2015 IECC Commercial 101 & Historic Buildings

Bringing Back Main Street

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- REEO – Regional Energy Efficiency Organization
- Member-based, non-profit 501(c)3 organization
- 50+ members from wide cross section of E.E. industries

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Agenda

- Construction Codes 101
- Energy Code in State Law
- Energy Code 101
- Existing and Historic Building Considerations
- Q & A

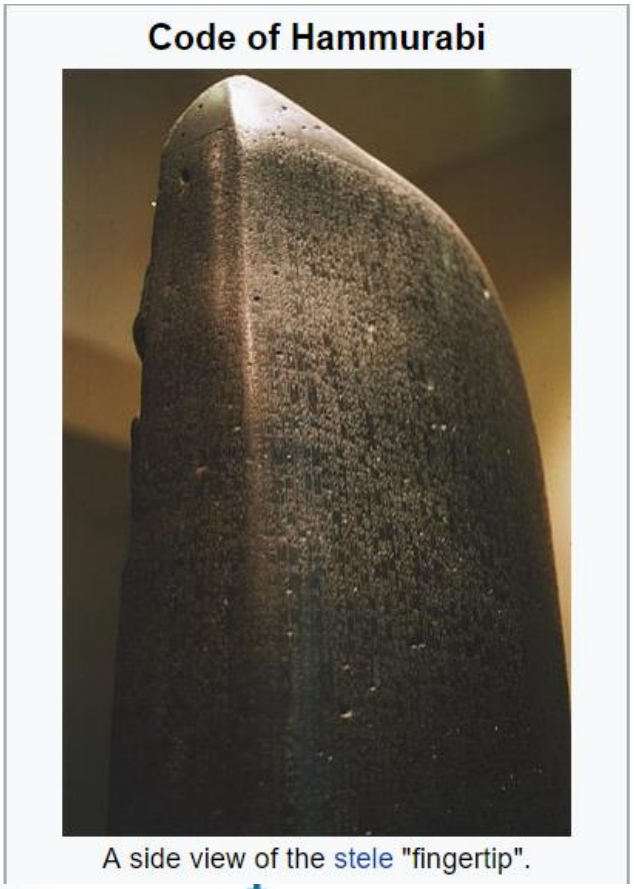
Oldest Code?

What is a Code?

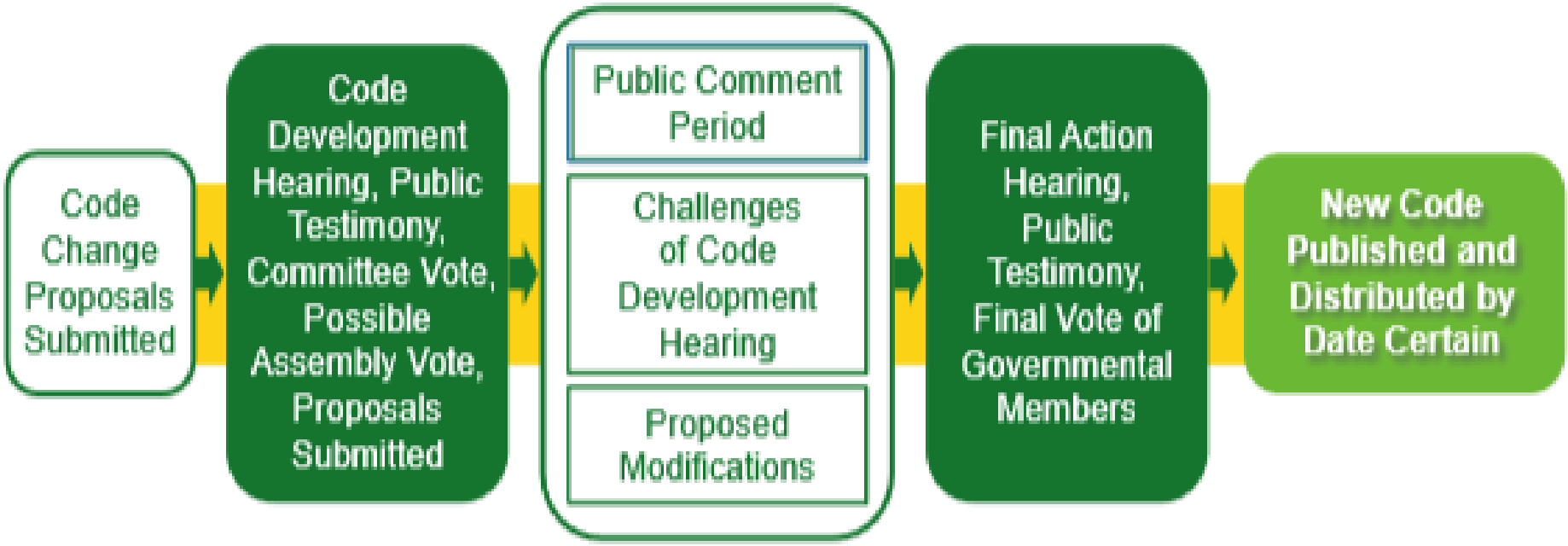
Code of Hammurabi – 1754 BC

- 282 Laws – contract, wages, inheritance, construction…

- #229. If a builder build a house for some one, and does not construct it properly, and the house which he built fall in and kill its owner, then that builder shall be put to death. #230. If it kill the son of the owner the son of that builder shall be put to death.



