New Climate Zones in the IECC 2004 Supplement and ASHRAE Standard 90.1-2004

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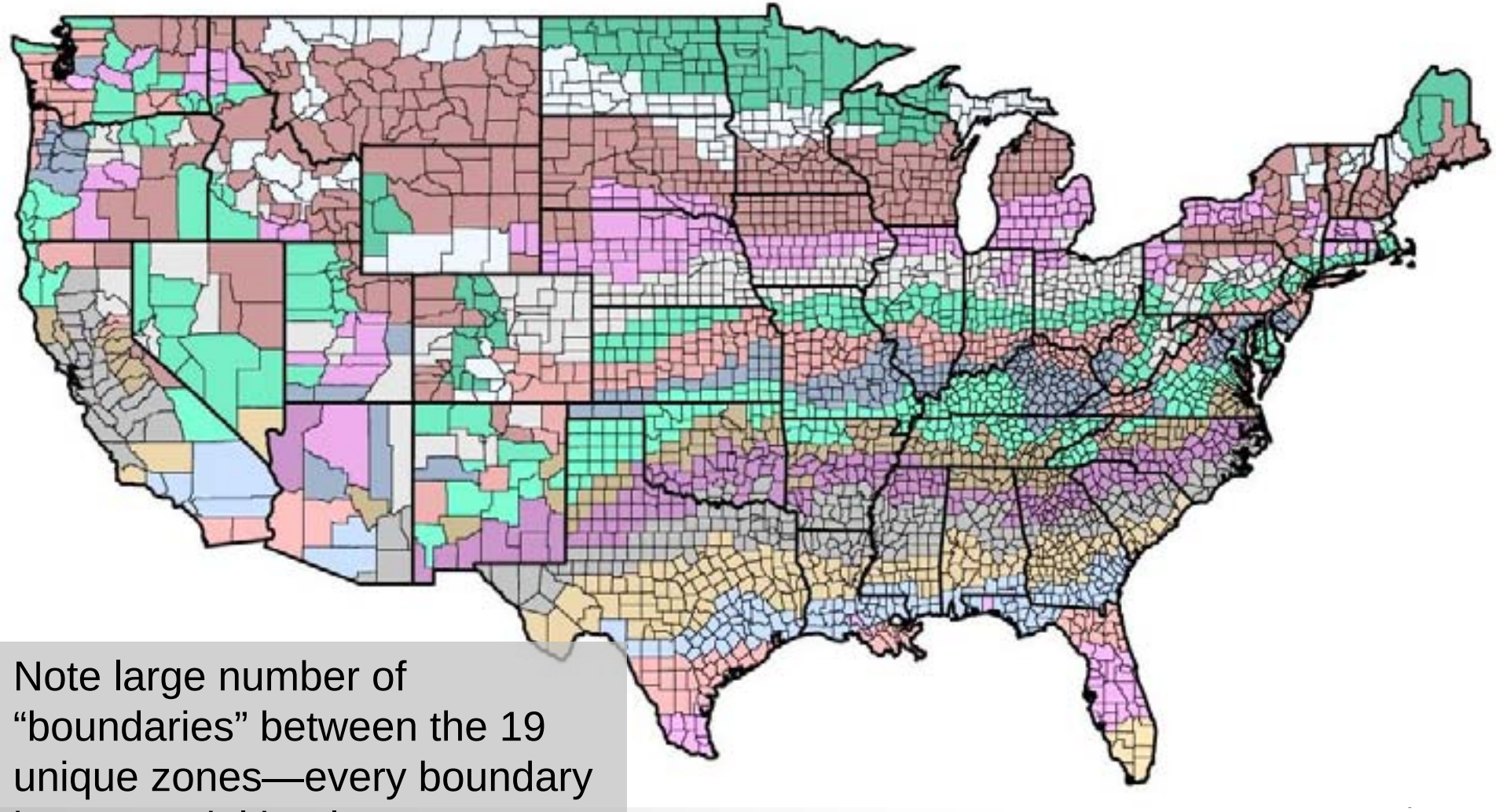
Why Did DOE Change the Climate Basis?

