

An Update on Dane County's Countywide Emissions

Earlier this year the Office of Energy & Climate Change (OECC) team completed an [updated emissions inventory](#) to track progress on our collective 2030 Climate Action Plan (CAP) goals. The inventory revealed:

- For **internal county operations**, we are largely on track to be carbon neutral across facilities, fleet and land operations by 2030. That is great, and it reflects the ongoing commitment of County staff across numerous departments.
- **Countywide**, we are making good progress on some reductions and we all need to do more faster to achieve the goals stakeholders set as part of the Climate Action Plan (CAP).

From the beginning our CAP goals have been community goals so when we learned that we needed to do more faster, we knew we needed to convene the community to discuss next steps. The meeting we are hosting on October 30 will bring people together to identify ways to accelerate our progress and this document—about our modeling efforts—is background for that meeting.

Summary of the Updated Emissions Inventory

From 2017 to 2022, Dane County reduced emissions by 3%. In that same timeframe, our population increased by 7%. That means our emissions per person (or per capita) *decreased* by 9%:

	2017*	2022	% Change (Actual)
Total Emissions Produced in MTCO2e¹ <i>(including electricity)</i>	9,741,658	9,426,337	-3%
Population	531,775	568,203	7%
Emissions per Person in MTCO2e	18.32	16.59	-9%

* As part of the 2022 inventory we updated the 2017 baseline emissions inventory so that the two inventories were more consistent.

In the CAP we set an absolute target of reducing emissions by 50% by 2030. That means reducing emissions to 4,870,832 MTCO2e by 2030.

	2017	2030	% Change (Goal)
CAP Emissions Goal <i>(50% of 2017 emissions by 2030)</i>	9,741,658	4,870,829	-50%

Increasingly, communities across the globe are setting Science-Based Targets (SBTs) which are per-capita targets that reflect each country's historic contribution to global emissions. For US communities the recommended 2030 Science-Based Target is a 63.4% reduction in per-capita emissions from 2017 levels. The chart below shows SBTs for Dane County based on our updated 2017 inventory.

	2017	2030	% Change (Goal)
2030 Science-Based Target for Dane County <i>(MTCO2e/Person)</i>	18.32	6.71	-63.4%

¹ MTCO2e is Metric Tons of Carbon Dioxide Equivalents; that is the standard way we measure emissions.

While we are trending in the right direction, we need to reduce emissions more and faster. At this point we consider all of the efforts underway between 2017 and 2022 to be “Business as Usual”. As shown in the table below, continuing at our current pace of change leaves us well short of our 2030 goals.

Projected Impact on:	2017	2022	2030 Estimate <i>(Business as Usual from 2017-2022)</i>	Estimated % Change <i>(2017-2030)</i>	2030 Goal
Total Emissions	9,741,658	9,426,337	8,752,112	-10.2%	-50%
Emissions Per Person	18.32	16.59	13.78	-24.8%	-63.4%

The good news, of course, is that a number of additional initiatives have been launched since 2022 that will further accelerate emissions reductions.

How Much More Is Already Likely?

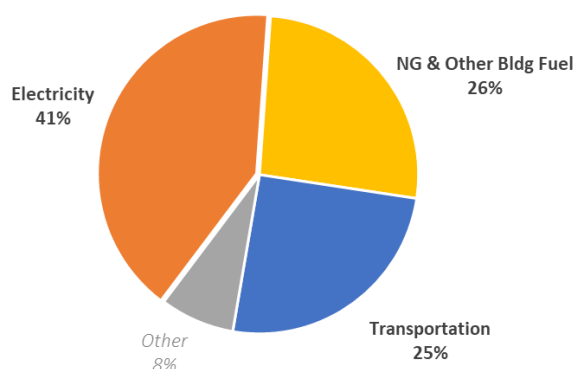
There are a variety of efforts already underway—from an increasingly clean electric grid to new energy efficiency and electrification programs—that will further reduce our emissions.

In our modeling efforts we focused on the three categories of emissions that make up more than 90% of the emissions produced in Dane County:

- Electricity
- Natural gas and other fossil fuels in our buildings
- Transportation

Source of Countywide Emissions (2022)

Total Emissions: 9.4 MMTCO₂e



Summary of Estimated Progress Toward 2030 Goal

As outlined below, our modeling acknowledges other measures being taken and makes a number of reasonable assumptions in order to better estimate our progress toward our 2030 shared goal:

Sector	Assumption	Est % Change (2017-2030)	
		Total	Per Person
Business as Usual	Continuation of efforts underway between 2017-2022	-10.2%	-24.8%
+ Electricity	Utility companies hit their 2030 goals	-16.6%	-13.9%
+ NG and Other Building Fuels	5% of households & commercial real estate pursue energy efficiency &/or electrification each year 2024-2030; ↑ efficiency in Madison commercial building stock	-8.1%	-6.8%
+ Transportation	Electric Vehicles ↑ 30%; Vehicle Miles Travelled ↓ 10%	-5.3%	-4.4%
= Total Estimated % Change in Emissions by 2030		-40.2%	-49.9%
Goal by 2030		-50%	-63.4%

All of that means we have the efforts in place to achieve about 80% of our 2030 goal; the challenge now is to identify efforts to get that last 20%. The remainder of this paper provides supporting detail about these modeling projections.

