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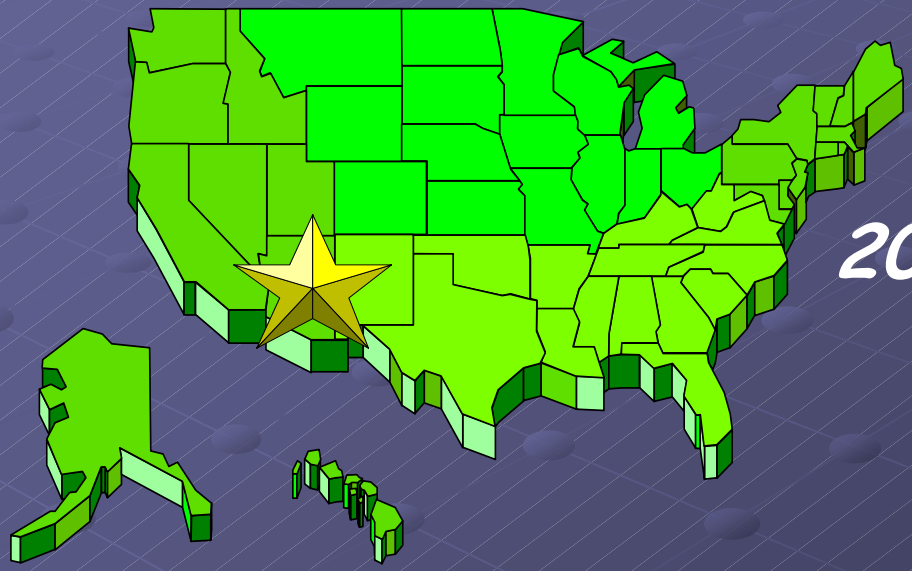

2006 International Energy Conservation Code

March, 15 2006

Cosimina Panetti, CEM
Outreach Manager

Maricopa Council of Governments March 15h 2006

BCAP

- Mission: promote adoption & implementation of up-to-date energy codes
- Non-profit group
- Founded in 1994 in response to EPAct
- Funded primarily by DOE & other local advocates
- Sponsored by ASE, NRDC, ACEEE

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Impact of Energy Codes

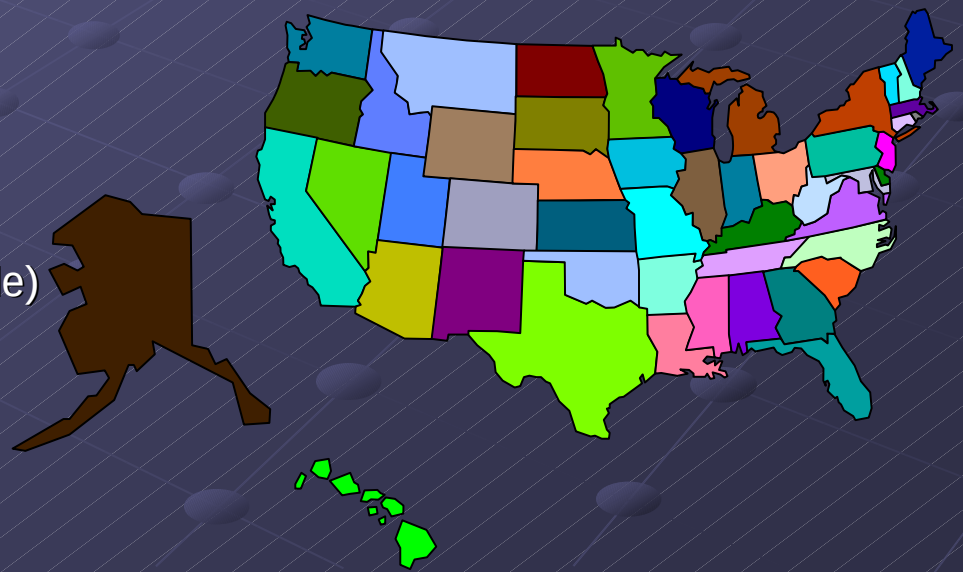
- Building energy consumption is almost 40% of total energy use in the US

