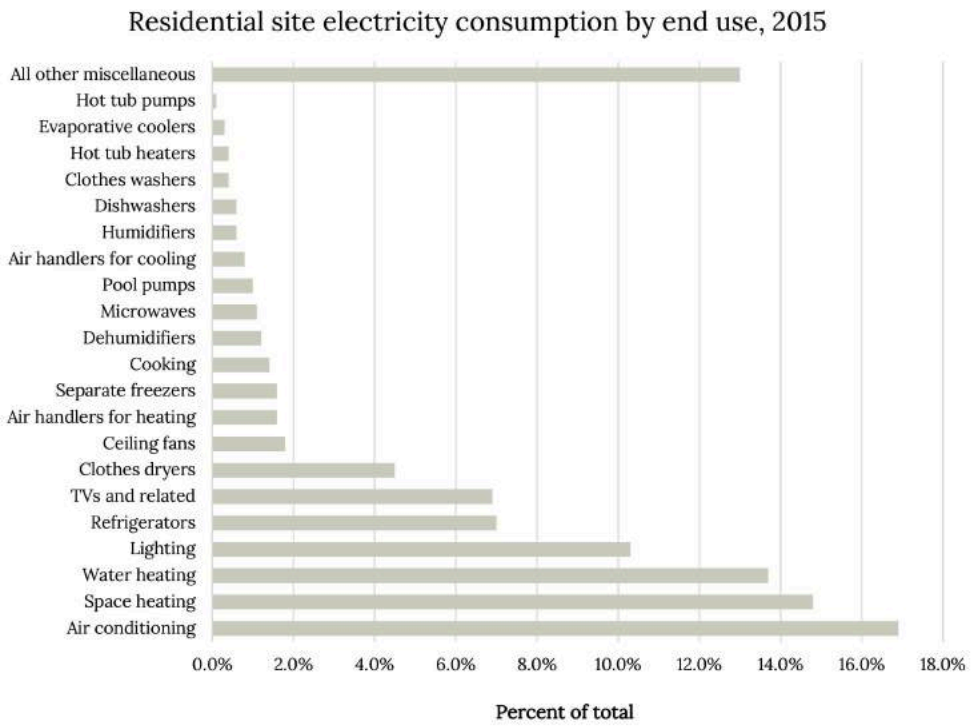

Figure 4.2: Residential site electricity consumption by end use (2015). Image description.

A holistic energy audit is the first step to understanding the property's energy consumption. The **energy audit**, an assessment of energy use and efficiency within the property, is holistic in the sense that all energy end uses are assessed and the impacts of these energy uses on environmental, social, and economic spheres are taken into consideration. A best practice is to create a checklist that will assist in identifying and prioritizing energy consumption reduction opportunities. Also, it is helpful to conduct energy audits every few years to continually evaluate the property's energy consumption and identify potential strategies to reduce energy consumption as well as consider the energy needs of the stakeholders.

Energy audits vary in scope and can be performed through either a self-assessment or energy professional, or some combination of the two. During a self-assessment energy audit, the following can be inspected:

- Any air leak locations
- Ventilation
- Insulation levels
- Heating and cooling equipment
- Lighting
- Appliances and Electronics

Source: https://www.energy.gov/energysaver/do-it-yourself-home-energy-assessments

Professional energy audits tend to be more comprehensive. Specialists trained in this line of work tend to identify more issues than a self-assessment will. Specialists provide the services listed above in the self-assessment and can also include services such as:

- Prior utility bill examination
- Blower door test (illustrated in figure 4.3, and a video on how this test works is at the end of this section)
- Thermographic scan (illustrated in figure 4.4, and a video on how this test works is at the end of this section)
- Air infiltration measurements

Source: https://www.energy.gov/energysaver/professional-home-energy-assessments

Figure 4.3: Blower door test illustration. Image description.

Figure 4.4: Thermographic inspection illustration.

When considering an energy audit at the property, some property managers may begin with a professional energy audit, whereas other property managers may first do a self-assessment and then set up a professional energy audit. A combination of both can be most effective because the property manager can share the self-assessment with the professional energy auditor, which can provide additional solutions above and beyond their standard energy audit. This combination also helps property managers become more familiar with the building components that can be helpful in catching issues early.

For further information, the United States Department of Energy offers a "Do-It-Yourself Home Energy Assessments" webpage that goes into more detail: https://www.energy.gov/energysaver/do-it-yourself-home-energy-assessments

Energy benchmarking is a significant component of an energy audit because it measures energy consumption and compares it to similar buildings as well as to other buildings in the company's portfolio. Benchmarking also provides a baseline for energy measurement and can be used to set future energy consumption goals. ENERGY STAR Portfolio Manager® is a widely used benchmarking tool for commercial buildings with approximately

25 percent of U.S. commercial building space utilizing this measurement and tracking tool (ENERGY STAR, n.d.). Utility bill data and basic building information are inputted and a score is generated comparing the subject building to similar buildings in the United States while accounting for weather and operating condition variations. The building score can be between 1–100 with 50 being the median score. The higher the score, the more energy efficient the subject building is compared to its peer buildings.

Energy efficiency recommendations are then put forward based on the building energy audit and benchmarking findings, and these include energy efficiency goals with associated target dates. An energy management policy is helpful in laying out the pathways to reach these goals within the respective timeframes and can include implementation of energy management best practice policies and energy efficient products. For example, an energy efficiency best practice policy can be to regularly schedule a walkthrough of all equipment to identify any items that are not functioning properly and flag them for repair and put a target date for the repair. Also, energy efficient product recommendations vary in the levels of upfront cost and subsequent savings during operations. For example, changing out traditional incandescent light bulbs to light emitting diode (LED) lightbulbs is a much lower cost recommendation than installing a photovoltaic (PV) array on the site, but also does not produce the same subsequent savings during operations. The next few paragraphs discuss some ideas to increase the energy efficiency of major end uses at the building level.

Lighting

Motion sensors are one method to increase the energy efficiency of lighting at a property. Motion sensors are installed to automatically turn the lights off when the sensor detects no more movement within the respective building space. Switching to more energy efficient light bulbs is another way to increase energy efficiency. There are three main types of light bulbs, as illustrated in figures 4.5–4.7. The incandescent light bulb is the traditional light bulb with the shortest lifespan and lowest energy efficiency. The compact fluorescent lamps (CFL) have a longer lifespan and higher energy efficiency than the incandescent lightbulb, but the LED is the most efficient light bulb with the longest lifespan. When we consider sustainability's environmental, social, and economic spheres, we find the LED is the most energy efficient, the maintenance staff onsite does not have to change the bulbs as often, and—although LED light bulbs cost more upfront—they are the most cost-effective long term due to their longer lifespan and energy efficiency. Also, material costs are reduced because LED light bulbs need to be replaced less often. Smart light bulbs are an LED light bulb option that allows the building user to set timers or manually turn off the lights in the building space using their smartphone, tablet, or smart home automation system.

Figure 4.5: Incandescent light bulb illustration.

Figure 4.6: CFL light bulb illustration.

Figure 4.7: LED light bulb illustration.

HVAC

Annual service of HVAC equipment by a professional is important for peak performance. Also, quarterly HVAC air filter replacement is recommended to maintain optimum energy efficiency, as dirty air filters decrease the efficiency of HVAC equipment. If the unit is reaching the end of its expected lifetime or when replacement is needed due to a malfunction, a more energy efficient unit can be considered. ENERGY STAR certification is available for HVAC units and a list of ENERGY STAR options can be reviewed at energystar.gov.

Air leaks and low insulation levels within the building space can make HVAC equipment work harder. Therefore, in addition to evaluating the HVAC equipment itself, it is important to identify any air leaks and evaluate the costs and benefits of sealing the air leaks. Air leaks can commonly occur in ductwork, windows, doors, plumbing fixtures, lighting fixtures, flooring edges, and electrical outlets. Caulking and weather stripping are cost effective methods to reduce air leaks. A more expensive method would be to replace windows with more energy efficient ones to reduce air leakage. However, this option may be more economically sensible as windows approach or are past their expected lifetime. Properly insulating areas of the building space with minimum recommended insulation levels can also increase the energy efficiency of the building. Considering the social sphere of sustainability, reduced air leakage and higher insulation levels typically increase occupant comfort.

Appliances and Electronics

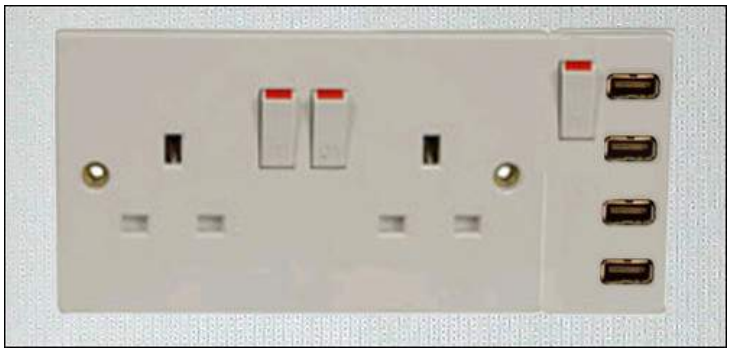

Figure 4.8: Outlet with shut-off switch illustration.

Consider the time spent using various appliances and electronics throughout your day. These can include a refrigerator, oven, stove, microwave, dishwasher, washer, dryer, coffee maker, phone, computer, and television, to name some examples. Also consider energy consumed by IT equipment within data centers. This energy consumption can be decreased by adjusting the settings of the devices or purchasing more energy-efficient devices. Furthermore, these devices consume energy even when they are turned off or on standby mode. This is known as vampire load or phantom power. Therefore, a best practice is to unplug a device when not using it. Another option, with upfront costs, is to install European-style outlets with shut off switches, as illustrated in figure 4.8. This prevents the building user from having to unplug appliances and electronics when not in use, but instead they just flip the switch on the outlet.

Water Heating

In the residential context, water heating is important for showering, cleaning dishes, and cleaning clothes. A cost-free way to decrease energy consumption of a water heater is to turn down the thermostat. This lowers cost and energy emissions without significantly affecting the comfort of taking a shower. Another cost-free method to reduce water heating is to use cold water for clothes washing. A low-cost method to decrease the energy emission from a water heater is to insulate the storage tank and the pipes. This reduces heat loss and the unit does not turn on as frequently. When considering new water heater choices, ENERGY STAR certified options are available and can be found at energystar.gov.

Energy Reduction Alternatives

Sometimes, energy reduction may not be possible. Therefore, bringing renewable energy to the operation of the building may be an opportunity to decrease fossil fuel use and associated greenhouse gas emissions. There are a variety of opportunities to include renewable energy into the building operations. First, electricity generated from renewable energy sources can be purchased directly from the utility company in many cases. Considering the economic sphere, there is typically a slight increase in cost for this option compared to nonrenewable power sources. In regions where utility companies do not offer this option, renewable energy certificates (RECs) can be purchased to illustrate the building's commitment to operate on renewable energy.

Alternatively, renewable energy systems can be installed on the building site. While not an inexpensive upfront investment, the subsequent savings during operations can make up for this initial cost outlay. For example, a PV array can be installed to generate solar power for the building's energy needs. Any solar power not used by the building is fed back to the power grid for use by other customers and the building would receive an REC that can be sold to others or be used as a credit against the building's energy usage (referred to as **net metering**). It should be noted that net metering benefits are subject to jurisdiction and system capacity limits for jurisdictions that currently offer the net metering benefit. Also, disadvantages of solar power include the expense of the panels that are often impossible to recycle, which puts the embedded toxic chemicals (that facilitate the energy capture) directly into landfills where they leach.

Section Videos

ENERGY STAR: A Simple Choice (Appliances)

[00:01:56] ENERGY STAR. https://youtu.be/NtER86Cf_d4

Blower Door Test: How It Works

[00:03:20] GreenfabTV. https://youtu.be/0Vk-qk-vLb4

How an Infrared Camera works during a Home Inspection

[00:02:14] The Home Inspector. https://youtu.be/h0J3A_Uep_k

Section References

ENERGY STAR. (n.d.). *Benchmark your building using ENERGY STAR portfolio manager.* https://www.energystar.gov/buildings/benchmark.

U.S. Energy Information Administration. (2022, December 23). *Frequently asked questions.* https://www.eia.gov/tools/faqs/faq.php?id=86&t=1

4.3 Water Efficiency

While this section discusses water efficiency, it is important to note the connection between water efficiency and energy efficiency as a substantial amount of energy is needed to provide drinking water (also referred to as **potable water**) and for treating wastewater (also referred to as **non-potable water**). Water efficiency is also important on its own as there is a limited supply of freshwater and the cost of household water utility bills is rising—up 43 percent from 2012 to 2021 (Bluefield Research, 2021). Reducing water use will help maintain the supply of freshwater while also decreasing water utility bills.

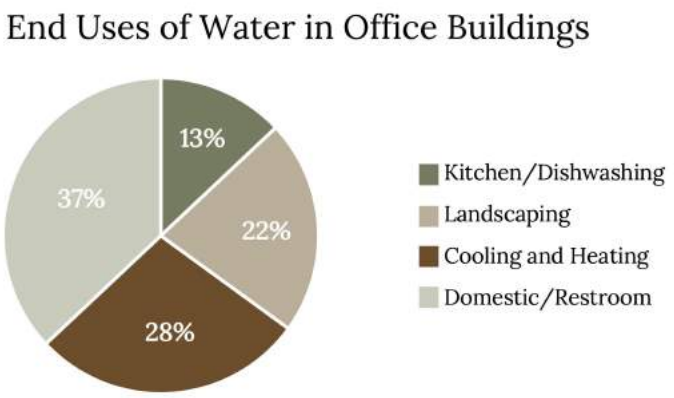

Figure 4.9: Water use in U.S. office buildings by major end use. Image description.

In 2015, approximately 12 percent of total water in the United States was withdrawn for public supply to domestic, industrial, commercial, and other users, and about 1 percent for self-supplied residences, for instance in well use (USGS, 2018). Figures 4.9 and 4.10 illustrate the end uses of water in office and residential buildings. Domestic/restroom use consumes the greatest percentage of water in office buildings, followed by cooling and heating, landscaping, and kitchen/dishwashing respectively. Toilets consume the greatest percentage of water in the residential setting, followed by showers, faucets, clothes washers, leaks, and other.

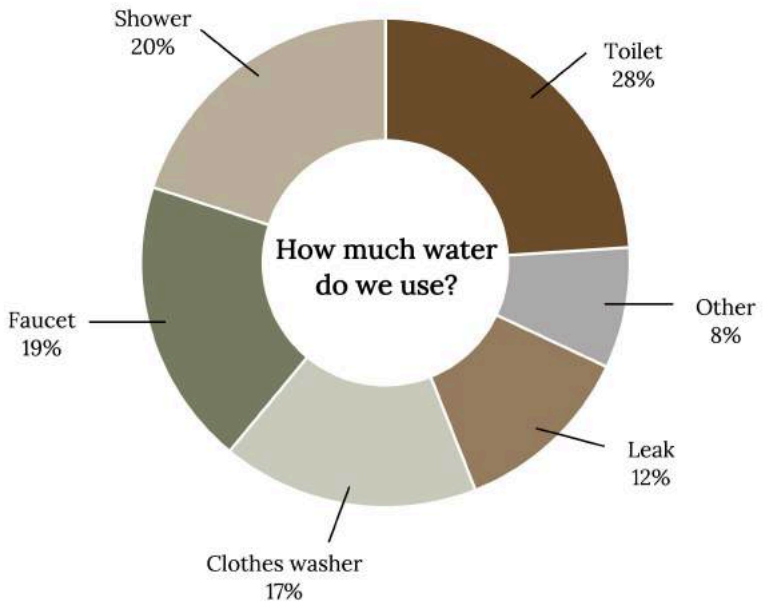

Figure 4.10: Water use in U.S. residential buildings by major end use.

Just like energy efficiency, a water assessment is the first step to understanding a building's water consumption. The items to evaluate during a water assessment include locating any water leaks, checking plumbing fixtures, and evaluating the working order of appliances, cooling and heating systems, and any irrigation systems. A best practice is to create a checklist that will assist in identifying and prioritizing water consumption reduction opportunities during the water assessment. The United States Environmental Protection Agency (EPA) offers a water assessment checklist template that can be found at: https://www.epa.gov/sites/default/files/2017-01/documents/ws-commercial-water-assessment-checklist.pdf. Also it is helpful to perform a water assessment on a regular basis to continually evaluate the property's water consumption and identify potential strategies to reduce water consumption.

Water benchmarking is an important factor in a water assessment because it measures water consumption across the building and compares water use over time and across any properties in the company's building portfolio. Benchmarking provides a baseline for water measurement and can be used to set future water consumption goals. ENERGY STAR Portfolio Manager can also be used to benchmark water use.

Recommendations are then put forward based on the water assessment. The establishment of a water management policy that includes water efficiency best management practices and water efficiency goals with associated target dates aids in the implementation of the recommendations. For example, a water efficiency best management practice can be to regularly schedule a walkthrough of all plumbing fixtures to identify any items that are not functioning properly and flag them for repair and put a target date for the repair.

These recommendations vary in the levels of upfront cost and subsequent savings during operations. For example, raising the blade on a lawn mower to allow the grass to grow longer and more drought-resistant is a no-cost recommendation with hard to quantify subsequent savings during operations. On the other hand, replacing all older toilets with low-flow flushing models will indeed have upfront costs but also have quantifiable utility cost savings once in operation. The next few paragraphs discuss some ideas to increase the water efficiency of major end uses at the building level.

Leaks

Leaks account for 12 percent of water use in the residential building sector. Therefore, regularly checking for leaks and repairing them promptly is important to the building's overall water efficiency strategy. While some leaks are obvious, some are not so obvious. A visual inspection can detect drips from a faucet or water stains on a ceiling from a pipe leak. However, a leaking toilet may not be visible to the eye. An easy and almost no-cost method to check for leaks in a toilet is to put a couple of drops of food coloring in the toilet tank overnight, do not flush the toilet during this time, and see if the food coloring has seeped into the toilet bowl in the morning. If the food coloring has seeped into the toilet bowl, this confirms a leaky toilet that needs to be fixed.

Plumbing Fixtures and Valves

It is beneficial to regularly check plumbing fixtures and valves to ensure that they are still working properly and are clean. This includes faucets in the kitchen and bathrooms, and fixtures in the shower, bathtub, and toilet. A low-cost way to decrease water consumption is to install aerators on sinks if there is no aerator currently on the fixture. An **aerator**, illustrated in figure 4.11, screws into the faucet and adds air to the water which reduces the amount of water consumed while also controlling the stream of water. If it is an older plumbing fixture, replacement of the old aerator with a model that lowers the water flow rate will reduce water consumption. Another way to consume less water is to have the water pressure checked to make sure it is at the proper level for the fixture, that it is not too high. This also helps lengthen the life of the fixture. A more expensive way to decrease water consumption is to replace toilets and/or fixtures with WaterSense labeled models. **WaterSense** is a labeling program for water-efficient products sponsored by the EPA and includes products such as toilets, showerheads, bathroom faucets, and urinals.

