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## Tiny homes: Improving carbon footprint and the American lifestyle on a large scale

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TINY HOMES: IMPROVING CARBON FOOTPRINT AND THE AMERICAN  
LIFESTYLE ON A LARGE SCALE

Timothy Michael Carlin  
ENVR 320: Research Colloquium  
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The average square footage of the modern American home has climbed drastically since the beginning of the 21<sup>st</sup> Century. In the last 60 years alone, the size of the average American home has increased 140% from the 1950 average of 1,000 square feet.<sup>1</sup> For most modern Americans, 1,000 square feet is considered a small home in relation to the incredible amount of stuff that is now accumulated within the walls of the average American dwelling. However, the average household income is not rising rapidly enough to keep up with the economic expectations and requirements of inhabiting and maintaining a larger home. In response to the American housing crisis beginning in 2008 and the general rising trend in environmental awareness, a growing number of Americans have moved away from traditional construction and into the realm of tiny homes. There are a number of benefits to living a minimized lifestyle and downsizing ones home to meet the standards to the tiny house movement. First, a greater social connection among families, reduced heating and cooling bills throughout the year, the potential for increased mobility (some tiny houses are built on trailers), not needing to make payments on a mortgage, a reduced environmental impact, a decreased number of belongings and amount of clutter and a general sense of happiness at the amount of freedom many tiny home owners experience. One of the largest benefits of inhabiting a tiny home is the decrease in carbon footprint. The carbon footprint is a multifaceted manner in which we attempt to measure human impact on the natural environment via the amount of carbon-producing energies utilized by the average person. These measurements are often split into categories that include: housing, transportation and waste. In the home, energy is used mainly for heating and electricity. Transportation

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<sup>1</sup> Bender, Kristin. "Seriously Downsize Our Homes." (2009).

incorporates emissions from vehicles and other carbon producing human actions related to movement. Waste includes all of the trash and byproduct produced by each person.

Despite all of the lifestyle improvements of downsizing, there are a number of drawbacks to owning a tiny home, most of which are related to at least one of the benefits. An example of this would be the necessity of getting rid of belongings as one downsizes their living space. This could lead to some tough decisions, particularly for those who are more inclined to a lifestyle that allows them to keep extra belongings “just in case”. One final hurdle that the tiny house movement must overcome is the rising price of land and legal issues surrounding space in which a tiny home can be constructed. This research explores whether tiny homes are capable of implementation on a wide scale as a strategy to reduce the American carbon footprint.

#### History of Tiny Homes:

The idea of tiny homes is nothing new, having been utilized in the form of bungalows and other smaller architectural styles. One of the early leaders in the architecture and construction of tiny homes was Frank Lloyd Wright, who wrote a book entitled “The Natural House” in 1950. Within the pages of this book he describes the construction and utilization of his Usonian dream, a dream that created small, single-story, moderately-priced homes that focus on the usage of natural materials in both construction and in the creation of aesthetic pleasure surrounding the home in the form of gardens.<sup>2</sup> Building from the ideas of Frank Lloyd Wright and other early architects, the

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<sup>2</sup> The word Usonian was coined by Frank Lloyd Wright and references housing in the United States; Frank Lloyd Walker Donald D. Wright, *The Natural House*(New York: Horizon Press, 1954).

modern tiny house movement began largely in the late 1980s and began booming during the early part of the 21<sup>st</sup> century. Following the housing market crash in 2007 and 2008, many homeowners lost their homes to foreclosure as a result of inability to pay enormous mortgages.<sup>3</sup> This loss inspired a number of people to reconsider their housing situation and explore the ideas of minimalism that serve as the basis for the tiny house movement. Many refer to this lifestyle as that of minimalism or the tiny life, as it looks to confront modern American consumerism and make humans more aware of the environmental effects of their consumer choices. The growth of the American house is an excellent example of the explosion in American consumerism, with home size serving as a facet of wealth and status.

