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Colorado Energy Efficiency Programs and Building Codes – an Assessment

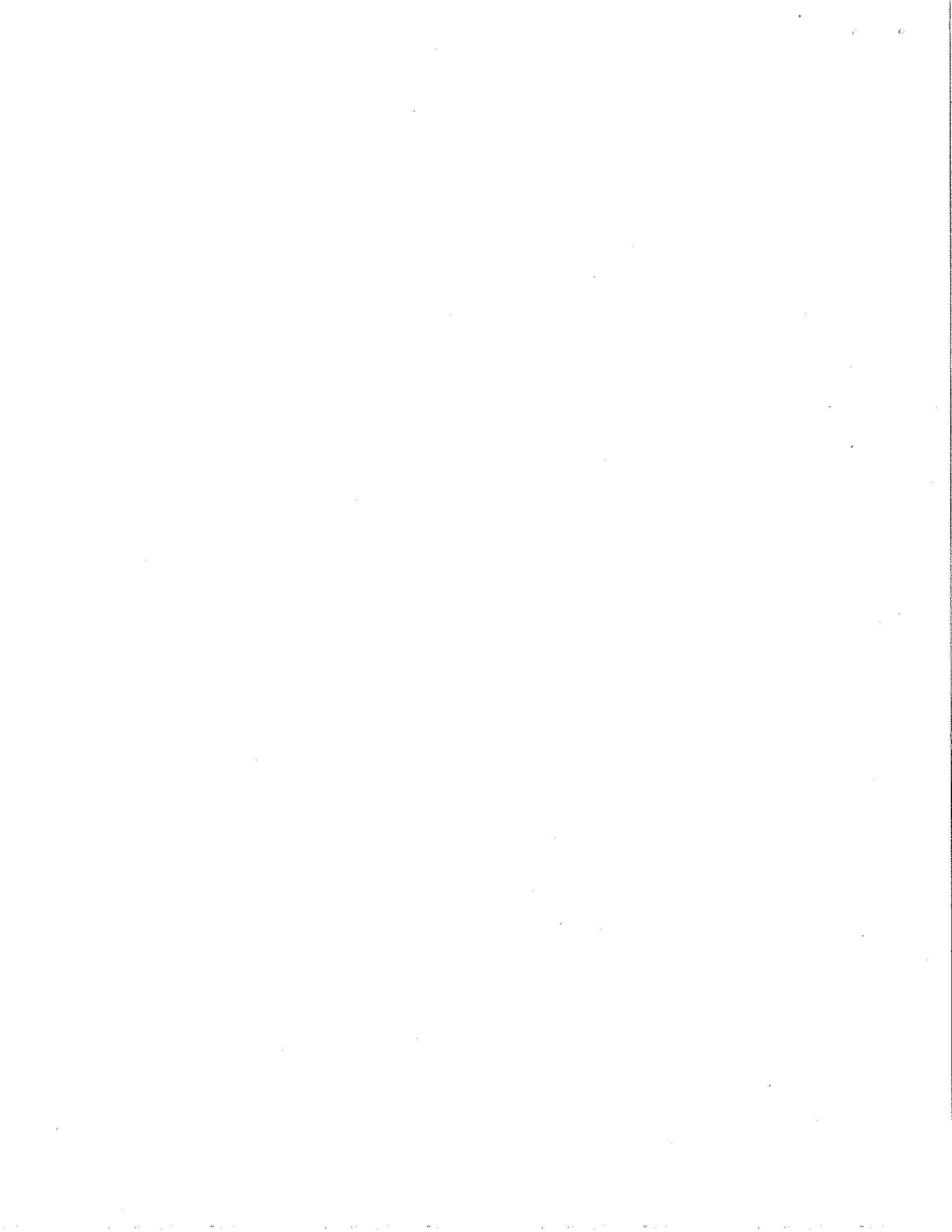
A Report to the Governor and General Assembly of Colorado
December 31, 2001

presented by



A Department of the Colorado Housing and Finance Authority





Executive Summary

This report, produced pursuant to C.R.S. 29-4-729, part of House Bill 01-1381, discusses, investigates, and offers sources for further review on energy conservation programs and energy related building codes. The report highlights significant differences between Colorado programs and codes and those in other U.S. states. Finally, it provides an analysis on the effectiveness and importance of these energy savings.

Two vehicles for energy conservation are discussed—energy efficiency and conservation programs and building codes. Energy programs in Colorado—led by Energy Rated Homes of Colorado (E-Star)—are comparable to those in other states in terms of their functionality and, roughly, in terms of the number of individual projects completed. However, the percentage of residences receiving an energy rating is a small part of the total amount of homes put on the market. At the same time, Colorado's building codes lag behind the vast majority of other states. This means that Colorado has a lot of energy saving potential to be realized if the frequency of energy rating programs are increased and building codes strengthened on a statewide basis.

The energy efficiency programs discussed in this report include the following:

Low-income / Weatherization	Provides funding to lower income residences for energy efficiency improvements.
Demand Side Management	Controls the demand for energy by requiring utilities to develop and manage projects that will implement energy conservation measures among energy users.
Performance Contracting	A private approach to energy conservation where energy service companies upgrade commercial and public buildings while guaranteeing the energy efficiency results of their work.
System Benefits Charges	Funds energy conservation measures and renewable energy initiatives through a charge on the utility bills of energy users, as mandated by a state legislature.
Home Energy Ratings and Energy Efficient Mortgages	Rates homes based on their level of energy efficiency while providing information on cost effective improvements, allows prospective homebuyers to qualify for better loan terms.
Branding	Uses brand recognition to encourage residences and businesses to comply with energy efficiency standards.

Building Codes Building codes provide a minimum standard for energy efficiency, compared to the programs recognizing market leaders described above.

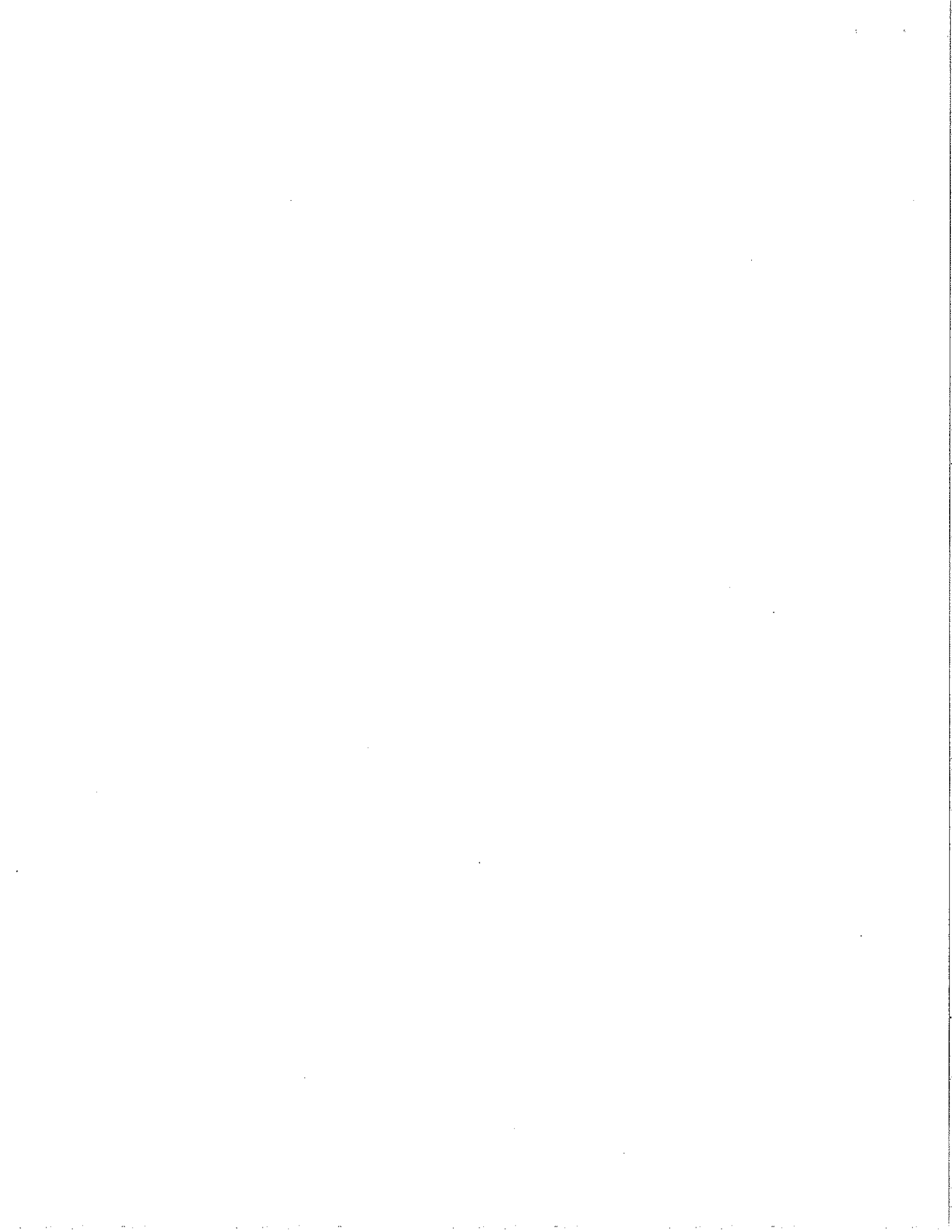
The report concludes that the low-income energy consumers have good programs available, and that the other end of the spectrum is well-served with home energy ratings, and brand programs such as the EPA Energy Star for Homes and the Built Green Colorado Program. However, there is a vast middle ground with significant room for improvement. Finally, the report ends with a list of approaches that have been successful in other states. These include:

- Support for local jurisdictions to adopt and enforce a consistent energy code across jurisdictions (see Texas, Vermont)
- A competitive interest rate for energy improvement mortgages (see Alaska)
- A "Negawatt Utility" program for promoting non-HERS energy efficiency programs for residential, commercial and industrial energy sectors (see Vermont)
- A funding mechanism for all of the above (i.e., a systems benefits charges in lieu of relying on the severance tax for funding low-income weatherization and bill paying assistance).

Colorado has historically enjoyed low energy costs, contributing to a lower cost of living and of doing business. This has also meant little attention is paid to energy codes, and that consumers have been less concerned with energy efficiency in homes and businesses than in other states. As market conditions become more volatile, the success of these energy efficiency codes and programs in other states warrants their adoption in Colorado.

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1.0 Introduction

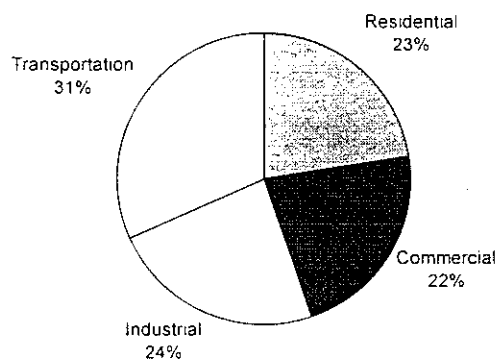
This report, *Assessment of Existing Energy Conservation & Efficiency Programs and Standards*, is written by the Colorado Housing and Finance Authority (CHFA) pursuant to C.R.S. 29-4-729. This statutory provision was part of House Bill 01-1381, sponsored by Representatives Grossman, Miller, Scott, Smith, Veiga, Borodkin, Boyd, Coleman, Dean, Decker, Garcia, Hefley, Jameson, Larson, Mace, Plant, Romanoff, Sanchez, Stafford, Tapia, Weddig, Williams S., and Witwer and Senators Hagedorn, Entz, and Tupa. The bill was signed into law by the Honorable Governor Bill Owens on June 5, 2001.

The statutory provision requires CHFA to:

- Assess existing energy conservation and efficiency programs and standards established by state and local governments and private organizations;
- Compare Colorado programs and standards to similar programs and standards adopted in other states; and
- Evaluate the effectiveness of voluntary performance programs and other financial incentives.

Residential energy use accounts for almost 20% and commercial for 16% of total U.S. energy consumption (Energy Information Administration, Country Analysis Briefs—United States www.eia.doe.gov/emeu/cabs/usa.html, 2001). In 1999,

Colorado Energy Consumption By Sector, 1999



Energy Information Administration, 2001

residential and commercial sectors in Colorado used 23% and 22% respectively of the state's total energy consumption. For this reason, conservation programs and energy related building codes are essential to maintaining a healthy economy and environment within the State of Colorado.

Even modest improvements in efficiency can have a significant cumulative impact on both income or profit and can reduce pollution associated with the

consumption of energy. Building codes, long used to assure the health and well-being of occupants, are a tool all sizes of government can use to implement the benefits of energy savings for homeowners, tenants, and businesses. Energy efficiency programs and energy-related building codes are essential to maintaining a healthy economy and environment in the State of Colorado.

2.0 Existing Energy Conservation and Efficiency Programs and Standards

This section will begin with a listing of energy efficiency programs, which come in a variety of formats. They may emphasize "bricks and mortar" (or in this case, insulation and air sealing) concentrating on making actual improvements to existing buildings or new construction practices. Low income weatherization programs, demand side management, performance contracting, home energy rating systems, and public interest energy programs inform customers about how to improve energy efficiency.

Alternatively, programs may emphasize creating market awareness of industry leaders already ahead of the curve. These would include branding programs such as the EPA Energy Star programs, the U.S. Green Building Council's "LEED," and the Denver Metro Home Builder Association-sponsored Green Builder Program of Colorado.

This section will end with a discussion of the standard embodied in energy codes for buildings. Colorado last had a statewide energy code in 1977, which is no longer in effect. Since then, several local jurisdictions have adopted various forms of energy codes. E-Star Colorado has surveyed local jurisdictions to find out which jurisdictions have an energy code in place; the section includes a summary of that survey.

2.1 Low Income Programs

Low-income programs focus on providing resources to families and individuals so they can adequately address their energy needs. These either take the form of weatherization, bill paying assistance, or both.

Low-income households typically spend 14% of their total annual income on energy, compared with 3.5% of other households. ("Close-Up--Weatherization Assistance Program," U.S. DOE--Office of Building Technology, State and Community Programs, 2001). Weatherization programs are a means for homeowners and renters with modest incomes to add insulation, more efficient windows, and weatherstripping that conserve energy and thereby lower monthly utility bills.