- Old scheme
  - ASHRAE 90.1 based on HDD(65) and CDD(50) – 26 zones
    - No geopolitical boundaries
    - Climate data required for all locations
  - IECC based on HDD65-based county aggregations – 33 zones
    - Originally developed as compliance tools for residential
    - Subdivided into “a, b, c” categories to account for cooling, solar
  - Residential and commercial “zones” differed
- New scheme (shared by ASHRAE, IECC)
  - All boundaries on state/county lines
  - Good climate differentiation with fewer overall zones
  - Cooling and moisture directly considered
  - No climate data required (in U.S.)
  - Residential and commercial use the same zones

Climate Zones—Before (ASHRAE 90.1 zones were degree-day bins)

	HDD65											
CDD50	0-900	901-1800	1801-2700	2701-3600	3601-5400	5401-7200	7201-9000	9001-10800	10801-12600	12601-16200	16201-19800	19801+
10801+	1											
9001-10800	2											
7201-9000	3	5										
5401-7200	4	6	8	10								
3601-5400		7	9	11	13	16						
1801-3600				12	14	17	19	21				
0-1800					15	18	20	22	23	24	25	26

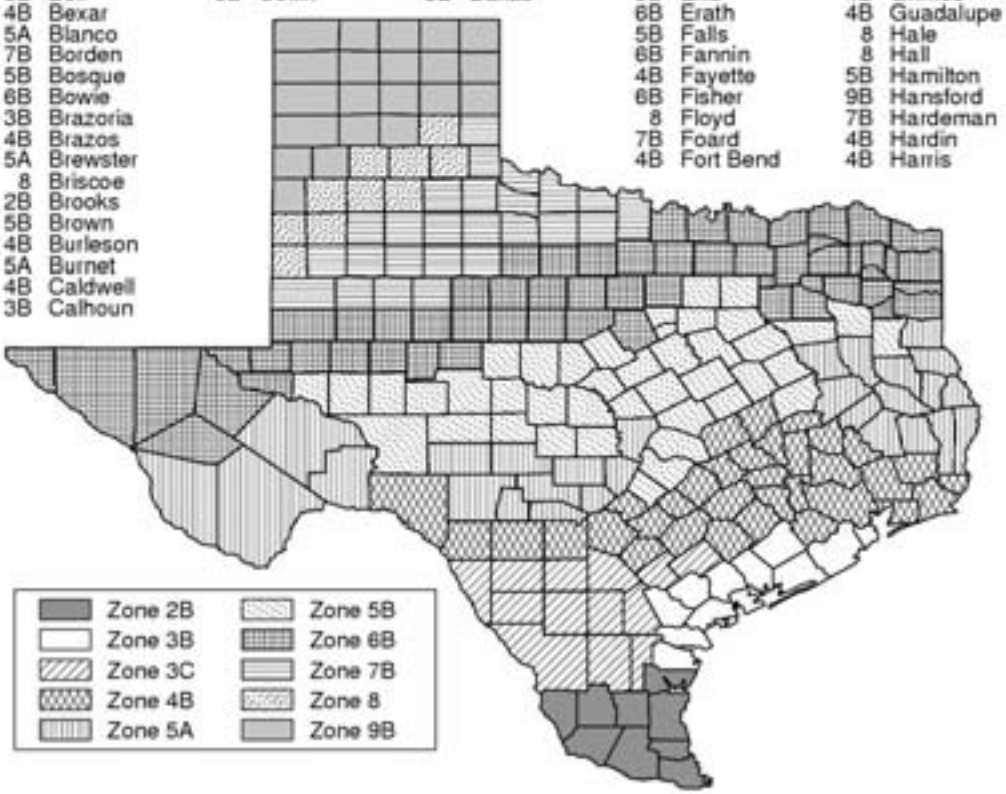
Climate Zones—Before
(IECC: 19 HDD-based zones shown)



Note large number of "boundaries" between the 19 unique zones—every boundary is a potential battle

Climate Zones—Before
(IECC: "a,b,c" overlay raises 19 zones to 33)

