

Built Environment Track Background Paper

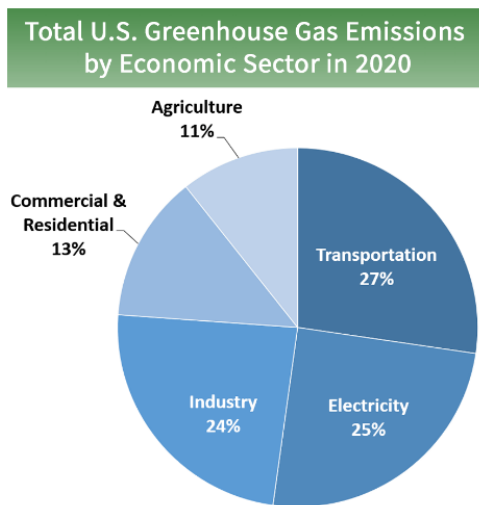
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Overview

This track focuses on the built environment – a broad topic that encompasses land use and development, transportation issues, and renewable energy within urban and rural areas.

The built environment “touches all aspects of our lives, encompassing the buildings we live in, the distribution systems that provide us with water and electricity, and the roads, bridges, and transportation systems we use to get from place to place. It can generally be described as the man-made or modified structures that provide people with living, working, and recreational spaces. Creating all these spaces and systems requires enormous quantities of materials.” ([Basic Information about the Built Environment | US EPA](#)).

Because the built environment is broad, it is an enormous contributor of greenhouse gas emissions. The chart below ([Sources of Greenhouse Gas Emissions | US EPA](#)) shows GHG emissions by economic sector. Only agriculture under our definition of the built environment does not apply.



Total Emissions in 2020 = 5,981 [Million Metric Tons of CO₂ equivalent](#). Percentages may not add up to 100% due to independent rounding.

Planning researchers and practitioners have been addressing the built environment and thinking about its environmental and climate footprint for many years. One overarching strategy to create more equitable, sustainable, and livable communities is through smart growth policies. Smart growth policies include higher density housing, smaller home sizes, more public spaces, and increased use of public transit. In addition, adequate green spaces, walkability and design of urban form have been advocated by public health practitioners and planners. Finally, green infrastructure, open space and wetland conservation, and renewable energy are three more topics supported by climate and planning practitioners. These kinds of policies are designed to

reduce negative environmental impacts, encourage affordable housing, active lifestyles, and equitable, healthy, livable, resilient, and sustainable communities.

Throughout our history, urban development has been dictated by our ability to travel. Before European settlement, indigenous populations lived in villages with complex trading networks. Early



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Wisconsin cities were compact centers of commerce, defined by horse and buggies and trolley cars. Now we live in sprawling communities supported by massive highway infrastructure. Today, suburban housing tracts make it largely impossible to access employment, basic goods, or friends and family without a car. As exclusive vehicle travel has become more and more mainstream, our transportation carbon emissions have grown immensely. At the same time our land use has responded with big box development, office parks, and abundant parking. Communities have created regulations to accommodate cars by building wider streets, and requiring minimum parking requirements, large lot zoning, and unnecessary setbacks. As we look to the future, special focus should be given to land use that supports transportation alternatives. We should be focused on building compact, walkable neighborhoods. To create safer, more sustainable places, we must start building communities that provide residents with meaningful transportation options.

When it comes to energy conservation and clean energy investments, local units of government are often restricted by state and utility policy leaving local actions inadequate to meeting most carbon reduction goals. These restrictions take the form of limiting access to financing, utility rate design that limits the financial viability of efficiency and distributed generation investments, limiting local energy investment opportunities such as in local community solar facilities, and inadequate transparency and planning horizons for jurisdictions to confidently develop and implement zero carbon energy strategies. Legislation in neighboring states have opened opportunities for community solar (MN and IL), third party financing (IA, IL, and MI), community choice aggregation (IL and OH), and on bill financing for energy efficiency (KS, MO, IL, and MN). Neighboring states (MN and MI) have also established detailed and transparent long term planning processes, known as integrated resource plans, that help to control costs and expand ratepayer energy efficiency and distributed energy resources to manage demand. Additionally, state regulators have also worked to quantify the ratepayer value that efficiency and distributed generation provide, which help to prioritize customer investments as a cost saving strategy for future ratepayers when analyzing the cost and benefits of new generation and transmission capacity.

Local governments are responsible for land use and local transportation systems, and they play a critical role in decarbonization by embracing many of the policies outlined above. Luckily, most of these strategies are not new to Wisconsin's local governments and planners and, in fact, many of them have already adopted many of these policies. Local governments can do more to prepare their communities for climate change and help to decarbonize. However, while many of these policies are municipal decisions, the state has a critical role to play, especially when it comes to clean energy. A key challenge is keeping equity front and center and a lens by which to create and analyze any and all strategies and policies related to the built environment.