These improvements are offered through "weatherization" programs, funded by the U.S. Department of Energy. Weatherization programs can work well with bill pay assistance since conserving energy reduces the need for ongoing financial assistance while providing recipients with a higher level of comfort, safety, and security in their homes. In fact, one out of four weatherization recipients experienced a 37% reduction in their heating bills. ("Close-Up--Weatherization Assistance Program"). Table 2.2 provides detail on two weatherization programs, one based in Colorado and the other a nationwide plan that provides the financial support for the Colorado program and those in other states.

Eligibility for the program is based on household income. The household must not make more than 185% of the Federal poverty guideline in order to receive weatherization assistance. For a family of four, this is \$32,652.50. Until gas rates increased in the fall of 2000, coupled with a cold snap, far fewer households took advantage of the assistance than were eligible. An improved marketing strategy, along with the increase in rates and colder weather, significantly increased participation in the program in the year 2000.

According to the latest census data, there were 1,808,037 housing units in Colorado as of the end of 2000. The Colorado weatherization efforts have impacted over 60,000 of those households since inception in 1976, or 3% of the housing stock.

Table 2.1 Low-Income Programs

Program Name, Government Agency, and Location	Description	Select Accomplishments
Colorado Energy Assistance Foundation	<ul style="list-style-type: none"> A non-profit providing bill paying assistance directly or through grants to local agencies. Funded partly by \$4.75 million from Xcel Energy due to a settlement through the PUC, and partly by donations (see www.ceaf.org for a list of activities and agencies assisted, and http://www.ceaf.org/StateReport.htm for a report on the Status of Colorado's Low-Income Energy Consumers). 	<ul style="list-style-type: none"> Funded local agencies who in turn assisted 6,000 households not eligible for LEAP funds. Provided 3,300 households with funds to supplement LEAP funding.
LEAP	<ul style="list-style-type: none"> Bill paying assistance. Federally funded (\$23 million for 2000-2001) through the Colorado Dept. of Health and Human Services. 	<ul style="list-style-type: none"> Provided bill paying assistance to over 76,000 households in the 2000-2001 heating season.
Energy Saving Partners Program ("ESP"), the Governor's Office of Energy Management and Conservation ("OEMC"), Statewide throughout Colorado	<ul style="list-style-type: none"> Provides cost-effective household energy efficiency or "weatherization" upgrades to low-income, senior, and physically-challenged Coloradans. Funded by the U.S. Department of Energy's Weatherization Assistance Program (see below) and Xcel Energy. 	<ul style="list-style-type: none"> One out of four residents who receive weatherization services experience a 37 percent reduction in their heating costs.
Weatherization Assistance Program, U.S. Department of Energy	<ul style="list-style-type: none"> The DOE, through its Regional Offices, awards and monitors grants to States, which in turn award grants to a network of local agencies, who perform weatherization services. Eligible low-income households receive services from professionally trained crews who weatherize single-family homes, multifamily dwellings, and mobile homes. 	<ul style="list-style-type: none"> In Colorado, 60,000 homes have received services since 1976.

(Source for OEMC Energy Saving Partners Program: OEMC web site, www.state.co.us/oemc, 2001; Source for DOE Weatherization Assistance Program: DOE web site, www.eren.doe.gov/dfo/whatdo/weatheriz.htm)

2.2 Demand Side Management

Demand side management (DSM) programs are mandated by public utility commissions, the regulating authority for electric and gas companies, as a means of curbing demand for energy services. DSM is used in lieu of expanding the supply of energy and its attendant externalities. It is also a method by which utilities can "load shave," which helps to control energy usage during times of peak usage (e.g. if a utility sponsors the installation of energy efficient air conditioners, the likelihood of brownouts during the hottest days of summer is lessened).

Xcel Energy is mandated by the Colorado Public Utilities Commission to spend no more than \$75 million to reduce electricity demand by 124 megawatts by the year x. If they achieve that savings prior to spending \$75 million, they cannot continue to spend DSM funds, which comes directly from the consumer.

DSM programs can be used within the residential, commercial, or industrial sectors and implement energy efficient technologies and practices to curb demand. Until recently, programs tended to focus on commercial and industrial users. However, due to changes in construction practices and changes in consumer demand, residential air conditioning has become one of the top three areas for focus for Xcel Energy's DSM program. Large amounts of windows facing west are particularly problematic, particularly in new subdivisions without mature trees to provide shading. Up to 50% of new homes have air conditioning installed in some regions of Colorado. Further, since air conditioners are installed in homes where the ductwork is assumed to be for delivering heated air, and is therefore typically very leaky, the benefits of purchasing a highly efficient air conditioner are lost through an inefficient delivery system (12 SEER units in Colorado typically operate at a 6 SEER equivalent due to ductwork, sizing, and other problems).

Projects offered through a DSM program may include offering rebates to homeowners who purchase energy-efficient furnaces or air conditioners, or who are willing to install peak demand switches which turn off in response to a signal from the utility company when peak demand is reaching supply limits. Other typical DSM programs include lighting retrofits for commercial establishments and overhauls of manufacturing facilities' electrical systems.

More frequently used in the 1980s and 1990s as a function of utility regulation, DSM programs slowed due to the expected and, in some states, actual occurrence of electric and gas deregulation. Nevertheless, DSM programs are still in existence and may come into more frequent use once again. Utilities pay for the programs, although they are ultimately funded by energy users. Table 2.2 provides some detail on Colorado's DSM program and several in other areas.

Table 2.2 Demand Side Management (DSM) Programs

Program, Utility, and Location	Description	Select Accomplishments
Commercial/Industrial DSM Program Xcel Energy Denver, CO	<ul style="list-style-type: none"> • \$75 Million was approved in 2000 for program costs and incentives in support of DSM, goal of curtailing 124 MW of summer demand by Q3 of 2005. • Overall, projects will help curtail energy use through pre-construction building design and re-commissioning of older electrical systems with more efficient technologies. Especially geared towards larger commercial establishments with high square footage and an active energy management staff. 	No phases of the DSM program completed as of yet. Three to be completed by 2005 and three others still in the planning stages.
Comprehensive Energy Management Programs Various California Utilities (e.g. Pacific Gas and Electric, Southern California Edison, San Diego Gas and Electric) Statewide throughout California	<ul style="list-style-type: none"> • As part of a broader DSM plan, the Comprehensive Energy Management plan provides customers with financial incentives to encourage comprehensive energy management (i.e. efficiency). • Standard Performance Contract program offers incentive payments to commercial consumers or energy service providers for projects delivering verified energy savings. • Residential Contractor program encourages residential customers to work directly with contractors to perform efficiency upgrades. • Express Efficiency program provides rebates for energy efficient technologies to small and medium sized business customers. This program maintains statewide consistency for product requirements and rebate levels. 	Not available. However, financial incentives range between \$100,000 and \$1,000,000+ per DSM project. The size of the incentives indicate significant energy savings are being achieved.

Table 2.2 Demand Side Management (DSM) Programs (continued)

Program, Utility, and Location	Description	Select Accomplishments
Virtual "Negawatt" Utility Efficiency Vermont Montpelier, Vermont	<ul style="list-style-type: none"> • Operates a virtual utility that provides energy efficiency programs to all end-use sectors in the state. • Efficiency Vermont manages all of the demand side management programs that would otherwise have been done by the utilities and reports to the Public Service Board. • Different approach relying upon the expertise of a non-profit organization. • Small portion of ratepayer utility bills goes toward a pool of funds for energy efficiency programs instead of funding DSM programs managed directly by the utility. • Offerings include incentives and support for Energy Star products and homes, technical and financial assistance to help Vermont's commercial and industrial businesses, a low-income energy efficiency project, an Emerging Market Initiative that identifies, evaluates, and tests innovative energy efficiency technologies and practices to promote their use. 	<ul style="list-style-type: none"> • 51% of recorded savings in the first year came from the business sector. • Saved \$17.7 million in energy costs in its first year of operation; the savings exceeded by \$12.3 million the \$5.4 million cost of operating Efficiency Vermont in its first year. • Provides energy efficiency at a cost of about 2.6 cents per kilowatt hour when a comparable price for wholesale electric supply is more than 5.2 cents per kWh.

(Source for Xcel Energy program: Xcel Energy web site, www.xcelenergy.com/ccd/; Source for California Energy Management program: California Public Utilities Commission web site, www.cpuc.ca.gov/static/industry/electric/energy+efficiency/statewide.htm, 2001; Source for Efficiency Vermont, Efficiency Vermont web site, www.efficiencyvermont.com/index.html, 2001).

2.3 Performance Contracting

Often, commercial or industrial energy users look askance at the initial costs of making significant energy efficiency improvements to their building. They may schedule improvements over a period of several years, rather than getting the full benefit of energy improvements up front. Performance contracting maximizes the return to the owner by creating a contractual agreement between the owner and a private energy service company (ESCO) which allows all improvements to be made up front. The costs are financed by the savings earned over the period of the contract.

The ESCO identifies and evaluates energy-saving opportunities and then recommends a package of improvements which will be paid for by the energy savings instead of by a capital outlay from the building owner. The packages typically include electric motor, boiler, or air conditioning retrofits, or the installation of energy management controls.

Typically, an ESCO guarantees that savings meet or exceed annual payments made by its customer to cover project costs, usually over a contract term of seven to ten years. If savings fail to materialize, the ESCO pays the difference to the energy user. To ensure savings, however, the ESCO offers staff training and long-term maintenance services. (Source: "What Is Performance Contracting," The Energy Services Coalition Home Page, www.esperform.org/whatis.htm, 2001).

The U.S. Department of Energy promotes performance contracting through its "Rebuild" program. The Colorado Governor's Office of Energy Management and Conservation provides staff support as the state liaison for this effort. This partnership was begun with a \$202,000 grant from DOE; the grant has leveraged over \$8 million in capital improvements for state agencies and colleges, which may result in energy savings potentially worth \$25 million annually.

Noteworthy to performance contracting within the State of Colorado is House Bill 01-1381, the impetus for this report. House Bill 01-1381 removed an administrative barrier preventing state agencies from entering into multi-year contracts necessary for performance contracting. Prior to the legislation, an agency could not obligate itself by contract for a time period beyond the annual budget appropriation year.

Table 2.3a details several performance contracting projects within the State of Colorado. Table 2.3b provides a list of ESCOs providing services within the State of Colorado.

Table 2.3a Performance Contracting

Name of Project	Location	Description	Financials
Platte Canyon School District	Bailey, CO	<ul style="list-style-type: none"> The two electric boilers cost the district a tremendous amount to heat the building. Switch from electric to gas boilers. High school originally built in the 1950s, some areas of building too hot or cold resulting in discomfort. Improvements addressed issues of comfort as well as convenience with fan modifications to improve air flow, automatic hand dryers to replace paper towels and motion detectors to turn lights on and off. Air conditioning added to computer rooms. 	<ul style="list-style-type: none"> \$1 million total project cost, seven-year payback for first phase of the project (boilers), ten-year payback for second phase (fan modifications, etc.) Entirely financed through the performance contract, using a tax-exempt lease-purchase agreement. \$76,824 in energy cost savings and \$54,200 in operational savings each year in Platte Canyon's buildings, but actual savings have far exceeded estimates at \$160,000 per year. District gets any savings above the total guaranteed amount, and puts the money back into the general fund for other student needs.
Auraria Higher Education Center	Denver, CO	<ul style="list-style-type: none"> Most of the lighting in 19 campus buildings was old and inefficient, and the aging cooling equipment was not meeting the needs of the campus. Upgraded lighting, replaced the cooling tower and chillers, and installed a new management control system, laboratory fume hoods and a new heat recovery system. Better learning and work environment resulted along with energy savings. 	<ul style="list-style-type: none"> \$2.1 million total project cost, nine-year payback. \$284,000 per year guaranteed; savings during the installation year exceeded expectations
Western State College	Grand Junction, CO	<ul style="list-style-type: none"> Steam was piped to most buildings on campus via 51-year-old underground lines, heating costs approaching \$500K annually. Replaced aging central heating system with many small gas-fired boilers and new gas piping where required. Upgraded all lighting, 2MkW/hour saved annually. 	<ul style="list-style-type: none"> \$3.3 million total project cost, 10-year payback. Annual savings guarantee of \$283,712.

(Source for performance contracting projects: Energy Services Coalition web site, www.esccperform.org/success.htm, 2001)

Table 2.3b Colorado Energy Service Companies

Name of Company	Telephone Number and/or Web Site
Abacus Engineered Systems, Inc.	(720) 733-9739, www.abacus-engr.com
Ameresco Energy Services	(508) 661-2221
CMS Viron Energy Services	(303) 221-7844
EMC Engineers, Inc.	(303) 974-1200, www.emcengineers.com
Ennovate	(303) 471-0755
Financial Energy Management	(303) 781-8455, www.financialenergy.com
Honeywell, Inc.	(303) 765-1045, www.honeywell.com
Johnson Controls, Inc.	(303) 973-5930, www.johnsoncontrols.com
Long Energy Solutions	(303) 975-2152
Noresco	(303) 371-4000
Performance Technologies, Inc.	(303) 674-3853
Sempra Energy Solutions	(303) 752-0103
Siemens Building Technologies	(303) 279-8500
Trane Company	(303) 228-3000
URS Corporation	(303) 694-2770
Western Energy Services	(970) 245-8771

(Source for Colorado ESCO list: Rebuild Colorado, Colorado Energy Service Companies web site list, www.state.co.us/oemc/rebuildco/escolist.htm, 2001).

2.4 System Benefits Charges

System benefits charges are fee programs passed by state legislatures that utility customers pay on either a voluntary or compulsory basis. These are not programs in and of themselves, but sources of funding for programs. Depending on what the legislature specifies, funds collected go towards a variety of energy conservation measures or, in some cases, to foster energy produced from clean and renewable energy sources such as photovoltaic (solar) or wind power. Table 2.4a lists states with systems benefits charges as of January 2001, with their utility deregulation status according to the Energy Information Administration. Most, but not all, were implemented as part of a utility restructuring or deregulation process.

Table 2.4b outlines system benefit charges in two states that have achieved particular success with this kind of program. Information on their programs can be found in "Clean Energy Funds: An Overview of State Support for Renewable Energy," Lawrence Berkeley National Laboratory/National Renewable Energy Laboratories, eetd.lbl.gov/ea/ems/reports/47705.pdf, 2001.

