



Applying International Buildings Best Practice to the United States

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2018 Buildings Rankings

| Country | Score | Rank |
|-------------|-------|------|
| Spain | 22 | 1 |
| France | 21 | 2 |
| UK | 21 | 2 |
| Netherlands | 21 | 2 |
| Germany | 20 | 5 |
| Italy | 20 | 5 |
| China | 19 | 7 |
| Poland | 18 | 8 |
| Mexico | 18 | 8 |
| Australia | 17 | 10 |
| Turkey | 16.5 | 11 |
| US | 16 | 12 |

In Buildings, only 6 points separate 1st place from 12th place

What are the prime opportunities for the US to apply best practices from top scoring countries?

Identifying Opportunities for US Buildings

| Metric | Max Points | Top Scoring Countries | US Score | Ranking |
|----------------------------------|--------------|---|------------------|--|
| Building Codes (R and C) | R: 3 C: 3 | Australia; EU Countries; South Africa; South Korea; Mexico (commercial) | R: 2.5 C: 2.5 | R: 11 th (T) C: 12 th |
| Appliance Standards | 5 | United States | 5 | 1st |
| Appliance Labels | 2 | China; EU Countries; Turkey; South Korea; Brazil | 1.5 | 12 th (T) |
| → Retrofit policies | 3 | France | 2 | 2 nd (T) |
| → Federal Incentives | 1 | EU Countries; Australia; Japan; Taiwan; China; Russia; Thailand | 0 | 14 th (T) |
| → Building Rating and Disclosure | 2 | EU Countries | 0.5 | 13 th (T) |
| Residential EUI | 3 | Mexico; China | 1 | 16 th (T) |
| Commercial EUI | 3 | Mexico; Brazil | 1 | 17 th (T) |

R = residential C = commercial T = tied

Retrofit policy best practice: France

- Targets for 2030 and 2050
- Builds on EPBD building labeling and disclosure requirements
- Residential buildings with F or G rating must complete renovations before 2025
- Every 10 years, tighter requirements will be adopted to drive ongoing improvements toward low-energy goals
- New plan (April 2018) calls for renovation of 500,000 homes per year; funding for training and family assistance
- Commercial buildings required to develop a “plan for renovation” to reduce energy use by at least 25% by 2017
- New funding allocation for retrofit of public buildings

Incentives best practice: Germany

- KfW Bank offers grants or loans for comprehensive renovations to meet specified performance levels
- Incentive tiers are graduated to encourage deeper retrofits
- Federal government grants also available for installation of heating systems using renewable resources

