

Reaching Austin's Net Zero Goals via Housing Density

By

Isabella Peterson

MPAff Candidate the LBJ School of Public Affairs

Table of Contents

Executive Summary	2
Housing Density	4
Mixed-Use Zoning	4
Austin Housing	5
Housing Density Benefits	5
Housing and Green House Gas Emissions	6
Austin Climate Equity Plan	8
Analysis of Austin's Goals	9
Recommendations	10

Executive Summary

In 2014, the City of Austin Office of Sustainability and ATMOS Research published "Net-zero by 2040" projections, outlining potential climate change implications through 2100. To address those climate change consequences, in 2021, Austin created its Climate Equity Plan. This project outlines several amazing programs and benefits to increase resiliency, and equity, and achieve emission reductions. However, for the transportation and land use goals, roughly six projects have yet to be started and zero have been completed. For the City to reach its sustainability goals as outlined in the Climate Equity Plan, it must take actions beyond the currently listed preparations.

The City's Climate and Equity Plan demonstrates a serious commitment to combating the effects of a changing environment. But additional attention and efforts are needed on housing density and transportation projects. Specific action to increase Austin's housing density will not only help achieve the "Net-Zero by 2040" goals but also strengthen and support the City's current efforts toward developing an efficient transportation system with Project Connect. These combined efforts will accelerate a sustainable transition, while also providing beneficial climate change reductions and subsequent public health benefits.

Austin's Current Transportation and Land Use Goals

1. **Goal 1:** 80% of new non-residential development is located within the city's activity centers by 2030.
2. **Goal 2:** 135,000 housing units are preserved and produced by 2027, including 60,000 affordable housing units, with 75% of new housing located within a half mile of the city's activity centers.
3. **Goal 3:** By 2030, 50% of trips in Austin are made using public transit, biking, walking, carpooling, or avoided altogether by working from home.

Background and methodology

The City of Austin's Net-zero by 2040 is a baseline for the potential climatic consequences the City will encounter. Strategies listed to achieve the 3 goals outlined in the Transportation and Land Use section are used as a baseline for our analysis and comparison. The resources used are

from the City of Austin website, US census data, and published journals. Qualitative research was used to gather supplemental data championing the increase in housing density. Housing, specifically, has large climate change benefits and will increase the City's reliance on public transit.

Key Findings

Housing density is linked to a reduction in greenhouse gas (GHGs) emissions mitigating the detrimental effects of climate change. Two-thirds of carbon emissions come from cities and towns, and Austin emits over 10 million metric tons of CO₂ annually. If Austin continues to emit greenhouse gases at the same rate, then there will be a rise in average temperatures, more frequent weather extremes, and increased droughts. Human-driven activities such as driving have worsened the impacts of climate change, forever altering the Texas landscape. Through the climate projections made by Atmos Research, Austin has great certainty for a worsening climate unless mitigation efforts are pursued.

High population density can help lower Austin's energy usage and reduce the City's carbon footprint. Those climate benefits combined with increased usage of public transit will reduce the reliance on cars and diminish air pollution.

Recommendations

1. **Increase housing density to achieve greater city mobility.** Eliminate or reduce zoning barriers along transit corridors to increase residential housing density.
2. **Increase the usage of current and future transit systems.** Advocate for the completion of Project Connect, and continue to educate Austinites about the benefits of public transportation in order to increase usage.
3. **Educate City of Austin residents on housing density importance.** Increase educational activism for the City on housing density matters.

Housing Density

Density refers to the amount of development per acre permitted on a plot of land that is allowed under current zoning regulations (League of California Cities, 2019). Density is commonly measured as dwelling units per acre, ranging from “low density” to “high density”. Low density refers to housing arrangements with single-family units with one to three stories and an average of 12 dwellings per acre. High-density housing refers to over 40 dwellings per acre and most commonly contains larger apartments with wraparounds, and structured parking, standing over four stories high.

The urban planning of a community will often be constrained by its current zoning laws, determining the amount of housing density. Zoning laws establish the type of construction allowed on certain plots of land, providing standards for the configuration of the buildings, floor-to-area ratio (FAR), neighborhood compatibility, and other features (City of Austin: Planning and Zoning Department, 2016). However, *restrictive* zoning laws, like single-family zoning, reduce the inclusion of acreage with a variety of buildings that merge residential and commercial features, such as apartments, grocery stores, and small businesses.