In recent years, the tiny house movement has gained a number of new leaders who are at the forefront of the movement's development. Jay Shafer is the founder and owner of Tumbleweed Tiny Homes, a premier California-based company in the construction, rental and direction of do-it-yourself construction of a tiny home. His well-known company offers construction plans for both stationary and mobile tiny homes, the difference being that mobile tiny homes are built on large trailers that allow for easy transport by nearly anyone with a trailer hitch and the towing capacity.<sup>4</sup> Shafer is also the author of several books on the topic of tiny houses and the process of downsizing, with titles including: *The Small House Book* (2009) and *Tumbleweed DIY Book of Backyard Sheds and Tiny Homes* (2012). Brad Kittel has helped to make the idea of salvaging existing building materials a mainstream concept as part of his company Texas

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<sup>3</sup> Rachel Adams, "The 'Comfort Zone' How Small Can It Be?: Homebuilders in Search of Doing More with Less," *Science & Spirit* 19, no. 2 (2008).

<sup>4</sup> "Tumbleweed Tiny House," Tumbleweed Tiny House Company, 2013, accessed January 26, 2014. <http://www.tumbleweedhouses.com>.

Tiny Houses. Through the reuse of construction materials, Kittel has attempted to create an awareness of the waste that is created in the construction of new buildings focusing on homes in particular.<sup>5</sup> Like Tumbleweed, Texas Tiny Houses offers both DIY guides as well as salvage services for existing structures for potential customers. Lloyd Kahn is an author who has helped to bring the tiny house movement into the forefront of architecture in recent years. His books on the benefits of downsizing ones home and minimizing ones lifestyle have helped to create publicity and popularity for the tiny house movement. Finally, Sarah Susanka has served as a leader among leaders with the recent surge in popularity experienced by the tiny house movement. Her involvement began in the late 1980s when she and her husband, both of whom are architects by trade, began planning the construction of their new home. In this process, they were enthralled by the idea of building a small, yet fully functional home.<sup>6</sup> The result was a small house for themselves and a book on the subject by Susanka in 1998 entitled *The Not So Big House*. Within the book, Susanka explains her motivation to downsize and her contribution to projects in tiny housing throughout the state of Minnesota and the United States.

#### Benefits of Downsizing:

One of the greatest environmental benefits of living in a tiny house is the reduction in carbon emissions. Carbon emissions come in multiple forms within the household, such as electricity, natural gas and heating oil. Although there are a number

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<sup>5</sup> "Tiny Texas Houses | Building the Future with the Past," 2014, accessed March 13th, 2014. <http://tinytexashouses.com/tiny-texas-houses-presents-the-inner-city-sanctuary/>.

<sup>6</sup> Sarah Obolensky Kira Susanka, *The Not So Big House : A Blueprint for the Way We Really Live*(Newtown, CT; [Emeryville, CA]: Taunton Press ; Distributed by Publishers Group West, 1998).

of other factors including household waste and vehicular emissions associated with individual households, these three are typically the largest percentage of the household carbon footprint. According to a study performed on the top 100 population centers in the United States, electrical energy represents 53% of the energy used within the average American household.<sup>7</sup> Americans use this electrical energy to power all kinds of electronics, heat and cool their homes, power lights within the home and heat water. The highest of these usages is heating, which utilizes 32% of the 53% of household energy that comes in the form of electricity.<sup>8</sup> In the year 2005, residences within the United States used 21.75 quadrillion Btu's, 14.81 quadrillion of which were utilized in the form of electricity alone.<sup>9</sup> This is the equivalent of 34.44 million propane tanks. Electricity accounted for 68% of the total energy used in households during the course of 2005. The production of the electrical energy still relies largely on coal for fuel, resulting in the creation of 241.6 million metric tons of carbon emissions.<sup>10</sup> This amount of carbon waste would fit into 15,100,000 dump trucks, which carry an average 16 tons per load. The individual American carbon footprint has climbed to more than 28.5 tons of annual carbon emissions, with 18% of these emissions coming from electricity. With an estimated 53% of energy use in the household coming in the form of electricity, 2.72 tons of carbon emissions are created. These numbers are staggering when compared to the estimated 2.214 tons of household carbon emissions that have been recorded within the