IECC Code Development Process at National Level



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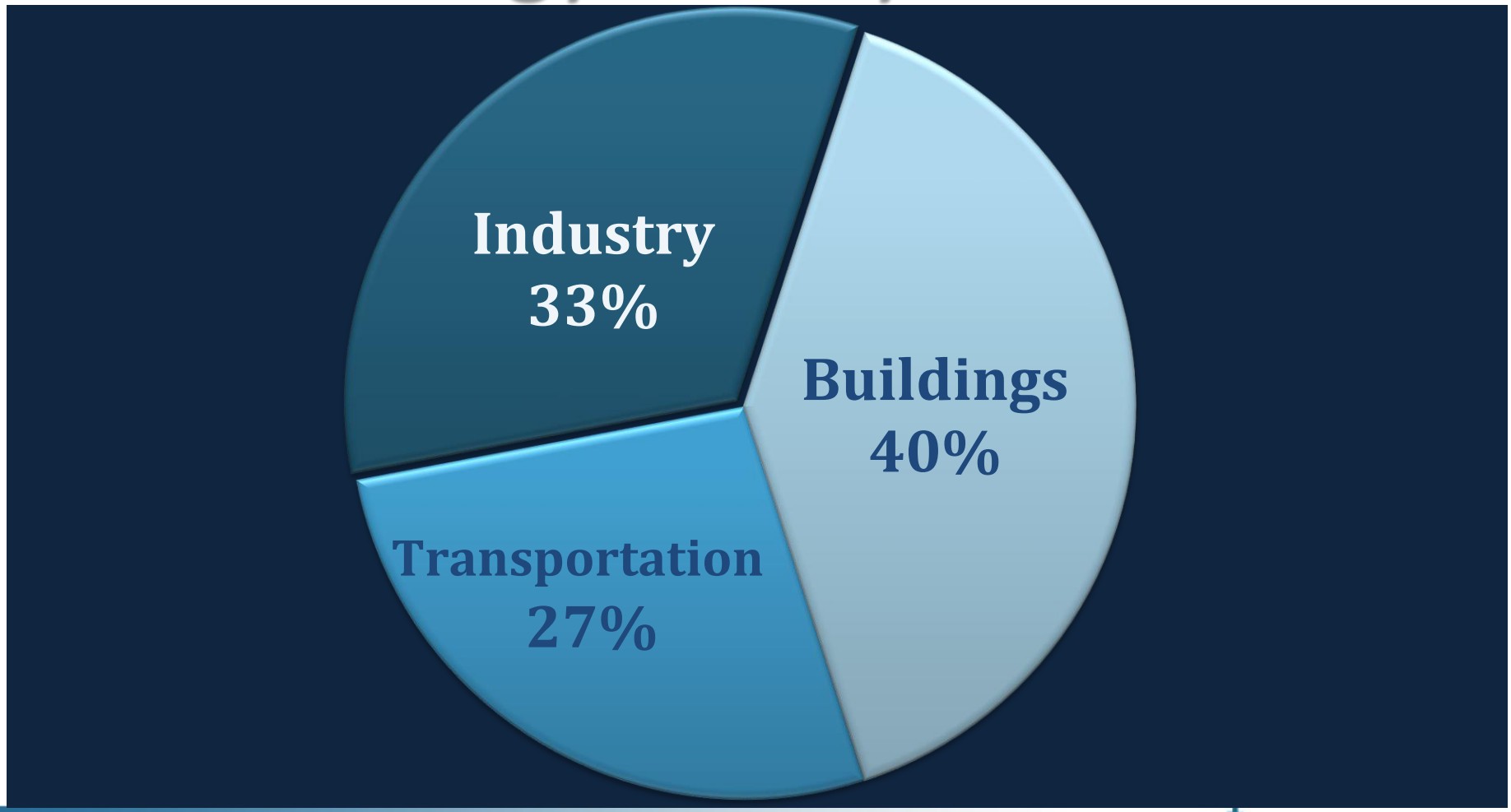
Energy Use by Sector