Lessons from international best practice

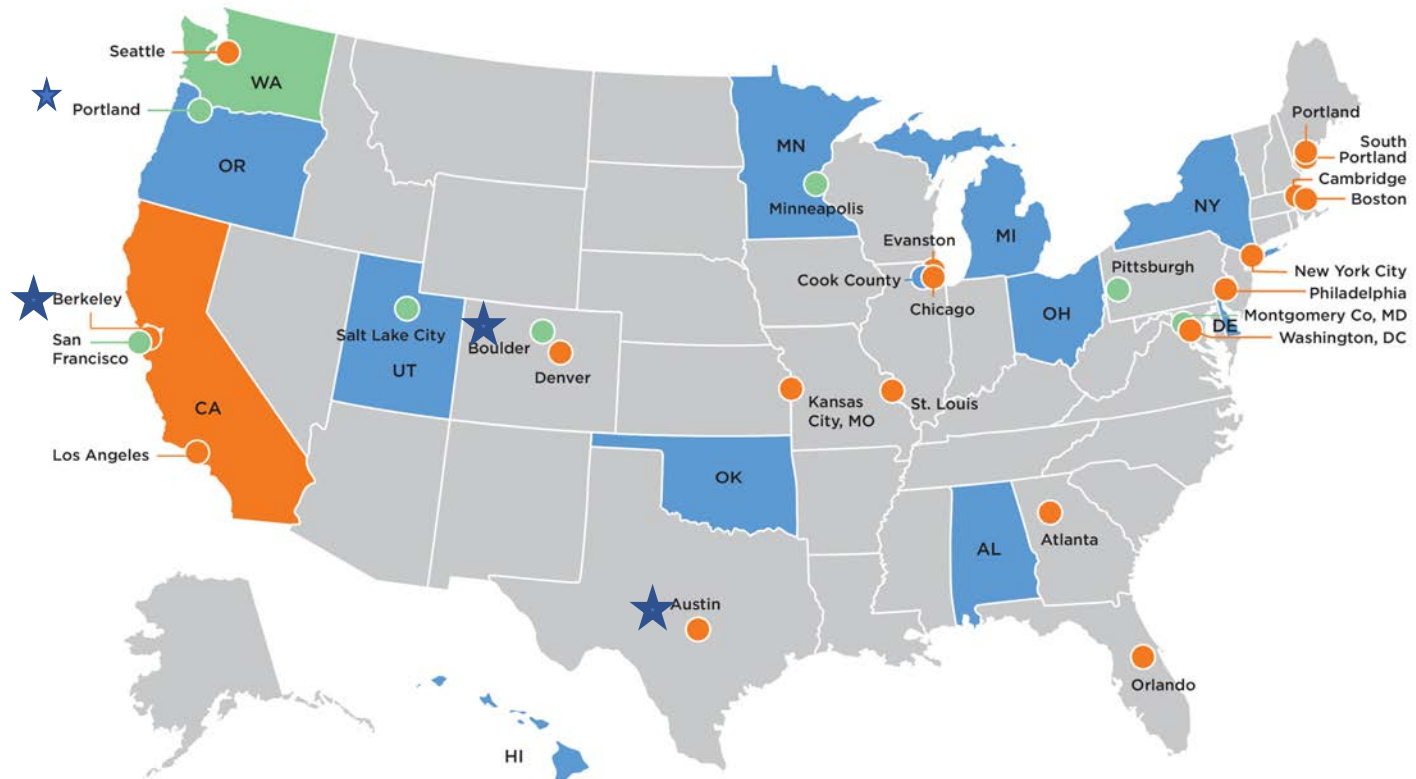
- Build on a consistent national labeling platform
- Use bold targets to drive policy action
- Promote deeper retrofits through tiered incentives and guidance for staged approach
- Combine information, incentives, and requirements to drive market actors and consumers
- Offer support for those with greatest need (low-income, small business)

Avenues to progress in US buildings

- Focus on existing buildings
 - complement success of codes & standards
 - drive greater reductions in energy intensity
- Expand state and local policy efforts
 - go where the action is and political will is greatest
 - start small and bring the market along
- Document and share state and local experience
 - build on what's working, learn from missteps
- Leverage utility and other private funds
 - ~\$7B/year in funding for energy efficiency from utilities

Building rating and disclosure

U.S. Building Benchmarking and Transparency Policies



- Public, commercial, and multifamily building benchmarking policy adopted
- Public and commercial building benchmarking policy adopted
- Public buildings benchmarked
- ★ Residential

