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ENVST 232
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Local Policy Report: Impacts of High Personal Transportation in Sauk City, Wisconsin

Sauk City, Wisconsin is a small town sandwiched between two more heavily populated tourist-magnet areas; Madison and Wisconsin Dells, approximately equidistant from Sauk; a 20-40 minute drive either direction. Sauk City is home to less than 4,000 people, and is composed primarily of residents who commute to work in Madison everyday, where there are more high paying jobs available (IQ Air 2023). 2020 data found the average commute time for adults living in Sauk City to be 20.4 minutes, and the average car ownership per household, 2, with most residents (83.9%) driving alone to work on a daily basis (IQ Air). Furthermore, availability and use of public transportation is scarce in Sauk City. In addition to the consistently high commuter traffic in the area, there is significant travel and tourist traffic passing through from Wisconsin Dells toward Madison or vice versa; this makes up a large portion of the traffic in town. Locals often drive to Madison or the Dells for entertainment, regular errands or leisure, as options are limited in town . Driving 20-40 minutes to one of the neighboring towns is a common part of lifestyle for much of Sauk's young population. There is a lack of policy or action regarding the reduction of vehicle ownership and single driver emissions, and simultaneously a lack of local policy or initiative in place to work toward more environmentally sustainable transportation options in Sauk City. With tourist, commuter and leisure travel being so high between Madison and Wisconsin Dells, it is of importance to acknowledge the impacts that high vehicle emissions, void of local policy or local implementation of alternatives, can have on the city, in regards to both human health, and the environment.

"On-road emissions," or pollutants produced by mobile traffic, are monumentally detrimental in impact on a local level and more widely in global warming contribution. The onroad sector significantly contributes to projected air pollution across most of the United States (Zawacki, Baker, Phillips 2018 Sep.), and the reduction of motor vehicle emissions have the power to, as historically demonstrated, make a major impact, motor vehicle emissions attributed to 84% of total pollution reductions from 1970 to 1999 for the six criteria pollutants (Gary Jensen 2003).

A 2019 study, documented by the International Council on Clean Transportation, quantifying the worldwide health impacts of vehicle exhaust linked ozone and PM2.5 pollution, caused by vehicle emissions specifically, to the premature death of roughly 361,000 people globally in 2010, and 385,000 in 2015. On estimate, 70% of these impacts in 2015 took place in the United States, the European Union, China and India; the largest markets for vehicles in the world. In 2015, on-road diesel emitting vehicles, very popular and prevalent in Sauk City,

accounted for almost 50% of the negative health impacts from vehicle-caused air pollution globally, and in 2010 and 2015 collectively, the global financial cost of these health impacts attributable to mobile vehicles was about $1 trillion (Joshua Miller 2019 February).

A USDA study, publicized by the EPA in 2016, found that the collective miles driven for the purpose of grocery store runs in the U.S. come to more than 42 billion per year if each family who reported grocery shopping on a regular basis made one trip per week , which equates to approximately ten times the distance from Earth to Pluto, and more than 17 million metric tons of CO2 pollution (United States Environmental Protection Agency). The EPA emphasizes that, if designed and implemented well, households in a given neighborhood all ordering their groceries for delivery on the same day each week, and allowing flexibility in the time their groceries are delivered on that day so that delivery vehicles can map out a fuel efficient route, an initiative to reduce vehicle emissions by ordering groceries online for delivery could cut this carbon pollution statistic in half (United States Environmental Protection Agency).

PM2.5 (miniscule and inhalable particulate matter), Sauk City's pollutant with the highest level of emissions, is largely produced by the burning of gasoline, oil and diesel fuel (California Air Resources Board). PM2.5 includes 5 contributors which are considered major health pollutants; NH3, NO*x* , PM2.5, SO2, and Volatile Organic Compounds (VOCs) (Zelasky and Buonocore). The onroad sector, in the midwest and portions of the west and east coast specifically, has been discovered responsible for annual average PM2.5 contributions between .5 - .9 µg/m3, among the highest levels recorded on the maps of mobile source sectors (Zawacki, Baker, Phillips 2018 Sep.).