  65.2% of total U.S. electricity consumption

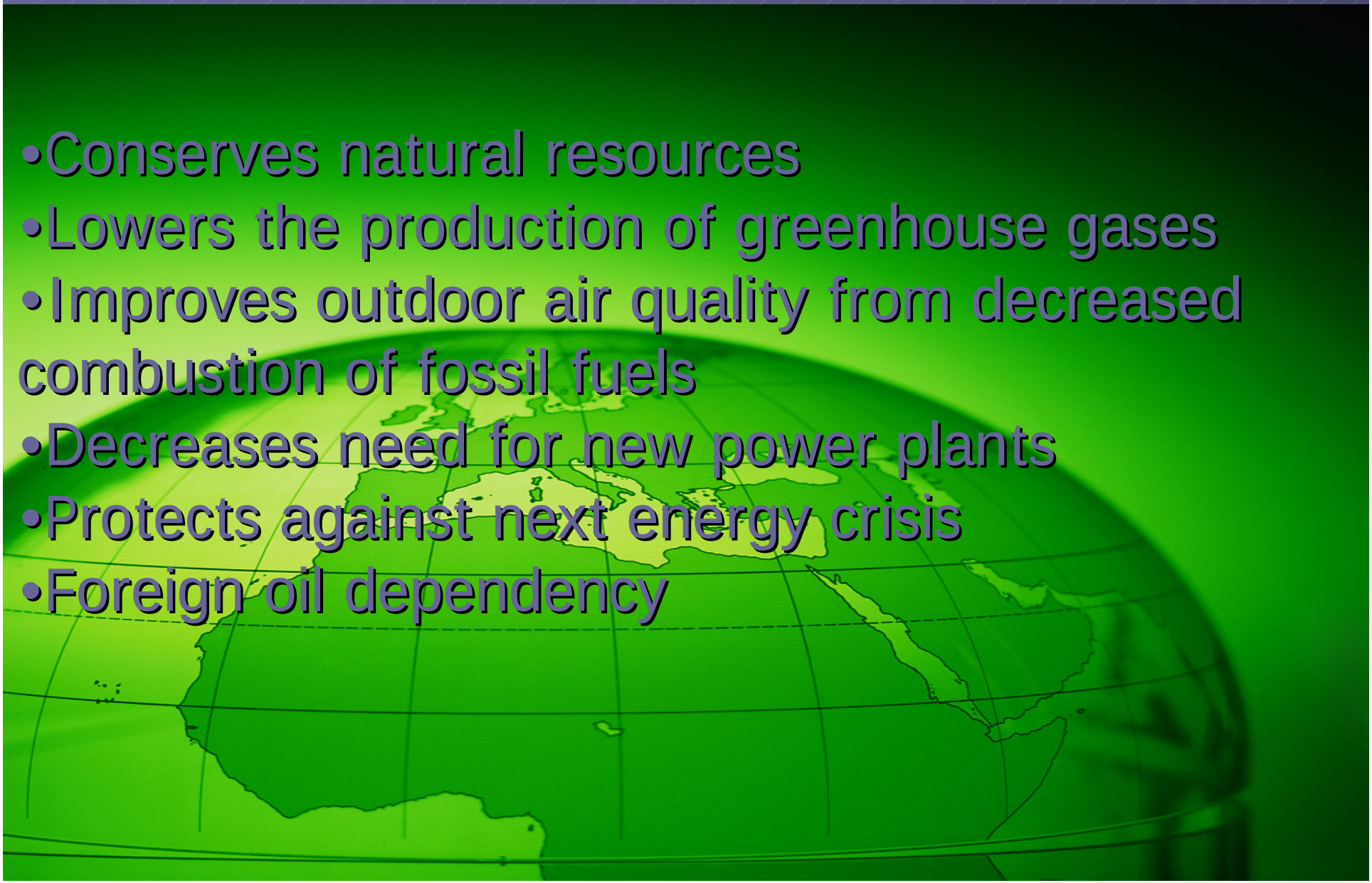
- Buildings are the nation's largest source of global warming pollution

  The average home emits twice as much ghg as the average car

In 2004, 1.1 million housing starts permitted in US
(90, 644 units in AZ)
(62,350 in Phoenix-Mesa-Scottsdale)



Energy Codes: Environmental Benefits



- Conserves natural resources
- Lowers the production of greenhouse gases
- Improves outdoor air quality from decreased combustion of fossil fuels
- Decreases need for new power plants
- Protects against next energy crisis
- Foreign oil dependency

Currently Designated Nonattainment Areas

State, County, Pollutant, * Part County NAA, NAA Area Name, Classification Standard – as of Sept. 2005 **http://www.epa.gov/oar/oaqps/greenbk/ancl.html**

ARIZONA Cochise Co *PM-10* * Douglas (Cochise County), AZ - Moderate *PM-10* * Paul Spur, AZ - Moderate *SO2* * Douglas (Cochise County), AZ - Primary Gila Co *PM-10* * Hayden/Miami, AZ - Moderate *SO2* * Miami (Gila County), AZ - Primary **Maricopa Co *8-Hr Ozone* * Phoenix-Mesa, AZ - Subpart 1 *PM-10* * Phoenix, AZ - Serious** Pima Co *PM-10* * Ajo (Pima County), AZ - Moderate *PM-10* * Rillito, AZ - Moderate Pinal Co *8-Hr Ozone* * **Phoenix-Mesa, AZ - Subpart 1 *PM-10*** * Hayden/Miami, AZ - Moderate *PM-10* * **Phoenix, AZ - Serious *SO2* *** Hayden (Pinal County), AZ - Primary *SO2* * San Manual (Pinal County), AZ - Primary Santa Cruz Co *PM-10* * Nogales, AZ - Moderate Yuma Co *PM-10* * Yuma, AZ - Moderate

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Energy Codes & Standards

- TEXAS – Home rule state – 2001 adoption of energy codes
  - SB5 – 2000 IECC with 2001 Supplement
  - SIP – Provides testimony to clean air potential

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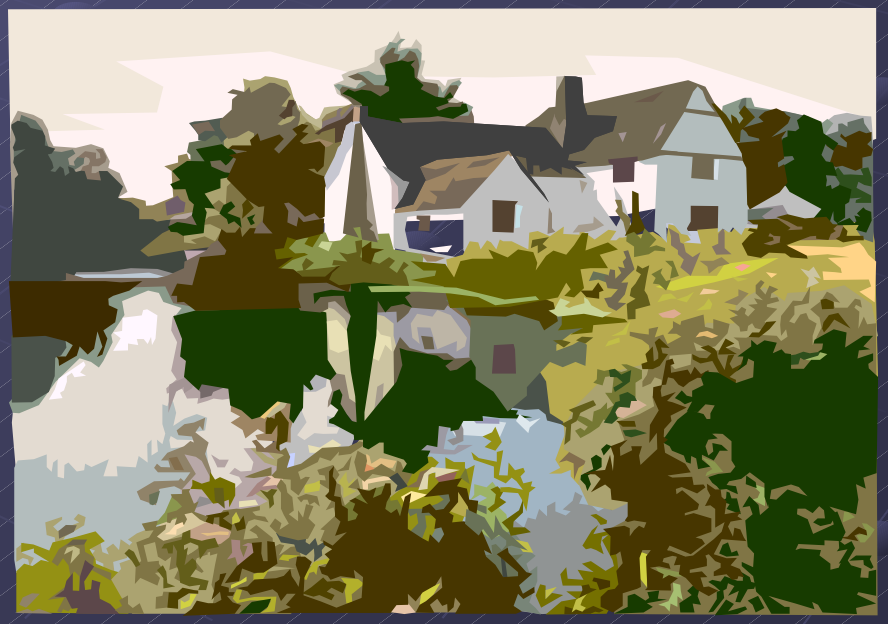
Energy Codes: Consumer Benefits

- Gas, Oil and Electric Prices Continue to Increase
- Homebuyers demand a High Degree of Comfort and Low Energy Costs
- And Demand a Healthy Living Environment
- Builders want fewer call backs
- And….

