



Climate Action Plan

for Rockford Mass Transit District

Final Report
March 30, 2022



Climate Action Plan for the Rockford Mass Transit District

Final Report

Adopted by the RMTD Board on
March 30, 2022

This document has been prepared by
Region 1 Planning Council



on behalf of
Rockford Mass Transit District



This report was prepared in cooperation with the following:

U.S. Department of Transportation
Federal Highway Administration
Federal Transit Administration
Illinois Department of Transportation
Illinois State Water Survey
The Prairie Research Institute at the University of Illinois Urbana-Champaign

The contents, views, policies, and conclusions expressed in this report are not necessarily those of the above agencies.

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Letter from the Executive Director



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Rockford Mass Transit District (RMTD) is taking bold measures to combat climate change impacts on its transit system and reduce greenhouse gas (GHG) emissions across all facets of the agency.

The transportation sector currently makes up the largest portion of U.S. GHG emissions at roughly 29 percent. By transitioning to electric vehicles and employing other emissions reduction measures, the transportation sector has the potential to drastically reduce GHG emissions.

RMTD is developing a strategic Climate Action Plan that will guide the organization over the next 30 years to achieve organizational sustainability goals and further invest in the community. RMTD has several ambitious targets and goals, including the reduction of its fleet GHG emissions by 50 percent by 2030, achieving a zero-emissions fleet by 2036, and stretching for net-zero emissions across the entire agency by 2050.

To achieve these targets, RMTD is investing in new technology such as battery electric buses and electric charging infrastructure, as well as developing strategies for increased efficient facility use of energy, water, and the diversion of solid waste. Throughout the implementation of this work, we continue to strive towards supporting our vulnerable communities that rely on public transit in a just and equitable manner. Each of these considerations will help RMTD create a more climate resilient public transportation network that provides safe and reliable service to both passengers and staff.

Best,

Michael J. Stubbe
Executive Director

Executive Summary

The Rockford Region's projected increase in frequency and intensity of flooding, extreme heat, and extreme cold will lead to higher risks for Rockford Mass Transit District's (RMTD) riders, employees, services, and infrastructure. The expected increase in weather hazards has the potential to disrupt RMTD services and passengers. RMTD has identified the need to create a plan that prepares its system to successfully adapt to these climate hazards. This Climate Action Plan is meant to provide guidance for RMTD as it works to create a resilient transit system throughout the area. RMTD's climate action vision statement is:

To support regional efforts to reduce climate change impacts, RMTD is dedicated to providing safe, climate-resilient, affordable, and accessible transportation to enhance the quality of life for all residents in the Rockford Region.

The 2022 Rockford Mass Transit District Climate Action Plan was prepared by Region 1 Planning Council staff members under the direction and supervision of RMTD staff. The resulting plan has established GHG reduction goals for fleet, energy, water, and solid waste emissions and formed actionable strategies to achieve the plan goals. This plan will further guide RMTD to meet its three goals for achieving net zero emissions: (1) Decrease total GHG emissions from transit fleet by 50 percent by 2030, (2) Transition to a zero-emissions fleet by 2036, and (3) Achieve net-zero emissions across all facets of the agency by 2050.

RMTD has already begun the work to reach these goals with the recent purchase of 15 hybrid electric buses, placement of an order for six battery electric buses, and investing in the necessary facility and infrastructure updates to support the transition to electric powered buses. While this transition is already underway, there are still additional actions needed to meet RMTD's emissions reduction goals.

Over 30 climate action strategies were developed to help RMTD work towards meeting its goals and targets. These strategies range from transitioning fleets from diesel to electric, creating strategic partnerships with local entities, and incorporating green design in facility updates.

The top strategies to achieve net-zero emissions by 2050 are:

1. Replace all fixed-route, paratransit, and contracted buses with battery electric buses (BEB).
2. Replace all non-revenue vehicles with battery electric vehicles.
3. Partner with local government and non-profit

organizations to plant trees at existing facilities and bus stops in vulnerable areas.

4. Increase use of vegetation in and around RMTD spaces.
5. Enhance communication and monitoring systems to respond quickly to climate risks.
6. Partner with electricity provider to ensure all electricity procurement in RMTD facilities are from 100% renewable energy sources.
7. Improve communication with riders to spread awareness of disruptions and changes to service in extreme weather events.
8. Regularly update plans and procedures for managing disruptions caused by weather-related events.
9. Integrate equity & climate resilience into current and future project planning and design.
10. Collaborate with municipalities to enhance resilience of vulnerable transit stops and routes.

Climate Action Plan Goals

1. Fleet

Sub-goal 1.1: Reduce GHG emissions from RMTD's vehicle fleet and increase climate resiliency.

2. Energy

Sub-goal 2.1: Reduce energy consumption and increase energy efficiency for all RMTD facilities.

Sub-goal 2.2: Transition to renewable energy sources for all building and fleet energy needs.

3. Water

Sub-goal 3.1: Reduce water consumption at all RMTD facilities.

Sub-goal 3.2: Improve stormwater management practices at RMTD facilities.

4. Solid Waste

Sub-goal 4.1: Increase the diversion rate of RMTD generated waste.

Sub-goal 4.2: Reduce RMTD use of raw materials and increase use of recycled or sustainable materials.

5. Equity

Sub-goal 5.1: Prioritize climate strategies to target disadvantaged communities.

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Chapter 1: Introduction

Background and Purpose

In 2021, Rockford Mass Transit District (RMTD) announced its commitment towards a net-zero emissions fleet by 2036. RMTD's goal to transition away from fossil fuels towards renewable energy sources is aligned with other state and federal efforts, such as Illinois' newly passed Climate and Equitable Jobs Act and the Federal Transit Administration's encouragement for transit agencies to reduce its greenhouse gas emissions. As such, the growing desire among state and national governments to address climate change is expected to result in increased funding opportunities for local and regional governments. Moreover, the new federal Infrastructure Investment and Jobs Act (IIJA) will also create additional grant programs to address climate change in the transportation sector. As a result, Region 1 Planning Council (RPC), on behalf of RMTD, created a Climate Action Plan (hereafter referred to as "the Plan") for the public transit agency to use as a strategic guide towards meeting its zero-emissions future.

Climate Action Plan

A Climate Action Plan acts as a comprehensive document, highlighting the challenges, solutions, and implementation measures required to address climate change. The Plan also includes the critical component of a greenhouse gas (GHG) emissions inventory, which details the approximate amount of emissions RMTD is responsible for contributing to the atmosphere. These findings support the collection of implementation strategies listed in the Plan that are dually-focused on reducing GHG emissions while building resilient systems to protect against current and future climate impacts.

Source: The National Academies Press

The purpose of the plan is to provide RMTD with goals and strategies for improving climate resiliency in its transportation network, mobile assets, and facilities. RMTD has already responded to the climate crisis by beginning the transition to hybrid and battery electric fleets, adopting a new sustainability policy, and utilizing green design in its facility updates.

This plan seeks to:

- Generate a greenhouse gas emissions inventory to be used in emissions reductions efforts;
- Describe future RMTD sustainability initiatives;
- Set specific climate action goals and targets;
- Provide climate adaptation strategies and actions; and
- Describe how to implement strategies and monitor progress.

RMTD's Role in Climate Action Planning

Rockford Mass Transit District offers essential transportation services to many residents and visitors of the Rockford Region. As the leading source of public transportation in the region, RMTD's service plays a critical role in the region's transportation system, as it connects those who cannot or may not have the ability to utilize a personal vehicle with access to essential destinations such as key employment and medical centers. For many transit dependent populations, such as low-income individuals, elderly citizens, and citizens with disabilities, transit service is especially necessary as it promotes sustainable lifestyles and provides a higher quality of life.

Expanding mobility for all while advancing environmental sustainability and equity is vital to RMTD's mission. As transportation continues to be the single greatest source of greenhouse gas emissions across the nation, RMTD is aware and

eager to do its part in addressing the ever-changing landscape brought about by climate change.

Rockford Mass Transit District is committed to the environment and enhancing the quality of life in the community, embracing environmentally sustainable practices whenever financially feasible. Over the years, RMTD has taken bold strides towards reducing greenhouse gas emissions and increasing the energy efficiency of its fleet, facilities, operations, and staff through projects like the green-design of its Downtown Transfer Center and the adoption of alternative fuel technology vehicles. More information about RMTD's sustainability initiatives is discussed in Chapter 4.

RMTD will use the Plan to direct planning efforts, policy adoption, staff training, funding opportunities, and provide guidance on how to achieve the goals and targets set by the Plan.

Plan Development

The Climate Action Plan for Rockford Mass Transit District was developed over an eight-month long period from September 2021 to April 2022 using a six-phase process shown in Figure 1-1.

The process began with general plan development such as defining the scope, budget, and draft document outline. A communications plan and survey were also created to gain valuable feedback from RMTD riders and staff members to inform the plan.

The second phase focused on critical research and data collection. Topics researched included greenhouse gas (GHG) inventory best practices, RMTD's sustainability initiatives, equity considerations, impacts of land use and transportation on climate change, and the potential risks of weather hazards. After gaining an understanding of these key elements, transit and GHG emissions data were then collected.

The third phase involved preparing a GHG emissions inventory for RMTD's fleet and facilities. There were two main categories of GHG emissions data collected: transit emissions and non-modal emissions. The transit emissions focused on vehicle emissions and the non-modal emissions focused on facilities. The inventory provides the total amounts of emissions in these categories for the period 2016-2020 (where data was available).

The fourth phase included the creation of a public engagement survey and RMTD staff survey. The results of these surveys were used to better understand what climate change impacts are most concerning to RMTD customers and staff.

Next, the document was drafted. This phase in the process included developing the Plan's vision and goals and identifying climate action strategies and actions.

Finally, the document was released to the public for public comment and edits were made to address those comments. After the Plan was adopted, it was submitted to FTA as part of RMTD's commitment to the "Sustainable Transit for a Healthy Planet Challenge."

Resiliency & Public Transit

As climate change continues to influence weather and climate patterns, it is becoming more difficult for accurate weather predictions, which amplifies the need for resilient transit systems that can respond to extreme weather fluctuations. The National Academies defines resilience as "the ability to prepare and plan for, absorb, respond, recover from, and more successfully adapt to adverse events," with an emphasis on the importance of planning proactively instead of reactively for extreme weather and disasters.ⁱ A Transit Cooperative Research Program case study highlighted four key "pathways" to resilience:

1. Past disaster experience – When transit agencies experience hazards, their motivations increase to be better prepared for future events.
2. Leadership and organizational culture – It is important for the leadership to be on board and supportive of a resilient transit system for successful planning and implementation of strategies.
3. Sustainability and environmental programs – When agencies commit to sustainable efforts, they are more likely to advance climate resiliency and adaptation.
4. Asset management and state of good repair – Transit agencies can use asset management systems and programs to promote resilience.ⁱⁱ

Source: National Academies Press

Engagement Efforts

Public engagement is an integral part of the climate and transportation planning process. As the region continues to experience an increase in extreme weather resulting from climate change, it is important to understand what challenges RMTD riders face when using transit in order to better identify future resiliency strategies.

The Climate Action Communications Plan established various communication methods for the successful creation of the Plan. Presentations and other outreach methods were used to promote engagement efforts. Two presentations were given to the RMTD Board and MPO Technical Committee. These presentations had various audiences, but shared the same objective of informing the public and elected officials on the Plan development. Other outreach efforts included surveys, printed marketing materials, and social media posts. RMTD conducted a ridership survey (see Appendix E), asking riders about concerns related to climate change and information on how current weather events impacted riders' comfort and convenience. RMTD also conducted an internal staff survey (see Appendix E) to gather feedback on what climate change impacts are most concerning to RMTD staff and

to gain insight into initiatives RMTD could implement to become more resilient.

Figure 1-1. Plan Development



Plan Structure

The Plan is divided into eight chapters, including this introduction, with accompanying appendices.

Chapter 2: Rockford Mass Transit District

The second chapter of the Climate Action Plan provides an overview of RMTD and information on its service area, transit services, facilities, and financial information. In particular, RMTD's fixed route and demand-response services are discussed in tangent with information on route intervals and service hours. Furthermore, all RMTD facilities and its amenities are explained and listed.

Chapter 3: Greenhouse Gas Emissions Inventory

The Greenhouse Gas Emissions Inventory details the methods used to define the boundaries in which the inventory was completed, provides regional context and an analysis of emissions for the period 2016-2020. These scenarios are discussed in terms of forecasting, where past emissions provide context to future emissions levels if RMTD remains within a Business as Usual (BAU) mindset.

Chapter 4: Past and Current Initiatives

This chapter contains information on RMTD's past sustainability efforts, a breakdown of current efforts in place, an overview of the public survey results, and identifies any future climate resiliency efforts RMTD has committed to thus far.

Chapter 5: Climate Action Vision, Targets, and Goals

Chapter 5 outlines the vision, goals, and targets RMTD intends to meet to address climate change. These goals are then specified into codified targets in multiple sectors of priority, such as fleet, energy, water, solid waste, and equity.

Chapter 6: Climate Resilience and Adaptation

Chapter 6 identifies current and future climate risks and hazards that can affect RMTD service and riders. Social vulnerability related to climate change is also addressed, along with RMTD's prioritization of equity for the climate actions and strategies.

Chapter 7: Climate Action Strategy

Based on the findings of the GHG Emissions Inventory and public surveys, Chapter 7 provides a detailed list of planned strategies and actions RMTD will undertake to meet its climate action goals.

Chapter 8: Looking Forward

Chapter 8 looks to the future and identifies potential barriers and challenges to achieving Plan implementation. Finally, detailed strategies for monitoring progress are laid out.

Appendices

The appendices include a glossary of terms, greenhouse gas methodology, climate action strategy selection methodology, connection to relevant regional plans and studies, full survey question and results list, and references.



Chapter 2:

Rockford Mass Transit District

Overview

Rockford Mass Transit District (RMTD) is dedicated to providing safe, efficient, affordable, dependable, and accessible transportation to the residents of Rockford and the surrounding area. For over 50 years, RMTD has provided federally-subsidized, coordinated, and fixed-route transit services for the Rockford Urbanized Area. A three-person board appointed by the City of Rockford oversees RMTD and is empowered through the Downstate Transportation Act of 1971. RMTD is funded through a combination of Federal, State, and Local subsidies, contractual payments for service provision, and internally generated revenue, including fares charged to transit riders. RMTD provides fixed-route and complimentary origin-destination paratransit services within Rockford, Loves Park, Machesney Park, and Belvidere, and subcontracts the Boone County Council on Aging (BCCA) to provide demand-response services in the urbanized portions of Boone County. Stateline Mass Transit District (SMTD) provides on-demand transit service to South Beloit, Rockton, and Roscoe, which RMTD operates. Additionally, service to and around CherryVale Mall, in the Village of Cherry Valley, is provided during regular operating periods for an additional zone fare. RMTD's service area covers approximately 150 square miles and an estimated 287,300 residents, with an annual ridership of 1,441,260 passengers in 2019.

Transit Services

Fixed Routes

RMTD currently operates 19 daily fixed-routes (Monday—Saturday), six weeknight routes, and five Sunday routes. Most of RMTD's fixed route services are provided on a hub-and-spoke radial operation pattern originating from RMTD's Downtown Transfer Center in Rockford. General service hours include service to all municipalities during weekdays, service to Rockford, Loves Park, and Machesney Park on Saturdays, and select areas in Rockford on Sundays. Services are not provided on Saturday and

Sunday nights. Out of RMTD's 19 routes, the majority of all fixed routes operate at 60-minute intervals. Exceptions include School Street and East State routes which run every 30 minutes, and Huffman and Kilburn routes which run every 90 minutes. RMTD is currently implementing recommendations from a Comprehensive Mobility Analysis for its service area, which will increase span of service and hours of operation over the next several years. RMTD has added an electronic ticket purchase option and cashless payment options through the Token Transit app. This app can be downloaded by anyone with a smartphone from the Google Play Store or App Store.

RMTD's fixed-route fleet consists of 41, 35-foot buses and one special event trolley. Each fixed-route bus has a 12-year replacement schedule, with the entire fleet expected to be replaced or in the process of being replaced by 2025. Currently, RMTD has 26 diesel and 15 hybrid-electric buses. The total includes five additional hybrid buses RMTD received in January 2022 to replace 2007 diesel buses. RMTD has also ordered six battery electric buses and the supporting charging infrastructure. The installation of the charging infrastructure and deployment of the electric buses will occur in 2022. By the end of 2022, RMTD

Figure 2-2. RMTD Fixed Route Hybrid Electric Buses



Source: Rockford Mass Transit District.

will have 20 diesel, 15 hybrid, and 6 battery electric buses to round out its fixed-route fleet.

RMTD also operates a diesel trolley bus route in downtown Rockford from May through September to accommodate access to popular public events. All RMTD buses are wheelchair accessible, as required by the Americans with Disabilities Act (ADA). Efforts to aid persons with disabilities and the general public in how to read transit schedules and use the transit system are conducted on a regular basis. Demand-response service is provided in accordance with ADA guidelines in the RMTD service area, outlined further below.

Demand-Response

In addition to fixed-route transit services, RMTD provides complimentary origin-destination paratransit service at a minimum of three-quarters of a mile from its fixed-route system in accordance with all aspects of the American's with Disabilities Act. Where applicable, this service is also extended to the incorporated limits of Rockford, Loves Park, and Machesney Park. Service is provided daily in Rockford and six days a week in Loves Park and Machesney Park. Hours of operation for demand-response and paratransit service are the same as those of fixed-route service. Although weeknight fixed-route service is only available in Rockford, complimentary paratransit service is extended to

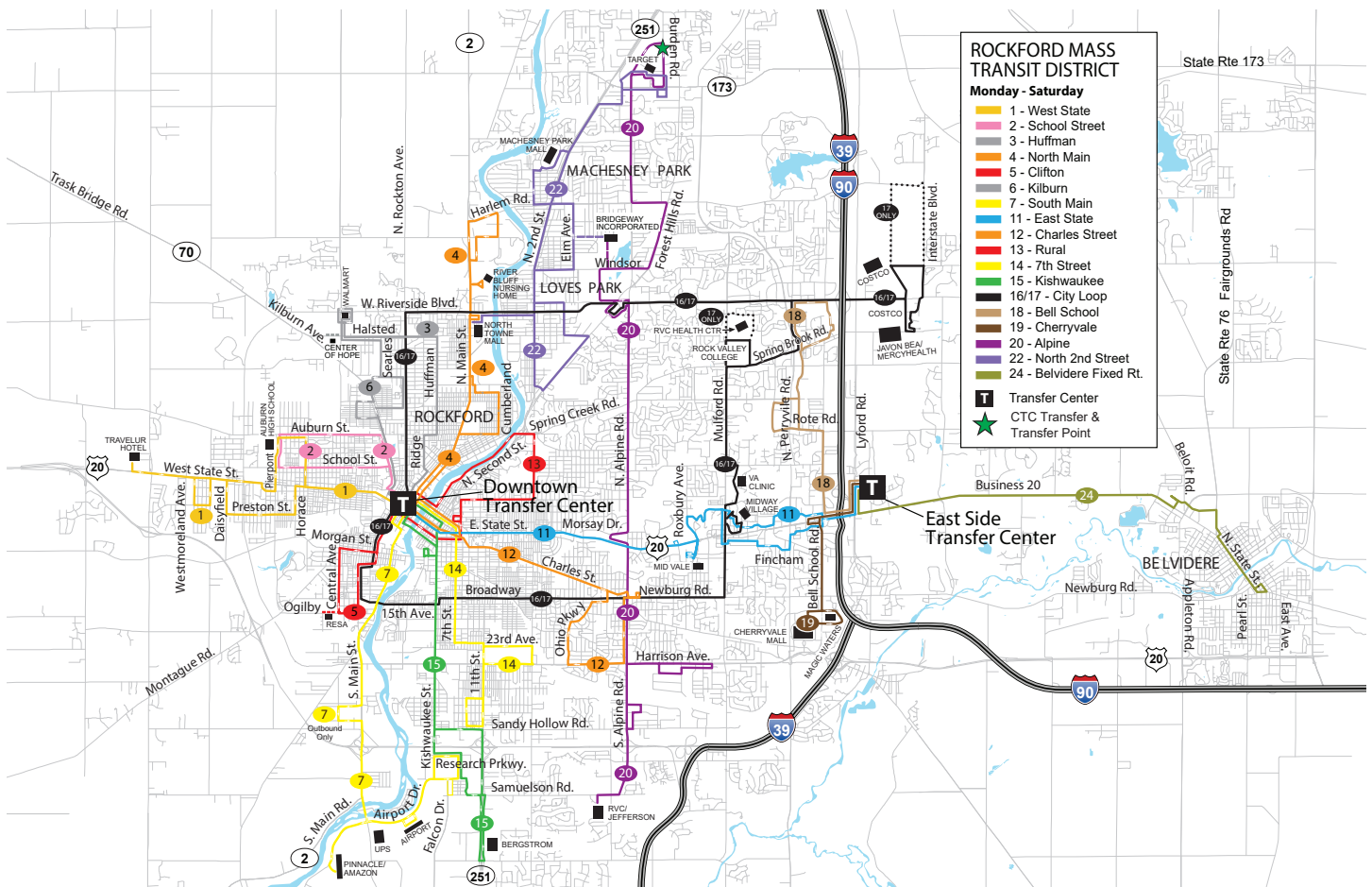
10:00 p.m. for Loves Park and Machesney Park. RMTD maintains multiple service agreements with adjacent public transit agencies for demand-response services. Through an intergovernmental agreement (IGA) with Boone County, RMTD subcontracts Boone County Council of Aging (BCCA) to provide demand-response service to the urbanized portions of the county. Similarly, an IGA exists with Stateline Mass Transit District (SMTD) for RMTD to operate demand-response service throughout Rockton and

Figure 2-3. Image of Trolley Bus



Source: Rockford City Market.

Figure 2-1. RMTD Route Map



Sources: Rockford Mass Transit District.

Roscoe Townships, which lay adjacent to the northern portion of RMTD’s service area.

RMTD’s demand response fleet are comprised of 33 medium and super-medium duty transit buses (13 diesel and 20 gasoline), each with a state or federally defined useful life of five to nine years. As with the fixed-route buses, RMTD is expected to begin replacing this fleet with alternative-fuel options by 2028 based on vehicle useful life with the goal of fully transitioning the demand response fleet to alternative-fuel zero emission by 2036. With the 2036 goal in mind, over the next several years RMTD will determine a specific course of action for replacing its gasoline and diesel powered demand response fleet with a zero emission fleet.

SMTD currently has eight medium and super-medium duty transit buses used for demand-response. SMTD is in the process of purchasing three more expansion vehicles, which will increase its fleet size to 11 vehicles. Similarly, BCCA has 12 vehicles, all of which are used for demand-response service in the rural and urban areas of Boone County.

Facility Types

Rockford Mass Transit District has two transfer centers in Rockford. The Downtown Transfer Center is located at 501 W. State Street and the East Side Transfer Center is located at 725 N. Lyford Road.

