

Using EIA's Energy Consumption Surveys to Analyze Energy Programs and Policies

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American Council for an Energy-Efficient Economy

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The American Council for an Energy Efficient Economy (ACEEE)

- Non-profit (501c (3)) dedicated to advancing energy efficiency through research and dissemination.
- ~25 staffers in Washington DC, Delaware, Michigan and Wisconsin
- Focus on End-Use Efficiency in Industry, Buildings, Utilities, Transportation, & National Policy
- Offer Conferences and Publications
- Funding:
 - Foundation and government grants (55%)
 - Contract research (20%)
 - Conferences and Publications (25%)



Outline

- Consumption survey data
- Applications
- Limitations
- Recommendations



Useful Data from the Consumption Surveys– RECS

- Equipment and system saturations
- Energy use per product and per household
- Housing stock
- Fuel shares
- Vintage (new construction vs. stock)
- Trends (e.g. home size)
- Data by region and 4-largest states

Can cross with Census population and other data for state estimates



Useful Data from the Consumption Surveys—CBECS

- Building stock by type and size
- Fuel shares by end-use
- Energy use per square foot
- Vintage (new construction vs. stock)
- Data by region
- Trends

Can cross with Census Bureau employment data to develop estimates at state level



Useful Data from the Consumption Surveys—MECS

- Use fuel consumption, end-use and price data by industry
- Disaggregation by individual industry (NAICS codes) is critical – energy use varies among industries.
- ACEEE uses in conjunction with Census's *Annual Survey of Mfg/Census of Manufacturing* to:
 - extend to state and regional level and
 - link to investment and economic data

These data series share common data frame with
MECS



EIA Surveys Are Often the Only Source of Data

- Some states and utilities used to collect some of this data, but these studies now rare and data categorization not consistent
- A few states/utilities conduct appliance saturation, commercial building stock, or new construction surveys
 - Particularly California, NW, southern New England



ACEEE Applications of this Data

- End-use baseline energy-use estimates
- Reference year data for developing energy use forecasts
- Energy efficiency potential estimates
- Estimate energy savings of programs and policies
 - Appliance standards
 - Building codes
 - Specific DSM programs



Typical Methodology

Number homes or building sq. ft.

X Saturation (for specific equipment and fuel)

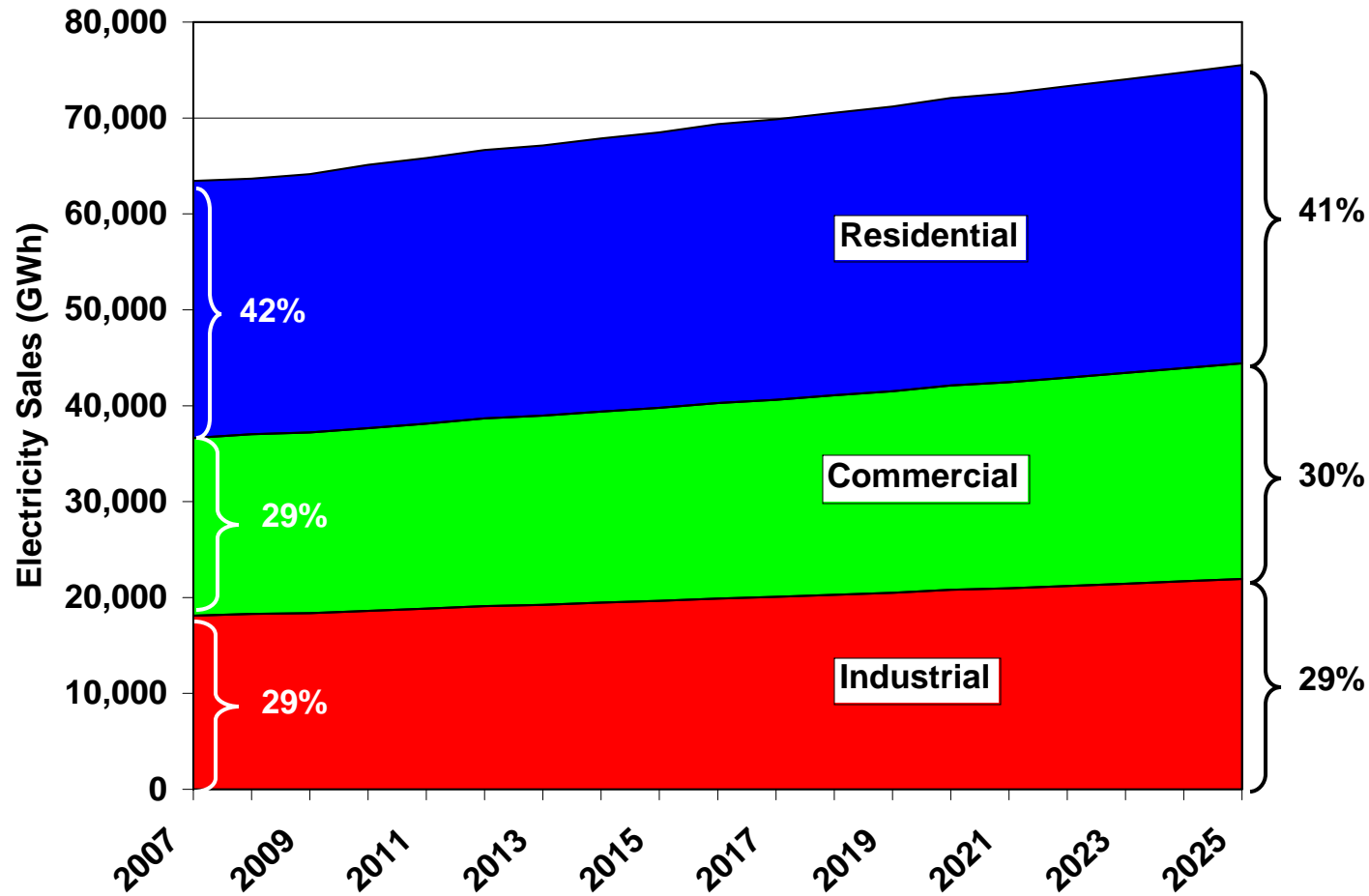
X Energy use/product (sometimes adjust for vintage)