Table 2.4a States With Systems Benefits Charges (January 2001)

States With SBC	Deregulation Active	Deregulation Delayed	No Intent to Deregulate
California	x		
Connecticut	x		
Delaware	x		
Illinois	x		
Maine	x		
Maryland	x		
Massachusetts	x		
Montana		x	
New Hampshire	x		
New Jersey	x		
New York	x		
Ohio	x		
Oregon		x	
Pennsylvania	x		
Rhode Island	x		
Texas	x		
Vermont			x
Wisconsin			x

(Source: Energy Information Administration, http://www.eia.doe.gov/cneaf/electricity/chg_str/regmap.html; U.S. DOE, http://www.eren.doe.gov/buildings/state_energy)

Table 2.4 System Benefits Charges Table

State	Charge	Program Benefits
Maine	<ul style="list-style-type: none"> Enacted a program to allow consumers to make voluntary contributions to fund research and development for renewable resources. 	<ul style="list-style-type: none"> Consumers indicate their willingness to contribute, and the transmission and distribution utilities collect the contributions. The funds are forwarded to the PUC, which then distributes the funds to various educational institutions. These institutions use the funds to conduct research on renewable resources and renewable resource development. By far the nation's largest renewable portfolio standard, requiring no less than 30% of an electric provider's supply sources to be from renewable resources. The typical requirement for other states is around 5%.
Montana	<ul style="list-style-type: none"> The charge will be levied on every utility customer. Customers with loads greater than 1000 kW will be assessed .9 mills per kWh up to \$500K. 2.4% of each utility's 1995 retail revenue marked as the annual funding for the program. Low-income energy bill and weatherization assistance at a minimum of 17% of each utility's funding level. Program will continue until July 1, 2003. 	<ul style="list-style-type: none"> The fund will underwrite research and development of renewable energy and energy conservation projects, as well as to offer energy assistance programs to low-income utility customers.

(Source for system benefit charges programs: "System Benefits Charges," Energy Efficiency and Renewable Energy Network, DOE, www.eren.doe.gov/state_energy/policy_content.cfm?policyid=29, 2001).

2.5 Home Energy Rating Systems

Home Energy Rating programs are market-oriented approaches to promoting energy efficiency in the residential market. Current homeowners, and buyers and sellers of new and existing homes, are the principal beneficiaries of home energy rating systems (HERS). These programs were developed in response to the Energy Policy Act of 1992 (EPAct).

E-Star Colorado was developed to provide Colorado with an accredited home energy rating system, and has been in operation for 6 years. It has rated over 7,900 homes and home plans as of year-end 2001. Currently, over 30 independent contractors are certified by E-Star Colorado, who provide their consulting services to homebuilders and homeowners.

Energy raters score houses on a scale of 0 to 100 points. The numerical rating represents the energy efficiency of the house based on a variety of factors including the efficiency of its ductwork, heating, ventilation and air conditioning equipment, insulation properties, and hot water systems among many other items. An average house is rated at 70 points. Houses earning a rating in excess of 80 points are considered efficient to highly efficient in their use of energy.

For houses with a rating at or below 70 points, HERS identifies where improvements can be made that will result in higher levels of energy efficiency. HERS also shows the cost to benefit ratios of making improvements. As a result, HERS analyses ensure that dollars spent on energy related improvements are used in the most cost-effective manner possible. Ratings provide a useful consumer protection service by showing what improvements will actually save in utility bills.

EPAct developed guidelines for HERS so that the mortgage industry could have a means for underwriting "Energy Efficient Mortgages" (EEMs). Documented energy savings theoretically allow prospective homeowners more favorable credit terms or larger loan amounts altogether. The idea behind EEMs is that if homeowners make improvements identified by HERS, less disposable income will have to be spent on energy bills, leaving more money to go towards mortgage payments.

Several mortgage lenders in other states recognize the HERS system and offer EEMs to home buyers as long as improvements resulting in a higher level of energy efficiency are completed. However, Colorado has not shown much interest in the energy efficient mortgage to date. We believe this is due to the extremely tight housing market, low interest rates, and very low utility bills relative to other states. The EEM was sold to lenders as an opportunity for

market distinction; until recently, market distinction has not been a necessity for anyone in the real estate industry.

E-Star Colorado was partially funded by a DOE grant. Barbara C. Farhar of the National Renewable Energy Laboratory completed a final report on the status of the pilot program for EEMS released to Congress in April of 2000. Her executive summary states the following:

"Although each of the pilot states' circumstances are different, a few common themes appeared during the five years of the pilot program. HERS providers with the following characteristics had a higher market penetration of home energy ratings:

- High levels of funding over relatively short time periods
- State-funded financial incentives for energy efficiency financing for mortgage borrowers
- Financial incentive for lenders to market EEMs
- Diversification of services
- Continuity in HERS program leadership
- Active involvement of key stakeholders."

(see "Pilot States Program Report: Home Energy Rating Systems and Energy Efficient Mortgages," Barbara C. Farhar, Ph.D., April 2000, www.nrel.gov/docs/fy00osti/27722.pdf)

Colorado's program benefited from the first and the last characteristics listed above, and is currently working to diversify its services. E-Star Colorado ranks among the top ten in energy rating programs nationally, when number of homes rated is compared as a percent of total housing units for that state.

Although demand for energy efficient mortgages has not been evident, demand for the home energy ratings has grown steadily over its 6 years of program operation. The market for ratings is segmented into those for existing homes and for new construction. The cost of the existing home energy rating had been subsidized by the previous administration's Office of Energy Conservation. When that subsidy was cut at the end of 1999, the demand for existing home energy ratings dropped significantly. However, rising energy costs have helped increase demand for homeowners interested in improving comfort and lowering utility bills. Finding marketing strategies for this segment will be a primary focus of E-Star Colorado's efforts in the next year.

The market for new construction ratings has been the main source of growth in the last several years. Raters are able to consistently demonstrate the value of their services to builders by providing quality control in the building process. The

following chart shows the growth in home energy rating volume by market segment over the last 6 years.

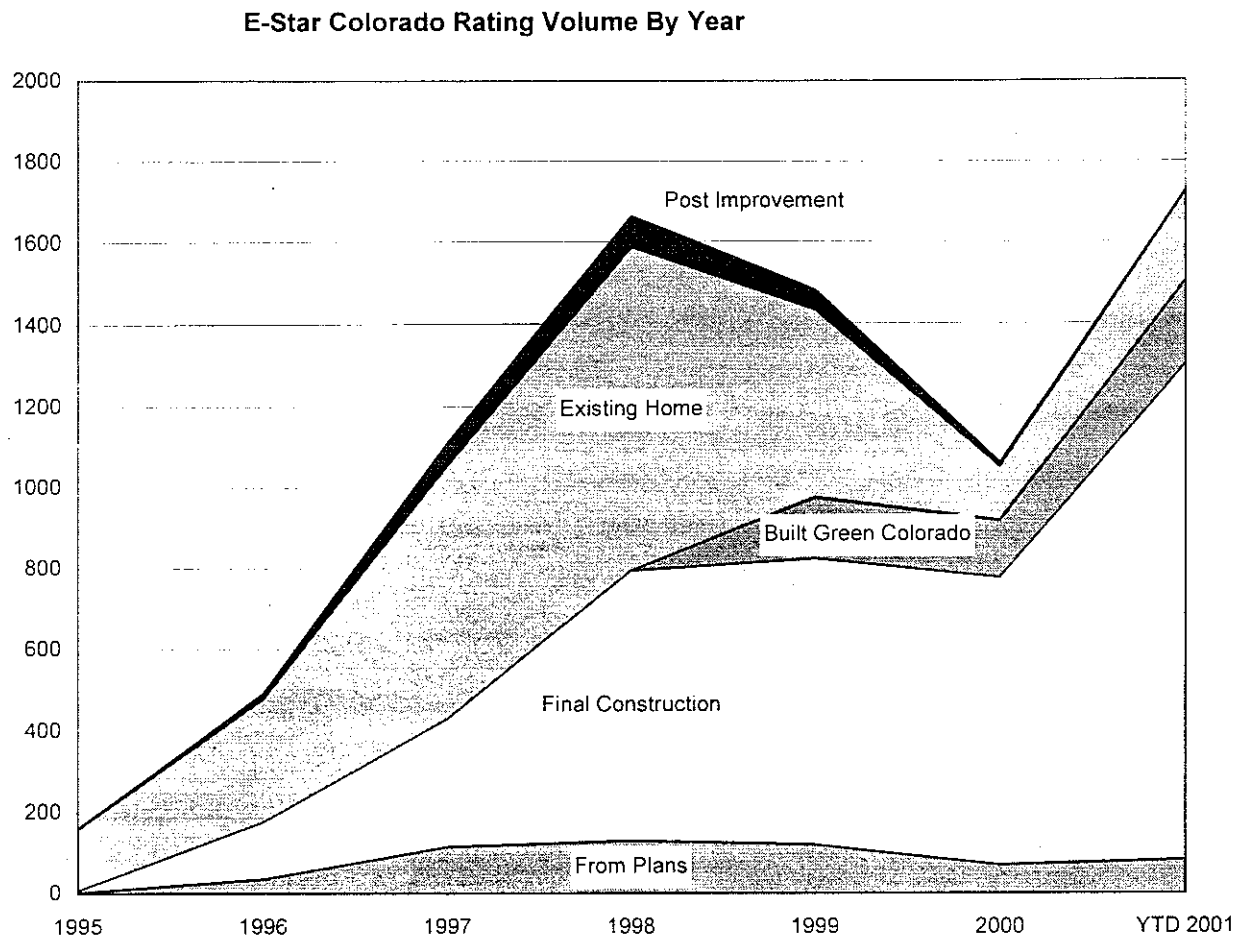


Table 2.5 identifies and details several energy rating programs, including E-Star, the HERS program offered through Energy Rated Homes of Colorado, a division of the Colorado Housing and Finance Authority. Other states have their own HERS programs similar to that offered by Energy Rated Homes of Colorado. Note that E-Star Colorado's volume was down significantly in the year used for comparison, but that volume in 2001 rose from 1,061 to 1,742 ratings completed.

For information on HERS programs throughout the U.S., see Energy Rated Homes of America, www.erha.com/programs.htm, or the Residential Energy Services Network (www.natresnet.org).

Table 2.5 States Ranked by Year 2000 Volume of Residential Energy Rating Programs as a Percent of Housing Units

State	Total Ratings	US Census 2000 Housing Units	Total Ratings as a Percent of Housing Units
S. Carolina (ERHS)	2	1,753,670	0.00000
N. Carolina (2 programs)	8	3,523,944	0.00000
Oregon (ERHOr)	5	1,452,709	0.00000
Washington (WHEAT)	10	2,451,075	0.00000
Georgia Total (3 programs)	24	3,281,737	0.00001
Kentucky (3 programs)	27	1,750,927	0.00002
Missouri (ERHAr)	39	2,442,017	0.00002
Ohio (2 programs)	78	4,783,051	0.00002
Mississippi (ERHS)	19	1,161,953	0.00002
Illinois (2 programs)	104	4,885,617	0.00002
Pennsylvania (4 programs)	118	5,249,750	0.00002
Idaho (Id Gem)	22	527,824	0.00004
New Hampshire (2 programs)	23	547,024	0.00004
Michigan (2 programs)	199	4,234,279	0.00005
Rhode Island (CSG)	33	439,837	0.00008
Iowa (ERHIa)	100	1,232,511	0.00008
Florida (Energy Gauge)	672	7,302,947	0.00009
Texas (GWSS)	771	8,157,575	0.00009
Oklahoma (2 programs)	157	1,541,400	0.00010
Arkansas (ERHAr)	123	1,173,043	0.00010
Wisconsin (WECC)	266	2,321,144	0.00011
Nebraska (NE HERS)	97	722,668	0.00013
Mass (CSG)	554	2,621,989	0.00021
Maryland (ESG)	482	2,145,283	0.00022
Utah (ERHUt)	298	768,594	0.00039
N. Jersey (MaGrann)	1480	3,310,275	0.00045
Louisiana (ERHLa)	975	1,847,181	0.00053
Colorado (E-Star)	1060	1,808,037	0.00059
Indiana (ERHMw)	1496	2,532,319	0.00059
Delaware (ESG)	215	343,072	0.00063
Arizona (2 programs)	2376	2,189,189	0.00109
California (2 programs)	18505	12,214,549	0.00151
Vermont (ERHVt)	480	294,382	0.00163
Nevada	1603	827,457	0.00194
Alaska (AHFC)	1040	260,978	0.00399

(Source for Energy Rated Homes of Colorado program: E-Star web site, www.e-star.com, 2001; Source for market penetration percentages: Energy Rated Homes of America, Steve Badaen, Legislative Session 2001, 2001 and U.S. Census Data, Bureaus of the Census, www.census.gov, 2001).

2.6 Branding Programs

Branding programs use the marketing power of a name and trademark to forward energy conservation goals. By creating recognition around a name, a branding program allows consumers to easily identify products and services that an organization has identified as energy efficient or otherwise associated with energy conservation.

A national brand that is gaining strength in Colorado is the EPA's ENERGY STAR FOR HOMES program. This program recognizes builders who build homes that are 30% more efficient than the Model Energy Code of 1993, which is equivalent to 86 points on the home energy rating scale. Builders must demonstrate to a rating agency that their homes consistently score 86 points or higher in order to market those homes under the Energy Star label. A few select builders around the state are beginning to consistently qualify for this label.

E-Star Colorado raters also provide some quality control for builders under the Colorado Built Green Program, another market brand that goes beyond energy efficiency. Builders under this program also use resource efficient products and practices, and focus on issues such as low volatility paints and products.

LEED, a program of the U.S. Green Building Council, has to date focused on commercial buildings.

Table 2.6 identifies the three branding programs, two nationwide in scope and one within the State of Colorado, that have been particularly effective in fostering energy conservation.