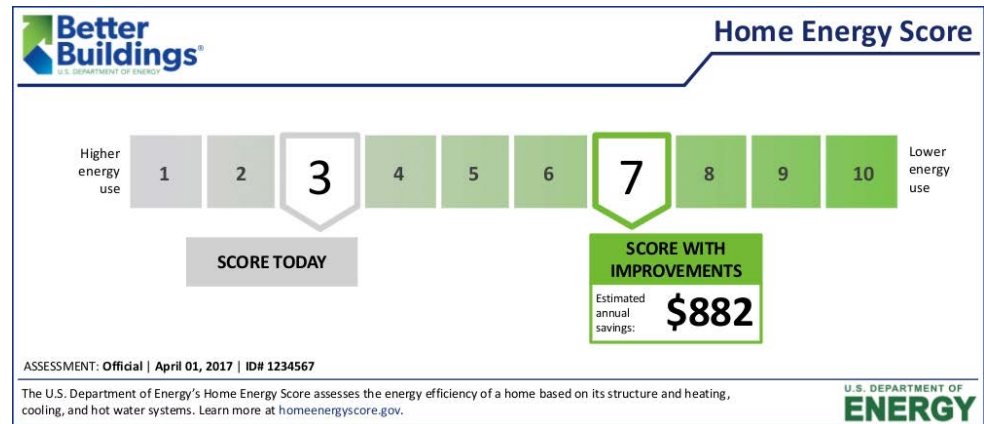


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Federal role is key to progress

Federal programs to create tools and infrastructure

- Building labeling
- Benchmarking tools
- Data access
- Financial incentives: tax credits, low-income weatherization



Thank You!

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Extra Slides

Residential Codes: 2.5 out of 3 points

Scoring:

Mandatory = 1 points

Mixed = 0.5 points

US Score = 0.5 (Mixed)

Technical Requirements:

5-6 = 2 points

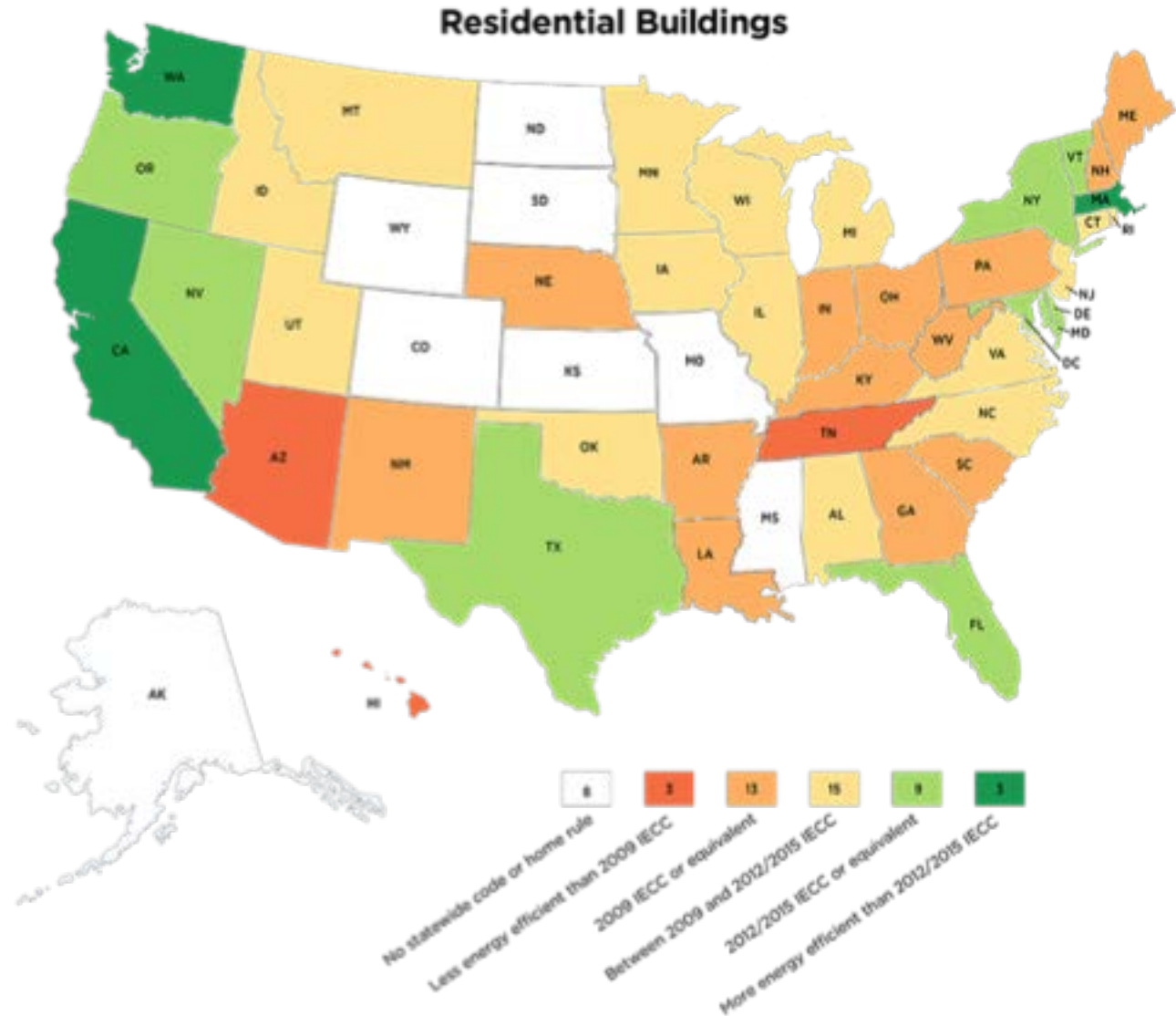
3-4 = 1.5 points

2 = 1 point

1 = 0.5 point

US Score = 2 points

(6 requirements)



Commercial Codes: 2.5 out of 3 points

Scoring:

Mandatory = 1 points

Mixed = 0.5 points

US Score = 0.5 (Mixed)

Technical Requirements:

5-6 = 2 points

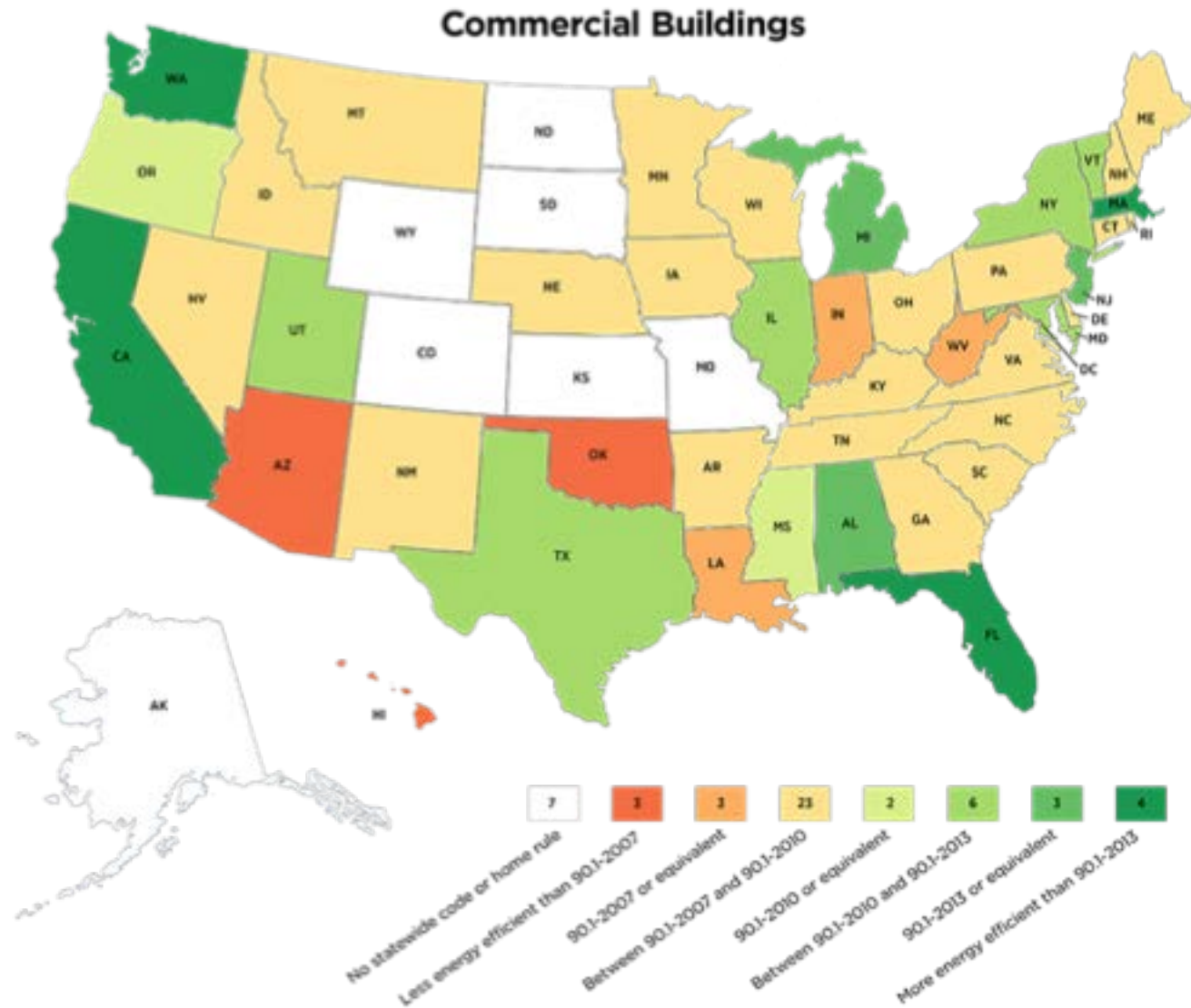
3-4 = 1.5 points

2 = 1 point

1 = 0.5 point

US Score = 2 points

(6 requirements)



Building rating: 0.5 out of 2 points

Scoring:

Mandatory for all

buildings = 2 points

Mandatory for some

buildings = 1 point

Voluntary but been used

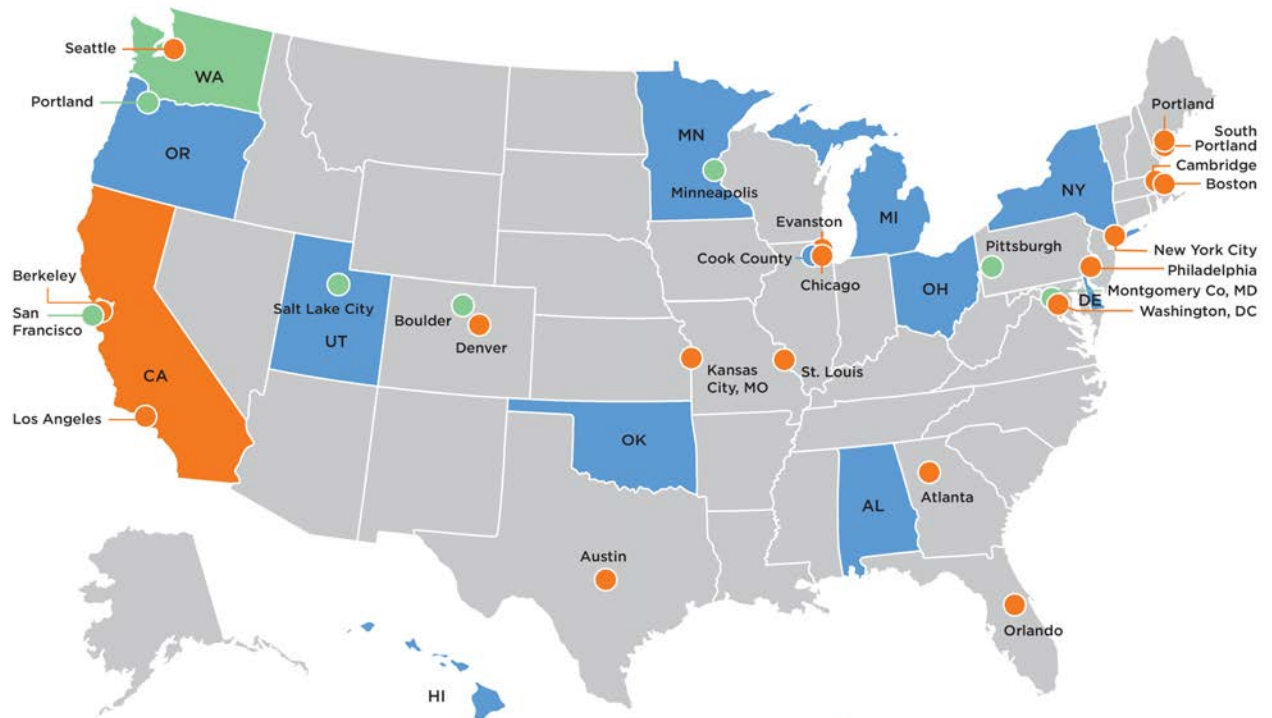
by a substantial number

of buildings = 0.5 points

Voluntary/ none= 0 points

US Score= 0.5 points

U.S. Building Benchmarking and Transparency Policies



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- Public, commercial, and multifamily building benchmarking policy adopted
- Public and commercial building benchmarking policy adopted
- Public buildings benchmarked

Appliance Minimum Energy Performance Standards (MEPS): 5 out of 5 Points

Scoring:

of groups covered:

45+ = 5 points

35 - 44 = 4 points

25 - 34 = 3 points

15 - 24 = 2 points

5 - 14 = 1 point

< 5 = 0 points

**US Score= 5 points
(52 appliances)**

Products covered by standards represent about:

- 90% of home energy use
- 60% of commercial building use

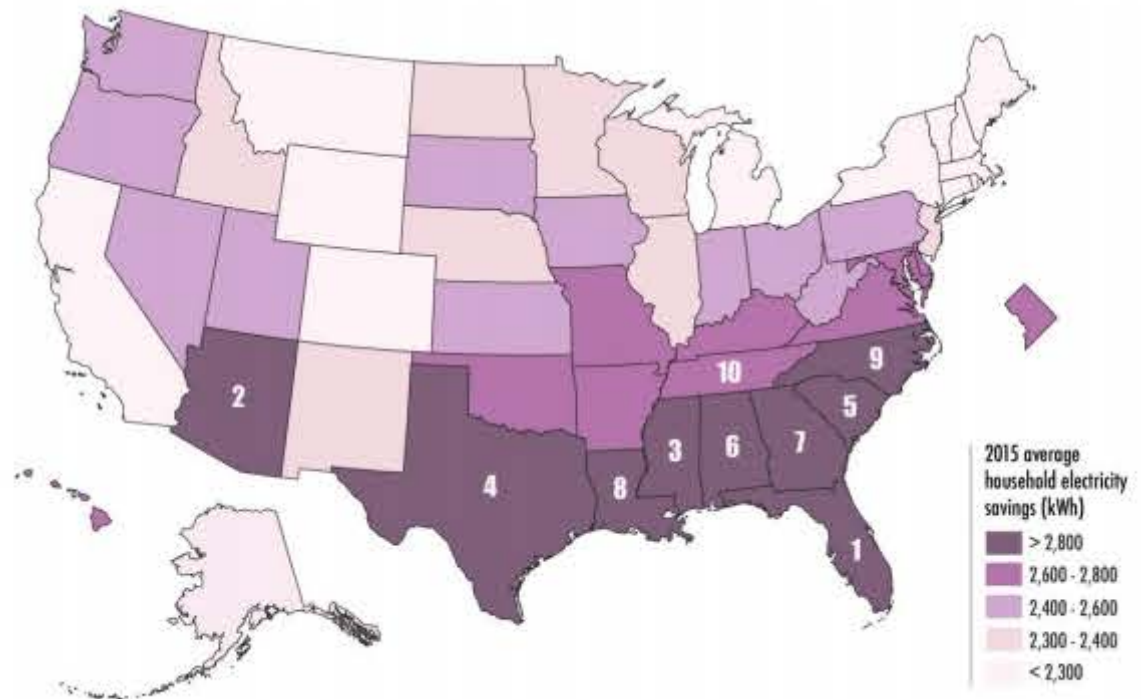
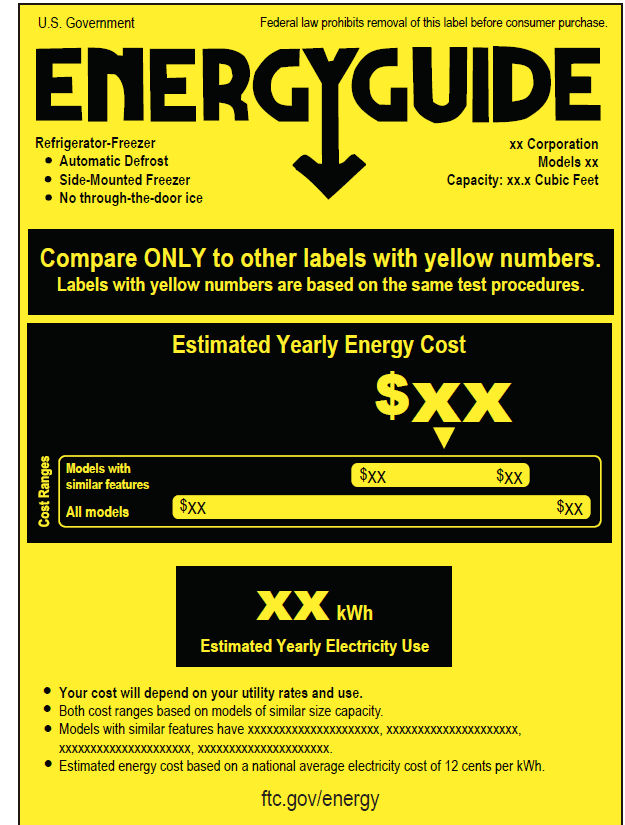
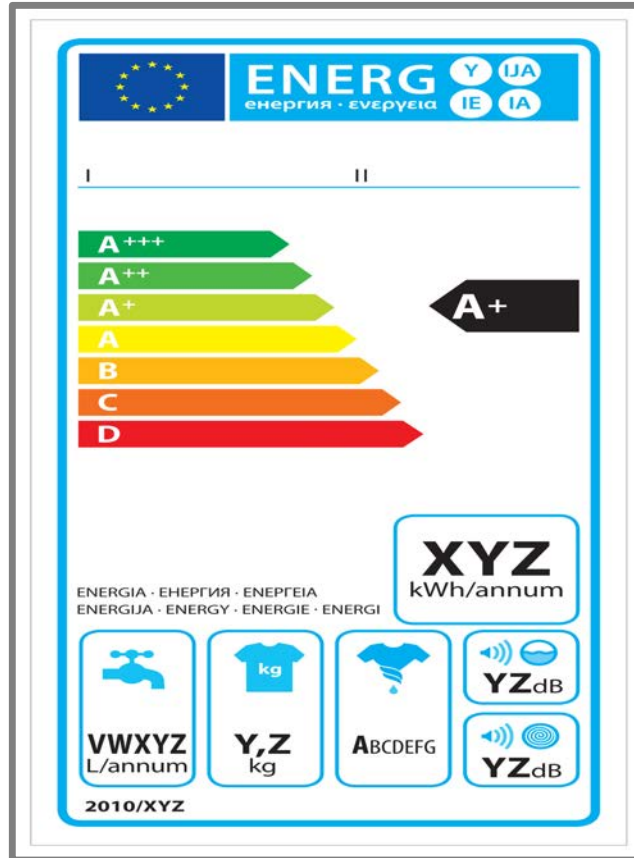