Adjacent to the Downtown Transfer Center, RMTD’s combined Administration, Operations, and Maintenance Facility at 520 Mulberry Street in Rockford was constructed in 1988. When constructed, the building was designed to store and maintain a 50-vehicle fleet. Over the past 30 years, RMTD has expanded its fleet to nearly 80 vehicles, which has led to space constraints. RMTD is currently conducting a Facility Master Planning Study. The project will expand the current Administration, Operations, and Maintenance Facility into the adjacent parcel to the northwest of the building. The expansion at this site will also accommodate electric charging infrastructure and vehicle storage that will allow RMTD to provide better service to its users while lowering its carbon footprint.

The Downtown Transfer Center is the heart of RMTD’s operation, and is strategically located in downtown Rockford on the block bounded by West State, Court, Mulberry, and Winnebago Streets. The Downtown Transfer Center is the only place RMTD riders can access nearly every bus route in the system.

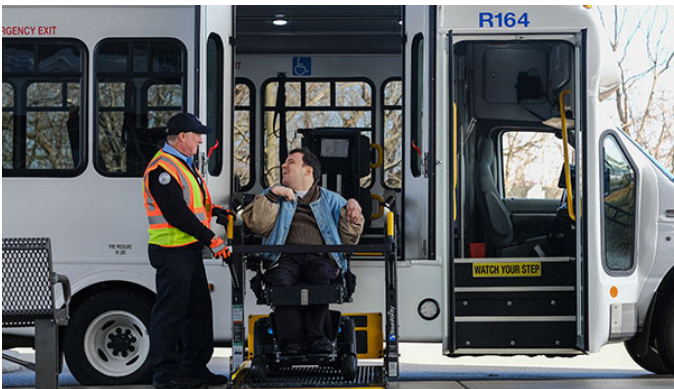
Both transfer centers are heated, air-conditioned, equipped with full restroom facilities, public telephones, vending machines, a large waiting room, and covered bus access areas. RMTD bus passes and tickets can be purchased at either location. Connections to the Greyhound and Trailways bus service can be made at the RMTD East Side Transfer Center. The RMTD East Side Transfer Center also has a state-of-the-art community room available for rent during the hours the Transfer Center is open.

Table 2-1. RMTD Mobile Assets, as of August 2022

Route Type	Fuel Type	Number
Fixed Route	Diesel	20
Fixed Route	Hybrid	15
Fixed Route	Battery Electric	6
Trolley bus	Diesel	1
Demand-Response	Diesel	13
Demand-Response	Gas	20

Source: Rockford Mass Transit District.

Figure 2-4. Image of Demand-Response Vehicles for SMTD, BCCA, and RMTD



Source: Rockford Mass Transit District.

Figure 2-5. Image of Downtown Transfer Center



Figure 2-6. Image of Eastside Transfer Center



Figure 2-7. Image of RMTD's Administration, Operations, and Maintenance Facility



Source: Rockford Mass Transit District.

Financial Information

Due to the COVID-19 pandemic, RMTD's total operating revenues have decreased from fiscal year (FY) 2020 to FY 2021. According to RMTD's 2021 audit, FY 2021 total operating revenues were \$711,242, which was 48.12 percent lower than the comparable FY 2020 total operating revenues of \$1,370,847.¹ Fixed-route passenger service also decreased between FY 2020 and FY 2021. For FY 2021, fixed-route service revenues were \$729,180, which was 42.56 percent lower than FY 2020 fixed-route passenger service revenue of \$1,269,376. Paratransit passenger service for FY 2021 was also less than FY 2020 at \$96,885, which was 15.62 percent lower than FY 2020 paratransit passenger service revenues of \$114,816.

While operating revenues decreased between FY 2020 and FY 2021, expenses increased. Total operation and maintenance expenses for FY 2021 (\$17,693,031) were 79.37 percent higher than the comparable total operation and maintenance expenses for FY 2020 at \$9,863,877.¹

Operating subsidies increased between FY 2020 and FY 2021. Total operating subsidies for FY 2021 (\$18,740,395) were 15.80 percent higher than the comparable total operating subsidies for FY 2020 (\$16,183,672).

Table 2-2. Rockford Mass Transit's Statement of Revenues, Expenses, and Subsidies (Thousands of Dollars)

	2019	2020 (Restated)	2021	% Change 2020-2021
Operating Revenues (\$)				
Passenger Fares	\$1,551.10	\$1,133.90	\$494.80	-56.36%
Advertising	\$82.80	\$126.00	\$126.80	0.63%
Other	\$176.30	\$110.90	\$89.60	-19.21%
Total Operating Revenues	\$1,810.20	\$1,370.80	\$711.20	-48.12%
Operating Expenses (\$)				
Operating Expenses	\$16,372.60	\$9,863.90 ^[1]	\$17,693.00	79.37%
Provision for Depreciations	\$2,023.70	\$1,899.20	\$2,162.20	13.85%
Total Operating Expenses	\$18,396.30	\$11,763.10^[1]	\$19,855.20	68.79%
Operating Loss (\$)	\$16,586.10	\$10,392.30	\$19,144.00	84.21%
Total Operating Subsidies (\$)	\$15,008.70	\$16,183.70	\$18,740.40	15.80%
Capital Contributions	\$6,793.40	\$4,009.80	\$4,776.00	19.11%
Investment Income & Other	\$98.00	\$60.40	\$16.00	-126.49%
Total Nonoperating Revenue and Capital Contribution	\$21,900.10	\$23,253.90	\$23,500.40	16.03%
Net Position End of Year	\$15,915.30	\$24,026.90	\$28,383.30	18.13%

Source: Rockford Mass Transit District, Baker Tilley Audit.

¹ NOTE 2020 (Restated): The annual review by the Actuarial regarding the estimated liability of Post-Employment Benefits Obligations reduced the noncurrent liability, Other Post-Employment Benefit to \$2,559,867 from \$10,677,590 in fiscal year ending June 30, 2020. This reduced the Operating Expenses by \$8,117,723 in fiscal year ending June 30, 2020 to \$11,763,092 compared to \$18,396,275 in fiscal year ending June 30, 2019 and \$19,855,227 in fiscal year ending June 30, 2021.



Chapter 3:

Greenhouse Gas Emissions Inventory

Chapter 3 provides an overview of RMTD's Greenhouse Gas Emissions Inventory, scope, methodology, and emissions source breakdown. Refer to Appendix B for more detailed information on emissions calculations.

Inventory Scope

The scope of a greenhouse gas (GHG) emissions inventory considers the emissions, geography, and authority of an organization. The following sections provide an overview of Rockford Mass Transit District's (RMTD) GHG Emissions Inventory and the methodology used to address the chosen scopes.

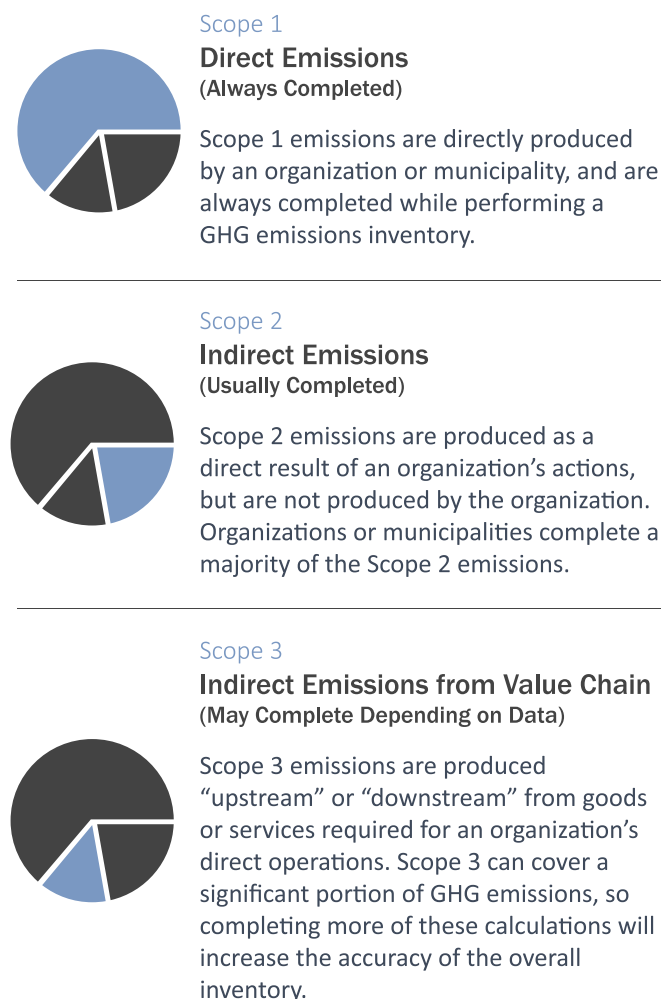
GHG Emissions Overview

A GHG emissions inventory divides emissions into three scope categories. Each category describes where emissions were produced within the operations or supply chain. Figure 3-1 provides an overview of each scope and how often GHG emissions inventories take the particular scope into account. Based on available data, RMTD's GHG Emissions Inventory used Scope 1 and 2 to calculate its total emissions.

All RMTD services are included in emissions calculations, regardless of geographic boundaries. The calculations also do not distinguish between emissions produced in different geographic areas.

Years 2016–2020 were included in this inventory to provide a brief historical overview of RMTD emissions over time. In particular, 2016 was chosen as the baseline year due to the difficulty of obtaining data prior to this date. These years also reflect the most recent fuel and energy calculation system available to RMTD, which means they are more accurate and can be compared against one another. This inventory also identifies RMTD's stationary and mobile emissions. Stationary emissions are those produced by

Figure 3-1. Greenhouse Gas Emissions Inventory Scopes



Source: American Public Transportation Association.

RMTD facilities and mobile emissions are produced by RMTD's vehicle fleet. Stationary emissions include electricity, heat, and waste from RMTD-owned buildings, and mobile emissions include tailpipe and refrigerant emissions from fixed-route, demand-response/paratransit, and contracted vehicles.

The RMTD GHG Emissions Inventory analyzed three main types of GHGs:

- Carbon dioxide (CO₂)
- Methane (CH₄)
- Nitrous oxide (N₂O)

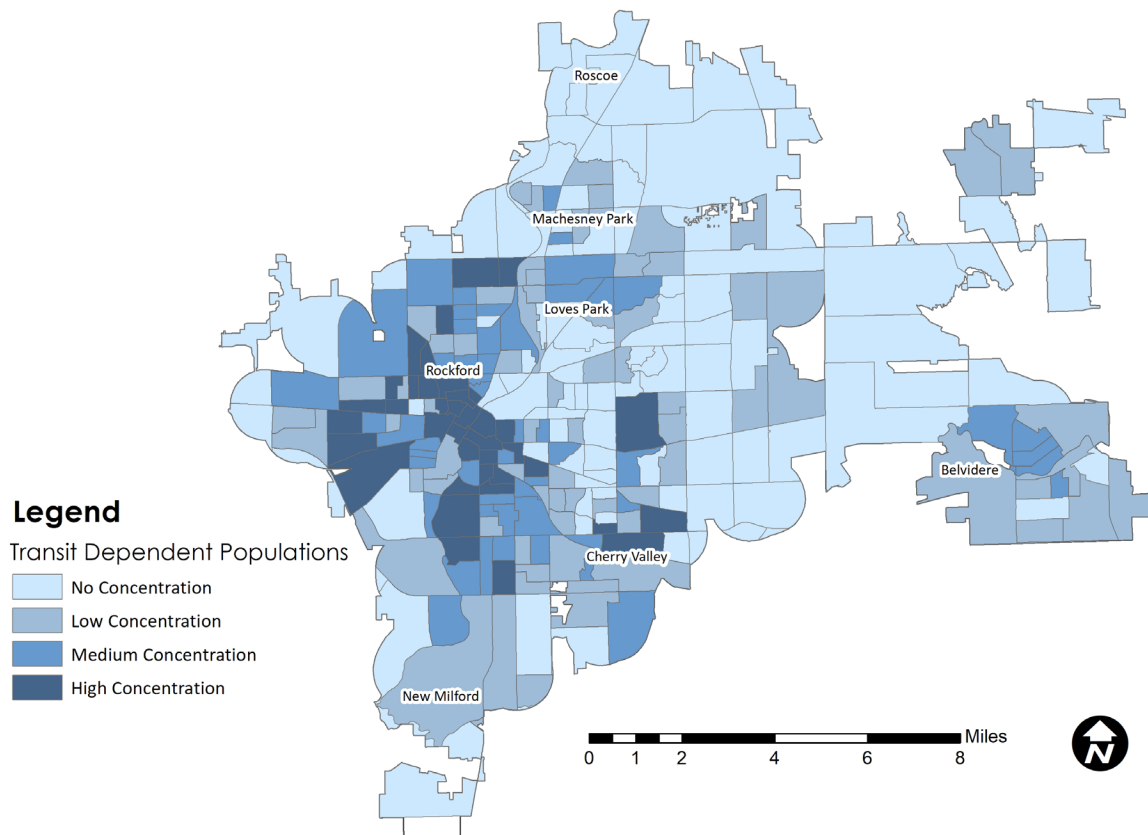
While carbon dioxide comprises most of the emissions produced from burning fossil fuels, other greenhouse gases, such as methane and nitrous oxide, contribute significantly to the total warming potential of all pollutants emitted. These gases contribute more per unit to warming than carbon dioxide, with methane being 256 times more potent and nitrous oxide 58 times more potent than carbon dioxide over a span of 100 years.ⁱ To better understand the effect of all emissions, calculation results are provided in metric tons of carbon dioxide equivalent (MTCO₂e). This is the standard unit for measuring the total greenhouse gas effects from all emissions. More information on how MTCO₂e is calculated can be found in Appendix B.

Regional Context

Greenhouse gas emission levels depend on a variety of regional-specific factors. Economics, weather, population, and waste can affect how much and what emissions are produced and may partially account for unusual patterns in emissions. Among other characteristics, the Rockford Region's focus on manufacturing, temperate climate, and low recycling rate help provide context for RMTD's emissions within the region as a whole.

The Rockford Region is a historical and present-day manufacturing area. In 2019, 20 percent of the workforce was engaged in manufacturing. The other significant industries that employed residents were retail trade (12 percent), professional/science/management (10 percent), health care/social assistance (16 percent), and arts/entertainment/recreation (10 percent).ⁱⁱ This is reflected in the gross domestic product (GDP) as well: 23 percent of Winnebago County's GDP is manufacturing while the next highest, real estate/rental and health care/social assistance both are only 13 percent.ⁱⁱⁱ Around 50 percent of residents make less than \$50,000 in annual household income and the median household income is \$44,000.^{iv} Winnebago County's labor force is primarily employed within Winnebago County (around 80 percent),^v but only two percent of the population uses public transit to commute to work.^{vi} Over half of the Census block groups in Rockford reach at least one threshold for transit dependence

Figure 3-2. Transit-Dependent Populations Across Rockford Region



Sources: US Census American Community Survey (2019).

and 15 percent reach three thresholds. Figure 3-2 shows the concentrations of these populations in Rockford, which are mainly grouped in the Downtown area, the West side, and some pockets on the East side. The thresholds are determined by finding the regional average populations of individuals 65 and older, individuals with disabilities, low-income individuals, and zero-vehicle households, then identifying which census blocks have higher-than-average concentrations.^{vii} The transit system plays an important role in the region for those who rely on it for a majority of their transportation needs.

The City of Rockford's land use is currently categorized as 47 percent residential, 22 percent industrial, 15 percent quasi-public facility, and 16 percent other uses (such as mixed use, recreation, or park acquisition). Winnebago County's land cover is more than 50 percent cultivated crops, with 21 percent developed land^{viii}. Boone County's land cover is 83 percent agricultural and 12 percent developed.^{ix}

In 2019, RMTD provided services to an estimated 287,300 residents over 156 square miles, with a population density of approximately 1,702 people per square mile.^x The population in Boone and Winnebago Counties is expected to grow only a small amount between 2020 and 2040, from 282,000 to 283,000 in Winnebago County and from 53,000 to 60,000 in Boone County.^{xi} With a transit system that covers a wide geographic area, it can be more difficult to reduce emissions per passenger.

The Rockford Region is in the United States Department of Agriculture's (USDA) Plant Hardiness Zone 5, which indicates a temperate, seasonal range with an average minimum winter temperature of -10°F to -20°F.^{xii} However, the onset of climate change will alter local temperatures and potentially cause changes in ridership and wear and tear on buses. By 2040, the annual average mean temperature is projected to increase from 48°F to 55°F (a difference of up to seven degrees Fahrenheit).^{xiii} Extreme weather, including heat and rain, may decrease ridership and is more likely to impact the health of those who use public transit.^{xiv}

Boone and Winnebago Counties together produced 363,000 tons of waste (excluding construction and demolition waste) in 2019. The most common waste materials were paper, food, plastic, and non-food organics. Waste diversion in the region as a whole was estimated to be 18 percent, but could potentially increase to almost 40 percent in the next several years, diverting 152,000 MTCO₂e from landfill emissions.^{xv} Knowing the local context of waste management can help RMTD develop and enact realistic waste diversion strategies.

Approach

The RMTD GHG Emissions Inventory used the American Public Transit Association's (APTA) protocol Quantifying Greenhouse Gas Emissions from Transit for emissions calculations, the International Council for Local Environmental Initiatives' (ICLEI) data collection resources, the Climate Registry, and ICLEI's US Community Protocol as tools to organize and collect data and calculations. The APTA protocol is one of the only transit-specific protocols in the United States, and provides tools, data lists, and equations for vehicle fleet emissions calculations. The Federal

Transit Administration's (FTA) Healthy Planet Challenge also recommends APTA as a resource for climate action planning. ICLEI resources were used to create templates for data requests, data collection, and performing calculations. The Climate Registry and the EPA's Greenhouse Gas Inventory Guidance: Fugitive Emissions, and Community Protocols were used as a secondary reference for calculations and for obtaining the conversion factors needed to perform the GHG emissions calculations.

The framework for organizing data and calculating emissions was adapted from ICLEI's GHG emissions worksheet, a resource primarily targeted towards city-level emissions inventories. The adapted transit-specific version included the original transit, buildings and facilities, and solid waste sections as well as the fuel and other conversion factors. It was organized to fit custom data breakdowns for vehicle types and the chosen inventory years.

While calculations were completed in this spreadsheet, other equations, conversion factors, and methodology were drawn from APTA's Quantifying Greenhouse Gas Emissions from Transit. This document informed what emissions were included in each scope and provided guidance on acceptable assumptions and data sources. Calculations are described in further detail in Appendix B.

Results and Analysis

From 2016 to 2020, RMTD produced approximately 5,291 MTCO₂e each year from its vehicles and facilities. The yearly amount has fluctuated over time, particularly in 2020 when overall ridership was affected by the COVID-19 pandemic. The slight reduction in emissions in 2020 can also potentially be attributed to the deployment of RMTD's new hybrid diesel-electric buses. Since 2016, total emissions have ranged between 4,900 and 5,450 MTCO₂e. Table 3-1 and Figure 3-3 both show the total emissions from each source, including transit emissions by mode and stationary emissions by type. Several data points are estimates and electricity was only partially available in 2017 and 2018 and not available at all for 2016 and 2019. See Appendix B for details.

As expected, fixed route transit was identified as the largest source of GHG emissions (60 percent), while paratransit/demand-response (16 percent) and natural gas (10 percent) produced the second and third highest emissions. Reductions in these areas will lead to the overall greatest reduction in emissions. Electricity usage is not reported in Figure 3-4 because full yearly data was only available for 2020, where it comprised 11 percent of the total

Data Analysis

Data analyzed included vehicles miles traveled (VMT), fuel type (diesel or gasoline), and fuel usage. Facility emissions were calculated from electricity use (MWh), natural gas use, water use, and solid waste generation (provided by various utility companies). See Appendix B for more information.

See Appendix B for more information.

emissions. See Figure 3-5 for a breakdown of GHG emissions in 2020, including electricity.

Transit Emissions

Figures 3-6 and 3-7 show the breakdown of transit emissions by mode amount and percentage. The change in emissions is particularly noticeable in 2020 due to both the COVID-19 pandemic and the addition of hybrid-electric buses to the fleet. Prior to 2020, GHG emissions had been steadily increasing. The effect of the deployment of hybrid buses is difficult to ascertain as the sole cause of the decrease in emissions, as their introduction coincided with the COVID-19 pandemic. The pandemic greatly altered riding patterns and overall usage of the transit system, decreasing emissions due to decreases in ridership. The emissions from non-revenue vehicles was a low value and therefore difficult to show in Figure 3-6.

The fixed-route fleet produced the majority of transit emissions (73 percent on average), followed by paratransit/demand-response at about 20 percent. Figure 3-7 shows the percent of emissions each mode produced. While the percentage of overall emissions from contracted vehicles increased significantly after 2016, the percent breakdown of other emissions has remained relatively steady each year despite the overall decrease in emissions in 2020. The emissions from non-revenue vehicles was a low value and therefore difficult to show in Figure 3-7.

Stationary Emissions

Stationary emissions encompass approximately 18 percent of RMTD's overall emissions. In 2020, the only year with available data for electricity, stationary emissions were close to 25 percent. Figures 3-8 and 3-9 show the emissions breakdown from natural gas, solid waste, and electricity (electricity values were only partially available for 2017 and 2018 and are missing for 2016 and 2019).

In 2020, RMTD's stationary emissions were divided relatively evenly between natural gas and electricity (41 and 42 percent respectively), and only a small amount (less than one percent) from solid waste and water. Refrigerants represent almost 20 percent of the total stationary emissions (Figure 3-9). Electricity values were only partially available for 2017 and 2018 and are missing for 2016 and 2019.

Energy

Energy emissions consist mainly of electricity and natural gas consumption. The total percent of emissions from energy can only be estimated for 2020, which is the only year with complete electricity data. In 2020, electricity represented 42 percent of stationary emissions and 11 percent of total emissions. Though natural gas percentages have remained similar between 2016 to 2020, emissions from natural gas have risen by almost 94 MTCO₂e, or about 21 percent.

Water

While electricity generation from water consumption has remained the lowest of all emitted greenhouse gases calculated, water consumption rose by more than 73 percent between 2016 to 2020. Such significant increases can partly be attributed to the opening of a new facility (501 State Street) in late 2018.

Solid Waste

Consistently below one percent of annual GHG emissions, solid waste emissions have also remained static over the years, with an average of only 53.82 tons of waste generated annually. Due to the calculations used and limited data on waste characterization, emission totals have been fixed at 5.02 MTCO₂e, which can be viewed in Table 3-1. This makes up less than 1 percent of all stationary emissions.