Mixed-Use Zoning

Unlike single-family zoning laws, which only allow for residential single-family homes, mixed-use zoning allows for the combination of office, retail, commercial, and residential uses to be allocated in a single development (eLaws, 2013.). Mixed-use zoning laws permit the development of thriving “hot spots” of communities that reside within walking distance of amenities and housing. Efficient public transportation in mixed-use neighborhoods allows for easy commuting to even areas located outside the mixed-use development. Mueller and the Domain are perfect examples of thriving mixed-use zoning neighborhoods in Austin.

Utilizing mixed-use zoning increases housing and population densities, lowering the need for reliance on single-use cars for daily commutes. Everyday tasks, with minimal time requirements,

will be replaced by public transportation, walking, or biking because of the proximity to local businesses. This helps develop a walkable community. A walkable community provides the everyday needs of a consumer to be highly accessible through a 20-minute commute by bike, walking, and public transit (Da Silva et al., 2019). The creation of these communities has reduced greenhouse gas emissions from cars, reduced FAR, and lowered the carbon footprints of their residents. Additionally, residents in these communities benefit from reduced congestion and air pollution while enjoying increased green spaces and sustainable urban planning (Bermejo, 2021).

Austin Housing

According to 2021 Census data, the current population of Austin is 964,177 people (U.S. Census Bureau, 2020). Between 2010 and 2020, Austin has added 90,185 housing units, representing a 25.5 percent growth compared to 21.7 growth in population (City of Austin: Housing and Planning Department, 2021). The current population density of Austin in 2020 is 3,006.4 people per square mile, with its most densely populated areas around the University of Texas (U.S. Census Bureau, 2020).

In 2017, the Austin City Council adopted a *Strategic Housing Blueprint*, creating a 10-year housing plan to construct 60,000 affordable housing units for those making less than 80% of the median family income (City of Austin, 2017). Creating a city-wide housing plan is a positive initial step, but according to the 2021 blueprint scorecard, the city is “off track” on six out of eleven of its strategic housing goals (Austin Housing Works, 2021). For example, the city has fallen extremely behind on its pace to meet its 10-year goal to construct 60,000 affordable buildings. In 2021, the city only produced 1,619 affordable housing units, far less than its annual goal of 6,000 units a year (Austin Housing Works, 2021). The inability of the city of Austin to stay on track with its affordable housing plans demonstrates the need for additional attention, structure, and focus on housing issues.

Housing Density Benefits

Increased housing density provides numerous benefits such as a reduction in greenhouse gas emissions because of population density and transportation usage. Innovations such as Project Connect can allow communities to fully rely on public transportation, especially if the communities are already in high housing density scenarios. However, if the housing structure of Austin is not compatible with public transportation, then asking individuals to utilize those services will be a daunting and dubious task.