Zone	County
5A	Anderson
6B	Andrews
5A	Angelina
3B	Aransas
7B	Archer
9B	Armstrong
3C	Atascosa
4B	Austin
9B	Bailey
5A	Bandera
4B	Bastrop
7B	Baylor
3B	Bee
5B	Bell
4B	Bexar
5A	Blanco
7B	Borden
5B	Bosque
6B	Bowie
3B	Brazoria
4B	Brazos
5A	Brewster
8	Briscoe
2B	Brooks
5B	Brown
4B	Burleson
5A	Burnet
4B	Caldwell
3B	Calhoun
6B	Callahan
2B	Cameron
6B	Camp
9B	Carson
6B	Cass
9B	Castro
4B	Chambers
5A	Cherokee
7B	Childress
7B	Clay
8	Cochran
6B	Coke
5B	Coleman
6B	Collin
7B	Collingsworth
4B	Colorado
4B	Comal
5B	Comanche
5B	Concho
6B	Cooke
5B	Coryell
7B	Cottle
5B	Crane
5B	Crockett
7B	Crosby
6B	Culberson
9B	Dallam
5B	Dallas
7B	Dawson
3C	De Witt
9B	Deaf Smith
6B	Delta
6B	Denton
7B	Dickens
3C	Dimmit
8	Donley
3C	Duval
6B	Eastland
6B	Ector
5A	Edwards
6B	El Paso
5B	Ellis
6B	Erath
5B	Falls
6B	Fannin
4B	Fayette
6B	Fisher
8	Floyd
7B	Foard
4B	Fort Bend
6B	Franklin
5B	Freestone
3C	Frio
7B	Gaines
3B	Galveston
7B	Garza
5A	Gillespie
6B	Glasscock
3B	Goliad
4B	Gonzales
9B	Gray
6B	Grayson
6B	Gregg
4B	Grimes
4B	Guadalupe
8	Hale
8	Hall
5B	Hamilton
9B	Hansford
7B	Hardeman
4B	Hardin
4B	Harris
6B	Harrison
9B	Hartley
6B	Haskell
5B	Hays
9B	Hemphill
5B	Henderson
2B	Hidalgo
5B	Hill
8	Hockley
5B	Hood
6B	Hopkins
5A	Houston
6B	Howard
6B	Hudspeth
6B	Hunt
9B	Hutchinson
5B	Irion
6B	Jack
3B	Jackson
5A	Jasper
6B	Jeff Davis
4B	Jefferson
2B	Jim Hogg
3C	Jim Wells
5B	Johnson
6B	Jones
3C	Karnes
6B	Kaufman
5A	Kendall
2B	Kenedy
7B	Kent
5A	Kerr
5A	Kimble
7B	King
4B	Kinney
2B	Kleberg
7B	Knox
3C	La Salle
6B	Lamar
8	Lamb
5B	Lampasas
4B	Lavaca
4B	Lee
5B	Leon
4B	Liberty
5B	Limestone
9B	Lipscomb
3C	Live Oak
5B	Llano
6B	Loving
7B	Lubbock
7B	Lynn
4B	Madison
6B	Marion
6B	Martin
5B	Mason
3B	Matagorda
3C	Maverick
5B	Mcculloch
5B	Mclennan
3C	Mcmullen
4B	Medina
5B	Menard
6B	Midland
4B	Milam
5B	Mills
6B	Mitchell
6B	Montague
4B	Montgomery
9B	Moore
6B	Morris
7B	Motley
5A	Nacogdoches
5B	Navarro
5A	Newton
6B	Nolan
3B	Nueces
9B	Ochiltree
9B	Oldham
4B	Orange
6B	Palo Pinto
5A	Panola
6B	Parker
9B	Parmer
5A	Pecos
5A	Polk
9B	Potter
5A	Presidio
6B	Rains
9B	Randall
5B	Reagan
5A	Real
6B	Red River
6B	Reeves
3B	Refugio
9B	Roberts
4B	Robertson
6B	Rockwall
5B	Runnels
5B	Rusk
5A	Sabine
5A	San Augustine
4B	San Jacinto
3B	San Patricio
5B	San Saba
5B	Schleicher
7B	Scurry
6B	Shackelford
5A	Shelby
9B	Sherman
5B	Smith
5B	Somervell
2B	Starr
6B	Stephens
6B	Sterling
7B	Stonewall
5A	Sutton
8	Swisher
5B	Tarrant
6B	Taylor
5A	Terrell
7B	Terry
6B	Throckmorton
6B	Titus
5B	Tom Green
5B	Travis
5A	Trinity
5A	Tyler
6B	Upshur
5B	Upton
4B	Uvalde
4B	Val Verde
6B	Van Zandt
3B	Victoria
4B	Walker
4B	Waller
6B	Ward
4B	Washington
3C	Webb
3B	Wharton
9B	Wheeler
7B	Wichita
7B	Wilbarger
2B	Willacy
5B	Williamson
4B	Wilson
6B	Winkler
6B	Wise
6B	Wood
8	Yoakum
6B	Young
2B	Zapata
3C	Zavala