X % energy savings

= Energy saved



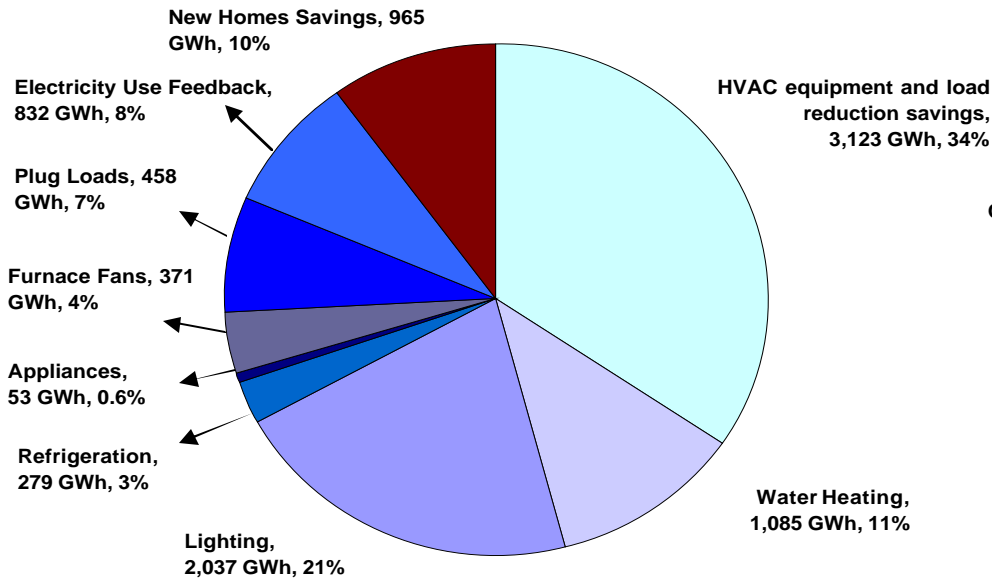
Maryland Electricity Forecast



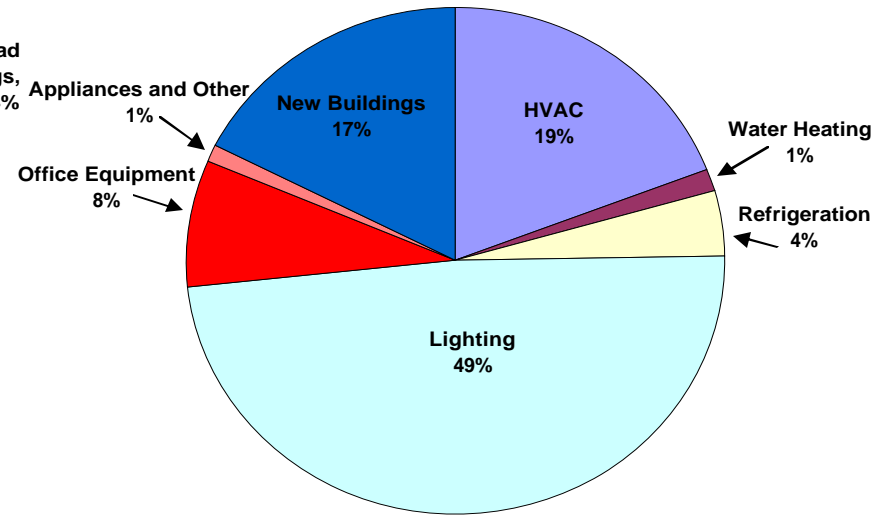
Source: ACEEE Feb. 2008 Maryland study



Electricity Savings Opportunities in Maryland



Residential

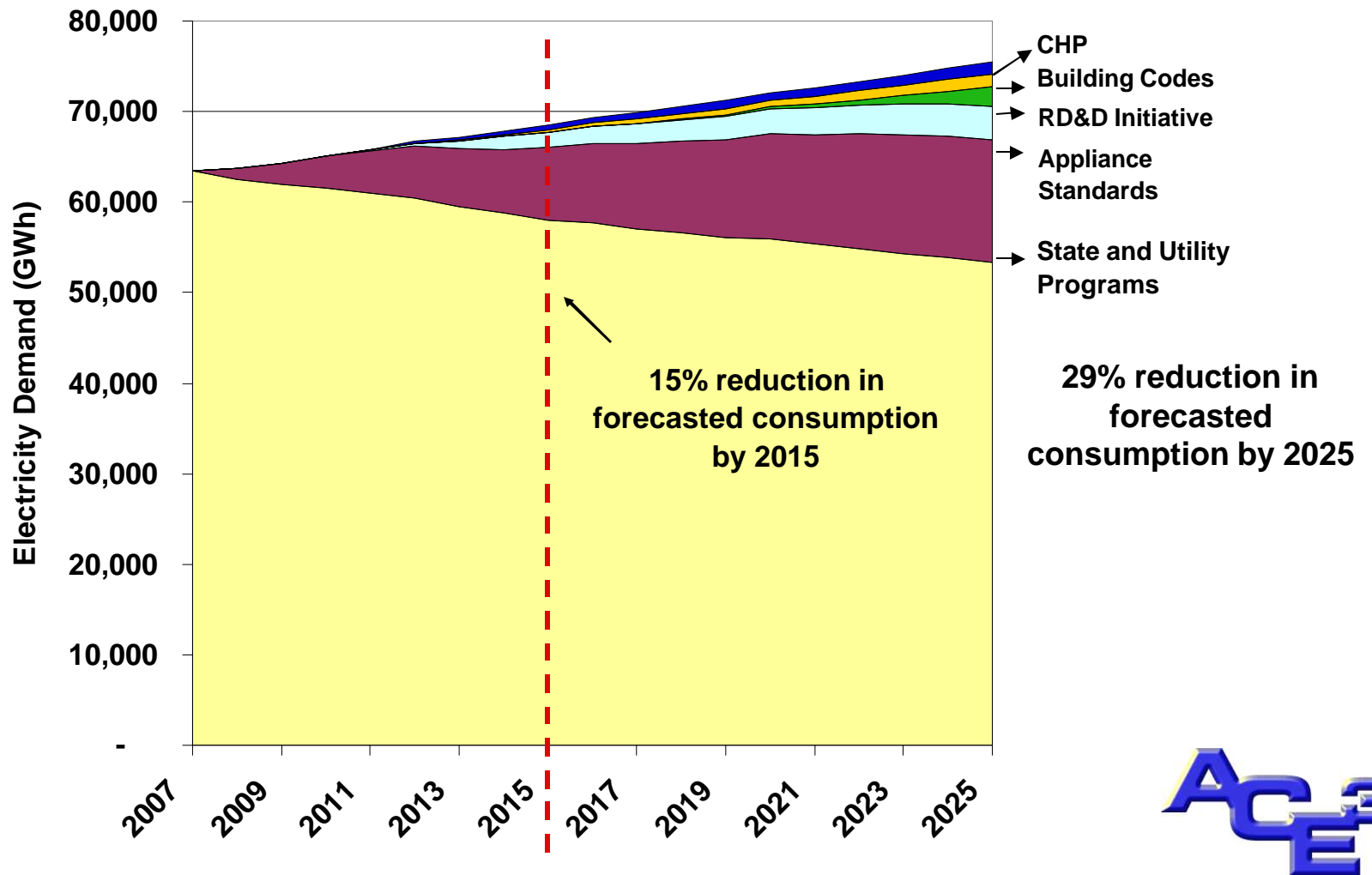


Commercial

Source: ACEEE Feb. 2008 Maryland study



Share of Maryland Electricity Sales That Can Be Met by Efficiency Policies



Savings from Appliance and Equipment Standards

Enact Year	Standards	Electricity savings (TWh/yr)			Primary energy savings (Quads/yr)			Peak load reductions (GW)			Carbon Reductions (MMT)			Net Benefit (\$Billion)
		2000	2010	2020	2000	2010	2020	2000	2010	2020	2000	2010	2020	Thru 2030
1987	NAECA	8.0	40.9	45.2	0.21	0.55	0.61	1.4	14.9	16.5	3.7	10.0	10.1	46.3
1988	Ballasts	18.0	22.8	25.2	0.21	0.27	0.29	5.7	7.1	7.9	4.4	5.0	5.0	8.9