Table 2.6 Branding Programs

Program	Description	Select Accomplishments
<p>U.S. Green Building Council Leadership in Energy & Environmental Design ("LEED") Nationwide throughout the U.S.</p>	<ul style="list-style-type: none"> The LEED Green Building Rating System is a program of the US Green Building Council. It is a voluntary, consensus-based, market-driven building rating system based on existing proven technology. It evaluates environmental performance from a "whole building" perspective over a building's life cycle. Designed for rating new and existing commercial, institutional, and high-rise residential buildings. Feature-oriented system where credits are earned for satisfying each criteria. Introduced in 1995, created by HBA of Metro Denver, the Governor's Office of Energy Management and Conservation, Xcel Energy, and E-Star Colorado. A voluntary program encouraging technologies, products and practices that will provide greater energy efficiency and reduce pollution, provide healthier indoor air, reduce water usage, preserve natural resources, improve durability and reduce maintenance. Builders enroll with Built Green and may choose to build using all, some, or none of the criteria. However, any home identified as Built Green must meet a minimum number of the criteria along with an energy efficiency requirement. 	<ul style="list-style-type: none"> In Aspen, Colorado, the Sundeck Restaurant, exceeds ASHRAE/IES Standard 90.1-1989 for overall energy efficiency, lighting exceeds California's Title 24 Lighting Energy Code. Other extensive projects resulting in substantial energy savings at commercial, industrial, and public building sites, for details see www.usgbc.org/programs/leedprojects.htm. High-level of recognition among potential purchasers since only those homes registered in the program may receive the Built Green designation. Largest green building program in the nation with over 100 builders across the state, 45 sponsors, and 10 organizations in the industry leaders group. By close of 2002, anticipated that 10,000 Colorado homes will be built to Built Green.
<p>Energy Star U.S. Environmental Protection Agency and U.S. Department of Energy. Nationwide</p>	<ul style="list-style-type: none"> Introduced by the EPA in 1992 as a voluntary labeling program designed to identify and promote energy-efficient products for homes and businesses. EPA partnered with the US DOE in 1996 to promote the Energy Star label, with each agency taking responsibility for particular product categories. Product areas include residential heating and cooling equipment, major appliances, office equipment, lighting, and consumer electronics among others. Commercial and residential buildings can also obtain an Energy Star efficiency designation. 	<ul style="list-style-type: none"> In 2000, helped save American businesses and consumers more than \$5 billion dollars and reduced emissions the equivalent by 10 million cars. Developed strong partnerships with 1,600 manufacturers labeling more than 11,000 products in over 30 product categories. More than 600 million Energy Star products have been purchased to date. 1,600 homebuilders have joined Energy Star as partners, constructing 25,000 Energy Star labeled homes to date.

(Source for Built Green: Built Green web site, Built Green, www.builtgreen.org, 2001; Source for Energy Star web site, U.S. EPA, www.epa.gov/mrgystar/about.html, 2001).

2.7 Public Interest Energy Programs

Several non-profit organizations run energy conservation and efficiency programs in their localities. These organizations often function as a clearinghouse for a variety of energy related projects and their activities may include education, distribution of energy-saving devices, and technical assistance in respect to energy conservation, efficiency, and renewable energy. Notable programs within Colorado include the Boulder Energy Conservation Center (BECC) (see bcn.boulder.co.us/environment/becc), the Community Office for Resource Efficiency (CORE) in Aspen (see www.altenergy.org), and outside Colorado, Strategic Energy Innovations in California (see www.cyane.com).

3.0 Building Codes

The programs described up to this point-weatherization, bill-paying assistance, home energy ratings, and even demand-side management programs-are voluntary. Energy codes, however, establish a minimum legally acceptable level of energy efficiency construction practice. Many states have adopted an energy code for residential and commercial construction. Colorado adopted such a code in 1977, which has since sunset. Materials and construction methods have advanced significantly beyond the level set in 1977.

In 1992, the Energy Policy Act signed into law by the Bush Administration included a "Model Energy Code" that states were required to adopt, or provide justification for not adopting. The then Governor's Office of Energy Conservation, under the Romer Administration, received a permanent waiver from providing this justification in 1996. The justification was based on the home rule nature of Colorado's jurisdictions. However, Texas, another home rule state, just enacted two pieces of legislation that together adopt the 2000 International Energy Conservation Code as the state's first statewide building energy code (see Building Codes Assistance Project, <http://www.bcap-energy.org/111201.pdf>). This indicates that home rule may not be as big a barrier to the adoption of a state-wide building code as previously assumed.

Energy codes are continuously updated and offered in publication form by national organizations such as the International Council of Building Officials (ICBO). The updating process is lengthy, and involves a public commentary period. The currently accepted benchmark for what should be considered the legally minimum standard is the International Energy Conservation Code 2000.

Although the State of Colorado has not adopted any energy code for either residential or commercial buildings, many local jurisdictions have. The following

table lists those jurisdictions that E-Star Colorado is aware of having adopted an energy code.

Table 3.0a Summary of Energy Code Survey Responses

Residential Energy Code	Number of Jurisdictions
Colorado State Code 1977	45
MEC 82	1
MEC 86	2
MEC 89	2
MEC 92	11
MEC 93	1
MEC 95	8
MEC 98	1
IECC 98	2
IECC 2000	4
Local Version	12
No Response	179

Table 3.0b Ten Top Growing Counties by Numeric Increase (Not Percent), and Energy Code Status

County	Increase in Population, 1990-1999	Energy Code in Effect?	Notes
El Paso	105,199	1992 MEC	
Douglas	104,104	1995 MEC	
Arapahoe	96,856	1995 MEC	
Jefferson	81,960	IECC 2000 for unincorporated only.	Golden: 1977 CO State Code Arvada: 1995 MEC Lakewood: 1986 Code
Adams	65,377	1977 CO State Code	
Denver	64,456	1995 MEC	
Boulder	57,106	IECC 2000	
Larimer	51,358	Unincorporated: 1977 CO State Code	Fort Collins: Local Code based on MEC 1995
Weld	40,238	1997 Uniform Building Code	
Mesa	22,638	IECC 2000	

The above demonstrates the lack of consistency in code requirements across building jurisdictions.

A sense of how much energy savings can be achieved by adopting a code can be gained by relating a house built to a certain code to the national Home Energy Rating System (HERS) scale. This scale is calibrated so that 80 points on the scale is equivalent to a home built to the Model Energy Code of 1993 (MEC 93). Each point on the scale represents a 5% savings in energy use compared to that same home built to MEC 93. Many homes, particularly in the Denver Metro area, are built to a standard not much better than the 1977 state code, and typically score between 77 and 79 points on the HERS scale. According to E-Star Colorado tests, a home built to the IECC 2000 would typically score between 82.5 and 83 points on the HERS scale.

In 2000, E-Star Colorado, under a grant from the U.S. Department of Energy, facilitated an advisory group to get feedback on the status of energy codes in Colorado. Attendees included code officials and the Denver Metro HBA. The issue was raised that even though a code may be adopted, a code inspector typically has an average of 11 minutes per home for inspection of all code issues. Therefore, inspection of energy code related materials are frequently skipped over in favor of more direct health and safety issues. Until jurisdictions go beyond adopting an energy code, and provide adequate resources for enforcement of the energy code, the maximum energy savings effect will not be achieved.

However, a recent in-depth study of Fort Collins building practices before and after adoption of an energy code in 1996 showed that, even with enforcement and compliance problems, the code still achieved a 16% energy savings in homes built after its adoption.

The table below provides a quick overview of current practice vs. new codes vs. recommended (best) practice, applicable to most production homes along the Front Range. (Current practice and code requirements in the mountains tend to be higher. Some custom home builders also build to higher standards.)

Glossary of key terms:

- R = level of resistance to heat flow. The higher the R-value figure, the more resistance to heat flow it provides, thus the more energy it saves (when installed properly).
- EF = Energy Factor. This term describes the annual efficiency of the water heater; the remaining fraction of heat is lost, either up the flue or into the space where the water heater is located (either main floors, basements, crawl spaces or garages). The higher the EF, the more efficient the appliance is. Typical: EF-0.53
- AFUE = Annual Fuel Utilization Efficiency. This term describes the useful amount of heat delivered to the ductwork (or hot water pipes) by the heating plant (usually a furnace). It is expressed as a fraction of one or a percentage. The higher the number, the better. 78% is the minimum federal standard.
- ACHr = Air Changes per Hour. This is a measure of how fast air leaks from the conditioned space in a home. Older homes typically leak 2/3 of their conditioned air per hour; thus the figure would be ACHr = 0.67. The lower the air changes per hour, the better.

Energy feature	Current practice ¹	Denver code	Fort Collins code	MEC 1993 ²	IECC 2000 ²	Best practice
Attic insulation	R-30 to R-38	R-30	R-30	R-38	R-38	R-38 with raised heel truss
Wall insulation	R-13 to R-15	R-15	R-13 to R-15 typical ³		R-18	R-22 to R-24
Windows	R-2 (R-1.4 in basements)	Double glazing	R-2 typical ⁴	R-2	R-2.85	R-3 to R-4
Basement	0 (R-11 when installed)	R-5 (starting below grade)	R-11 interior; R-10 exterior	R-11	R-11	R-11 to R-20
Crawl space	R-11 is typical	R-11	R-19	R-16+	R-16+	R-19
Slab (edge of perimeter) ⁵	0	R-5 (can start below grade ⁵)	R-10 (18" deep)	R-5, down 4'	R-9 (4 feet down)	R-8 (4') or R-10 (2')
Cantilevered floors	R-19	R-19	R-30	R-38	R-38	R-38
Floors above garages	R-19	R-19	R-19	R-20	R-21	Fill the floor with insulation (typically R-30 to R-38)
Heating plant	Gas-forced air, with 80% efficiency (AFUE)	Minimum federal standard (78%)	Minimum federal standard	Minimum federal standard	Minimum federal standard	90% AFUE (sealed combustion air)

¹ This assumes either no energy code or not a stringent one.

² The figures listed here reflect the energy requirements within the prescriptive method of compliance. There are several other methods of compliance.

³ This figure varies, depending on the amount of windows in the wall, plus their insulating value.

⁴ This figure varies, depending on the amount of windows plus the wall's insulating value.

⁵ The R-value requirements here, and for some other measures, are higher in electrically heated homes than in gas-heated homes.

Energy feature	Current practice ⁶	Denver code	Fort Collins code	MEC 1993 ⁷	IECC 2000 ²	Best practice
Heating ducts	Testing indicates that ductwork commonly leaks a minimum of 75% of total system flow.	"Substantially air tight."	"Substantially air tight ducts." Must be sealed with mastic when outside the conditioned space	"Substantially air tight."	"Substantially tight ducts." Must use mastic, not duct tape.	Ductwork sealed such that it leaks no more than 10% of flow under test conditions. (Today, it leaks roughly 100% under test conditions.)
Water heater	53% efficient (EF) for 50 gallon water heater; unit is very susceptible to back-drafting and spillage of combustion gases back into the home	Denver has on the books requirement for 60% EF water heater (not enforced)	Min. federal standard; is <i>considering</i> a requirement for power-vented or other method to provide more safety here	Min. federal standard (53% for 50 gal. Heater)	Longmont requires a 60% EF water heater, and inspects for it.	60% EF, with either power-vented, direct vent, or other means to isolate combustion byproducts from the occupants
Air sealing	Basic foam sealing; average new home has about ACHr-0.50 for its tightness factor	Complex foam sealing or other alternatives	Complex sealing specified by location; measured performance (ACH-0.38) is an alternative compliance method	Advanced sealing	Advanced sealing	Some minimum prescriptive sealing around vulnerable features (tubs and fireplaces against outside walls); otherwise ACH-0.25 or tighter, plus mechanical ventilation

⁶ This assumes either no energy code or not a stringent one.

⁷ The figures listed here reflect the energy requirements within the prescriptive method of compliance. There are several other methods of compliance

4.0 Observations and Analysis

This survey of energy efficiency programs and energy codes in Colorado indicates that while a few programs are working well, there are some gaps in addressing the large potential for improvement in energy use in Colorado buildings.

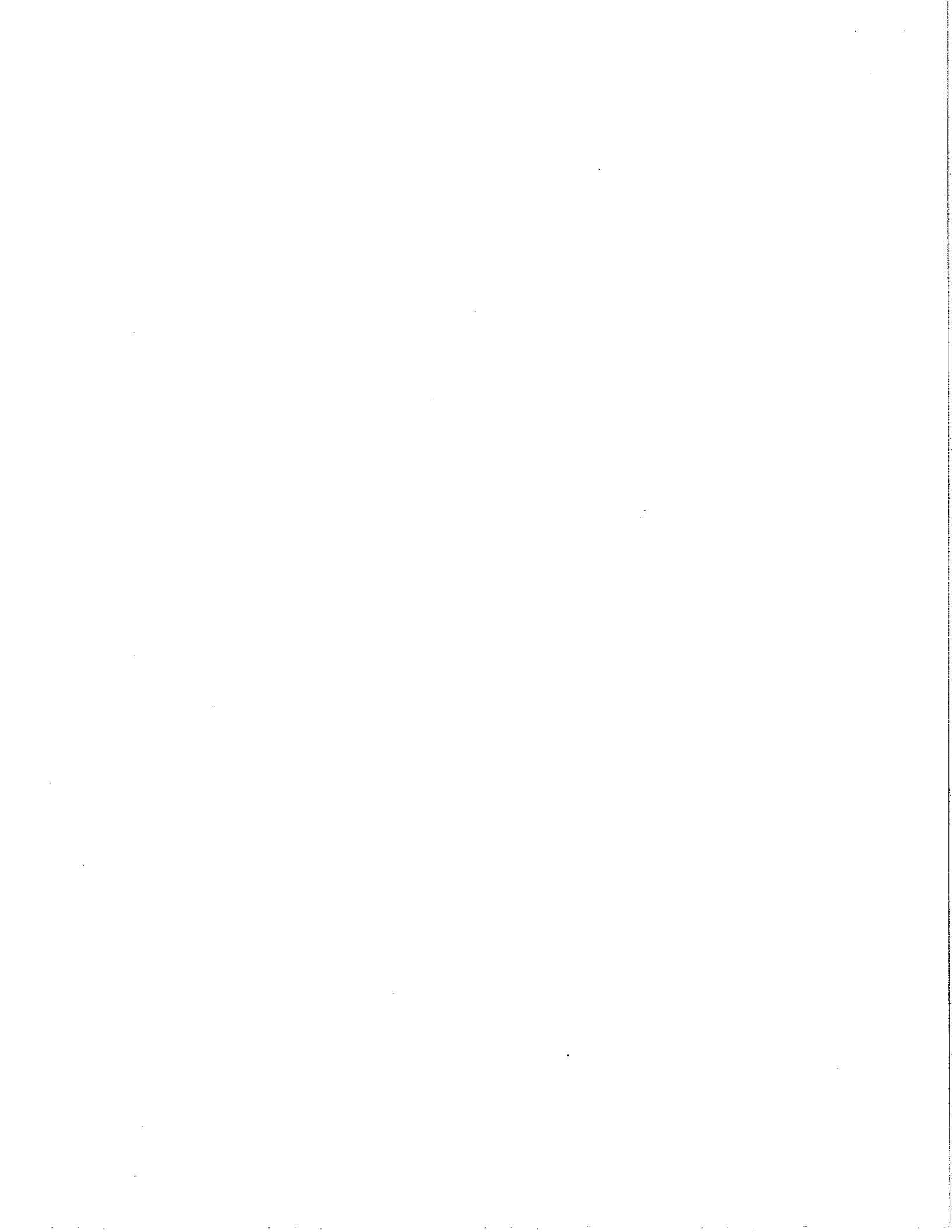
For example, low-income households have a variety of resources to turn to for both bill-paying assistance and for weatherization, to reduce future need for bill-paying assistance. Approximately 3% of the housing stock in Colorado has been served by these programs.

