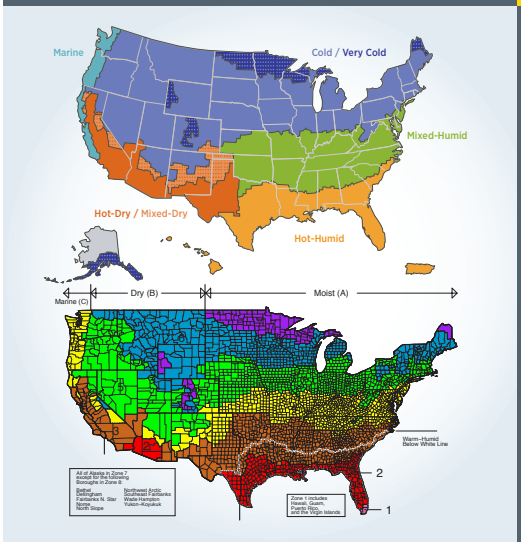


Building America researchers developed a climate zone map for the DOE based on the IECC climate zone map.

The Building America-developed climate zone map has had a profound impact on high-performance homes by, serving as a consistent framework for energy-efficiency requirements in the national model energy code starting with the 2004 IECC Supplement and the ASHRAE 90.1 2004 edition. The map also provides a critical foundation for climate-specific guidance in the widely disseminated EEBA Builder Guides and Building America Best Practice Guides.

BUILDING AMERICA TOP INNOVATIONS

Recognizing Top Innovations in Building Science – The U.S. Department of Energy's Building America program was started in 1995 to provide research and development to the residential new construction and remodeling industry. As a national center for world-class research, Building America funds integrated research in market-ready technology solutions through collaborative partnerships between building and remodeling industry leaders, nationally recognized building scientists, and the national laboratories. Building America Top Innovation Awards recognize those projects that have had a profound or transforming impact on the new and retrofit housing industries on the road to high-performance homes.

BUILDING AMERICA TOP INNOVATIONS HALL OF FAME PROFILE

INNOVATIONS CATEGORY:

4. Infrastructure Development
4.3 Informing Codes and Standards Process

Building Science-Based Climate Maps

It may not be intuitively obvious why a U.S. climate zone map is so important to the construction industry. Thanks to this Building America innovation, building science education, energy code development, and residential design can much more effectively integrate climate-specific best practices and advanced technologies across the United States.

Climate has a major impact on the energy use of residential buildings, and energy codes and standards rely on a clear definition of climate zones to convey requirements to builders. However, prior to 2004, there was no single, agreed-upon climate zone map for the United States for use with building codes. Four different methods for specifying climate-dependent requirements were used by the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) and the International Energy Conservation Code (IECC) for their residential and commercial building standards. ASHRAE used 38 climate groupings identified for 240 cities, while the IECC used 33 different climate zones based on county boundaries. In most cases, the climate data needed to determine which requirements apply were not included in the standard or code documents.

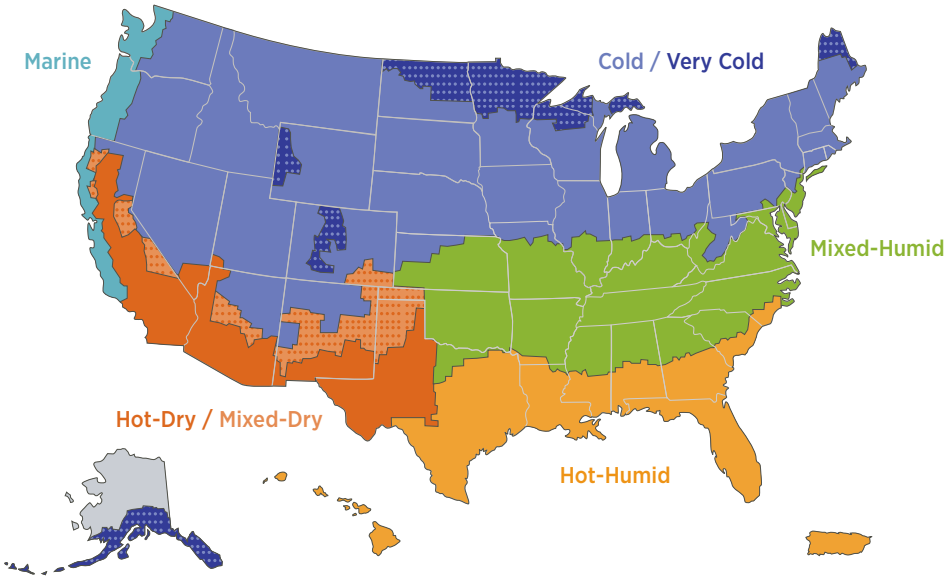
In the early 2000s, researchers at the U.S. Department of Energy's Pacific Northwest National Laboratory prepared a simplified map of U.S. climate zones. The map was based on analysis of the 4,775 U.S. weather sites identified by the National Oceanic and Atmospheric Administration as well as widely accepted classifications of world climates that have been applied in a variety of different disciplines. This PNNL-developed map divided the United States into eight temperature-oriented climate zones. These zones are further divided into three moisture regimes designated A, B, and C. Thus, the IECC map allows for up to 24 potential climate designations. The new climate zones were set along county boundaries, making it easier for builders to determine what climate zone applied to a specific building.