Electricity

Electricity is currently the biggest piece of our countywide emissions and it is the segment that is changing the most quickly. Even though total electricity usage went up 5% between 2017 and 2022, total emissions from electricity were down 6% because the grid is getting greener. A key strategy for deep decarbonization is to electrify facilities and fleets, transitioning away from fossil fuels to 100% carbon-free electricity—which means greening the grid is critical. Over time we should expect our electric consumption to increase and emissions from electricity to decrease. The table, below, shows electricity use overall, with breakouts for homes and the commercial sector.

	2017	2030	% Change
Population	531,775	568,203	7%
OVERALL			
Electric Use (kwh)	5,353,210,232	5,600,690,880	5%
Emissions (MTCO ₂ e)	4,078,053	3,849,089	-6%
Residential			
Electric Use (kwh)	1,589,146,502	1,776,399,433	12%
Emissions (MTCO ₂ e)	1,210,605	1,249,415	3%
Commercial, Industrial, Governments, etc.			
Electric Use (kwh)	3,764,063,730	3,824,291,447	2%
Emissions (MTCO ₂ e)	2,867,448	2,599,674	-6%

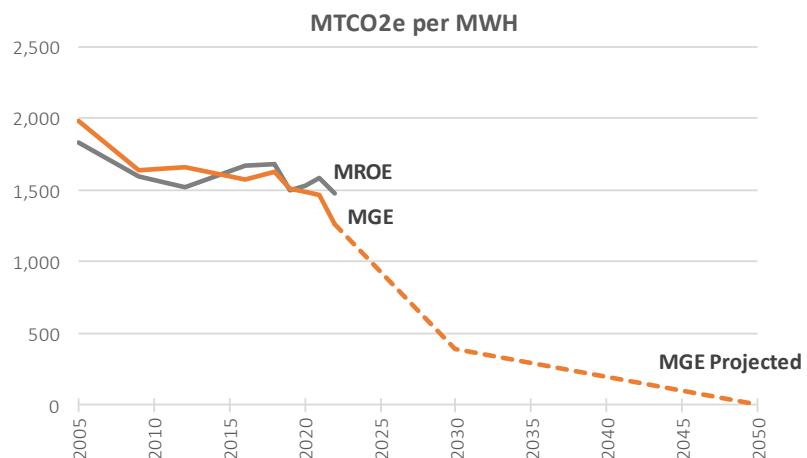
It is critical the electricity we use generate fewer and fewer emissions over time. All three of the large investor-owned utilities serving Dane County have commitments to reduce emissions from electricity:

Utility	CO ₂ e Reduction Goals (from 2005 level)	
	2030	2050
Alliant Energy	50%	100%
MGE	80%	100%
We Energies	80%	100%

A big question, of course, is whether or not these efforts are on track. The [EPA's eGRID](#) tracks electric utility emissions across the US. Dane County is part of the EPA's MROE region and, according to the EPA, the emissions associated with every kwh used in the MORE region dropped by 11% between 2017 and 2022.

(A little more than half of Dane County is served by one

utility, MGE; per data provided by MGE, their emissions dropped 28% in that same timeframe.) That is



good, but these past efforts are not on pace to achieve the 2030 utility targets. Utility leaders consistently assert that they will achieve their clean electricity goals, but it is important to note that these are voluntary commitments; there is no penalty if a utility misses these goals. And, while we have good data about past utility emissions, there is also relatively little transparency about utility milestones toward 2030.

Our modeling presumes that utilities will hit their 2030 goals, which has a substantive impact on countywide emissions. Building on the countywide efforts already underway 2017-2022, this would get us a little more than halfway to our countywide target of cutting emissions in half by 2030.