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<sup>7</sup> Marilyn A Brown, Frank Southworth, and Andrea Sarzynski, "Shrinking the Carbon Footprint of Metropolitan America," *Blueprint for America Prosperity*(2008), [http://wiki.ornl.gov/sites/rams09/k\\_fernandez/Documents/carbonfootprint\\_report\\_US.pdf](http://wiki.ornl.gov/sites/rams09/k_fernandez/Documents/carbonfootprint_report_US.pdf)

<sup>8</sup> Ibid.

<sup>9</sup> Ibid.

<sup>10</sup> Ibid.

United Kingdom.<sup>11</sup> Emissions from American electrical energy alone are higher than the total household carbon emissions in the United Kingdom. This value does not include transportation, food, services, personal travel and manufacturing and construction that were also factored into this estimate, 5.13 tons of carbon emissions result from the heating and electrical utilities used in the average household.<sup>12</sup> Although the advent of Energy Star appliances and the compact fluorescent light bulb have helped to combat the amount of electrical required to power the American household, their contribution alone is not enough to drive down household energy consumption in the United States.

Tiny homes can help to reduce electrical usage in part because they are a smaller space. When heating a smaller space, less electrical energy is required in order to do so. When less electrical energy is used in the home, the household carbon footprint is quickly diminished as the largest percentage of household energy comes directly from electricity. In the tiny home, electrical energy usage can also be reduced through lower use of lighting. Less light energy is necessary to illuminate the tiny home due, once again, to a smaller space that requires light. One author discusses the use of windows on two walls of each room in order to properly light the room and reduce the need to install large amounts of electrically powered lighting.<sup>13</sup> With the efficient use of ambient light during the daylight hours, it is possible to further minimize the need for electricity use.

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<sup>11</sup> James Corbett, "Carbon Footprint," in *Climate Change: In Context*, ed. Brenda Wilmoth Lerner and K. Lee Lerner(Detroit: Gale, 2008).

<sup>12</sup> Ibid.

<sup>13</sup> Patricia Foreman and Andy Lee, *A Tiny Home to Call Your Own: Living Well in Just Right Houses*(Good Earth Publications, Inc., 2005).

In addition to electrical energy, American households utilize a collective 4.889 trillion standard cubic feet of natural gas each year.<sup>14</sup> This value is the equivalent of 21,000,516 dump trucks filled with natural gas. The majority of natural gas is used for heating (both space and water) and cooking in the American home and accounts for an estimated 14% of household carbon emissions.<sup>15</sup> For every 100 cubic feet of natural gas that is utilized, 12 pounds of carbon emissions are created.<sup>16</sup> Cooking accounts for approximately 4% of household carbon emissions associated with natural gas, while space heating accounts for 60% and water heating for 20%.<sup>17</sup> In colder regions, the average amount used in home heating will be significantly higher than in warmer areas with shorter winters. Over the course of an average year, the individual American household emits and estimated 2.2 tons of CO<sub>2</sub> emissions from natural gas.<sup>18</sup> Another consideration in the creation and utilization of natural gas as a common natural resource is the use of fracking in the extraction process. Fracking destroys the local environment as pipes are inserted into the ground in order to pump natural gas from deposits trapped underground. Large numbers of animals and amount of soils and sands have been displaced in the process of fracking in the last 4 years. One final consideration in the continued utilization of such large amounts of natural gas in the American home is the

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<sup>14</sup>Nuri Cihat Onat, Murat Kucukvar, and Omer Tatari, "Scope-Based Carbon Footprint Analysis of U.S. Residential and Commercial Buildings: An Input–Output Hybrid Life Cycle Assessment Approach," *Building & Environment* 72(2014).

<sup>15</sup> Ibid.