  Reduced Liability



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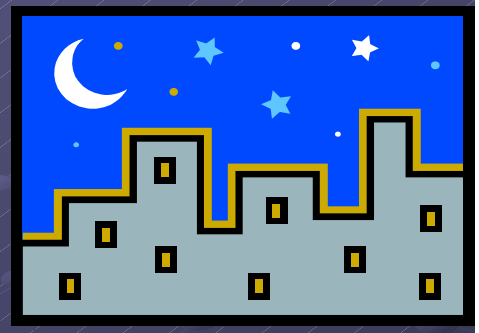
BCEGS



- ISO's Building Codes Effectiveness Grading Schedule (BCEGS)
- The Insurance Industry's tool which sets community insurance rates.
- Equal weight with the six ICC sub codes
- www.isomitigation.com

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Insurance: areas of Commonality

- Building Durability Issues - Moisture
- Mold and Mildew
- Discomfort
- Condensation on Windows
- Increases Potential for Poor Indoor Air Quality

Solution: Energy code provisions for air sealing, insulation, installation, HVAC efficiency and sizing and duct sealing.

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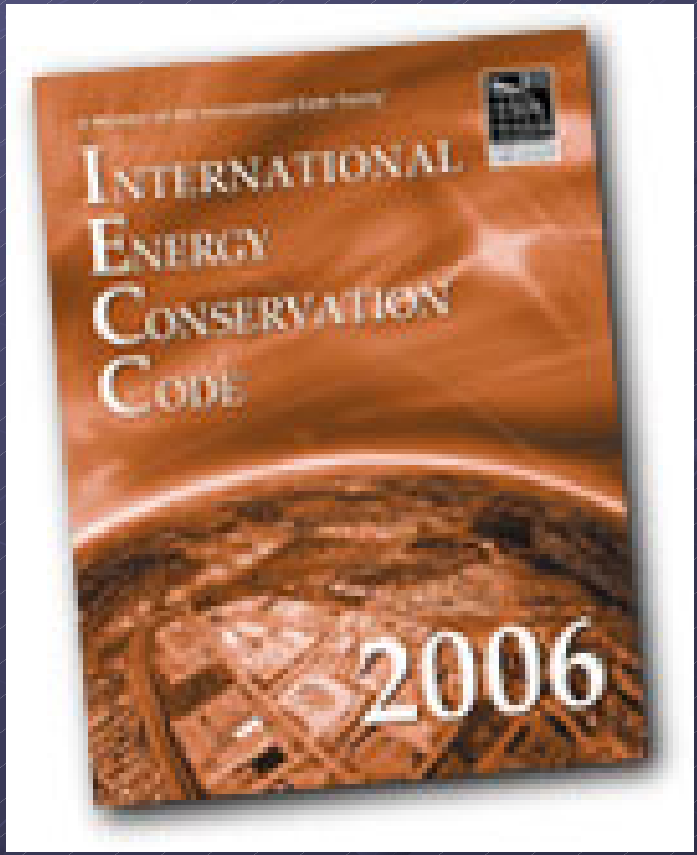
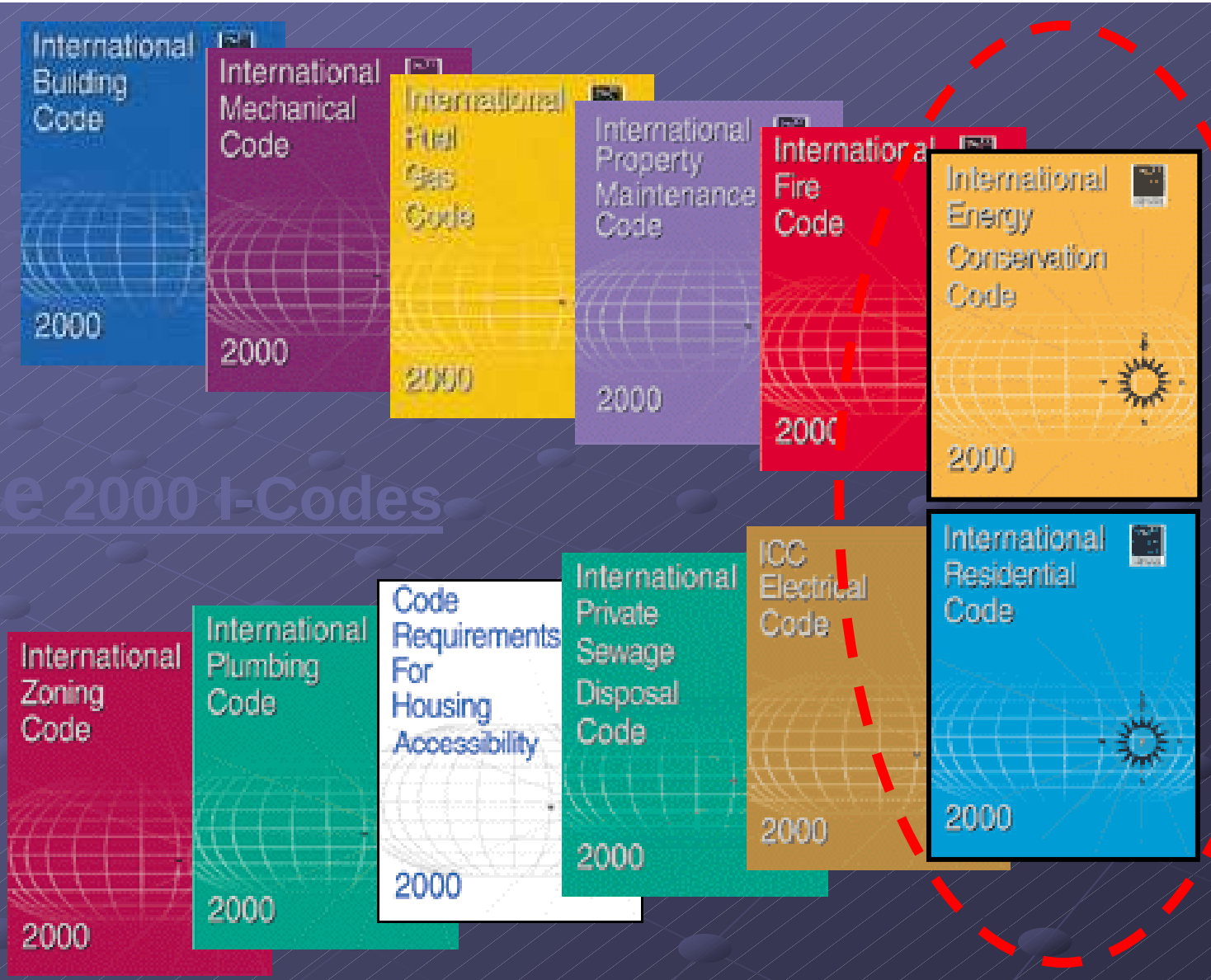
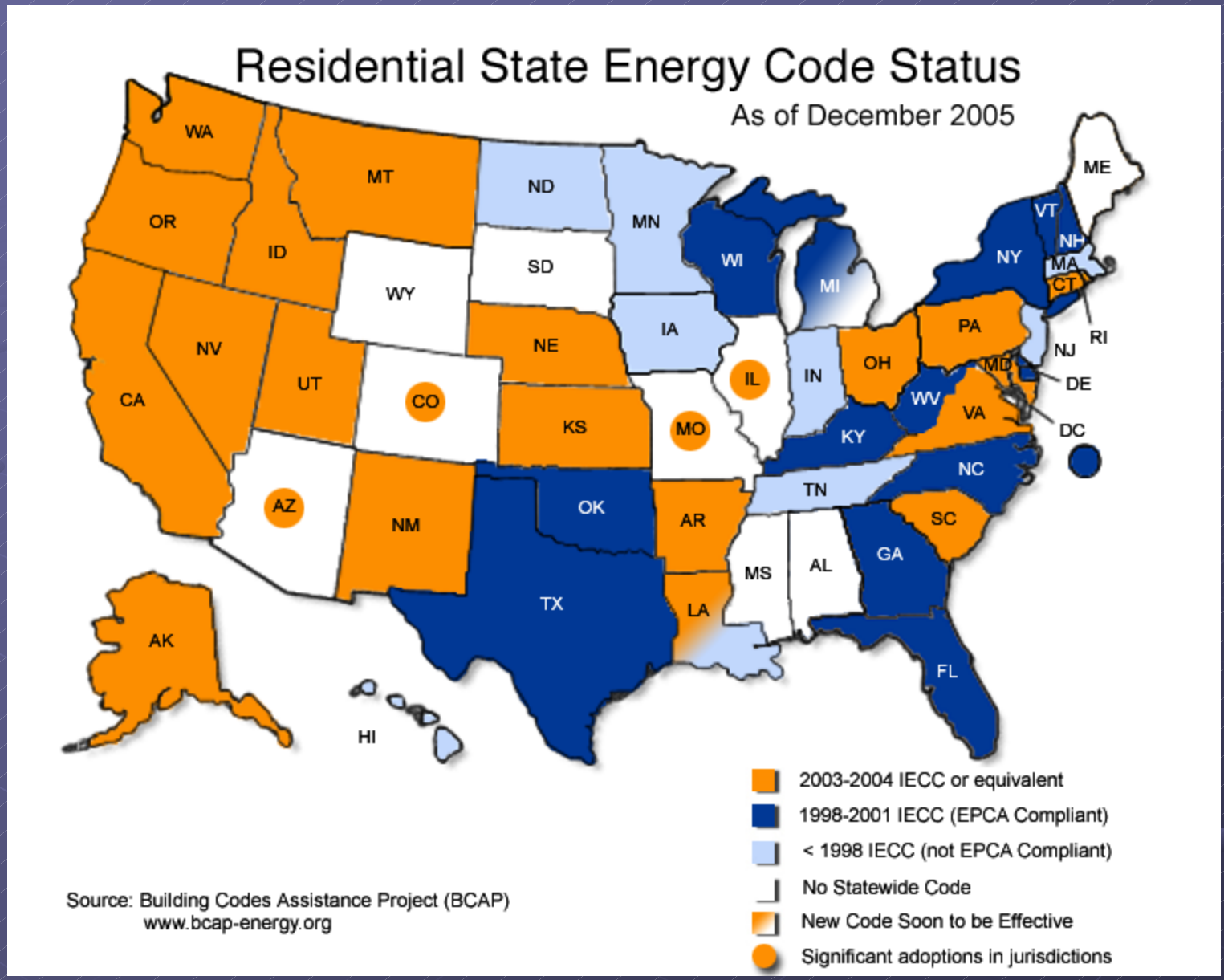
What is the IECC?