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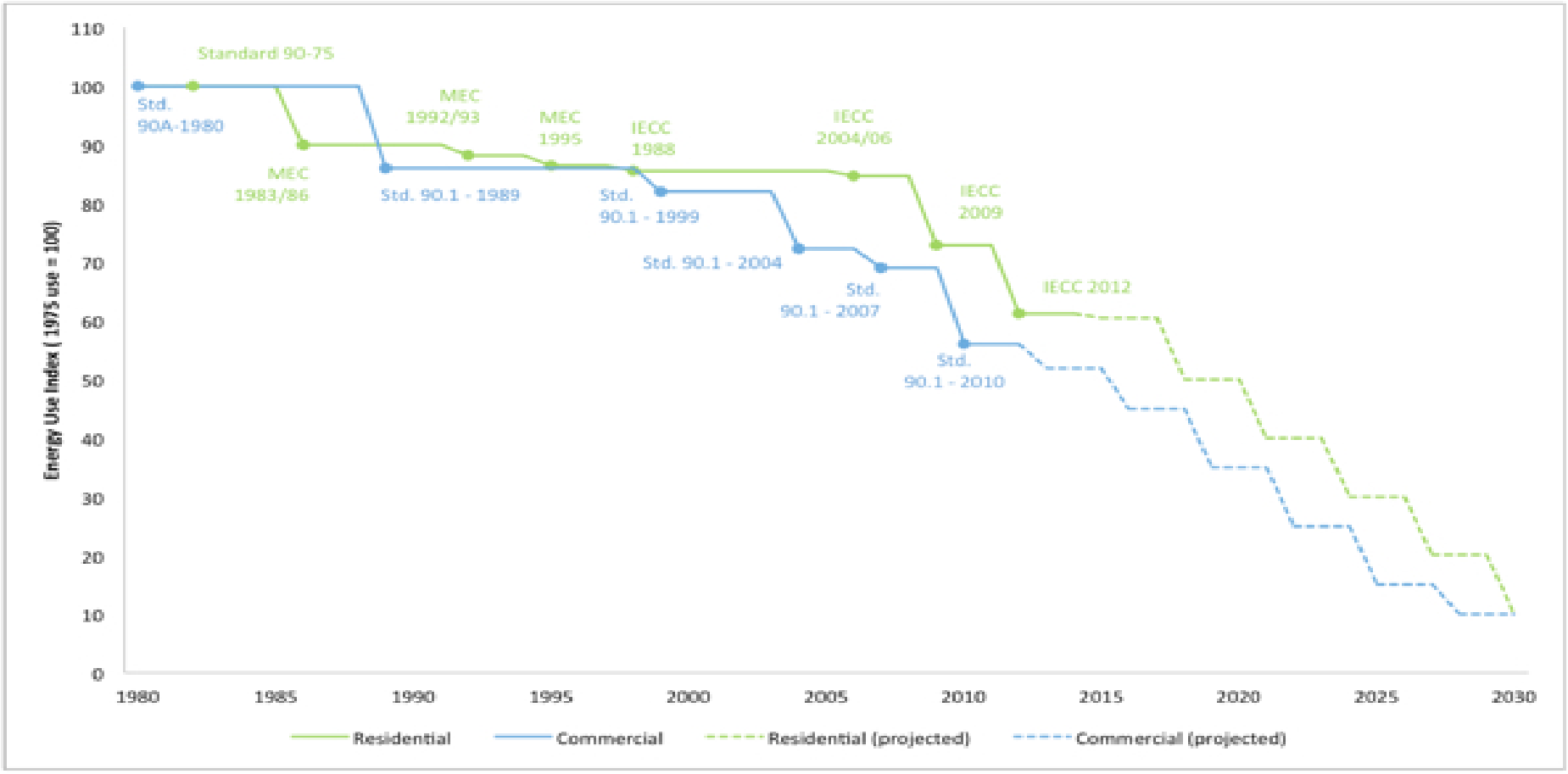
History of U.S. Energy Code Revisions



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Why Care About Energy Use in Buildings