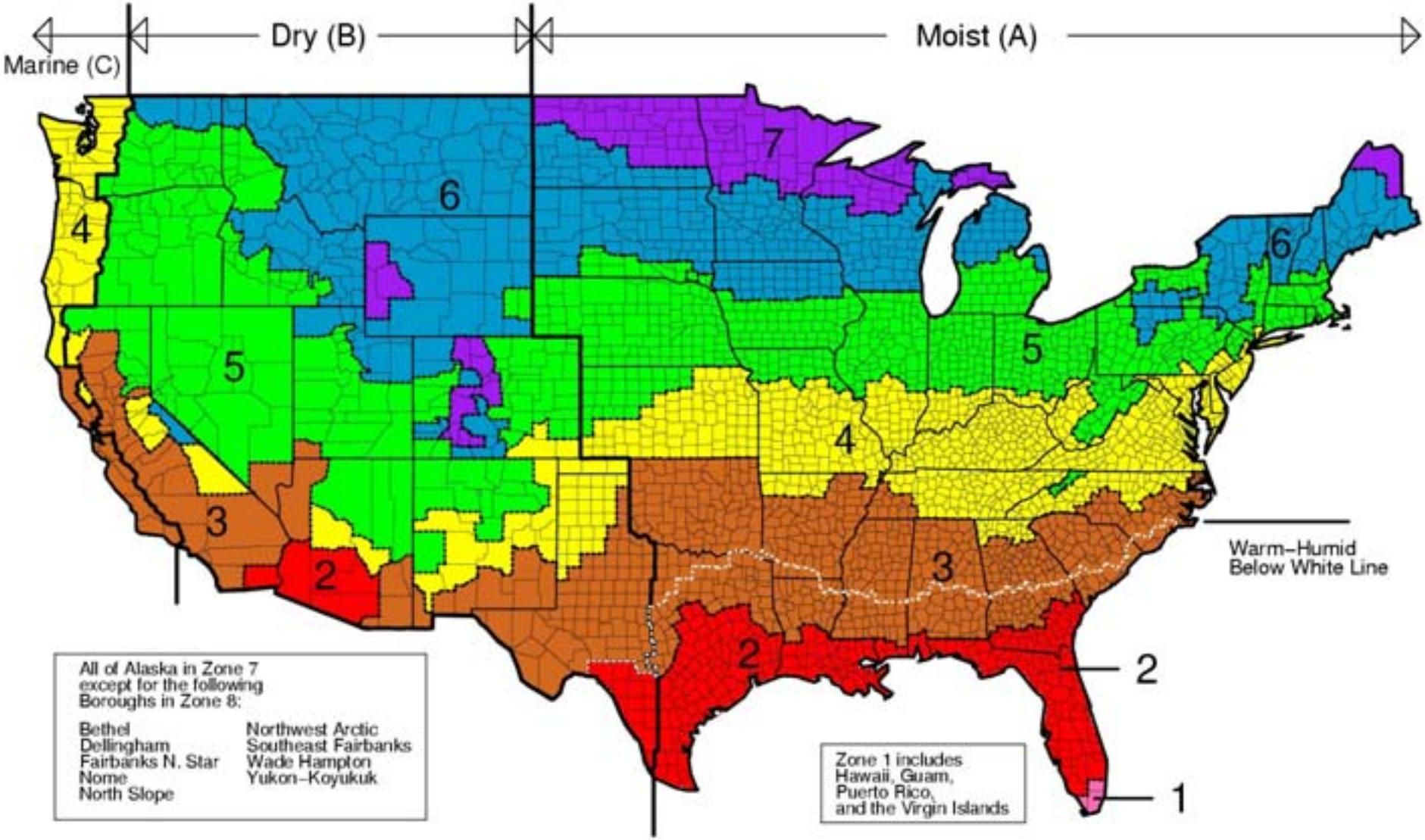


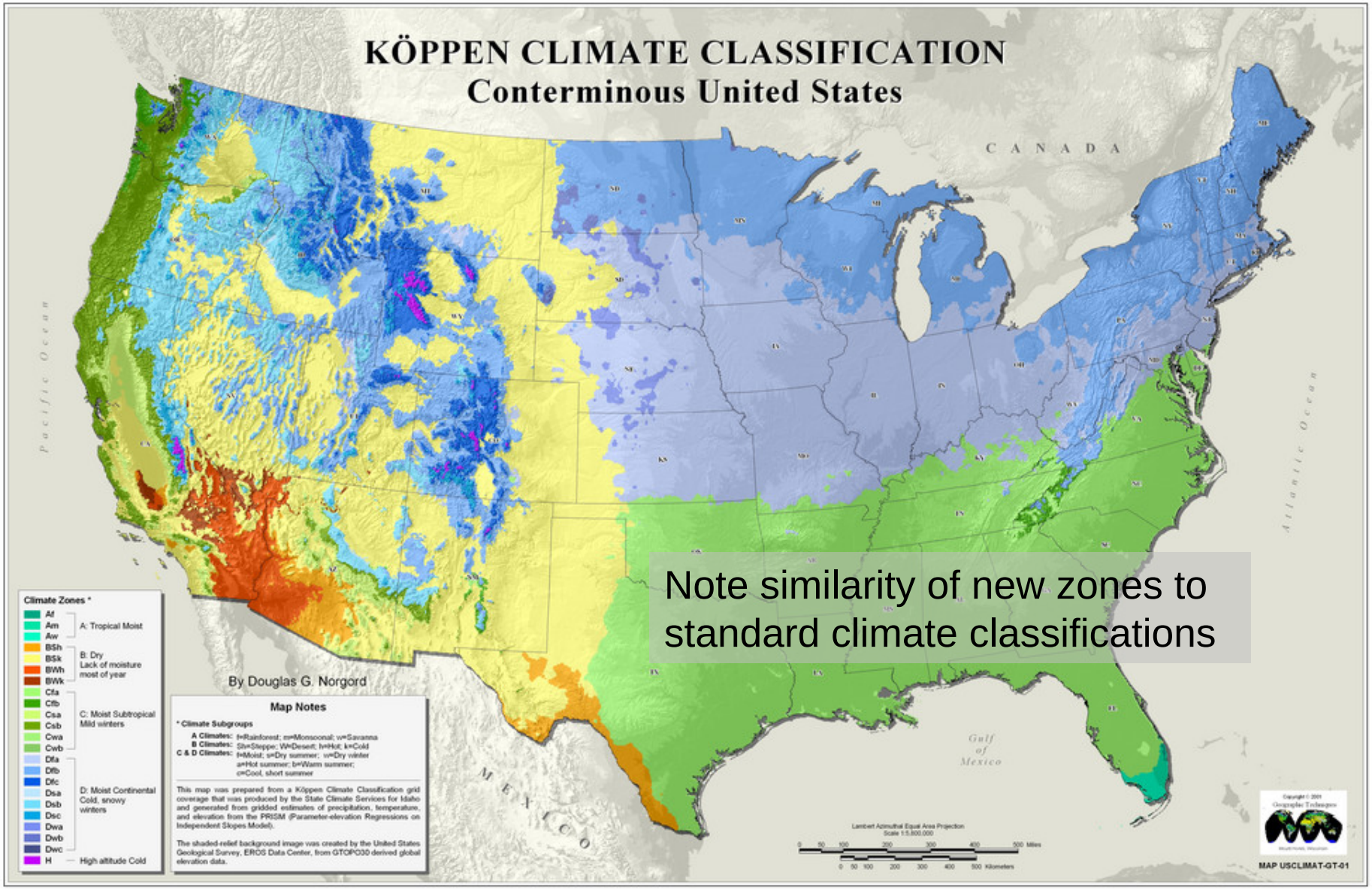
COMcheck-EZ Climate Map

U.S. Department of Energy - Building Standards and Guidelines Program

Version 2.1, April 2000

Climate Zones—After





Note similarity of new zones to standard climate classifications

Climate Zones—After

- 8 temp regions x 3 moisture regimes = 24 theoretical zones
  - Only 17 actually occur in the U.S.
  - Moisture regimes don't apply to zones 7 & 8, so there are actually <u>15 unique zones in the U.S.</u>
- Most code requirements don't distinguish by moisture regime, so there are usually <u>8 zones to think about</u>
- Not all code requirements differ between all zones, leaving, in residential for example, <u>7 unique code-related zones</u>

Mapping from HDD-based Zones to New Zones (each cell shows the number of cities)

New Zone Number

Old Zone Number

	1	2	3	4	5	6	7	8
1	799	250	0	0	0	0	0	0
2	0	1481	0	0	0	0	0	0
3	0	2756	227	0	0	0	0	0
4	0	5305	2052	0	0	0	0	0
5	0	1031	6410	0	0	0	0	0
