



Buildings for the 21st Century

Buildings that are more energy-efficient, comfortable, and affordable...that's the goal of DOE's Office of Building Technology, State and Community Programs (BTS). To accelerate the development and wide application of energy efficiency measures, BTS:

- Conducts R&D on technologies and concepts for energy efficiency, working closely with the building industry and with manufacturers of materials, equipment, and appliances
- Promotes energy/money saving opportunities to both builders and buyers of homes and commercial buildings
- Works with State and local regulatory groups to improve building codes, appliance standards, and guidelines for efficient energy use
- Provides support and grants to States and communities for deployment of energy-efficient technologies and practices



TEXAS BUILDING CODE AND ENERGY PERFORMANCE STANDARDS

Projected to save at least \$1.1 billion in annual energy costs by 2008

The state of Texas passed two pieces of landmark legislation in 2001 that will deliver substantial economic benefits to the state for years to come.

Senate Bill (SB) 5 adds "Texas Building Energy Performance Standards" to the Texas Health and Safety Code, among innovative measures to meet Federal Clean Air Act requirements in Texas. SB 5, which became effective September 1, 2001, adopts the energy-efficiency chapter of the International Code Council's (ICC) International Residential Code (IRC) (as it existed at May 1, 2001) as the energy code in Texas for most single-family homes and townhouses. SB 5 also adopts the ICC's International Energy Conservation Code (IECC) (as it existed at May 1, 2001) as the energy code for all other residential, commercial, and industrial construction, including single-family homes that have greater than 15 percent glass in the exterior wall area.

Municipalities may adopt local amendments to the Texas Building Energy Performance Standards. However, amendments may not result in less-stringent energy-efficiency requirements for any areas designated as nonattainment areas for air quality standards by the U.S. Environmental Protection Agency (EPA) or in certain "affected counties" as defined by SB 5. Local amendments must be reviewed by the Energy Systems Laboratory (ESL) of the Texas A&M University System, designated by the Legislature as the agency responsible for energy code implementation. ESL is also responsible for calculating the detailed impacts of SB 5 building energy provisions for use by the Texas Natural Resource Conservation Commission in obtaining emission reduction credit within the State Implementation Plan from EPA. Because about 70 percent of new construction in the state occurs in nonattainment areas or the "affected counties," the new Texas energy code is a significant step toward a cleaner, more energy-efficient future.

With the adoption of the 2001 IRC/IECC as Texas Building Energy Performance Standards, Texas broadened the base of participation in improving the state's air quality through more efficient energy use. Enforcement of the new standards is expected to save approximately \$200 per year in energy costs for the owner of a typical new home.



The second piece of legislation – SB 365, which became effective January 1, 2002, establishes the IRC as the standard municipal residential building code for the state. Although local amendments are allowed, this legislation is the first major initiative in Texas to create consistent standards for residential construction.

Code Adoption Benefits All Texas Residents

The change in how buildings are constructed in Texas as a result of the new legislation will significantly benefit residents.

In the first year, the Texas Building Energy Performance Standards are projected to save nearly 1.75 trillion Btus from residential buildings alone. As estimated by the Public Citizen Texas Office, Texas residents should save approximately \$1.1 billion in annual energy costs by 2008.

Greater energy efficiency will reduce emissions from coal- and natural gas-fired power plants. Public Citizen estimates that by 2008, the annual reduction in nitrogen oxide (NO_x) emissions is expected to exceed 21,000 tons. Reduced emissions will help Texas nonattainment areas meet Clean Air Act requirements.

The Texas Building Energy Performance Standards are expected to moderate future peak electric power demand, helping ensure greater reliability within the Texas power system.

Applying the IRC statewide offers builders the convenience and simplicity of having a single set of residential requirements that are applicable throughout Texas.

New and replacement windows must have a solar heat gain coefficient (SHGC) of 0.40 or less – considerably better than the SHGC of 0.73 that was typical prior to code adoption. Reducing solar gain means reducing air conditioning loads during the summer ozone season.



World's Best Window Co.
Millennium 2000+ Casement
Vinyl-Clad Wood Frame
Double Glaze • Argon Fill • Low E

ENERGY Performance

- Energy savings will depend on your specific climate, house and lifestyle
- For more information, call (manufacturer's phone number) or visit NFRCC's web site at www.nfrcc.org

Technical Information			
Res	U-Factor .32	Solar Heat Gain Coefficient .40	Visible Light Transmittance .58
Non-Res	.31	.40	.60

Manufacturer stipulates that these ratings conform to applicable NFRCC procedures for determining whole product energy performance. NFRCC ratings are determined for a fixed set of environmental conditions and specific product sizes.