Figure 4.11: Faucet aerator illustration.

Appliances

It is beneficial to regularly assess appliances such as clothes washers and dishwashers to ensure proper working order. Regular cleaning is important so that buildup does not occur that could make the appliance less efficient. Also, running them only when full reduces water consumption. As they reach the end of their lifecycle, new models that are more water efficient can be considered. ENERGY STAR certified clothes washers use approximately 1/3 less water than conventional clothes washers and certified dishwashers save on average 3,870 gallons of water over the lifetime of the appliance (ENERGY STAR, n.d.a; ENERGY STAR, n.d.b). A list of certified clothes washers and certified dishwashers can be found on the ENERGY STAR website.

Cooling and Heating

The amount of water used for the cooling and heating equipment in a commercial building is tied to the amount of energy used for the operation. Therefore, the implementation of energy efficient measures will also reduce the amount of water needed to operate these systems. Also, captured rainwater and air handler condensation can be used as an alternative to increase efficiency. Regular evaluation of the working order of these systems is important to ensure optimal efficiency.

Landscaping

There are various methods that can be employed to increase water efficiency for landscaping at a building site. The first method to consider is **xeriscaping**, which is using native drought-resistant plants at the property.

Example: Landscaping That Increases Water Efficiency

Figure 4.12 illustrates an example of a xeriscape garden which requires less watering than a traditional lawn. Alternatively, figure 4.13 depicts a brown lawn in California, a state that has grappled with droughts and associated water restrictions throughout the recent years. Although green grass paint for lawns is available for sale to make this brown lawn green, a long-term solution would be to transition to xeriscaping the grounds versus maintaining a lawn in places like California and the arid U.S. Southwest.

Figure 4.12: Xeriscape garden example.

Figure 4.13: California brown lawn example. Image description.

Figure 4.14: Rainwater harvesting storage tank example.

Irrigation systems are another area to examine when considering water efficiency. **Drip irrigation** systems are more water efficient than traditional sprinkler irrigation systems because they deliver water directly to the root zone of plants over a longer period of time. This method also helps prevent overwatering and reduces evaporation. Drip irrigation systems may work well in some landscape settings while also saving resources. **Smart irrigation technology** is another option that can be added to various types of irrigation systems; instead of a user-determined fixed schedule, a complete controller or a sensor added to an existing irrigation timer can use soil moisture data or weather data to determine when the landscape needs watering. Sensors that detect rain and moisture can also be an option added to different types of irrigation systems, versus running on a timer, which makes the irrigation system more efficient. Rainwater harvesting is another option to reduce water for irrigation. **Rainwater harvesting** involves the collection of rainwater runoff to a storage system, such as a tank that can be used later as illustrated in figure 4.14. Other non-potable uses for rainwater include activities such as watering gardens and flushing toilets. Regular inspection is important for any of these options to ensure proper and efficient functioning. Some states have legal restrictions on rainwater catchment, so property managers need to check with their local jurisdictions before implementing a rainwater harvesting program.

Section References

Bluefield Research. (2021, August 23). Up 43% *over last decade, water rates rising faster than other household utility bills.* https://www.bluefieldresearch.com/ns/up-43-over-last-decade-water-rates-rising-faster-than-other-household-utility-bills/

ENERGY STAR. (n.d.a). *Clothes washers.* https://www.energystar.gov/products/clothes_washers

ENERGY STAR. (n.d.b) *Dishwashers.* https://www.energystar.gov/products/dishwashers

USGS. (2018, June). *Summary of estimated water use in the United States in 2015.* https://pubs.usgs.gov/fs/2018/3035/fs20183035.pdf

De Olivia, A. (2021, June 30). *Making water in a desert, from sunlight and air.* CNN. https://amp.cnn.com/cnn/2021/06/30/middleeast/source-global-dubai-spc-intl/index.html

4.4 Indoor Environmental Quality (IEQ)

Indoor environmental quality encompasses indoor air quality (IAQ), acoustics, thermal comfort, lighting, and views from a building, as illustrated in figure 4.15. This section will cover these main components of IEQ and put forward ideas to increase IEQ throughout the building space.

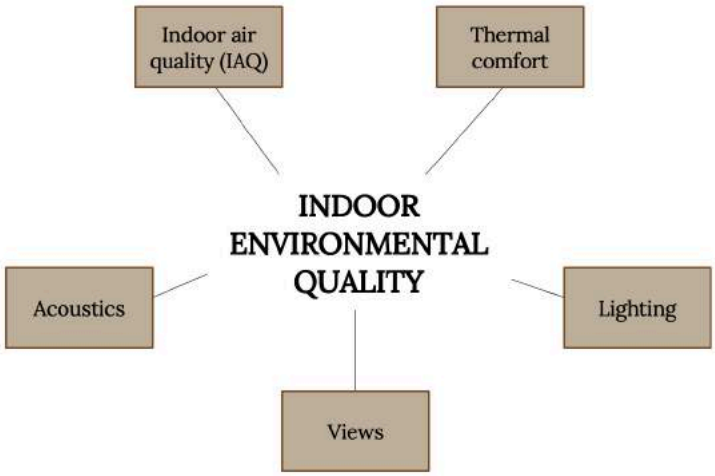

Figure 4.15: Main IEQ components.

IAQ

IAQ refers to the quality of the air within a building space. IAQ is an important consideration because some pollutant concentrations are higher indoors than outdoors. Furthermore, Americans on average spend approximately 90 percent of their time indoors (EPA, 2021). Pollutant source examples include tobacco smoke, volatile organic compounds (VOCs), cleaning supplies, building materials, mold, radon, and carbon monoxide. **Sick building syndrome (SBS)** occurs when contaminants and pollutants reach a certain level within the building and cause building occupants severe discomfort, including headaches, dizziness, fatigue, and/or irritation to the eyes, nose, or throat.

There are a variety of ways to reduce contaminants and pollutants throughout the building space. First and foremost, it is important to ensure there is proper ventilation within the building with adequate air exchange between indoor and outdoor air. Changing air filters as part of preventative maintenance can also help with IAQ. Regularly cleaned building entryways and floors help rid the building space from contaminants. A smoking policy that prohibits smoking inside the building and within a certain distance outside of the building can also be part of a building's IAQ plan. Some office campuses and multifamily rental communities have prohibited smoking anywhere on site whether it be indoors or outdoors.

Volatile organic compounds (VOCs) are airborne chemicals that are emitted from many products such as paint, carpeting, furniture, office equipment, and cleaning supplies. VOCs can decrease the IAQ in a building and cause adverse health effects to building occupants. There are third-party certifications that help consumers limit their exposure to VOCs. GREENGUARD Certification, offered through global safety science company UL Solutions, is available for building materials, furniture, furnishings, electronic equipment, cleaning, and maintenance products. Prior to receiving GREENGUARD Certification, the product is tested for a plethora of chemicals and must meet the low emission level standard to receive the certification. Green Seal labels can be found on cleaning products that are safer and more ecologically friendly. One way to formalize using products with lower VOCs is to implement an environmentally preferable purchasing (EPP) program to secure

products with reduced negative environmental impacts. Staples, a retail company specializing in the sale of office products, offers Staples® Sustainable Earth™ products that can be used for creating a sustainable purchasing guide for on-site staff that only lets them choose items from this line of products. For example, the only option would be to choose recycled copy paper versus virgin copy paper.

A pest control program is important at the building because it manages and mitigates adverse impacts on humans and buildings, reducing site damage from pests such as cockroaches, ants, bed bugs, spiders, and termites. Conventional pest management focuses on regular applications of pesticides to control pests in and around the building. **Integrated pest management (IPM)** is a more sustainable option that encompasses a more holistic strategy to lower the risks to people and the environment, and focuses on the building and the surrounding landscape areas as well. Rather than relying mainly on pesticide application to control pests, there are other steps that are first taken before pesticides are applied in a thoughtful manner. The first step is to create a threshold for pest populations that will be used to determine if pest control needs to be taken. Pests are then identified and monitored to see if they meet this threshold and if pest control is needed. Prevention is also a critical step in IPM to reduce the need for pesticides. For example, cleaning out food and drink containers before putting them in a recycle bin and sealing building cracks can help prevent pests. Once these steps are in place and pest control is deemed necessary, targeted chemicals are used first before general pesticides are sprayed widely. It is important to regularly evaluate the IPM program that is put into place and modify where necessary to improve the effectiveness of the program.

Acoustics

Building acoustics impact the performance of the building and the associated health and well-being of the building occupants. Effective **building acoustics** minimize the noise transmission from one building space to another while also controlling the sound within a specific building space. While building acoustic considerations are important to consider during the building design and construction phase of the lifecycle, there are some actions to consider during the operations phase of the building should building acoustics be an issue. The installation of acoustical ceiling tiles as pictured in figure 4.16, furniture, or spray-on acoustical treatments can improve building acoustics. Sound masking systems are another option that can help tune out background noise in office settings.

Figure 4.16: Acoustic ceiling tiles example.

Thermal Comfort

Thermal comfort, the sense of whether a person feels too hot or too cold, is another consideration in the overall IEQ of a building. As with acoustics, thermal comfort considerations are important during building design and construction. Once the building is in operation, regular occupant surveys can provide information regarding the level of thermal comfort satisfaction. If there is a high level of thermal comfort dissatisfaction, examination and adjustment of the HVAC system's air speed, moisture level, and air temperature can help address this dissatisfaction. Additionally, in an office setting, fans can be placed near individual workstations so that building occupants have more control over their immediate environment. It should be noted that there is often difficulty in balancing the social and ecological sustainability spheres within the thermal comfort context, because people can be legitimately uncomfortable as a result of many greening initiatives that attempt to regulate temperature without a heavy reliance on air-conditioning.

Lighting

Building space is illuminated by natural and artificial light sources. These sources affect the building occupants' circadian rhythms with bright light fostering a feeling of alertness while soft light cultivates a feeling of relaxation. Lighting can also affect energy efficiency. It is important that the goal of each building space be considered when deciding on lighting choices. When possible, access to natural light is best for the health and well-being of the building occupants. **Daylighting** is a technique that allows natural light into the building space and reduces the energy load requirements for lighting, resulting in reduced lighting costs and ecological impacts. Building light shelves, which are placed above eye-level, maximize daylighting by directing light onto the building ceiling and deep into the building while also reducing heat and glare. The tradeoff is that the addition of internal glass leads to a more expensive tenant build-out and has a significant impact on upfront costs. These considerations highlight the difficulty that sometimes arises in balancing the three spheres of sustainability. In an office context, daylighting techniques combined with artificial task lighting at workspaces can be an efficient mix of both natural and artificial light sources.

Views

Access to views of the outdoors from building spaces cultivates health and well-being for building occupants. **Biophilia**, the human condition of seeking connection with nature and other living beings, can be maximized in building views to increase cognitive performance and reduce stress levels. Premiums are regularly charged for a city view, mountain view, or water view. While the building orientation is decided upon during design and construction, during the operations and maintenance building lifecycle phase, indoor configurations of furnishings and fixtures can be considered to maximize views of the outdoors.

Section Video

Particles in your indoor air and strategies to improve indoor air quality

[00:01:15] U.S. EPA. https://youtu.be/JZx_mRTpSts

Section Reference

EPA. (2021). *Report on the environment: Indoor air quality*. https://www.epa.gov/report-environment/indoor-air-quality#:~:text=Americans%2C%20on%20average%2C%20spend%20approximately,higher%20than%20typical%20outdoor%20concentrations.

4.5 Waste Management

Waste management is an important consideration in the building operation and maintenance plan. The first step in establishing a waste management program is a waste stream audit. While not the most glamorous job, it assists in identifying the type and amount of waste in the building's waste stream. The ENERGY STAR® Portfolio Manager® tool can be used for tracking and measuring this waste. The results of this audit provide a baseline that can be used to set future waste diversion goals.

The waste diversion rate is the amount of waste that is diverted from landfills through recycling and source reduction activities. The less waste produced within a building, the less amount of times the waste management provider needs to provide trash haul away service. This saves on the number of trash container pulls and associated costs for these services. Furthermore, this puts less strain on the ecological environment. **Total Resource Use and Efficiency (TRUE)** project certification, a rating system that complements LEED project certification, can also assist with waste management goals. To receive TRUE certification, a building must have a zero-waste policy in place and divert a minimum of 90 percent of waste from landfills, incinerators or the environment for twelve months. An individual can obtain a TRUE Advisor certification and advocate for the TRUE building certification by adopting a holistic waste strategy that focuses on the product lifecycle in its entirety and on the reduction, reuse, and recycling of products.

Figure 4.17 illustrates a symbol that is commonly used in recycling campaigns. The words associated with these arrows are reduce, reuse, and recycle. The first word in this signage is *reduce*, but the main focus is commonly on recycling. The word *reduce* is first in the motto and is the most resource efficient. Reusing is the second most resource efficient option, followed by recycling. Therefore, it is not just about the waste diversion rate, but also the waste generation rate. However, this concept can be difficult to implement in hyperconsumerism societies such as the United States.

Figure 4.17: Example of a reduce, reuse, recycle symbol.

Section Videos

How Much Plastic is in the Ocean?

[00:04:59] Be Smart. https://youtu.be/YFZS3Vh4lfI

Adidas x Parley—A Mission for our Oceans

[00:01:06] https://youtu.be/ogNWB0XlOo8

Case Study: "Swap Room"—Recycling Unwanted Goods in an Apartment Complex

[00:01:45] Green Strata. https://youtu.be/gCqX3wTNJ9M

How Garbage is Recycled at the US' Largest Recycling Facility

[00:03:30] Insider. https://youtu.be/L2Rc8oTOtd8

4.6 Site Sustainability

Many site sustainability options should be considered during the building design and construction process. For example, an undeveloped site, or *greenfield*, may be the target for a new building with sustainable features. Let's also assume it is far from amenities and public transportation, so a car is necessary for all trips. While the building may contain many sustainable features, the building site as a whole causes a relatively high amount of site ecology destruction and greenhouse gas emissions through car dependence. Conversely, a previously developed site, or *brownfield*, may be the target for a conventional building. Let's also assume it is in an urban area close to amenities that are walkable, such as shopping, work, and entertainment. While the building may not contain many sustainable features, the location of the site makes it a sustainable site. There are cost implications to both infill/redevelopment sites and greenfield sites that also affect site selection decisions and must be balanced with a green/environmental agenda in the context of the project budget and lending realities.

Of course, when acquiring an existing building, this choice has already been made. But there are still site sustainability options during the operations and maintenance building lifecycle phase. Site sustainability considerations such as landscaping and rainwater management considerations were discussed above, but there are more options to consider.

Transportation options are an important site sustainability consideration. Thinking through modes of available transportation can increase site sustainability. Options include walking, biking, public transportation, carpooling, or driving alone to the site. While there are limitations based on the building's location relative to the existing landscape, there are still possibilities to increase sustainability through transportation to the site. For example, if an office site is in a rural location that is car dependent, tenant incentives can be put into place to incentivize carpooling. Virginia Tech offers this type of incentive by offering a parking pass for carpoolers that is less expensive than a parking pass for a single driver. This can reduce emissions and fuel consumption as well as costs for building occupants.

Paving options and roof considerations are also important to site sustainability. Pavement and rooftops contribute to the **heat island effect** and **stormwater runoff**. The heat island effect occurs in urban areas where structures like buildings and parking lots absorb and re-emit more heat from the sun than natural surfaces and create higher temperatures than in more rural areas. Stormwater runoff increases when impermeable surfaces increase, like parking lots, driveways, sidewalks, and roofs. Highly reflective, light colored, porous materials can be used for sidewalks to reduce the heat island effect and stormwater runoff. A lighter roof can help reduce the heat island effect and adding some type of vegetated roof can decrease stormwater runoff. These are options to consider when paving needs to be done and the roof needs to be replaced during the operations phase of the building lifecycle.

Light pollution is also a site sustainability consideration. **Light pollution** occurs when artificial light is used excessively or inappropriately at night. Figure 4.18 illustrates an example of light pollution with glare, skyglow, light trespass, and clutter (See https://www.darksky.org/light-pollution/ for more information on light pollution and these components). Furthermore, light pollution increases GHG in the atmosphere and disrupts human and wildlife patterns. While artificial light is necessary at night for illumination and safety, appropriate use of it is an important consideration. Figure 4.19 illustrates a photograph taken with and without a light pollution filter that reduces the transmission of light to illustrate the appropriate use of artificial light at night. Therefore, light pollution reduction is an important consideration when replacing lighting at a property during the operations phase of the building lifecycle.

Figure 4.18: Light pollution example.

Figure 4.19: Light pollution reduction example. Image description.

Section Video

The Kandi Machine—China's Sweet Pollution Solution

[00:08:34] Aaron Rockett. https://youtu.be/fiEJPbxL2hI

4.7 Conclusion

There are a variety of opportunities to implement sustainable practices into the maintenance and repair functions during the operations phase of the building lifecycle. While this chapter focuses on making the property more efficient, the human stakeholders are the decision makers of these sustainable initiatives and as such the building maintenance and repair functions remain a human-centered process. Regular property performance evaluation and sustainable implementation solutions holistically improve sustainability by saving both building owners and building tenants money, mitigating negative ecological externalities, and providing a nice place for building occupants. While some sustainable initiatives discussed in this chapter are relatively low-cost, some are expensive and cost is a significant barrier. Financial concepts related to sustainable property management will be further discussed in chapter 7.

Discussion Questions

1. Make a list of buildings you regularly spend your time in (i.e., residence, workspace, classroom, gym, etc.).
    a. Are any of these building spaces without access to natural light? How does it make you feel?
    b. Think about how artificial light compares to natural light throughout day and night. How does it make you feel?
    c. Do any of these building spaces have views? If so, what is the view of and what feelings do these building views cultivate?
2. Think about buildings you have been in or buildings you have seen in pictures. What is one of your favorite building views and why? How does the view make you feel?
3. What is your key takeaway from this chapter? In which section did you find it?

Activities

1. Read the article titled, "Proposal Seeks to Dim NYC Skyline at Night to Save Energy" at the link below:
   https://www.pressherald.com/2015/05/16/proposal-seeks-to-dim-nyc-skyline-at-night-to-save-energy/
   Read the webpage: https://www.darksky.org/light-pollution/. Based on these readings, what are the pros and cons of the proposal to dim the New York City skyline at night?
2. Find two examples of biophilic design within a building space.
   a. Share pictures of each biophilic design and source of the picture.
   b. List the specific features that incorporate biophilic design principles.
   c. Share what feelings are invoked within you when looking at these biophilic design examples.