The EPA states that generally, in cities, mobile sources (including on road vehicles and sources such as boats and construction vehicles) account for 50% or more of two environmentally harmful pollutants in those urban areas; hydrocarbons and nitrogen oxides (Arkansas Department of Energy and Environment). And according to the EPA, emissions from the transportation sector can be attributed to about 45% of the United States' total documented NOx (nitrogen oxide) emissions (United States Environmental Protection Agency 2023). Hydrocarbons, when exposed to the air, produce carbon dioxide, and sometimes carbon monoxide (UCAR Center for Science Education 2006). Nitrogen oxides, in chemical reaction with hydrocarbons and sunlight, produce ozone (Arkansas Department of Energy and Environment), an inhalable particulate pollutant and cause of health issues in humans, including breathing issues and lung disease (Arkansas Department of Energy and Environment). Nitrogen oxide also poses health risks on its own after exposure to oxygen, increasing airway inflammation, reducing lung function, and increasing risk of respiratory attacks, hospitalization and premature death (American Lung Association 2023; United States Environmental Protection Agency 2023).

Ozone (O3), a comparably fine pollutant to PM2.5, causes harm to the environment and to the human body, and has been monitored and tracked by the EPA in the Sauk City area for several decades; compared against the NAAQ standard of 0.70 ppm set in 2015 (United States Environmental Protection Agency 2023), the Sauk City area has come close to the ozone concentration maximum, within .005 of the 0.70 limit for 4 years since the 2015 NAAQ was established, but has successfully stayed at or under this maximum after the limit was set, showing the stark improvement that this national policy made on the regulation of this pollutant, considering the levels of ozone reaching well above .070 ppm for 15 of the 22 years documented between 1990 and 2012 (United States Environmental Protection Agency 2023). On the maps of mobile source sectors, some of the highest recorded levels of ozone contributions during the summer season (within 2 and 5 ppb) were produced by the onroad sector; particularly light duty and heavy duty vehicles (categories that serve as umbrellas for all individual gasoline and diesel emitting vehicles) (Zawacki, Baker, Phillips 2018 Sep.).

While the demonstrated progress due to federal NAAQ policy is a notable victory, as have been multiple levels of policy implementing environmental standards for fuel efficiency and progressively cleaner manufacturing of automobiles since the Clean Air Act passed in 1970 and emission standards took effect five years later (United States Environmental Protection Agency 2023), according to the National Library of Medicine, exposure to pollutants like these, produced by automobile and other vehicle emissions are not safe to humans *at any level*. In the last 20 years of research, air pollution has revealed itself as a critical and monumental human health risk (as well as financial burden in terms of immense medical bills and health care costs). Results of air pollution can take the form of decreased lung functioning, increased respiratory symptoms, irregular heartbeat, heart attacks, elevated asthmatic symptoms, and increased chance of premature death for individuals with heart or lung diseases (United States Environmental Protection Agency 2023). As of 2021, air pollution was number 4 in the ranks of global disease and mortality risk factors, following only smoking, hypertension and dietary factors (Hoffmann et al. 23 Sep. 2021). And the health detriment lies at every level of exposure and severity. "...health effects of air pollution are serious and can affect nearly all organ systems of the human body [4]. Importantly, recent studies and large research programmes consistently show that the adverse effects of air pollution are not only limited to high exposures; harmful health effects can be observed all the way down to very low concentration levels, with *no* observable thresholds below which exposure can be considered safe" (Hoffmann et al. 23 Sep. 2021).

The impacts of mobile vehicle pollutants on local ecosystems are similarly critical. While the harmful effects of gasoline and diesel pollution spread outside of county parameters, and of course, the climate change contribution of emissions spreads greater still, causing collective impact on a global scale (Zelasky and Buonocore 2021), communities closest to the source of the high and concentrated emissions will take on much of the environmental deterioration, including harm to sensitive crops and forests as well as to ecosystem diversity, the

reduction of nutrients in local soil, imbalanced or acidic bodies of water and perpetration of acid rain (United States Environmental Protection Agency 2023). Elevated exposure to ozone particularly, a risk most prominent during hot summers which are inevitably increasing due to climbing global temperatures, can harm ecosystems including forests, wilderness areas, wildlife refuges, and parks, as well as sensitive vegetation, especially during the growing season (United States Environmental Protection Agency 2023). Sauk City's natural landscape, agriculture, and local farm-rooted food service industry are not sustainable under current environmental conditions and regulations, and drivers as well as automobiles are on the rise in the U.S.; consequently, so are the destructive impacts of the resulting emissions (Arkansas Department of Energy and Environment).