4 of the top 5 fastest growing cities are in Texas

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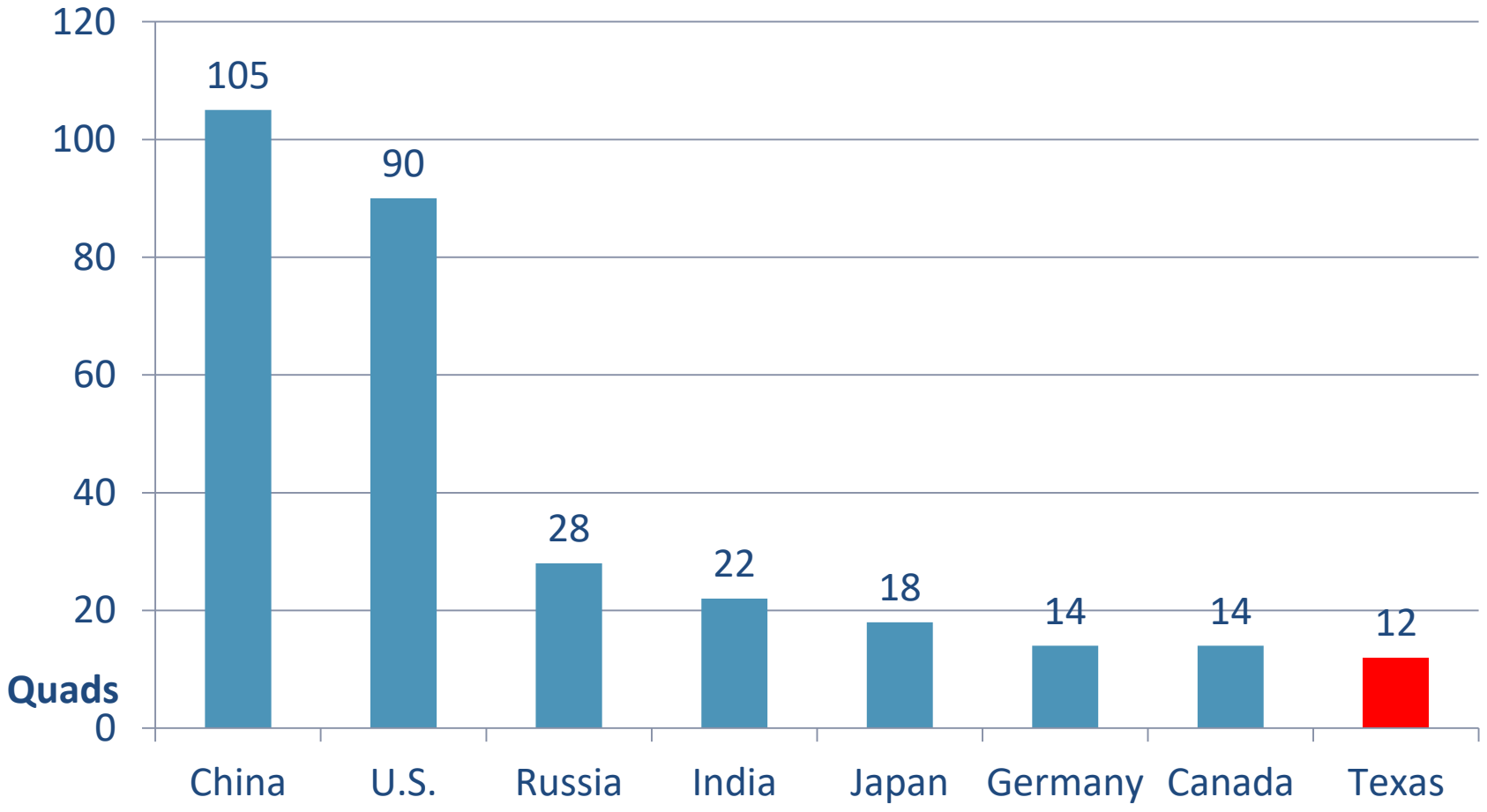
Texas Energy Consumption



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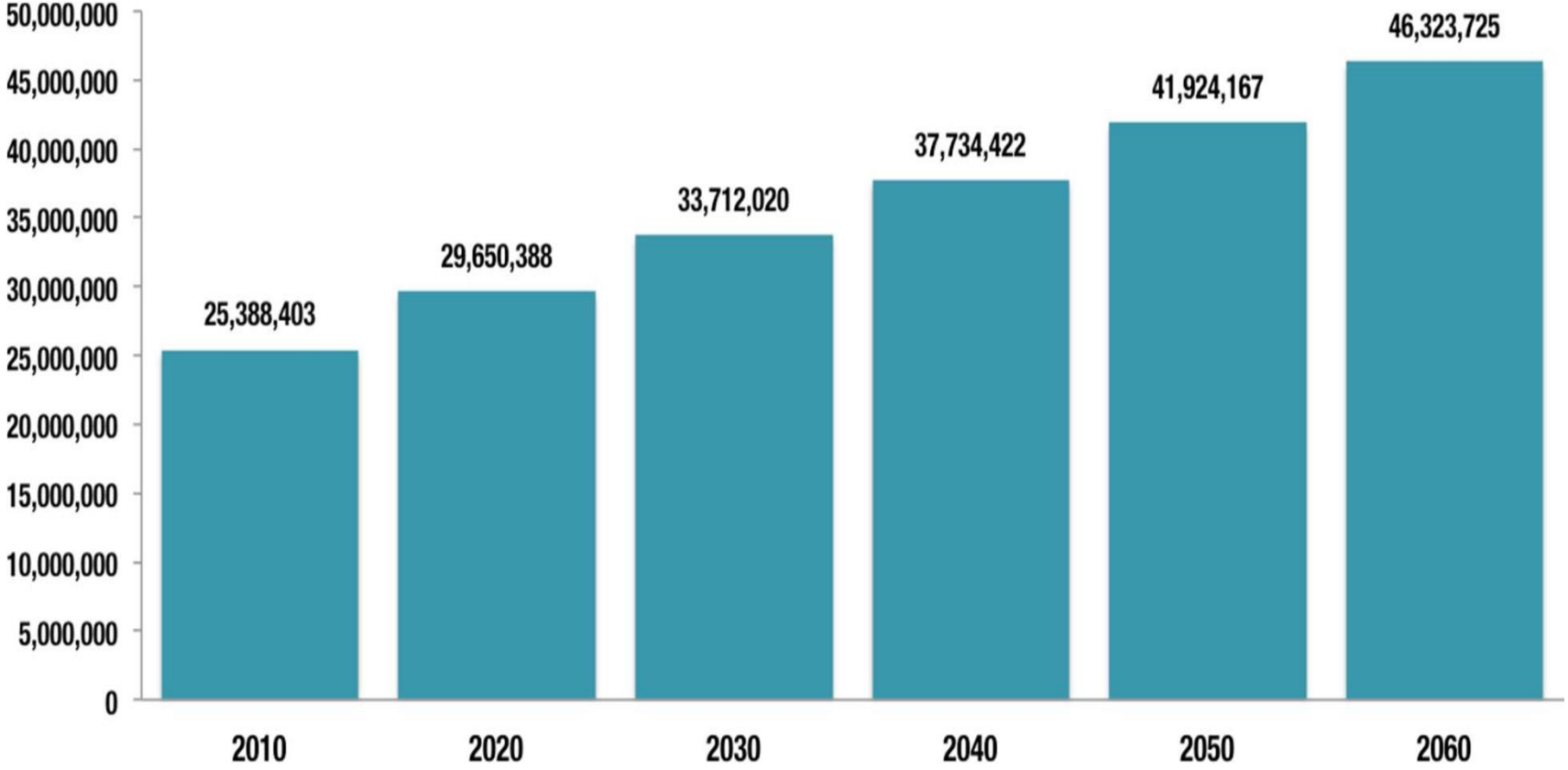
Projected TX Population Growth