Figure References

Figure 4.1: Electricity use in U.S. commercial buildings by major end use (2018). Kindred Grey. (2023). Data from *Forms EIA-871A and E of the 2018 Commercial Buildings Energy Consumption Survey*. (2022, December). U.S. Energy Information Administration. (http://www.eia.gov/consumption/commercial/data/2018). CC BY 4.0

Figure 4.2: Residential site electricity consumption by end use (2015). Kindred Grey. (2023). Data from *Use of energy explained: Energy use in homes*. (2019, May 9). U.S. Energy Information Administration. (https://www.eia.gov/energyexplained/use-of-energy/electricity-use-in-homes.php). CC BY 4.0

Figure 4.3: Blower door te st illustration. Jim Duncan. (2012). *Getting ready for the blower door test*. https://flic.kr/p/bu6yBq. CC BY-NC-SA 2.0

Figure 4.4: Thermographic inspection illustration. Thomas Que sne l.(2019). *Infrared thermographic home inspections*. Public domain. https://flic.kr/p/2gfwQGN

Figure 4.5: Incandescent light bulb illustration. Anton Fomkin. (2008). *The incandescent light bulb*. https://flic.kr/p/5D9eEk. CC BY 2.0

Figure 4.6: CFL light bulb illustration. MattysFlicks. (2013). *Accidental lighting*. https://flic.kr/p/fTvigP. CC BY 2.0

Figure 4.7: LED light bulb illustration. Theron Trowbridge. (2010). *Toshiba LED light bulbs.* https://flic.kr/p/7uePo4. CC BY-NC 2.0

Figure 4.8: Outlet with shut-off switch illustration. ben_osteen. (2010). *USB wall socket.* https://flic.kr/p/7sGzLT. CC BY 2.0

Figure 4.9: Water use in U.S. office buildings by major end use. Kindred Grey. (2023). Data from *Saving water in office buildings.* (2012, November). U.S. Environmental Protection Agency. (https://www.epa.gov/sites/default/files/2017-01/documents/ws-commercial-factsheet-offices.pdf). CC BY 4.0

Figure 4.10: Water use in U.S. residential buildings by major end use. Kindred Grey. (2023). Data from *Data and information used by WaterSense.* (2022, August 29). U.S. Environmental Protection Agency. (https://www.epa.gov/watersense/data-and-information-used-watersense). CC BY 4.0

Figure 4.11: Faucet aerator illustration. HomeSpot HQ. (2011). *Faucet aerator.* https://flic.kr/p/e3oDtt. CC BY 2.0

Figure 4.12: Xeriscape garden example. Mahmood Al-Yousif. (2008). *Xeriscape garden.* https://flic.kr/p/4G38Hp. CC BY-NC-ND 2.0

Figure 4.13: California brown lawn example. Kevin Cortopassi. (2014). *CalPERS and the drought.* https://flic.kr/p/o4QuhC. CC BY-ND 2.0

Figure 4.14: Rainwater harvesting storage tank example. SuSanA Secretariat. (2011). *Rainwater harvesting tank.* *https://flic.kr/p/a7AMjt*. CC BY 2.0

Figure 4.15: Main IEQ components. Kindred Grey. (2023). CC BY 4.0

Figure 4.16: Acoustic ceiling tiles example. Melinda Young Stewart. (2019). *Hanging lamps.* https://flic.kr/p/2dXPSn3. CC BY-NC-ND 2.0

Figure 4.17: Example of a reduce, reuse, recycle symbol. Steve Snodgrass. (2011). *Reduce, reuse, recycle.* https://flic.kr/p/9sgWLi. CC BY 2.0

Figure 4.18: Light pollution example. makelessnoise. (2006). *Make light pollution illegal.* https://flic.kr/p/aSYGq. CC BY 2.0

Figure 4.19: Light pollution reduction example. Fernando Vega. (2019). *IMG_3856 Light pollution filter.* https://flic.kr/p/2gfFgth. CC BY-NC-SA 2.0

Image Descriptions

Figure 4.1: Vertical bar chart showing electricity use in commercial buildings by major end uses (2018). Y-axis shows Kilowatt Hours in billions, x-axis shows major end uses. Ventilation: 18%, lighting: 17%, cooling: 14%, refrigeration: 9%, computing: 7%, space heating: 6%, cooking: 2%, water heating: 2%, office equipment: 1%, all other (includes motor, pumps, air compressors, process equipment, backup electricity generation, and miscellaneous appliances, and plug-loads): 24%. Return to figure 4.1.

Figure 4.2: Horizontal bar chart showing residential site electricity consumption by end use (2015). X-axis shows percent of total end use, y-axis shows end uses. Air conditioning: 17%, space heating: 15%, water heating: 13.8%, lighting: 10%, refrigerators: 7%, TVs and related: 7%, clothes dryers: 4%, ceiling fans: 2%, air handlers for heating: 2%, separate freezers: 2%, cooking: 2%, dehumidifiers: 1%, microwaves: 1%, pool pumps: 1%, air handlers for cooling: 1%, humidifiers: 0.5%, dishwashers: 0.5%, clothes washers: 0.5%, hot tub heaters: 0.5%, evaporative coolers: 0.5%, hot tub pumps: 0.5%, all other miscellaneous: 13%. Return to figure 4.2.

Figure 4.3: Red fabric door with a fan in the middle replaces a standard front door. The door is attached to a computer system that measures air tightness of buildings. Return to figure 4.3.

Figure 4.9: Pie chart showing end uses of water in office buildings. Kitchen/dishwashing: 13%, landscaping: 22%, cooling and heating: 28%, domestic/restroom: 37%. Return to figure 4.9.

Figure 4.13: A field of dead grass outside of an office building. A sign in the grass reads “Pardon the appearance of our lawns. Due to the drought and current water restrictions, CalPERS has stopped watering the grass.” Return to figure 4.13.

Figure 4.19: Big picture: city skyline with a few buildings lit up at night. Sky is pitch black and clear. Small picture: Same skyline with many buildings lit up at night. Sky is light and cloudy. Return to figure 4.19.

5. The Intersection of Sustainable Property Management and Risk Management

Chapter Contents

Learning Objectives

- Describe the risk management process model
- Identify environmental risk management components
- Identify social risk management components
- Identify governance risk management components
- Describe how ESG risk management concepts relate to sustainable property management

5.1 Introduction

The human condition tends to consider immediate risks more frequently than distant risks. However, both types of risks are important when considering the sustainability and resiliency of a real estate asset. The process of risk management first identifies property liabilities and then assesses associated control measures; risk management actions are then carried out to bring these risks within acceptable levels. Risk management helps protect the property and associated stakeholders such as building occupants, the building owner, and the property management company.

The incorporation of sustainability measures through the utilization of the ESG reporting framework can identify and address risks to create a more resilient property and organization. ESG, introduced in chapter 1, stands for environmental, social, and governance. This chapter will cover various environmental, social, and governance risks and associated risk management initiatives as investors are increasingly using the ESG framework for decision-making in their investments.

5.2 The Risk Management Process Model

The **risk management process model**, as illustrated in figure 5.1, can be applied to all ESG components. The model is depicted as a circle with arrows representing a cycle and iterative process that takes place continually versus just one time. The first step is to identify potential risks and the likelihood of occurrence of these risks. The next steps are to assess the impact of these potential risks on the property and then identify measures to respond to these risks to avert, minimize, and address damages and losses. This process is sometimes referred to as a gap analysis, as it assesses current business practices and the changes that need to be made in order to close the gap on these shortcomings. Once risk management measures are identified, they need to be prioritized and then funded based on priority. The last steps are to implement the measures and evaluate the risk management measures in place. This evaluation identifies any necessary changes that should be made. It is important that these risk management processes be performed at the asset level of a building portfolio on an ongoing basis, as identified risks and associated risk management measures may change throughout time. Also, identified risks and associated risk management measures will vary by property depending on location, product type, size, age, occupant mix, and turnover frequency.

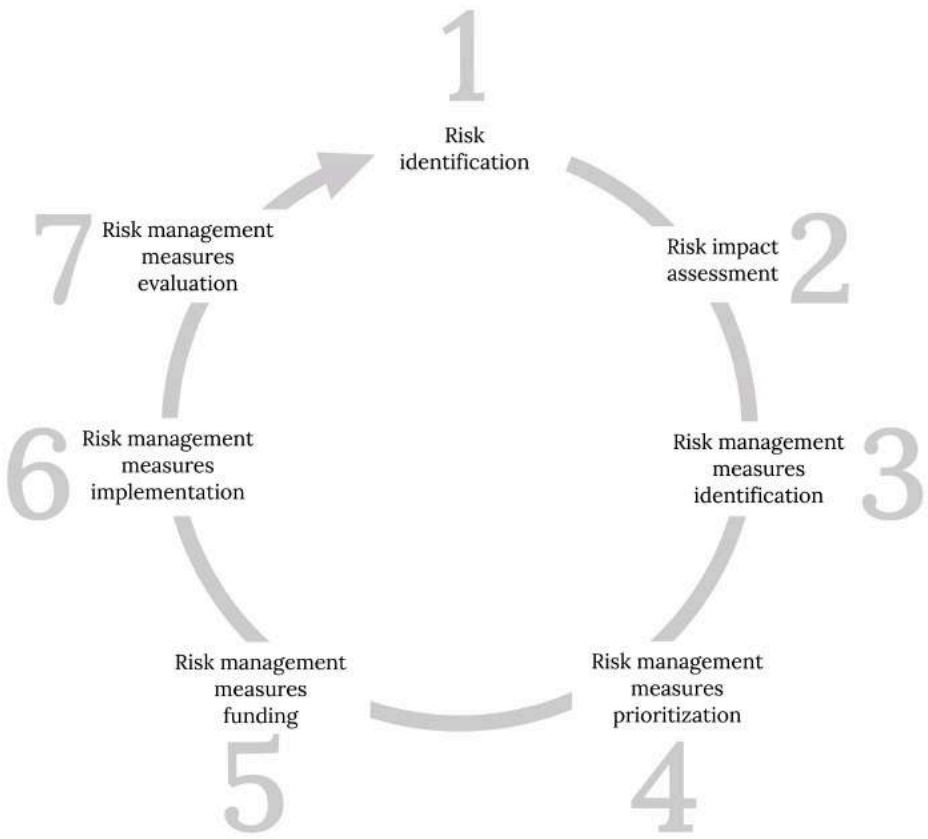

Figure 5.1: Risk management process model. Image description.

5.3 Environmental Risk Management

Environmental risk management examples include climate risk management, environmental regulation management, and resource management.

Climate Risk Management

Climate science shows average temperatures are rising, which is causing greater frequency and severity of **climate risks** such as flooding, wildfires, hurricanes, earthquakes, rise in sea level, droughts, and a sustained trend toward increased average temperatures. In a report released in 2018, inland flood risk, sea level rise and coastal floods, and hurricanes or typhoons were used as climate risk factors to assess the amount of real estate exposure to climate hazards in the United States. Of the 73,500 properties owned by 321 real estate investment trusts (REITs), 35 percent were identified to be exposed to these climate risk hazards (Starkman,

2018). Examples of location-based climate risks include hurricane damage to beachfront condo towers in Miami, first-floor and basement unit flooding in New York City, and drought in Nevada and California, which puts pressure on the development of new units as well as threatens existing assets.

The first step in climate risk management is to identify these potential physical risks and the likelihood of occurrence at the property. Once any physical risks are identified, the material impacts that may be caused to the property directly and indirectly should be spelled out. Examples include higher insurance premiums, higher energy bills for cooling the building space, and disruption in operations and resulting lower revenue. The next step is to identify measures to incorporate resilience to these physical risks at the property. Resilience can include durable property features such as xeriscaping to address drought risks.

Example: Climate Risk Management

An example of climate risk management can be seen in Miami Beach, Florida. Figure 5.2 shows pictures of flooding in South Beach, Miami, that have increased in frequency and severity in recent years due to the rising sea level. The continued rise in sea level has required the City of Miami Beach to raise their streets by multiple feet. This risk management measure is obviously extremely expensive and time consuming, but something necessary if people continue to want to live, work, and play here.

Figure 5.2: Flooding in South Beach, Miami, Florida. Image description.

Environmental Regulation Management

Environmental regulations are put forward with the goal of improving environmental quality and protecting human health. These types of regulations can be introduced at the federal, state, and/or local levels. A federal example is Section 608 of the Clean Air Act (CAA) that regulates the disposal of refrigeration air conditioning equipment (United States Environmental Protection Agency, 2011). This regulation is required by law and ensures that emissions of ozone-depleting substances are minimized during the disposal of this equipment. An example at the state level is Virginia's High-Performance Buildings Act that requires electric vehicle–charging infrastructure installation for new state and local government building construction or renovation (Virginia Clean Cities, 2021). Locally, the City of San Francisco passed the Renewable Energy Law that requires private commercial buildings larger than 50,000 square feet to be powered by 100 percent renewable electricity (City and County of San Francisco, 2019).

A climate transition plan can reduce environmental regulation risk by preparing the property company for legislation that has recently been enacted or may be forthcoming relating to carbon taxes or lower carbon footprint requirements. A **climate transition plan** is a plan that lays out how the property and organization will adjust building operations to incorporate climate science recommendations. Holistically, property owners and management companies can incorporate a climate transition plan taking into account the building operations and organization-wide policies. Not only can a climate transition plan reduce environmental risk, as the decarbonization of buildings impacts climate change to the greatest degree, a climate transition plan can help organizations address climate change and support the transition toward a low-carbon economy.

Example: Climate Transition Plan

In April 2019, the city council in New York City approved Mayor Bill de Blasio's (pictured in fig. 5.3) **Climate Mobilization Act**. This act is one of the most ambitious plans for reducing greenhouse gas emissions in the world and pledges New York City to carbon neutrality by 2050. Local Law 97 is part of this act and requires buildings to meet aggressive carbon reduction targets. Specifically, under this law most buildings over 25,000 square feet are mandated to meet new energy efficiency and greenhouse gas emission limits by 2024, and then stricter limits by 2030. The aim of the law is to reduce greenhouse gas emissions 40 percent by 2030 and 80 percent by 2050. Climate transition plans for these properties are essential to ensure compliance with these new local requirements and to reduce environmental regulation risk.

Figure 5.3: Image of Mayor Bill de Blasio (New York City mayor from 2014–2021).

Resource Management

Resource management takes into account how resources such as energy, water, and waste are handled at the property. Value is created and risk is lowered when energy and water consumption are lowered and there is less waste disposal at the property. Reductions in these resources lower operating costs immediately and potentially can lower operating costs further should environmental regulations be imposed, such as a carbon tax.

An **Environmental Management System (EMS)** is a helpful framework to address resource management risks by increasing operational efficiency and mitigating environmental impacts. Each EMS is customized to a particular property and is a process to continually review and evaluate opportunities to improve the environmental performance of the property. As illustrated in figure 5.4, the EMS process includes planning environmental goals of the property based on environmental impacts and requirements of the property, establishing goals and programs to reduce these environmental impacts, reviewing and evaluating the progress of the EMS in achieving these property goals, and acting based on this review and evaluation. It is important to note that a risk management measure that is feasible at one property or company may not be reasonable or feasible for another property or company. Company and property resources must be considered.

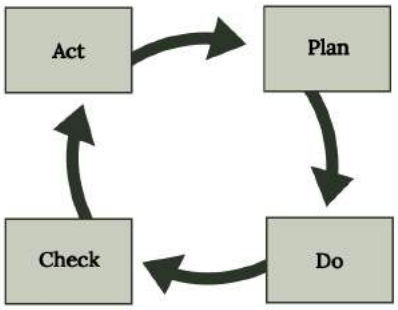

Figure 5.4: EMS process model.

Section Video

What is ISO 14001 Environment Management Systems EMS training

[00:02:13] Best Practice. https://youtu.be/XDaNmdBPwqM

Section References

City and County of San Francisco. (2019, September 17). *Board of supervisors votes unanimously to power San Francisco's downtown with 100 percent renewable electricity.* https://sfmayor.org/article/board-supervisors-votes-unanimously-power-san-franciscos-downtown-100-percent-renewable

Starkman, K. (2018). *Climate risk, real estate, and the bottom line.* https://www.preventionweb.net/news/report-climate-risk-real-estate-and-bottom-line

United States Environmental Protection Agency. (2011, February). *Construction and demolition: How to properly dispose of refrigeration and air-conditioning equipment.* https://www.epa.gov/sites/default/files/documents/ConstrAndDemo_EquipDisposal.pdf

Virginia Clean Cities. (2021, June 3). *High performance buildings act take effect on July 1.* https://vacleancities.org/high-performance-buildings-act-take-effect-on-july-1/

5.4 Social Risk Management

Social risk management examples include health and safety measures, effective supply chain management, and diversity and inclusion measures.

Health and Safety Measures

Health and safety risks of the building occupants, employees, contractors, and community are important considerations. Exposure to these risks can open up the property and organization to a negative reputation and potential criminal consequences. It can also decrease stakeholder satisfaction, which can subsequently reduce revenue. To build a more resilient business, the real estate organization must invest in the health and safety of these stakeholders. Examples include implementing procedures to prevent workplace injuries, providing good ventilation with access to fresh air and clean water, and providing a tobacco-free work environment.

Effective Supply Chain Management

A **supply chain** refers to services and supplies used to operate the property and organization. As illustrated in figure 5.5, common components of a property management supply chain include accounting services, banking services, cleaning services, general contractor services, landscaping services, legal services, marketing services, office supplies, pest control services, and trash removal services. General contractor services include HVAC, plumbing, and electrical maintenance and repair. Engaging with the supply chain on ESG issues and detailing out the standards between the property and vendor can decrease risk exposure. This is because effective supply chain management helps reduce operating costs and avoid supply shortages. A disruption in the property's supply chain can put a strain on purchasing and contracting strategies already in place and also impact the property's reputation. This can impact financial performance because of an increase in price from suppliers and a lack of availability, causing a decrease in occupant satisfaction and resulting lost revenue should they choose to go to another property.

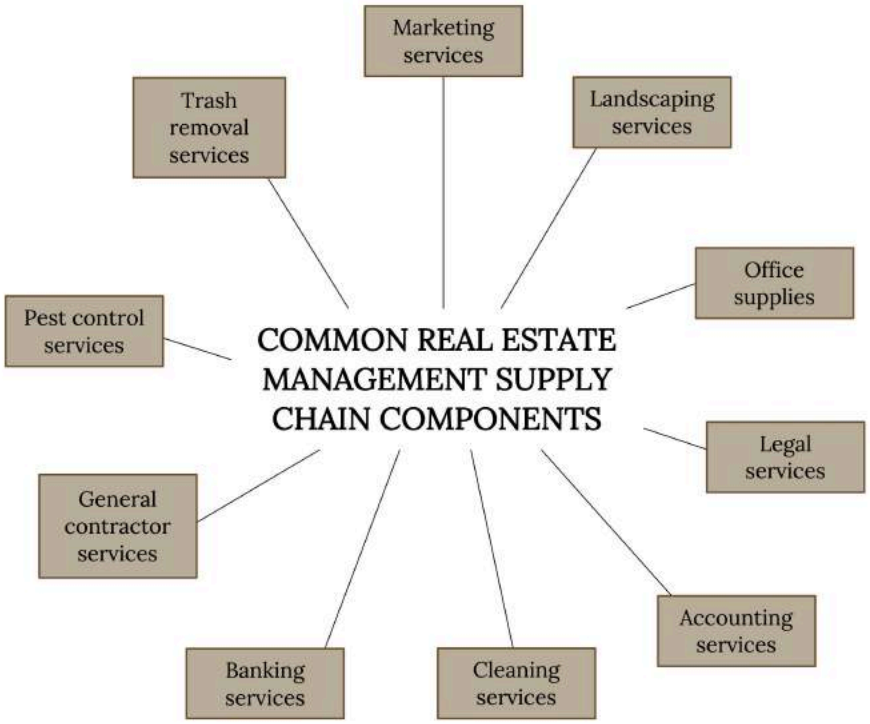

Figure 5.5: Common property management supply chain components. Image description.

