Switch to Save

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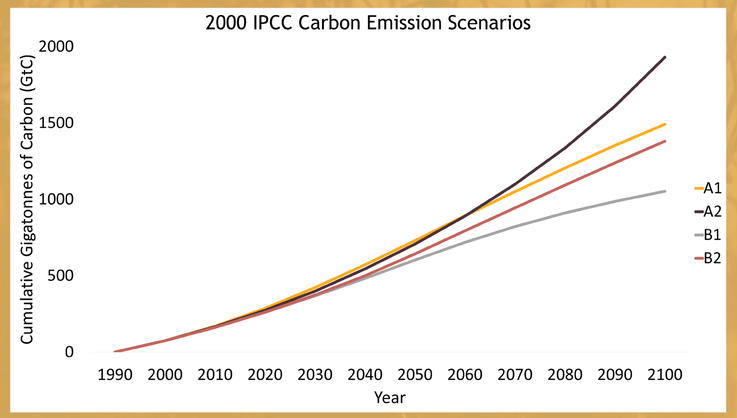
Background

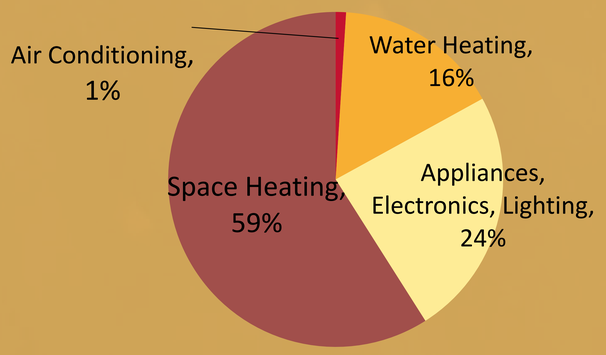
The United States residential sector demands 39% of total energy consumption. Power plants produced 21.641 quadrillion BTUs of energy to supply the residential sector in 2015. This amount of energy production emits large amounts of carbon dioxide that enters the atmosphere and ocean, expediting three environmental anomalies: the greenhouse gas effect and increasing ocean temperature and acidification.



A1 scenario describes a fossil fuel intensive future. B1 describes implementation of energy efficient technologies.

Energy changes in households, especially when dealing with heating and cooling, are location and climate specific. In order to increase the effectiveness of the solutions chosen for this project, we based the project around Massachusetts. The graph below is a percentage breakdown of energy consumption in the residential sector of our area of focus.

Consumption by End Use in MA



Problem & Goal

Massachusetts' suburban homes are energy inefficient which creates a high demand for energy from fossil fuel power plants. These plants emit carbon dioxide, resulting in rises in surface and ocean temperatures and ocean acidification . Our goal is to inform homeowners of energy efficient practices and systems that can be incorporated into their daily lives to decrease carbon dioxide emissions and provide an economic benefit.

Methods

In order to obtain information on solutions to energy inefficiency, we interviewed professionals in sustainability. Data regarding the costs and potential energy savings was then compiled for each solution. We analyzed the information based off of efficiency and uniqueness to fit a broad spectrum of price ranges. Including unique and interesting components is important for the effectiveness of our overall solution because they can be more appealing to homeowners. Once our list of solutions was finalized, the data was composed into a pamphlet in order to get the information out to the public.

- Clotheslines
- Passive Heating and Cooling
- Weather Stripping and Caulking
- LED Light bulbs
- Programmable Thermostats
- Smart Thermostats
- Solar Tubes
- Low Emissivity Window Films
- Landscaping
- Smart Window Films

Lower Costs → Solutions → Higher Costs

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References

A Smart Home Control Panel. (2015). Retrieved from https://commons.wikimedia.org/wiki/File:Smart_Home_Control_Panel.png
Intercontinental Panel on Climate Change (IPCC). (2000). Emissions Scenarios. Retrieved from http://www.ipcc.ch/ipccreports/sres/emission/emissions_scenarios.pdf
Kotter, Mimi. (2012). *Solatube Daylighting System - residential rafter cutaway of 160 DS tubular daylighting device*. Solatube International. Retrieved from https://commons.wikimedia.org/wiki/File:Solatube_160_DS_rafter_cutaway.jpg
Kadysz, Pawel. (2015) *Sunset in the Countryside*. Retrieved from http://picalls.com/sunset-in-the-countryside/
Siegert, Marc. (2005). *Open Window*. Retrieved from https://commons.wikimedia.org/wiki/File:The_open_window_(6028681236).jpg
Sulcer, Tom. (2013). *House in Amherst*, Massachusetts. Retrieved from https://commons.wikimedia.org/wiki/File:Amherst_Massachusetts_house_with_trees_and_leaves_in_early_autumn.JPG
U.S. Energy Information Administration. (Octobec, 2015). Residential Sector Energy Consumption. Retrieved from http://www.eia.gov/totalenergy/data/monthly/pdf/sec2_5.pdf
U.S. Energy Information Administration (2011). Household Energy Use in Massachusetts: A Closer Look at Residential Energy Consumption. Retrieved from https://www.eia.gov/consumption/residential/reports/2009/state_briefs/