Transportation policy in the United States is very "hands off" in terms of single person vehicle ownership limits and mileage, implementing no accountability for individual emissions. There is however, and has been since the Clean Air Act of 1970, federal policy set by the EPA on emission standards for vehicle manufacturers, specific to different vehicles (e.g. "heavy duty" engines). Recently, the Biden-Harris administration has proposed the strongest pollution standards for cars and trucks yet in an effort to speed up the critical transition to more sustainable transportation (United States Environmental Protection Agency 2023).

The EPA sets an essential foundation for environmental regulation throughout the country, and national political leaders have a lot of weight in policy implementation. But state and local governments need to take initiative as well and put resources into new, innovative ideas and policy, not only to ensure compliance with NAAQ standards, but also in order to make the significant progress needed to halt environmental disasters from continuing to cause destruction, and significantly tackle climate change. In Sauk City, locally specific environment or sustainability focused roles of any kind for the community as a whole are virtually nonexistent outside of DNR protected natural recreational areas, at least to the extent of public knowledge. In contrast, in Madison for example, these positions are prevalent and valued, and people are being actively sought for these roles. There is also a need to fill in terms of boards and commissions with clean-energy, or environmental protection focused initiatives in the Sauk City area, beyond the management of the Great Lakes for the state of Wisconsin.

Local governments in some U.S. cities, and many European cities currently regulate traffic through "car free planning" or vehicle restrictions, with the intention of limiting mobile congestion and resulting emissions in certain places and at certain times, and/or encouraging and incentivising or promoting alternative forms of transportation to single passenger driving, such as public transportation, walking, biking, carpooling etc. New infrastructure, making for safer and more accessible travel by bike or foot, and road restructuring for the purpose of pedestrian and biker accessibility are common and successful strategies when set in motion as long term and widespread plans (Victoria

Transport Policy Institute 15 May 2014; Victoria Transport Policy Institute 22 May 2014). Price reduction or complete fee elimination for public transportation use, as was done in Hasselt, Belgium in 2000, has proven to be immensely successful in reducing single passenger on-road traffic. "Faced with rising debt and traffic congestion, the mayor decided to abandon plans to build a third ring road around the town. Instead, he closed one of the two existing ring roads, planted trees in its place, laid more pedestrian walkways and cycle tracks, increased the frequency and quality of the bus service, and announced that public transport would be free of charge. A year later the use of public transport has increased by a staggering 800%" (Victoria Transport Policy Institute). Local action like this has the potential to make a monumental impact when we consider the collective effect that would result from many communities implementing these innovative alternative transportation options and incentives for local residents.

Politics in Sauk City lean conservatively, and prioritization of or concern for the environment is not widespread. While all residents would be positively impacted in terms of health, and living in a healthy environment by the movement towards cleaner and more environmentally friendly on-road emissions, the initiative and momentum in the community needed to make this idea actionable are lacking. At a Sauk City Non-Profit Roundtable meeting in the summer of 2023, Tywana German, Executive Director of the Village of Sauk City Chamber of Commerce, said in regards to environmental initiatives in town, "No offense, but I've never been big on the environment." The ED of the single and very small environmental organization represented at the meeting emphasized the organization's struggle to retain a consistent executive director for more than a year, to execute good organization and communication, and to retain dedicated members and volunteers. The potential for substantive changes that will work to actively reduce individual vehicle emissions in Sauk City lies with the Chamber of Commerce and its leaders, as well as motivated and well organized local environmental non profit organizations; importantly, also with donors. There are many wealthy and active donors in the areas of Sauk City and Madison who donate to Sauk's well established organizations, including organizations with arts, community, and career development focuses. These donors have the power to support and mobilize the intentions of environmental interest organizations, and community goals for sustainability, if and when such interested parties engage and are made known. Increased environmental awareness and education locally are key in regards to seeing an increase in concern and action surrounding vehicle emission reductions. Sauk City should look to case studies of cities who have made an environmental impact through their aims to support and mobilize citizens in forming new sustainable, convenient and financially feasible transportation habits. By creating affordable public transportation availability between Sauk City and Madison, WI, those who rely on their individual vehicles to commute to work everyday would be able to reduce GHG emissions and locally harmful pollutants, while also saving money on gas.

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