# Table of Contents

**Overview**................................................................................................................. vii

**Course Schedule** ...................................................................................................... xi

## SECTION 1

### Introduction

- Required Textbook .......................................................................................... 2
- Course Overview ............................................................................................ 2
- Green or Not Green? ....................................................................................... 3
- Green Building Big Picture ............................................................................... 3
- Self-Assessment Quiz ..................................................................................... 5

### Part 1. Identifying Green Buildings and Green Features

- Part 1 Learning Objectives .............................................................................. 9
- What Makes a Building “Green?” ..................................................................... 9
- A Closer Look at a Green Building................................................................. 11
- What Is Sustainability? .................................................................................... 14
- Green Building Rating Systems ..................................................................... 16
- Scope of Work Considerations ....................................................................... 23
- Case Study 5.B ............................................................................................ 24
- 1.2 Case Study ............................................................................................ 25
- Review Part 1 ............................................................................................... 27
- Practice Test Section 1 .................................................................................. 29
### SECTION 2

## Part 2. Integrating Green Building into the Cost Approach

<table>
<thead>
<tr>
<th>Learning Objectives</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Part 2 Learning Objectives</td>
<td>33</td>
</tr>
<tr>
<td>Relevance of the Cost Approach</td>
<td>34</td>
</tr>
<tr>
<td>Effect of Green Building on Cost of Improvements</td>
<td>34</td>
</tr>
<tr>
<td>2.1 Discussion Question</td>
<td>35</td>
</tr>
<tr>
<td>Understanding Green Building Design and Construction</td>
<td>35</td>
</tr>
<tr>
<td>2.2 Discussion Question</td>
<td>39</td>
</tr>
<tr>
<td>Cost of Green Improvements</td>
<td>39</td>
</tr>
<tr>
<td>2.3 Case Study</td>
<td>39</td>
</tr>
<tr>
<td>2.4 Case Study</td>
<td>63</td>
</tr>
<tr>
<td>2.5 Case Study</td>
<td>70</td>
</tr>
<tr>
<td>Types of Obsolescence</td>
<td>73</td>
</tr>
<tr>
<td>2.6 Discussion Question</td>
<td>74</td>
</tr>
<tr>
<td>2.7 Discussion Question</td>
<td>74</td>
</tr>
<tr>
<td>Green Building Incentives</td>
<td>75</td>
</tr>
<tr>
<td>2.9 Problems</td>
<td>77</td>
</tr>
<tr>
<td>2.10 Problem</td>
<td>78</td>
</tr>
<tr>
<td>Review Part 2</td>
<td>80</td>
</tr>
</tbody>
</table>

## Part 3. Integrating Green Building into the Sales Comparison Approach

<table>
<thead>
<tr>
<th>Learning Objectives</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Part 3 Learning Objectives</td>
<td>81</td>
</tr>
<tr>
<td>Effect of Sustainability on Market Analysis</td>
<td>82</td>
</tr>
<tr>
<td>Gauging Sustainability Orientation</td>
<td>84</td>
</tr>
<tr>
<td>Expanded Elements of Comparison</td>
<td>87</td>
</tr>
<tr>
<td>3.1 Group Discussion</td>
<td>89</td>
</tr>
<tr>
<td>3.2 Case Study Exercise</td>
<td>89</td>
</tr>
<tr>
<td>Comparative Analysis—Using Studies and Secondary Support</td>
<td>104</td>
</tr>
<tr>
<td>Comparative Analysis—Applying Cost- and Income-Based Adjustments</td>
<td>104</td>
</tr>
<tr>
<td>3.3 Case Study Exercise</td>
<td>106</td>
</tr>
<tr>
<td>Appraisal Reporting Requirements</td>
<td>109</td>
</tr>
<tr>
<td>Review Part 3</td>
<td>110</td>
</tr>
<tr>
<td>Practice Test Section 2</td>
<td>113</td>
</tr>
</tbody>
</table>
SECTION 3