<sup>16</sup> Peter Miller, "Saving Energy: It Starts at Home," *National Geographic* 215, no. 3 (2009).

<sup>17</sup> Onat, Kucukvar, and Tatari, "Scope-Based Carbon Footprint Analysis of U.S. Residential and Commercial Buildings: An Input–Output Hybrid Life Cycle Assessment Approach."

<sup>18</sup> Christopher M. Jones and Daniel M. Kammen, "Quantifying Carbon Footprint Reduction Opportunities for U.S. Households and Communities," *Environmental Science & Technology* 45, no. 9 (2011).

fact that it is a nonrenewable resource. Once all available natural gas has been harvested and used, it will not be replenished in the near future.

Tiny homes serve to reduce the American usage of natural gas in heating homes. With an obvious reduction in the size of physical housing area, there is a steep decline in the amount of natural gas that is required to heat space, water and provide for cooking in tiny homes.<sup>19</sup> According to one source, reducing home size by 50% results in a 36% decrease in lifecycle greenhouse gas emissions from materials on the house and the emissions produced by actions of the inhabitants.<sup>20</sup> Lifecycle greenhouse gas emissions includes an estimate of the carbon emissions created throughout the entire life cycle of all materials used to provide for the home as well as the materials used in the construction of the physical structure of the home. Jay Shafer measured one of his homes (89 Square Feet) at less than 900 pounds of annual carbon emissions.<sup>21</sup> This figure can be compared to the 2.72 tons of annual carbon emissions mentioned previously, an approximate 77% decrease in annual carbon emissions. The reduction in carbon emissions from both electricity and natural gas usage is an excellent reason to consider downsizing to a tiny home.

Another benefit of downsizing to a smaller living space is a reduction in general household spending. When usage in household utilities begins to decrease, annual spending on utilities bills decreases immensely. In some homes, the reduction in utility

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<sup>19</sup> Adrienne Wimberley Kautz, "The 880 Square Foot House: A Small Residential Design That Transforms to Accommodate Multiple Household Types" (Florida State University, 2011).

<sup>20</sup> Jordan Palmeri, "Smaller Homes, Smaller Footprint, Deq-Commissioned Report Shows," (2014).

<sup>21</sup> Jay Shafer, *The Small House Book*(Sebastopol, Calif.: Tumbleweed Tiny House Company, 2009).

costs can be as much as 100% or more with the installation of solar and/or geothermal heating and electricity sources. Installation and investment in these elements will allow for complete function of the home and the potential to contribute some to the municipal electrical system, meaning that the contributor would be paid by the local electrical company for their contribution. One couple estimated that they have saved around \$50 per month during the summer and \$100 per month during the winter when they downsized.<sup>22</sup> If living off the grid is of more interest, it is possible to use a combination of multiple off the grid utilities in order to supply the home with electrical and heat energy. In one instance, a man interviewed on the blog *Inhabitat*, a blog focusing on sustainable topics, said that he built a home for less than \$2,000 that relies on solar and wind power for electrical energy.<sup>23</sup> The possibilities of energy supply to the home are endless and easily help contribute to lower annual household spending on utilities.

Due to the decrease in available space, tiny home inhabitants can spend less money on unnecessary items and are often more aware consumers. Much of this decrease in spending comes as a result of the reduction in storage space resulting from downsizing to a home that has room for the bare essentials. Many homeowners will tell you that the hardest part of downsizing is the process of purging belongings for which there is no room in the home. This can be a hard process as it may force families to part with meaningful or historic pieces that have been with the family for years. On the bright side of purging unnecessary belongings, being rid of excess items can help to reduce stress and also to create a small amount of income, potentially helping to fund the

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<sup>22</sup> Andrea Browne, "Saving Big by Buying a Tiny Home," (Kiplinger).