6	0	0	13405	0	0	0	0	0
7	0	0	10764	1299	0	0	0	0
8	0	0	3768	7419	0	0	0	0
9	0	0	317	14473	0	0	0	0
10	0	0	39	15370	154	0	0	0
11	0	0	0	12539	2137	0	0	0
12	0	0	0	659	15469	56	0	0
13	0	0	0	0	12044	0	0	0
14	0	0	0	0	9426	427	0	0
15	0	0	0	0	1927	12744	62	0
16	0	0	0	0	0	2631	350	0
17	0	0	0	0	0	125	2605	16
18	0	0	0	0	0	0	11	113
19	0	0	0	0	0	0	0	163

Mapping from ASHRAE HDD/CDD Bins to New Zones (each cell shows the number of cities)

	New Zone														
	Zone 1	Zone 2		Zone 3			Zone 4			Zone 5		Zone 6		Zone 7	Zone 8
Old Zone	Moist	Moist	Dry	Moist	Dry	Marine	Moist	Dry	Marine	Moist	Dry	Moist	Dry		
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	489	70	0	0	0	0	0	0	0	0	0	0	0	0	0
3	234	1279	0	0	0	0	0	0	0	0	0	0	0	0	0
4	49	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	0	1299	1018	3	175	0	0	25	0	0	6	0	0	0	0
6	0	4099	154	50	416	1	0	0	0	0	0	0	0	0	0
7	7	0	0	0	440	13	0	0	0	0	0	0	0	0	0
8	0	2703	122	10304	806	6	0	36	0	0	5	0	0	0	0
9	10	0	25	656	818	328	0	55	0	0	3	0	0	0	0
10	0	0	1	1982	248	0	0	9	0	0	5	0	0	0	0