1989&91	NAECA updates	20.0	37.1	41.0	0.23	0.43	0.47	3.6	6.9	7.7	4.8	8.1	8.1	15.2
1992	EPAct (lamps, motors, etc)	42.0	110.3	121.9	0.59	1.51	1.67	10.1	26.2	28.9	11.8	27.5	27.9	84.2
1997	Refrigerator/freezer update	0.0	13.3	28.0	0.00	0.13	0.28	0.0	1.7	3.6	0.0	2.9	5.5	5.9
1997	Room Air Conditioner update	0.0	1.3	2.1	0.00	0.01	0.02	0.0	1.0	1.6	0.0	0.3	0.4	0.6
2000	Ballasts update	0.0	6.2	13.7	0.00	0.06	0.13	0.0	1.8	3.0	0.0	1.3	2.7	2.6
2001	Clothes Washer Update	0.0	8.0	22.6	0.00	0.11	0.28	0.0	1.3	6.1	0.0	2.2	5.4	15.3
2001	Water heater update	0.0	2.5	4.9	0.00	0.08	0.13	0.0	1.5	3.6	0.0	1.4	2.2	2.0
2001	Central AC&HP update	0.0	10.7	36.4	0.00	0.11	0.35	0.0	3.5	41.5	0.0	2.3	7.2	5.0
2005	EPAct 2005	0.0	14.7	53.0	0.00	0.21	0.65	0.0	5.8	23.9	0.0	3.7	11.5	47.5
TOTAL		88	268	394	1.2	3.5	4.9	21	72	144	25	65	86	234
% of projected U.S. use		2.5%	6.9%	9.1%	1.3%	3.1%	4.0%	2.8%	8.3%	15.1%	1.7%	3.6%	4.4%	