Refrigerants

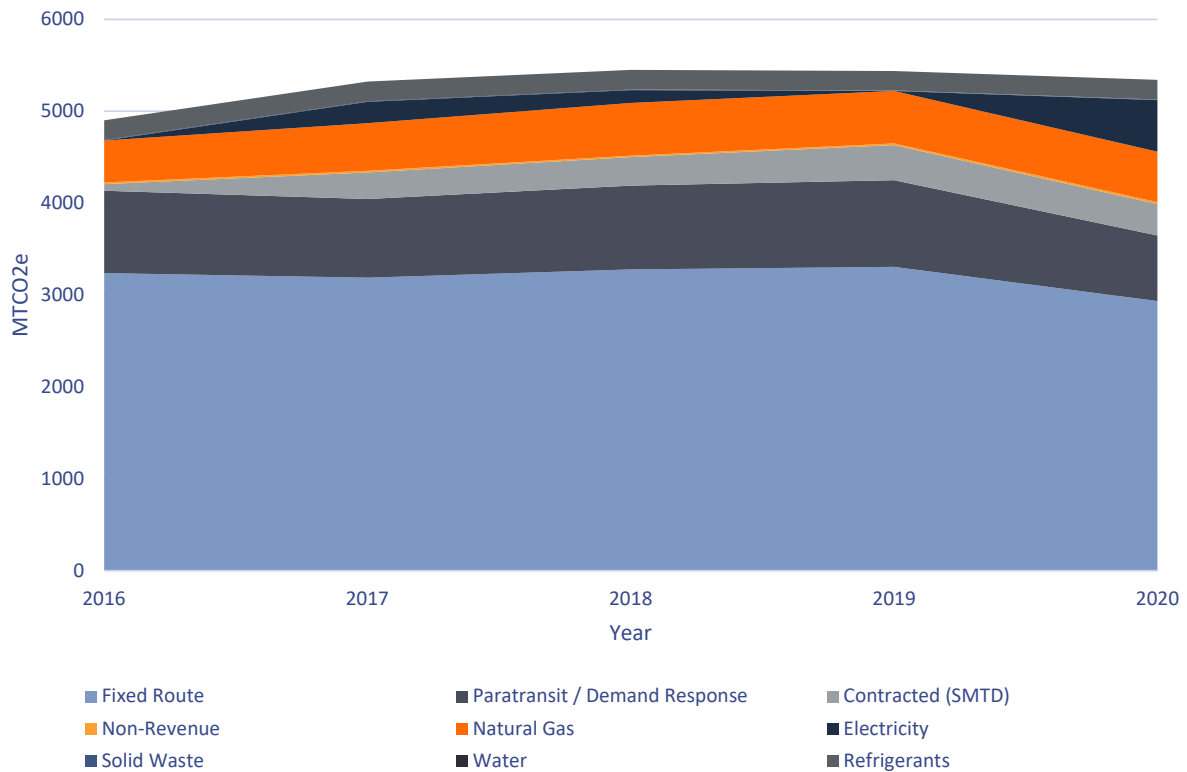
Similar to solid waste in its static trend over the past five years, refrigerants have contributed to five percent of total emissions on average. This static trend is due to lack of data and information on when the exact recharging of R22 and R134A refrigerants in buses and facility equipment occurred, resulting in an even split estimation through the years. Refrigerants represent 23 percent of stationary emissions.

Table 3-1. RMTD's Total Greenhouse Gas Emissions (MTCO₂e)

Year	Fixed Route	Paratransit/ Demand-Response	Contracted (SMTD)	Non- Revenue	Natural Gas	Electricity	Solid Waste	Water	Refrigerants	Total
2016	3239.2	896.9	71.8	18.5	454.9	N/A	5.0	0.7	213.6	4900.6
2017	3188.0	856.7	288.7	17.7	518.8	233.6	5.0	1.1	213.6	5323.1
2018	3280.5	909.5	309.7	15.9	573.8	140.8	5.0	1.1	213.6	5449.9
2019	3307.1	943.8	379.7	18.8	570.1	N/A	5.0	1.3	213.6	5439.3
2020	2935.2	713.6	342.1	21.6	548.6	562.0	5.0	1.2	213.6	5342.8

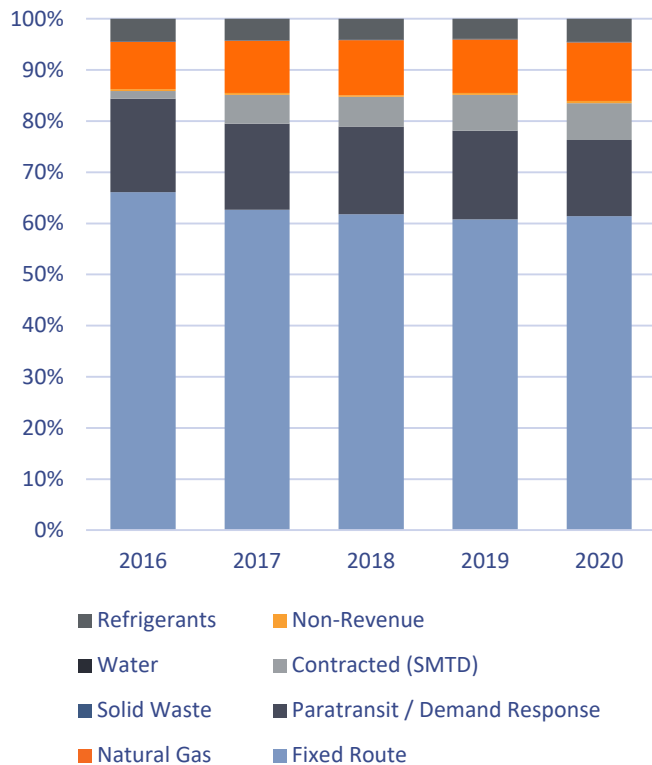
Sources: Rockford Mass Transit District

Figure 3-3. Total Emissions Over Time by Source 2016-2020



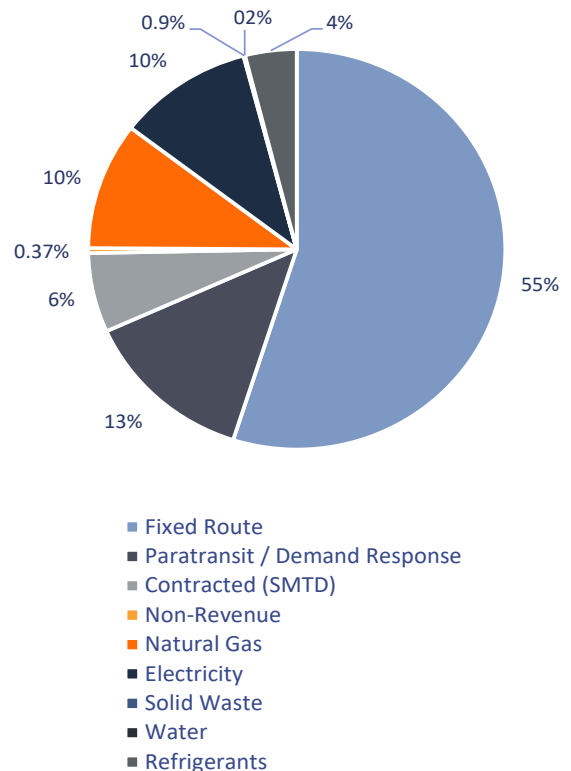
Sources: Rockford Mass Transit District.

Figure 3-4. Percent MTCO₂e by Source, 2016-2020 (Excluding Electricity)



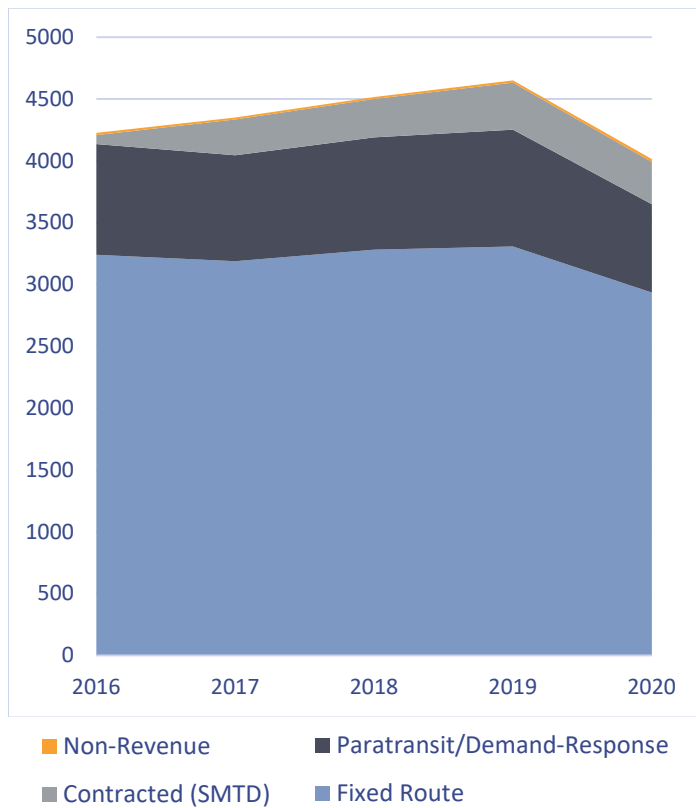
Source: Rockford Mass Transit District.

Figure 3-5. Percent MTCO₂e by Source, 2020 (Including Electricity)



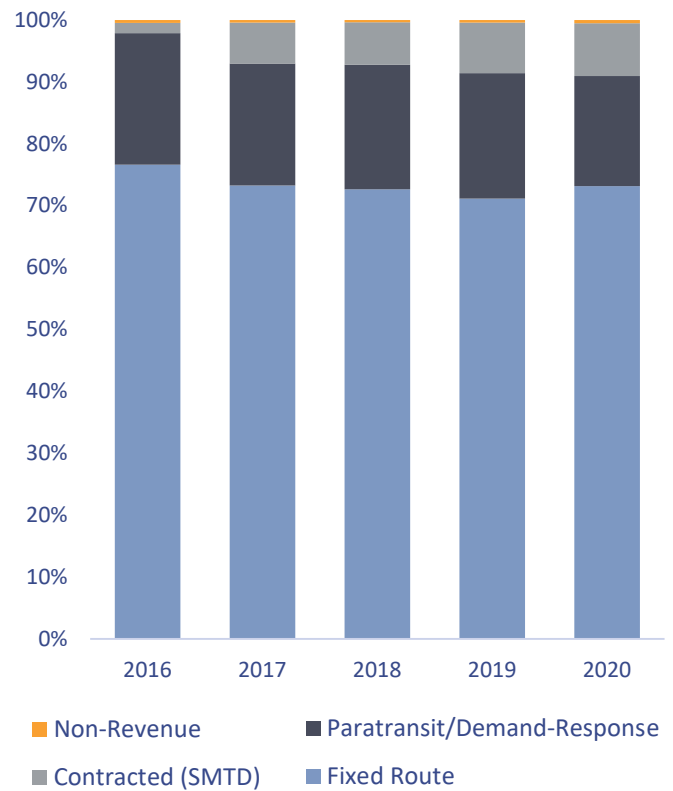
Source: Rockford Mass Transit District.

Figure 3-6. Transit-Only MTCO₂e by Source, 2016-2020



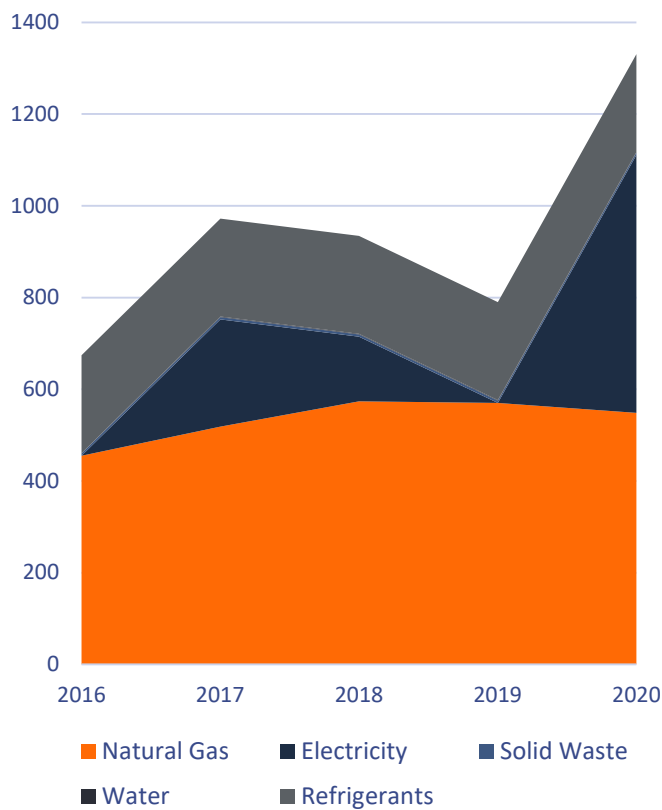
Source: Rockford Mass Transit District.

Figure 3-7. Percent Transit-Only MTCO₂e by Source, 2016-2020



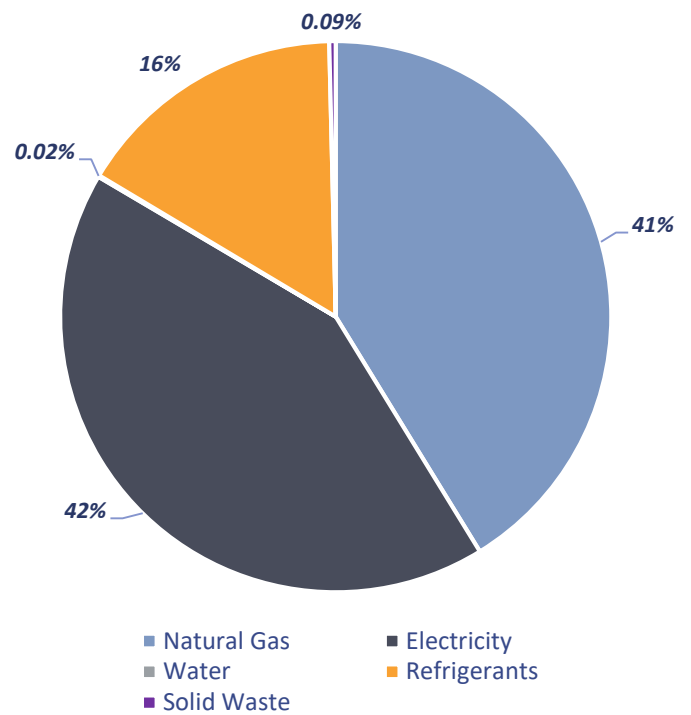
Source: Rockford Mass Transit District.

Figure 3-8. Stationary Emissions (MTCO₂e) by Source 2016-2020



Source: Rockford Mass Transit District.

Figure 3-9. Percent of Total Stationary Emissions by Source, 2020 (Including Electricity)



Source: Rockford Mass Transit District.



Chapter 4:

Past, Current, and Future Sustainability Efforts

Rockford Mass Transit District (RMTD) has shown its commitment to the environment by adopting a sustainability policy, transitioning from diesel to hybrid electric and battery electric buses, renovating the Downtown Transfer Center with a greener design, and working towards a Zero Emissions Policy. RMTD's history of sustainability efforts are further outlined below.

Past Efforts

RMTD has implemented various sustainability efforts over the past few years. A few of these efforts include adopting new technology, increasing public engagement to promote the new technology, and updating its facilities. Educating the public on sustainability efforts increases awareness and encourages changes in individual behavior to consider public transit.ⁱⁱ Another public outreach effort included a hybrid electric bus tour during the region's Drive Electric Week in Fall 2021. These tours offered a chance to connect with individuals who may not ride the bus and encourage them to use public transit instead of their personal vehicle. Additionally, RMTD's Downtown Transfer Center was recently renovated in 2019. This renovation utilized the existing structure, which allowed for a greener design. RMTD also has installed energy efficient lighting and water systems, and incorporated green space with planter boxes surrounding the facility and along the berthing.

What is Sustainability?

Protecting the environment, being a responsible member of society, and promoting economic development, with the goal to increase quality of life for all.ⁱ

In 2018, the RMTD Board approved RMTD's Sustainability Policy. This policy outlines several strategies that will reduce the agency's carbon footprint. Using concepts outlined in the 2014 Vital Signs Regional Plan for Sustainable Development, RMTD created a Commitment to Sustainability Statement that was adopted by the RMTD Board as a guideline for future initiatives.ⁱⁱⁱ

Current Efforts

RMTD has begun the process of replacing its diesel buses that have reached the end of their useful life. Currently, RMTD has 26 diesel and 15 hybrid-electric buses, with an additional five hybrid-electric buses ordered to replace four diesel buses. RMTD has also ordered six battery electric buses (BEBs) to replace six diesel buses in addition to the supporting charging infrastructure. The charging infrastructure is anticipated to be installed Spring 2022 and the deployment of electric buses in Summer 2022.

RMTD is also working with the RMTD Board to adopt a Zero Emissions policy to outline the agency's goal of transitioning to a zero-emission fleet by 2036. The policy will serve to guide its fleet capital investment plan.

Sustainability Statement

As the Rockford Mass Transit District is committed to the environment and enhancing the quality of life in our community, we therefore will work toward implementing environmentally sustainability practices whenever financially feasible. These include, but are not limited to, the adoption of alternative fuel technology vehicles to reduce greenhouse gas emissions.

Start/Stop Technology

The start/stop technology of hybrid buses is advantageous for public transit as the engine shuts down when the vehicle is stopped.^{iv} Compared to diesel buses, there are fuel savings of approximately 25 percent with hybrid-electric buses.^v Battery Electric Buses (BEB) provide an option for zero-emissions and are four times more fuel efficient than diesel.^{vi} BEBs also reduce air pollution, produce less noise, and benefit from the fuel-price stability of electricity.^{vii}

RMTD Public & Staff Surveys

To seek input and engagement from the public, RMTD distributed online and paper surveys to both its riders and staff (see Appendix E). The purpose of the surveys was to gather feedback on what climate change impacts are most concerning to those who rely on the public transit system and those who are employed by RMTD. The staff survey also provided insight into the initiatives RMTD is currently undertaking to become more resilient.

Particularly, survey data helped identify strengths and weaknesses of RMTD operations from the perspective of riders and staff. For instance, the rider survey revealed that most respondents did not have access to their own car or other personal vehicle, as shown in Figure 4-1. This indicated that a large portion of RMTD riders are dependent on transit. Transit-dependent populations are often more vulnerable to the impacts of climate change, and knowing this information is crucial in identifying and addressing system gaps.

One gap identified was the lack of adequate protection from the elements provided by bus stop infrastructure. In addition to better weather protection at bus stops, a common recommendation from survey respondents was the inclusion of more routes, times, and bus stops. The strengths identified in the rider survey were the lack of weather-caused delays reported and the reliability of air conditioners on buses. It was also determined that inclement weather events are likely to increase the chances of individuals using public transit, as shown in Figure 4-2.

The RMTD staff survey revealed that the largest barriers to climate action strategy implementation were infrastructure and funding, as shown in Figure 4-3. In regards to recommended initiatives, the most commonly cited ones were converting to electric busses, installation of solar panels, and reduced paper use in the office. See Appendix E for the complete list of survey questions and results.

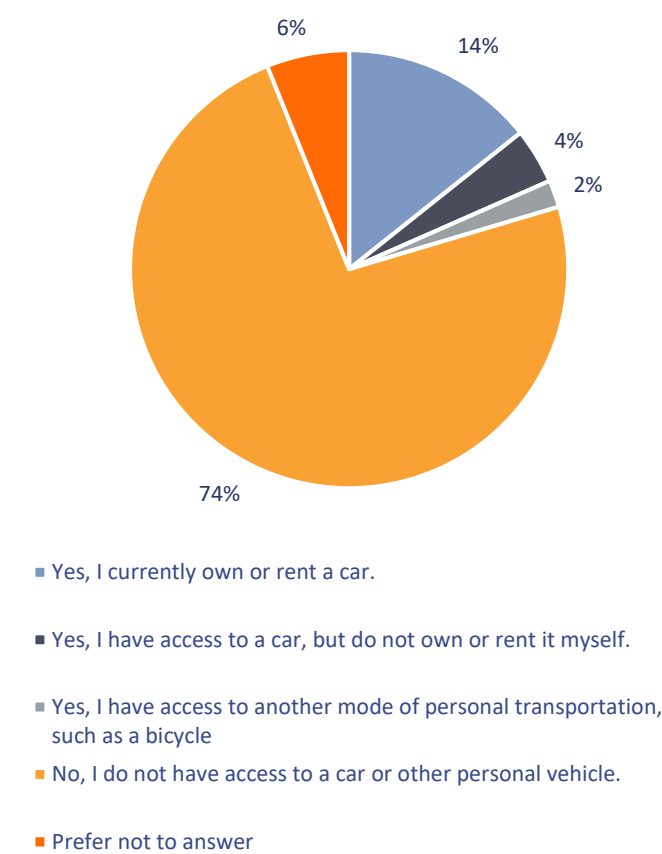
Future/Planned Efforts

In November 2018, RMTD began a Comprehensive Mobility Analysis Study for its service area and is currently in the implementation phase of the plan. The goal of the analysis is to

create a plan for future development of public transportation services in the Rockford Region for the next five to ten years. Recommendations from the plan will impact route times and location as implementation occurs over the next several years.

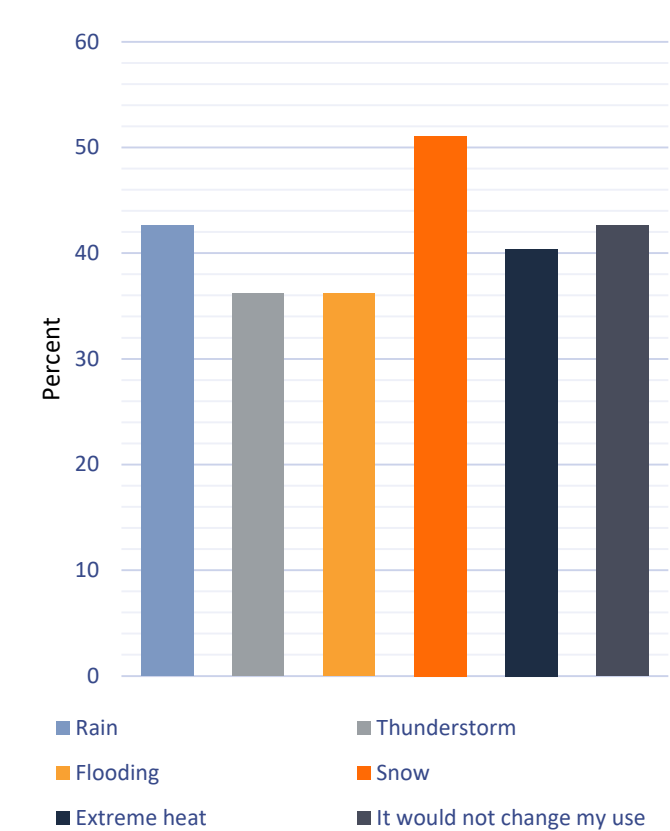
Additionally, Illinois Department of Transportation (IDOT) will receive a \$16,384,905 Rebuilding American Infrastructure with Sustainability and Equity (RAISE) grant for the Downtown Complete Streets Revitalization Project in Rockford. RAISE is a federal grant program that “funds transportation projects that create high-quality jobs, improve safety, protect the environment, and generate equitable economic opportunities.”^{viii} The grant was written by Region 1 Planning Council and includes reconstruction of Chestnut and Walnut streets and three battery electric buses for RMTD to run a downtown circulator route, as shown in Figure 4-4. Public safety will be increased with the changes on Chestnut and Walnut Streets, while the downtown circulator will increase access to underserved populations and the battery electric buses will reduce RMTD’s GHG emissions. This project will also add three battery electric buses to further expand RMTD’s fixed-route fleet size to 44 buses. RMTD has also applied for a Bus and Bus Facilities grant to replace 12 more diesel buses from 2009 with six hybrid-electric and six battery electric buses.

