



Water-Heating

Background

Water heating is the second largest energy use in American homes constituting 17% of residential energy consumption. Characteristics such as energy source, size, and age all contribute to a water heater's efficiency. Ohio's water heater characteristic breakdown is as follows [1]:

- 60% Natural Gas, 40% Electric
- 15%, <= 30 gallons; 63%, 31-49 gallons; 22%, >= 50 gallons
- Median age is 5-9 years old

Since 1990, the Federal Government has regulated the baseline efficiency standards for residential water heaters by size and energy source. The most updated standards go into effect in the year 2015 [2]. The standards are typically increased every 10 years and are an effective method for lowering carbon emissions and energy bills without forcing consumers to change their lifestyles. The effectiveness of the regulation stems from the fact that one third of all water heater replacements are emergency replacements [3]. Consumers in the middle of an emergency are not likely to worry about emissions factors when they require hot water immediately. Instead, they call the plumber to install a new water heater as soon as possible. This often results in the installation of a baseline efficiency water heater.

Business as Usual

If regulatory standards are not increased past their current levels, CO₂ emissions will initially decrease as old residential water heaters are replaced with new. However, once the stock is updated completely to current standards, CO₂ emissions will rise as housing increases. We estimate that from 2012 – 2050, the total carbon dioxide emissions in this business as usual situation will be approximately 178 million tons.

Wedge

If standards are increased by 10% every 10 years, we do not see CO₂ emissions rise with housing stock, but instead see a continual decrease. Thus, we estimate the 2012 - 2050 total at

164 million tons of carbon dioxide. The difference of 13.9 million tons of carbon dioxide is nearly an 8% decrease in the total 2012 – 2050 emissions.

Citations

- [1] "2009 Residential Energy Consumption Survey." *U.S. Energy Information Administration – EIA – Independent Statistics and Analysis*. 06 May 2013.
<http://www.eia.gov/consumption/residential/data/2009/#undefined>
- [2] "Energy Conservation Program for Consumer Products: Energy Conservation Standards for Residential Water Heaters." *Federal Register* 78.38 (2013): 12969-12988.
- [3] "Water Heater Market Profile." *U.S. Department of Energy*. Report. 2009. <http://www.energystar.gov>

Figure 1: Annual Emissions

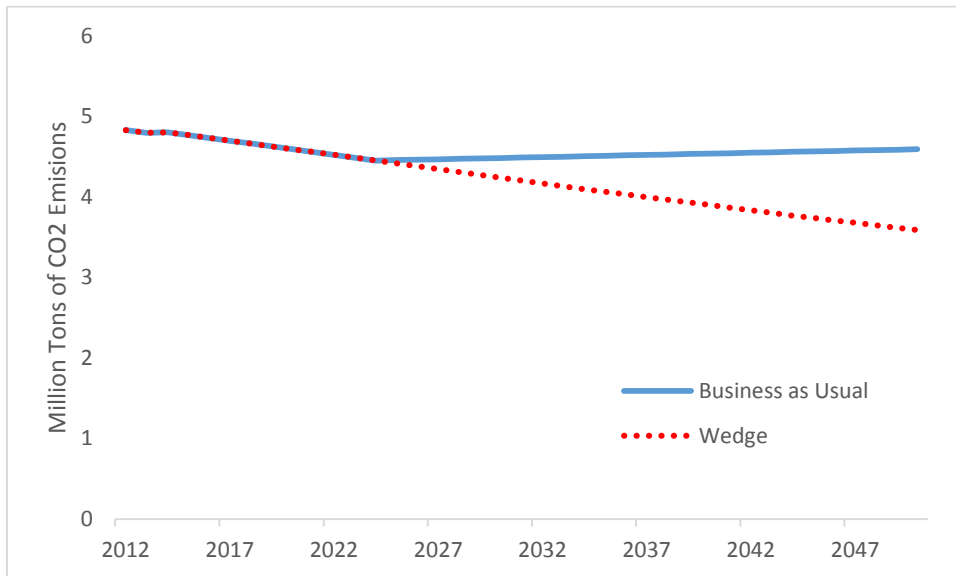


Figure 2: Annual Emissions Savings

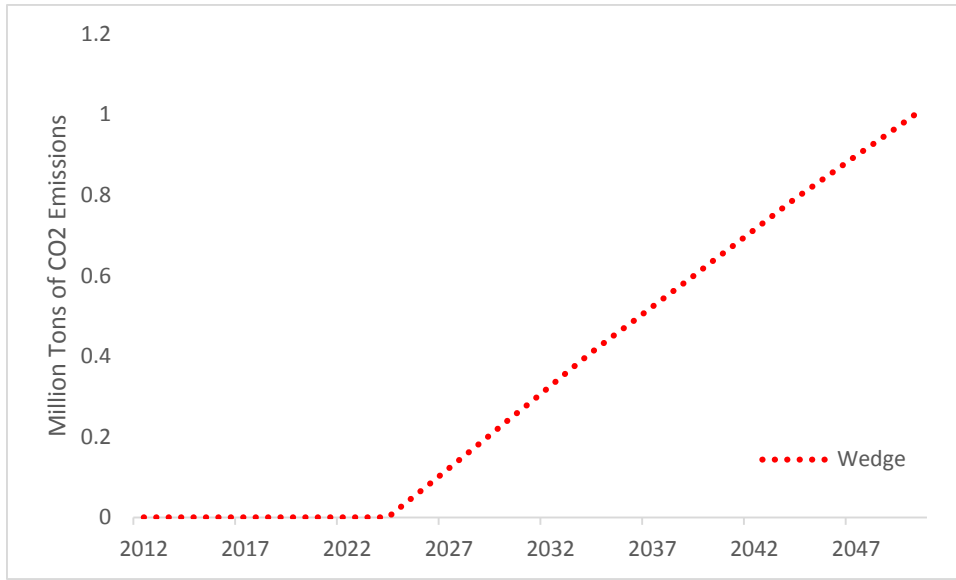


Figure 3: Cumulative CO2 Savings

	Millions of Tons of CO2
Wedge	14 Million