On the other end of the housing market, custom and semi-production builders are making increased use of the home energy rating systems and branding programs that help them build to a higher standard, or at least document code compliance. E-Star Colorado has rated close to 8,000 homes, but this represents less than one-half of one percent of the housing units identified by the U.S. 2000 Census. This is comparable to the volumes reached by other state programs. E-Star Colorado plans to grow to a 5% market share of all new homes in 5 years, but this growth will still leave the majority of Colorado homes built without maximizing cost-effective energy efficiency measures. Built Green Colorado predicts it will have registered 10,000 homes by the end of 2001, which is another half of one percent of the Colorado housing stock.

What is the best way to impact the vast number of buildings between these two ends of the spectrum? Other states provide models for successful approaches that go beyond energy rating programs. These approaches include:

- Support for local jurisdictions to adopt and enforce a consistent energy code across jurisdictions (see Texas, Vermont)
- A competitive interest rate for energy improvement mortgages (see Alaska)
- A program for promoting non-HERS energy efficiency programs for residential, commercial and industrial energy sectors (see Vermont)
- A funding mechanism for all of the above (i.e., a systems benefits charges in lieu of relying on the severance tax for funding low-income weatherization and bill paying assistance).

Colorado has historically enjoyed low energy costs, contributing to a lower cost of living and of doing business. This has also meant little attention is paid to energy codes, and that consumers have been less concerned with energy efficiency in homes and businesses than in other states. As market conditions become more volatile, the success of these energy efficiency codes and programs in other states warrants their adoption in Colorado.

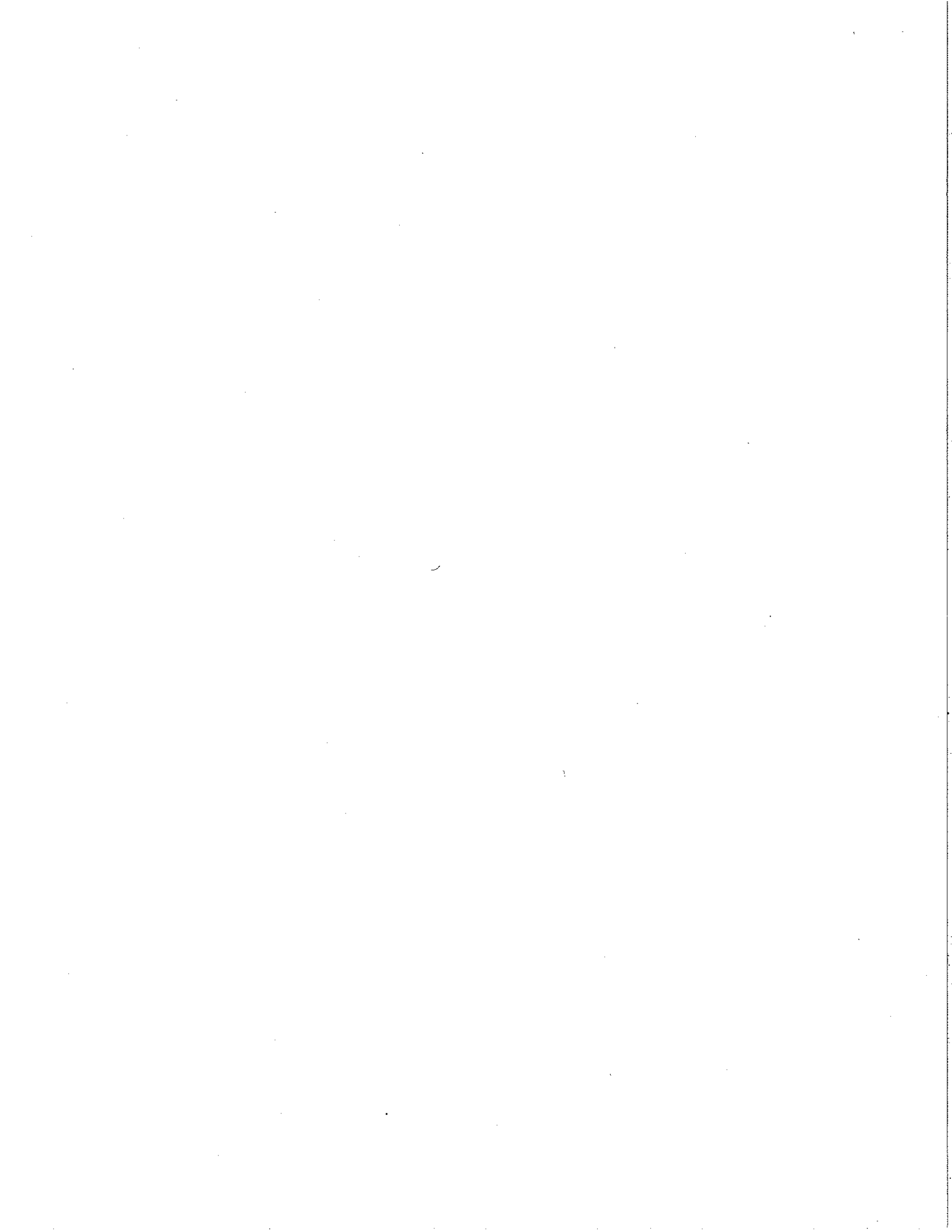


5.0 Appendixes

Contents

Appendix A Residential and Commercial State Building Codes

Appendix B BCAP Map of States That Have Adopted Energy Codes



Appendix A Residential and Commercial State Building Codes

Many of these regulations apply only to new constructions or significant remodeling. For more detail, see http://www.eren.doe.gov/buildings/codes_standards/buildings/status_list.html

State	Residential	Commercial	Compliance and Enforcement
AL	Residential Energy Code for Alabama (RECA), a state developed code equivalent to the 1993 MEC is contingent upon local adoption.	ASHRAE/IESNA 90.1-1989 for only state-owned or -funded buildings	<ul style="list-style-type: none"> Compliance. For state-owned or-funded buildings, the Alabama Building Commission reviews plans and specifications to ensure compliance. For other buildings in localities that have adopted an energy code, compliance is addressed through the normal permit process. Typically plans are submitted and reviewed and buildings are inspected during construction. Enforcement. For state-owned or -funded buildings, the design professional works with the Commission to establish compliance. For other buildings, units of local government enforce compliance. If a local government adopts the 1993 MEC, the code requirements are enforced through the permit/inspection process for new construction and additions. Depending on the size of the local government unit, the same office may perform plan reviews and inspections.
AK	The Building Energy Efficiency Standard (BEES) is the mandatory minimum energy efficiency standard for construction using state financing programs. BEES provides minimum energy efficiency requirements for the building envelope, air leakage, moisture control, heating system efficiency, and duct/piping insulation. BEES also includes requirements for supplying a minimum amount of outside air.	None statewide. However, all public facilities must be designed to comply with the thermal and lighting energy standards adopted by the Alaska Department of Transportation and Public Facilities	<ul style="list-style-type: none"> Compliance. Compliance with the current standards for residential buildings may be shown using one of four envelope compliance methods: 1) prescriptive, 2) performance, 3) building budget, or 4) state-approved home energy rating methods. Enforcement. Compliance with BEES is covered by local building officials, banks, or the Alaska Housing Finance Corporation. A standardized compliance form is required to be furnished with mortgage packages for mortgage-financed residences. Certification may also be made by the architect, engineer, an International Conference of Building Officials (ICBO) certified building inspector, or a local building code official.

State	Residential	Commercial	Compliance and Enforcement
AZ	2000 IECC voluntary statewide	<p>ASHRAE/IESNA 90.1-1999</p> <p>Voluntary statewide, except for state-owned or -funded buildings, which must comply with ASHRAE/IESNA 90.1-1999</p>	<p>Compliance. No mandatory compliance procedure.</p> <p>Enforcement. No mandatory energy inspection procedures exist at the state level for any building construction. The Arizona Energy Office may review energy code requirements for state-owned commercial buildings if requested to do so by the responsible governmental agency. No mandatory field inspections exist for state-owned commercial buildings. Local enforcement agencies are responsible for enforcing local energy codes. Note that some jurisdictions may adopt the International Conference of Building Officials Uniform Building Code and enforce energy requirements for non state-owned buildings.</p>
AR	<p>Arkansas Energy Code, equivalent to 1992 MEC is mandatory statewide; can use ARKcheck or HERS Rating to show compliance.</p>	<p>ASHRAE/IESNA 90.1-1989 is mandatory statewide; can use COMcheck-EZ, a state specific software version of MECcheck, to show compliance.</p>	<p>Compliance. Proof and verification of compliance is required statewide for all buildings by the responsible party (e.g., builder) signing a self-certification seal. In jurisdictions that have adopted the energy code, a local inspection is required to verify compliance and the builder must sign the self-certification seal. A state Board of Appeals (BOA) has been established in the regulations to resolve different interpretations of the standards. The code requires local jurisdictions that adopt the code to also establish a BOA.</p> <p>Enforcement. In jurisdictions that have adopted codes, units of local government enforce the codes through the established inspection process. Depending on the size of the local government, the same individual may be responsible for performing plan reviews and inspections. In jurisdictions that have not adopted codes, state enforcement staff or their agents use spot inspections and consumer notifications. Since the compliance system is based on self-certification by the builder, and because enforcement depends on homeowner involvement, considerable effort has been spent on education and communication.</p>

State	Residential	Commercial	Compliance and Enforcement
CA	<p>State-developed code, Part 6 of Title 24, which exceeds 1995 MEC is mandatory statewide.</p>	<p>State-developed code, Part 6 of Title 24, which meets or exceeds ASHRAE/IESNA 90.1-1989, is mandatory statewide.</p>	<p>Compliance. Currently both a prescriptive package and computer compliance approach is available to determine compliance for both the nonresidential and residential energy standards. Manuals for both residential and nonresidential construction are available.</p> <p>Enforcement. Plans and specifications are submitted to and reviewed by the local city or county, building departments responsible for issuing the building permit. The department of General Services is the enforcement agency of public schools and state-owned buildings. The enforcement agency cannot issue a building permit until it has been determined that the building design complies with all energy code requirements. Field inspections are required by the enforcement agency prior to issuing a certificate of occupancy or final approval. Installation certificates for all equipment and manufacture devices required to comply with the efficiency requirements must be posted on-site or made available to the inspector and provide to the first building owner at the time of occupancy. An insulation certificate must be posted indicating that installed R-values are consistent with the plans, specifications, and manufacturer's recommendations. Operation and maintenance information for the mechanical equipment and devices must be provided to the person responsible for operating and maintaining the building.</p>
CO	<p>Colorado is a home rule state so no statewide energy code exists. State provisions that do not meet the 1992 MEC are mandatory only in jurisdictions that have adopted a building code.</p>	<p>Voluntary state provisions are based on ASHRAE/IESNA 90.1-1989; can use the Colorado version of COMcheck-EZ to show compliance.</p>	<p>Compliance. Compliance is based on the requirements of the local jurisdictions.</p> <p>Enforcement. Energy codes are not enforced at the state level. Local enforcement agencies in jurisdictions that have adopted building codes are required to enforce the provisions of the residential energy code at the local level, but may adopt their own requirements without state approval. Inspections are required as a part of the established building inspection process. No special inspection requirements exist for state-owned and -funded buildings. These inspections are handled by the local enforcement agencies.</p>

State	Residential	Commercial	Compliance and Enforcement
CT	<p>1995 MEC is mandatory statewide; can use MECcheck to show compliance.</p>	<p>ASHRAE/IESNA 90.1-1989 is mandatory statewide; can use COMcheck-EZ to show compliance. All commercial buildings except buildings less than 5,000 sq. ft. (having separate alternative requirements) must comply with the ASHRAE/IESNA 90.1-1989 requirement.</p>	<p>Compliance. Compliance is determined through construction documents submitted to the local building official showing detailed building data and features, and equipment systems governed under the code. Variances and interpretations of the code are granted through the Department of Public Safety. State statutes require the signature and seal of a licensed registered professional for all buildings of any use group (other than single-family residential [R-3] or agricultural) greater than 5,000 sq. ft. in floor area or of any use group A, E, or I of any size.</p> <p>Enforcement. The State Building Inspector enforces compliance for state-owned buildings and local code officials enforce compliance for all other buildings.</p>
DE	<p>1993 MEC is mandatory statewide; can use MECcheck to show compliance.</p>	<p>ASHRAE/IESNA 90.1-1989 is mandatory statewide; can use COMcheck or COMcheck-EZ to show compliance. Agricultural structures are excluded. County and municipal governments may also exclude commercial structures less than 5,000 sq. ft. All existing commercial and high-rise residential buildings over 25,000 sq. ft. in floor area must also meet the lighting standards of ASHRAE/IES 100.</p>	<p>Compliance. Compliance with the energy code is determined at the local level and varies depending on the county or locality. Local government has the option of using alternative methods to ensure that commercial buildings less than 5,000 sq.ft. in floor area and residential buildings over three stories in height and less than 5,000 sq. ft. in floor area meet ASHRAE/IESNA 90.1-1989 requirements, as opposed to requiring certification by a licensed architect/engineer.</p> <p>Enforcement. Enforcement is at the local level and left to code officials within the county or municipality. The Department of Administrative Services is responsible for enforcing compliance for state-owned buildings.</p>