Figure 4-1. Self-Identified Vehicle Ownership



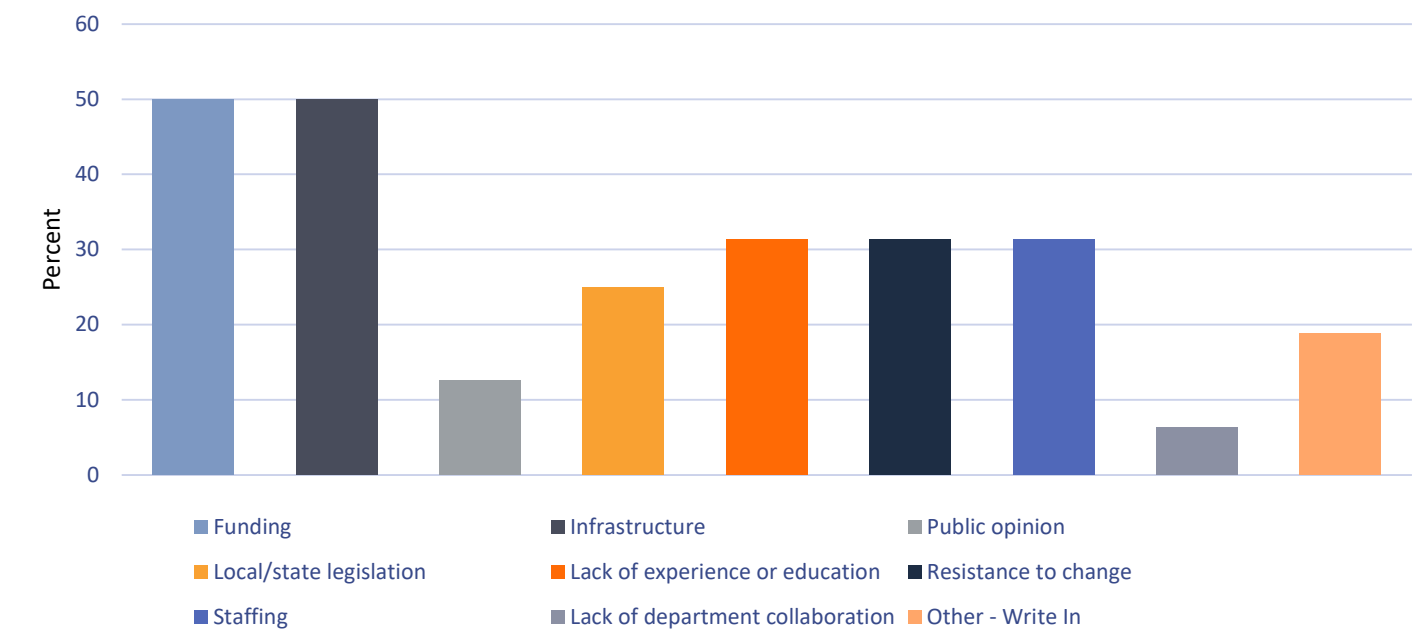
Source: Region 1 Planning Council, Public Engagement Survey (2021)

Figure 4-2. Weather Events that Increase Transit Use



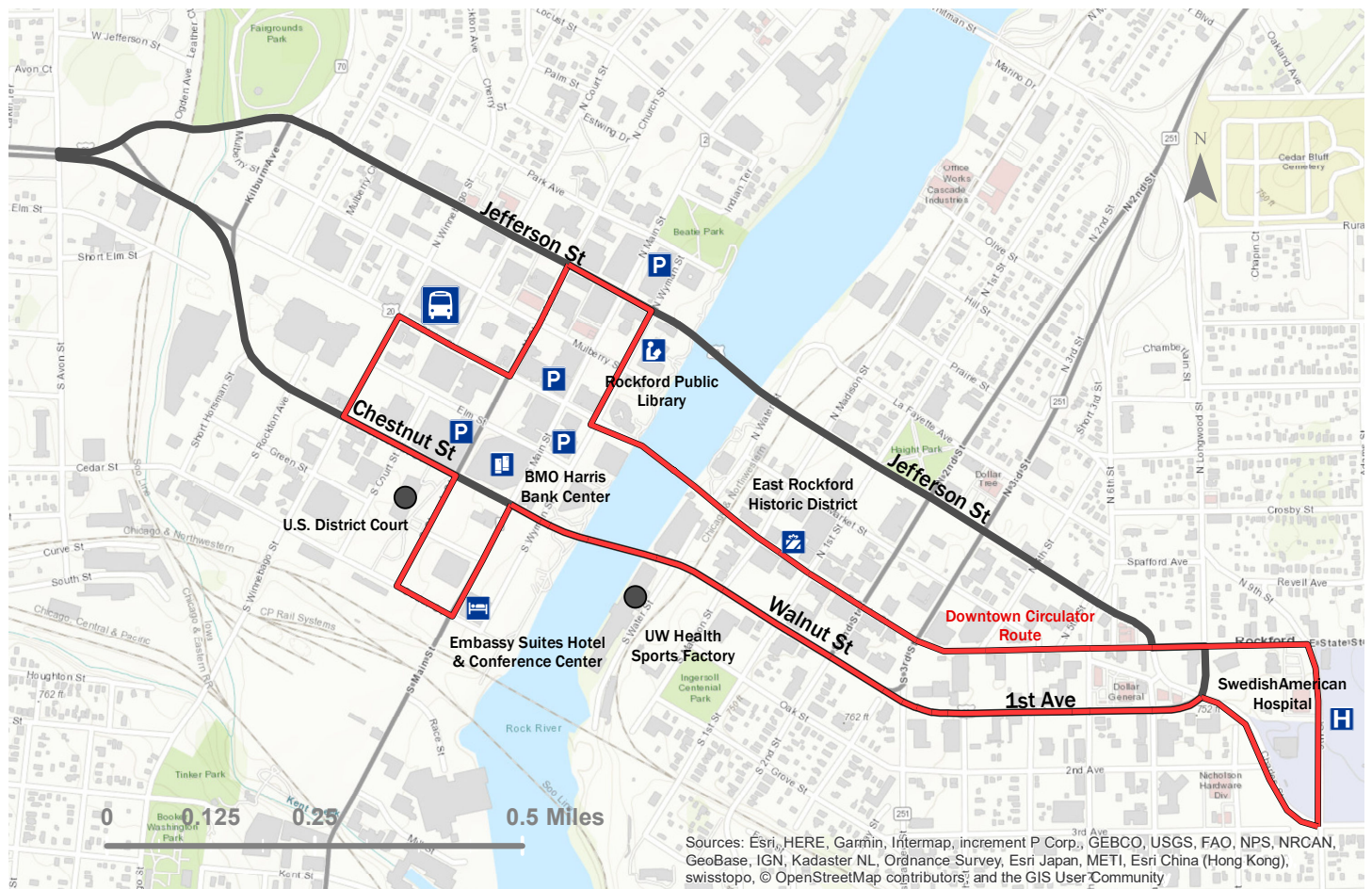
Source: Region 1 Planning Council, Public Engagement Survey (2021)

Figure 4-3. Staff Barriers to Climate Action Strategy Implementation



Source: Region 1 Planning Council, Public Engagement Survey (2021)

Figure 4-4. Map of Circulator Route



Sources: Region 1 Planning Council.



Chapter 5:

Climate Action Vision, Targets, and Goals

Setting climate action goals and targets are a crucial step in the reduction of emissions and transition to a more sustainable transit system. This chapter provides an overview on Rockford Mass Transit District's (RMTD) vision and climate action goals, particularly as they relate emissions pertaining to fleet, energy, water, waste, and equity. Actions to support the identified goals and targets can be found in Chapter 7.

Climate Action Vision

RMTD's vision for a sustainable and resilient transit system is dependent on its ability to provide quality service while reducing its environmental impact on the region. To support regional efforts in reducing climate change impacts, RMTD is dedicated to providing safe, climate-resilient, affordable, and accessible transportation to enhance the quality of life for all residents in the Rockford Region. RMTD's Climate Action Vision is:

"Rockford Mass Transit District is dedicated to providing safe, climate-resilient, affordable, and accessible transportation to enhance the quality of life for all residents in the Rockford Region."

Climate Action Targets

In order to fulfill the vision identified above, RMTD chose three specific, measurable, and time-bound targets to support its reduction of greenhouse gas (GHG) emissions. These targets, outlined below, offer a phased-approach for RMTD to achieve net-zero emissions.

1. Decrease total GHG emissions from transit fleet by 50 percent by 2030.
2. Transition to a zero-emission fleet by 2036.
3. Achieve net-zero emissions across all facets of the agency by 2050.

Climate Action Goals

In order to achieve the above climate action targets, RMTD will need to continue to measure its greenhouse gas emissions. The following sub-goals below reflect RMTD's priorities to reduce its share of GHG emissions.

1. Fleet

GHG emissions are composed of a variety of gases (mainly carbon dioxide (CO₂), methane (CH₄), and nitrous oxide (N₂O)) that when emitted, remain in the atmosphere for tens to hundreds of years and create a stronger greenhouse effect and therefore warming of the planet. Tracking RMTD's emissions will provide consistent data to help build a focused set of climate action and adaptation policies.

Sub-goal 1.1: Reduce GHG emissions from RMTD's vehicle fleet and increase climate resiliency.

With over 83 percent of RMTD's annual emissions originating from its vehicle fleet, implementing strategies to address the

largest share of emissions will make the biggest impact. Within this share, the majority of emissions are from RMTD's fixed route fleet, which is nearly half of the whole fleet. RMTD will anticipate future climate effects on its fleet by implementing climate resilience strategies.

2. Energy

Prioritizing specific operational areas with a significant share of emissions can assist RMTD to effectively meet its targets. The energy sector accounts for a fourth of total emissions in the United States. In the case of RMTD, energy accounts on average between 10 to 20 percent in their emission, highlighting the importance for RMTD to transition away from energy sources that are the key drivers to climate change.ⁱⁱ The following sub-goals below reflect RMTD's priorities to reduce its energy consumption.

Sub-goal 2.1: Reduce energy consumption and increase energy efficiency for all RMTD facilities.

Implementing strategies with energy efficiency improvements such as replacing appliances and lights will make meaningful strides in reducing emissions from energy consumption.

Sub-goal 2.2: Transition to renewable energy sources for all building and fleet energy needs.

In agreement with the newly passed Illinois Climate and Equitable Jobs Act (CEJA), RMTD will transition away from fossil fuel sources to renewable energy to reduce GHG emissions while building facility resilience.

3. Water

Though not a significant portion of RMTD's emissions, tracking water consumption can be useful for many reasons. Firstly, understanding the amount of water consumed can help to understand where reductions can be made, saving money, and increasing the lifespan of RMTD's infrastructure. In the context of transit agencies, it is also important to consider partnering with municipalities to mitigate potential flooding events and service disruptions due to increased severe weather patterns.

Sub-goal 3.1: Reduce water consumption at all RMTD facilities.

Lowering water consumption at all RMTD facilities can help reduce energy use, utility costs, and GHG emissions.

Sub-goal 3.2: Improve stormwater management practices at RMTD facilities.

Currently, RMTD has a storm water retention basin installed under the facility drive at the Downtown Transfer Center and a storm water retention pond at the ESTC. As climate projections show a greater potential for increased storm severity as well as flooding, continue implementing stormwater management best practices at RMTD facilities and bus stops will serve to boost organizational resiliency and reduce potential service interruptions for vulnerable populations.

GHG Emissions in the U.S

In the United States, the largest share of GHG emissions (29 percent) are from the transportation sector, highlighting the need for RMTD and other transit agencies to reduce their emissions.ⁱ

4. Solid Waste

Though solid waste accounts for less than one percent of RMTD's total emissions share, quantifying and tracking waste can increase understanding for where RMTD can reduce its material consumption. Whether it is the use of paper in the office or the recycling of metal previously used in the fleet, there are many waste diversion options to support emission reductions.

Sub-goal 4.1: Increase the diversion rate of RMTD generated waste.

As all of RMTD's waste is currently landfilled. It is RMTD's goal to implement measures to divert waste by reducing initial waste, reusing materials, or increasing facility recycling rates.

Sub-goal 4.2: Reduce RMTD use of raw materials and increase use of recycled or sustainable materials.

Reducing the amount of waste created starts with the materials RMTD purchases on an annual basis. Setting stricter standards towards more sustainable purchasing and procurement, with the goal of upcycling materials to further increase waste diversion and emission reductions.

5. Equity

When considering RMTD's response to climate change, it is necessary to understand the vulnerabilities its ridership faces. Applying social vulnerability factors, such as transit dependence and income, can help more accurately measure how RMTD can equitably approach the implementation of its climate actions and strategies. Equity is an integral target that must receive a great deal of focus when addressing all goals and targets.

Sub-goal 5.1: Prioritize climate adaptation strategies to target disadvantaged communities.

With transit dependence a key issue for RMTD riders, the effects of climate change disproportionately affect riders who are reliant on RMTD services regardless of weather conditions. RMTD will implement a robust climate action response to support its most vulnerable riders.



Chapter 6:

Climate Resilience and Adaptation

As the local climate continues to change, the Rockford Region is faced with growing threats from increased temperatures, flooding, drought, and extreme heat.ⁱ Strategies that reduce greenhouse gas (GHG) emissions can help mitigate these climate impacts. However, GHG reductions alone will not stop climate change. Therefore, it is necessary to adapt to the existing impacts of climate change while building resilience against future changes.

From small preventative maintenance changes to larger collaborative efforts in upgrading infrastructure, adapting to climate change can take many forms. To determine the best ways to adapt to climate change, RMTD assessed a variety of potential climate risks and vulnerabilities for the region. This chapter references The Nature Conservancy’s Illinois Climate Assessment (ICA) report and data from the University of Illinois Urbana-Champaign’s (UIUC) Prairie Research Institute to identify modeling scenarios through 2100 that show projected changes to temperature, precipitation, and more. These projections are based on a variety of emissions scenarios as seen in the figures below.

Understanding Climate Risks and Hazards

Climate Hazards in the Rockford Region

This Plan highlights several significant natural and human induced climate hazards that were identified as threats to the region in Booneⁱⁱ and Winnebago Counties’ Hazard Mitigation Plans.ⁱⁱⁱ Table 6-1 lists these hazards and their connections to the counties above. While all hazards pose risks to the transit system, some are beyond RMTD’s level of influence. This chapter prioritizes hazards with direct consequence to RMTD’s services, with the goal of

providing support for taking robust actions.

For this Plan, ISWS ran 19 climate models obtained from the sixth phase of the Coupled Model Intercomparison Project (CMIP6). Figures 6-1 to 6-3 show three key measurements:

- 1. The observed climatology (indicated by the black line) averaged and presented between 1985-2014;
- 2. The historical simulations (shaded in grey) shown from 1985-2014; and
- 3. The projected changes from 2015-2095 broken

Table 6-1. An Overview of Climate-Related Hazards in the Rockford Region

Boone County	Winnebago County
Tornados	Flooding
Thunderstorms	Severe storms
Winter storms	Tornados
Flooding	Hazardous materials storage and transportation
Hazardous material release	Winter storms
Fire	Drought/extreme heat
Dam/levee failure	Dam and levee failure
Extreme heat and drought	Earthquakes
Earthquakes	Groundwater shortage

Sources: Region 1 Planning Council.

down into a moderate emissions scenario (SSP4.5; green shading) and a high emissions scenario (SSP7.0; red shading), using the Shared Socioeconomic Pathways (SSP) framework.

These shaded ranges display the 10% to 90% confidence intervals averaged from the 19 climate models.

Extreme Temperature

One of the most pervasive risks to RMTD and its riders is extreme temperature. Extreme heat can affect not only infrastructure, including battery efficiency and lifespan of roads, but also health outcomes of RMTD riders. In the United States alone, rising temperatures are projected to increase the cost of pavement material selection and overall maintenance between \$19.0 to \$26.3 billion dollars by 2040.^{iv}

Extreme heat can disrupt RMTD's daily operations in several ways. RMTD is currently transitioning from traditional diesel-powered buses to fully electric and hybrid-electric buses in an attempt to reduce GHG emissions. As part of this transition, RMTD must adjust to the new range and efficiency of battery electric buses during periods of extreme heat and cold. Significant decreases in the efficiency and range of battery powered buses may occur when buses are operated beyond the preferred temperature range of 50 to 60°F.^v In some cases, extreme temperatures can require additional buses to maintain full service.

In addition to concerns with battery efficiency, it is important to consider the effects of extreme temperatures on RMTD's ridership. By 2040, the Northern Illinois region is projected to experience a significant increase in very hot days (daily maximum temperatures of 95°F or higher) by approximately 8 to 24 days a year.^{vi} When coupled with projected increases in warm nights (nighttime minimum temperatures of 70°F), the risk for heat-related illness intensifies. Such risks are of particular concern to vulnerable populations who are often dependent on public transit. For example, households with no owned vehicles have more than four times greater heat exposure than households with four or more vehicles.^{vii}

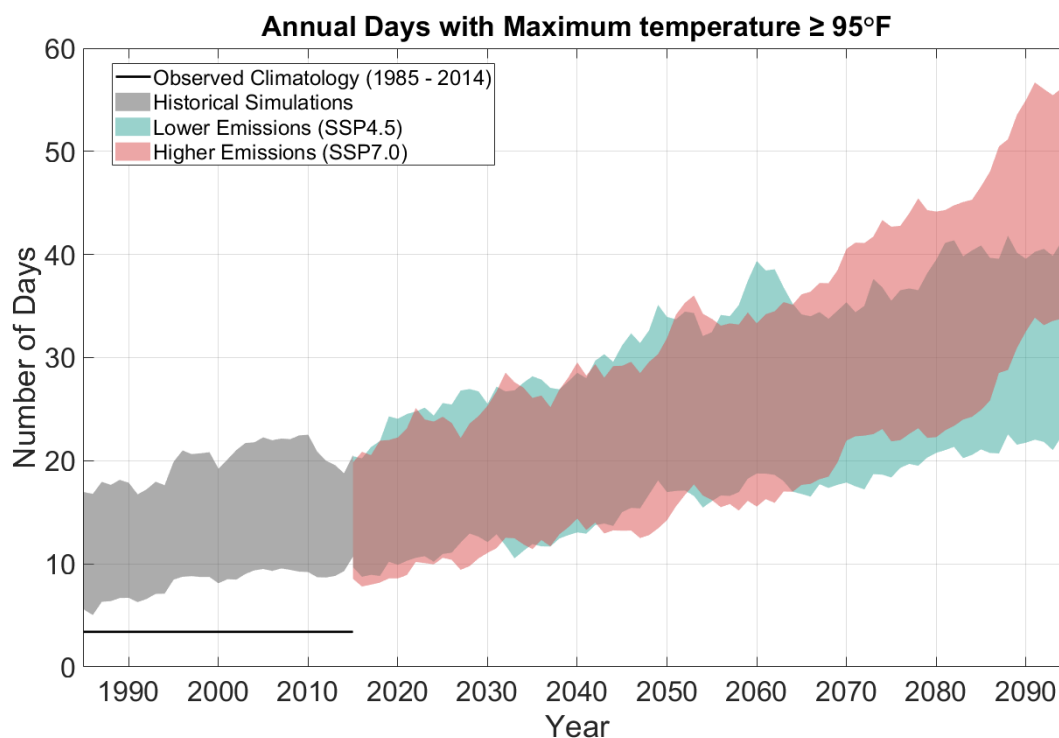
Precipitation

Along with the risk of extreme temperatures, changes in precipitation patterns can pose similar challenges to riders and RMTD's overall transit service. While adverse weather has the potential to reduce ridership, RMTD's rider survey has shown that an increase in weather events lead to a corresponding increase in ridership (see Appendix E).^x

RMTD operations will be impacted by changes in precipitation patterns, such as more intense periods of rainfall, especially during the winter and spring months. Average rainfall in Northern Illinois is approximately 35 inches annually, but is expected to increase 2 to 10 percent by 2100.^{xi} RMTD could experience a greater risk of flooding along its standardized routes, leading to negative outcomes on trip duration and a decrease in ridership.

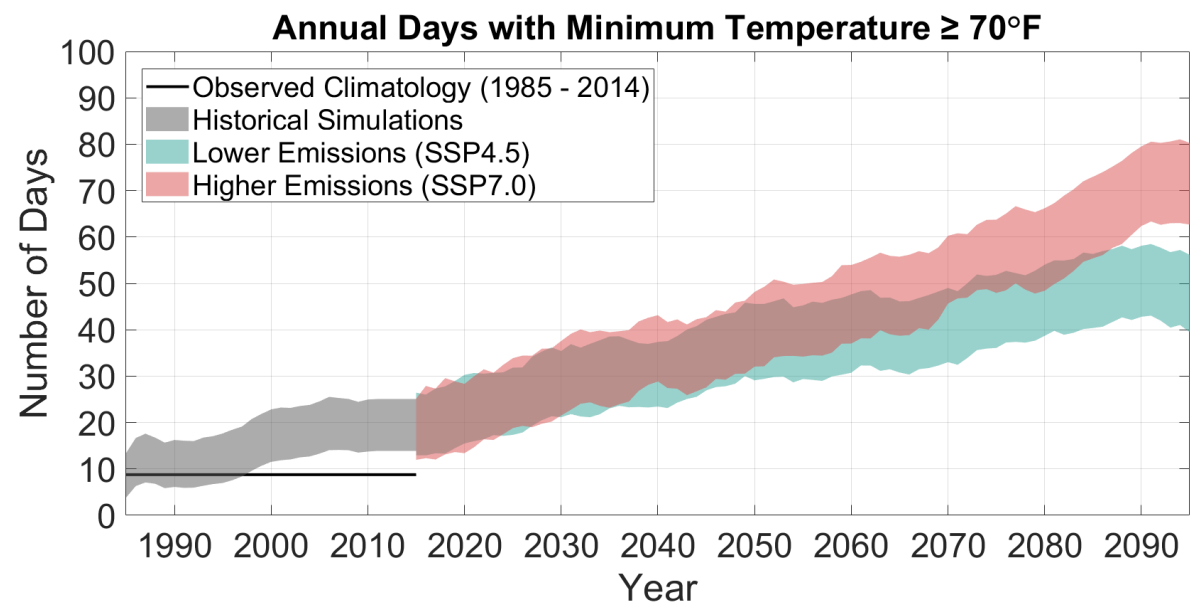
For riders continuing to utilize service during adverse weather, protection from the elements while waiting for service is

Figure 6-1. Projected Increase in Extreme Heat Days in the Rockford Region



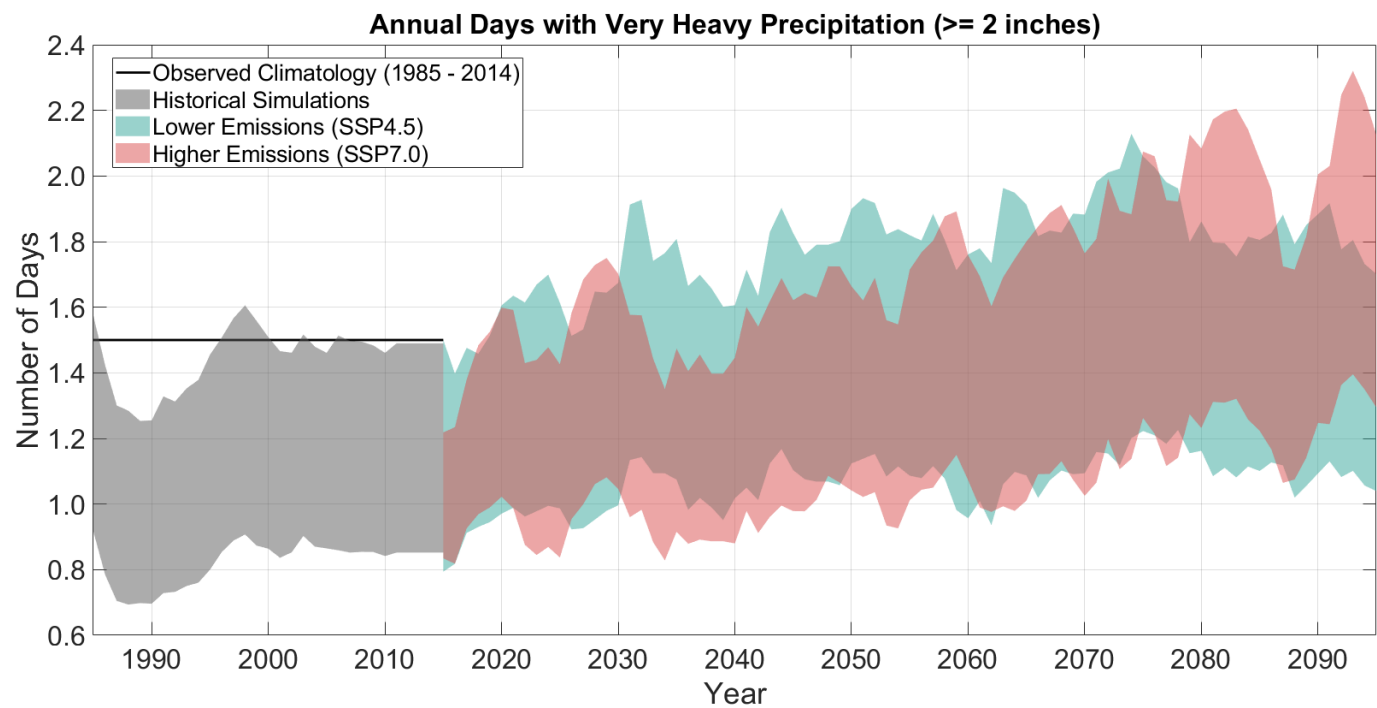
Source: Illinois State Water Survey.