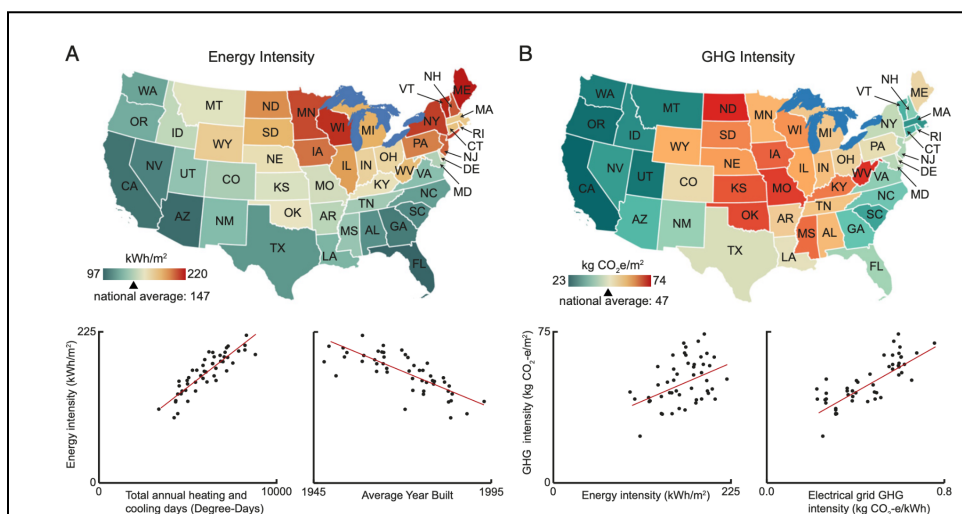
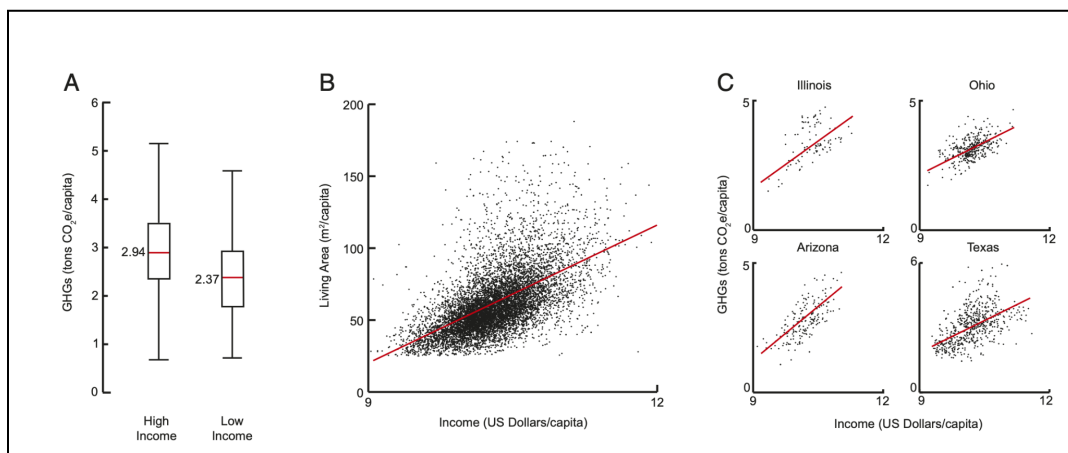
Focusing on housing density not only incentivizes the use of Austin's current transportation system but will streamline the use of the programs in Project Connect. Additionally, a combination of housing density and regular public transportation will support the City of Austin in reaching its Climate Equity Goals, reaching net zero by 2040.

Housing and Green House Gas Emissions

To best demonstrate the links between housing density and climate change; this report references a paper from the School for Environment and Sustainability at the University of Michigan. This publication concludes that current carbon footprints in the United States are not sustainable enough to achieve a reduction in GHG emissions equating to the reductions in the Paris Climate Agreement. Grid decarbonization alone would be insufficient to meet upwards of 80% of emission reduction targets for 2050 (Goldstein et al., 2017). Energy efficiency policies are not, on their own, strong enough to reduce carbon emissions, and a large portfolio of zero-emission strategies and behavioral changes are needed (Goldstein et al., 2017). This means that while Austin's current sustainability efforts are a positive step in reducing emissions, they are not enough. The University of Michigan found that to meet zero-emission targets, a reduction in floor space and increases in housing density is needed to build low-carbon communities.

According to the Nature Conservancy, the average carbon footprint for a person in the United States is 16 tons (The Nature Conservancy, 2023). The average for a single-family household in the US is estimated at 45 kg of CO₂ equivalent per square meter (Goldstein et al., 2017).