Diversity and Inclusion Measures

Diversity and inclusion are often referred to together, but are not synonymous. **Diversity** refers to the characteristics that make individuals unique, including race, gender, age, ethnicity, sexual orientation, abilities, and others. **Inclusion** refers to creating a culture where everyone feels a sense of belonging and is valued for their unique perspectives and contributions. A social risk assessment can be performed to evaluate the degree to which diversity and inclusion are part of the environment. At the organizational level, this can include examining the gender ratio, gender pay gaps, age group distribution, racial diversity, and board of directors composition. This is important, as the inclusion of a diverse workforce decreases exposure to risk by increasing the perspectives for problem solving and increasing the competitive profile for the property management company.

At the property level, an apartment community example is offering inclusive programming to include households with and without children. A mixed-use example is ensuring access for people with disabilities or who are elderly, as well as using the common area for a range of different programming initiatives. These types of initiatives can help building users feel more welcomed and valued.

5.5 Governance Risk Management

Governance risk management examples include disclosure, implementation strategies, and cybersecurity.

Disclosure

ESG disclosure is important for transparency and showcases ESG activities being performed at the property and organizational levels. Disclosure opportunities include investor reporting, an exclusive ESG report, GRESB participation, and a section dedicated to ESG on the property and organization website. Disclosing ESG activities illustrates consideration and management of ESG risks and can increase resiliency. Disclosure can also help attract investors who are increasingly concerned with a company's ESG initiatives.

Implementation Strategies

The strategies for implementing ESG policies are important because they provide pathways for policy implementation. Thoughtfully creating these pathways can manage risk so that the ESG risk management measures are effectively implemented at the property level and within the organization. Some strategies to consider include creation of an ESG committee tasked with monitoring and evaluating ESG initiatives. It is important that senior management decision makers are included on this task force so that ESG policies are more easily applied throughout the organization. Another strategy is to create a standardized checklist that can be used at each property to evaluate sustainability broken into E, S, and G component sections. This can foster easier implementation of ESG initiatives at the property level. Also, making a commitment to public ESG leadership principles is a strategy that can showcase commitment and also help inform ESG policies within the property and organization. An example of such public ESG principles are the **United Nations' Sustainable Development Goals (SDGs)** as listed in figure 5.6. These seventeen interconnected goals, introduced in 2015 with the intention to be achieved by 2030, provide pathways for a more sustainable future for all. The Royal Institution of Chartered Surveyors (RICS), a global organization that creates and enforces standards related to real estate, has partnered with the United Nations Global Compact to make it easier for real estate companies to implement the SDGs throughout real estate businesses. They have done this through creation of a document titled "Advancing Responsible Business in Land, Construction, Real Estate Use and Investment—Making the Sustainable Development Goals a Reality" that provides resources such as a toolbox, case studies, and self-assessment checklist. Further information on this resource can be found at: https://www.rics.org/north-america/about-rics/responsible-business/un-sustainable-development/.

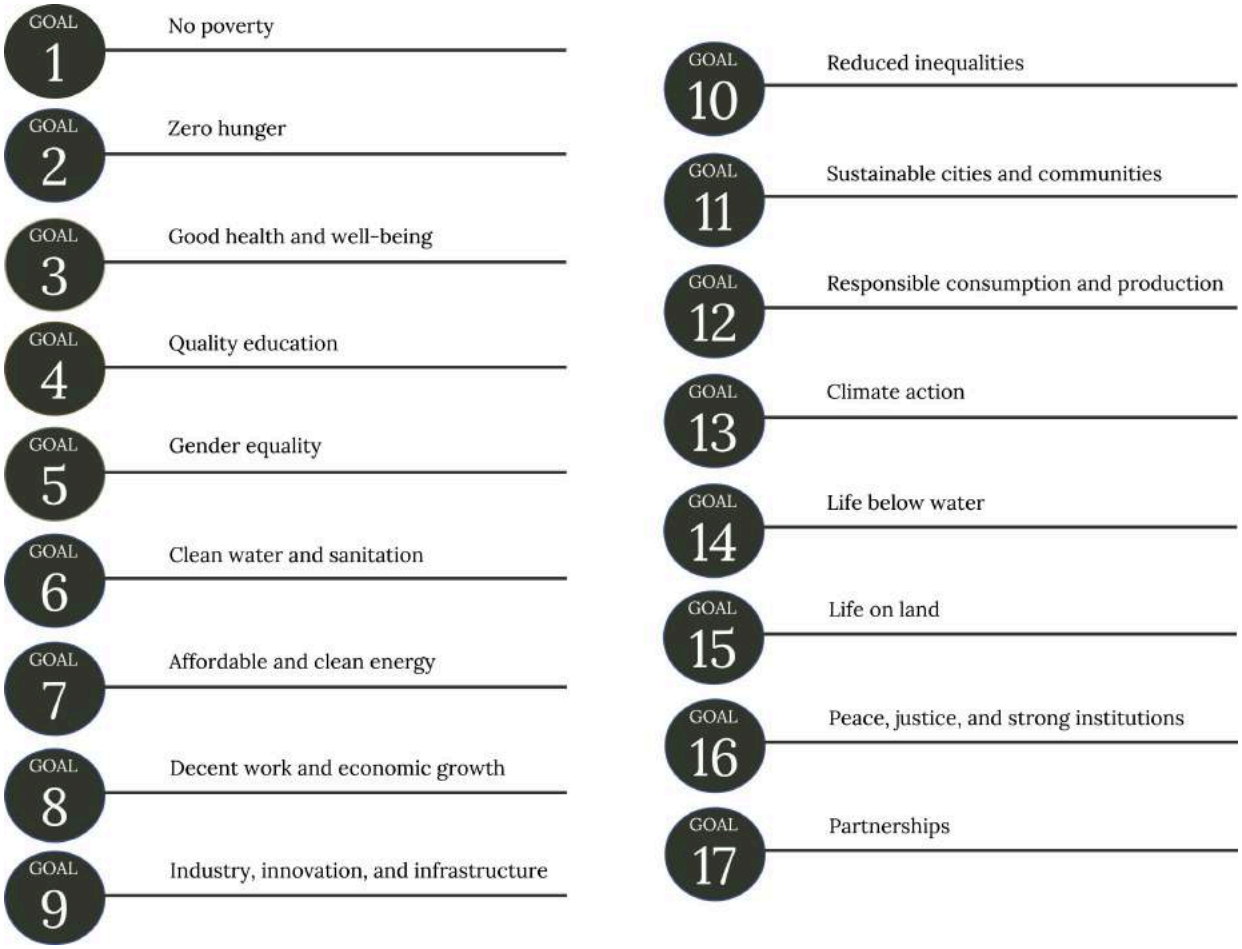

Figure 5.6: United Nations' Sustainable Development Goals. Image description.

Cybersecurity

Cybersecurity refers to the protection of the networking system, hardware, software, and data of a property and organization from cyberattacks. A cyberattack can target computer networks, infrastructure or computer devices, with $200,000 being the average cost of a cyberattack on a business (Steinberg, 2020). This is a significant threat for the sustainability of the real estate organization, and policies should be implemented to incorporate cybersecurity into property management operations. Examples of cybersecurity initiatives include installation of anti-virus software, stronger password requirements, multi-factor authentication, encrypted networks, and data backup policies. These initiatives can reduce risks of a cyberattack.

Section Video

Do you know all 17 SDGs?

[00:01:24] United Nations. https://youtu.be/0XTBYMfZyrM

Section Reference

Steinberg, S. (2020, March 9). *Cyberattacks now cost companies $200,000 on average, putting many out of business*. CNBC. https://www.cnbc.com/2019/10/13/cyberattacks-cost-small-companies-200k-putting-many-out-of-business.html

5.6 Conclusion

This chapter introduced the risk management process model that can be applied to environmental, social, and governance risk management components both at the property and organization levels. ESG initiatives are interconnected and provide a holistic look at risk management. ESG initiatives can be implemented at the property, property portfolio, and organizational levels and should contain goals that are measurable and reasonable. Risk management initiatives will vary depending on the property age, location, size, condition, occupant mix, and turnover frequency. While this chapter introduces a sampling of ESG risk management components, by no means is it an exhaustive list. Furthermore, the ESG framework has limitations. The measurement of ESG performance is complex and requires data that companies may not have previously collected, which can cause inaccurate results. Also, applying a single global benchmark to real estate assets, which inherently are not homogeneous, can cause ESG ratings to be imprecise. But a basic understanding of ESG risk management components is necessary in this environment where investors are increasingly using ESG components to make investment decisions.

Discussion Questions

1. What is an example of the E of ESG as applied to property management, and how does this example address risk management?
2. What is an example of the S of ESG as applied to property management, and how does this example address risk management?
3. What is an example of the G of ESG as applied to property management, and how does this example address risk management?
4. What is your key takeaway from this chapter? In which section did you find it?

Activities

1. Research the rising sea level issues in Miami Beach, FL, and answer the questions below:
    a. Is real estate still being built near the water in Miami Beach? Why or why not?
    b. Using ESG as a framework, what are the risks of continuing to build real estate near the water in Miami Beach, FL?
    c. Is it ethical to build real estate near the water in Miami Beach, FL? Why or why not?
2. Research a local environmental regulation that affects buildings and provide the following details:
    a. Where was it passed?
    b. When was it passed?
    c. What is the goal of the law?
    d. Is there a plan in place to help buildings comply with the law?
    e. What is your reaction to the law?
3. Find a real estate company's ESG plan and summarize the plan. Is there anything that particularly stands out to you? Why?
4. Refer to the UN's website on the SDGs (https://www.un.org/sustainabledevelopment/sustainable-development-goals/) and choose five SDGs and how you can apply them to property management operations.

Figure References

Figure 5.1: Risk management process model. Kindred Grey. (2023). CC BY 4.0.

Figure 5.2: Flooding in South Beach, Miami, Florida. Left image: maxstrz. (2009). CC BY 2.0. https://flic.kr/p/6u5gkd Right image: maxstrz. (2009). *South Beach flood.* https://flic.kr/p/6u17PM. CC BY 2.0

Figure 5.3: Image of Mayor Bill de Blasio (New York City mayor from 2014-2021). KevinCase. (2013). *NYC Mayor Bill de Blasio.* https://flic.kr/p/hcxKLM. CC BY 2.0

Figure 5.4: EMS process model. Kindred Grey. (2023). CC BY 4.0

Figure 5.5: Common property management supply chain components. Kindred Grey. (2023). CC BY 4.0

Figure 5.6: United Nations' SDGs. Kindred Grey. (2023). Adapted from *The 17 Goals.* (n.d.). United Nations Department of Economic and Social Affairs. (https://sdgs.un.org/goals). CC BY 4.0

Image Descriptions

Figure 5.1: The circular model begins with 1) Risk identification, 2) Risk impact assessment, 3) Risk management measures identification, 4) Risk management measures prioritization, 5) Risk management measures funding, 6) Risk management measures implementation, 7) Risk management measures evaluation. Return to figure 5.1.

Figure 5.2: Left: A sign directs pedestrians away from a flooded sidewalk with an overturned post office collection container. Right: A person stands in knee-high deep flood waters next to a vehicle in the street. Return to figure 5.2.

Figure 5.5: The components include these services: marketing, landscaping, office supplies, legal, accounting, cleaning, banking, general contractor, pest control, and trash removal. Return to figure 5.5.

Figure 5.6: Goal 1) no poverty, Goal 2) zero hunger, Goal 3) good health and well-being, Goal 4) quality education, Goal 5) gender equality, Goal 6) clean water and sanitation, Goal 7) affordable and clean energy, Goal 8) decent work and economic growth, Goal 9) industry, innovation, and infrastructure, Goal 10) reduced inequalities, Goal 11) sustainable cities and communities, Goal 12) responsible consumption and production, Goal 13) climate action, Goal 14) life below water, Goal 15) life on land, Goal 16) peace, justice, and strong institutions, Goal 17) partnerships. Return to figure 5.6.

6. Integrating Sustainable Practices into Marketing and Leasing

Chapter Contents

Learning Objectives

- Explain how a market analysis informs the supply and demand of sustainable building initiatives
- Identify sustainable building initiatives in a marketing plan
- Describe greenwashing
- Identify green lease components
- Explain the role of a tenant satisfaction survey in assessing sustainable building initiatives

6.1 Introduction

There are many opportunities for property management companies to integrate sustainable practices into the marketing and leasing function. The first step is to perform a market analysis to evaluate the supply and demand of sustainable building initiatives both regionally and locally. This market analysis determines what sustainable property management components can be added to the property marketing plan to attract tenants to the property. Once the tenant is attracted to the property, green lease concepts can be added to the leasing plan to set the basis for sustainable building operations. During the lease, it is a best practice for the property company to engage with tenants through a tenant satisfaction survey on sustainable building initiatives. This feedback is evaluated and any necessary adjustments made to increase tenant satisfaction and foster tenant retention. Holistically, the social sphere of sustainability is addressed through happier tenants, the economic sphere is addressed through increased revenue from tenant retention, and the environmental sphere is addressed through mitigation of ecological impacts through sustainable marketing and leasing practices.

6.2 Market Analysis

Marketing and leasing activities are informed by a **market analysis**. A market analysis consists of acquiring knowledge about the demographic and economic profiles of the region and neighborhood as it relates to the subject property. **Demographics** are population data such as education, income, religion, gender, ethnicity, race, age, and marital status information. The economic profile includes data such as the area's largest employers, the mix of industries, employment statistics, and visitor statistics. Regional and neighborhood analyses of demographic and economic profiles help determine the supply and demand of various buildings and their associated features. Sustainable building features are the focus when considering a sustainable property management plan.

While the majority of Americans believe climate change impacts are a priority, sustainable building initiatives vary depending upon location (Tyson et al., 2021). In 2021, a study was released ranking the 100 largest cities in the United States on the promotion of an environmentally friendly lifestyle, based on the dimensions of environment, transportation, energy sources, and lifestyle and policy (McCann, 2021). Figure 6.1 lists the most sustainable and least sustainable cities in the United States based on this study. From review of this figure, it is likely that sustainable property management initiatives in Gilbert, Arizona, are in less demand than in San Diego, California. However, if there is no supply of sustainable building initiatives in Gilbert, there may be unrecognized or unrealized demand in a specific area in Gilbert that values sustainable building initiatives. This is why a neighborhood analysis is also important.

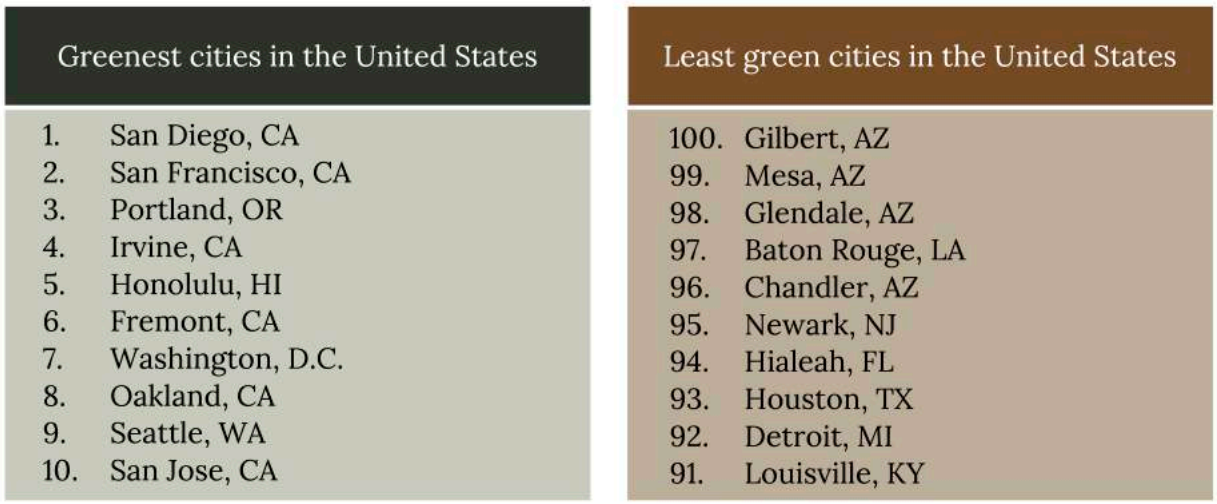

Figure 6.1: Greenest and least green cities in the United States (2021). Image description.

The market analysis is informed by market signals regarding sustainable building practices. Some relevant questions about market signals include:

- Is the market that the property operates within signaling higher rental rates for sustainable building management practices? Or are they required to merely remain competitive?
- Are there image and brand impacts of providing sustainable property management services?
- Will there be reduced demand for this property in the future if sustainable property management practices are not practiced due to a shift in consumer preferences?

Section References

McCann, A. (2021, October 5). *Greenest cities in America.* WalletHub. https://wallethub.com/edu/most-least-green-cities/16246

Tyson, A., Kennedy, B., & Funk, C. (2021, May 26). Climate energy and environmental policy. In *Gen Z, Millennials stand out for climate change activism, social media engagement with issue.* Pew Research Center. https://www.pewresearch.org/science/2021/05/26/climate-energy-and-environmental-policy/

6.3 Marketing Plan

A **marketing plan** contains the marketing goals for the property in order to attract tenants. The addition of sustainable property management activities to the property marketing plan can help attract tenants that value sustainable building initiatives from various perspectives. If operating in a market that does not place value on sustainable building initiatives from an ecological standpoint, the marketing plan can highlight these initiatives from an economic or health and well-being perspective to appeal to the market.

Example: Marketing Plan

For example, in a market that values the ecological sphere of sustainability, energy-efficient appliances can be advertised to provide a lower-carbon lifestyle and lower utility bills. In a market that does not value the ecological sphere of sustainability, energy-efficient appliances can simply be advertised as providing lower utility bills for the tenant. Alternatively, in a market that values the ecological sphere of sustainability, the property can market its use of low VOC flooring and paints as better for the planet and as a benefit to the occupant's level of indoor air quality. In a market that does not value the ecological sphere of sustainability, the property can market its use of low VOC flooring and paints solely as a benefit to the occupant's level of indoor air quality.