Part 4. Integrating Green Building into the Income Approach

Part 4 Learning Objectives ................................................................. 117
Effect of Green Building on Income Approach ..................................... 117
Income Effects from Green Building ..................................................... 118
4.1 Discussion Question ..................................................................... 118
4.2 Discussion Question ..................................................................... 119
What Is a “Green Lease”? .................................................................. 120
Operating Expense Effects from Green Building ................................. 122
4.3 Case Study .................................................................................. 123
Operating Expense Effects: Benchmarks ............................................. 124
4.4 Case Study .................................................................................. 125
Operating Expense Effects: Water and Sewer ..................................... 126
Case Study 7.A .................................................................................. 128
Operating Expense Effects: Waste Diversion ....................................... 132
Operating Expense Effects: Green Cleaning ....................................... 132
Operating Expense Effects: Other Operating Expenses ..................... 133
Operating Expense Effects: Replacement Reserves .......................... 134
4.5 Case Study .................................................................................. 139
Overall Rate/Yield Rate Considerations .............................................. 151
Review Part 4 ................................................................................... 152
Practice Test Section 3 ........................................................................ 155

SECTION 4

Part 5. Distributed Energy Generation

Part 5 Learning Objectives ................................................................. 159
What Is Distributed Energy Generation? ............................................. 159
Key Terms and Concepts .................................................................. 160
Real or Personal Property? ................................................................. 165
Valuation Considerations ................................................................. 166
Net Zero Energy Buildings ............................................................... 171
5.1 Case Study .................................................................................. 173
Review Part 5 ................................................................................... 193
Part 6. Land Value and Highest and Best Use Considerations

Part 6 Learning Objectives ................................................................. 195
Green Building: Effect on Property and Site Analysis ...................... 195
6.1 Discussion Question..................................................................... 197
6.2 Discussion Question..................................................................... 198
Valuation Effects ........................................................................... 199
Resilience .................................................................................... 201
ETI “Net Zero Plus” Renovation ..................................................... 203
Review Part 6.................................................................................. 209

Part 7. Conclusion and Wrap-Up

Part 7 Learning Objectives ................................................................. 211
Emerging Topics in Green Building .................................................. 211
Next Steps ................................................................................... 212
Resources for Continued Learning .................................................. 212
Practice Test Section 4 .................................................................... 215

APPENDIX

Acronym Chart ........................................................................... 219

SOLUTIONS

Introduction ................................................................................... 223
Part 1 ........................................................................................... 227
Part 2 ........................................................................................... 235
Part 3 ........................................................................................... 239
Part 4 ........................................................................................... 243
Part 6 ........................................................................................... 255
Part 7 ........................................................................................... 257

CASE STUDIES SOLUTIONS

2.3 Case Study ............................................................................. 261
2.4 Case Study ............................................................................. 267
3.2 Case Study ............................................................................. 273
3.3 Case Study ............................................................................. 281
4.5 Case Study ............................................................................. 285
5.1 Case Study ............................................................................. 293
Commercial Green and Energy Efficient Addendum
Overview

Course Description

Practical Applications in Appraising Green Commercial Properties is a two-day course that introduces participants to a broad range of valuation problems encountered when appraising green commercial buildings, conventional buildings with green features, and conventional buildings in today’s markets where sustainability influence is increasing. This course immerses participants into the effects of green building and sustainability on the valuation process for commercial real estate. Using real-world case studies, participants develop insight and experience applying established appraisal methodology to a variety of green building appraisal problems.

Structured around the application of each of the three approaches to value, participants learn credible techniques for analyzing and reporting the degree to which green building and sustainability affect the valuation process for a given property. They also learn how cost- and income-based adjustments can be utilized when comparable sale data is lacking. In addition, the course addresses how green building and sustainability affect the development of an appropriate scope of work and may require changes to the highest and best use analysis for both green and conventional properties.

This course is one of five courses that make up the Appraisal Institute’s Valuation of Sustainable Buildings Professional Development Program. The other courses include Introduction to Green Buildings: Principles & Concepts, Case Studies in Appraising Green Residential Buildings, Residential and Commercial Valuation of Solar, and Case Studies in Appraising Green Commercial Buildings (online only). The Valuation of Sustainable Buildings Professional Development Program has a residential path and commercial path. For more information, please see www.appraisalinstitute.org/education/your-career/professional-development-programs

Note. Practical Applications in Appraising Green Commercial Properties is approved by GBCI for 15 CE hours.