Figure 6-2. Projected Increase in Warm Nights in the Rockford Region



Source: Illinois State Water Survey.^{viii}

Figure 6-3. Projected Increase in Heavy Precipitation in the Rockford Region



Source: Illinois State Water Survey.^{ix}

important. Only 7 percent of bus stops in RMTD's transit district are covered (69 out of 1051). A lack of protection from adverse weather can potentially lead to further reductions in ridership. Additions of tree cover and covered bus stops can mitigate ridership decreases with added health benefits.^{xii}

Inclement Weather

Weather and climate disaster events can lead to billions of dollars in loss and damages. In 2021, there were 20 weather and climate disaster events across the United States, with losses exceeding \$1 billion each.^{xiv} Two of those events occurred in the Midwest, primarily caused by tornadoes and severe weather.

In their respective multi-hazard mitigation plans, both Boone and Winnebago Counties identified tornadoes and severe storms as hazards that have the potential to pose a threat to human health, infrastructure, and the local economy.

Boone and Winnebago Counties are considered to be a Humid-Continental climate.^{xv} The National Oceanic and Atmospheric Administration (NOAA) defines this climate by humid hot summers – with connective thunderstorms dominating these months – to extremely snowy winter months, where temperature often drops below freezing and can remain that way for multiple days to weeks.^{xvi} Both counties experience measurable precipitation from thunderstorms and snow storms.

In the past 62 years (1958 to 2020), 33 tornadoes have occurred in the region.^{xvii} While some of the most significant tornadoes occurred in the late 1900s, roughly half of total tornadoes have

occurred in the last 10 years, indicating that the frequency of tornadoes is increasing.

Tornadoes are classified according to the Enhanced Fujita (EF) tornado intensity scale, which ranges from EF0 to EF5. Table 6-1 outlines the EF intensity scale and Table 6-3 lists the top five most significant tornadoes in the region to date.

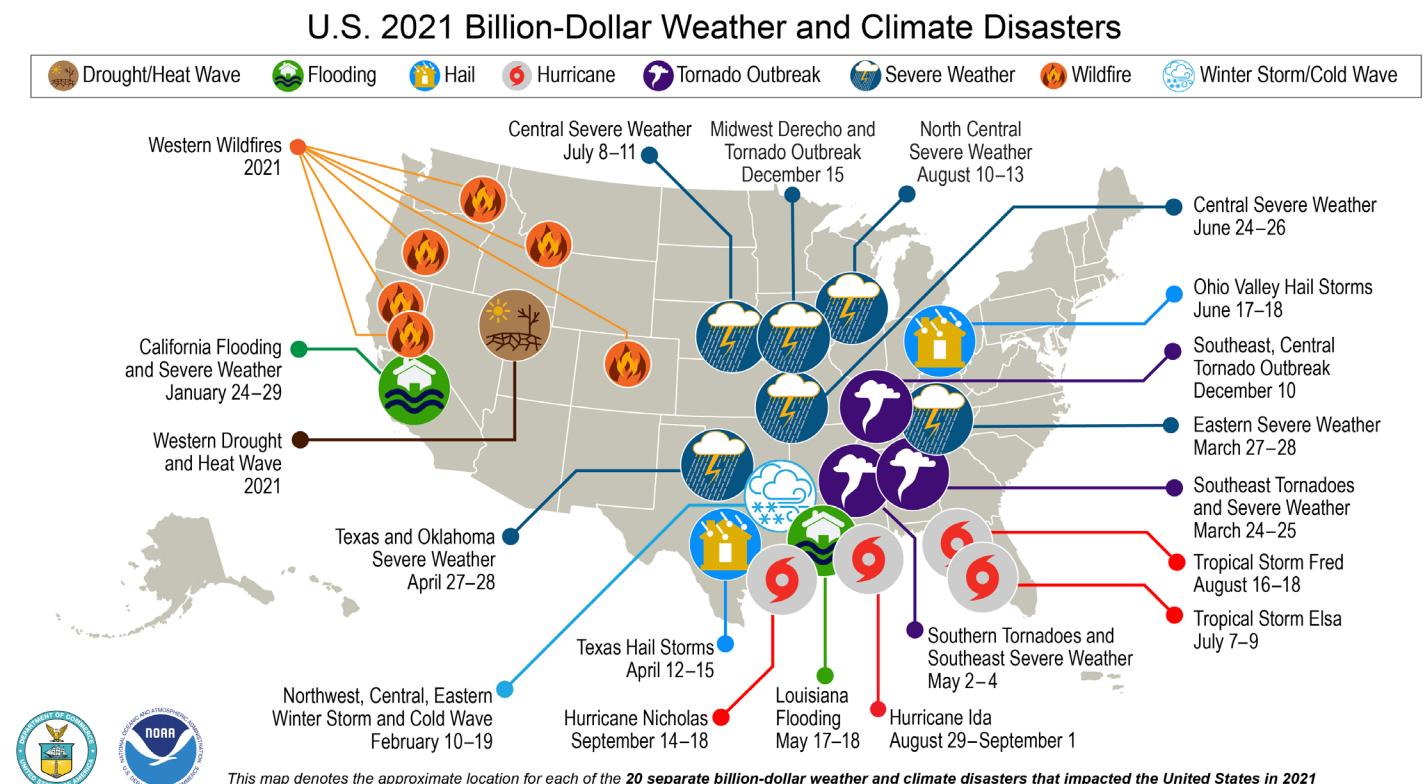
Social Vulnerability and Equity

Equity is an integral cornerstone in addressing the climate change threats both RMTD and the community will encounter. RMTD already incorporates equity considerations into its operations by providing affordable and accessible transit to underserved populations, while simultaneously working towards creating a healthier public transportation system. In order to achieve more equitable outcomes, prioritizing climate action strategies towards the most vulnerable is essential.

Climate change has the potential to exacerbate stressors vulnerable communities already experience. Increases in temperature, extreme heat events, and changes in precipitation disproportionately impact transit-dependent populations.

Transit-dependent populations are defined by a number of groups: seniors, individuals with disabilities, individuals with low incomes, and zero-vehicle households. Individuals of the aforementioned groups are likely to face situations that inhibit

Figure 6-4. U.S. 2021 Billion-Dollar Weather and Climate Disasters



Source: National Oceanic and Atmospheric Administration.^{xiii}

Table 6-2. Enhanced Fujita Scale for Tornadoes

Enhanced Fujita Number	Estimated Wind Speed (MPH)	Path Width (Yards)	Path Length (Miles)	Description of Destruction
0 Gale	40 – 72	6 – 17	0.3 – 0.9	Light Damage
1 Moderate	73 – 112	18 – 55	1.0 – 3.1	Moderate Damage
2 Significant	113 – 115	56 – 175	3.2 – 9.9	Considerable Damage
3 Severe	158 – 206	176 – 556	10 – 31	Severe Damage
4 Devastating	207 – 260	0.3 – 0.9	32 – 99	Complete Damage
5 Incredible	261 – 318	1.0 -3.1	100-315	Foundations swept clean, automobiles become missiles and thrown for 100 yards or more, steel-reinforced concrete structures badly damaged.

Disclaimer: The Fujita (F) Scale was originally developed by Dr. Tetsuya Theodore Fujita to estimate tornado wind speeds based on damage left behind by a tornado. This EF Scale has replaced the original F scale, which has been used to assign tornado ratings since 1971.

Source: National Oceanic and Atmospheric Administration.

Table 6-3. Top Five Most Significant Tornadoes in the Rockford Region

Location	Date	Fujita Scale	Deaths	Injuries	Property Damage (\$)
Boone / Winnebago County	11/22/2010	EF2	0	6	\$5M
Boone County	1/7/2008	EF3	0	4	\$2M
Boone County	4/21/1967	F4	24	410	\$250K
Winnebago County	8/17/1979	F2	0	0	\$250K
Boone County	4/9/2015	EF1	0	0	\$150K

Source: NOAA National Centers for Environmental Information NCEI Storm Events Database.

their ability to own or drive a vehicle. Geographic distribution of transit-dependent populations is imperative to understanding systemic gaps in transit service and highlights the needs of vulnerable community members. Figure 6-5 demonstrates the areas within the metropolitan planning area (MPA) that contain the most identified transit-dependent populations and identified flood zones.

Transit-Dependent Populations in the Region

Seniors

Seniors (individuals 65 or older) make up 16 percent of the population in Boone County and 17 percent of Winnebago County, most of which are located towards the north and east sides of Rockford. These areas are often less walkable and reliant on personal transportation, as access to public transit in such areas is limited. Owning or operating a personal vehicle is often no longer feasible or safe once an individual gets older, thus highlighting the necessity of public transit options such as RMTD's origin-to-destination paratransit services. This service provides elderly and disabled individuals living in low transit accessible areas with the ability to transport themselves to medical appointments and access stores that sell healthy or fresh foods.

Individuals with Disabilities

The percentage of individuals with disabilities in Boone and Winnebago Counties are 12 and 14 percent respectively. The categorization of disability is broad and may look different for everyone, but can refer to both mental and physical conditions. A majority of individuals with disabilities inhabit western, southern, and downtown Rockford, which are mostly served by fixed-route transit. Significant barriers that exist for individuals are the long distances from bus stops to destinations and inaccessible road infrastructure in which ramps and even- wheel chair accessible sidewalk are not always prevalent.

Low-Income Individuals

Approximately 10 percent of individuals in Boone County and 16 percent in Winnebago County are categorized as low-income. Vehicle ownership, registration, and maintenance costs can be substantial; thus, lower income individuals tend to be more reliant on public transportation than other populations. Low-income individuals are concentrated in the south and west sides of the City of Rockford. While these areas are well served by RMTDs fixed-route operations, it may be more difficult for individuals to access jobs in locations where transit is more limited, such as the northeastern portion of Rockford.

Zero Vehicle Households

There are approximately 4 percent of households that do not own a vehicle in Boone County, and 8 percent in Winnebago County, with a majority of these households located in downtown Rockford. While located in a well-served transit area, this population lacks connectivity to surrounding areas that are not accessible to transit.

Role of RMTD in Addressing Equity

RMTD is committed to establishing a resilient transit system that can continue serving the region's underserved populations. This is accomplished by analyzing the needs of the community and then implementing necessary strategies. RMTD has recognized the importance of connectivity to major employment destinations and has adjusted routes to increase accessibility to these locations.^{xviii} Further initiatives aim to continue the work RMTD has previously accomplished to further address equity among vulnerable populations.

Strengthening Climate Resilience

Across the United States, transit agencies have used climate adaptation measures to protect against the effects of climate change. It is RMTD's role to provide mobility to riders throughout the area. A focused increase in resiliency efforts will be needed

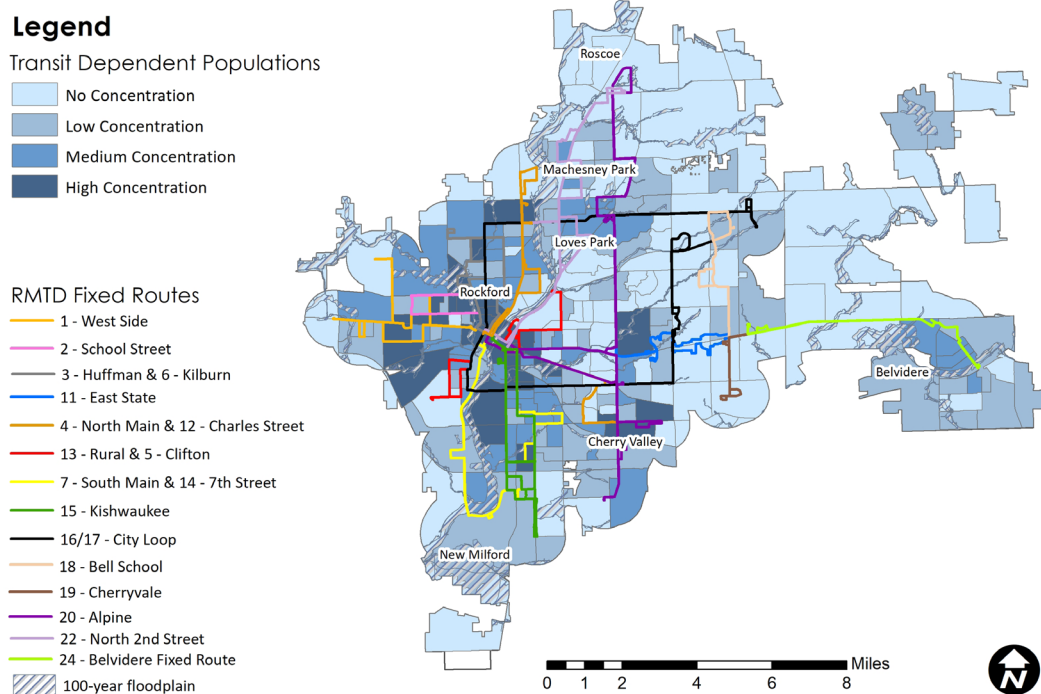
in order for RMTD to continue to provide services as climate change accelerates. To achieve this goal, RMTD will implement a number of strategies centered around resilience and adaptation. These action strategies, introduced in following chapter, integrate the principles of equity in order to address challenges faced by vulnerable and transit-dependent groups. RMTD's approach to identifying climate resiliency strategies included the use of systems-thinking and other strategic frameworks. Encompassed within the goals of climate adaptation are the strategies that build resilience in transit agencies, to be explained further in Chapter 7.

Table 6-4. Percent of Transit Dependent Populations in the RMTD Service Area

Transit Dependent Population	Boone County	Winnebago County
Seniors	15.6%	17.0%
Individuals with Disabilities	11.5%	13.9%
Below Poverty Level	10.1%	15.6%
Zero Vehical Households	4.3%	8.4%

Sources: US Census American Community Survey (2019).

Figure 6-5. Concentrations of Transit Dependent Populations within RMTD Service Area in Flood Zones



Sources: US Census American Community Survey (2019).



Chapter 7:

Climate Action Strategy

Based on information compiled in the previous chapters, this chapter provides a comprehensive list of climate action strategies for Rockford Mass Transit District (RMTD) to implement to reduce its greenhouse gas (GHG) emissions. The first section outlines the criteria used to identify relevant climate action strategies. The second section lists the complete list of proposed strategies and actions for each of the goals discussed in Chapter 5.

Selection Criteria

In order to include only action strategies that were relevant and important to RMTD, a strategy selection criteria list was created to filter potential action strategies into the final action

strategies. Strategy selection criteria were broken down into six categories: GHG Emissions Reductions Benefit, Technical Feasibility, Adaptation & Resilience, Co-Benefits, Equity, and Customer Satisfaction. Each criterion contained multiple considerations with additional filtering questions used to guide the selection process. Applying the criteria, considerations, and questions to each potential strategy, all categories were rated on a high/medium/low rating scale, with total scores ranging from zero to six. Potential action strategies at a rating above or equal to 2.5 were then filtered and incorporated into the final action strategies. Table 7-1 displays the climate action strategy selection criteria used.

Table 7-1. Climate Action Strategy Selection Criteria

Criteria	Considerations	Questions to Ask
<i>Primary</i>		
GHG Emissions Reductions Benefit	GHG per vehicle mile	Could this strategy lead to emissions reductions?
	Passenger miles reduced	Will passenger miles traveled be reduced?
Technical Feasibility	Technology barriers	What are potential implementation barriers?
	Technology readiness	Are there any technological limitations?
	Ease of implementation	Is the technology easy to implement?
Adaptation & Resilience	Climate resilience	Does this strategy build resilience in existing systems?
	Climate adaptation	Does this strategy help with adaptation for future climate impacts?
<i>Secondary</i>		
Co-Benefits	Cost savings	Are there potential cost savings?
	Reduced energy demand	Any potential reductions in energy demand?
	Public relations	Will this positively affect RMTD's image?
	Travel choices	Will more residents switch to public transit as a result of this strategy?
Equity	Accessibility	Does this improve access to transit in vulnerable and/or low-income areas?
Customer Satisfaction	Passenger comfort (climate-based)	Will passenger comfort be improved?
	Passenger safety and security	Will passenger safety and security increase?

Sources: Region 1 Planning Council; Rockford Mass Transit District.

Strategies

Table 7-2 below provides a complete list of climate action strategies RMTD will implement to meet its goal of achieving net-zero emissions across all facets of the agency by 2050. Climate action strategies are filtered under the goals and sub-goals discussed in Chapter 5. These include the emissions reductions areas of fleet, energy, water, waste, and equity. Each action is accompanied by an estimate for amount of funding needed, whether this action qualifies as a short term or long-term strategy, and a proposed timeline.

The amount of funding that will be needed to implement each strategy has been grouped into three divisions, described below.

- \$0-\$20,000 (\$)
- \$20,000-\$100,000 (\$\$)
- \$100,000 or more (\$\$\$)

Table 7-2. RMTD Climate Action Strategies

1. Fleet

Sub-Goal 1. Reduce GHG emissions from RMTD's vehicle fleet and increase climate resiliency.

#	Action	Funding	Term	Timeline
1.1A	Replace all Fixed Route, Paratransit, and Contracted Buses with Battery Electric Buses (BEB).	\$\$\$	Long Term	15 Years
1.1B	Replace all Non-Revenue vehicles to Battery Electric vehicles.	\$\$	Long Term	10 Years
1.1C	Reduce vehicle idling and improve route efficiencies.	\$	Short Term	1 Year
1.1D	Regularly update plans and procedures for managing disruptions caused by weather-related events.	\$	Long Term	Ongoing
1.1E	Create and maintain a structured emissions data collection system for future Climate Action Plans.	\$\$	Long Term	Ongoing
1.1F	Ensure adequate fuel storage before an extreme climate event occurs.	\$	Short Term	5 Years
1.1G	Enhance communication and monitoring systems to respond quickly to risks.	\$	Short Term	1 Year
1.1I	Enhance internal awareness on climate change impacts and adaptation.	\$	Short Term	5 Years

2. Energy

Sub-goal 1. Reduce energy consumption and increase energy efficiency for all RMTD facilities.

#	Action	Funding	Term	Timeline
2.1A	Install on-site energy storage systems where feasible.	\$\$\$	Long Term	20 Years
2.1B	Establish minimum energy performance targets for new construction and major renovations.	\$	Short Term	5 Years
2.1C	Replace existing HVAC with electric systems.	\$\$	Long Term	15 Years
2.1D	Replace all building lighting fixtures with LED lights.	\$	Short Term	5 Years

Sub-goal 2. Transition to renewable energy sources for all building and fleet energy needs.

#	Action	Funding	Term	Timeline
2.2A	Partner with electricity provider to ensure all electricity procurement in RMTD facilities are from 100% renewable energy sources.	\$	Short Term	5 Years
2.2B	Install on-site energy generation where feasible for both fleet charging and facility consumption.	\$\$\$	Long Term	10 Years
2.2C	Install EV charging infrastructure using renewable energy for employee commuter use.	\$\$	Short Term	5 Years
2.2D	Establish a clean energy fund to invest in energy efficiency and renewable energy projects.	\$\$	Short Term	5 Years

Table 7-2. RMTD Climate Action Strategies, Continued

3. Water

Sub-goal 1, Reduce water consumption at all RMTD facilities.

#	Action	Funding	Term	Timeline
3.1A	Install non-potable recycled water and water-saving systems in RMTD facilities.	\$\$	Long-Term	10 Years
3.1B	Install new designs or retrofits of low-water sanitary fixtures that require less water and energy.	\$\$	Long-Term	5 Years
3.1C	Ensure hot water pipes are properly insulated	\$	Short-Term	1 Year

Sub-goal 2. Improve stormwater management practices at RMTD facilities.

#	Action	Funding	Term	Timeline
3.2A	Increase use of vegetation in and around RMTD spaces.	\$	Short Term	5 Years
3.2B	Install green or living roofs above bus shelters.	\$\$	Short Term	5 Years
3.2C	Partner with the City of Rockford to pilot a permeable pavement project at main transfer station.	\$\$	Short Term	5 Years

4. Solid Waste

Sub-goal 1. Increase the diversion rate of RMTD generated waste.

#	Action	Funding	Term	Timeline
4.1A	Increase accessibility to recycling infrastructure at transfer centers and on buses and encourage riders to use.	\$	Short Term	1 Year
4.1B	Partner with local organizations to install and manage composting bins in facilities.	\$\$	Short Term	5 Years
4.1C	Explore partnerships with local artists or businesses to repurpose used materials from facilities.	\$	Short Term	5 Years

Sub-goal 2. Reduce RMTD use of raw materials and increase use of recycled or sustainable materials.

#	Action	Funding	Term	Timeline
4.2A	Implement waste characterization data tracking and set more specific waste reduction metrics.	\$\$	Short Term	1 Year
4.2B	Establish green procurement strategies for facilities and new construction.	\$	Short Term	1 Year
4.2C	Research and transition to paperless office best practices.	\$	Short Term	5 Years

5. Equity

Sub-goal 1. Prioritize climate adaptation strategies to target disadvantaged communities.