A Required Minimum Level of Energy Efficiency In New Residential and Commercial Construction



International Family of Codes




Residential State Energy Code Status
As of December 2005
WA
OR
CA
ID
NV
MT
WY
UT
AZ
CO
NM
ND
SD
NE
KS
OK
TX
MN
IA
MO
AR
LA
WI
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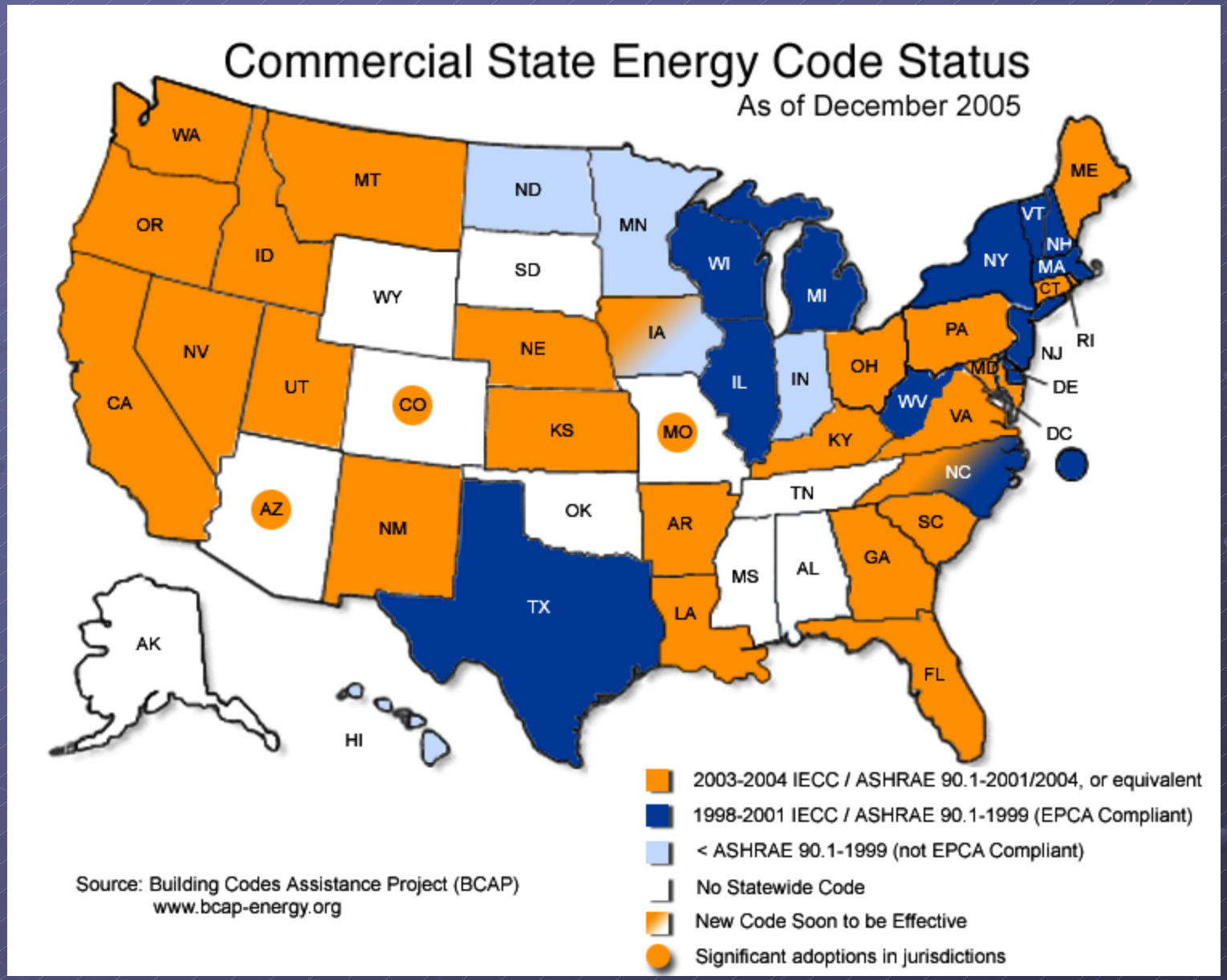
IN
TN
AL
OH
KY
GA
FL
WV
VA
NC
SC
PA
NY
ME
VT
NH
MA
CT
RI
NJ
MD
DE
DC
AK
HI
2003-2004 IECC or equivalent
1998-2001 IECC (EPCA Compliant)
< 1998 IECC (not EPCA Compliant)
No Statewide Code
New Code Soon to be Effective
Significant adoptions in jurisdictions
Source: Building Codes Assistance Project (BCAP)
www.bcap-energy.org


Commercial State Energy Code Status
As of December 2005
WA
OR
CA
ID
NV
MT
WY
UT
AZ
CO
NM
ND
SD
NE
KS
OK
TX
MN
IA
MO
AR
LA
WI
IL
MS
MI
IN
TN
AL
OH
KY
GA
FL
SC
NC
VA
WV
PA
NY
MD
DE
NJ
CT
RI
MA
VT
NH
ME
DC
AK
HI
2003-2004 IECC / ASHRAE 90.1-2001/2004, or equivalent
1998-2001 IECC / ASHRAE 90.1-1999 (EPCA Compliant)
< ASHRAE 90.1-1999 (not EPCA Compliant)
No Statewide Code
New Code Soon to be Effective
Significant adoptions in jurisdictions
Source: Building Codes Assistance Project (BCAP)
www.bcap-energy.org

Avondale	2003 IECC
Buckeye	None
Carefree	not reported
Cave Creek	None
Chandler	not reported
El Mirage	2000 IECC
Fountain Hills	not reported
Gila Bend	not reported
Gila River	None
Gilbert	not reported
Glendale	None
Goodyear	2003 Residential
Guadalupe	not reported
Litchfield Park	not reported

Maricopa Co.	None
Mesa	None
Paradise Valley	2003 IECC
Peoria	2003 IECC Residential
Phoenix	2004 Supplement
Queen Creek	References the 2003 IRC
Salt River	None
Scottsdale	2003 IECC
Surprise	IECC by Reference
Tempe	None
Tolleson	2003 IECC by reference
Wickenburg	None
Youngtown	None

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Challenges

Codes are not being well Implemented:

- Training Inadequate
- Compliance Low
- Misunderstanding of Requirements and how to build them into buildings
- We're NOT getting the projected energy savings OR building better buildings

Live Webcast
(No Cost)

Residential Requirements of the 2006 International Energy Conservation Code (IECC)
Thursday, March 23, 2006
10:00 am to 11:30 am Pacific Time

This live one-hour webcast followed by a 30-minute Q & A session with participants will provide an overview of the residential requirements of the IECC.