Highlights of the Texas Building Energy Performance Standards

Compared to previous residential construction practice, the Texas Building Energy Performance Standards save energy primarily by:

- ✓ Reducing solar heat gain through windows. New and replacement windows must have a maximum solar heat gain coefficient (SHGC) of 0.40 – considerably better than the SHGC of 0.73 typical in Texas prior to energy code adoption. Improved window performance is expected to reduce air conditioning energy by as much as 30 percent.
- ✓ Improving the performance of heating and cooling ducts. The adopted code requires R-8 insulation and careful sealing of duct joints, seams, and connections in unconditioned spaces.
- ✓ Requiring recessed can lighting fixtures located adjacent to attics or other unconditioned spaces to be sealed against air leaks.
- ✓ Setting minimum insulation levels for walls and ceilings, and reducing conductive heat loss through windows.



Collaboration Contributes to Successful Code Adoption

The Texas Building Energy Performance Standards were adopted as a result of an extensive multigroup effort. Supporters and contributors to the adoption process included:

- ✓ Public Citizen Texas Office
- ✓ Texas Natural Resources Conservation Commission
- ✓ Texas Energy Coordination Council
- ✓ Texas Building Energy Institute
- ✓ Energy Systems Laboratory of the Texas A&M University System
- ✓ Texas Association of Builders
- ✓ Greater Dallas Home Builders Association
- ✓ Greater Houston Builders Association
- ✓ Center for Energy & Environmental Resources at the University of Texas at Austin
- ✓ Energy Foundation
- ✓ Sustainable Living Alliance
- ✓ Building Performance and Comfort, Inc.
- ✓ State Energy Conservation Office (*Texas Comptroller of Public Accounts*)
- ✓ North Central Texas Council of Governments
- ✓ Environmental Protection Agency
- ✓ Pacific Northwest National Laboratory
- ✓ Building Codes Assistance Project
- ✓ Alliance to Save Energy
- ✓ Other citizens and organizations, key legislators, and legislative staff in the 77th Texas Legislature.

These groups recognized that energy-efficient construction could make an important contribution to helping Texas communities comply with the federal Clean Air Act. The major metropolitan areas have been struggling with air emissions for several years, and Texas has been working with the EPA to develop a State Implementation Plan for emission reduction. Texas faced the potential loss of federal transportation funding in 2008 if the plan was ineffective.

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Working closely with the EPA and DOE, Texas advocates researched the potential impact that building energy performance standards would have on air quality. DOE's Building Energy Codes Program supported this effort by:

- ✓ Calculating estimates of residential energy savings and emission reductions from compliance with the IRC and IECC in five major metropolitan areas.
- ✓ Providing detailed information on various IECC provisions and compliance paths.
- ✓ Helping Texas evaluate the merits of alternative code proposals.
- ✓ Expediting a planned update of the **MECcheck™** residential energy code compliance software and accompanying training manuals so they would be available to the Texas building community.

"The preliminary energy savings estimates provided by DOE through PNNL helped confirm that building energy performance standards were a plausible approach to emission reduction," says Tom Fitzpatrick, a member of the Energy Systems Laboratory's implementation team. "Their data helped folks understand that an energy code would deliver results."

The IRC and IECC save energy in a cooling climate like Texas, especially through low solar gain windows, better duct sealing and insulation, and proper HVAC sizing. "The IECC also offers the benefits of being a nationally recognized code that is supported with national code organizations, training and certification opportunities, and tools such as **MECcheck™** energy code compliance software," says Fitzpatrick.

Training and Compliance Tools Strengthen the Process

Texas has initiated several efforts to support compliance and enforcement of the Texas Building Energy Performance Standards:

- ✓ **Outreach and training for code officials and building professionals.** The Energy Systems Laboratory (ESL) at Texas A&M is offering outreach materials and technical assistance on code implementation as required by SB 5. ESL is conducting energy code training throughout the state under a DOE Special Projects grant through the State Energy Conservation Office (SECO), and in cooperation with the Texas Association of Builders, Sustainable Living Alliance, and Building Performance & Comfort, Inc. More than 2,000 building professionals had been trained by February 2002, with another 1,000 expected to be trained by October 2002. Information on Energy Code Workshops is available at the SECO website at www.seco.cpa.state.tx.us.
- ✓ **MECcheck™ compliance software.** **MECcheck™**, developed and distributed by DOE's Building Energy Codes staff, is a recognized tool for easily showing compliance with national model energy codes. Builders and designers use **MECcheck™** to demonstrate compliance with the residential Texas Building Energy Performance Standards. With funding from DOE, PNNL provided 3,000 copies of **MECcheck™** on CD for use in energy code training. **MECcheck™**

can be downloaded free of charge from the DOE Building Energy Codes website at www.energycodes.gov/meccheck/download.stm. Additional copies of the CD are available for a nominal fee by calling the Energy Codes Hotline at **1-800-270-CODE (2633)**.