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Benefits of Building Energy Codes

$ Net Savings: Homeowners

Health & Comfort

$ Savings: Public

Environmental

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Homebuyer Cash Flow – Climate Zone 2

	Incremental Cost of moving from 2009 IECC to 2012 IECC = $1,995 + $32 for 2015 IECC	**Annual**	**Monthly**
A	Downpayment and other up-front costs (one time)	$ 165.00	N/A
B	Energy Savings (year one)	$ 207.00	$ 17.25
C	Mortgage increase	$ 90.00	$ 7.50
D	Net cost of mortgage interest deductions, mortgage insurance, and property taxes (year one)	$ 4.00	$ 0.33
E	Net Cash Flow (Savings) =[B-(C+D)]	$ 113.00	$ 9.42
F	Years to positive savings, including up front costs =[A/E]	1.5	N/A

*Cost-*Effectiveness Analysis of the 2009 and 2012 IECC Residential Provisions – Technical Support Document, April, 2013* and *National Cost-Effectiveness of the Residential Provisions of the 2015 IECC, June 2015.*

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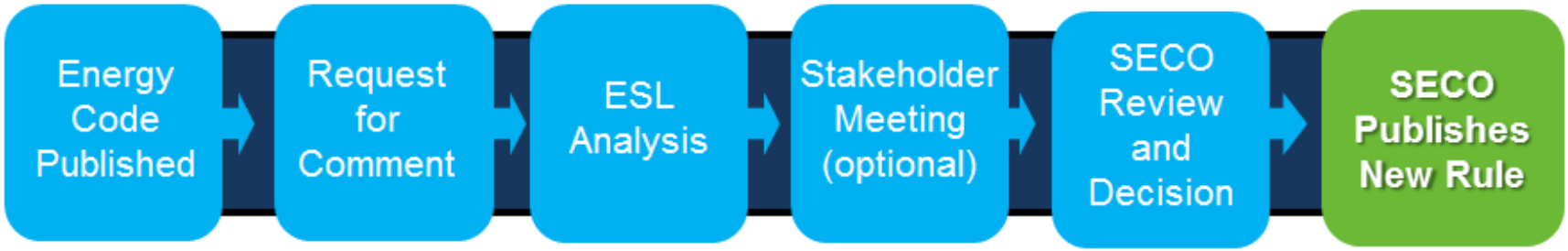
Adoption of Codes in Texas

- SECO has the authority to adopt new editions of International Energy Codes

Chapter 388: Texas Building Energy

§388.003 – The State Energy Conservation Office (SECO) has the authority to determine, based on the recommendations of Texas A&M Energy Systems Laboratory (ESL), whether to adopt more stringent editions of the IECC and IRC, Chapter 11.



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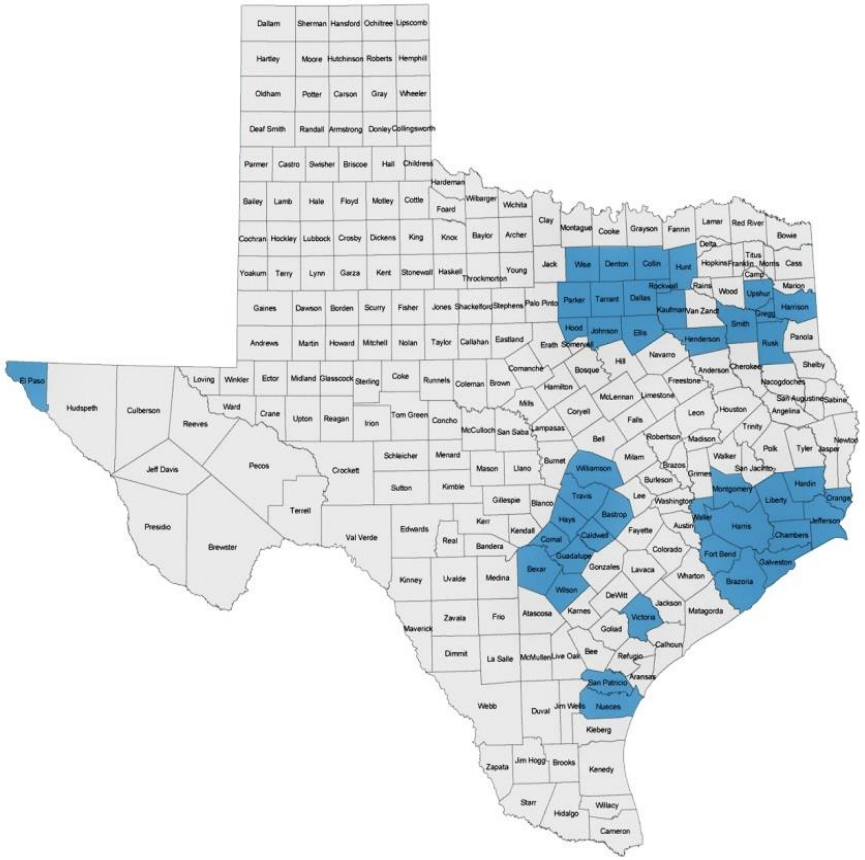
34 Texas Administrative Code §19.53

