



Energy Code Essentials

Based on the 2018 International Energy Conservation Code®

International Code Council
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Energy Conservation Code®**

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Preface

Construction practice, building design and material development have changed little over many centuries. People mostly lived in temperate parts of the world, and cold living spaces were managed simply by layering up with heavy clothing and lighting a fire. Hot temperatures were often avoided by changing living habits to be less active during the day and seeking shade and a breeze. Some cultures developed portable shelters to avoid the heat. In all cases and throughout most of history, people built *something* to support their need to live in a safe and comfortable place. Building practice developed over time to suit the local climate and make use of local materials, with the common goal of keeping out dust, rain, threatening animals and bugs and letting in light and fresh air.

Fire safety has long been a concern as well. As more buildings were constructed in denser city patterns and more people gathered in larger buildings, fire issues had to be addressed. When loss of life and massive property damage become intolerable, the need to regulate construction is satisfied by building codes. The regulatory environment aims to fulfill people's expectation that when they go to work in a building or to an event in a large concert hall, they will breathe clean air and get out safely. The regulations are crafted for the understood need for safety of living and sleeping in the comfort of our homes. The codes adopted by governmental agencies develop over time to refine structural practice so that buildings withstand the forces of nature to protect the building occupants and provide safe, clean water and air.

But buildings need to do more than just shelter people and business. As the structural fire resistance and exiting, plumbing, and ventilation systems of buildings became more reliable and the cost of energy increased, building and design professionals began to focus on reducing energy consumption. Regulating energy use in buildings is a relatively new concept in the design and code enforcement industry. Nationally recognized building safety regulations were published in the early 1900s. The first national energy code was published in the mid-1980s. Code development related to building safety principles has been organized for over a hundred years. Designers, tradespeople and administrators have had a lot of time to test, try and teach modern safe building practice. By comparison, the focus on energy efficiency is new to many in the building design and construction trades. The *International Energy Conservation Code*® (IECC®) developed quickly into a complex document, and the learning curve was steep. The complexity is necessary as innovation in buildings and building systems increases. As new materials, methods and equipment are introduced, the code provisions change to keep up with advancements. The regulations may overwhelm the homeowner, designer or builder unfamiliar with the energy code. Sorting through the complex and detailed provisions can be intimidating.

Energy Code Essentials captures the provisions that regulate energy use in commercial and residential building construction. It is written to provide a readable and user-friendly overview of the IECC,

explaining regulations in clear, noncode language. Understanding energy code provisions is essential to the application of the IECC to any building design; thus, this text is illustrated to further simplify and communicate essential concepts. The text is presented and organized in a user-friendly style with an emphasis on technical accuracy and clear, understandable language. This book is directed to readers familiar with basic construction, architectural and building system principles but with a limited knowledge of energy code requirements and provisions.

Anyone involved in the design, construction or regulation of building construction can learn from this book. Homeowners, people in nearly any building trade and those in building design will gain a basic understanding of the principles, provisions and applications of the technical content of the energy code. The reader will be able to use this book to more fully explore the most common residential and commercial energy efficiency code provisions.

The content of *Energy Code Essentials* is organized into commercial and residential building provisions and discusses the administrative regulations that a code official in the building department will use to enforce the energy regulations. The climate zone map and how climate zones affect requirements for different parts of the country are explained, as well as how to use the map. Examples of work that requires a permit and, just as important, work that does not need a permit are identified. Coverage is also provided of the level of detail and information to be included in the building plan documents that are prepared for permit submittal. Requirements for what construction and equipment need to be inspected and when to call for the inspection are explained. The provisions for basement and wall insulation and discussion about the choices that may best suit a particular condition are introduced in easy-to-follow code references. Requirements for windows, doors and skylights and their selection and installation in accordance with the IECC are covered. The provisions to control air leakage are included in the specific requirements section of the book (Part IV). Efficient mechanical system specification and installation provisions are included, along with what to do to specify and install a compliant hot water system. Discussion also includes the provisions for electric power and regulations applicable to exterior and interior building lighting.