#	Action	Funding	Term	Timeline
5.1A	Partner with local government and non-profit organizations to plant trees at existing facilities and bus stops in vulnerable areas.	\$	Short Term	5 Years
5.1B	Collaborate with municipalities to enhance resilience of vulnerable transit stops and routes.	\$	Short Term	5 Years
5.1C	Integrate equity & climate resilience into current and future project planning and design.	\$	Short Term	1 Year
5.1D	Improve communication with riders to spread awareness of disruptions and changes to service in extreme weather events.	\$	Short Term	1 Year
5.1E	Work with local municipalities to increase public access to drinking water when waiting for buses.	\$	Short Term	5 years



Chapter 8:

Looking Forward

This chapter addresses the framework for implementing and monitoring strategies that will accomplish the goals laid out in this Plan, as well as detail the potential barriers and challenges that may be encountered moving forward.

Potential Barriers and Challenges

Climate

While the initiatives detailed in this plan will contribute towards reducing Rockford Mass Transit District's (RMTD) emissions and mitigating climate change, adverse climate events remain a very real possibility. Inclement weather, heavy precipitation, and extreme heat events will continue to occur, leaving no community untouched. Additionally, actions taken by RMTD to create a more sustainable transit system have vulnerabilities of their own. The extent of these vulnerabilities may not be fully known until after the Plan is implemented. RMTD's transition to electric and hybrid-electric buses can have impacts on transit operation that must be adapted to. The reliability and efficiency of battery electric buses may be impacted by weather events such as extreme heat and cold, presenting new challenges for RMTD to address.

Resources and Funding

As regions move to protect against climate change threats, funding opportunities from state and federal governments for climate resiliency projects is expected to increase. Procurement of sufficient funds to undergo necessary implementation measures could be a significant barrier to RMTD accomplishing its goals.

Battery electric and hybrid-electric buses have higher upfront costs than that of traditional diesel buses. It is estimated that hybrid-electric buses cost approximately 50 percent more than the price of diesel buses, and battery electric buses are twice as expensive as diesel. Battery electric and hybrid-electric buses also require costly modifications to infrastructure to accommodate

charging equipment and additional training for transit operators and maintenance personnel.ⁱ Battery and hybrid-electric buses have the potential be more profitable than diesel buses, but feasibility varies by transit agency and geographic location.

Unforeseen circumstances can temporarily shift RMTD's focus. This was observed during the COVID-19 pandemic, in which much of RMTD's funding and resources went towards initiatives to keep riders and operators safe from the virus. In 2020, over \$300,000 was spent on personal protective equipment for staff that was not previously budgeted for. To ensure social distancing during this time, buses operated under limited capacity, though many individuals elected not to utilize public transit. Ridership, and thus revenue from fares, experienced a tremendous drop as a result of the pandemic. Overall, as a result of the COVID-19 pandemic, RMTD experienced a 71 percent loss of revenue when compared to the previous fiscal year. This would have led to major operational issues at RMTD if it had not received funding from the CARES Act in 2020.ⁱⁱ

Implementation and Monitoring

The creation of this plan acts as the foundation for future RMTD sustainability initiatives. The next crucial step is to follow the contents of the Plan thorough implementation. This will result in significant changes for RMTD and its operations in the form of improvements to infrastructure, staffing, routes, and its fleet.

In order to ensure implementation of the proposed goals and climate action strategies in this plan, RMTD will adhere to the following principals.

Implementation Principals

These principles will act as a guiding force to aid RMTD in the necessary efforts required for successful plan implementation.

Leadership and Collaboration

Leadership from RMTD and local elected officials is a key factor for the Plan's implementation. RMTD has made its commitment to sustainability apparent through its past and current initiatives, and continues to make strides in future sustainability and resiliency planning. Such initiatives include a gradual transition from traditional diesel buses to battery and hybrid-electric buses. Involvement from elected officials and key stakeholders will be beneficial when addressing the various barriers posed by implementation.

Sufficient Funding and Resources

An integral requirement for implementation is proper funding and resources. As governments are placing increasing stress on sustainability in the transportation sector, more funding opportunities for sustainable initiatives is expected to occur as well.

Community Engagement

A crucial component of the decision-making process is community engagement. RMTD consistently weighs the needs and opinions of the public when enacting agency changes. Opinions from members of the community are beneficial when analyzing gaps in service and areas of improvement. The RMTD Rider and Staff surveys created for this Plan highlighted the needs of the community and transit-dependent populations.

Incorporation of Climate Science in Decision Making

Climate and emissions data were a guiding factor in the formulation of this Plan. As new data emerges, it will continue to be integrated into RMTD decision making. Climate action strategies will be reevaluated on a regular basis to check progress and determine if further action may be necessary.

Monitoring and Reporting Progress

To track progress on reaching GHG emission reduction targets, regular and continued monitoring of RMTD emission trends will take place in the form of yearly Plan updates and/or reports to the RMTD board.



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Appendix A:

Glossary & Acronyms

Acronyms & Abbreviations

A

ADA	Americans with Disabilities Act
APTA	American Public Transit Association

B

BAU	Business as Usual
BCCA	Boone County Council on Aging
BEB	Battery Electric Buses

C

CAP	Climate Action Plan
CH ₄	Methane
CO ₂	Carbon Dioxide

F

FTA	Federal Transit Administration
-----	--------------------------------

G

GDP	Gross Domestic Product
GHG	Greenhouse Gas

H

HEB	Hybrid Electric Buses
HFCs	Hydrofluorocarbons

I

ICA	Illinois Climate Assessment
ICLEI	International Council for Local Environmental Initiatives
IDOT	Illinois Department of Transportation
IGA	Intergovernmental Agreement
IIJA	Infrastructure Investment and Jobs Act

M

MH ₄	Methane
MPA	Metropolitan Planning Area
MPO	Metropolitan Planning Organization
MTCO _{2e}	Metric Tons of Carbon Dioxide Equivalent

N

N ₂ O	Nitrous Oxide
------------------	---------------

P

PMT	Passenger Miles Traveled
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R

RAISE	Rebuilding American Infrastructure with Sustainability and Equity
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RMAP	Rockford Metropolitan Agency for Planning
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RMTD	Rockford Mass Transit District
------	--------------------------------

S

SMTD	Stateline Mass Transit District
------	---------------------------------

U

USDA	United States Department of Agriculture
------	---

V

VMT	Vehicles Miles Traveled
-----	-------------------------

Glossary of Terms

B -----

Business as Usual

Scenario that projects energy and CO2 emissions considering only current trends and policies and expecting no further policy action.

Source: International Council on Clean Transportation

D -----

Demand-Response Service

Any non-fixed route system of transporting individuals that requires advanced scheduling by the customer, including services provided by public entities, nonprofits, and private providers.

Source: Federal Transit Administration

E -----

Emissions Forecasting

An emission projection that estimates future emissions based on current emissions, expected regulatory implementation, and other technological, social, economic, and behavioral patterns.

Source: California Air Resources Board

F -----

Fixed-route System

A system of providing transportation for individuals (other than by aircraft) on which a vehicle is operated along a prescribed route according to a fixed schedule.

Source: Cornell Law School

G -----

Greenhouse Gases (GHG)

Gases that trap heat in the atmosphere and contribute to climate change.

Source: U.S. Environmental Protection Agency

H -----

Hub-and-Spoke Radial Operation Pattern

Hub and Spoke, sometimes also called “radial,” is a description of a generalized design for a transportation system—in this case, a fixed-route transit system. The essential design provides for routes (the spokes) that all converge on a single point (the hub). Riders wishing to reach different points on the various spokes all travel through the hub. The hub is often located in a major activity center like a downtown.

Source: Whatcom Transportation Authority

H -----

Net-Zero Emissions

A state in which the greenhouse gases going into the atmosphere are balanced by their removal from the atmosphere.

Source: Net Zero Climate

Non-Modal Emissions

Emissions that are not directly associated with transit. In the case of RMTD, these originate from facilities that are used for

maintenance, administrative work, and transfer center stations for riders.

Source: Environmental Protection Agency

O -----

Origin-Destination Paratransit Service

Provides transportation for people with disabilities who are unable to use the regular, fixed route transit service that serves their region. Paratransit usually provides door-to-door service for people who call to reserve a ride.

Source: Disability Rights Texas

R -----

Resilience

The ability to quickly absorb and recover from sudden shocks. Achieved by anticipating risk, limiting impacts, and building social, economic, and natural capital.

Source: Community and Regional Resilience Institute

S -----

Social Vulnerability

The potential negative effects on communities caused by external stresses on human health. Such stresses include natural or human-caused disasters, or disease outbreaks.

Source: Agency for Toxic Substances and Disease Registry

Stationary Emissions

Emissions produced by non-mobile sources, such as facilities.

Source: International Council for Local Environmental Initiatives

Systems Thinking

The act of considering the interactions and relationships of a system with its containing environment.

Source: MITRE

T -----

Transit Emissions

Emissions from energy used for transportation by transit systems.

Source: International Council for Local Environmental Initiatives

Appendix B:

Greenhouse Gas Methodologies

This section describes the methodologies and data sources used to develop Rockford Mass Transit District's (RMTD) GHG Emissions Inventory. Methodologies are divided by emission source and type as reported by RMTD. Unless otherwise noted, the data used in the GHG Emissions Inventory is derived from RMTD.

RMTD's emissions are derived primarily from its vehicle fleet and three facilities. The vehicle fleet includes several transit modes, including fixed route, paratransit/demand-response, contracted, and non-revenue. Each of these modes was calculated separately for the GHG emissions inventory. Emissions from electricity, water, natural gas, waste, and refrigerants are also calculated separately. This appendix details the emissions calculations broken down by source and year to provide context for changes in emission production over time.

Final emission totals are in metric tons of carbon dioxide equivalent (MTCO₂e), which indicates the warming potential of all emissions rather than just the CO₂ emitted.ⁱ Each type of emission, including carbon dioxide (CO₂), methane (CH₄), and nitrous oxide (N₂O), were calculated separately for each mode, converted to MTCO₂e using a conversion factor, and summed to provide the total MTCO₂e by mode and year. Some data needed additional calculations, the explanations of which are included in the relevant sections. The conversion factors are 28 MTCO₂e per MTCH₄ and 265 MTCO₂e per MTN₂O.ⁱⁱ

Table B-1. Emissions Conversion Factors

Climate Registry Transportation Emissions Factors (Updated 2021)

Fuel Type	Vehicle Type	Year	CH ₄ (g / mi)	N ₂ O (g / mi)	kgCO ₂ /gallon
Gasoline	Passenger Vehicle	2015	0.0068	0.0042	8.78
Gasoline	Light Truck	1997	0.0452	0.0871	8.78
Gasoline	Light Truck	2009	0.0095	0.0036	8.78
Gasoline	Light Truck	2010	0.0095	0.0035	8.78
Gasoline	Light Truck	2013	0.0095	0.0035	8.78
Gasoline	Bus	2008	0.034	0.0015	8.78
Gasoline	Bus	2010	0.032	0.0015	8.78
Gasoline	Bus	2012	0.0313	0.0015	8.78
Gasoline	Bus	2014	0.0315	0.0015	8.78
Gasoline	Bus	2016	0.0321	0.0061	8.78
Gasoline	Bus	2018	0.0326	0.0082	8.78
Diesel	Passenger Vehicle				10.21
Diesel	Light Duty Truck	2007-2018	0.029	0.0214	10.21
Diesel	Light Duty Truck	1983-1995	0.0009	0.0014	10.21

EPA Emissions Factors (2021)

Natural Gas		Electricity	
	per mmBtu		per MWh
kg CO ₂	53.06	lbCO ₂	1067.7
kgCH ₄	0.001	lbCH ₄	0.099
kgN ₂ O	0.00001	lbN ₂ O	0.014
MTCO ₂	0.05306	kgCO ₂	484.3
MTCH ₄	0.000001	kg CH ₄	0.04491
MTN ₂ O	0.00000001	kg N ₂ O	0.00635
	per scf		
mmBtu	0.001026	MTCO ₂	0.4843
kg CO ₂	0.5444	MTCH ₄	0.00004491
g CH ₄	0.00103	MTN ₂ O	0.00000635
g N ₂ O	0.0001		

IPCC Fifth Assessment Global Warming Potentials (2014)

Emissions	Cumulative forcing over 100 years
CO ₂	1
CH ₄	28
N ₂ O	265
R22	1760
R134A	1300

**ISAWWA Water-Energy Report (2012)
Water**

kWh/MG
1560

Transit Emissions

Transit emissions are emissions produced during operations of both passenger and maintenance vehicles. More specifically, this includes fixed-route, paratransit/direct response, contracted bus fleet, and non-revenue vehicles. Each vehicle has its own set of emissions factors due to their differing engine types.

Fixed-Route Fleet

RMTD's fixed-route fleet is the set of buses owned by the transit district and operated along a set route. Data were reported in gallons of fuel used per year from 2016 to 2020 by vehicle and vehicle miles traveled (VMT) per year by vehicle from 2017 through 2020. Vehicles include diesel vehicles, and, as of 2020, hybrid diesel-electric vehicles. Table B-2 describes the summary data for RMTD's fixed-route fleet. The 2016 value is estimated by taking the average miles per gallon for the vehicles in years 2017-2020 and multiplying it by the gallons of fuel used that year.

The calculations used to determine the metric tons of each emission used the conversion factors listed in Table B-1. The format for the equation used to calculate the final MTCO_{2e} is below.ⁱⁱⁱ

$$\text{Gallons of diesel} \times \text{Vehicle emission factors} \times \text{unit conversion} = \text{MTCO}_2e$$

Table B-3 shows the total emissions calculations for RMTD's fixed-route fleet. Emissions factors from 2018 were used to calculate emissions for the five hybrid buses added in 2020 as more recent numbers have not been published.

Table B-2. Summary Data Fixed Route Fleet

Fixed-Route Characteristics	2016	2017	2018	2019	2020
Number of Vehicles	41.00	41.00	41.00	40.00	45.00*
Miles	1,248,724.00	1,224,728.00	1,227,104.00	1,236,061.00	1,153,422.00
Diesel Used (Gallons)	316,530.00	310,842.00	319,898.00	322,489.00	286,160.00

* Includes five hybrid-electric buses.

Table B-3. Total Emissions Calculations: Fixed-Route Fleet

Emissions	2016	2017	2018	2019	2020
MTCO ₂	3,231.77	3,173.71	3,266.16	3,292.61	2,921.69
MTCH ₄	0.01	0.01	0.01	0.01	0.01
MTN ₂ O	0.03	0.05	0.05	0.05	0.05
MTCO _{2e}	3,239.21	3,188.00	3,280.49	3,307.05	2,935.17

Paratransit/Demand-Response Fleet

Paratransit vehicles and demand-response vehicles are those used on a request-only basis. The vehicles used by RMTD include gas and diesel vans. Table B-4 describes the summary data for RMTD's paratransit/demand-response fleet. The 2016 value is estimated by taking the average miles per gallon (mpg) for each vehicle in years 2017-2020 and multiplying it by the gallons of fuel used that year. Miles values for vehicles P064 and P086 were not reported so another vehicle, P087, that is the same make and model, was used to approximate the vehicle's mpg.

The calculations used to determine the metric tons of each emission use the conversion factors in Table B-1. The format for the equation used to calculate the final MTCO_{2e} is below.^{iv}

$$\text{Gallons of diesel} \times \text{Vehicle emission factors} \times \text{unit conversion} = \text{MTCO}_2e$$

$$\text{Gallons of gasoline} \times \text{Vehicle emission factors} \times \text{unit conversion} = \text{MTCO}_2e$$

Table B-5 shows the total emissions calculations for RMTD's paratransit/demand-response fleet.

Table B-4. Summary Data Paratransit/Demand-Response Fleet

Paratransit/Demand Response Characteristics	2016	2017	2018	2019	2020
Number of Vehicles	29.00	31.00	29.00	30.00	26.00
Total Miles	717,216.00	678,165.00	727,283.00	731,324.00	544,500.00
Diesel Used (Gallons)	59,240.60	49,928.00	56,726.00	42,707.00	29,594.00
Gasoline Used (Gallons)	32,669.00	38,944.00	36,976.00	57,282.00	46,455.00

Table B-5. Total Emissions Calculations: Paratransit/Demand-Response Fleet

Emissions	2016	2017	2018	2019	2020
MTCO ₂	891.68	851.70	903.82	938.98	710.03
MTCH ₄	0.01	0.01	0.01	0.02	0.01
MTN ₂ O	0.02	0.02	0.02	0.02	0.01
MTCO _{2e}	896.87	856.68	909.51	943.75	713.60

Contracted Bus Fleet

Contracted bus fleets include buses hired by the transit authority but not owned or maintained by it. These may include gas or diesel vehicles. Table B-6 describes the summary data for RMTD's contracted bus fleet. The 2016 value for miles is estimated by taking the average miles per gallon for each vehicle in years 2017-2020 and multiplying it by the gallons of fuel used that year.^v

The calculations used to determine the metric tons of each emission use the conversion factors in Table B-2. The format for the equation used to calculate the final MTCO_{2e} is below.

$$\text{Gallons of diesel} \times \text{Vehicle emission factors} \times \text{unit conversion} = \text{MTCO}_2\text{e}$$

$$\text{Gallons of gasoline} \times \text{Vehicle emission factors} \times \text{unit conversion} = \text{MTCO}_2\text{e}$$

Table B-7 shows the total emissions calculations for RMTD's contracted bus fleet.

Table B-6. Summary Data Contracted Bus Fleet

Contracted Bus Fleet Characteristics	2016	2017	2018	2019	2020
Number of Vehicles	6.00	6.00	6.00	8.00	8.00
Miles	59,232.00	240,981.00	261,505.00	311,363.00	265,418.00
Diesel Used (Gallons)	972.00	2,353.00	2,104.00	2,496.00	4,893.00
Gasoline Used (Gallons)	7,018.00	30,055.00	32,730.00	40,233.00	33,151.00

Table B-7. Total Emissions Calculations: Contracted Bus Fleet

Emissions	2016	2017	2018	2019	2020
MTCO ₂	71.54	287.91	308.86	378.73	341.02
MTCH ₄	0.00	0.01	0.01	0.01	0.01
MTN ₂ O	0.00	0.00	0.00	0.00	0.00
MTCO _{2e}	71.77	288.70	309.68	379.73	342.07

Non-Revenue Vehicles

Non-revenue vehicles are those used for maintenance or other functions aside from client transport. These vehicles include light duty trucks or pickups, passenger vehicles, and heavy-duty trucks. Non-revenue data was collected and converted from fiscal year into calendar year, with fuel consumption data lacking in all years. As a result, miles per gallon totals for each non-revenue vehicle were researched and utilized to determine gallons used.^{vi}

The calculations used to determine the metric tons of each emission use the conversion factors in Table B-1. The format for the equation used to calculate the final MTCO_{2e} is below.^{vii}

$$\text{Gallons of diesel} \times \text{Vehicle emission factors} \times \text{unit conversion} = \text{MTCO}_2\text{e}$$

$$\text{Gallons of gasoline} \times \text{Vehicle emission factors} \times \text{unit conversion} = \text{MTCO}_2\text{e}$$

Table B-9 shows the total emissions calculations for RMTD's non-revenue vehicles. Values for CH₄ and N₂O that show up as 0.000 were less than 1 kg of pollutant. Values this low only impact the final MTCO_{2e} by <1 percent.

Table B-8. Summary Data Non-Revenue Fleet

Non-Revenue Fleet Characteristics	2016	2017	2018	2019	2020
Number of Vehicles	10.00	10.00	10.00	10.00	10.00
Miles	31,390.00	30,230.00	25,707.00	30,216.00	27,397.00
Gasoline Used (Gallons)	1,964.00	1,881.00	1,671.00	1,984.10	1,803.00

Table B-9. Total Emissions Calculations: Non-Revenue Fleet

Emissions	2016	2017	2018	2019	2020
MTCO ₂	18.39	17.53	15.77	18.67	17.03
MTCH ₄	0.00	0.00	0.00	0.00	0.00
MTN ₂ O	0.00	0.00	0.00	0.00	0.02
MTCO _{2e}	18.52	17.65	15.89	18.82	21.56

Non-Modal Emissions

Energy

Facilities owned and operated by RMTD are used for maintenance, administrative work, and transfer center stations for riders. RMTD has three facilities in the Rockford area. Data used to estimate facility energy emissions came from utility bills for electricity, water, and natural gas. Based on data limitations, no values for electricity were available for 2016 and 2019, and only partial values were available for 2017 and 2018 (see Table B-10). Data for 2016 and 2019 could not be accurately collected and analyzed. Only 7 months of 2017 data was available. Only 5 months of 2018 data was available.

The total CO_{2e} produced by a MWh depends on the fuel makeup of the local grid. RMTD uses ComEd, whose fuel mix is shown in Figure B-1 to be made up 36 percent nuclear, 32 percent coal, and 27 percent natural gas. The emission factor for Illinois is calculated at 0.496 MTCO_{2e}/MWh, which estimates the MTCO_{2e} but may not be precisely accurate to the local grid.

The calculations used to determine the metric tons of each emission use the conversion factors in Table B-1. The format for the equation used to calculate the final MTCO_{2e} is below. Only 7 months of 2017 and 5 months of 2018 data was available; no data was available for 2016 and 2019.

$$\text{MWh} \times \text{Grid emission factors} \times \text{unit conversion} = \text{MTCO}_2\text{e}$$

RMTD's facilities also use natural gas to provide heat. The data on natural gas production was provided in therms and reported by the utility on a monthly basis. Table B-12 describes the natural gas use in RMTD facilities.

The calculations used to determine the metric tons of each emission use the conversion factors in Table B-1. The format for the equation used to calculate the final MTCO_{2e} is below.

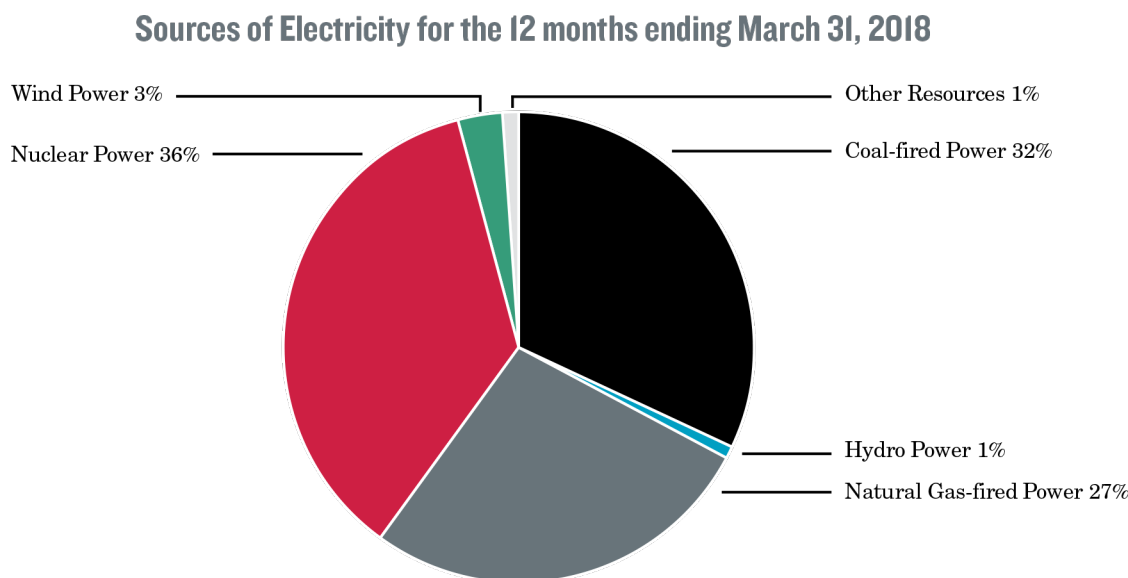
$$\text{Therms of natural gas} \times \text{Natural gas emission factors} \times \text{unit conversion} = \text{MTCO}_2\text{e}$$

Final emissions for natural gas, calculated with this equation, are shown in Table B-13. Values for CH₄ and N₂O that show up as 0.000 were less than 1 kg of pollutant. Values this low only impact the final MTCO₂e by <1 percent.