Effective November 1, 2016, the International Energy Conservation Code, as it existed on May 1, 2015, is adopted as the energy code for use in this state for all residential, commercial, and industrial construction that is not single-family residential construction under subsection (a) of this section.

Local Ordinances

- Texas is a “home rule” state allowing local jurisdictions to adopt amendments to the energy code.
- To amend the state code in non-attainment and affected counties, the amended code must be as stringent as the existing state codes.
- Local jurisdictions are responsible for building energy code implementation and enforcement.



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Updating Compliance by Jurisdictions

220 of the Largest Cities	2014	2015	2016	2017	2018
Earlier than 2009 E-code	48	28	24	19	12
Adopted 2009 E-code	108	98	68	46	16
Adopted 2012 E-code	64	86	65	54	37
Adopted 2015 E-code		8	63	101	152*

– current as of 9/17/18

Overview

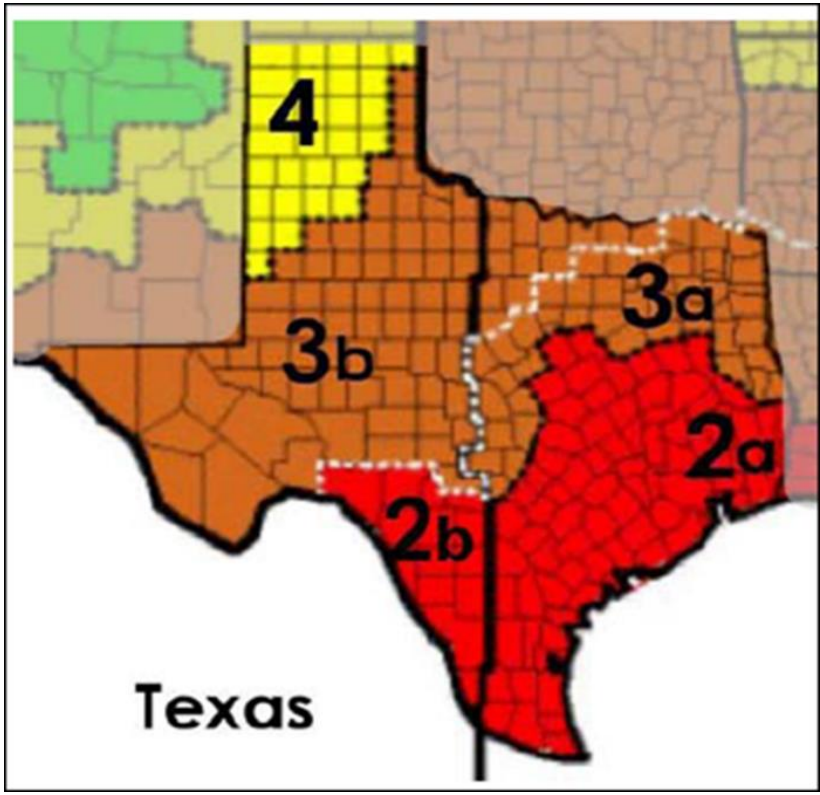
- 2015 IECC- Ch. 1 & 3 General Requirements
  - Climate Zones
  - Construction Documents
- 2015 IECC- Ch. 4 Commercial Energy Efficiency
  - C401 General
  - C402 Building Envelope Requirements
  - C403 Building Mechanical Systems
  - C404 Service Water Heating
  - C405 Electrical Power and Lighting Systems
  - C406 Additional Efficiency Package Options
  - C407 Total Building Performance
  - C408 System Commissioning
- 2015 IECC- Ch. 5 Existing Buildings

Texas Climate Zones

Texas includes climate zones 2, 3 and 4.Climate zones are based on historical heating and cooling degree days and precipitation

Climate Zones:

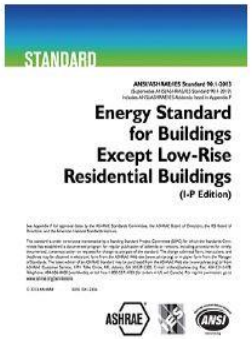
2A	Hot-humid
2B	Hot-dry
3A	Warm-humid
3B	Warm-dry
4B	Mixed-dry