Don't Wait!

Registration is Limited!

Building Energy Codes Program
www.energycodes.gov

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Basic Requirements

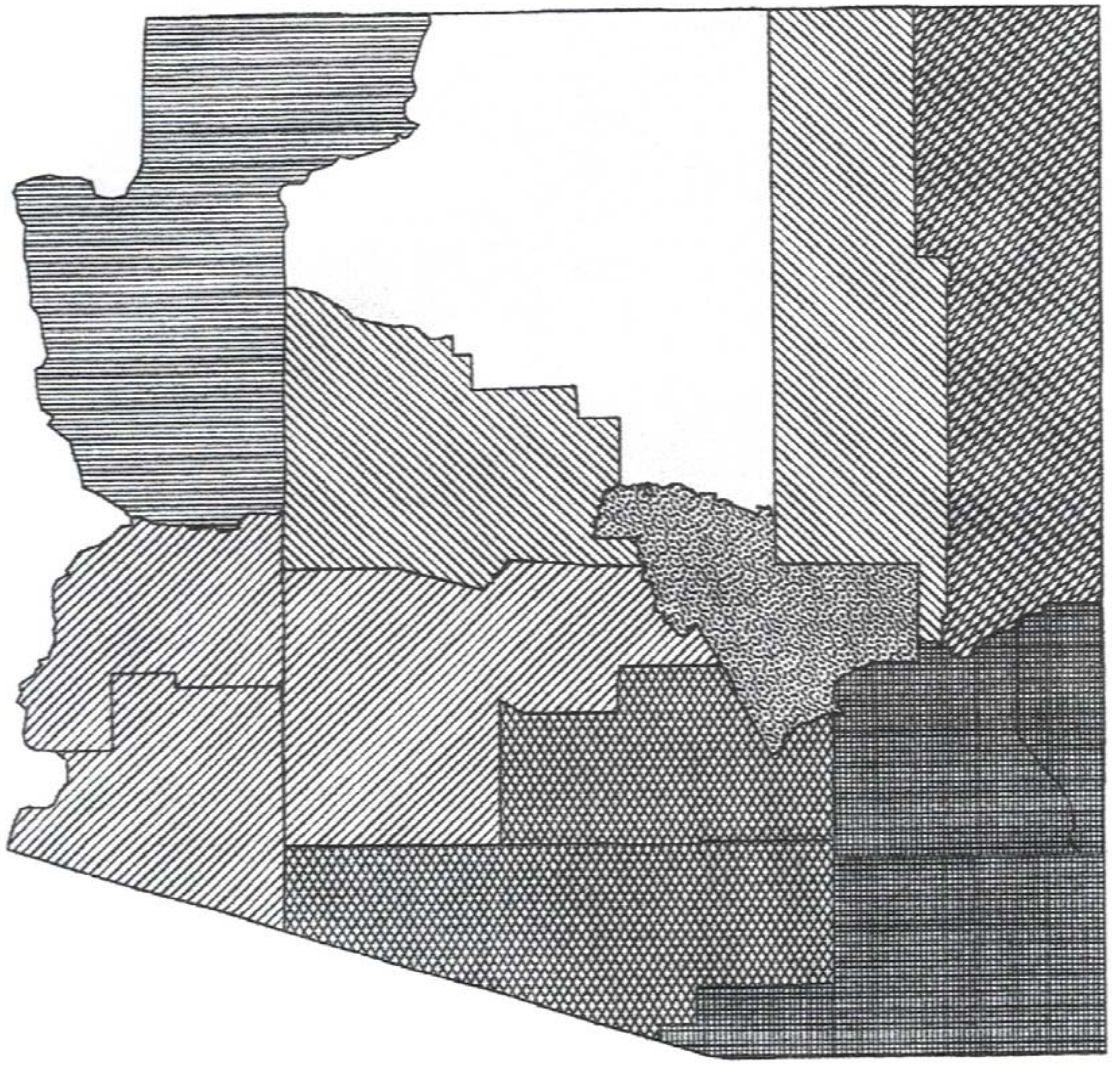
- **Air Leakage**
- **Materials and Equipment Information**
- **Duct Insulation and sealing**
- **Temperature Controls**
- **Piping Insulation**
- **Swimming Pools**
- **Electrical Submetering**
- **Service Hot Water Systems**
- **Envelope** construction assembly (materials & insulation levels) windows, doors & skylights
- **HVAC Systems**
- **Lighting Systems**

Recommendation:
Demonstrate compliance for systems at the time of permit

Key Elements of the 2006 IECC

- Revised format
  - Requirements shrink from 50 to 24 pages
  - 50 pages of maps removed
- Climate zones
  - Number of zones reduced from 19 to 8
  - Defined geographically by county lines
  - Metropolitan areas kept together
  - ASHRAE 90.1-2004 will use same zones