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Resources

From EPA:

[NRDC: Growing Cooler: The Evidence on Urban Development and Climate Change \(pdf\)](#), a 2008 study published by the Urban Land Institute and partially funded by EPA, concluded that compact development can reduce vehicle miles traveled by 20 to 40 percent compared to conventional development. Based on the amount of development that will take place and the percentage of that development that could reasonably be expected to be compact infill, the study estimated that compact development could reduce carbon dioxide (CO₂) emissions by 7 to 10 percent in 2050.

A subsequent study, [Moving Cooler: An Analysis of Transportation Strategies for Reducing Greenhouse Gas Emissions \(issuelab.org\)](#), found that a combination of more compact development and investments in transit and other transportation options could reduce greenhouse gas emissions from transportation by 9 to 15 percent by 2050.

[Smart Growth Fixes for Climate Adaptation and Resilience | US EPA](#): Guide that describes specific changes communities could make to their land use and building policies to prepare for climate change while gaining other environmental, economic, health, and social benefits in the short and long terms.

From UW Division of Extension:

[Community Climate Resilience Menu – Community Economic Development \(wisc.edu\)](#): The Community Climate Resilience Menu (CCRM) is an integrated tool to assist communities to become more resilient to the impacts and shocks from major weather changes that disrupt communities. We created the CCRM to provide a flexible approach for community decision-makers to select strategies for each community's unique environment, culture, and economy. The goal of the menu is to help communities identify critical elements that will increase their ability to mitigate the effects of extreme weather and adapt to changes cost-effectively and sustainably. Communities will need to do the work to identify their own strategies and projects and to assess local capacity and fiscal resources to become resilient to this challenge.

From Center for Land Use Education:

[Ready for Electric Vehicles? \(20-page\)](#). This 20-page publication is intended for local government officials and planning and zoning staff to provide an introduction to electric vehicles (EVs), and EV charging outlets. It also provides examples of how general zoning ordinances and building codes can be used to support EVs and benefit communities. A 2-page publication is available and is intended for elected officials. [Energy - Center for Land Use Education | UWSP](#)



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Built Environment Goals

Goal 1: Build compactly and place the range of human land uses (housing, shopping, etc.) close to each other so that people can easily walk, bike, use public transit, or drive shorter distances and put these land uses in the least vulnerable locations (to floods, for example) as possible.

Current status: In a study by Radeloff et al. (2005), they found “The number of housing units in the Midwest grew by 146% between 1940 and 2000. Spatially, housing growth was particularly strong at the fringe of metropolitan areas (suburban sprawl) and in nonmetropolitan areas (rural sprawl) that are rich in natural amenities such as lakes and forests. The medium-density housing (4-32 housing units/km²) category increased the most in area. Temporally, suburban housing growth was especially high in the post-World War II decades. Rural sprawl was highest in the 1970s and 1990s.” In a more recent study by Smart Growth America that measured sprawl of metropolitan areas, Wisconsin’s metro areas varied. Madison and Appleton were becoming more compact and dense while Green Bay continued to sprawl (Ewing, 2014). A recent study suggests that the pandemic, at least in the short-term, is pushing people out of higher density and compact areas to much less dense areas (Peiser and Hugel, 2022). There are many factors that are pushing and pulling people into urbanized areas and out of them.

End status: Less vehicle miles, more compact development (less land adjacent to existing cities converted to development)

Impact on climate change mitigation, adaptation, or resilience: Less driving would reduce greenhouse gas emissions, retain agricultural and natural landscapes, increase in flood retention capacity, and reduce vulnerability to flooding.

Why this is a good approach for Wisconsin: Wisconsin is getting warmer and wetter - approximately 17% wetter than prior decades (WICCI 2021). More precipitation and stronger storms can lead to more flooding. By locating new uses in the least vulnerable locations and making vulnerable locations more resilient to flooding, communities will become safer and more resilient.