- ✓ **Energy Codes Support.** Specialists at PNNL offer technical support to code officials, builders, and others on the code and the software through email at techsupport@bec.pnl.gov.

DOE Grants Support the Effort

DOE State Energy Program (SEP) Special Project Grants have helped lay the foundation for the new Texas energy code. As early as 1997, Texas received a DOE grant to promote energy codes to communities throughout the state. Another DOE grant in 1999 allowed Texas to conduct workshops and forums for key stakeholders. "These grants helped establish an infrastructure of experience and support with energy codes," says Felix Lopez, Senior Engineer, Texas State Energy Conservation Office. "Encouraging early voluntary adoption was important because it gave different jurisdictions the opportunity to get acquainted with the value of a residential energy code."

In 2001, DOE awarded Texas a grant to provide training on the energy-efficiency chapter of the IRC and the IECC at locations throughout the state. This training is critical to the widespread acceptance and enforcement of the Texas Building Energy Performance Standards.

This air conditioning technician reviews his Manual J load calculation required by the new code. Proper HVAC sizing is critical to achieving the rated efficiency of air conditioning equipment and maintaining control of humidity.



TEXAS BUILDING CODE AND ENERGY STANDARDS

For more information on the Texas Special Project Grant contact:

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Austin, TX 78774

State Energy Conservation Office Website

<http://www.seco.cpa.state.tx.us>

For more information on Texas energy codes contact:

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Energy Systems Laboratory

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1-877-AnM-CODE (266-2633)

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DOE support offered through PNNL:

Energy Codes Tech Support
techsupport@bec.pnl.gov

Website

www.energycodes.gov

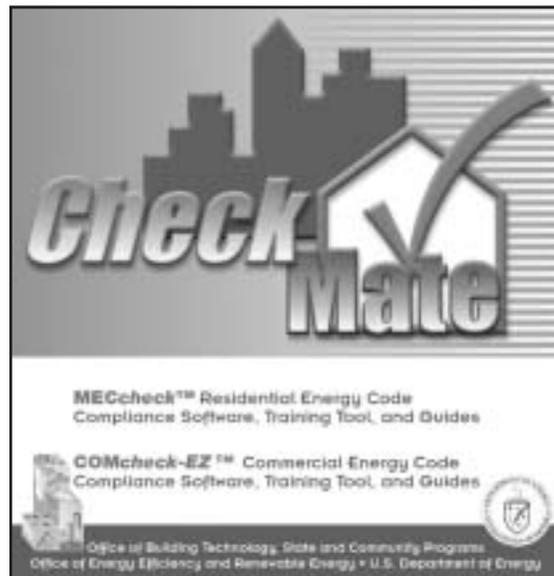
Building Energy Codes Program

Building Energy Codes outreach activities offer a range of services and products that make it easy to update, implement, and enforce commercial and residential energy codes.

- ✓ **Energy Codes Support** — Specialists at PNNL offer technical support on code compliance software tools and national energy codes through email at techsupport@bec.pnl.gov.
- ✓ **Website** — Access a wealth of information, download DOE's **COMcheck-EZ™** and **MECcheck™** compliance software, and learn more about products and services at www.energycodes.gov.
- ✓ **Code Compliance Support Materials** — The **COMcheck-EZ™**, **COMcheck-Plus™**, and **MECcheck™** energy code compliance software provide a fast and easy way for designers, builders, and others to

determine if new buildings meet the requirements of model energy codes. Different versions of the software are being used to demonstrate compliance with model energy codes in more than 30 states. The software and accompanying users' guides and compliance manuals can be downloaded free of charge from the Website.

- ✓ **Training** — Hands-on training on the compliance software occurs regularly throughout the country.
- ✓ **Training Materials** — The **MECcheck™** and **COMcheck-EZ™** product lines include videos, computer-based training tools, and other training materials. These materials are available in hard copy and on diskette by calling the Energy Codes Hotline or by visiting the DOE Website.
- ✓ **Technical Assistance** — States can request that Building Energy Codes staff perform needed analyses or provide specialized support.



Since the adoption of the IRC/IECC Texas has developed an aggressive training program, with more than 30 classes in 2002. Over 3,000 copies of the CheckMate CD, provided by DOE through Technical Assistance to the States, have already been distributed in energy code trainings.



Printed with renewable – source ink on paper containing at least 50% wastepaper, including 20% post consumer waste.