

Consumer Behaviors: Reducing Electricity Use with Residential Wood Energy



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Purpose and Questions

To understand how behaviors and renewable energy alternatives, such as wood and pellet heating, can lower our consumption rates of electricity.

- How can curtailment behaviors impact household consumption rates of electricity?
- How can the use of residential wood energy effect consumption rates of electricity?

Areas of behaviors:

How can behaviors effect residential electricity consumption?

- **Study**
 - 10 Households
 - 14 Behaviors
 - 1 month

***Pre and post surveys were taken in order to understand physical and behavioral differences that could have impacted the results of this study**

Study Results

Household #	# of Members	Size of household in m2	Jan 2010 consumption in kWh	Jan 2011 consumption in kWh	% reduction	kWh saved
1	4	150	1994	1870	6.2	124
2	2	54	200	159	20.5	41
3	1	45	142	131	7.8	11
4	4	146	1217	996	18.2	221
5	4	92	449	429	4.7	20
6	1	42	156	119	23.7	37
7	2	54	339	210	38.1	129
8	6	128	3456	2869	16.9	587
9	3	570	7214	5345	25.9	1869
10	4	128	925	850	8.1	75

How could the use of wood energy continue to lower consumption rates

- 2011
 - Average annual 11,280 kWh
 - 940 kWh per month
- 132,312,404 households
- ~1.5 trillion kWh annual electricity consumption within the residential sector

Heating

- 79 Billion kWh used for space heating
 - 0.27 Quadrillion BTUs
- ~6.6 billion kWh consumed for space heating in residential sector per month
- ~50 kWh per household per month
 - 170,000 BTU

What does this mean?

- Hypothetical Situations:
- If 10% of households in the US in 2011 used wood and pellet stoves instead of space heating
- 13,231,240 households
 - Saved 658,254,190 kWh
 - This is around the annual electricity consumption

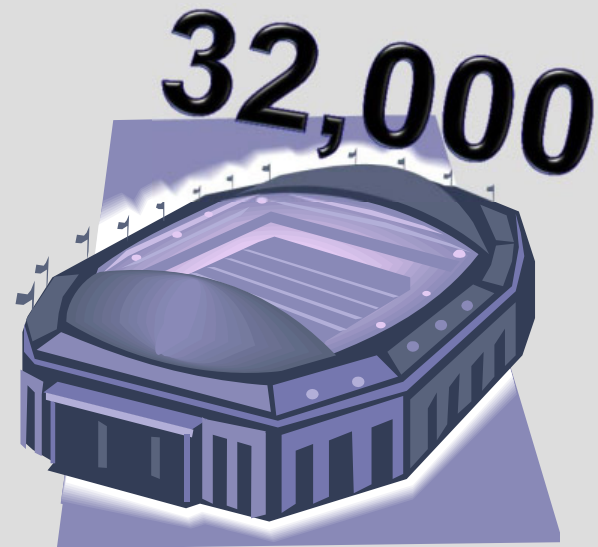
58,000



- 1% reduction in the households in the US in 2011

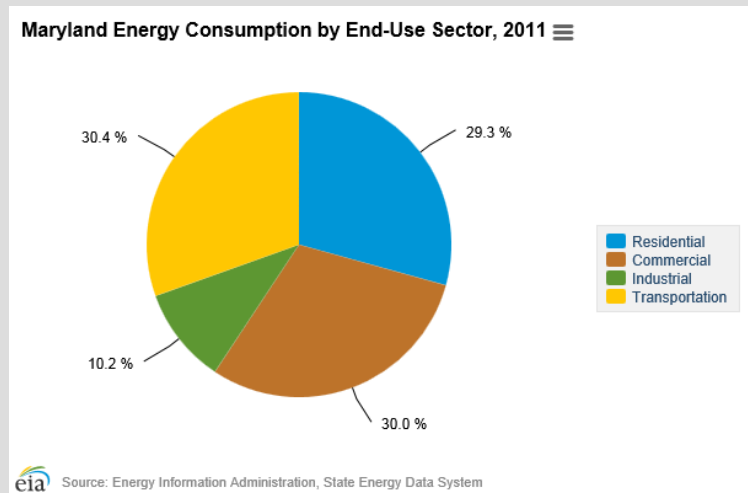
- 1,323,124 households

Savings of 65,825,419 kWh



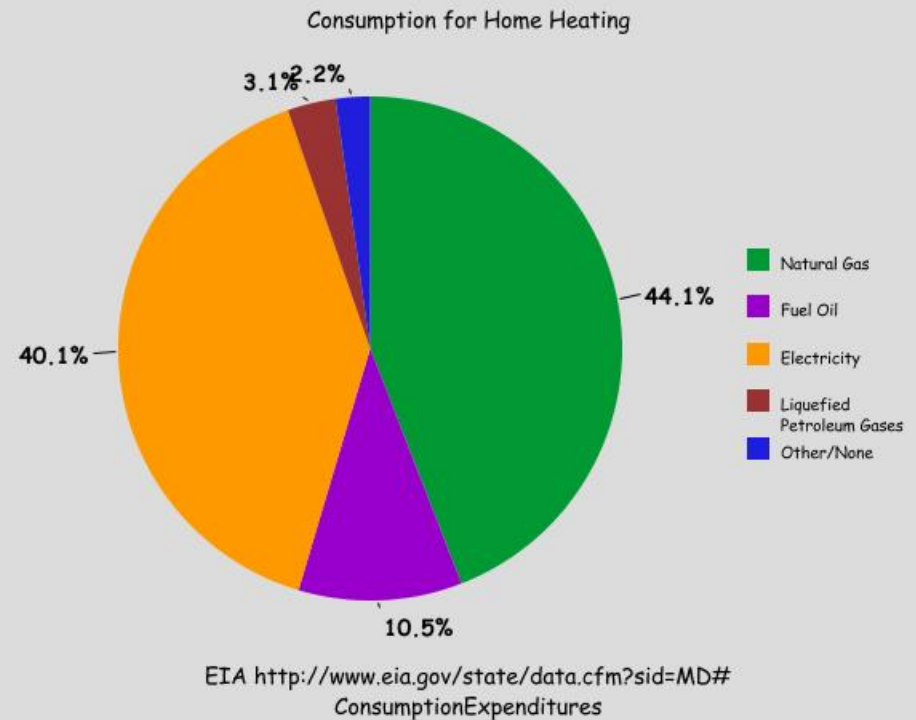
Maryland

- Households in MD 2011- 2,391,350



- Average annual electricity consumption- 11,414 kWh
 - 961 kWh per month

- Households in MD 2011- 2,391,350
- 40% home heating consumed by MD households in 2011 was from electricity ~957,000 homes



- 35% of homes used electric heating
- Reduction of 71,382,096 kWh
- 119,568 homes using alternative sources of heating
- In order to lower the annual residential electricity consumption within Maryland by 1%
 - 285,527,190 kWh
 - 20% of households in MD in 2011 would have needed to supplement their electric heating with an alternative source

Conclusion

Through my personal field study I have, to the best of my ability, quantified potential energy savings through basic curtailment behaviors.



Mechanical adjustments such as the installation and implementation of wood or pellet stoves in a residence is also a way to lower the consumption rates of electricity, and personally I believe it necessary to carry out more research in this field in order to understand the exact extent of savings.