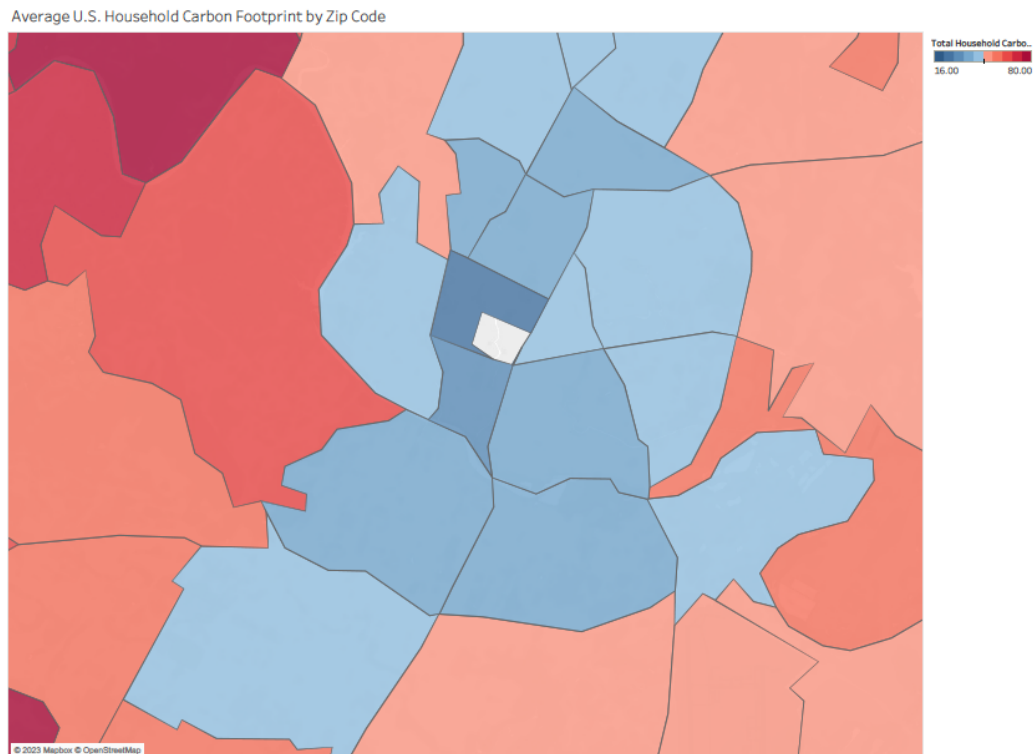
Although these are U.S. averages, variations in house size and income can alter a family's carbon footprint. Larger house sizes, in general, take more energy to operate for heating and cooling, lighting, and more, developing a larger carbon footprint. According to the publication, wealthier Americans have per capita, footprints 25 percent higher than those of lower-income residents - due to a larger house size (Goldstein et al., 2017). And if a household is *extremely wealthy*, the carbon footprint of that house can be up to 15 times higher than an entire neighborhood (Goldstein et al., 2017). The income-to-carbon footprint relationship can be seen below, with Texas' relationship being positively correlated with an increase in greenhouse gases.



Households that reside in denser neighborhoods close to city centers tend to have lower carbon footprints than more widespread communities (Plumer, 2022). Analysis by the EcoDataLab in

collaboration with the University of California, Berkeley produced several data maps demonstrating the reduction in the carbon footprints of an average household when they reside in densely populated regions (Plumer, 2022). This outcome is no different for the City of Austin.

As the data map below demonstrates, residents closer to the city center have lower carbon footprints than those communities that live further away. The densest and most centralized communities are reporting less than the national average carbon footprint. Achieving Austin's sustainability goals could be increasingly difficult if large-scale single-family housing is the current most popular housing option.



The most interesting conclusion of the University of Michigan study was that even with their most aggressive climate reduction scenario, which includes energy retrofitting, decarbonization, and small-scale low-carbon energy, the US residential sector would need additional efforts to reach Paris Agreement standards (Goldstein et al., 2017). The report states that “meeting the 2050 Paris target also requires fundamental changes to the built forms of communities. New

homes will need to be smaller... density needs to increase on average by 19% nationally,” (Goldstein et al., 2017).

If Austin expects to fulfill its Climate Equity Plan and achieve net zero by 2040, there must be a strong emphasis on housing density. Achieving net zero will only be possible with serious attention to how Austin allocates its land usage and how public transportation is used.

Austin Climate Equity Plan

The 2021 Austin Climate Equity Plan was created with a bold and ambitious goal of reaching net zero by 2040 (City of Austin, 2019). This plan complements other sustainability projects such as Project Connect and the Strategic Housing Blueprint. This plan has a wide combination of over 74 strategies to help achieve the climate goals of the City.

Austin’s current emissions primarily come from five sectors: energy use in buildings from electricity and natural gas, transportation, industry, refrigerants, and waste (City of Austin, 2019). The two main emitter sectors are transportation and electricity.