<sup>23</sup> Lisa Wang, "Author Builds Tiny Solar-Powered Off Grid Cabin for under \$2,000!," *Inhabitat* (blog), February 15th, 2014, <http://inhabitat.com/author-builds-tiny-solar-powered-off-grid-cabin-for-under-2000/>.

construction of a new tiny home or to ease general financial burdens.<sup>24</sup> Although the purging of excess will likely be hard, there are certainly positives to come out of it. Decreased household spending can also help to combat another issue that has risen significantly along with the size of the average American home. The average American has \$15,250 in credit card debt.<sup>25</sup> That's enough money to comfortably purchase and maintain a used vehicle, or to construct a tiny home! Much of this debt comes from excessive spending on unnecessary items as discussed previously. For many, the process of attempting to keep up with their neighbors in housing size, updating wardrobes, new technologies, etc. has driven them into debt.<sup>26</sup> This spending to keep up to date and up to par with others around us is the central reason for American debt driven entirely by consumerism and the modern American consumerist culture. Constructing and inhabiting a tiny home can help immensely in the process of decreasing household debt and creating informed consumers. In this sense, tiny homes and the lifestyle they inspire serve as an example of the anti-consumerist movement.

In moving into a tiny home, it is possible for families to create a stronger family bond. Because of more consistent time spent with one another, the potential for a more intimate connection among family members exists. There are some important things to keep in mind with the construction of a new tiny home in relation to family interactions, with younger children requiring more interaction and older children requiring less

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<sup>24</sup> Browne, "Saving Big by Buying a Tiny Home."

<sup>25</sup> "American Household Credit Card Debt Statistics: 2014," 2014, accessed March 28th, 2014. <http://www.nerdwallet.com/blog/credit-card-data/average-credit-card-debt-household/>.

<sup>26</sup> Juliet B. Schor, *The Overspent American: Why We Want What We Don't Need*, First ed. (New York, NY: Haper Perennial, 1998).

interaction as they strive for independence from the family.<sup>27</sup> With these simple considerations in creating a living space that also allows for privacy among individual family members makes it very possible to dwell in a tiny home with an entire family.

Along with a sense of connection among families, many homeowners could gain a sense of increased happiness resulting from their choice in moving into a smaller home. With lessened amounts of home maintenance in both newly constructed buildings and tiny homes, a huge sense of relief can be found in spending time relaxing during the weekends instead of constantly performing maintenance tasks. Along with less maintenance comes less spending on home maintenance and renovation and most often significantly smaller debts and mortgages, if any mortgage at all is required. With lessened debt, come lessened stress and an increased amount of time and funding to engage in activities that are enjoyable, helping to create the space for a greater sense of happiness. Relief that living space is potentially significantly more permanent with so many considerations in the construction process that allow room for continued growth can also inspire a sense of relief and happiness.<sup>28</sup> A sense of permanence and safety is incredibly important to human psychology in regards to a living space. Tiny homes also allow a sense of security for many families as they create a sense of security that they have provided for themselves and their families.<sup>29</sup> Being able to provide for one's family gives a sense of security and often allows more room for relaxation within the home. Along with the ability to provide, it has often been considered a part of the American

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<sup>27</sup> Kautz, "The 880 Square Foot House: A Small Residential Design That Transforms to Accommodate Multiple Household Types".

<sup>28</sup> Ibid.

<sup>29</sup> Adams, "The 'Comfort Zone' How Small Can It Be?: Homebuilders in Search of Doing More with Less."

dream to own an individual home. This serves as another driving force in the tiny house movement because it allows for the average American family to live well in a smaller home. These factors can help to increase comfortability in the home and inspire a sense of satisfaction, all of which aide in the maintenance of happiness among all members of the family, especially among the homeowners.

One enormous positive that results from downsizing are the savings of both money and time that can be used for other opportunities or simply be put away for later in life. With fewer maintenance projects to constantly attend to, families can easily spend more time with one another and have the time to travel or engaging activities outside of the home that are of interest to all members of the family. For many, travel is an incredibly important experience. And with money saved that would otherwise be spent on home decoration or items that exceed storage capacity, funding travel opportunities is an excellent possibility. This money saved can also be used to eliminate any existing debt. Once again, with a diminished debt, savings to fund travel opportunities and other endeavors can be accounted for. Finally, the money saved can be set aside for later in life in retirement accounts that will help to create greater financial stability and eliminate the need to work to an older age, as has become more common in the United States.