Figure 2. 2015 average household electricity savings by state

Appliance Labeling: 1.5 out of 2 points

Categorical = 1 points
 Continuous = 0.5 points
US Score = 0.5
(Categorical)

Appliance Groups:
 15+ = 1 point
 5-14 = 0.5 point
US Score= 1 points
(18 groups)



Residential EUI: 1 out of 3 points

| Country | MMBtus/m ² of residential space | Score | MMBtus/capita | Score | Total score |
|--------------|--|-------|---------------|-------|-------------|
| Mexico | 0.16 | 1.5 | 5.48 | 1.5 | 3 |
| China | 0.29 | 1.5 | 8.59 | 1.5 | 3 |
| Brazil | 0.31 | 1 | 4.64 | 1.5 | 2.5 |
| Taiwan | 0.38 | 1 | 8.48 | 1.5 | 2.5 |
| Turkey | 0.26 | 1.5 | 9.32 | 1 | 2.5 |
| Spain | 0.29 | 1.5 | 13.15 | 1 | 2.5 |
| Japan | 0.32 | 1 | 13.71 | 1 | 2 |
| India | 0.65 | 0 | 5.46 | 1.5 | 1.5 |
| Thailand | 1.14 | 0 | 6.51 | 1.5 | 1.5 |
| Indonesia | 0.67 | 0 | 8.44 | 1.5 | 1.5 |
| Ukraine | 0.52 | 0.5 | 12.70 | 1 | 1.5 |
| UAE | n/a | 0 | 8.54 | 1.5 | 1.5 |
| UK | 0.38 | 1 | 16.80 | 0.5 | 1.5 |
| Netherlands | 0.36 | 1 | 17.29 | 0.5 | 1.5 |
| Germany | 0.37 | 1 | 18.29 | 0.5 | 1.5 |
| South Africa | 0.70 | 0 | 12.17 | 1 | 1 |
| South Korea | 0.68 | 0 | 13.10 | 1 | 1 |
| Australia | 0.40 | 1 | 21.89 | 0 | 1 |
| Saudi Arabia | n/a | 0 | 11.07 | 1 | 1 |
| France | 0.46 | 0.5 | 19.07 | 0.5 | 1 |
| US | 0.35 | 1 | 24.24 | 0 | 1 |

Commercial EUI: 1 out of 3 points

| Country | MMBtus/m ² of commercial space | Score | MMBtus/\$GDP | Score | Total score |
|--------------|---|-------|--------------|-------|-------------|
| Mexico | 0.14 | 1.5 | 201 | 1.5 | 3 |
| Brazil | 0.63 | 1.5 | 302 | 1.5 | 3 |
| Taiwan | 0.65 | 1.5 | 463 | 1.0 | 2.5 |
| Spain | 0.76 | 1 | 369 | 1.5 | 2.5 |
| Indonesia | 0.26 | 1.5 | 452 | 1.0 | 2.5 |
| UK | 0.89 | 1 | 298 | 1.5 | 2.5 |
| Netherlands | 1.25 | 1 | 375 | 1.5 | 2.5 |
| Australia | 0.93 | 1 | 317 | 1.5 | 2.5 |
| Italy | 0.96 | 1 | 397 | 1.5 | 2.5 |
| China | 0.32 | 1.5 | 653 | 0.5 | 2 |
| India | 0.32 | 1.5 | 676 | 0.5 | 2 |
| South Africa | 0.70 | 1 | 590 | 1.0 | 2 |
| France | 1.29 | 1 | 403 | 1.0 | 2 |
| Japan | 1.54 | 0.5 | 487 | 1.0 | 1.5 |
| Ukraine | 0.56 | 1.5 | 2,074 | 0.0 | 1.5 |
| Germany | 1.34 | 0.5 | 530 | 1.0 | 1.5 |
| Turkey | 1.58 | 0.5 | 708 | 0.5 | 1 |
| US | 1.46 | 0.5 | 622 | 0.5 | 1 |