Projected Impact on:	2017	2022	2030 Estimate <i>(based on utility goals*)</i>	Estimated % Change <i>(2017-2030)</i>	2030 Goal
Total Emissions	9,741,658	9,426,337	7,128,165	-26.8%	-50%
Emissions Per Person	18.32	16.59	11.22	-38.7%	-63.4%

* Also includes continuation of the efforts underway between 2017 and 2022

Other renewable efforts—geothermal heat pumps, rooftop solar—help reduce emissions too. A key consideration relative to customer-sited systems is equity—are we ensuring that everyone in our communities has access to clean energy technologies? Currently a variety of state-specific barriers make it difficult for people in apartments and condominiums to see the benefits of rooftop solar and even geothermal heat pumps. In 2023 the State of Wisconsin won a \$62.4M [Solar for All Grant](#) that may provide opportunities to expand access to solar energy for low- and moderate-income households, including renters. The state’s Solar for All program is still evolving but we will need to determine how we can leverage that program to increase equitable access to lower cost renewable energy systems.

Natural Gas and Other Fossil Fuels in Buildings

Residential Buildings

Our use of methane gas (aka natural gas) to heat space and water in buildings is growing. In fact, our methane gas emissions in Dane County are growing faster than our population. This is a major area of concern, especially relative to new construction. When we build new homes and businesses using gas service we lock in higher emissions for decades, making it much more difficult to achieve our goals.

There are several new initiatives that can help to reduce our methane gas usage in buildings.

- The Inflation Reduction Act (IRA) includes tax credits and two Home Energy Rebate (HER) programs focused on increasing household energy efficiency and electrifying home appliances. These measures, administered through Focus on Energy (our statewide energy efficiency and renewable energy program), can accelerate a reduction in methane gas usage in households. Households can stack federal incentives with Focus on Energy rebates.
- Dane County and multiple municipalities are working in conjunction with community-based groups to expedite retrofits. In our modeling we assumed that 5% of households would pursue energy efficiency and/or electrification each year between 2024 and 2030.
- There are also new tax incentives for builders who build net-zero energy homes. We did not specifically model a shift in new construction.

Commercial Buildings

On the commercial side the IRA provides robust tax credits for renewable energy systems (including geothermal heat pumps) and a tax deduction for whole-building energy efficiency upgrades. Entities can also access existing Focus on Energy incentives and PACE financing for projects. For the modeling we assumed these efforts would yield upgrades to about 5% of commercial real estate space annually.

In addition, the City of Madison launched its [Building Energy Savings Program \(BESP\)](#) in 2024. This program requires commercial buildings over 25,000 square feet to benchmark their energy usage. Research shows that benchmarking leads to energy savings so, consistent with the research, we modeled an increased level of energy efficiency upgrades in Madison’s commercial building stock.

The impact of the above changes, together with a Greener Grid (based on utility goals related to electrification), we get more than half of the way to our 2030 goals.

Projected Impact on:	2017	2022	2030 Estimate <i>(Green Grid & EE/BE⁺)</i>	Estimated % Change <i>(2017-2030)</i>	2030 Goal
Total Emissions	9,741,658	9,426,337	6,339,294	-34.9%	-50%
Emissions Per Person	18.32	16.59	9.98	-45.5%	-63.4%

⁺ Also includes continuation of the efforts underway between 2017 and 2022

Transportation

Between 2017 and 2022 transportation emissions went down 5% while our population went up 7%. This is encouraging—because it suggests that at least some of the reduction in transportation emissions during the pandemic might be permanent, perhaps tied to people working from home, riding electric bikes to work and school, or doing something else to reduce driving alone.

For the modeling we estimated a 30% market share for electric vehicles by 2030 and that vehicle miles traveled (VMTs) would decline 10%. Two newer transportation factors are not integrated into the model because not enough information is available to produce a forecast:

- In fall 2024 Madison implemented Bus Rapid Transit (BRT) using all-electric buses, which is likely to increase transit ridership, thereby reducing VMTs.
- Dane County received a \$13.2M USDOT grant for electric vehicle charging in multifamily neighborhoods, rural areas and multi-modal areas. This is likely to accelerate EV adoption.

Combining all three scenarios—a Greener Grid (based on utility goals related to electrification), more energy efficiency and electrification, and more EV adoption with fewer VMTs—the projected impact is:

Projected Impact on:	2017	2022	2030 Estimate <i>(Green Grid & EE/BE & More EVs, less VMTs⁺)</i>	Estimated % Change <i>(2017-2030)</i>	2030 Goal
Total Emissions	9,741,658	9,426,337	5,823,516	-40.2%	-50%
Emissions Per Person	18.32	16.59	9.17	-49.9%	-63.4%

⁺ Also includes continuation of the efforts underway between 2017 and 2022

It All Adds Up

All of that tells us that we are already on the path to achieving about 80% of our 2030 countywide climate action goals. This is very encouraging news. And, again, it means we need to do more faster to get all the way to our 2030 goals.

Estimated Progress Toward 2030 Goal