Greenwashing, a marketing tactic that portrays a property to be greener than it actually is, is a consideration when creating the marketing plan. While a property company certainly wants to advertise sustainable building initiatives, caution should be taken to ensure consumers are not being deceived that a building is more sustainable than a conventional building when it is not or making claims that have not been verified. Some common examples of greenwashing in property management include marketing the property as energy efficient when it truly is not or advertising the property as having a low carbon footprint when this has not been verified. Properties may be advertised as being eco-friendly with no details and varying colors of green may be used in their marketing materials.

One way to address greenwashing is for tenants and investors to look for reporting efforts on sustainable building initiatives. This can most likely be found through a property company's ESG reporting, if they participate in this type of reporting. Another method is to look for third-party building and product certifications such as LEED building certification and ENERGY STAR products. These efforts to use third-party certifications can be showcased on the property's marketing materials, including the certification logos on websites and print materials. Showcasing these logos can also provide positive brand reputation and attract potential tenants. A property's **Walk Score** is another third party scoring metric to consider showcasing in the marketing plan's sustainable activities. Although the property manager doesn't dictate where the building is sited, a high Walk Score can be attractive to tenants. A Walk Score can be between 0 and 100 and the higher the number, the higher the walkability of the property. Figure 6.2 illustrates the various levels of a Walk Score. The Walk Score website also offers a Transit Score and Bike Score, with the same scoring range, that may be worthwhile to showcase within the property's marketing materials.

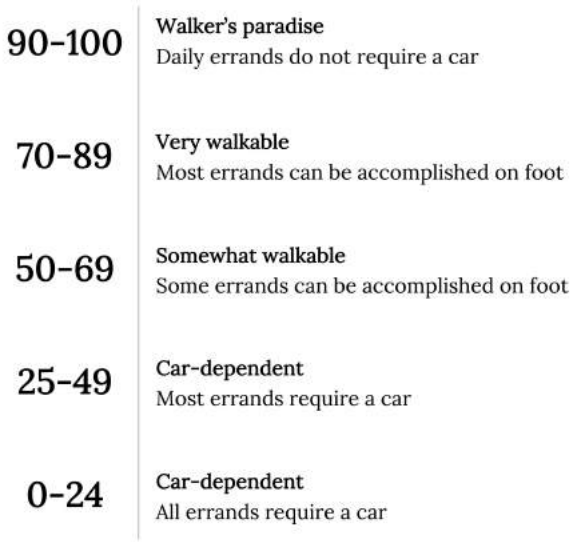

Figure 6.2: Walk Score levels. Image description.

6.4 Leasing Plan

Leasing structures vary widely depending on the property type. Residential leases typically do not vary much from one tenant to another within the same property, with the exception of rent amount and lease start and end dates. Commercial leases, on the other hand, are typically multiple years with lease escalations included as well as a greater propensity for negotiation depending upon the market and tenant. A **leasing plan** contains the guidelines concerning leasing parameters such as rent, rent term, concessions, tenant allowances, and common area maintenance pass-throughs. The leasing plan contents will vary based on property sector and company guidelines.

In some cases, a **lease request for proposal (RFP)** is submitted by a tenant to building owners to compare various building space opportunities. The RFP can include various requirements of the tenant such as the size of the building space, common area spaces that the tenant is responsible for paying their pro-rata share of, the proposed use of the space, the lease term and rate, renewal options, tenant improvements, and parking requirements. The lease RFP also may contain sections related to HVAC responsibilities, janitorial services, building amenities, and any sustainable building initiatives. For example, a lease RFP may require a certain level of LEED certification as a corporate responsibility strategy to showcase they are environmentally friendly and also to respond to employees who are requesting sustainable spaces.

The leasing plan can also incorporate green lease concepts. A **green lease** is a collaboration between property owner, property manager, and property tenant to align sustainable building interests by sharing in the costs and benefits of incorporating sustainable initiatives within the building space. Green leases help to address the split incentive barrier that sometimes prevents either the tenant or landlord from implementing sustainable building initiatives. Green lease language examples can be found at https://www.imt.org/wp-content/uploads/2020/02/IMT-Green-Lease-Language-Examples-January-2020.pdf

Example: Green Leasing

For example, if the tenant is responsible for utility bills, there is no significant financial incentive for the landlord to provide capital improvements that yield energy savings as they will not fully realize the cost savings of these improvements. While there may be some capacity to raise rents because of energy-efficient capital improvements, it is unlikely the landlord will recover their full investment. In order for both landlord and tenant to financially benefit from capital improvements that yield energy savings, a lease provision can be added to resolve this barrier so that both parties are working together toward energy-efficient capital improvements.

Green Lease Leaders, developed by the Institute for Market Transformation and the U.S. Department of Energy's Better Buildings Alliance, provides a framework for implementing green lease standards. While this framework is limited in scope, it does provide standardization for landlords and tenants. Figure 6.3 illustrates the prerequisites and credits for this framework to demonstrate leadership in green leasing for landlords in both commercial and multifamily settings. To achieve Silver recognition the landlord must meet two of the three prerequisites and address at least five of the best practices credits, while Gold recognition requires proof of execution of these prerequisites and best practices credits through documentation such as an executed lease. For further reading, the Green Lease Leaders Reference Guide for Tenants can be found here: https://www.greenleaseleaders.com/wp-content/uploads/2021/02/Green-Lease-Leaders-Tenants-Reference-Guide-FINAL.pdf.

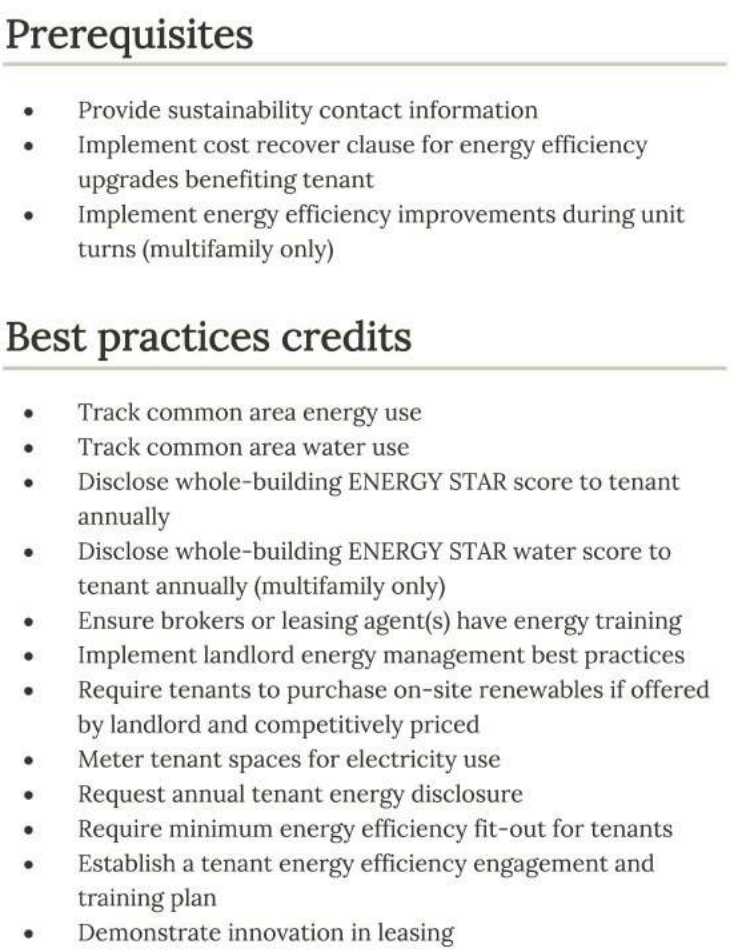

Figure 6.3: Green Lease Leaders framework prerequisites and credits for ***landlords****. Image description.*

Figure 6.4 illustrates the prerequisites and credits for this framework to demonstrate leadership in green leasing for tenants in commercial settings. To achieve silver recognition, the tenant must meet both prerequisites and address at least five of the best practices credits while gold recognition requires proof of execution of these prerequisites and best practices credits through documentation such as an executed lease. For further reading, The Green Lease Leaders Reference Guide for Landlords can be found here: https://www.greenleaseleaders.com/wp-content/uploads/2022/02/Green-Lease-Leaders-Landlords-Reference-Guide-FINAL.pdf.

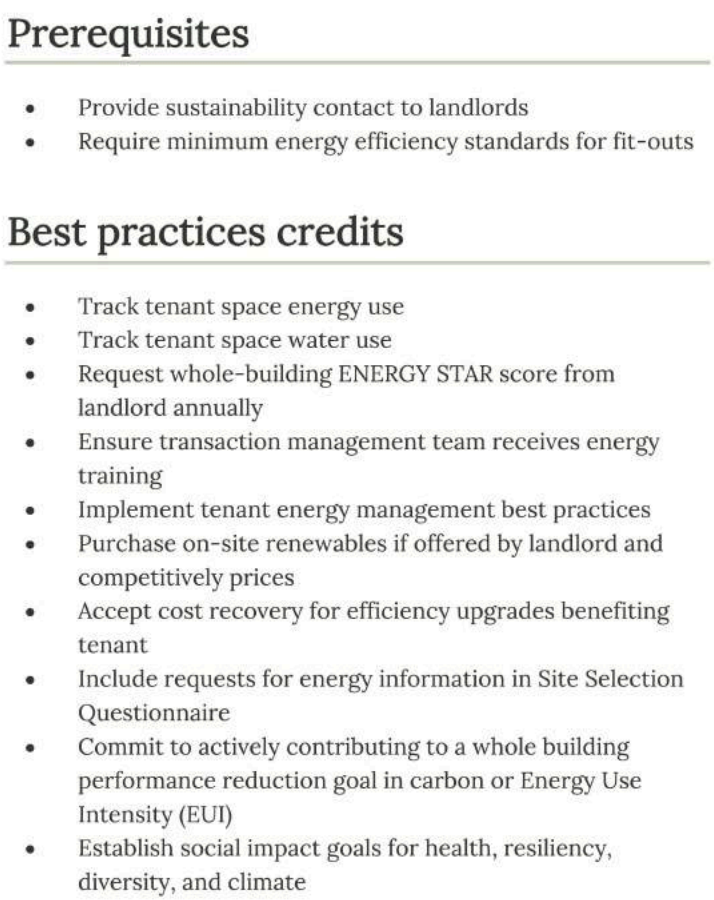

Figure 6.4: Green Lease Leaders framework prerequisites and credits for ***tenants****.* *Image description.*

6.5 Tenant Satisfaction Survey

Tenant feedback on sustainable property management practices helps the property company understand issues that are important to tenants and subsequently helps retain tenants through resolution of any issues. It is holistic in the sense that it takes into account the health and well-being of the building occupants while also fostering a positive economic situation for the property company through increased tenant satisfaction and tenant retention. A best practice to elicit this feedback is through a regularly occurring tenant satisfaction survey. A **tenant satisfaction survey** is useful to not only assess what sustainable products and services may be important to tenants that are not currently in place, but also to assess tenants' level of knowledge about sustainable initiatives at the property or company level. It also provides feedback on what sustainable initiatives are working well at the property and company level. This feedback can inform recommendations for sustainable building initiatives moving forward.

There are multiple formats for a tenant satisfaction survey. A questionnaire, interview, focus group, or a combination of these methods can be used to create the format for building occupant feedback. For example, a focus group consisting of a smaller group of tenants may be the first step in crafting a full property or property portfolio questionnaire. The responses from this focus group can help in crafting a standardized survey for the property as a whole. A standardized survey can also be helpful when comparing results and looking for themes across the property portfolio. If using a questionnaire, a 1-5 scale can be used to assess tenant satisfaction on sustainable building initiatives, with 1 being very unsatisfied to 5 being very satisfied. Below are areas where questions can be crafted related to satisfaction with sustainable property management:

- Energy Efficiency
- Water Efficiency
- Indoor Environmental Quality
- Waste Management
- Site Sustainability

The results of the sustainable property management tenant satisfaction survey are helpful in informing future decisions toward a sustainable property management plan. They assist the property company in understanding the satisfaction of current sustainable building offerings as well as the level of tenant interest. These results are likely to vary by tenant, building, and market. If there is lower interest in sustainable building initiatives, tenants may still find satisfaction in a sustainable building initiative should it reduce operating costs and/or increase the health and well-being of building occupants. If any of the feedback needs further clarification, a focus group can help with this clarification.

Based on the feedback from the surveys, a plan can be developed to incorporate the feedback that includes specific action to be taken, deadlines for implementation, and how these action items will be funded. Once this plan is implemented, evaluation through another tenant satisfaction survey is important to assess the success of these implemented actions. Continual tenant engagement and collaboration can cultivate a higher level of tenant satisfaction, which may promote improved tenant retention rates. By retaining tenants, a property is able to continue collecting rental revenue and also does not have to spend funds marketing and finding new tenants.

6.6 Conclusion

A market analysis is critical to evaluating the position of the subject property to the broader market of properties within the region and neighborhood as it relates to sustainable building initiatives. The interest in sustainable building activities will likely vary by tenant, property, and market so the property company needs to understand the market within which they operate. If tenants have a relatively low interest in sustainable building initiatives, the property can appeal to the financial and health benefits of the initiative both in the marketing plan and tenant satisfaction survey. In markets that value sustainable building activities, including these activities in the marketing plan can enhance a property's competitive profile in the marketplace for prospective tenants, and provide positive reputation impacts. Once a tenant is attracted to the property, creating leases with sustainable measures within the terms sets the basis for sustainable building operations. During the lease, a tenant satisfaction survey engages tenants with the sustainable activities taking place at the property and can assess their level of satisfaction and interest in these activities. This helps inform the future of a sustainable property management plan.

Discussion Questions

1. What is the difference between a market analysis and a marketing plan?
2. Why does demand for sustainable building initiatives vary by U.S. city?
3. How can a tenant satisfaction survey be helpful in assessing sustainable building initiatives?
4. What is your key takeaway from this chapter? In which section did you find it?

Activities

1. Research a multifamily community in the municipality where you reside and answer the following questions:
    a. Does their website advertise any sustainable building initiatives?
    b. If so, do you believe any greenwashing is occurring? Why or why not?
2. Look up the Walk Score, Transit Score, and Bike Score (https://www.walkscore.com/) of the building you researched in the first question and answer the following questions:
    a. What is the Walk Score?
    b. What is the Transit Score?
    c. What is the Bike Score?
    d. Do you find value in these scores? Why or why not?
3. Create five questions a property manager may want to ask through a questionnaire, interview, or focus group to obtain tenant satisfaction information about sustainable building initiatives. Explain why these questions are important to ask.

Figure References

Figure 6.1: Greenest and least green cities in the United States (2021). Kindred Grey. (2023). Data from Greenest cities in America. (2022, October 5). *WalletHub*. https://wallethub.com/edu/most-least-green-cities/16246.. CC BY 4.0

Figure 6.2: Walk score levels. Kindred Grey. (2023). Data from How Walk Score works. (2023). *Walk Score*. https://www.walkscore.com/how-it-works/.. CC BY 4.0

Figure 6.3: Green lease leaders landlord framework prerequisites and credits. Kindred Grey. (2023). Data from *Green lease leaders reference guide for landlords.* (n.d.). https://www.greenleaseleaders.com/wp-content/uploads/2022/02/Green-Lease-Leaders-Landlords-Reference-Guide-FINAL.pdf. CC BY 4.0

Figure 6.4: Green lease leaders tenant framework prerequisites and credits. Kindred Grey. (2023). Data from *Green lease leaders reference guide for landlords.* (n.d.). https://www.greenleaseleaders.com/wp-content/uploads/2022/02/Green-Lease-Leaders-Landlords-Reference-Guide-FINAL.pdf. CC BY 4.0

Image Descriptions

Figure 6.1: The top ten greenest cities in the U.S. are 1) San Diego, CA, 2) San Francisco, CA, 3) Portland, OR, 4) Irvine, CA, 5) Honolulu, HI, 6) Fremont, CA, 7) Washington, D.C., 8) Oakland, CA, 9) Seattle, WA, and 10) San Jose, CA. The least green cities in the U.S. are 100) Gilbert, AZ, 99) Mesa, AZ, 98) Glendale, AZ, 97) Baton Rouge, LA, 96) Chandler, AZ, 95) Newark, NJ, 94) Hialeah, FL, 93) Houston, TX, 92) Detroit, MI, and 91) Louisville, KY. Return to figure 6.1.

Figure 6.2: The score of 90-100 is a walker's paradise: daily errands do not require a car; 70-89 is very walkable: most errands can be accomplished on foot; 50-69 is somewhat walkable: some errands can be accomplished on foot; 25-49 is car-dependent: most errands require a car; and 0-24 is car-dependent: all errands require a car. Return to figure 6.2.

Figure 6.3: Prerequisites: provide sustainability contact information; implement cost recovery clause for energy efficiency upgrades benefiting tenant; implement energy efficiency improvements during unit turns (multifamily only). Best practices credits: track common area energy use; track common area water use; disclose whole-building ENERGY STAR score to tenant annually; disclose whole building ENERGY STAR water score to tenant annually (multifamily only); ensure brokers or leasing agent(s) have energy training; implement landlord energy management best practices; require tenants to purchase on-site renewables if offered by landlord and competitively priced; meter tenant spaces for electricity use; request annual tenant energy disclosure; require minimum energy efficiency fit-out for tenants; establish a tenant energy efficient engagement and training plan; and demonstrate innovation in leasing. Return to figure 6.3.

Figure 6.4: Prerequisites: provide sustainability contact to landlords; and require minimum energy efficiency standards for fit-outs. Best practices credits include: track tenant space energy use; track tenant space water use; request whole-building ENERGY STAR score from landlord annually; ensure transaction management team receives energy training; implement tenant energy management best practices; purchase on-site renewables if offered by landlord and competitively prices; accept cost recovery for efficiency upgrades benefiting tenant; include requests for energy information in site selection questionnaire; commit to actively contributing to a whole building performance reduction goal in carbon or energy use intensity (EUI); and establish social impact goals for health, resiliency, diversity, and climate. Return to figure 6.4.

7. Financial Evaluation of Sustainable Building Initiatives

Chapter Contents

Learning Objectives

- Explain how sustainable property management initiatives affect the property statement of cash flow
- Calculate the cash-on-cash return for sustainable initiatives
- Calculate the simple payback period for sustainable initiatives
- Calculate the discounted payback period for sustainable initiatives
- Calculate a cost-benefit analysis for sustainable initiatives

7.1 Introduction

Previous chapters discussed the social, environmental, and economic spheres of sustainable property management. This chapter takes a closer look at the economic sphere of sustainability. It introduces calculations to determine if a sustainable building initiative makes financial sense. There are multiple metrics within the accounting and finance function to account for sustainable initiatives. These include the calculation of net operating income (NOI), before-tax cash flow, cash-on-cash return, payback period, and cost-benefit analysis. Some impacts of sustainable building initiatives are difficult to monetize, such as the cost of carbon, an employee wellness initiative, or the enjoyment of building users from using power generated from renewable energy sources. However, sustainable property management initiatives will impact the economic condition at the property. As the overarching goal of a property manager is to increase property NOI, it is important to consider the associated economic impacts of sustainable initiatives at the property.