Source: Geller, Kubo, and Nadel 2001, ACEEE analysis on EPAct 2005

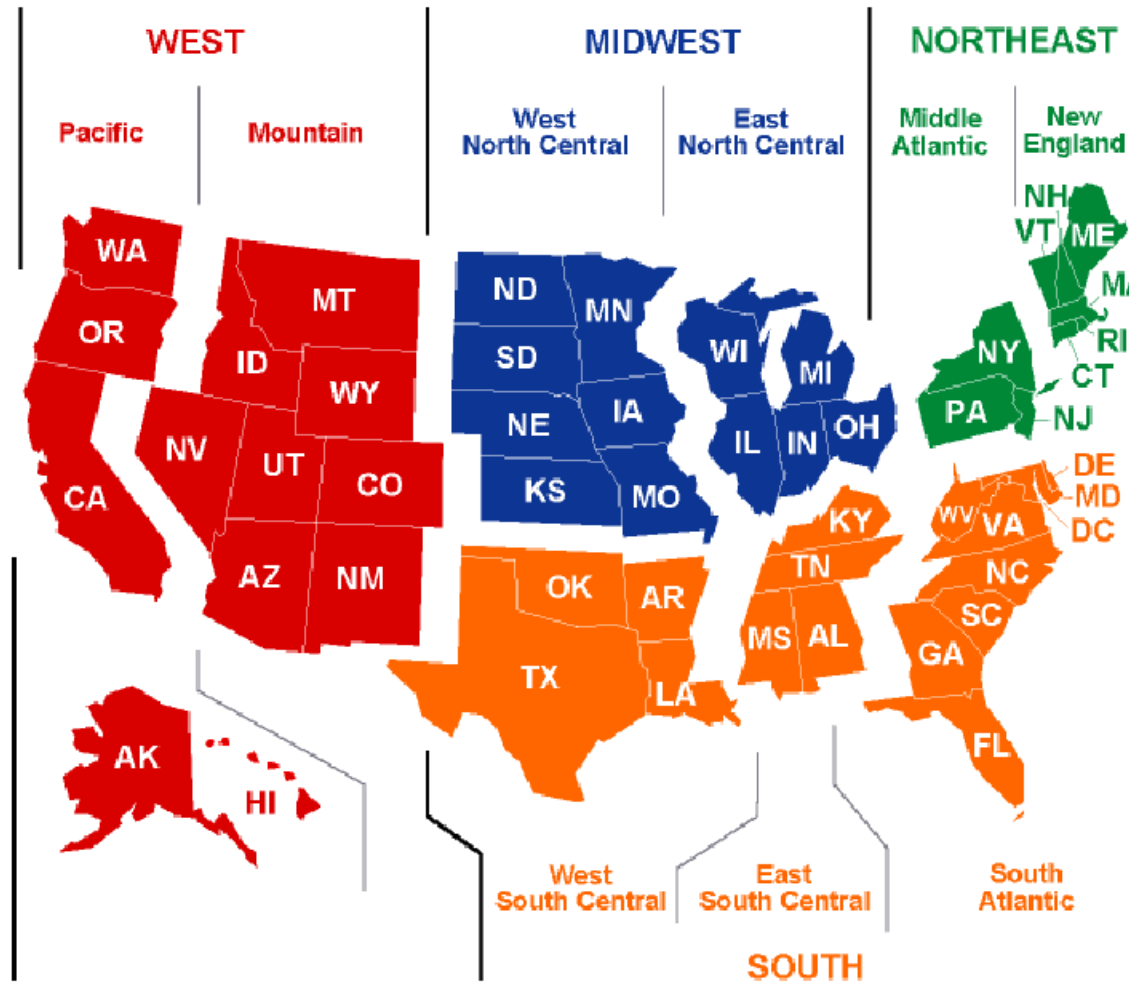


Limitations to the Consumption Surveys

- Some regions very large and too much variation (especially Mountain & South Atlantic)
- Time-period between surveys lengthening (still using RECS 2001, 2005 not released)
- Technology data only moderately detailed
- CBECS lacks end-use consumption estimates and data on large states
- Sample sizes becoming smaller, making data less robust and limiting level of detail that can be released



Survey Regions



Recommendations

- Continue to update questions for changing times
- Return to 3-year schedule
- Speed up analysis and release (e.g. 2005 survey out by 2007)
- Split some of the largest regions
- Increase sample size so data more robust
 - Would allow release of data for additional states and more detail on building types



Recommendations

- Provide end-use consumption estimates for CBECS (conditional demand analysis)
- Provide more detail on newest homes and buildings (for new construction analyses)
- Consider ways to release more data, even if statistical confidence somewhat lower
- Many of these suggestions require increased budgets



Conclusion and Commentary

- EIA consumption surveys critical source of data
 - Generally only data source
- EIA staff doing very good job managing shrinking resources
- Cutbacks in budgets have compromised the surveys
- With growing energy problems and energy bills, time for more robust surveys