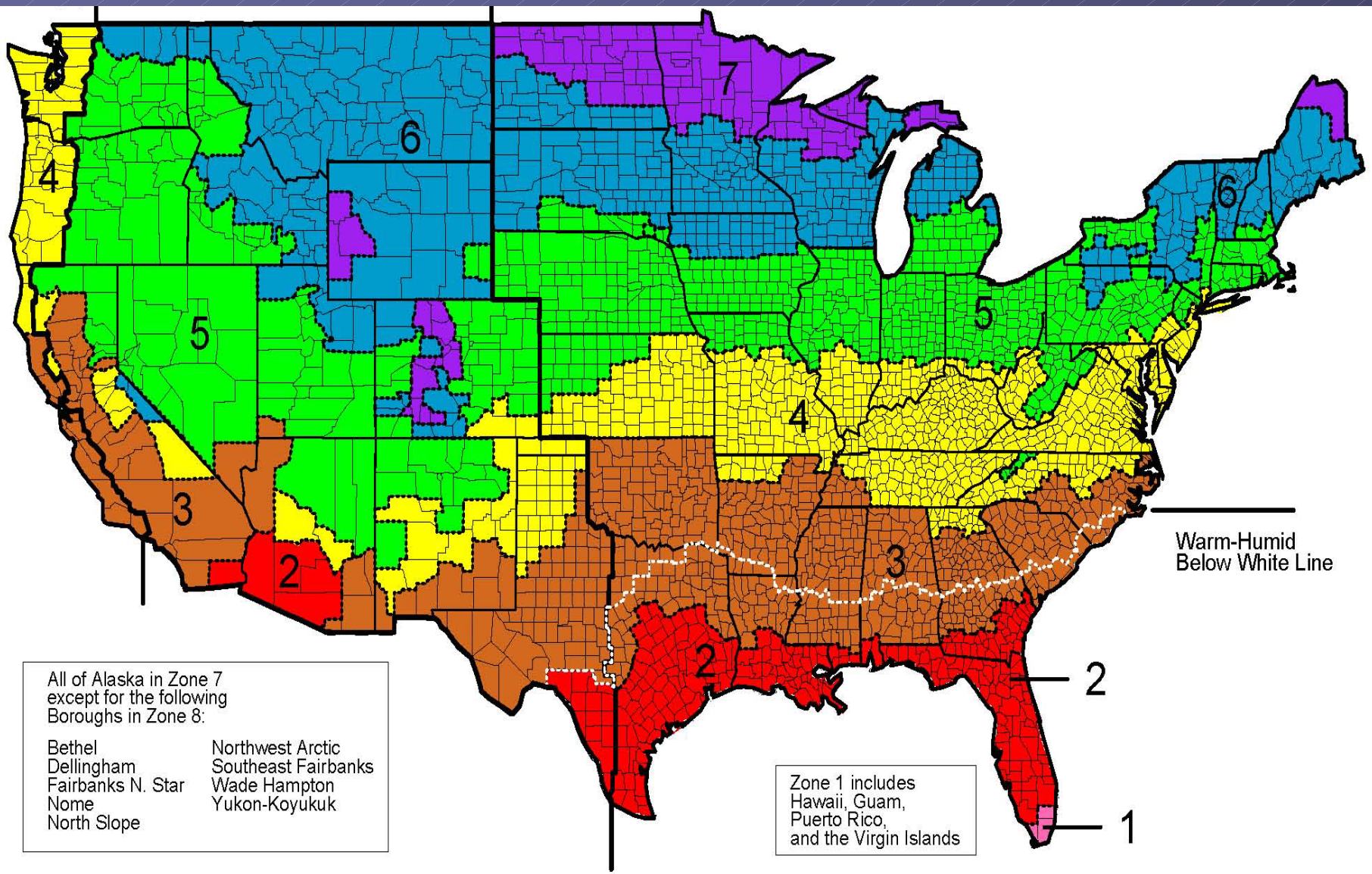
ARIZONA



Zone	County
13B	Apache
6B	Cochise
14A	Coconino
8	Gila
6B	Graham
6B	Greenlee
3C	La Paz
3C	Maricopa
7B	Mohave
10B	Navajo
4B	Pima
4B	Pinal
6B	Santa Cruz
10B	Yavapai
3C	Yuma

- Zone 3C
- Zone 4B
- Zone 6B
- Zone 7B
- Zone 8
- Zone 10B
- Zone 13B
- Zone 14A

New Climate Zones



Key Elements of the 2006 IECC Residential

- Elimination of Window/Wall Ratio
- Compliance methods reduced to 3:
  - single prescriptive table
  - UA trade-off
  - total home performance path (e.g. HERS)

Table 402.1
Insulation and Fenestration Requirements by Component

CLIMATE ZONE	FENESTRATION *U*-FACTOR	SKYLIGHT[b] *U*-FACTOR	GLAZED FENESTRATION SHGC	CEILING *R*-VALUE	WOOD FRAME WALL *R*-VALUE	MASS WALL *R*-VALUE	FLOOR *R*-VALUE	BASEMENT[c] WALL *R*-VALUE	SLAB[d] *R*-VALUE & DEPTH	CRAWL SPACE[c] WALL *R*-VALUE
1	1.20	0.75	0.40	30	13	3	13	0	0	0
2	0.75	0.75	0.40	30	13	4	13	0	0	0
3	0.65	0.65	0.40	30	15	5	19	0	0	5 / 13
4 except Marine	0.40	0.60	NR	38	15	5	19	10 / 13	10, 2 ft	10 / 13
5 and Marine 4	0.35	0.60	NR	38	21 or 15+5[g]	13	30[f]	10 / 13	10, 2 ft	10 / 13
6	0.35	0.60	NR	49	21 or 15+5[g]	15	30[f]	10 / 13	10, 4 ft	10 / 13
7 and 8	0.35	0.60	NR	49	21	19	30[f]	10 /13	10, 4 ft	10 / 13