Various city departments have been tracking their total emissions from each sector, displaying a slight decline starting in 2018 (City of Austin, 2021). Transit Forward’s report is an evaluation of the transportation and land use goals in Austin’s Climate Equity Plan. Transportation and land use highlight where residents live, work, and mobilize around the community. By cultivating a more transit-forward approach and increasing housing density, the City can be on its way to achieving its climate change goals.

Austin’s three main transportation and land use goals are as follows:

Goal 1: 80% of new non-residential development is located within the city’s activity centers by 2030.

Goal 2: 135,000 housing units are preserved and produced by 2027, including 60,000 affordable housing units, with 75% of new housing located within a half mile of the city's activity centers.

Goal 3: By 2030, 50% of trips in Austin are made using public transit, biking, walking, carpooling, or avoided altogether by working from home.

Analysis of Austin's Goals

Goal 1

Austin has yet to start on a large portion of its four strategies to achieve goal one. A Complete Community is a great project the City has initiated. Complete communities are “a planning concept that aims to meet the basic needs of all residents in a community through integrated land use planning, transportation planning, and community design,” (City of Austin, 2023). These goals also are working on increasing employer location and amenities; creating mobility hubs; and phase-out of free parking (City of Austin, 2023).

Goal 2

Austin has begun two out of its three strategies to fulfill goal number two. These strategies involve a combination of affordable housing assistance programs; funding affordable housing, and enhancing community engagement for affordable housing and anti-displacement programs.

Goal 3

Austin has committed to six strategies to expand and improve public transportation; promote free transportation options; enhance transit stations and stops; prioritize bicycle networks; bike education and training; improved sidewalks, urban trails, and crossings (City of Austin, 2023). Many of these programs are still in their initial research stages, but no strategy has reached completion. These programs are beneficial for the Austin community but must be completed for residents to receive those benefits.

These three goals housed under the Austin Climate Equity Plan are strong initial measures at both increasing Austin housing density and public transportation usage. But it is evident in the Climate Equity Plan dashboard that many of these strategies, if not all, have yet to be completed, started, or even halfway completed. Considering the large and ever-growing necessity for housing density, transportation, and a reduction in greenhouse gas emissions, the City of Austin must do better. Reducing Austin's GHG emissions and carbon footprint is a considerable necessity when taking into consideration the climatic projections for the City, as outlined by the 2014 climate projections (Hayhoe, 2014).

Recommendations

To help improve the City of Austin's current performance on the three goals above, Transit Forward recommends the following three solutions. Not only will these recommendations help fulfill the transportation and land usage priorities of the climate equity plan, but will dramatically reduce greenhouse gas emissions fighting against climate change and reducing its negative impacts.

Increase housing density to achieve greater city mobility.

Through mixed residential zoning, accessory dwellings, and more affordable units, Austin can increase its housing density. Increased usage of mixed-use zoning can facilitate the accomplishment of all three goals.

Increase the usage of current and future transit systems

Through educational campaigns, and increased residential density, Austinites will be more encouraged to use current transportation systems and plan for the future usage of transportation projects. This recommendation would help achieve goal 3. It is difficult to increase the current usage of public transportation, but one avenue may be an increase in the user-friendliness of the CapMetro app and lowering rider fees.

Educate City of Austin residents on housing density importance

Through the distribution of TF resources, open meetings, and PSAs, Austinites will become more aware of the benefits of housing density. With a combination of educational resources on housing density success, like areas in the Domain and Muller, residents can realize that housing density is a more pleasing and beneficial way of living.