Focal constituencies: Community planners, land trusts, non-profits, university research

Potential key actions: update comprehensive plans, update zoning, map vulnerable areas, measure compactness, measure vehicle miles

Radeloff, Volker C., Hammer, Roger B., and Stewart, Susan I. Rural and Suburban Sprawl in the U.S. Midwest from 1940 to 2000 and Its Relation to Forest Fragmentation. (2005). Conservation Biology, Vol. 19, No. 3 (June), pp. 793-805: <https://www.jstor.org/stable/3591069>



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Ewing, et al. (2014). [Measuring Sprawl 2014 - Smart Growth America](#)

Peiser, Richard B. and Hugel, Matt (2022) "Is the Pandemic Causing a Return to Urban Sprawl?,"
Journal of Comparative Urban Law and Policy: Vol. 5 : Iss. 1 , Article 7, 26-41.:
<https://readingroom.law.gsu.edu/jculp/vol5/iss1/7>

Urban Land Institute. (2010). Land Use and Driving: The Role Compact Development Can Play in Reducing Greenhouse Gas Emissions. Washington, D.C.: Urban Land Institute. [Land Use and Driving: The Role Compact Development Can Play in Reducing Greenhouse Gas Emissions | ULI Americas](#)

WICCI. (2021). [Air | Wisconsin Initiative on Climate Change Impacts 2021 Assessment Report](#)



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Goal 2: Update state commercial and residential building energy codes

Current status: Buildings have a large energy footprint in addition to the types of materials that are used, such as concrete. Codes are a cost-effective way to reduce energy use, reduce carbon emissions, improve occupant comfort, and save money for utility customers. Energy codes are adopted at the state level, and many local jurisdictions adopt “stretch” codes that go beyond their state or model codes. The International Energy Conservation Code (IECC) is the most widely adopted model energy code, and is updated every three years through a voting process facilitated by the International Code Council (ICC). Through this process, government members from state and local governments (including representatives from building departments, sustainability offices, housing departments, and others) meet to vote on provisions affecting efficiency in the new code, including standards for the structure (walls, floor, ceiling, insulation), openings (windows and doors), and conditioning (ducts, ventilation, and leakage).

End status: Wisconsin updates its building codes annually. Local governments implement stretch codes to encourage more innovation.

Impact on climate change mitigation, adaptation, or resilience: Changing the current and future buildings in terms of weatherization, materials, and using updating codes will have a large impact on GHG emissions.

Why this is a good approach for Wisconsin: Wisconsin’s energy code is currently the 2015 IECC with amendments for commercial buildings and the 2009 IECC with amendments for residential buildings. Because Wisconsin’s codes are outdated, new building projects have not implemented all potential cost-effective energy efficiency measures included in newer codes.

Focal constituencies: local governments, Wisconsin legislature, Department of Safety and Professional Services

Potential key actions:

- Allow local communities to implement their own ordinances that are more stringent than the state energy codes so long as they clearly provide how to comply with the state and local codes and thus, be able to create a local stretch code.
- Wisconsin adopts the most current energy code without amendment (unless specific provisions are not feasible or cost-effective in Wisconsin) and establishes a process for more regularly updating the state code to align with the model code through the Department of Safety and Professional Services and the Wisconsin legislature.

From: [GovernorsTaskForceonClimateChangeReport-LowRes.pdf \(wi.gov\)](#) p.38



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Goal 3: Increase customer adoption of solar energy 20% per year (measured in AC capacity) over the next 10 years.

Current status: In 2021, Wisconsin residential and commercial ratepayers deployed approximately 60MW of PV to reduce their annual electricity expenditures. Wisconsin’s technical capacity for “rooftop” solar is 37 Gigawatts (more than 600x current annual deployment).

End status: With the passages of the federal IRA, continuation of the Focus on Energy Program, and extension of utility net metering benefits, Wisconsin utility ratepayers will annually increase solar deployment, installing 370MW per year by 2032.

Impact on climate change mitigation, adaptation, or resilience: By 2032, annual customer solar additions would offset more than 1.6 million kWh per year, which represents a reduction of 1,180 metric tons of atmospheric carbon dioxide.

Why this is a good approach for Wisconsin: A policy focus on customer adoption of solar has myriad benefits including: 1) policy advancements are needed to advance customer adoption while they are not needed to advance utility deployment of clean energy, 2) customer investments in solar can lead to additional investments in energy efficiency, energy storage, and electrification which all contribute to carbon reductions in the utility system, 3) deploying energy generation and management technologies at the point of energy use contribute to system efficiency, 4) customer adoption of distributed energy resources reduce the need for high cost investments in new centralized generation and transmission which helps to control electricity price inflation over time, and 5) DER adoption has higher local economic development and job creation than large-scale solar projects.