Even with this extensive coverage, this book is not intended to explain all of the provisions of the commercial and residential energy code or all of the acceptable materials and methods of construction. It focuses on the most common and used provisions applicable to many conditions in residential and commercial construction. This is not to say that the information not covered is any less important or less valuable to the reader. This book should be used with the *2018 International Energy Conservation Code*, which should be referenced for more detail.

Reasonable application of the code provisions is supported by a basic understanding of the scope and intent of both the IECC and the other International Codes® (I-Codes®). This book and the IECC reference other

codes and standards, as such a basic understanding of interrelated concepts and provisions provided in this book is necessary.

Energy Code Essentials contains full-color photos and illustrations to help the reader visualize and understand the application of the code requirements. Practical examples, simplified tables and highlights of particularly useful information help clarify the basic requirements of the code and help the reader determine compliance. References to the applicable sections of the 2018 IECC are included to easily locate the applicable code section for more detail and exact code language. A glossary of energy code terms clarifies the meaning of technical terms. This is the third edition of this publication, updated for the 2018 IECC.

ABOUT THE INTERNATIONAL ENERGY CONSERVATION CODE

The IECC is a comprehensive model code that regulates minimum energy-efficient provisions for new buildings and additions and alterations to existing buildings. There are two separate sets of provisions. The commercial and residential regulations each apply to heating, air-conditioning, ventilation and lighting systems. Administrative provisions and definitions specific to each commercial and residential set of regulations are also included. The IECC integrates easy-to-understand prescriptive provisions for compliance as well as performance criteria that make possible the use of new materials, new equipment and new building designs.

The IECC is one of the codes in the family of the International Codes published by the International Code Council (ICC). All of these codes are maintained and updated through an open code development process and are available internationally for adoption by the governing authority to provide consistent and enforceable regulations for the built environment.

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Energy Code Essentials is the result of many hours of research, code language analysis and collaborative effort. The authors are grateful for the valuable assistance and contributions of Jay A. Woodward, ICC Senior Staff Architect. Jay was the ICC staff secretary to the IECC Code Development Committee during the fast-moving early years of sweeping energy code changes. His unwavering commitment to accuracy and to those actively involved in the tedious code hearing process is much appreciated. The knowledge and experience of the ICC staff were instrumental to its development, and Jay contributed to the accuracy and quality of this product. Hamid Naderi, PE, Senior Vice President of Business and Product Development at the ICC, came up with the concept of this book and provided the initial direction. Dr. Joseph Lstiburek, Shaunna Mazingo and the Colorado Chapter Energy Code Change Committee continues

to contribute to the ever-growing body of knowledge relating building and energy codes to high-performance building practice and are highly appreciated for their important work. The authors would like to thank Pam Cole, Research Scientist in the Energy Policy & Economics Group at the Pacific Northwest National Laboratory, Robby Schwartz of Energy Logic and Howard Wigg of the Hawaii State Energy Office for their review of this edition. Lastly, a special thanks to Joseph Kistner, Special Projects Intern in the Aspen Building Department, for the LED research, developing graphics, managing files and organization for the residential chapters of this edition.

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Mr. Klein is actively involved in the code development process of the International Code Council (ICC) and serves on two National Fire Protection Association (NFPA) committees and one International Association of Plumbing and Mechanical Officials (IAPMO) committee. Mr. Klein earned his bachelor of science degree in Chemical Engineering at the University of Delaware and his master of science degree in Engineering and Technology Management from Washington State University. He is a licensed Professional Chemical Engineer in Washington State, a Certified Energy Manager (CEM) through the Association of Energy Engineers (AEE) and an ICC-certified Energy Code Specialist.

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ABOUT THE INTERNATIONAL CODE COUNCIL

The International Code Council is a member-focused association dedicated to developing model codes and standards used in the design, build and compliance process to construct safe, sustainable, affordable and resilient structures.

Most U.S. communities and many global markets choose the International Codes. ICC Evaluation Service (ICC-ES) is the industry leader in performing technical evaluations for code compliance, fostering safe and sustainable design and construction.

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