Course Objectives

Upon completion of the course, participants should be able to:

- Identify and understand green building features and practices in both green and conventional commercial buildings.

- Recognize and analyze the effect of sustainability and green building for various commercial property types in a given market for both green and conventional buildings.

- Identify how green building and sustainability impact the entire appraisal process.
Identify and analyze the value effects of green building for each of the three approaches to value.

Develop an appropriate scope of work for assignments involving green building features or in sustainability-oriented markets.

Learning Enhancements

The course has been designed with a variety of elements to enhance your learning experience.

- **Preview.** Each part begins with a preview page, which includes a brief overview of the content and learning objectives to consider as you move through the content.

- **Learning Objectives.** Each learning objective covers essential information needed to understand the concepts in the course. Review them before the part begins so that you have a frame of reference as you move through the material. At the end of each part, reread the objectives. Are you able to do what is stated? If not, this is the time to ask your instructor for help or review the concepts that you do not understand.

- **Examples and Problems.** To supplement the discussions, we’ve included examples and problems to help you visualize and practice what you are learning.

- **Case Studies.** The case studies in the course contain exercises that allow practical application of the tools and methods needed to appraise green commercial properties.

- **Green Resources.** Tap a variety of online Green Resources from our website at: www.appraisalinstitute.org/education/education-resources/green-building-resources. Topics are expanded regularly and include legislation, national and state government sites and programs, databases, design, and solar energy. This free benefit is available only to class participants. Appraisal Institute Designated members, Candidates for Designation, Practicing Affiliates, and Affiliates receive indefinite access; all other class participants are granted two-year admittance.

- **Review.** Each part ends with a review of the concepts covered.

- **Practice Tests.** Practice tests are included at various points within the materials. The questions are similar to the types of questions you might find on the exam.

- **Digging Deeper.** Throughout the course, you will find content labeled Digging Deeper. Generally, the instructor will not cover this material in class. More advanced participants or those looking for an extra challenge can refer to the Digging Deeper sections while the rest of the class is finishing work on individual or small group activities. Content identified as Digging Deeper will not appear on the exam. However, appraisers preparing for the Comprehensive Exam should be
familiar with it, as well as all other material contained in the course handbook, whether or not it is presented in class.

Classroom Guidelines
To make the classroom environment a positive experience, please follow these guidelines:

- 100% attendance is required. No exceptions.
- Silence cell phones.
- Limit use of computers and wireless devices to classroom projects.
- Recordings are not permitted.
- Put away reading materials such as newspapers and books that are not used in class.
- Refrain from ongoing conversations with those seated near you and other distracting behavior.

General Information

- Practical Applications in Appraising Green Commercial Properties is approved by GBCI for 15 CE hours.

- Basic Function Calculator. A basic function calculator is required for this course. Certain mathematical functions are easier to perform on a calculator such as the HP-12C, but a normal function calculator can also perform the calculations.

  Important Note. Laptops, cellular phones, tablets, iPads, wearable technology (smart watch, Apple Watch, etc.), and other devices that can store data or connect to the Internet are NOT permitted during the exam. In addition, all watches, wallets, bags, and purses must be removed and stored out of reach prior to taking the exam.

- Required Textbook. The Valuation of Green Commercial Real Estate is a required book for this course. It will be referenced throughout the two-day course. The course is built around the book, and many of the problems and case studies are derived directly from examples in the book. Participants need the book in class for several of the case studies. While a laptop is not required for the course, participants MUST access either a printout or the electronic pdf of the textbook during class.

- Breaks. There will be one 20-minute break during the morning session and one 20-minute break during the afternoon session unless noted otherwise by the course sponsor. The lunch break is one hour.
- **Attendance sheets** will be distributed during class to verify your attendance during the morning and afternoon sessions.

- **Certificates of completion** will be e-mailed after completion of the course, and attendance during the entire course is required.

**Prerequisites**

- **Required:** *Introduction to Green Buildings: Principles & Concepts*

- **Recommended:** *Residential and Commercial Valuation of Solar*

**Exam**

- 25 multiple-choice questions