State	Residential	Commercial	Compliance and Enforcement
FL	<p>State-developed code (Chapter 13 of the Florida Building Code), which exceeds 2000 IECC is mandatory statewide. Chapter 13 of the FBC is the statewide uniform standard for energy efficiency in the thermal design and operation of all buildings in the state of Florida. As such, the energy code is uniform throughout the state and cannot be made more lenient or stringent by local government.</p>	<p>State-developed code, which meets or exceeds ASHRAE/IESNA 90.1-1989 is mandatory statewide.</p>	<p>Compliance. To obtain a building permit, the building owner or the owner's only designated agent must certify compliance. If design and/or construction modifications are made that would diminish the building's energy performance, an amended compliance certification must be submitted to the local enforcement agency. All work requiring a permit is subject to inspection by the local building official.</p> <p>Enforcement. Local building departments enforce compliance as part of the building regulatory programs. Technical assistance is provided by the Department of Community Affairs.</p>
GA	<p>1995 MEC with amendments is mandatory statewide.</p>	<p>ASHRAE/IESNA 90.1-1989 is mandatory statewide; can use COMcheck-EZ to show compliance.</p>	<p>Compliance. A process to demonstrate compliance is unavailable in jurisdictions not enforcing codes. In jurisdictions that are enforcing codes, compliance can be demonstrated during the plan review stage and verified by local inspection.</p> <p>Enforcement. Local units of government enforce the code in jurisdictions that have elected to enforce it. The code is not enforced in jurisdictions that have not adopted the code; however, the designer and builder must still comply with the requirements. Local inspectors are hired by cities and counties.</p>

State	Residential	Commercial	Compliance and Enforcement
HI	<p>The Hawaii Model Energy Code (HMEC) is a voluntary code that exceeds the 1995 MEC.</p>	<p>A modified version of ASHRAE/IESNA 90.1-1989 adopted by all counties except Maui.</p>	<p>Compliance. Low-rise residential buildings (for counties adopting the residential portion of the HMEC) may use a single prescriptive envelope path. For other buildings, the three compliance paths used are those contained in ASHRAE/IESNA 90.1-1989. The computer program Hilight can be used to show compliance with the ASHRAE/IESNA 90.1-1989 lighting standards. Plans are submitted when required by the County Public Works Department. Local jurisdictions require that a registered architect or engineer review and stamp the plans and provide a written statement indicating compliance with the code requirements. However, local jurisdictions still have the obligation to oversee the actual plans that are submitted during the established plan review functions.</p> <p>Enforcement. For all commercial buildings and all residential structures over three stories in height, field inspections by the County Public Works Department (Building Department in the city and county of Honolulu) are conducted during the established inspection process mandated by the building code. No special procedures are required to enforce the energy requirements. Enforcement for state buildings is handled by the County Building Departments. State buildings are specifically cited in the state law that mandated which counties must adopt the HMEC or equivalent.</p>
ID	<p>Idaho Commercial Building Energy Code which is based on ASHRAE 90.1-1989 is voluntary statewide. A recent addition to the law will result in most jurisdictions having both the IECC and ASHRAE 90.1-1999.</p>	<p>Idaho Commercial Building Energy Code which is based on ASHRAE 90.1-1989 is voluntary statewide. Can use modified COMcheck-EZ to show compliance. ASHRAE/IESNA 90A-80 and 90B-1975 for state-owned buildings.</p>	<p>Compliance. For state-owned buildings, compliance pathways and requirements for submitting plans are those in the 1992 MEC. All low-rise residential structures are required to comply with the Idaho state code unless a local code exists that is more stringent. Where the Idaho state code is applicable and the local jurisdiction is enforcing the standard, the builder must complete and submit a form to the local jurisdiction to show compliance. In jurisdictions that are not enforcing the code, builders must provide a self-certification to the home buyer and to the jurisdiction if requested. Individual residences can use modified COMcheck-EZ to show compliance.</p> <p>Enforcement. Enforcement varies depending on whether the jurisdiction chooses to enforce IRES, has and enforces its own energy code (local alternative energy code), or elects not to enforce an energy code.</p>

State	Residential	Commercial	Compliance and Enforcement
IL	None	State-owned buildings and city-owned buildings must comply with ASHRAE/IESNA 90.1-1989. This is not referenced in writing, it is an advisory only.	Compliance. NA. Enforcement. NA.
IN	Indiana Energy Conservation Code (IECC) based on 1992 MEC is mandatory statewide. The IECC is a mandatory minimum statewide code and may be modified to be more stringent by local government.	The state-developed code, which does not meet ASHRAE/IESNA 90.1-1989, is mandatory statewide.	Compliance. Varying rules depending on building type; all structures besides one and two unit residential must have plans filed with the Indiana Department of Fire and Building Services. In some cases, the stamp of a licensed engineer or architect will suffice. Enforcement. The state has established two building classes for energy code enforcement: Class 2 (one- and two-family dwellings) and Class 1 (all other buildings.) The local building official is responsible for the enforcement of the requirements for all one- and two-family dwellings (Class 2.) Plans and specifications must be submitted when required by the building official. Field inspections are performed prior to the issuance of a certificate of occupancy. The state provides cursory reviews of plans for all new nonresidential buildings and residential buildings other than one- and two-family dwellings (Class 1) and provides field inspections on buildings where no approved local building official exists. The State Building Commissioner is responsible for enforcement of the energy requirements for all Class 1 and Class 2 buildings that are industrialized building systems.

State	Residential	Commercial	Compliance and Enforcement
IA	<p>State energy code based on 1992 MEC is mandatory statewide; can use MECcheck to show compliance. On February 10, 1999, the Iowa State Building Code Commissioner accepted HERS as a voluntary method of compliance with the 1992 MEC.</p>	<p>ASHRAE/IESNA 90.1-1989 is mandatory statewide; can use COMcheck to show compliance.</p>	<p>Compliance and Enforcement Compliance. Residential: For one- and two-family dwellings, the local utility company must obtain a written statement/certification from the builder or homeowner attesting to their compliance with the state energy code. Commercial: ASHRAE/IESNA 90.1-1989 provides three compliance approaches -- the Energy Cost Budget method, the System Performance approach, and the Prescriptive approach. For buildings with over 100,000 cubic feet of heated or cooled space, a registered engineer or architect must review plans and calculations. Enforcement. In areas where a local or state building code has been adopted, the local jurisdiction is responsible for review and inspection of all buildings that have less than or equal to 100,000 cubic feet of conditioned volume. When required by the building official, plans and specifications must be submitted. Where required by the local enforcement agency, plans must be stamped by registered architects and engineers. Field inspections are performed prior to the issuance of a certificate of occupancy. Certification to the state using the state-furnished compliance form is required. Before electrical hook-up for one- and two-family dwellings, the local utility company requires a statement of review based on compliance with the Code, issued by the state or the local enforcement agency.</p>
KS	<p>1993 MEC or energy-efficiency disclosure form is mandatory statewide; can use MECcheck to show compliance.</p>	<p>ASHRAE/IESNA 90.1-1989 is mandatory statewide; can use COMcheck to show compliance.</p>	<p>Compliance. The statewide energy standards require an energy efficiency disclosure by the builder or seller of new residential buildings to the buyer. The disclosure provides the energy attributes of the structure. The MECcheck compliance materials developed by the U.S. Department of Energy are one of several ways to show compliance with the 1993 MEC. No formal plan review or construction inspection is required. The potential for litigation exists as a way to ensure compliance for commercial and industrial buildings. Enforcement. Local jurisdictions do not enforce the statewide energy standards. The state conducts enforcement activities for state-owned buildings.</p>

State	Residential	Commercial	Compliance and Enforcement
KY	1992 MEC is mandatory statewide.	1992 MEC is mandatory statewide. ASHRAE/IES Standard 90A-1980 and 90B-1975 is an acceptable alternative.	<p>Compliance. Compliance with the Code is determined by plan review by either the Department of Housing, Buildings, and Construction or local jurisdictions.</p> <p>Enforcement. Local jurisdictions are required to follow the statewide energy provisions and are not allowed to reference or enforce any other standard or code other than the Kentucky code. The exception to this requirement is that jurisdictions may enforce the Council of American Building Officials One- and Two- Family Dwelling Code as an alternative method of compliance when the scope of coverage has been extended to include homes that are not trade-name or brand-name homes. Compliance with the energy provisions are verified through a plan review and field inspections by local code officials.</p>
LA	1995 MEC is mandatory for low-rise multifamily only; can use MECcheck to show compliance.	ASHRAE/IESNA 90.1-1989 is mandatory statewide.	<p>Compliance. For state-owned facilities, the Facility Planning and Control Section of the Division of Administration has authority. They must determine that plans, specifications, and energy code compliance documents comply with the code, as well as all alterations and repairs. The Office of the State Fire Marshal has authority to enforce the code for commercial buildings statewide except state-owned commercial buildings.</p> <p>Enforcement. The State Fire Marshal and Facility Planning and Control Section of the Division of Administration have authority to promulgate rules and regulations necessary to enforce the provisions of the legislation. These rules and regulations are currently being formulated. A local government may adopt and enforce its own commercial building energy conservation code; however, it must be the state's commercial building energy conservation code.</p>

State	Residential	Commercial	Compliance and Enforcement
ME	<p>State-developed code that is less stringent than the 1992 Maine code is mandatory statewide. Exceptions include single-family homes built by an owner-builder (which includes anyone supervising the construction of that person's single-family dwelling or a general contractor hired to supervise the construction) and log homes. As a result, the code only affects about 5% of new residential construction.</p>	<p>ASHRAE/IESNA 90.1-1999. Manufacturing facilities are exempt.</p>	<p>Compliance. New commercial and institutional construction must conform to the current ASHRAE/IESNA 90.1 standard using any of the ASHRAE compliance paths. No state-required plan reviews or permits are required. All commercial construction must be designed by an architect or engineer, and it is suggested that local code officials look for certification of compliance. Prior to installing permanent electrical service, the owner, or the owner's legal agent, of commercial or institutional buildings constructed after October 13, 1993, must certify that the building complies with the energy standards. Residential building contractors must sign a contract for any work over \$1,400. One provision of the contract is to state whether or not the building complies with the minimum energy efficiency standards. No notifications or compliance documents are submitted to the state.</p> <p>Enforcement. The Energy Conservation Division of the DECD is responsible for administering and enforcing the energy requirements. If the building owner does not comply with these requirements, then a penalty equaling up to 5% of the value of the building may be enforced. The DECD may review plans and inspect for compliance; however, limited funding and staff have prevented plan reviews and inspections.</p>
MD	<p>Maryland Building Performance Standards (MBPS), based on the 2000 IECC are mandatory statewide.</p>	<p>Maryland Building Performance Standards (MBPS), based on the 2000 IECC are mandatory statewide.</p>	<p>Compliance. Can use MECcheck to show compliance. Builders must demonstrate compliance to local government (cities, counties) that have adopted the code. In cities and counties that have not adopted the code, the builder must certify code compliance to the serving electric utility as a condition for electrical service.</p> <p>Enforcement. The state code is enforced by local jurisdictions that have adopted the code through plan review and inspections. In areas that have not adopted the code, a certification form filled out by the builder is required to show compliance. The local utility must evaluate the building prior to providing electrical service.</p>

State	Residential	Commercial	Compliance and Enforcement
MA	ASHRAE/IESNA 90.1-1989 and additional state-developed codes are mandatory statewide.	ASHRAE/IESNA 90.1-1989 and additional state-developed codes are mandatory statewide. Developed a new commercial code that includes elements from both the revised ASHRAE/IESNA 90.1R and the International Energy Conservation Code (IECC).	<p>Compliance is determined at the local level by local building inspectors as part of an application review and inspection process. Compliance is addressed in three distinct ways: 1) registered architects and engineers at the design level are charged by state law and regulations with abiding by design criteria of the code, 2) the construction community is equally charged with abiding by the code, and 3) the building officials review the submitted plans and complete inspections prior to issuing the certificate of compliance. Compliance paths include both prescriptive and performance approaches. Building professionals can use MAScheck to show compliance.</p>
MI	Michigan Uniform Energy Code Part 10 Rules, less stringent than 1992 MEC, is mandatory statewide.	ASHRAE 90A-1980 and 90B-1975 are mandatory statewide.	<p>Enforcement is through the local building inspectors of the 351 cities and towns of the Commonwealth. Only a Building Code Board of Appeals, consisting of specified technical members, may grant a variance to the code. Plan review and construction inspection, although performed by the local building official, is also required of the engineers/architects of record when buildings exceed 35,000 cubic feet of interior volume.</p> <p>Compliance is determined by plan review and inspection by the local code official or state building official.</p> <p>Enforcement. The local code official is designated to enforce the state energy requirements. Enforcement is completed through plan review and inspections. The Bureau of Construction Codes, Department of Consumer and Industry Services, interprets the code and enforces it in those jurisdictions in which the Bureau has enforcement responsibilities.</p>

State	Residential	Commercial	Compliance and Enforcement
MN	Minnesota State Building Code, based on the 1995 MEC is mandatory where the state building code applies.	Minnesota State Building Code, which exceeds ASHRAE/IESNA 90.1-1989, is mandatory statewide, including state-owned and operated buildings.	Compliance. Can show compliance using COMcheck-MN. Enforcement. Various enforcement.
MS	State energy code, based on ASHRAE Standard 90-1975, is adopted by local jurisdictions.	ASHRAE Standard 90-1975 is mandatory for state-owned buildings, public buildings, and high-rise buildings.	Compliance. Compliance for state-owned buildings is verified by the Bureau of Building. Other buildings are subject to enforcement by local authorities. For state-owned or -funded buildings, the Bureau of Building reviews plans and specifications to ensure compliance. For other buildings in jurisdictions that have adopted the state code, plan reviews and inspections are typically used to show compliance through the normal permit process. After successfully completing this process, the building department issues a certificate of occupancy. Enforcement. For state-owned and -funded buildings, the design professional works with the building commission to establish compliance. For other buildings, local units of government enforce the code through the normal inspection process. If local governments adopt the energy provisions of the Standard Building Code enforcement is then accomplished through the permit/inspection process for new construction and additions. Depending on the size of the local government unit, the same individual may be responsible for performing plan reviews and inspections. As of mid-1998, 20 of the state's 82 counties have adopted the current edition of the SBC.