Focal constituencies: electricity ratepayers, building construction industry, MUSH market (municipalities, universities, schools, hospitals), electric utilities

Potential key actions: updating and sharing information, partnership building, expanding net metering, workforce development

Focus on Energy. (2021). Rooftop Solar Potential Study Report:
https://focusonenergy.com/sites/default/files/inline-files/Potential_Study_Report-FoE_Rooftop_Solar_2021.pdf

Why Local Solar For All Costs Less: A New Roadmap for the Lowest Cost Grid. (2020). Vibrant Clean Energy, Boulder, CO:
https://www.vibrantcleanenergy.com/wp-content/uploads/2020/12/WhyDERs_ES_Final.pdf



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Goal 4: Reduce driving (VMT, vehicle miles traveled) by increasing trips via walking, biking, and public transit

Current status: In 2019, [Wisconsinites drove 66,341,000 miles](#), a statewide increase of 15.8% from 2000.

End status: Reduce vehicle miles traveled (VMT) by 10% statewide from 2019 number by 2030.

Impact on climate change mitigation, adaptation, or resilience: Transportation is the [largest contributor to climate change](#) in the United States, with personal automobile usage representing 59% of all transportation emissions. While electric vehicles will be critical for addressing transportation emissions, it will take [several decades to transition](#). A truly resilient transportation system will be flexible, providing multiple options for travel, including walking, biking, and transit. [Colorado's DOT](#) has adopted a 10% reduction goal and [Minnesota's DOT](#) is considering a similar measure.

Why this is a good approach for Wisconsin: Our transportation system is overly-reliant on one mode of transportation, personal automobiles. This dependance has inherent weaknesses, which was on [full display when gasoline prices increased in 2022](#) and many families struggled to afford basic travel. Resilience to future crises will come from transportation flexibility.

Wisconsin's transportation system is both carbon intensive and deeply inequitable. Our funding decisions over the last seventy years have predominantly focused on car-centric infrastructure. While it has created a well-connected road network, it has hindered those who do not, or cannot drive. According to the Wisconsin Department of Transportation (WisDOT), [non-drivers represent 31% of Wisconsin's population](#) (approximately 1.8 million people). Our transportation system also harbors gaps in racial equity. Communities of color are disproportionately affected by our historic infrastructure investments, including [exposure to more vehicle pollution](#) and increased risk of [pedestrian injury](#) and [death](#). Providing more transportation options and reducing VMT will create a more equitable and sustainable built environment in Wisconsin.

Focal constituencies: Wisconsin Department of Transportation, community planners, elected officials

Potential key actions: Promote better land use policy, reauthorize regional transit authorities (RTAs), promote passenger rail, reinstate Wisconsin's complete streets law, restore eminent domain power to communities to build walking and biking infrastructure

Inspiration:

<https://www.americanprogress.org/article/colorados-greenhouse-gas-emissions-rule-for-surface-transportation-offers-a-model-for-other-states-and-the-nation/>

<http://www.dot.state.mn.us/d8/atp/pdfs/April2022/Statewide%20VMT%20Reduction%20Goal%20Presentation.pdf>



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Goal 5: Direct the Wisconsin Department of Transportation (WisDOT) to perform climate and environmental justice impact analyses as transportation-related projects are considered and developed.

Current status: WisDOT is required to undergo an environmental review of major projects (NEPA), but it does not require WisDOT to account for the carbon-emission impacts of the project they pursue.

End status: WisDOT will analyze and report the carbon emissions and environmental justice impacts associated with their future transportation project. The carbon and climate impact analysis should include an evaluation of a project's potential impacts on VMTs, transportation-related carbon emissions, and an assessment of climate resilience.

Impact on climate change mitigation, adaptation, or resilience: Transportation is the [largest contributor to climate change](#) in the United States, with personal automobile usage representing 59% of all transportation emissions. WisDOT oversees most of the major projects in this category of emissions. They make strategic decisions about which projects to fund and the timeline for their completion. At present, this decision making process is internal and opaque. Climate impacts are not a major factor, if they are considered at all. Other states, like [Virginia](#) and [Colorado](#), have a transparent process that ranks projects based on criteria and allows climate impacts to influence the decision-making process.

Why this is a good approach for Wisconsin: A more transparent process that quantifies the carbon impacts of transportation projects will allow planners at WisDOT and at the local level to identify cost-effective, low-carbon alternatives. From the Governor's Task Force on Climate Change, "This type of analysis provides planners with an analytical framework for evaluating a transportation project's carbon and associated health impacts, allowing planners to evaluate the full direct and indirect costs of a project...utilizing tools that support building resilient infrastructure now and into the future are essential as Wisconsin prepares for a changing climate."

Focal constituencies: Wisconsin Department of Transportation, elected officials, community planners

Potential key actions: Promote better land use policy, reauthorize regional transit authorities (RTAs), promote passenger rail, reinstate Wisconsin's complete streets law, restore eminent domain power to communities to build walking and biking infrastructure

Inspiration: [Governor's Task Force on Climate Change Final Report \(p.44\)](#)