The 2004 IECC Supplement was the first model energy code to adopt this new climate zone map. It first appeared in ASHRAE 90.1 in the 2004 edition. The climate zone map was also adopted by ENERGY STAR for Homes in 2006.

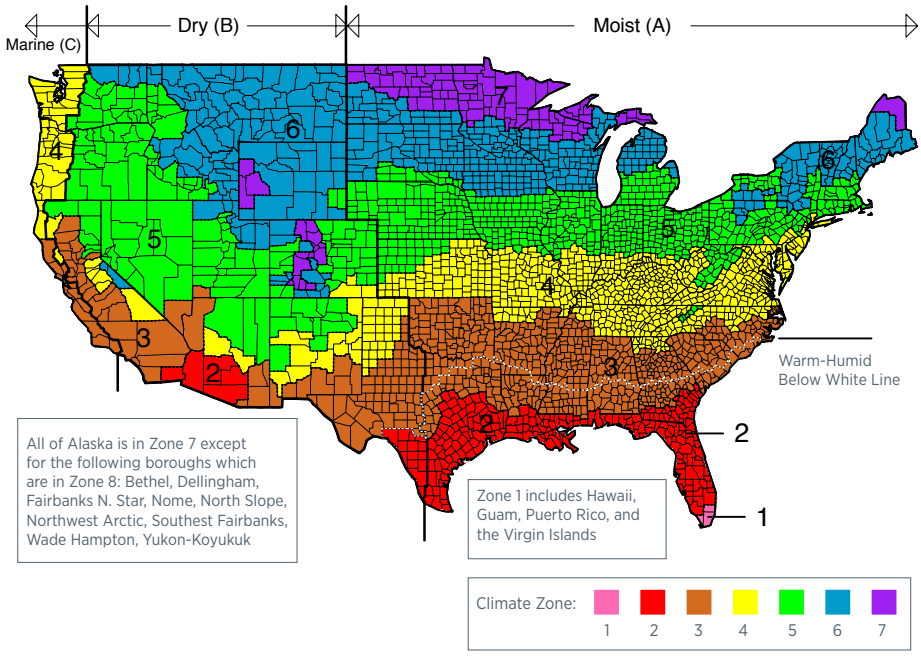
In 2003, with direction from the Building America teams, in particular Building Science Corporation, researchers at DOE's National Renewable Energy Laboratory further simplified the new IECC map for purposes of the Building America Program. They divided the map into eight climate zones based on temperature,

precipitation, and heating and cooling degree days. The zones are hot-humid, hot-dry, mixed-dry, mixed-humid, marine, cold, very cold, and subarctic. Building America prepared a guide that includes detailed definitions of each climate zone and a listing of all U.S. counties by state, indicating the climate region in which each county is located, *Building America Best Practices Series Volume 7.1: Guide to Determining Climate Regions by County* (Baechler et al. 2010).

The Building America Climate Regions



International Energy Conservation Code (IECC) Climate Regions



Building America and IECC Climate Zones

The table below shows the relationship between the Building America and IECC climate zones.

Building America	IECC
Subarctic	Zone 8 (only found in Alaska)
Very Cold	Zone 7
Cold	Zones 5 and 6
Mixed-Humid	4A and 3A counties above warm-humid line
Mixed-Dry	Zone 4B
Hot-Humid	2A and 3A counties below warm-humid line
Hot-Dry	Zone 3B
Marine	All counties with a "C" moisture regime

REFERENCES

Baechler, MC, JL Williamson, TL Gilbride, PC Cole, MG Hefty, and PM Love. 2010. *Building America Best Practices Series Volume 7.1: Guide to Determining Climate Regions by County*, http://apps1.eere.energy.gov/buildings/publications/pdfs/building_america/ba_climateguide_7_1.pdf

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Briggs, RS; RG Lucas; and ZT Taylor. 2003. "Climate Classification for Building Energy Codes and Standards: Part 1 – Development Process, and Part 2 - Zone Definitions, Maps and Comparisons," *Technical and Symposium Papers, ASHRAE Winter Meeting*, Chicago, IL, January 2003.

U.S. DEPARTMENT OF ENERGY
Energy Efficiency & Renewable Energy

DOE Building Technologies Program
www.buildings.gov

Building America Solutions Center
www.buildingamerica.gov/solutionscenter

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