7.2 Statement of Cash Flow and Sustainable Property Management

It is crucial for the property manager to understand how to evaluate each line item of a cash flow statement. This financial literacy aids in understanding the financial impacts of various sustainable property management initiatives. The property cash flow statement is broken into "above the line" categories and "below the line" categories. "Above the line" categories refer to categories above the NOI line item and "below the line" refers to categories below the NOI line item. Figure 7.1 illustrates an example of a property **statement of cash flows**. The revenue category includes all line items down to **effective gross income (EGI)**. The **operating expenses (OPEX)** category is below the revenue category, and the list below figure 7.1 illustrates common operating expense line items.

Figure 7.1: Sample statement of cash flow. Image description.

Common operating expense line items:

- Legal
- Maintenance and Repairs
- Management Fee
- Marketing
- Payroll
- Property Insurance
- Real Estate Taxes
- Supplies
- Telephone & Internet
- Services
    - Landscaping
    - Pest Control
    - Trash Removal
- Utilities
    - Electricity
    - Heating Fuel
    - Water & Sewer

As per figure 7.1, NOI is calculated by subtracting operating expenses (OPEX) from effective gross income (EGI). NOI is a significant calculation because it is a common measure the real estate industry uses to determine the financial health of a property. NOI is also important because it is a major element in the calculation of market value of an asset. **Annual debt service (ADS)**, **capital expenditures (CAPEX)**, and **replacement reserves** line items are typically accounted for below NOI. ADS is the total amount of principal and interest payments made over a twelve month period, CAPEX are expenses that are not regularly occurring operating expenses such as parking lot paving, and replacement reserves is like a savings account where funds are put annually to "save" for planned building component replacements as well as serve as an emergency fund. For example, the replacement reserves line item may be used to annually contribute funds for a planned roof replacement in five years. ADS, CAPEX, and replacement reserves are subtracted from NOI to arrive at before-tax cash flow (BTCF). (Note that **before-tax cash flow** refers to before income-tax considerations, not real estate taxes which are part of operating expenses.)

Example: Sustainable Property Management Initiatives and Associated Before-Tax Cash Flow Statement Impacts

Sustainable property management initiatives can impact each of the before-tax cash flow statement categories. Within the revenue category, marketing the sustainable initiatives at the property can attract more tenants and therefore increase occupancy; this could increase rent revenue. This quantification is relatively difficult because there is no exact calculation, but tenant satisfaction surveys (as discussed in chapter 6) can help inform property management on the importance of sustainable initiatives in attracting and retaining tenants at the property. Within the operating expense category, changing from conventional light bulbs to LED light bulbs can reduce electricity expenses. Also, maintenance and repairs could decrease because LED light bulbs last longer so they do not need to be changed out as often. Upfront, the cost of the LED light bulbs would be accounted for either in CAPEX or maintenance and repairs, depending on the size and cost of the project. Debt service is typically not a line item that property managers influence, but there are financing options for sustainable buildings such as Fannie Mae's Multifamily program that offers preferential pricing for sustainable buildings.

The CAPEX item for sustainable initiative implementation may increase in the current year statement of cash flow, but there tend to be positive financial impacts in future years from these expenditures. These future year impacts can be accounted for in a forecasted statement of cash flow, commonly called a **proforma statement of cash flow**. A proforma statement of cash flow is helpful in planning for the potential impacts of sustainable initiatives. For example, it can account for an initial capital outlay to change from conventional landscaping to a xeriscape landscape design, but also account for lower water bills, maintenance, and fertilizer costs in future years as this type of landscape requires less watering, less maintenance, and less fertilizer. Therefore, property cash flow will experience more **upfront cost** impacts and property NOI will experience more operational cost saving impacts.

7.3 Cash-on-Cash Return Analysis

A helpful and easy calculation to quickly analyze a return of a sustainable building initiative is a cash-on-cash return. The **cash-on-cash return** calculates the rate of return on the cash invested in a property based on the annual cash income earned. The equation is as follows:

Cash-on-Cash Return = Annual Cash Income / Total Cash Invested

Let's use an example to apply this equation.

Example: Cash-on-Cash Calculation

It cost the property $9,100 to replace traditional light bulbs with more energy-efficient LED light bulbs. The annual electricity savings from installing LED light bulbs is projected to be $2,350.

Calculate the cash-on-cash return.

Step 1: Apply the cash-on-cash return formula.

Cash-on-Cash Return = Annual Cash Income / Total Cash Invested

Cash-on-Cash Return = $2,350 / $9,100

Cash-on-Cash Return = 25.82 percent

The results of the cash-on-cash return can be used to compare the property owner's required rate of return against the cash-on-cash return. The investor will move forward if the cash-on-cash return is greater to or equal to the required rate of return. For example, suppose the property owner's required rate of return in the example above is 8 percent. Since the cash-on-cash return of 25.82 percent is greater than the required rate of return of 8 percent, the investor will move forward on the sustainable initiative.

The cash-on-cash return is different from **return on investment (ROI)** because the cash-on-cash return is a snapshot of an annual cash income based on cash invested, whereas ROI takes into account the gain or loss over the life of ownership and divides that gain or loss by the the cost of the investment. However, both the cash-on-cash return and ROI can be misleading as they do not account for the **time value of money** or the **holding period** of an investment. A cost-benefit analysis is introduced in a later section in this chapter that takes these variables into account.

7.4 Payback Period Analysis

There are no-cost, low-cost, and high-cost sustainable property management initiatives. No-cost examples include turning off lights and equipment when not in use. Low-cost examples include providing recycling bins to tenants and changing from conventional light bulbs to LED light bulbs. High-cost examples include adding solar panels to the property and installing a green roof on the building. The **simple payback period**, a calculation that determines the amount of time it takes to recover the upfront costs of an investment, can be calculated for sustainable initiatives that have upfront costs. The formula can be seen below and an example of this formula applied is found in the box below.

Simple Payback Period = Initial Investment Costs / Annual Savings

Example: Simple Payback Period Calculation

It cost the property $9,100 to replace traditional light bulbs with more energy-efficient LED light bulbs. The annual electricity savings from installing LED light bulbs is projected to be $2,350.

Calculate the simple payback period.

Step 1: Apply the simple payback period formula.

Simple Payback Period = Initial Investment Costs / Annual Savings

Simple Payback Period = $9,100 / $2,350

Simple Payback Period = 3.87 years

A **discounted payback period** analysis takes into account time value of money by applying a discount rate to discount the future cash flows. The **discount rate** is either the cost of capital or a required "hurdle" rate-of-return metric, which an investment must minimally achieve; otherwise the money will be invested elsewhere. For example, a property company may be paying 5 percent on its debt, so 5 percent is used as the discount rate to represent this cost of capital. Alternatively, shareholders may require a 9 percent return, so 9 percent is used as the discount rate to represent this required rate of return to invest in a project. The formula can be seen below and an example of this formula applied is found in the box below. These calculations can also be done on a financial calculator or financial analysis spreadsheet.

Discounted Payback Period = Preceding Year that Discounted Payback Return Occurs + (Absolute Value of Cumulative Discounted Cash Flow in this Preceding Year / Discounted Cash Flow for the Year After Discounted Payback Return Occurs)

Example: Discounted Payback Period Calculation

It cost the property $9,100 to replace traditional light bulbs with more energy-efficient LED light bulbs. The annual electricity savings from installing LED light bulbs is projected to be $2,350. The discount rate = 8 percent.

Calculate the discounted payback period.

Step 1: Create the chart described below that determines the first year that cumulative discounted cash flows become positive.

a. Calculate the simple payback period.
b. Based on the number of years for the simple payback period, list out the years in the chart.
c. Add the net cash flow by year.
d. Use the discounting cash flow formula to arrive at the discounted net cash flow: **Discounting Cash Flow = Net Cash Flow / (1 + Discount Rate)$^{\text{Time Period}}$.**
e. Find the cumulative discounted cash flow by subtracting the previous year cumulative discounted cash flow from the current year discounted net cash flow.
f. If the cumulative discounted cash flow remains negative after completing these steps, keep adding an additional year column with the above components until the cumulative discounted cash flow is positive.

	Time Zero	Year 1	Year 2	Year 3	Year 4	Year 5
Net Cash Flow	**(9,100.00)**	2,350 .00	2,350.00	2,350.00	2,350.00	2,350.00
Discounting Cash Flow Formula	**(9,100.00)** / (1 + 8 percent)^0	2,350 / (1 + 8 percent)^1	2,350 / (1 + 8 percent) ^2	2,350 / (1 + 8 percent)^3	2,350 / (1 + 8 percent)^4	2,350 / (1 + 8 percent)^5
Discounted Net Cash Flow	**(9,100.00)**	2,175 .93	2,014.75	1,865.51	1,727.32	1,599.37
Cumulative Discounted Cash Flows	**(9,100.00)**	**(6,924.07)**	**(4,909.33)**	**(3,043.82)**	**(1,316.50)**	282.87

Table 7.1: The first year that cumulative discounted cash flows become positive. Negative numbers are bolded.

Step 2: Apply the discounted payback period formula.

> **Discounted Payback Period = Preceding Year that Discounted Payback Return Occurs + (Absolute Value of Cumulative Discounted Cash Flow in this Preceding Year / Discounted Cash Flow for the Year After Discounted Payback Return Occurs)**
>
> Discounted Payback Period = 4 + 1,316.50 / 1,599.37

Discounted Payback Period = 1,316.50 / 1,599.37 = .82

Discounted Payback Period = 4 + .82

Discounted Payback Period = 4.82

Discounted Payback Period = 4.82 years

As you can see from the above example, the discounted payback period is greater than the simple payback period because the time value of money is factored in. The time value of money concept is that a dollar is worth more today than a dollar tomorrow because of the opportunity cost of investing the dollar somewhere else. This is why future cash flows are discounted.

7.5 Cost-Benefit Analysis

Both the simple payback period and discounted payback period discussed in the previous section do not take into account the savings once the initial capital outlay is paid back. Therefore, a cost-benefit analysis is useful when taking into account the initial capital outlay and the savings once this initial capital outlay is paid back. A **cost-benefit analysis** is a decision-making tool to determine if the benefits outweigh the costs of a potential investment throughout the product lifecycle. The **net present value (NPV)** is a helpful calculation when carrying out a cost-benefit analysis. The investor will move forward if NPV is equal to or greater than zero. If the NPV is equal to zero, the investor achieves their required rate of return. If the NPV is greater than zero, the investor achieves a return higher than their required rate of return. In order to determine NPV, the discount rate, product lifecycle, initial costs, and operating savings are needed. A simple formula for NPV is below:

NPV = Today's Value of Expected Cash Flows — Today's Value of Cash Invested

Let's again use the example used throughout the chapter, but this time performing an NPV calculation as illustrated in the box below.

Example: Net Present Value Calculation

It cost the property $9,100 to replace traditional light bulbs with more energy-efficient LED light bulbs. The annual electricity savings from installing LED light bulbs is projected to be $2,350. The discount rate = 8 percent. The LED lighting useful life is between 30,000 and 50,000 hours (LED Basics, n.d.). Assume 2,080 hours annually for LED lighting use and 40,000 hours of useful life for LED lighting. Therefore, the LED lighting useful life is 40,000 / 2,080 = 19.23 years. Conservatively, 19 years will be used as the LED lighting product lifecycle.

Calculate the NPV.

Step 1: Create chart below.

a. List out the number of years of the product useful life in the first column.
b. List out the annual cash flow during the product's useful life.
c. Calculate the discount factor for each year: $\mathbf{1/(1 + Discount\ Rate)^{Year}}$.
d. Calculate the present value by multiplying the cash flow by the discount rate.
e. Sum all present value rows to come up with the net present value.

Year	Cash flow	Discount factor	Present value
0	**(9,100)**	1.0000	**(9,100.00)**
1	2,350	0.9259	2,175.93
2	2,350	0.8573	2,014.75
3	2,350	0.7938	1,865.51
4	2,350	0.7350	1,727.32
5	2,350	0.6806	1,599.37
6	2,350	0.6302	1,480.90
7	2,350	0.5835	1,371.20
8	2,350	0.5403	1,269.63
9	2,350	0.5002	1,175.59
10	2,350	0.4632	1,088.50
11	2,350	0.4289	1,007.87
12	2,350	0.3971	933.22
13	2,350	0.3677	864.09
14	2,350	0.3405	800.08
15	2,350	0.3152	740.82
16	2,350	0.2919	685.94
17	2,350	0.2703	635.13
18	2,350	0.2502	588.09
19	2,350	0.2317	544.52
Total	35,550	10.6036	13,468.46

Table 7.2: Year, cash flow, discount factor, and present value. Negative numbers are bolded.

Step 2: Calculate NPV.

NPV = Today's Value of Expected Cash Flows — Today's Value of Cash Invested

Net Present Value = 13,468.46

If NPV is equal to zero, the investor achieves their required rate of return. If NPV is greater than zero, the investor achieves a return higher than their required rate of return. In the above example, since NPV is greater than 0, the project is projected to achieve a return higher than their required rate of return. NPV is also helpful to use when comparing alternative projects because it provides a tangible number for comparison purposes. There is an NPV function in Excel, but Excel does not take into account Year 0 in the calculation, so the result in Excel will differ from the manual calculation if there is cash flowing in Year 0. This can be corrected in Excel by excluding the cash outflow in year 0 when calculating NPV and then subtracting out the initial cash outflow from the NPV calculation in Excel.

Benefit-cost ratio (BCR) is another popular calculation when carrying out a cost-benefit analysis. The BCR equation is as follows:

BCR = Discounted Value of Incremental Benefits / Absolute Value of Discounted Value of Incremental Costs

Let's again use the example used throughout the chapter, but this time performing a BCR calculation as illustrated in the box below.

Example: Benefit-Cost Ratio Calculation

It cost the property $9,100 to replace traditional light bulbs with more energy-efficient LED light bulbs. The annual electricity savings from installing LED light bulbs is projected to be $2,350. The discount rate = 8 percent. The LED lighting useful life is between 30,000 and 50,000 hours (LED Basics, n.d.). Assume 2,080 hours annually for LED lighting use and 40,000 hours of useful life for LED lighting. Therefore, the LED lighting annual useful life is 40,000 / 2,080 = 19.23 years. Conservatively, 19 years will be used as the LED lighting product lifecycle.

Calculate the NPV.

Step 1: Create chart below.

a. List out the number of years of the product useful life in the first column.
b. List out the annual cash flow during the product's useful life.
c. Calculate the discount factor for each year: $\mathbf{1/(1 + Discount\ Rate)^{Year}}$.
d. Calculate the present value by multiplying the cash flow by the discount rate.

Year	Cash flow	Discount factor	Present value
0	**(9,100)**	1.0000	**(9,100.00)**
1	2,350	0.9259	2,175.93
2	2,350	0.8573	2,014.75
3	2,350	0.7938	1,865.51
4	2,350	0.7350	1,727.32
5	2,350	0.6806	1,599.37
6	2,350	0.6302	1,480.90
7	2,350	0.5835	1,371.20
8	2,350	0.5403	1,269.63
9	2,350	0.5002	1,175.59
10	2,350	0.4632	1,088.50
11	2,350	0.4289	1,007.87
12	2,350	0.3971	933.22
13	2,350	0.3677	864.09
14	2,350	0.3405	800.08
15	2,350	0.3152	740.82
16	2,350	0.2919	685.94
17	2,350	0.2703	635.13
18	2,350	0.2502	588.09
19	2,350	0.2317	544.52
Total	35,550	10.6036	13,468.46

Table 7.3: Year, cash flow, discount factor, and present value. Negative numbers are bolded.

Step 2: Sum up the present value of savings (22,568.46).

Step 3: Sum up the present value of costs (9,100.00).

Step 4: Apply the BCR formula from up above.

BCR = Discounted Value of Incremental Benefits / Absolute Value of Discounted Value of Incremental Costs

BCR = 22,568.46 / 9,100.00

BCR = 2.48

If BCR is equal to one, the investor achieves their required rate of return. If the BCR is greater than one, the investor achieves a return higher than their required rate of return. In the above example, because the BCR is greater than one, this indicator also shows this sustainable initiative makes sense from a financial standpoint. The BCR ratio can also be used to compare various sustainable building projects.

As the discount rate rises, the NPV and BCR decrease. As the product lifecycle increases, the NPV increases along with the BCR.

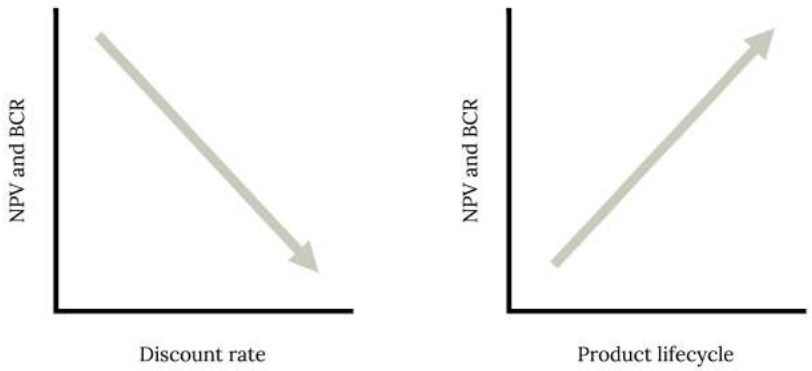

Figure 7.2: Discount rate and product lifecycle in relation to NPV and BCR. Image description.

Section Reference

Office of Energy Efficiency and Renewable Energy. (n.d.). *LED basics: Solid-state lighting.* https://www.energy.gov/eere/ssl/led-basics

7.6 Conclusion

In review, depending on the calculation used, the sustainable initiative should be pursued if the cash-on-cash return is greater than or equal to the required rate of return, the simple or discounted payback period is less than the allowable payback period, NPV is greater than or equal to 0, or if the BCR is greater than 1. Also, as the discount rate rises, the NPV and BCR decrease, and as the product lifecycle increases, the NPV increases along with the BCR.

A property manager who can perform financial evaluations is essential in the sustainable building initiative decision-making process. By understanding the statement of cash flow and various financial calculations introduced in this chapter, the property manager can determine the financial viability of sustainable building initiatives. These financial results can be shared with property ownership to illustrate which sustainability building initiatives make sense financially. However, it is important that the property manager be cognizant of the property owner's goals and objectives as these can affect which analysis is relevant. For example, if a property owner does not plan to hold the real estate asset for a long time period, the NPV calculation may not be relevant, but the payback period may be appropriate to determine if the real estate asset will recover the initial investment prior to the sale of the real estate asset. For long-term property holders, the NPV may be more relevant as it takes into account the product lifecycle. No calculation can capture all costs and benefits due to intangible components, but it is important to also consider these intangible elements during the sustainable building decision-making process.

Discussion Questions

1. What is the difference between the payback period and discounted payback period? Why does this difference matter?
2. How can the actions of the property management firm affect the outcome of these calculations?
3. What is your key takeaway from this chapter? In which section did you find it?