11	0	0	11	15139	1393	201	2809	285	1	0	53	0	2	0	0
12	0	0	1	0	61	504	0	6	6	0	1	0	0	0	0
13	0	0	0	2833	133	0	27909	828	1	573	174	0	11	0	0
14	0	0	41	3	203	80	13028	487	1657	1759	720	0	8	0	0
15	9	0	0	0	0	57	0	0	710	0	0	0	0	0	0
16	0	0	0	0	0	0	297	0	0	670	25	0	0	0	0
17	0	0	0	0	37	0	3021	130	25	27295	6772	1463	368	1	0
18	0	0	0	0	42	0	0	2	527	0	374	0	81	17	0
19	0	0	0	0	0	0	0	0	0	1545	128	8976	1090	145	0
20	1	0	0	0	50	0	0	31	4	104	715	1715	1393	186	0
21	0	0	0	0	0	0	0	0	0	1	0	192	50	974	0
22	0	0	0	0	0	0	0	4	3	0	86	357	234	1494	1
23	0	0	0	0	0	0	0	0	0	0	4	0	43	177	25
24	0	0	0	0	0	0	0	0	0	0	2	0	0	34	247
25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12
26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7

Climate Zones – Final Thoughts

- New zones much easier to use
- New zones designed for code purposes—inadequate for design tools
- Others have embraced the new zones
  - ASHRAE 90.2
  - Building America
  - Energy Star
- International application requires access to climate data