2006 IECC Commercial Buildings Prescriptive Requirements

BUILDING DESIGN FOR COMMERCIAL BUILDINGS

TABLE 802.2(1)
BUILDING ENVELOPE REQUIREMENTS – OPAQUE ELEMENTS

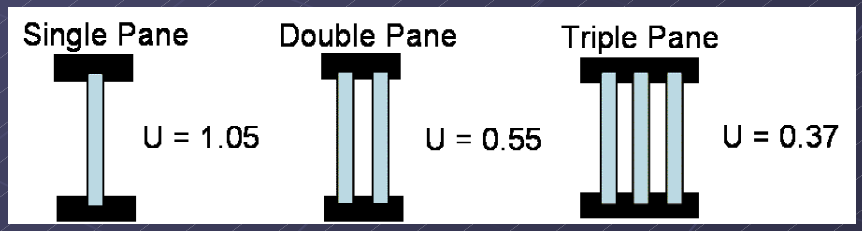
CLIMATE ZONE	1	2	3	4 except Marine	5 and Marine 4	6	7	8
Roofs								
Insulation entirely above deck	R-15 ci	R-15 ci	R-15 ci	R-15 ci	R-20 ci	R-20 ci	R-25 ci	R-25 ci
Metal buildings (with R-5 thermal blocks[a])[b]	R-19 + R-10	R-19	R-19	R-19	R-19	R-19	R-19 + R-10	R-19 + R-10
Attic and other	R-30	R-30	R-30	R-30	R-30	R-30	R-38	R-38
Walls, Above Grade								
Mass	NR	NR	R-5.7 ci[c, e]	R-5.7 ci[c]	R-7.6 ci	R-9.5 ci	R-11.4 ci	R-13.3 ci
Metal building[b]	R-13	R-13	R-13	R-13	R-13 + R-13	R-13 + R-13	R-13 + R-13	R-13 + R-13
Metal framed	R-13	R-13	R-13	R-13	R-13 + R-3.8 ci	R-13 + R-3.8 ci	R-13 + R-7.5 ci	R-13 + R-7.5 ci
Wood framed and other	R-13	R-13	R-13	R-13	R-13	R-13	R-13	R-13 + R-7.5 ci
Walls, Below Grade								
Below grade wall[d]	NR	NR	NR	NR	NR	NR	R-7.5 ci	R-7.5 ci
Floors								
Mass	NR	R-5 ci	R-5 ci	R-10 ci	R-10 ci	R-10 ci	R-15 ci	R-15 ci
Joist/Framing	NR	R-19	R-19	R-19	R-19	R-30	R-30	R-30
Slab-on-Grade Floors								
Unheated Slabs	NR	NR	NR	NR	NR	NR	NR	R-10 for 24 in. below
Heated Slabs	R-7.5 for 12 in. below	R-7.5 for 12 in. below	R-7.5 for 12 in. below	R-7.5 for 12 in. below	R-7.5 for 24 in. below	R-10 for 36 in. below	R-10 for 36 in. below	R-10 for 48 in. below
Opaque Doors								
Swinging	U – 0.70	U – 0.70	U – 0.70	U – 0.70	U – 0.70	U – 0.70	U – 0.70	U – 0.50
Roll-up or sliding	U – 1.45	U – 1.45	U – 1.45	U – 1.45	U – 1.45	U – 0.50	U – 0.50	U – 0.50

For SI: 1 inch = 25.4 mm.

Windows & Glass Doors

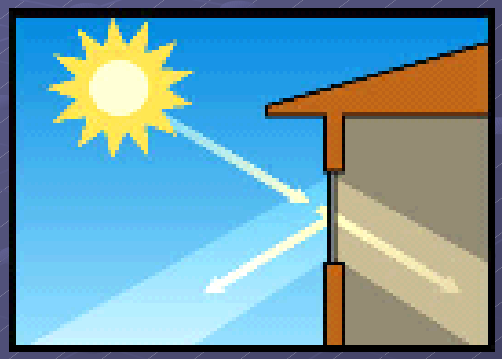
- **Key Elements**
  - **SHGC values**
  - **U-Values**

NFRC tested and certified or default window U-value range
Use assembly U-value
All windows must meet or exceed
Skylights: Restricted to < 3% of roof area
Requirements based on U-value (NFRC tested) or Default U-value table

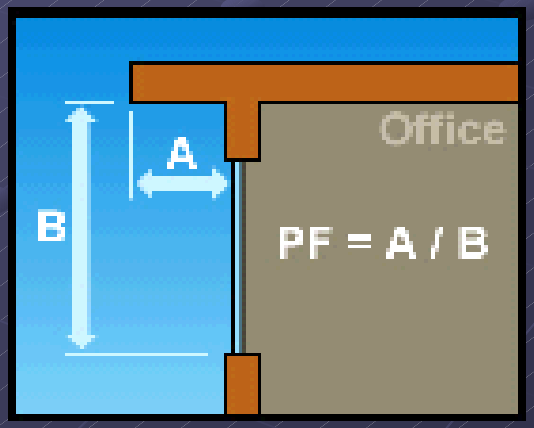


Windows - SHGC

- Solar Heat Gain Coefficient
  - Requirements dependent on projection factor
  - National Fenestration Rating Council (NFRC) tested
  - Default SHGC range diagrams
  - SHGC = SC x .87



Solar Heat Gain Coefficient



Projection Factor (PF)

Key Elements of the 2006 IECC (cont'd)

- Glazing U-factor and SHGC trade-off limits
- Cooling Climate improvements
  - Efficiency requirements no longer tend toward "zero" in hot climates
- Conditioned attics specifically allowed
- Air handlers must be sealed
- Certificate must be posted on or in electrical panel to show R-values, U-factors, SHGC, type and efficiency of HVAC

Key Elements of the 2006 IECC (cont'd)

- Performance path better aligned with RESNET/HERS guidelines
- Whole Code is easier to enforce
  - No calculations
  - Plan review greatly simplified
  - Inspections easier – more standardized
  - On-site design changes don't alter compliance, and don't require resubmittal

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IN CONCLUSION :

Codes are an Opportunity to impact all buildings!!

Reduce Pollution, Save Energy & Save Money!

- **Keep Energy Dollars Home**
- **Conserve our natural resources**
- **Protect the Environment- STOP POLLUTION**
- **Improve Building Stock**
- **Level the playing field**
- **Improve Comfort and Health**
- **ISO - BCEGS Credit, Insurance Impacts**
- **Good Public Policy**

THANK YOU!

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Thank You!

Technical Support

- US-DOE website: www.energycodes.gov
  Suite of compliance/inspection tools
  - worksheets, software, forms, checklists

  Training for code officials and builders
- International Code Council: www.iccsafe.org
- ASHRAE Standard 90.1-1999 Users Manual, and the ENVSTD software are available from ASHRAE on the web at www.ashrae.org or by phone at 404-636-8400
- BCAP: www.energy-codes.org