Activities

1. Consider the following scenario and then answer the questions below:A property owner is evaluating a landscape transition from a traditional lawn to xeriscaping. Year 0 cost to change from lawn to a xeriscape landscape is $9.25/sf. There is 1,100 sf of lawn to be changed out. As this landscape design change is not considered a typical operating expense, the costs would not be part of NOI. The water savings from this landscape design change are $75/month and maintenance savings are $55/month. The life expectancy of this xeriscape landscape design is 10 years. The discount rate is 8.5 percent.

    a. What statement of cash flow line items are affected from this scenario in both the current year and future years?
    b. What is the cash-on-cash return?
    c. What is the simple payback period?
    d. What is the discounted payback period?
    e. What is the NPV?
    f. What is the BCR?
    g. What should be considered when advising the property owner on the financial viability of this project?

Figure References

Figure 7.1: Statement of cash flow example. Kindred Grey. (2023). CC BY 4.0

Figure 7.2: Discount rate and product lifecycle in relation to NPV and BCR. Kindred Grey. (2023). CC BY 4.0

Image Descriptions

Figure 7.1: Stacked linear algebraic equation. Everything above NOI is “above the line,” everything below NOI is “below the line.” Above the line is broken into revenues (first 6 lines) and expenses (OPEX). From top to bottom: Gross potential income (GPI). (-) Loss to lease. (-) Vacancy and collection loss. (=) net rent revenue. (+) ancillary income. (+) expense reimbursements. (=) effective gross income (EGI). (-) operating expenses (OPEX). (=) net operating income (NOI). (-) annual debt services (ADS). (-) capital expenditures. (-) replacement reserves. (=) before-tax cash flow (BTCF). Return to figure 7.1.

Figure 7.2: As discount rate increases, NPV and BCR decrease (negatively correlated). As product lifecycle increases, NPV and BCR increase (positively correlated). Return to figure 7.2.

8. Human Health Considerations

Chapter Contents

Learning Objectives

- Identify building certifications that focus on health of humans within the built environment
- Describe strategies to enhance the physical dimension of health in the built environment
- Describe strategies to enhance the mental dimension of health in the built environment
- Describe strategies to enhance the social dimension of health in the built environment
- Identify various smart devices that can enhance health in the built environment

8.1 Introduction

Chapter 7 took a closer look at the economic sphere of sustainability within sustainable property management. This chapter examines the social sphere of sustainability within sustainable property management, specifically the health of humans within the built environment. There has been an increased focus on health within the built environment. This is evidenced by the formation of the World Green Building Council in 2002, which now encompasses approximately seventy green building councils around the world, with one of their three strategic areas being health and well-being (World Green Building Council, 2022). Additionally, the WELL Building Standard® and Fitwel Certification were launched in 2014 and 2017, respectively, to provide third-party building certifications focused on human health within the built environment that work together with environmental building certifications. As of 2021, there were 33,986 enrolled or certified WELL projects in 100 countries, and as of 2022, there were approximately 4,375 certified, pending certification, and registered Fitwel projects in approximately fifty countries (International WELL Building Institute, 2022; Active Design Advisors, Inc., 2022).

The World Health Organization (WHO) defines **health** as a "state of complete physical, mental and social well-being and not merely the absence of disease or infirmity" (WHO, 2022). This definition highlights the holistic and interconnected nature of a person's well-being, consisting of three distinct yet interconnected dimensions. These three interconnected dimensions of human health are illustrated in figure 8.1 and are significantly impacted by the built environment as we live, work, and play within it. This impact is felt not only by building occupants and users, but also the community at large. This chapter will examine how these physical, mental, and social dimensions can be addressed in sustainable property management. While dimensions do overlap, strategies most closely aligned with that particular dimension will be presented in the respective health dimension section. This chapter will also look at how **smart building** technology can be an ally in sustainable property management to cultivate human health.

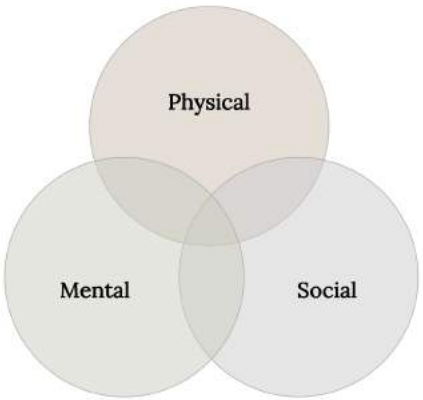

Figure 8.1: The three dimensions of health in sustainable property management.

Section Videos

What is WELL and why it matters

[00:06:51] International WELL Building Institute. https://youtu.be/w0ivwp6Va_c

What is Fitwel Certification?

[00:01:07] UL Solutions. https://youtu.be/etoZMivl9WE

Section References

Active Design Advisors, Inc. (2022). *Fitwel is the world's leading certification system committed to building health for all®*. https://www.fitwel.org/

International WELL Building Institute. (2022). *Healthier companies outperform their peers.* https://www.wellcertified.com/why-well/

WHO. (2022). *Health and Well-Being.* https://www.who.int/data/gho/data/major-themes/health-and-well-being#:~:text=The%20WHO%20constitution%20states%3A%20%22Health,of%20mental%20disorders%20or%20disabilities

World Green Building Council. (2022). *About us: Our mission.* https://worldgbc.org/our-mission

8.2 Physical Dimension

Many building features can be optimized during the building design and construction phase to address the **physical dimension of human health**. Some examples include:

- Siting the building so that walkable amenities are available to the building user to promote more physical activity
- Designing the building so that natural daylight exposure is optimized
- Installing building systems that optimize indoor air quality

There are also many opportunities to incorporate the physical dimension of human health during the building's operations and maintenance phase. Sustainable property management can address physical health through physical space alterations and programming. Physical space alterations can range from relatively small modifications to large retrofits using capital expenditures, whereas programming can range from building occupants to the community as a whole. A small physical space alteration example would be adding a living plant wall, while a large retrofit example would be upgrading the HVAC equipment. Programming examples include offering yoga classes or a running club for building occupants or for the community as a whole.

There are a variety of strategies to cultivating physical health within sustainable property management. Main components include:

- More physical activity opportunities
- Increased access to healthy food and drink
- Building user safety promotion

(Please note that **Indoor Environmental Quality [IEQ]** is also a main component of physical health within the built environment and is discussed in detail in chapter 4.)

More physical activity opportunities

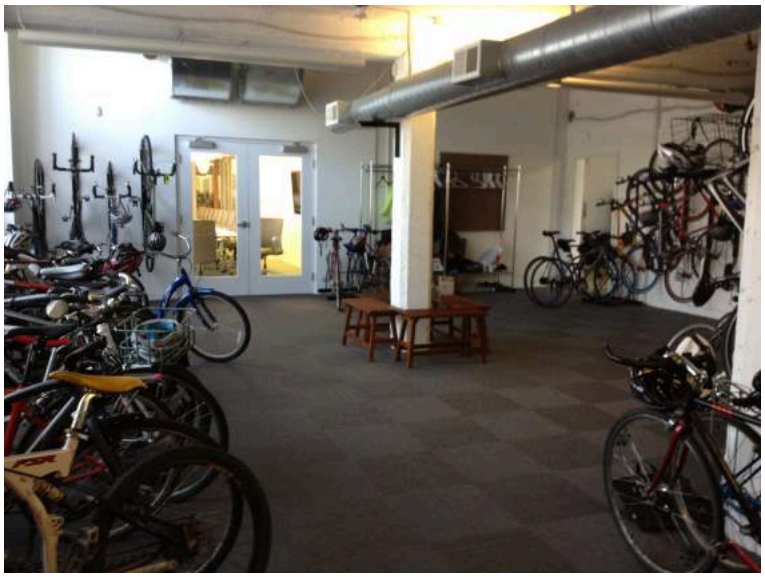

Figure 8.2: Example of bike parking.

Physical activity is a central element of the physical dimension. Introducing more physical activity opportunities can help building users become more physically active. For example, a stair renovation can be completed to make the stairs more inviting so that building users find them an attractive alternative to elevators. Another strategy is to encourage active transportation such as walking and biking. One example to foster active transportation would be to reconfigure indoor space for bike parking. Figure 8.2 illustrates an example of bike parking so that building users can arrive at the building by bike and have a safe place to park their bike. Indoor and outdoor areas can also be reconfigured to provide fitness areas. For example, an outdoor walking trail can be added if there is adequate space on site, so that building users can be active during breaks or even perhaps have a walking meeting. Additionally, indoor space can be reconfigured to provide a fitness area with cardio and weight training equipment. Programming can also be added to encourage more physical activity. Examples include forming a walking club so building occupants can meet and exercise together, and creating physical activity incentive programs such as fitness competitions with prizes to motivate building occupants.

Increased access to healthy food and drink

There are numerous strategies to increase the availability of healthy food and drink options. One strategy to encourage healthier drinks is adding access to high quality drinking water. Having a free water option in the cafeteria, restaurant, fitness center, or lobby of a building can encourage building occupants to drink more water versus paying for a soda at the cafeteria or vending machine. This may also be seen as a building amenity for tenants. Free reusable water bottles can also be given to tenants to encourage them to drink more water versus less healthy alternatives such as soda.

Figure 8.3: Vending machine options.

A strategy to increase access to healthier foods is to provide healthier options in vending machines within the building. Figure 8.3 illustrates various vending machine options. The picture on the left shows the least healthiest options with mostly candy, the middle picture some healthier options such as pita chips and fruit gummies, and the picture on the right showing the healthiest options with whole fruit. The change to a vending machine with healthier options can persuade consumers to make healthier choices. Another way to persuade consumers toward healthier food choices is to display the nutritional information of each menu item. This helps the consumer make a more informed decision before making a selection. Also, any food service in the building can provide smaller portion sizes by using smaller cups, plates, and bowls. This can help reduce calorie consumption. Furthermore, food display cases and advertising can highlight the healthier options available. For example, healthier salads can be showcased and placed where the consumer will see them before they see a pizza option. Additionally, offering a local farmer's market on site or a **community supported agriculture (CSA)** program can increase healthy food options to tenants and also support the local community. Nutrition programming on site can also help educate building occupants on healthy eating habits.

Building user safety promotion

There are various strategies to promote building user safety. Stair safety can be increased by ensuring adequate lighting at staircases, properly placed handrails, and a non-slip surface on stairs. Proper maintenance of sidewalks and streets on the property can decrease the risk of injuries to pedestrians and bicyclists. To discourage crime, lighting that is functioning properly throughout the property is important so that criminals have fewer places to hide. Properly maintained landscaping is also important so that potential criminals cannot hide in overgrown vegetation. A best practice is for on-site personnel to tour the property on a regular basis to check for any safety issues that need to be addressed such as a cracked sidewalk, burned out light bulb, overgrown landscaping, or any debris causing a hazard on stairs.

8.3 Mental Dimension

Sustainable property management also addresses the **mental dimension of human health** within the built environment. While we intrinsically know that the mind and body are connected, this section will focus on strategies more closely associated with the mental dimension. Essential components of the mental dimension include:

- Mental health resources
- Restorative spaces and programming
- Wayfinding

(Please note that Indoor Environmental Quality (IEQ) is also a main component of mental health within the built environment and is discussed in detail in chapter 4.)

Mental health resources

Mental illness is prevalent in the United States, with one in five Americans being diagnosed with a mental illness during any given year and more than half of Americans expected to experience a mental illness or mental disorder diagnosis sometime during their lifetime (Substance Abuse and Mental Health Services Administration, 2016; Kessler et al., 2007). While sustainable property management is not the panacea for these illnesses, it can be an ally to help provide mental health resources through education, programming, policies, and accommodations both at a property level and organizational level. Mental health education and programming can help to normalize mental health issues as well as cultivate acceptance of disease within the mind. Figure 8.4 illustrates a mental health resource: an advertisement to cultivate awareness, acceptance, and a pathway for help for building users. Property managers could also place mental health resource flyers in the lobby. Policies and accommodations can be helpful to property employees suffering from a mental health issue. For example, employee assistance programs can be offered for depression and anxiety treatment as well as referrals to other qualified professionals if needed. Additionally, work-life balance policies can be created so that there is time for property employees to handle family challenges and potentially lessen mental health impacts. Accommodations can include a suitable work environment and time for a property employee to go to mental health appointments.

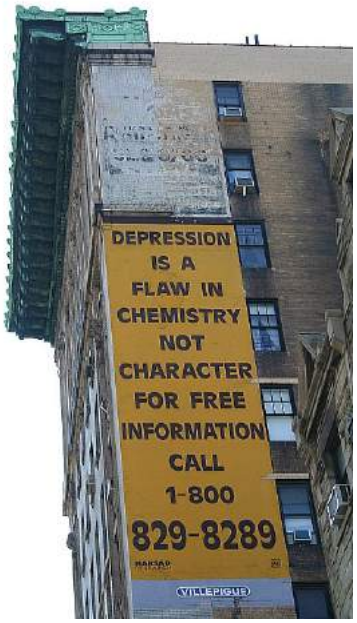

Figure 8.4: Mental health resource example. [Image description](#).

Restorative spaces and programming

Figure 8.5: Living wall example.

Restorative spaces are important in sustainable property management to decrease stress and promote relaxation. Natural elements, natural lighting, and indoor plants can help cultivate a restorative space within a building. An example of this is the creation of a living wall within a building space as illustrated in figure 8.5. An outdoor sitting area surrounded by nature can also be created as a restorative space for building users. Space can also be configured within the building for a meditation room. **Meditation** is a mindfulness practice that can be restorative in nature. Meditation rooms, as illustrated in figure 8.6, are becoming increasingly common among various property sectors. This is evidenced by the creation of The 50 Best Campus Meditation Spaces which can be found at: https://web.archive.org/web/20220808140555/http://www.bestcounselingschools.org/best-campus-meditation-spaces/. Programming can also be offered to building occupants to introduce **mindfulness** practices for relaxation and stress reduction. In addition to meditation, programming on **labyrinth** work can be introduced to promote relaxation. Stress management workshops facilitated by a professional can also promote restoration.

Figure 8.6: Meditation room example. Image description.

The minimization of clutter can also make a space feel more inviting and relaxing. Figure 8.7 shows a cluttered and neat desk. A neat desk can invoke a calmer state within the employee. One strategy to help property management employees minimize clutter is to put programming in place that provides time and tips to declutter workspaces. The implementation of a time during the evening that property management employees must cut off work, work emails, and the like can promote restoration so that employees do not feel that they need to respond to work situations during all hours of the day and night. However, the reality is that property managers must respond to emergencies which can happen throughout the night such as a fire, loss of power, or a leak.

But the on-call person can rotate so that everyone can turn off their work responsibilities on some nights. Altruism, which has also been shown to help with stress management, can be incorporated into programming by offering charitable activities for building users such as donating blood or participating in a charity run (Post, 2014).

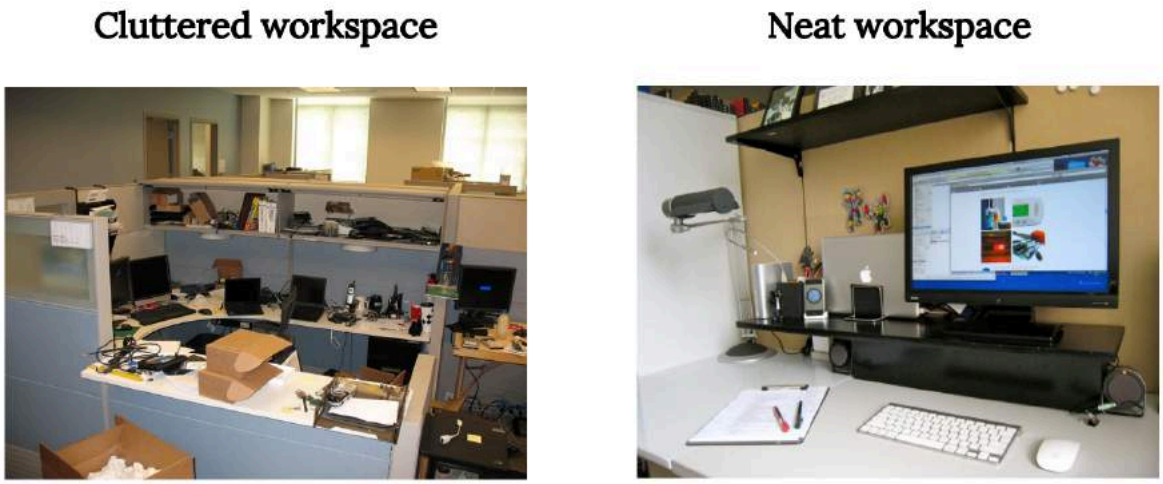

Figure 8.7: Cluttered versus neat workspace.

Wayfinding

Wayfinding helps building users access and navigate the building space by providing identification, directional, orientation, and regulation signage. Figure 8.8 illustrates wayfinding signage using both words and images. Bad wayfinding facilitates people getting lost or finding navigation of the building space difficult. This can invoke feelings of frustration or anxiety. On the other hand, effective wayfinding design helps building users not familiar with the space to easily navigate their surroundings. Imagine how helpful this can be in a retail or hospital setting. For example, in a retail setting, effective wayfinding helps the consumer arrive at the appropriate section of merchandise as well as a fitting room when relevant. In the hospital setting, it helps direct the building user to the appropriate department. Therefore, it is important to review current wayfinding design and update accordingly. An effective wayfinding plan provides clear, consistent, and concise messaging.

Figure 8.8: Wayfinding example.

As a comprehensive example, the wayfinding master plan for Virginia Tech can be found here: https://www.facilities.vt.edu/content/dam/facilities_vt_edu/design-and-construction-standards/appendices/Appendix%20F%20-%20Campus%20Wayfinding%20Guidelines.pdf.

Section References

Kessler, R. C., Angermeyer, M., Anthony, J. C., De Graaf, R., Demyttenaere, K., Gasquet, I., De Girolamo, G., Gluzman, S., Gureje, O., Haro, J. M., Kawakami, N., Karam, A., Levinson, D., Mora, M. E. M., Oakley Browne, M. A., Posada-Villa, J., Stein, D. J., Tsang, C. H. A., Auilar-Gaxiola, S., … Üstün, T. B. (2007, October). *Lifetime prevalence and age-of-onset distributions of mental disorders in the World Health Organization's World Mental Health Survey Initiative*. World Psychiatry, 6(3), 168.

Post, S. G. (2014). *It's good to be good: 2014 Biennial scientific report on health, happiness, longevity, and helping others*. International Journal of Person Centered Medicine, 2014(2), 1–53.

Substance Abuse and Mental Health Services Administration. (2016). *Key substance use and mental health indicators in the United States: Results from the 2015 National Survey on Drug Use and Health*. Center for Behavioral Health Statistics and Quality.

8.4 Social Dimension

Humans are social beings and social behavior is important to human health (Young, 2008). The encouragement of socialization among building users and the community can enhance health. Critical components of the **social dimension of human health** include:

- Amenities that encourage socialization
- Equitable and inclusive spaces and programs
- Community engagement programs

Amenities that encourage socialization

Figure 8.9: Socialization amenities.