Table B-10. Summary Data Electricity Usage

Facility Location	2016 (MWh)	2017 (MWh)	2018 (MWh)	2019 (MWh)	2020 (MWh)
520 Mulberry	N/A			N/A	823.83
625 Mulberry	N/A	479.42	289.05	N/A	81.78
725 Lyford	N/A			N/A	247.74

Figure B-1. ComEd Fuel Mix, 2017/2018



Sources: ComEd via US Environmental Protection Agency.

Table B-11. Total Emissions Calculations: Electricity

Emissions	2016	2017	2018	2019	2020
MTCO ₂	N/A	232.19	139.99	N/A	558.57
MTCH ₄	N/A	0.02	0.01	N/A	0.05
MTN ₂ O	N/A	0.00	0.00	N/A	0.01
MTCO ₂ e	N/A	233.59	140.84	N/A	561.96

Table B-12. Summary Data Natural Gas Usage

Facility Location	2016 (Therms)	2017 (Therms)	2018 (Therms)	2019 (Therms)	2020 (Therms)
725 Lyford	10,107.26	10,665.18	11,705.27	12,463.79	11,254.76
520 Mulberry	67,583.62	77,784.48	78,435.80	80,232.72	74,931.72
625 Mulberry	7,995.66	9,261.55	17,931.34	14,675.96	17,152.28
Total	85,686.54	97,711.21	108,072.41	107,372.47	103,338.76

Table B-13. Total Emissions Calculations: Natural Gas

Emissions	2016	2017	2018	2019	2020
MTCO ₂	454.65	518.46	573.43	569.72	548.32
MTCH ₄	0.01	0.01	0.11	0.01	0.01
MTN ₂ O	0.00	0.00	0.00	0.00	0.00
MTCO ₂ e	454.92	518.76	573.76	570.05	548.63

Solid Waste

Solid waste data was provided in volume of waste landfilled (cubic yards). Considering RMTD's waste totals have not changed in the past ten years, 2020 data provided was used to reflect all totals from 2016 onwards. Utilizing the EPA's 2016 Volume-to-Weight Conversion Factors, the decision was made to classify RMTD's waste as 'Commercial, Uncompacted, All Waste,' using the calculation of one cubic foot of waste being equal to 138 pounds (lbs.).^{viii}

Building off of this initial calculation of one cubic foot of waste equal to 138 pounds, RMTD's yearly total of 780 cubic yards of waste was then converted into tons, leading to a total of 53.82 tons. In order to convert this total into MTCO₂e, Table 2-12 (Composition of Landfilled Urban ICI (Industrial, Commercial & Institutional) MSW) from the 2015 Update of the Illinois Commodity/Waste Characterization and Generation Study was used estimate RMTD's waste characterization breakdown.^{ix} Utilizing Version 15 of the EPA's Waste Reduction Model (WARM), RMTD's tonnage was broken down and categorized with a list of conversion factors to apply to the characterized waste.^x Table B-14 lists the total of these conversions into MTCO₂e.

The calculations used to determine the metric tons of each emission use the conversion factors in Table B-1. The format for the equation used to calculate the final MTCO₂e is below.

$$\text{Tons of Waste} \times \text{Waste emission factors} \times \text{Unit conversion} = \text{MTCO}_2\text{e}$$

Table B-14. Total Emissions Calculations: Solid Waste

Emission	2016	2017	2018	2019	2020
MTCO ₂ e	5.02	5.02	5.02	5.02	5.02

Refrigerants

Refrigerant data was provided in weight (pounds) and split between two types of refrigerants: R22 & R134A. Knowing only the amount of refrigerant purchased and used throughout 2016-2020 with no specific dates as to when transport refrigeration or commercial A/C units were recharged on RMTD's buses and facilities, the simplified material balance method from the EPA's Greenhouse Gas Inventory Guidance: Fugitive Emissions sheet was used.^{xi} The total amount of refrigerants used were then split evenly over the past five years, leading to emission totals remaining static over the past five years. The calculations used to determine the metric tons of carbon dioxide equivalent use of both R22 and R134A can be found below (with emission factors found in Table B-1).^{xii}

$$\text{Metric Tons of R22} \times \text{Global Warming Potential} = \text{MTCO}_2\text{e}$$

$$\text{Metric Tons of R134A} \times \text{Global Warming Potential} = \text{MTCO}_2\text{e}$$

Table B-15. Total Emissions Calculations: Refrigerants

Year	Type	MTCO ₂ e	Total
2016	R22	110.17	213.60
	R134A	103.43	
2017	R22	110.17	213.60
	R134A	103.43	
2018	R22	110.17	213.60
	R134A	103.43	
2019	R22	110.17	213.60
	R134A	103.43	
2020	R22	110.17	213.60
	R134A	103.43	

Water

Water data was provided from RMTD facilities in units and converted to gallons (1 unit = 100 cubic yards = 748 gallons). In order to convert water consumption into MTCO₂e, LA Metro's methodology was referenced, which indicated finding an emission factor to estimate the electricity embedded in RMTD's water consumption. This emission factor was found from the Illinois Section American Water Works Association's (ISAWWA) Water-Energy Nexus Survey Summary Report, which possessed energy intensity data of water production from water utilities throughout the State of Illinois. With the City of Rockford being the main designated water utility, the medium size was chosen leading to a factor of 1560 kWh per million gallons (kWh/MG).^{xiii} Once this conversion was applied, the same process used to find electricity emissions occurred, resulting in water emissions data (Table B-16). The calculations used to determine the metric tons of carbon dioxide equivalent of water consumption can be found below (emission factors found in Table B-1).^{xiv}

$$\text{Million Gallons of Water} \times \text{Water emission factors} \times \text{mWh} \times \text{Grid conversion factors} \times \text{Unit conversion} = \text{MTCO}_2\text{e}$$

Final emissions for water, calculated with this equation, are shown in Table B-16. Values for CH₄ and N₂O that show up as 0.000 were less than 1 kg of pollutant. Values this low only impact the final MTCO₂e by <1 percent.

Table B-16. Total Emissions Calculations: Water

Emissions	2016	2017	2018	2019	2020
MTCO ₂	0.69	1.06	1.11	1.28	1.19
MTCH ₄	0.00	0.00	0.00	0.00	0.00
MTN ₂ O	0.00	0.00	0.00	0.00	0.00
MTCO ₂ e	0.69	1.06	1.12	1.29	1.20

Appendix C:

Strategy Selection Criteria Methodology

The following section describes the methodologies and sources used to develop the final climate action strategies identified in Chapter 7. This methodology is broken down into three sections: Section one details the process of collecting potential action strategies from climate action plans across the United States; section two highlights the criterion used to score action strategies and the scoring system implemented; and section three explains the process of filtering and determining the final action strategies to be listed.

Collecting Potential Strategies

In order to find relevant action strategies for this Plan, it was important to use the results of the RMTD Greenhouse Gas Emissions Inventory as the data-focused context. More than 61 strategies were collected after reviewing nine other Climate Action Plans, featuring mostly plans from transit agencies across the United States. Utilizing these strategies from other cities allowed for the analysis of key themes across transit agencies and the development of more nuanced strategies that address RMTD's challenges.

Strategy Selection Criteria

After collecting all potential strategies, a strategy selection criteria matrix was formed to guide the scoring of these strategies. Table C-1 highlights the criterion chosen. The criteria are broken down into six themes: GHG Emissions Reductions Benefit, Technical Feasibility, Adaptation & Resilience, Co-Benefits, Equity, and Customer Satisfaction. Each theme is accompanied with a separate set of considerations or indicators, along with a set of questions listed to guide the review of potential action strategies.

Utilizing this criterion, potential strategies were then rated based on a high/medium/low scoring scale. Themes considered to a high rating received one point, a medium rating received a half point, and a low rating received zero points. Once a potential action strategy was reviewed, the final score would be tallied, with six being the highest possible score. Table C-2 displays the scoring system below.

Filtering Process

Once the climate action strategy selection criteria and scoring system were formed, all of the identified action strategies underwent a filtering process. Each action strategy was filtered using academic research or staff expertise. Any action strategy with a score of 2.5 or higher was then filtered into the next stage where more research was done, with a greater emphasis on the implementation process. As a result, 32 strategies were chosen and included in the final RMTD Climate Action Strategy list in Chapter 7. Table C-3 lists these strategies.

Table C-1. Climate Action Strategy Selection Criteria

Criteria	Considerations	Questions to Ask
<i>Primary</i>		
GHG Emissions Reductions Benefit	GHG per vehicle mile	Could this strategy lead to emissions reductions?
	Passenger miles reduced	Will passenger miles traveled be reduced?
Technical Feasibility	Technology barriers	What are potential implementation barriers?
	Technology readiness	Are there any technological limitations?
	Ease of implementation	Is the technology easy to implement?
Adaptation & Resilience	Climate resilience	Does this strategy build resilience in existing systems?
	Climate adaptation	Does this strategy help with adaptation for future climate impacts?
<i>Secondary</i>		
Co-Benefits	Cost savings	Are there potential cost savings?
	Reduced energy demand	Any potential reductions in energy demand?
	Public relations	Will this positively affect RMTD's image?
	Travel choices	Will more residents switch to public transit as a result of this strategy?
Equity	Accessibility	Does this improve access to transit in vulnerable and/or low-income areas?
Customer Satisfaction	Passenger comfort (climate-based)	Will passenger comfort be improved?
	Passenger safety and security	Will passenger safety and security increase?

Table C-2. Strategy Scoring Ratings

Score	Rating	Range
1	High Benefits	4.5-6
0.5	Medium	2.5-4
0	Low Benefits	0-2

Table C-2. Strategy Scores

1. Fleet		2. Energy		3. Water		4. Solid Waste		5. Equity	
Strategy	Score	Strategy	Score	Strategy	Score	Strategy	Score	Strategy	Score
1.1A: Replace all Fixed Route, Paratransit, and Contracted Buses with Battery Electric Buses (BEB).	4.5	2.1A: Install on-site energy storage systems where feasible.	3.5	3.1A: Install non-potable recycled water and water-saving systems in RMTD facilities.	2.5	4.1A: Increase accessibility to recycling infrastructure at transfer centers and on buses and encourage riders to use.	2.5	5.1A: Partner with local government and non-profit organizations to plant trees at existing facilities and bus stops in vulnerable areas.	5
1.1B: Replace all Non-Revenue vehicles with Battery Electric vehicles.	3	2.1B: Establish minimum energy performance targets for new construction and major renovations.	3.5	3.1B: Install new designs or retrofits of low-water sanitary fixtures that require less water and energy.	2.5	4.1B: Partner with local organizations to install and manage composting bins in facilities.	2.5	5.1B: Collaborate with municipalities to enhance resilience of vulnerable transit stops and routes.	5
1.1C: Reduce vehicle idling and improve route efficiencies.	3.5	2.1C: Replace existing HVAC with electric systems.	2.5	3.1C: Ensure hot water pipes are properly insulated.	2.5	4.1C: Explore partnerships with local artists or businesses to repurpose used materials from facilities.	2.5	5.1C: Integrate equity & climate resilience into current and future project planning and design.	3.5
1.1D: Regularly update plans and procedures for managing disruptions caused by weather-related events.	3.5	2.1D: Replace all building lighting fixtures with LED lights.	4	3.2A: Increase use of vegetation in and around RMTD spaces.	4.5	4.2A: Implement waste characterization data tracking and set more specific waste reduction metrics.	2.5	5.1D: Improve communication with riders to spread awareness of disruptions and changes to service in extreme weather events.	4.5
1.1E: Create and maintain a structured emissions data collection system for future Climate Action Plans.	3.5	2.2A: Partner with electricity provider to ensure all electricity procurement in RMTD facilities are from 100% renewable energy sources.	3.5	3.2B: Install green or living roofs above bus shelters.	3.5	4.2B: Establish green procurement strategies for facilities and new construction.	3	5.1E: Work with local municipalities to increase public access to drinking water when waiting for buses.	2.5
1.1F: Ensure adequate fuel storage before an extreme climate event occurs.	2.5	2.2B: Install on-site energy generation where feasible for both fleet charging and facility consumption.	3.5	3.2C: Partner with the City of Rockford to pilot a permeable pavement project at main transfer station.	2.5	4.2C: Research and transition to paperless office best practices.	2.5		
1.1G: Enhance communication and monitoring systems to respond quickly to climate risks.	4.5	2.2C: Install EV charging infrastructure using renewable energy for employer commuter use.	3						
1.1I: Enhance internal awareness on climate change impacts and adaptation.	3	2.2D: Establish a clean energy fund to invest in energy efficiency and renewable energy projects.	3						

Appendix D:

Connection to Regional Plans & Studies

The following appendix provides a list of completed planning documents that relate to the RMTD Climate Action Plan. Planning documents in development by partner agencies will be reviewed and included in future RMTD climate action planning.

Statewide Plans & Studies

The Nature Conservancy

An Assessment of the Impacts of Climate Change in Illinois

The Climate Assessment for Illinois was created to illustrate the climate impacts in Illinois with various data and explanations of how climate impacts water resources, agriculture, public health, and nature in the state. This report explains how climate change is likely to influence local and regional climate patterns.

Connections to the RMTD CAP: This plan was used to describe the climate in the region as well as future projections and their potential impacts.

ICLEI Greenhouse Gas Protocol

Global Protocol for Community Scale Greenhouse Gas Emissions

The Global Protocol is an internationally used plan that outlines the best practices for determining what to include in an emissions inventory. ICLEI has several other resources used in parallel to this document, including data request templates and calculation spreadsheets.

Connections to the RMTD CAP: This plan was used to determine which emissions would be highlighted, baseline calculations, and geography.

Illinois Environmental Council (IEC) 2021 IEC Legislative Report

IEC progresses environmental laws and policies at all levels of government to influence decision makers and ensure clean air, clean water and healthy communities. This report discusses legislation that has passed in regards to the environment in Illinois.

Connections to the RMTD CAP: Clean energy and transportation legislation may have an impact on the implementation and priorities of this plan.

State of Illinois

Climate and Equitable Jobs Act

This regulation works to combat climate change by creating jobs, improving health, and supporting disadvantaged communities. Some of the goals of this act are as follows: (1) Require Illinois to achieve a 100% zero-emissions power sector by 2045, prioritizing environmental justice communities for the fastest pollution reductions; (2) Invest \$580 million a year (more than double current funding) to generate 40% of Illinois' energy from wind and solar by 2030 and 50% by 2040 (compared to less than 10% today, and a target of 25% under current law); (3) Extend cost-saving energy efficiency programs to save residents money on their electric bills; (4) create a planning processes for beneficial electrification, and providing rebates for electric vehicles and electric vehicle charging infrastructure; (5) Move towards cleaner buildings by creating a statewide stretch building code; and (6) Prepare the grid for electric vehicles and clean, efficient all-electric buildings.

Connections to the RMTD CAP: As RMTD works towards net-zero emissions, it will align with the Climate and Equitable Jobs Act rules and regulations.

Regional Plans & Studies

Metropolitan Planning Organization

2050 Metropolitan Transportation Plan (MTP)

Planning for transportation needs is essential to ensuring the Rockford Region has a balanced multi-modal transportation system that safely and efficiently moves people and goods. This plan addresses the transportation system in the Rockford Metropolitan Planning Area (MPA), consisting of the urbanized portions of Boone, Ogle, and Winnebago Counties, providing an innovative and sustainable framework for the region's transportation network over the next twenty to thirty years.

Connections to the RMTD CAP: The 2050 MTP informs the Plan because RMTD is the public transportation entity in the area and therefore under its purview.

Bicycle & Pedestrian Plan for the Rockford Metropolitan Area (2017)

The purpose of the Bicycle and Pedestrian Plan is to promote a safe and efficient transportation network for people that provides a balanced multi-modal system minimizing costs and impacts to the taxpayer, society and the environment. The plan addresses the development of a region-wide system of on-street bicycle and pedestrian facilities to connect with existing shared use path facilities, existing and planned public transportation services and provide model development regulations and ordinances to promote and encourage bicycle- and pedestrian-friendly growth in the Rockford Metropolitan Planning Area (MPA).

Connections to the RMTD CAP: The RMTD Climate Action Plan addresses planning and policy considerations for public transportation with an emphasis on creating a safe environment for the community by reducing air pollution and creating a climate resilient transit network. Having a climate-resilient public transportation system will connect people using other modes of transportation such as bicycle and pedestrian pathways.

Greenways: A Green Infrastructure Plan for Boone and Winnebago Counties (2016)

The Greenways Plan promotes a regional greenway network that protects natural and cultural resources; provides alternative forms of transportation and recreational benefits; enhances environmental and scenic qualities; and stimulates economic development. The Greenways Plan lays the foundation for natural areas protection, balanced growth, and expanded transportation choices.

Connections to the RMTD CAP: RMTD's Climate Action Plan focuses on creating a resilient transportation system and fulfilling sustainability initiatives. The Greenways Plan discusses pedestrian pathways that could be connected to public transit routes. Both plans can inform one another as implementation efforts occur.

Metropolitan Mayors Caucus Climate Action Plan for the Chicago Region

The Climate Action Plan for Chicago Metropolitan Region recognizes the threats of a changing climate and identifies goals and objectives to equitably build the region's climate resilience through municipal leadership.

Connections to the RMTD CAP: The Climate Action Plan for the Chicago Region identified common objectives for regional stakeholders to consider, though strategies are scaled for municipal action. While RMTD does not fall in the boundaries of this plan, it was used as a guiding framework when identifying implementation strategies.

Economic Development District Comprehensive Economic Development Strategy (CEDS)

Throughout this document, strategies and action items center on collaboration within the region and fostering efficient business development, expansion, diversification, job growth, and entrepreneurial enterprises across the region. The goal of the CEDS plan is to make the Northern Illinois Region a world-class, prosperous region with a resilient economic base and a superior quality of life that outperforms peer regions in job growth, capital investment, and innovation.

Connections to the RMTD CAP: The Climate Action Plan also focuses on increasing the quality of life for the community by improving air quality and investing in electric charging infrastructure.

Local Plans & Studies

Boone County

Boone County Comprehensive Plan 2029

The Boone County Comprehensive Plan establishes a community vision for the future and serves as a guide for development in Boone County over the next ten years. It was created through collaboration with county staff, elected officials, municipalities, and the general public.

Connections to the RMTD CAP: Environmental sustainability is one of the eight themes in the Boone County Comprehensive Plan. Environmental sustainability focuses on conserving land, water, air, and energy resources. RMTD has fleet, energy, water, and waste goals that should consider Boone County's plan. Having RMTD work towards a zero-emissions fleet could be a strategy for reaching Boone County's Environmental Sustainability goal.

Boone County Hazard Mitigation Plan

The Boone County Multi-Hazard Mitigation Plan reviews the possible impacts of specific hazards to the county, as well as changes in land-use, population, and demographics. The plan incorporates detailed analyses and mitigation strategies.

Connections to the RMTD CAP: The Climate Action Plan for RMTD utilized some of the background information to illustrate which hazards are most likely to impact current and future transit routes in Boone County.

Winnebago County

Winnebago County 2030 Land Resource Management Plan

The 2030 Land Resources Management Plan ensures that change in the county occurs pursuant to the consensus of area stakeholders, such as civic and business leaders, various interest groups, citizens, and the County's municipalities and townships. The plan looks to accommodate an increased population with proportional economic development, preserve and enhance both the urban and rural characters of the County, and minimize the impact of future development on natural resources, agriculture, and the environment.

Connections to the RMTD CAP: Several of the goals of this plan align with the goals of the Climate Action Plan, such as focusing on balanced growth that preserves the quality of life within the community and implementing strategies that minimize air and water pollution. These goals should be integrated into RMTD's Climate Action Plan.

Winnebago County Multi-Hazard Mitigation Plan

The Winnebago County Multi-Hazard Mitigation Plan (MHMP) represents the integration of a community profile, hazard profile, mitigation strategies, and a Risk Priority Analysis profile into one plan. The MHMP is a stakeholder-driven document that a state, tribal, or local government can use to describe risks and vulnerabilities as well as long-term strategies and implementation approaches for reducing loss of life and property from natural disasters.

Connections to the RMTD CAP: The Climate Action Plan can be used in conjunction with the Multi-Hazard Mitigation Plan to provide examples of historical hazards impacting Winnebago County.

City of Rockford

City of Rockford Comprehensive Plan 2020

The comprehensive plan has been adopted and revised since the 1980s and provides guidelines for the management of land use, transportation, community facilities and services, telecommunications, housing, economic development, neighborhoods, natural resources, historic preservation, community design, public participation, and monitoring implementation. The comprehensive plan guides the development of the community and decisions about infrastructure, priorities, transportation, energy resources, and the economy.

Connections to the RMTD CAP: The comprehensive plan provides guidance on energy allocation and transportation initiatives, which was used in background research of the Plan.

City of Rockford Stormwater Master Plan

The purpose of the Stormwater Master Plan is to develop a comprehensive planning approach to manage storm water quality and quantity throughout Rockford. It helps mitigate potential damage to property and infrastructure that may occur in the future.

Connections to the RMTD CAP: Stormwater can become an issue for those using public transportation. As flooding directly impacts the public transportation system, this plan could benefit from reviewing the stormwater plan and inform future updates to the stormwater master plan.

Downtown Rockford Strategic Action Plan

The overarching goals of this plan are to create a strategic vision to guide policy for the revitalization of Rockford's downtown and align land use, transportation, and urban design implementation strategies so the entire city can benefit from increased growth and development.

Connections to the RMTD CAP: Downtown growth and development will involve transportation and climate resilience. The plan was further reference when developing the strategies for the Climate Action Plan.

Appendix E:

Public & Employee Surveys

Survey Overview

Climate change has the potential to cause unprecedented shifts in precipitation patterns, storms, strong wind, and extreme heat events. Regardless of climate mitigation measures, such events will occur and pose a threat to human health, infrastructure, and the environment. Many transit agencies, such as Rockford Mass Transit District (RMTD), have adopted sustainable initiatives to reduce emissions from fleets, but transit operations will continue to be impacted by the changing climate. Transit dependent populations including the elderly, disabled, low-income individuals, and zero vehicle households are especially vulnerable. Research and planning of resilience and adaptation practices remains important in helping these populations. Public outreach is crucial to address equity by understanding gaps that are present in the transit system that can be improved through implementation practices. To identify the opinions and concerns of RMTD riders and staff, two different surveys were drafted and made available. The first was a rider survey that was intended for those who utilize RMTD services, and the second was intended for those who are employed by RMTD.