Downsizing can create numerous opportunities for a more financially stable lifestyle and provide the homeowner with increased savings in time that can be used to engage in activities that bring happiness to the family.

### Downfalls of Downsizing:

Although there are numerous benefits to downsizing there are several potential downsides as well. One of these downsides is the question of whether or not tiny homes are limited only to upper class families with a larger source of income and savings. Although it may seem this way with many prebuilt models ranging from \$40,000 to \$50,000, the ability to construct and inhabit a tiny home is not limited by the cost. In fact, many who have built the homes themselves report construction and interior decoration has cost them under \$20,000, with some costing as little as \$2,000.<sup>30</sup> In fact, the Tumbleweed Tiny House Company, owned and managed by Jay Shafer, quoted prices as low at \$16,000 to self-construct a tiny home.<sup>31</sup> Another means through which to lower the costs of construction is the use of salvaged goods and materials in the construction process. Brad Kittle, owner of Texas Tiny Homes, strives to increase the reuse of construction materials when building new structures. Reuse helps to increase the carbon lifecycle of construction materials and reduce the carbon footprint of the structure and the carbon footprint of the homeowner. With continued reuse of materials, the average American carbon footprint could easily be driven down from its currently high value. With the average family income in the United States at \$64,053 in the year 2012 for families and \$30,880 for non-family households, tiny homes are an affordable housing option for all American families and individuals.<sup>32</sup> This affordability also provides the opportunity for the average American to build and inhabit a home that will

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<sup>30</sup> Terence Chea, "Tiny House Movement Sprouts," *The Washington Post*, 12/04/2010 Dec 04 2010.

<sup>31</sup> Browne, "Saving Big by Buying a Tiny Home."

<sup>32</sup> Carmen DeNavas-Walt, Bernadette D Proctor, and Jessica C Smith, "Income, Poverty and Health Insurance Coverage in the United States: 2012," ed. United States Department of Commerce(Census.gov: United States Census Bureau, 2013).

not put them debt and require continued investment and payments. Although tiny homes may seem a costly investment that are limited to those with more money, the average American truly can afford a tiny home.

Another issue in the construction of tiny homes regards the land availability and city and state building construction policy. Some cities and states do not allow homes under a certain square footage to be recognized as homes, meaning that tiny homes are not considered to be a building or home. For example, the state of California requires all homes to be more than 300 square feet.<sup>33</sup> One of the attempts to combat the limits of these zoning regulations has been the construction and inhabitation of mobile tiny homes or tiny homes on trailers, which allow the owner to move with ease and also to avoid housing size limitations within cities. Tumbleweed Tiny Homes and Little House on the Trailer manufacture rentable and buyable homes constructed directly on trailers. They also offer training seminars in construction and can provide buyers with the properly modified trailers should there be an interest in self-construction.<sup>34</sup> Prebuilt mobile units from Tumbleweed Tiny Homes have been quoted anywhere from \$55,000 to \$70,000.<sup>35</sup> However, many cities and states also have laws and regulations regarding the permanent parking of mobile homes, further complicating the construction of tiny homes on trailers as a means through which to combat housing regulations.<sup>36</sup>

This issue could be solved by changing legal statutes regarding housing in the United States in order to make room for tiny homes both on trailers and as permanent

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<sup>33</sup> Shafer, *The Small House Book*.

<sup>34</sup> "Little House on the Trailer, Petaluma Ca- Custom Built Manufactured Homes," 2014, accessed March 18th, 2014. <http://littlehouseonthetrailer.com/>.