IECC Commercial Compliance Options

1

- ASHRAE **90.1-2013**



OR

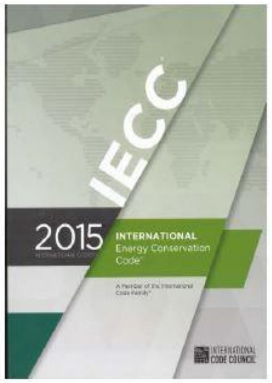
2

2015 IECC - **Prescriptive**

- C402 - Envelope
- C403 - Mechanical
- C404 - SWH
- C405 - Lighting

AND

- Pick One Efficiency Option in C406:



OR

3

2015 IECC - **Performance**

- C407 – Total Building Performance
- C402.5 – Air Leakage
- C403.2 – Provisions applicable to all mechanical systems
- C404 - SWH
- Lighting Mandatory Sections
  - **C405.2**
  - C405.3
  - **C405.4**
  - C405.6
- Building energy cost to be ≤ 85% of standard reference design building

Component Performance Alternative

(C402.1.5)

Alternative component performance path for commercial buildings allows trade-offs among *building envelope* components.

A + B + C + D + E ≤ Zero

(Equation 4-2)

A = Sum of the (UA Dif) values
B = Sum of the (FL Dif) values
C = Sum of the (CA Dif) values
D = (DA · UV) - (DA · U_{Wall}), but not less than zero
E = (EA · US) - (EA · U_{Roof}), but not less than zero

Prescriptive Tables

OPAQUE THERMAL ENVELOPE INSULATION

CLIMATE ZONE	1		2		3		4
	All other	Group R	All other	Group R	All other	Group R	A
Insulation entirely above roof deck	R-20ci	R-25ci	R-25ci	R-25ci	R-25ci	R-25ci	
Metal buildings[b]	R-19 + R-11 LS	R-19 + R-11 LS	R-19 + R11 LS	R-19 + R-11 LS	R-19 + R-11 LS	R-19 + R-11 LS	R
Attic and other	R-38	R-38	R-38	R-38	R-38	R-38	
Mass	R-5.7ci[c]	R-5.7ci[c]	R-5.7ci[c]	R-7.6ci	R-7.6ci	R-9.5ci	
Metal building	R-13+ R-6.5ci	R-13 + R-6.5ci	R13 + R-6.5ci	R-13 + R-13ci	R-13 + R-6.5ci	R-13 + R-13ci	
Metal framed	R-13 + R-5ci	R-13 + R-5ci	R-13 + R-5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	
Wood framed and other	R-13 + R-3.8ci or R-20	R-13 + R-3.8ci or R-20	R-13 + R-3.8ci or R-20	R-13 + R-3.8ci or R-20	R-13 + R-3.8ci or R-20	R-13 + R-3.8ci or R-20	R

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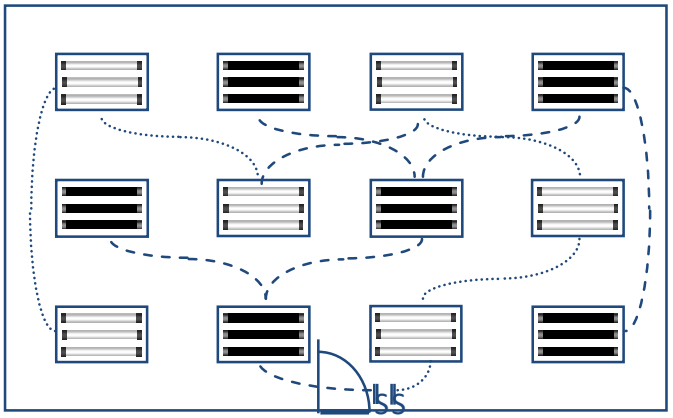
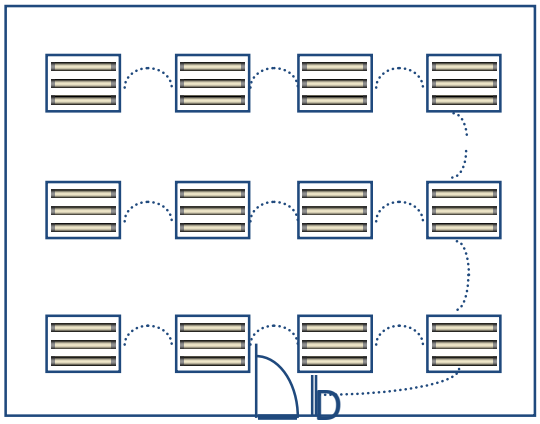
Light Reduction Controls

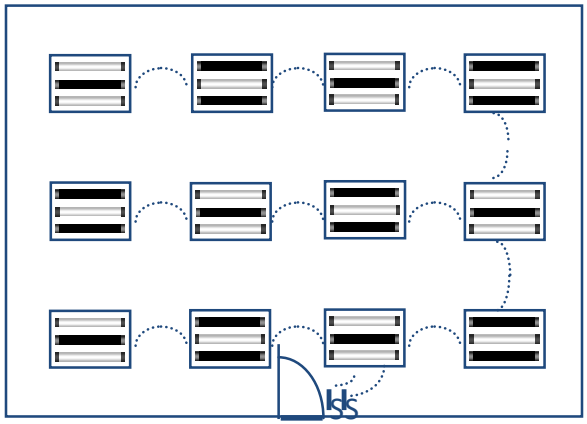
Alternating Luminaires



Alternate Dimming



Alternating Lamps



Exceptions:

- *Areas with only one luminaire*
- *Areas controlled by occupancy sensor*
- *Lighting in daylight zones w/controls*
- *Corridors, storerooms, restrooms or public lobbies*
- *Spaces with <0.6 w/ft2*
- *Spaces with one luminaire < 100 W*

Vertical and Horizontal Transportation Systems and Equipment (C405.9)

Elevators

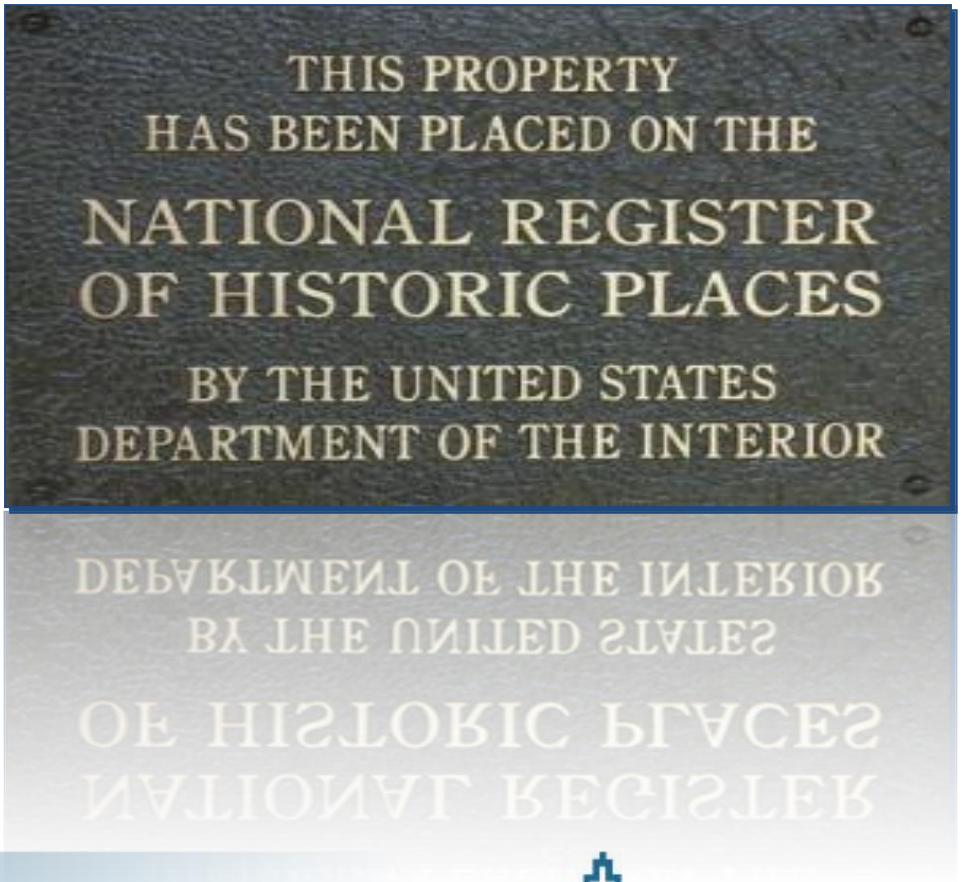
- Luminaires ≥ 35 lumens/watt
- ventilation fans ≤ 1/3 watts/cfm
- Controls to de-energize fans & lighting after 15 minutes of nonuse

Escalators & moving walks

- ASME's Safety Code for Elevators and Escalators
- Automatic speed reduction
- Variable frequency regenerative drive (750#)

Existing Buildings

- Additions
- Alterations
- Repairs
- Buildings designated as historic



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Historic Buildings

C501.6 Historic buildings. No provisions of this code relating to the construction, *repair, alteration*, restoration and movement of structures, and *change of occupancy* shall be mandatory for *historic buildings* provided a report has been submitted to the *code official* and signed by a *registered design professional*, or a representative of the State Historic Preservation Office or the historic preservation authority having jurisdiction, demonstrating that compliance with that provision would threaten, degrade or destroy the historic form, fabric or function of the building.

Existing Buildings
Section C502 - Additions

Any nonconditioned space that is altered to become conditioned space shall be required to be brought into full compliance with this code

Examples:

- ✓ Converting part of an unconditioned warehouse to office space
- ✓ Shell building tenant build-out

Existing Buildings
Section C503 - Alterations

Code applies to any new construction

Unaltered portion(s) do not need to comply

Alterations comply with ASHRAE 90.1-2013 do not need to comply with C402-C405

Vertical Fenestration and Skylight Area similar to requirements for additions

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Section C503.2 – Change in Occupancy

Spaces undergoing a change in occupancy that would result in an increase in demand for either fossil fuel or electrical energy shall comply with this code

Intent of the Code

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Thank You
Questions?

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