References

- Austin Housing Works. (2021). *Executive Summary*. AustinTexas.gov. Retrieved March 30, 2023, from https://www.austintexas.gov/sites/default/files/files/Housing_%26_Planning/2021_ScoreCard_ExecutiveSummaryandScorecards_FINAL.pdf
- Berkeley. (2013). *CoolClimate Maps of USA*. CoolClimate Network. Retrieved March 30, 2023, from <https://coolclimate.berkeley.edu/maps>
- Bermejo, F. (2021). *Introducing the “15-Minute City”: Sustainability, Resilience and Place Identity in Future Post-Pandemic Cities*. MDPI. Retrieved March 30, 2023, from <https://www.mdpi.com/2624-6511/4/1/6>
- The City of Austin. (2017). *Austin Strategic Housing Blueprint*. AustinTexas.gov. Retrieved March 30, 2023, from <https://www.austintexas.gov/blueprint>
- The City of Austin. (2019). *Austin Climate Equity Plan | Open Data | City of Austin Texas*. Austin's Open Data. Retrieved March 30, 2023, from <https://data.austintexas.gov/stories/s/Austin-Climate-Equity-Plan/f7zt-irg6/>
- The City of Austin. (2021, September). *HE.E.1 - Community Carbon Footprint (number of metric tons of carbon dioxide emissions)*. Austin's Open Data. Retrieved March 30, 2023, from <https://data.austintexas.gov/stories/s/HE-E-1-Community-Carbon-Footprint-number-of-metric/gram-yd8s/>
- The City of Austin. (2023, March 14). *Transportation and Land Use*. Retrieved March 30, 2023, from <https://data.austintexas.gov/stories/s/2ue5-4whe>
- The City of Austin. (2023, March 14). *Transportation and Land Use: Goal 3*. Retrieved March 30, 2023, from <https://data.austintexas.gov/stories/s/hgwj-tag3>
- City of Austin: Housing and Planning Department. (2021, August 27). *Austin By the Numbers: City Releases Tract-Level Analysis of 2020 Census Data for Austin Metro Service Area*.

- AustinTexas.gov. Retrieved March 30, 2023, from <https://www.austintexas.gov/news/austin-numbers-city-releases-tract-level-analysis-2020-census-data-austin-metro-service-area>
- City of Austin: Planning and Zoning Department. (2016, September). *Zoning Guide.indd*. AustinTexas.gov. Retrieved March 30, 2023, from https://www.austintexas.gov/sites/default/files/files/Planning/zoning_guide.pdf
- Da Silva, D. C., King, D. A., & Lemar, S. (2019). *Accessibility in Practice: 20-Minute City as a Sustainability Planning Goal*. MDPI. Retrieved March 30, 2023, from <https://www.mdpi.com/2071-1050/12/1/129>
- eLaws. (2013). § 4.2. *MIXED USE ZONING DISTRICTS., Article 4. MIXED USE., SubChapter E. DESIGN STANDARDS AND MIXED USE., Chapter 25-2. ZONING., Title 25. LAND DEVELOPMENT., Code of Ordinances*. Austin. Retrieved March 30, 2023, from http://austin-tx.elaws.us/code/coor_title25_ch25-2_subche_art4_sec4.2
- Goldstein, B., Gounaridis, D., & Newell, J. P. (2017, December 30). *The carbon footprint of household energy use in the United States*. PNAS. Retrieved March 30, 2023, from <https://www.pnas.org/doi/full/10.1073/pnas.1922205117>
- Hayhoe, K. (2014). *Climate Change Projections for the City of Austin*. AustinTexas.gov. Retrieved March 30, 2023, from https://www.austintexas.gov/sites/default/files/files/Katherine_Hayhoe_Report_-_April_2014.pdf
- League of California Cities. (2019, March 7). *Understanding Density and Development Intensity*. Cal Cities. Retrieved March 30, 2023, from https://www.calcities.org/docs/default-source/planning-commissioners-academy---session-materials/understanding-density-and-development-intensity.pdf?sfvrsn=d6b7bb05_3
- The Nature Conservancy. (2023). *What is your carbon footprint? | Carbon Footprint Calculator*. The Nature Conservancy. Retrieved March 30, 2023, from <https://www.nature.org/en-us/get-involved/how-to-help/carbon-footprint-calculator/>

Plumer, B. (2022, December 13). *The Climate Impact of Your Neighborhood, Mapped*. The New York Times. Retrieved March 30, 2023, from <https://www.nytimes.com/interactive/2022/12/13/climate/climate-footprint-map-neighborhood.html>

U.S. Census Bureau. (2020). *Austin city, Texas*. U.S. Census Bureau QuickFacts: Austin city, Texas. Retrieved March 30, 2023, from <https://www.census.gov/quickfacts/fact/table/austincitytexas/LND110210#qf-flag-NA> 19122-19130. <https://doi.org/10.1073/pnas.1922205117>