State	Residential	Commercial	Compliance and Enforcement
MI	None statewide. State-owned single-family and multi-family residential buildings must comply with the MEC or ANSI/ASHRAE Standard 90.2-1993.	None, except state-owned buildings must comply with ASHRAE/IESNA 90.1-1989.	<p>Compliance. Compliance for state-funded buildings is demonstrated through plan review and inspections by the Missouri Office of Administration, Division of Design and Construction. Compliance at the local level (if any) is through plan review and inspection by local building officials.</p> <p>Enforcement. The Missouri Office of Administration, Division of Design and Construction enforces the requirements for state-funded buildings. The local jurisdiction enforces any locally adopted code requirements.</p>
MT	1993 MEC with state amendments is mandatory statewide for jurisdictions that adopt codes.	ASHRAE/IESNA 90.1-1989 is mandatory statewide for jurisdictions that adopt codes, this provision also applies to state-owned and -operated buildings.	<p>Compliance. The builder must provide a labeling sticker. The label must be permanent and placed on the interior electrical panel. The R-values and U-values provided for building envelope components and mechanical equipment efficiency must be shown on the label.</p> <p>Enforcement. Local government code enforcement jurisdictions have 90 days to adopt the state building code once they receive notification from the state of change to the code. If an approved local government code enforcement program does not exist, the State Building Codes Division enforces the applicable codes. When required by the building official, plans and specifications must be submitted. The building official may also require that plans and specifications be prepared by a licensed architect or engineer. A registered architect or engineer must prepare all MEC type submissions.</p>

State	Residential	Commercial	Compliance and Enforcement
NE	<p>1983 MEC is "mandatory" statewide. Although the state code is mandatory statewide, local jurisdictions are not required to adopt or enforce it (although they may do so). State-owned and -funded buildings must comply with 98 IECC.</p>	<p>1983 MEC is "mandatory" statewide. Although the state code is mandatory statewide, local jurisdictions are not required to adopt or enforce it (although they may do so). State-owned and -funded buildings must comply with ASHRAE/IESNA 90.1-1989.</p>	<p>Compliance: NA</p> <p>Enforcement: Currently, the energy code is not actively enforced at the state level. The city, county, or their designated enforcement agency may (but are not required to) adopt the MEC, or another code that is at least as stringent as the MEC, and provide the necessary enforcement at the local level.</p>
NV	<p>1986 MEC with state amendments.</p>	<p>1986 MEC with state amendments; state owned facilities must comply with ASHRAE/IESNA 90.1-1989. The "Regulations for the Conservation of Energy in New Building Construction" are statewide minimum requirements for local jurisdictions that have not adopted a local energy code. Such jurisdictions are required to enforce these regulations, but may adopt less-stringent regulations without state approval.</p>	<p>Compliance: The required envelope compliance pathways, plan submittal requirements, and requirements for engineer signatures are those contained in the 1986 MEC.</p> <p>Enforcement. The city or county enforces the code except for state-owned and -funded buildings, which are regulated by the Nevada Public Works Board (NPWB). The NPWB generally requires the plans to be stamped by a registered engineer or architect to indicate compliance with the energy code requirements. Plans and specifications must be submitted when required by the provisions of the MEC. Field inspections are performed by the local jurisdiction during established construction inspections. Interpretations are the responsibility of the local jurisdiction.</p>

State	Residential	Commercial	Compliance and Enforcement
NH	1995 MEC is mandatory statewide.	ASHRAE/IESNA 90.1-1989 is mandatory statewide, with some amendments.	<p>Compliance: All plans must be submitted to the local building code official. If there is no code official, then the plans and a certificate of compliance application must be sent to the PUC for review and certification. MECcheck can be used to show compliance for residential buildings, and COMcheck for commercial buildings.</p> <p>Enforcement. The local building official enforces the energy requirements.</p>
NJ	ASHRAE 90A-1980 and 90B-1975 is mandatory statewide. Local jurisdictions may not make amendments to the codes.	ASHRAE/IESNA 90.1-1989 is mandatory statewide; can use COMcheck to show compliance. Local jurisdictions may not make amendments to the codes.	<p>Compliance. Compliance is determined through the construction permit process that includes a plan review and site inspections.</p> <p>Enforcement. To enforce the requirements of the New Jersey Uniform Construction Code Act, the construction code officials must be licensed by the Licensing Section of the Bureau of Code Services, Construction Code Element. The construction code enforcement agency having jurisdiction enforces the uniform construction code requirements. The Department of Community Affairs enforces the code for municipalities that have not established a construction code enforcement agency. Inspections are made during construction.</p>

State	Residential	Commercial	Compliance and Enforcement
NM	1992 MEC with state amendments is mandatory statewide.	ASHRAE 90A-1980 and 90B-1975 are mandatory statewide; ASHRAE/IESNA 90.1-1989 is mandatory for state-funded buildings.	<p>Compliance. All residential and commercial structures, as defined in the MEC, are required to comply with the New Mexico energy code. Compliance and plan review requirements are those specified in the MEC.</p> <p>Enforcement. Plan review and enforcement is regulated by the local jurisdiction (when they elect to enforce the code) as required in the MEC. If the local jurisdiction does not elect to, or does not have personnel qualified to enforce the code provisions, the Construction Industries Division provides the necessary reviews and inspections for residential buildings. Technical assistance is provided to the Construction Industries Division by the Energy, Minerals and Natural Resources Department for commercial buildings. The Construction Industries Division reviews plans and inspects all state-owned or -funded buildings.</p>
NY	State-developed energy code, which exceeds 1992 MEC is mandatory statewide.	State-developed energy code that nominally meets ASHRAE/IESNA 90.1-1989 is mandatory statewide.	<p>Compliance: Compliance is determined through the normal building permit process that includes plan review and inspection by the government entity responsible for the administration and enforcement of the provisions of the Building Construction Code or the Fire Prevention and Building Construction Code applicable within the municipality.</p> <p>Enforcement. Enforcement of the state energy requirements is the responsibility of the governmental entity responsible for administering and enforcing the provisions of the Building Construction Code or the Fire Prevention and Building Construction Code applicable within the municipality. For areas without local municipal enforcement, the NYS Department of State must ensure that the minimum requirements of the code are met. The local code official is responsible for reviewing all plans and specifications.</p>

State	Residential	Commercial	Compliance and Enforcement
NC	State-developed code, which is a simplified version of the 1995 MEC, is mandatory statewide.	ASHRAE/IESNA 90.1-1989 with state provisions is mandatory statewide.	<p>Compliance. Can use MECcheck or COMcheck to show compliance. Compliance is determined by plan review and inspections through the normal building permit process.</p> <p>Enforcement. Local units of government enforce the code through the permit/inspection process for new construction and additions. The North Carolina Department of Insurance is responsible for general supervision of the effort statewide. Depending on the size of the local government unit, the same individual may be responsible for performing plan reviews and inspections.</p> <p>Compliance. Can use MECcheck or COMcheck to show compliance. However, compliance is not mandatory for most buildings. Compliance for state buildings is determined by plan review and inspection conducted by the agency constructing the building.</p> <p>Enforcement. Statewide enforcement is not required by the state energy code. State or local government-owned and -funded buildings are covered by the code, as well as buildings receiving federal grants from the OIA. Enforcement is not required at the local level unless the code is adopted by a local jurisdiction.</p>
ND	1993 MEC is contingent on adoption by local jurisdiction.	ASHRAE/IESNA 90.1-1989 is contingent on adoption by local jurisdiction.	

State	Residential	Commercial	Compliance and Enforcement
OH	1995 MEC is mandatory statewide.	ASHRAE/IESNA 90.1-1989 is mandatory statewide.	<p>Compliance. Can use MECcheck or COMcheck to show compliance. Compliance is determined through plan review and inspection at the local level by the local building department. If there is no certified building department within a jurisdiction, the Ohio Department of Commerce Division of Industrial Compliance reviews and approves plans for commercial construction. One-, two-, and three-family dwelling plans are not reviewed for MEC compliance at the state level.</p> <p>Enforcement. Building officials whose building department has been certified by the Board of Building Standards enforce the provisions of the Ohio Basic Building Code for their jurisdiction. Plans must be submitted for all buildings within the scope of the code, as adopted by the state and local government. The jurisdiction is required to review and approve the plans and to perform inspections to determine if the work performed conforms with the approved plans. One-, two-, and three-family dwellings are reviewed by certified building departments only when they also have responsibility for one-, two-, and three-family dwelling plan review.</p>
OK	The 1995 MEC is mandatory for jurisdictions that do not adopt their own code and for state-owned and -leased facilities.	ASHRAE/IESNA 90.1-1989 is mandatory for jurisdictions that do not adopt their own code and for state-owned and -leased facilities.	<p>Compliance. For state-owned buildings, the Oklahoma Office of Central Services, Construction Properties Division, monitors the construction process for compliance with the relevant construction codes. Non state-owned buildings must comply with whatever the state has put in place, which is currently the 1996 BOCA International NBC that includes the 1995 MEC.</p> <p>Enforcement. Local jurisdictions are responsible for enforcing any locally adopted codes. The Oklahoma State Department of Central Services administers construction and maintenance programs for state-owned and -leased buildings.</p>

State	Residential	Commercial	Compliance and Enforcement
OR	<p>State-developed code that exceeds 1995 MEC is mandatory statewide. The Oregon One- and Two-Family Dwelling Specialty Code contains energy conservation requirements for residential construction.</p>	<p>State-developed code that meets or exceeds ASHRAE/IESNA 90.1-1989 is mandatory statewide. The state energy code provisions are mandatory for all heated and / or cooled (residential and) commercial construction, including state-owned and -operated buildings that are constructed, altered, and repaired within the state. The energy conservation requirements are a mandatory statewide minimum that cannot be modified by local government without state approval.</p>	<p>Compliance. Plans and specifications showing all pertinent data in sufficient detail, including U- and R-values of materials, equipment sizes, and controls must be submitted to the enforcement agency (local or state.) Compliance can be demonstrated for residential construction either by using the prescriptive path or by completing a residential thermal performance calculation form for trade-offs of the exterior envelope requirements. Documentation for commercial buildings must be submitted on standardized forms available from the Oregon Department of Energy (ODOE) or the BCD.</p> <p>Enforcement. Plans and specifications must be submitted unless exempted by the building official. If required by the building official, the plans must be stamped by registered design professionals. The codes establish minimum submittal requirements concerning R-values, equipment efficiencies, and lighting components. Field inspections are required prior to the issuance of a certificate of occupancy. For all buildings, the city, county, or designated enforcement agency may either enforce the code or have the BCD enforce the code.</p>
PA	<p>State-developed code based on ASHRAE 90A-1980 and 90B-1975 is mandatory statewide.</p>	<p>ASHRAE 90A-1980 and 90B-1975 is mandatory statewide.</p>	<p>Compliance. Compliance is determined by builder or designer certification to DCED or DLI. For residential construction, the DCED has the authority to conduct energy inspections of residential properties. The homeowner may use the inspection report to require the builder to achieve compliance. For nonresidential construction, an architect or engineer must sign a compliance statement stating that the building complies with the energy code. No follow-up energy inspections are conducted.</p> <p>Enforcement. The Building Energy Conservation Act divides the responsibility for administering Act 222 between the DCED for residential construction and the DLI for commercial construction. Local governments can enforce the residential regulations if they choose. Currently, 144 of 2,600 local governments elect to enforce the Building Energy Conservation Act requirements.</p>

State	Residential	Commercial	Compliance and Enforcement
RI	1995 MEC is mandatory statewide.	ASHRAE/IESNA 90.1-1989 is mandatory statewide.	<p>Compliance. Can use MECcheck or COMcheck to show compliance. Compliance is determined through the building permit and inspection process by local building code officials and the State Building Commission.</p> <p>Enforcement. The code official in local jurisdictions enforces the state building code. The State Building Commissioner enforces the code for all state buildings and buildings built on state-owned property.</p>
SC	2000 IECC is mandatory statewide.	ASHRAE/IESNA 90.1-1989 is mandatory statewide.	<p>Compliance. Can use MECcheck or COMcheck to show compliance. In areas where local governments have adopted the code, compliance is determined by plan review and inspection by local building officials. For local government with no building official, the engineer or director of public works or chief fire inspector may be called upon to act as the enforcement agency. Some jurisdictions may accept a registered design professional's seal on a letter stating that the design conforms with the adopted code.</p> <p>Enforcement. Local units of government enforce the code through the normal inspection process. Depending on the size of the local government unit, the same individual may be responsible for performing plan reviews and inspections.</p>

State	Residential	Commercial	Compliance and Enforcement
SD	None.	None.	NA
TN	1992 MEC is mandatory statewide.	ASHRAE 90A-1980 and 90B-1975 are mandatory statewide.	<p>Compliance. Compliance can be demonstrated during plan review and verified by local inspection. Some jurisdictions may accept the registered design professional's seal on a letter stating that the design complies with the code.</p> <p>Enforcement. In jurisdictions that have adopted a code, local units of government enforce the code through the normal inspection process for new construction and additions. Depending on the size of the local government unit, the same individual may perform plan reviews and inspections. The state provides no enforcement. Therefore, if the code is not locally adopted, there is no enforcement.</p>