<sup>35</sup> "Tumbleweed Tiny House," 2014. <http://www.tumbleweedhouses.com>.

structures. Tiny homes can be easily developed on existing properties, whether they are located in an urban or rural setting. These homes also have a significantly smaller footprint, meaning that the amount of land that an individual home takes up is significantly smaller than the average American home. This fact makes it possible to fit larger number of homes on a significantly smaller amount of land. With legislation put in place to help encourage the construction of tiny homes, they could easily be an excellent option for affordable, sustainable housing in the United States.

One example of this can be found in the city of Portland, Oregon. Portland has taken steps toward the inclusion of multiple housing units on an individual property. Some residents within the city are taking advantage of friendly zoning laws in order to create a second dwelling on their property. One couple, Jen Wantland and Bryan Scott, have converted their two-car garage into a 480-square foot “granny flat” for approximately \$60,000.<sup>37</sup> Upon completion of their new tiny home, they promptly moved into the smaller dwelling and began renting out the four-bedroom house that was the focus of the property. These zoning laws have been in the process of development since the 1990s and have finally been developed in a manner that officially allows for property owners to develop accessory dwelling units on their property. This has offered some the opportunity to downsize from their large city homes and more the opportunity to rent as a means of supplementing their income. The zoning laws allow for property owners to build a second dwelling on the property that is no more than either 75% of the square footage found in the main house, or 800 square feet, whichever value is smaller.<sup>38</sup>

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<sup>36</sup>Sandy Keenan, "Grandma Never Had It So Good," *The New York Times*, 20140507 2014.

<sup>37</sup> Ibid.

Portland now serves as one example within the United States of the ability to develop city-zoning laws in a manner that is friendly toward tiny housing and the development of new, smaller homes within the city.

Although it is possible to rewrite city ordinances and zoning laws in order to allow for tiny homes, obtaining the space on which to construct a tiny home, mobile or otherwise, still presents a huge issue to downsizing. Since many cities will not allow homeowners to park within the limits of the city due to zoning and lot laws, many are turning to places outside of the city when looking for a place to park on a more permanent basis. When parking or constructing in areas outside the city, many homeowners do not realize that they are contributing to sprawl, even if their physical addition is significantly smaller and less permanent than most peoples are. Whether purchasing land in a rural or urban area, land is an expensive commodity and adds cost to construction and inhabitation of a tiny home. With the average cost of a singular acre of undeveloped land in the United States at approximately \$1,000, the cost of purchasing land could add up quickly.<sup>39</sup> Keep in mind that this is undeveloped land and the price will only increase in more urban settings or closer to roads, which would be necessary to have access to other items that are essential to life (food, water, etc.). This price does not take the price of connecting to local sources of water, electricity, sewage, and other municipal resources available to the homeowner. With a home that is off the grid, it is possible to avoid these items and keep the price of construction low. However, living in this manner is not always a plausible reality for all and could present further costs to be

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<sup>38</sup> "Average Cost of Land Per Acre: Things to Consider When Buying Land," 2014, accessed April 24th, 2014. <http://www.brighthub.com/money/home-buying/articles/95017.aspx>.

factored in the planning process. Ultimately, land could be another expensive factor in the process of constructing a tiny home and could be a limiting element for those looking to build and inhabit a tiny home.

### Conclusion:

With the enormous spike in the size of the American home since the year 1950, the American carbon footprint has grown substantially. This growth has left many Americans looking for options that will allow them to live a comfortable lifestyle while still considering sustainability on a daily basis through their choices. Of the contributing factors to the American carbon footprint, housing is by far the largest. Tiny homes are an excellent option for homeowners looking to live in a manner that reduces the household carbon footprint while leaving room for a comfortable lifestyle. Challenges to tiny homes and the tiny house movement can be addressed with cooperation of citizens and a push to create new legislation that will allow for the construction of these structures throughout the United States. In order to fully understand the environmental impact of the individual household, it is important to continue to research the home through various aspects of the carbon footprint and to continue to understand just how beneficial downsizing to a smaller home can be both financially and environmentally. Only time will tell just how much impact the tiny house movement will have on the consumerist habits of the American population and whether or not it will take hold among the majority of the population.

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