There are a plethora of amenities that can foster socialization and a sense of belonging. As illustrated in figure 8.9, **socialization amenities** might include a recreation room with a pool table can be created as well as a pool league to foster connections among building users. In the multifamily property sector, outdoor grilling stations, pet parks, pools, and community lounges are all examples of opportunities for social engagement. Additionally, programming within these amenities, such as a pool party or a "yappy" hour, can bring building occupants together. In the office sector, conference rooms, multipurpose collaboration areas, dining options such as food trucks, and mentorship programs can bring people together.

Equitable and inclusive spaces and programs

Social equity and inclusion are critical considerations when promoting socialization within the physical building space and building programming initiatives. Social equity through **universal design** is one method to address equity and inclusion within the physical building space. According to the National Disability Authority, universal design is "the design and composition of an environment so that it can be accessed, understood and used to the greatest extent possible by all people regardless of their age, size, ability or disability" (National Disability Authority, 2020). Examples include automated doors, tables and counters at a variety of heights, flat entrances, braille on signage, and task lighting. Figure 8.10 highlights additional examples of universal design: in kitchen environments with accessible cutting boards; and within bathroom environments with a flat shower entrance, bench, grab bars, various shower head heights, accessible soaps, and space underneath the sink for a wheelchair. While some accessibility strategies must be completed to comply with Americans with Disabilities Act (ADA) regulations, a focus that is also friendly toward various groups of people with disabling conditions, such as wheelchair-friendliness, fosters the universal design concept.

Social equity through programming, such as lower prices for healthier food if possible, increases access for more diverse socio-economic groups. Programming to increase awareness and knowledge of equitable and inclusive environments also promotes the social dimension of human health within the built environment. While there are plenty more examples, this is an overview of the diversity of initiatives available to increase equity among building users.

Figure 8.10: Universal design examples. Image description.

Community engagement programs

Engaging with the local community is another way to enhance the social dimension within health beyond building occupants. This can be accomplished through **community engagement programs** that address community concerns, enhance public spaces, employ the local community within the building, and support community groups through various charity events. Some examples include volunteering within local community non-profits, sponsoring programming within public spaces such as a music festival or arts exhibition, and meeting with community officials on concerns they may have over any building operations.

Section References

National Disability Authority. (2020). *What is universal design.* http://universaldesign.ie/What-is-Universal-Design/.

Young, S. N. (2008, September). *The neurobiology of human social behaviour: An important but neglected topic.* Journal of Psychiatry & Neuroscience: JPN, 33(5), 391.

8.5 Smart Device Technology as an Ally to Health in Sustainable Property Management

A **smart device** is "an electronic gadget that is able to connect, share and interact with its user and other smart devices" (Technopedia, 2022). These smart devices can be an ally to health within sustainable property management for both property management employees and tenants. For example, a discount can be offered to property employees for wearable smart devices that track physical activity and quality of sleep to support them on their path to enhanced health. A smartphone or tablet can be used to download apps for mindfulness practices, nutrition logs, socialization apps, relaxation music, or upbeat music for aerobic activity. These health apps can also be shared with tenants to promote health among building occupants. Smart thermostats can be provided to building occupants for increased thermal comfort in the building, while smart locks and doorbells can be installed for increased occupant safety in the multifamily sector. Smart speakers can be utilized for meal prep help as well as a mind and body workout repertoire. Smart refrigerators can be promoted that can track meals eaten and calories consumed as well as provide recipes based on the foods in the refrigerator. A partnership can be formed with a local appliance store to offer a discount on these types of refrigerators. While these smart devices can promote a healthier lifestyle, programming is important for educating and training potential smart device users for optimal effectiveness.

Section Reference

Technopedia. (2022). *Smart device*. https://www.techopedia.com/definition/31463/smart-device

8.6 Conclusion

This chapter illustrated how sustainable property management also focuses on the human health experience through physical, mental, and social dimensions. It also looked at how smart building technology can be an ally in sustainable property management to cultivate human health. Some of the strategies discussed in this chapter are expensive and may be considered during retrofits or by using capital expenditures. Other strategies are relatively low cost and do not require any space alterations. The property management personnel need to understand the market that the building is operating within as this will often dictate what physical, mental, and social strategies will be utilized on-site. Also, property layout will impact strategies. For example, active transportation by bike may not be possible depending on where the building is located. The careful selection of health strategies can not only attract and retain tenants, but also form building users into engaged community citizens.

Discussion Questions

1. What opportunities are there to cultivate the physical, mental, and social dimension of health within the community you live? Which, if any, do you take advantage of?
2. Do you own any smart devices? If so, in what ways do they help with your health? Do you see any of these smart devices hindering your health?
3. This chapter presented strategies within particular dimensions of health, while acknowledging that dimensions do overlap. Provide an example of a physical-mental, mental-social, social-physical, or physical-mental-social strategy, and explain why your example has that particular overlap.
4. What is your key takeaway from this chapter? In which section did you find it?

Activities

1. Labyrinth Exercise
    a. Complete this finger labyrinth by clicking on the below link and following the directions: https://shepherdscorner.org/2020/03/25/finger-labyrinths-for-meditation/.
    b. After completing the labyrinth, explain how you felt during and after the exercise.
2. Research a WELL certified or Fitwel certified project and report back:
    a. Project name and location
    b. Five key features of the building that qualified for certification

Figure References

Figure 8.1: The three dimensions of health in sustainable property management. Kindred Grey. (2023). CC BY 4.0

Figure 8.2: Bike parking example. San Francisco Bicycle Coalition. (2012). *Atlassian bike parking* [photograph]. https://flic.kr/p/bUMg3Q. CC BY-NC-ND 2.0

Figure 8.3: Vending machine options. Left: tkraska. (2011). [photograph]. https://flic.kr/p/9mPM5X. CC BY 2.0. Middle: Bing. (2015). [photograph]. https://flic.kr/p/ru2Kkp. CC BY-NC-SA 2.0. Right: Martin Deutsch. (2010). *Fruit vending machine* [photograph]. https://flic.kr/p/8C3wvo. CC BY-NC-ND 2.0

Figure 8.4: Mental health resource example. Rupert Ganzer. (2008). *Depression* [photograph]. https://flic.kr/p/5B2R6v. CC BY-NC-SA 2.0

Figure 8.5: Living wall example. LiveWall Living Wall Systems. (2015). *Sanseveria-living-wall-design* [photograph]. https://flic.kr/p/xkmf6W. CC BY-NC-SA 2.0

Figure 8.6: Meditation room example. Corinne Staley. (2012). *Meditation room* [photograph]. https://flic.kr/p/bUYRNg. CC BY-NC 2.0

Figure 8.7: Cluttered versus neat workspace. Kindred Grey. (2023). Includes James Emery. (2007). *Workspace_2615* [photograph]. https://flic.kr/p/2e1m4j. CC BY 2.0. Includes Jason de Villa. (2009). *Freedom from cable clutter!* [photograph]. https://flic.kr/p/7pLL1v. CC BY-NC 2.0.

Figure 8.8: Wayfinding example. Joe Shlabotnik. (2005). *Meditation room* [photograph]. https://flic.kr/p/2PUKij. CC BY 2.0

Figure 8.9: Socialization amenities. Pennsylvania DMVA. (2013). *Soldiers' & sailors' home* [photograph]. https://flic.kr/p/q8xkQ7. CC BY-NC-ND 2.0

Figure 8.10: Universal design examples. Left: Fairfax County. (2011). [photograph]. https://flic.kr/p/9uoh5r. CC BY-ND 2.0. Right: Summit Design Remodeling. (2011). [photograph]. https://flic.kr/p/a15S7P. CC BY-NC-SA 2.0

Image descriptions

Figure 8.4: A large sign on the side of a building reads, "Depression is a flaw in chemistry, not character. For free information call 1-800-829-8289." Return to image 8.4.

Figure 8.6: A room has mats or cushions laid out on the floor in front of 3 open windows. Except for a clock on the wall, there is no other decoration. Return to image 8.6.

Figure 8.10: Left: kitchen with accessible cutting boards. Right: bathroom with a flat shower entrance, bench, grab bars, various shower head heights, accessible soaps, and space underneath the sink for a wheelchair. Return to image 8.10.

Glossary

Aerator

A product that screws into a faucet and adds air to the water; this reduces the amount of water consumed while also controlling the stream of water

Annual debt service (ADS)

The annual principal and interest on outstanding debt

Before-tax cash flow (BTCF)

The cash flow after debt service and capital expenditures are subtracted from net operating income, but before income-tax considerations

Benchmarking

How a building performs in relation to its peers

Benefit-cost ratio (BCR)

A helpful calculation when carrying out a cost-benefit analysis to determine if a project makes sense from a financial standpoint

Biophilia

The human condition of seeking connection with nature and other living beings

Building acoustics

The control of sound in a building

Building lifecycle

The life of a building from idea conception to renovation or demolition

Building owner

Entity that holds title to the property

Built environment

Human-made environments where people live, work, and play

Capital expenditures (CAPEX)

Expenditures to increase the useful life of the property that last for more than one year

Carbon footprint

A measure of the amount of carbon dioxide that is produced by the daily activities of a person or company

Cash-on-cash return

Calculates the rate of return on the cash invested in a property based on the annual cash income earned

Climate Mobilization Act

One of the most ambitious plans for reducing greenhouse gas emissions in the world, and pledges New York City to carbon neutrality by 2050

Climate risks

The risk of climate change causing consequences to the property

Climate transition plan

A plan that lays out how the property and organization will adjust building operations to incorporate climate science recommendations

Community engagement programs

Programming that engages the community to enhance the social dimension within health beyond building occupants

Community supported agriculture (CSA)

A system where community members and farmers are connected through community members purchasing a seasonal share of the farmer's crops and participating in the risks and benefits of the farmer's harvest

Corporate social responsibility (CSR)

A business model that takes into account the economic, social, and environmental impacts the corporation has on multiple stakeholders versus the impact solely on the owners of the company

Cost-benefit analysis

A decision-making tool to determine if the benefits outweigh the costs of a potential investment throughout the product lifecycle

Cybersecurity

The protection of the networking system, hardware, software, and data of a property and organization from cyber attacks

Daylighting

A technique that allows natural light into the building space and reduces the energy load requirements for lighting

Demographics

Population data such as education, income, religion, gender, ethnicity, race, age, and marital status information

Discount rate

The cost of capital or a required "hurdle" rate of return metric that an investment must minimally achieve

Discounted payback period

An analysis that takes into account the time value of money by applying a discount rate to discount the future cash flows

Diversity

The characteristics that make individuals unique, including race, gender, age, ethnicity, sexual orientation, abilities, and others

Drip irrigation

An irrigation method that can save water and fertilizer by applying water directly to the root zone either on or below the soil surface through artificial methods

Effective gross income (EGI)

The net revenue of the property

Energy audit

An assessment of energy use and efficiency within the property

Energy burden

Household energy costs as a percentage of gross household income

Environmental justice

Fair treatment and meaningful involvement for all regarding environmental policies

Environmental Management System (EMS)

A framework to address resource management risks by increasing operational efficiency and mitigating environmental impacts

Environmental privilege

Allows groups with power to construct and use environmental amenities for themselves and deny these amenities to less privileged groups

Environmental regulations

Regulations at the federal, state, and/or local levels with the goal of improving environmental quality and protecting human health

Environmental, Social, and Governance (ESG)

A set of standards used by socially conscious investors to evaluate investments

ESG reporting

The disclosure of environmental, social, and governance data

Global Real Estate Sustainability Benchmark (GRESB)

An assessment framework used as an ESG benchmark for real estate assets

Green building initiatives

Actions undertaken to minimize the environmental impact of a building

Green building management certifications

Green building certifications for the operations and maintenance phase of the building lifecycle such as LEED O+M, IREM CSP, BREEAM In-Use, and ENERGY STAR Certification

Green lease

A lease that involves collaboration between property owner, property manager, and property tenant to align green building interests by sharing in the costs and benefits of incorporating sustainable initiatives within the building space

Green Lease Leaders

A national program that provides a framework for implementing green lease standards

Greenhouse gas (GHG)

Gases that trap heat in the Earth's atmosphere

Greenhouse Gas Protocol

An international standard that helps account for, report, and mitigate GHG emissions in a standardized framework

Greenwashing

A marketing tactic that portrays a property to be greener than it actually is

Health

A "state of complete physical, mental and social well-being and not merely the absence of disease or infirmity," as defined by The World Health Organization (WHO)

Heat island effect

When structures like buildings and parking lots absorb and re-emit more heat from the sun than natural surfaces and create higher temperatures

Holding period

The length of time a property is owned

Hyper-consumerism

Excessive consumption of goods

Inclusion

Creating a culture where everyone feels a sense of belonging and is valued for their unique perspectives and contributions

Indoor air quality (IAQ)

The quality of the air within a building space

Indoor environmental quality (IEQ)

Indoor environmental quality that encompasses indoor air quality, acoustics, thermal comfort, lighting, and views from a building

Integrated pest management (IPM)

A pest control program that encompasses a more holistic strategy to lower the risks to people and the environment and focuses on the building and the surrounding landscape areas

Irrigation systems

Systems that supply water to land through artificial methods

Labyrinth

A mindfulness tool constructed of detailed passageways that can foster relaxation

Lease request for proposal (RFP)

A request submitted by a tenant to building owners to compare various building space opportunities

Leasing plan

A plan containing guidelines concerning leasing parameters such as rent, rent term, concessions, tenant allowances, and common area maintenance pass-throughs

LEED certification

A third-party green building certification

Light pollution

When artificial light is used excessively or inappropriately at night

Management agreement

A contract between the building owner and property management company outlining the responsibilities of the property management company

Market analysis

The analysis of demographic and economic profiles of the region and neighborhood as they relate to the subject property

Marketing plan

A plan containing the marketing goals for the property in order to attract tenants

Maslow's hierarchy of needs

A theory stating that lower-level needs have to be satisfied before moving to higher-level needs

Meditation

A mindfulness practice that can be restorative in nature

Mental dimension of human health

The psychological aspect of human health such as emotional well-being

Merchant builders

Builders that build buildings for resale in the near future

Mindfulness

Focusing on the present moment without judgment

Net metering

Renewable energy metering that provides a renewable energy certificate (REC) from a public-utility provider for power generated but not used by the building, power which can then be sold to others or used as a credit against the building's energy usage

Net operating income (NOI)

Total Operating Revenue minus Total Operating Expenses

Net positive energy

Buildings that consume less energy than they produce

Net present value (NPV)

A helpful calculation when carrying out a cost-benefit analysis to determine if an investor will move forward with a project

Net zero energy

Buildings that consume as much energy as they produce

Non-potable water

Water that is not of drinking quality

Nonrenewable energy

An energy source that will eventually run out, such as fossil fuels

Operating expenses (OPEX)

Regularly occurring costs for operating and maintaining the day-to-day activities at a property

Paris Agreement, The

A legally binding international treaty on climate change with the aim of limiting global warming

Payback period

The time period it takes to recover the initial capital outlay of an investment through revenue or cost savings

Physical dimension of human health

The physical aspect of human health such as blood pressure level, weight, and physical exercise

Plug loads

The energy used by products that are plugged into an outlet

Potable water

Water that is of drinking quality

Profit

Revenue minus expenses

Proforma statement of cash flow

A forecasted statement of cash flow

Property management

Management of a property during the operations and maintenance phase of the building lifecycle

Property management company

Entity that manages the operations and maintenance of the property

Rainwater harvesting

The collection of rainwater runoff to a storage system, such as a tank, that can be used later

Real Estate Investment Trusts (REIT)

Entities that own or finance income-producing real estate through capital from many investors

Replacement reserves

Where funds are put annually to save for planned building component replacements as well as serve as an emergency fund

Resource management

How resources such as energy, water, and waste are handled at a property

Return on investment (ROI)

Calculation that takes into account the gain or loss over the life of ownership divided by the invested debt and equity

Risk management process model

A model used to minimize the negative impact of risks

Shareholders

Entities that own shares in a company's stock

Sick building syndrome (SBS)

When contaminants and pollutants reach a certain level within the building and cause building occupants severe discomfort including headaches, dizziness, fatigue, and/or irritation to the eyes, nose, or throat

Simple payback period

A calculation that determines the amount of time it takes to recover the upfront costs of an investment

Smart buildings

Buildings with building systems such as HVAC, lighting, and security that are linked with real-time sensors that provide information to enable building automation with the goal of increasing building efficiencies as well as lowering operational costs

Smart device

An electronic device with a level of interactivity and autonomy

Smart irrigation technology

Technology that uses soil moisture sensors or weather data to determine irrigation needs

Social dimension of human health

The social aspect of human health such as relationships with others

Social equity

Social policies that are just and fair for all people

Socialization amenities

Amenities that encourage socialization

Stakeholders

Entities that are impacted by a company's operations

Statement of cash flows

A financial statement that illustrates the financial health of the property

Stormwater runoff

Rain and snowmelt that does not soak into the ground

Supply chain

Services and supplies used to operate the property and organization

Sustainability

The ability to meet current generation needs without compromising future generation needs

Sustainable property management

Implementation of green building initiatives during the operations and maintenance phase of the building lifecycle, taking into account their environmental, social, and economic impacts

Sustainable property management plan

An operating plan developed by the property management company, with collaboration from various stakeholders, that outlines sustainability initiatives to be undertaken at the property and how these initiatives align with property ownership goals

Systems theory

The theory that individual stakeholder groups do not exist alone but in a system where they are interdependent on each other

Tenant

Entity that occupies the property leased from a landlord

Tenant education programs

Programs to help tenants learn about ways to incorporate sustainable property management practices on a regular basis

Tenant satisfaction survey

A survey administered to tenants to receive feedback on property management and operations that can inform recommendations for the property moving forward

Thermal comfort

The sense of whether a person feels too hot or too cold

Time value of money

The idea that an amount of money is worth more now than the same amount of money in the future

Total Resource Use and Efficiency (TRUE)

A third-party zero waste certification

United Nations' Sustainable Development Goals (SDGs)

Seventeen interconnected goals, introduced in 2015 with the intention to be achieved by 2030, that provide pathways for a more sustainable future for all

Universal design

Built environment design that creates accessibility to the greatest extent possible

Upfront costs

The initial capital outlay for a product or service

Vendors

Contractors and suppliers that provide services and supplies to the property

Volatile organic compounds (VOCs)

Airborne chemicals that are emitted from many products such as paint, carpeting, furniture, office equipment, and cleaning supplies

Walk Score

A third-party scoring metric that illustrates the walkability level of the property

Waste management

A strategy implemented at the property for waste disposal, reduction, reuse, and prevention

WaterSense

A labeling program for water-efficient products sponsored by the EPA

Wayfinding

Helps building users access and navigate the building space by providing identification, directional, orientation, and regulation signage

Wider community members

Community members not directly involved with building operations

Xeriscaping

Using native drought-resistant plants

Index

Page numbers in bold indicate tables and figures.