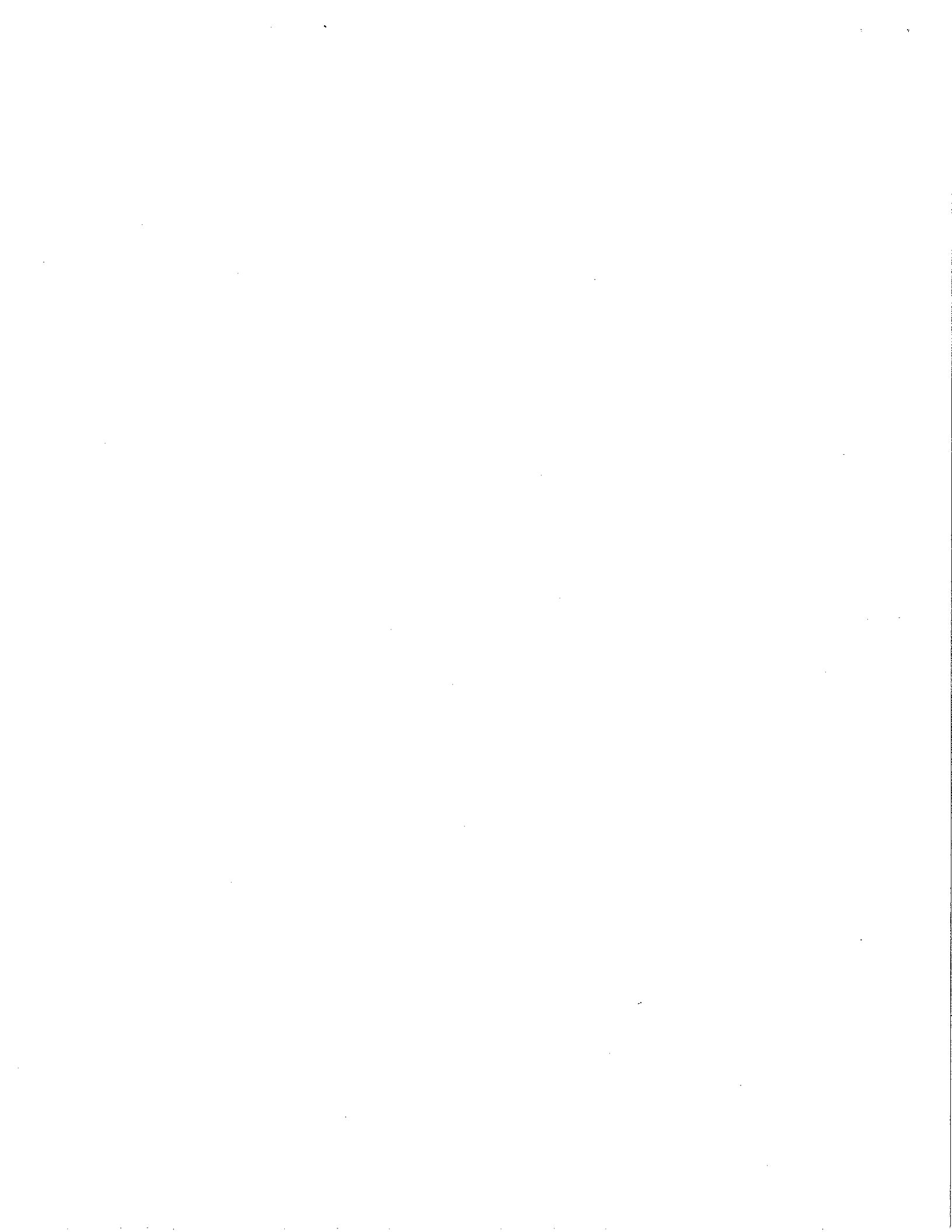
State	Residential	Commercial	Compliance and Enforcement
TX	None except for low-rise state-owned or -funded buildings, which must comply with the 1993 MEC.	None except for state-owned buildings and state-supported institutions, which must comply with a modified ASHRAE/IESNA 90.1-1989.	<p>Compliance. Can use MECcheck or COMcheck to show compliance. For state-owned or -funded buildings, the design professional submits a completed compliance statement and certification to the cognizant state agency that the design is in compliance with the Texas Design Standard or the MEC (as applicable based on the building type.) For all other buildings in jurisdictions that have adopted energy provisions, compliance is determined through the permit process. Typically, plans are submitted and reviewed and then buildings are inspected. After successful completion of this process, the building department issues a certificate of occupancy.</p> <p>Enforcement. For state-owned or -funded buildings, the cognizant state agency enforces the code. For all other buildings, the cognizant local government enforces the code. If a jurisdiction adopts an energy code, the code is enforced through the permit/inspection process for new construction and additions. Depending on the size of the jurisdiction, the same individual may perform plan reviews and inspections.</p>
UT	1995 MEC is mandatory statewide.	ASHRAE/IESNA 90.1-1989 is mandatory statewide.	<p>Compliance. Can use MECcheck or COMcheck to show compliance. All residential buildings (one- and two-family dwellings, and multi-family dwellings three stories high and less) comply with the 1995 MEC using the compliance pathways, plan submittal, and plan review as specified within that code. Commercial and high-rise residential buildings that must comply with ASHRAE/IESNA 90.1-1989 follow the compliance pathways in that code and go through a similar plan submittal and plan review process. Plans and specifications must be submitted when required by the local jurisdiction. Field inspections, as part of the normal building inspection process, are required prior to the issuance of a certificate of occupancy.</p> <p>Enforcement. The energy code is part of the enforcement process for the state building code. However, actual enforcement of the energy code provisions by the local enforcement agency is sporadic. Educational programs that began in September/October 1994 are expected to improve actual compliance. The Division of Occupational and Professional Licensing is responsible for enforcement for all state-owned or -funded buildings.</p>

State	Residential	Commercial	Compliance and Enforcement
VT	<p>State-developed code, Residential Building Energy Standards (RBES) that is equivalent to 1995 MEC, is mandatory statewide.</p>	<p>State-developed code that meets or exceeds ASHRAE/IESNA 90.1-1989 is mandatory for state-funded construction. Vermont does not have a statewide commercial energy code for non state-funded construction.</p>	<p>Compliance. Can use MECcheck or COMcheck to show compliance. Act 250 compliance is determined by nine quasi-judicial District Environmental Commissions. The Vermont Department of Labor and Industry determines compliance for state-funded new commercial construction.</p> <p>Enforcement. The RBES requires that a certification label be signed and permanently affixed in the home. The person certifying compliance must provide a certificate to the Vermont Department of Public Service and each certificate must be recorded and indexed in the town land records. The builder of the home, a licensed architect or engineer, or a Vermont-accredited home energy rating organization can certify compliance with the RBES. The RBES does not require inspections by code officials; however, it does not eliminate inspections related to the Code, spot checks for enforcement of other codes, or inspections required by local codes.</p>
VA	<p>State building code, which adopts the 1995 MEC by reference, is mandatory statewide. The Code is a statewide minimum requirement that local jurisdictions cannot amend.</p>	<p>ASHRAE/IESNA 90.1 is mandatory statewide.</p>	<p>Compliance. Can use MECcheck or COMcheck to show compliance. Compliance for non state buildings is demonstrated through plan review and inspection at the local level. The Director of the Virginia Department of General Services, acting through the Division of Engineering and Buildings, acts as the code official for state buildings. This office performs plan reviews and construction inspections for all state buildings.</p> <p>Enforcement. The local building department enforces the Code requirements through plan reviews and inspections.</p>

State	Residential	Commercial	Compliance and Enforcement
WA	State-developed code is mandatory statewide.	State-developed code, based on ASHRAE/IESNA 90.1-1989, is mandatory statewide.	<p>Compliance. Compliance is determined by plan review and inspection by the local building official. Plans and specifications must be submitted unless otherwise required by the building official. The building official may also require that the plans be stamped by a registered design professional for more complicated designs. The energy code for residential buildings establishes minimum/maximum requirements for R-values and equipment efficiencies. Field inspections are required before a certificate of occupancy is issued. The energy code for commercial buildings sets minimum inspection requirements for the building envelope, mechanical systems, and lighting installations.</p> <p>Enforcement. For commercial buildings, the city or county, or its designated enforcement agency, can enforce the code or require the building owner to hire a certified nonresidential energy special inspector to perform the plan review and/or field inspection. The energy plan reviewers and special inspectors are certified through a program regulated by the Washington Association of Building Officials (WABO.) Certification requires that individuals complete a comprehensive testing program and have specific credentials. Recertification is required when changes are made to the code. Technical assistance is offered through the Northwest Energy Efficiency Council (NEEC.) For residential buildings, the city or county, or its designated enforcement agency, regulate enforcement.</p>
WV	State building code based on ASHRAE 90A-1980 and 90B-1975, is adopted by local jurisdictions.	State building code based on ASHRAE 90A-1980 and 90B-1975, is adopted by local jurisdictions.	<p>Compliance. Local jurisdictions must adopt the statewide requirements to enforce them at the local level. For jurisdictions that adopt the statewide codes, compliance is determined by plan review and inspection by local building officials. If local jurisdictions do not adopt the statewide codes, contractors, builders, and architects are responsible for complying with the provisions of the codes.</p> <p>Enforcement. Local jurisdictions that have adopted the state building code are the enforcing authority. The local code official reviews the plans and completes a building inspection. For local jurisdictions that have not adopted the energy code, the State Fire Marshal is responsible for enforcement.</p>

State	Residential	Commercial	Compliance and Enforcement
WI	State-developed code (COMM 22), which meets or exceeds 1995 MEC, is mandatory statewide.	State developed code (COMM 63) based on ASHRAE/IESNA 90.1-1989, is mandatory statewide.	<p>Compliance. Can use WIScheck or COMcheck-EZ to show compliance. Compliance is determined through plan review and inspection by local or state building officials for certain requirements. For other requirements, the Department licenses private individuals who conduct energy audits when residential rental properties are sold. The energy audits for compliance are commissioned by the owner of the property within one year of transfer.</p> <p>Enforcement. After plan review by the state or a certified municipality, certain requirements are enforced in the field by local municipal building inspectors for communities that have local inspections. In communities without a local inspector, the state Department of Commerce's inspectors are responsible. Other requirements are enforced by the local municipal building inspector after the municipality adopts the code. If a jurisdiction chooses not to adopt and enforce the code, the Department of Commerce administers and enforces the code. Enforcement is mandatory for municipalities with populations over 2,500. Still other inspections are conducted by private-sector inspectors who are licensed by the Department of Commerce under the Code's requirements. All enforcement is done by Department of Commerce certified inspectors and plan examiners.</p>
WY	The ICBO Uniform Building Code, which is based on the 1989 MEC, may be adopted and enforced by local jurisdictions.	The ICBO Uniform Building Code, which is based on the 1989 MEC, may be adopted and enforced by local jurisdictions.	<p>Compliance. Compliance is determined by plan review and inspection by local code officials in jurisdictions that have adopted energy provisions as a part of their building code.</p> <p>Enforcement. Towns and counties that are established as local enforcement may, but are not required to, enforce an energy code at the local level.</p>

(Source: "Department of Energy Online Database of State Energy Codes," DOE web site, www.eren.doe.gov, 2001).

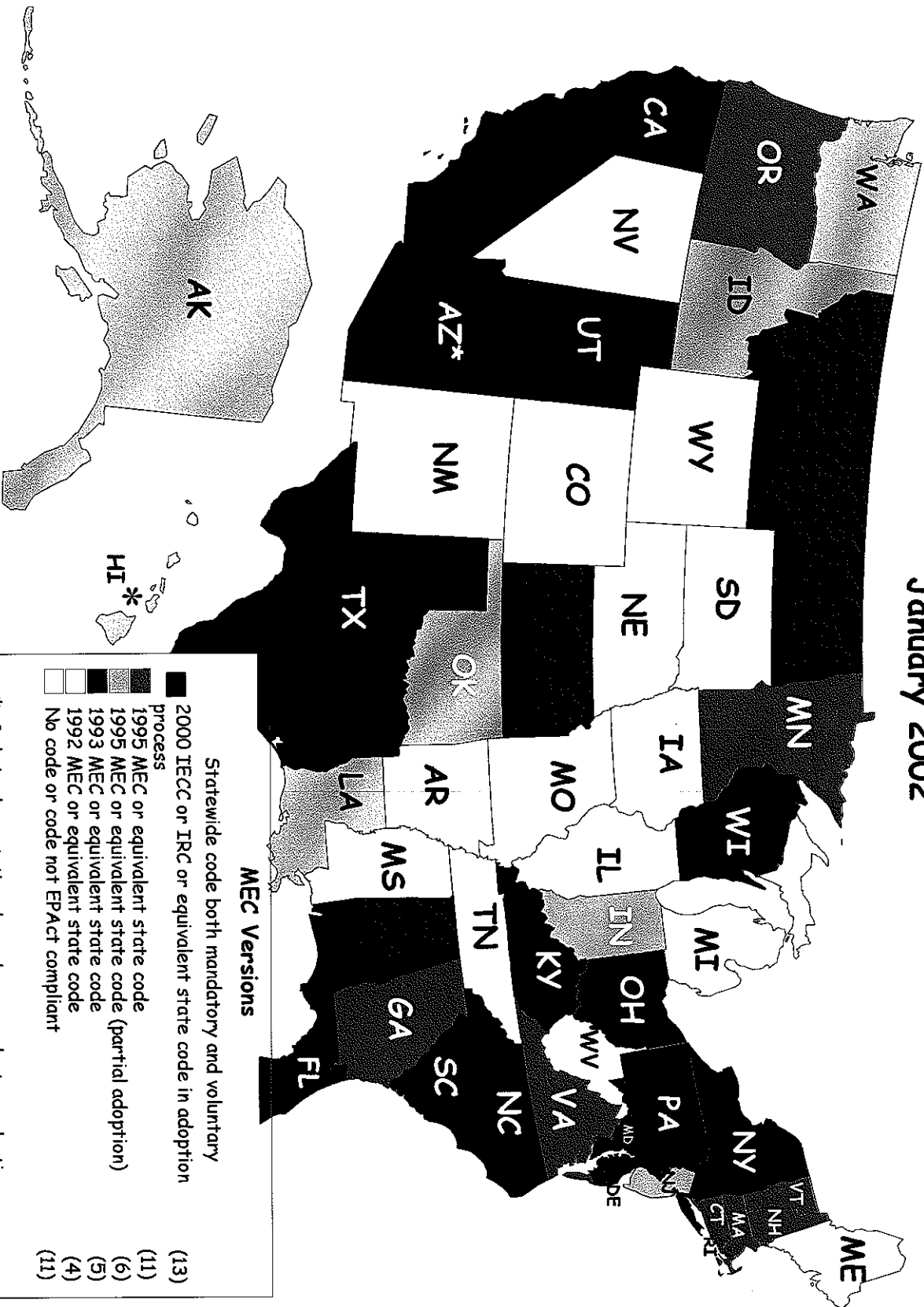


Appendix B Map of States That Have Adopted Energy Codes



RESIDENTIAL ENERGY CODE STATUS

January 2002



Building Codes Assistance Project