Methodology

Survey content and distribution varied between the rider and RMTD staff surveys. Both were made available to take from December 3rd, 2021 to January 6th, 2022.

RMTD Rider Survey

The rider survey was available to those who utilize RMTD public transit. The goal of this survey was to determine how dependent respondents are on public transit, what they would do if it was no longer available, and how their mode of transportation may be impacted by climate change.

Surveys were distributed in both paper and virtual formats. Paper surveys were provided on select RMTD buses and a QR code to access the virtual surveys were available on select buses and at the transfer centers. At the end of the survey period, there were 45 complete and five partially complete surveys submitted by riders.

RMTD Staff Survey

The RMTD staff survey was available to anyone who is employed by RMTD. The goal of this survey was to identify gaps in the transit system as well as any resiliency initiatives that are currently in place.

Surveys were distributed virtually, either by scanning a QR code, or forwarded through email. A small number of paper surveys were accepted as well. By the end of the survey period, there were 17

complete and 17 partially complete surveys submitted by staff.

Survey Limitations

Survey data is not representative of RMTD transit users and staff as a whole, merely a small proportion of these populations who elected to complete it. It is especially important to note that only two RMTD operators completed the operator-only section, indicating that the views expressed for those questions are only representative of two individuals.

Some questions accept multiple respondent answers, so as a result these questions contain values over 100 percent. In such cases, the percentages indicate answer frequency rather than proportions.

Due to the organization of the survey, certain questions were only available to answer based on the results of previous questions. For example, respondents were only asked about the frequency of weather caused transit delays if they indicated that they had experienced them.

Key Findings

The key findings identified from the analysis of the rider and staff surveys are provided below.

- A majority (74 percent) of respondents of the rider survey reported having no access to a car or other personal vehicle.
- Over half of riders (55 percent) stated that they utilize public transit five or more days a week.
- There are mixed levels of concern regarding the potential impacts of climate change in the Rockford Region, with 31 percent of riders claiming that they were extremely concerned and 27 percent of riders claiming they were not concerned at all.
- Snow, rain, extreme heat, thunderstorms, and flooding events were likely to increase ridership in half of individuals.
- The most common suggestions for RMTD provided by riders were improved bus stop infrastructure and increased routes and times. A route option to include the AMC Movie Theater in Rockford was recommended by 20 percent of respondents.
- Over half (53 percent) of riders claimed to have an average household income of \$20,000 or less.
- Infrastructure and funding were found to be the biggest obstacles RMTD faces when implementing strategies.

Summary

Most of the respondents who participated in the rider survey did not have access to a car or other personal vehicle. A potential attributing factor could be issues with vehicle affordability, as more than half of respondents reported a total household income of \$20,000 or less. If public transit is no longer available, the three most frequently selected alternatives were walking, taking a taxi or other ride share app, and being driven by someone else. Walking is also the most common method for respondents to get to the bus stop and to their destination.

There are mixed levels of concern regarding the potential impacts of climate change in the Rockford Region, with 31 percent of riders claiming that they were extremely concerned and 27 percent claiming they were not concerned at all. Respondents were less concerned about climate change impacting their method of transportation than they were for overall impacts in the Rockford area. Overall, a majority reported having a moderate to extreme level of concern for climate caused transit impacts. This trend is similar to results from the RMTD staff survey.

As mentioned previously, extreme heat poses a substantial threat to human health. Fortunately, when asked about the temperature of buses during the summer, most respondents described the temperature as being adequate or cool. Only 13 percent of riders reported that buses were either hot or far too hot. Regarding the reliability of air conditioners on public buses, data showed that most riders and operators described the A/C systems as mostly to always operational.

Weather conditions have the potential to impact public transit ridership positively or negatively. Slightly more than half of respondents reported that the chances of them utilizing public transit increased as a result of the following weather conditions (listed from most to least likely): snow, rain, extreme heat, thunderstorms, and flooding. The margin between the frequency of answers was not exceptionally large, indicating that all of these conditions are potential factors that encourage ridership.

It was found that weather conditions were more likely to increase ridership rather than decreasing it. When asked, a majority reported that the aforementioned weather events would not change their public transit use. This is likely attributed to the lack of transportation alternatives, making public transit a necessity for some, especially during adverse weather events. Delays caused by adverse weather events were found to occur on a rare to moderate basis, as only 35 percent of rider respondents claimed that they have ever experienced them. Typically, it was reported to occur only a few times a year. This is corroborated by the two operators who both reported that weather caused delays occur a few times a year.

Answers from riders regarding the level of protection provided by bus stop infrastructure from the elements were split. Approximately 41 percent ranked bus stop infrastructure as providing great or good protection, 26 ranked it as moderate, and 33 percent ranked it as either having poor or no protection from the elements. The diversity of these answers is likely attributed to respondents utilizing different bus stops that have differing infrastructure. Of the two operators who answered this question,

both ranked bus stops overall as having poor protection from the elements.

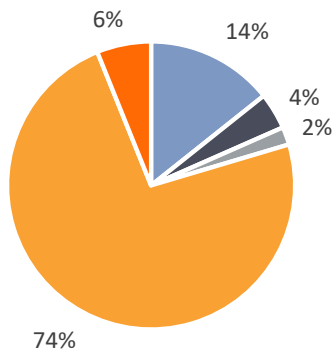
A commonly referenced suggestion from riders was to improve RMTD transit services was modifications to bus stop infrastructure. Transit riders would like to see bus stops that provide more protection from the elements while they are waiting for their bus. Other notable requests were the inclusion of more trash cans to reduce litter and more accessible sidewalks to accommodate those with disabilities. Riders also would like to see increased route options and times, especially at night. Addition of a bus stop near the local AMC movie theater in Rockford was highly requested, with almost one fifth of respondents requesting it.

Recommendations by RMTD staff to improve climate action areas mostly consisted of responses regarding lower GHG emissions by using electric and hybrid electric buses. Another common suggestion was reducing the amount of paper by utilizing more digital formats for administrative work. The biggest obstacles for RMTD faced when implementing current climate action strategies were infrastructure and funding.

Rider Survey Responses

Question 1. Do you have access to a car or other personal transportation vehicle that can be used for day-to-day trips (e.g., travel to work, run errands, etc.)?

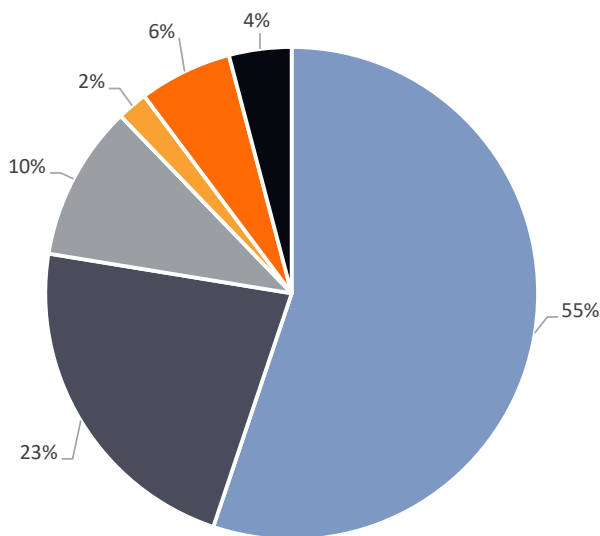
Responses = 49



- Yes, I currently own or rent a car.
- Yes, I have access to a car, but do not own or rent it myself.
- Yes, I have access to another mode of personal transportation, such as a bicycle
- No, I do not have access to a car or other personal vehicle.
- Prefer not to answer

Question 2. How many days a week do you use public transit?

Responses = 49

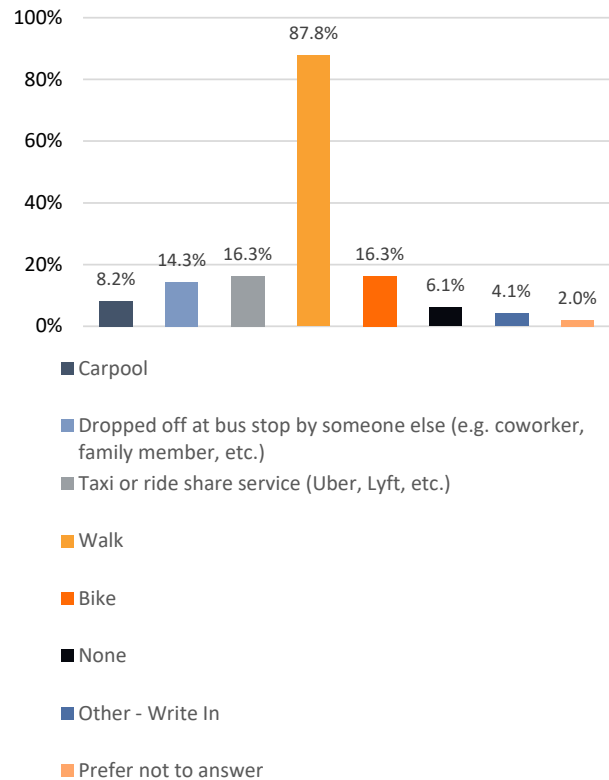


- 5 or more days
- 3-4 days
- 1-2 days
- Rarely
- Never
- Prefer not to answer

Question 4. How do you get to your bus stop?

Multiple responses accepted.

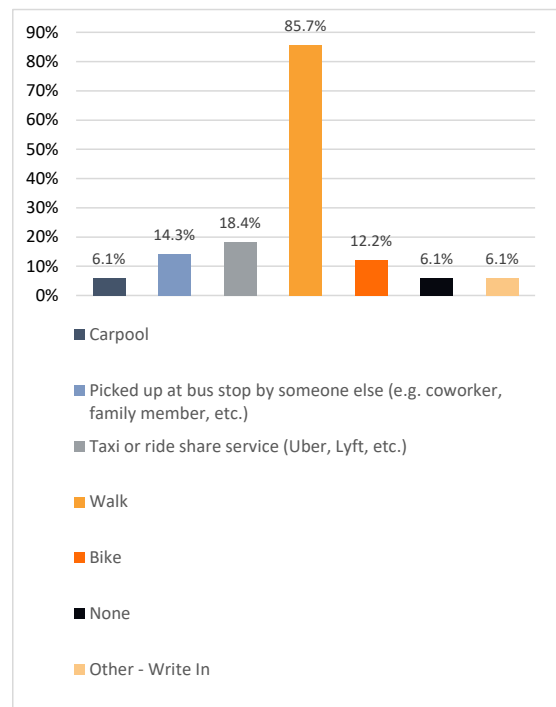
Total Responses = 49



Question 4. After your bus ride, how do you get to your final destination from the bus stop?

Multiple responses accepted.

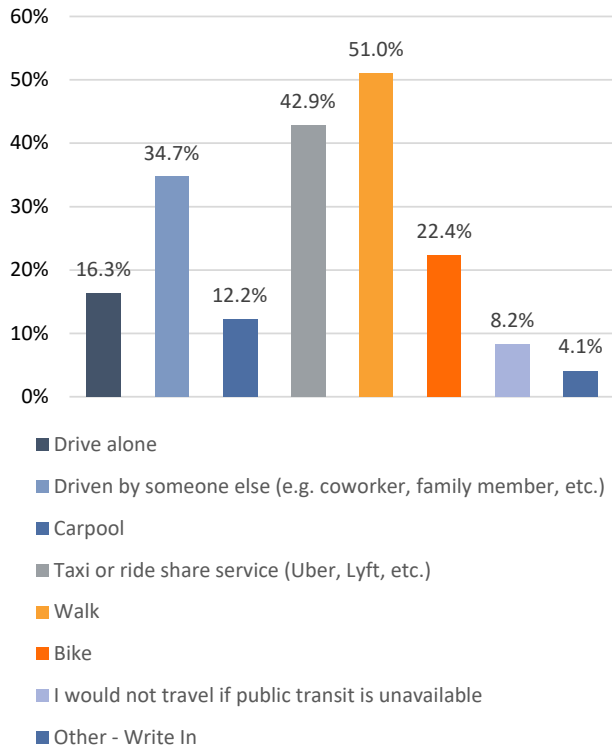
Total Responses = 49



Question 5. Which mode of transportation do you use if public transit is not available?

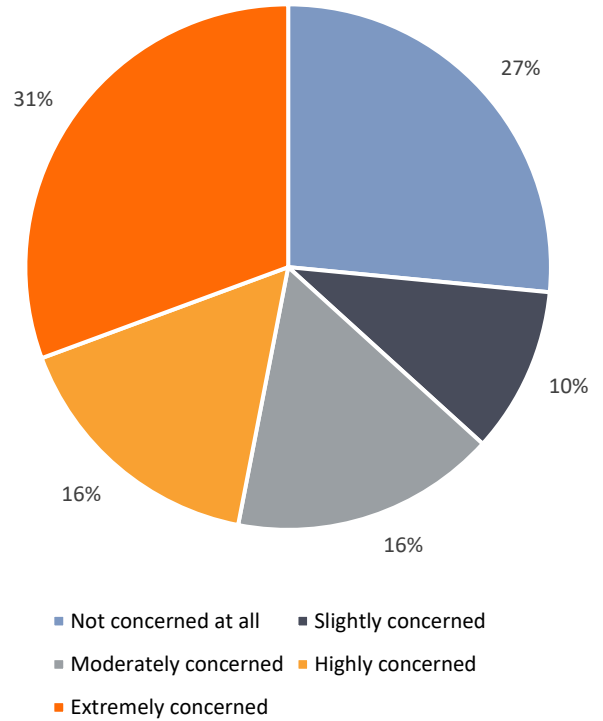
Multiple responses accepted.

Total Responses = 49



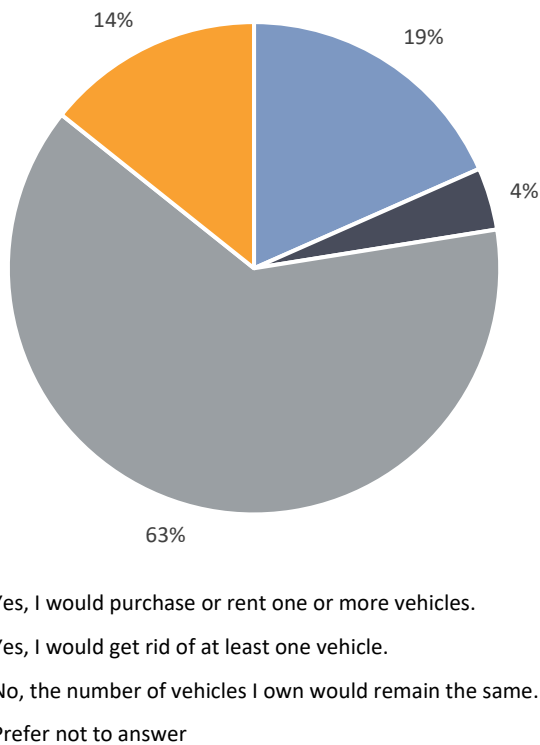
Question 7. How concerned are you about climate change affecting the Rockford area?

Total Responses = 49



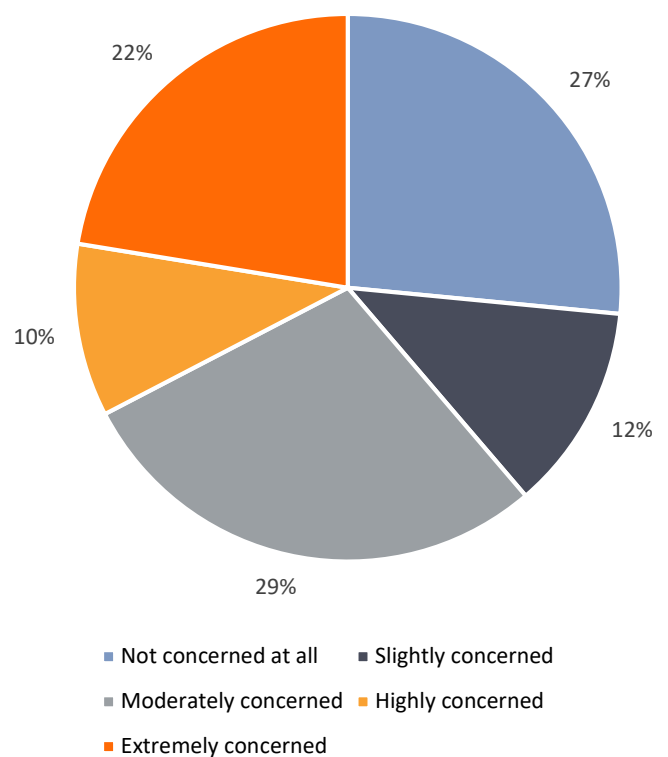
Question 6. If public transit was suddenly unavailable, would it impact the number of vehicles you have?

Total Responses = 49



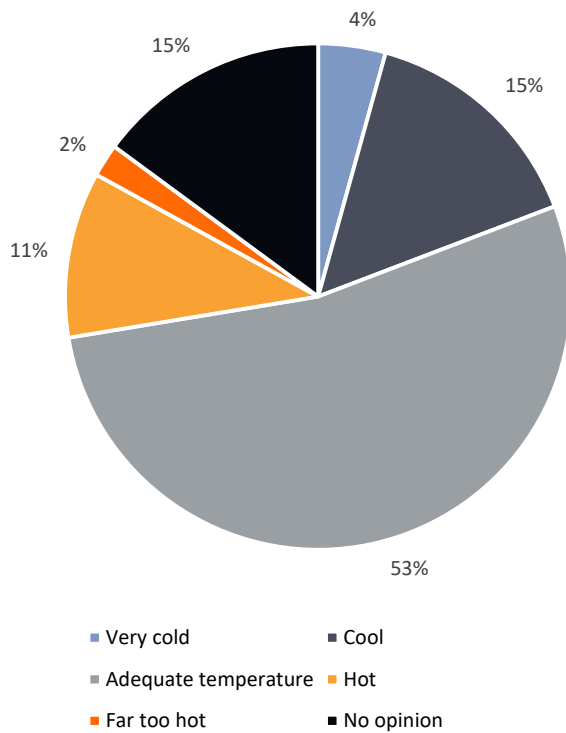
Question 8. How concerned are you that climate change may impact your method of transportation?

Total Responses = 49



Question 9. One of the impacts Rockford may face as a result of climate change is extreme heat. How would you describe the temperature on public buses during the summer?

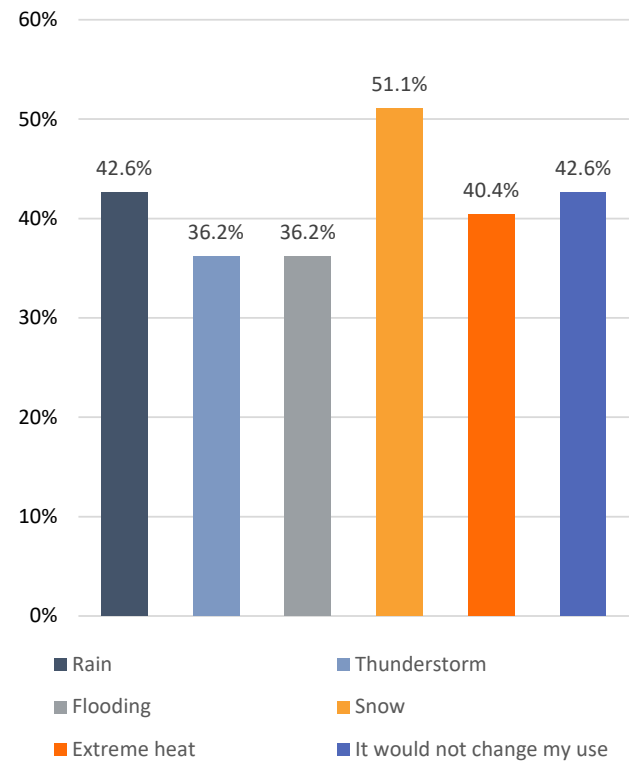
Total Responses = 47



Question 11. Which weather events would INCREASE your use of public transit?

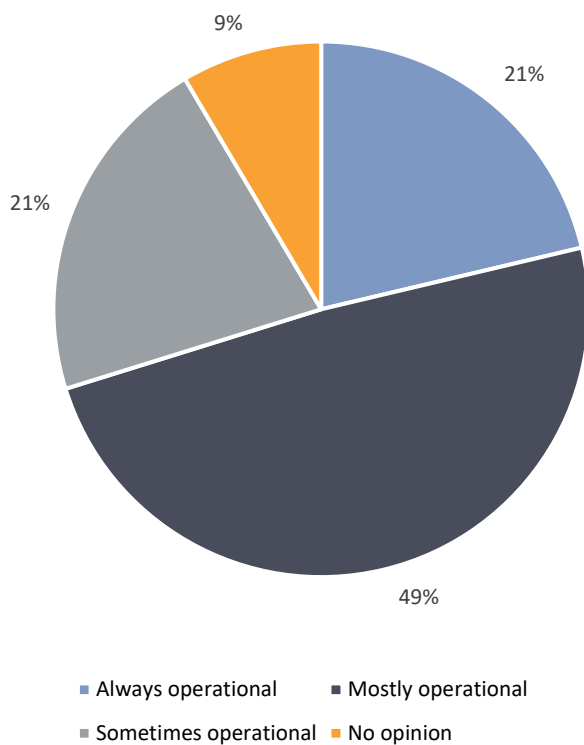
Multiple responses accepted.

Total Responses = 47



Question 10. How would you describe the reliability of air conditioners on the public buses you ride?

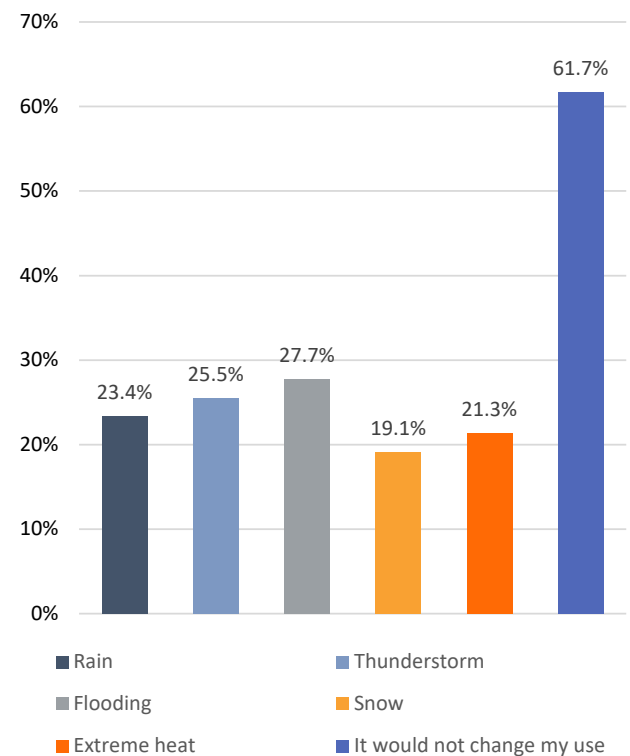
Total Responses = 47



Question 12. Which weather events would DECREASE your use of public transit?

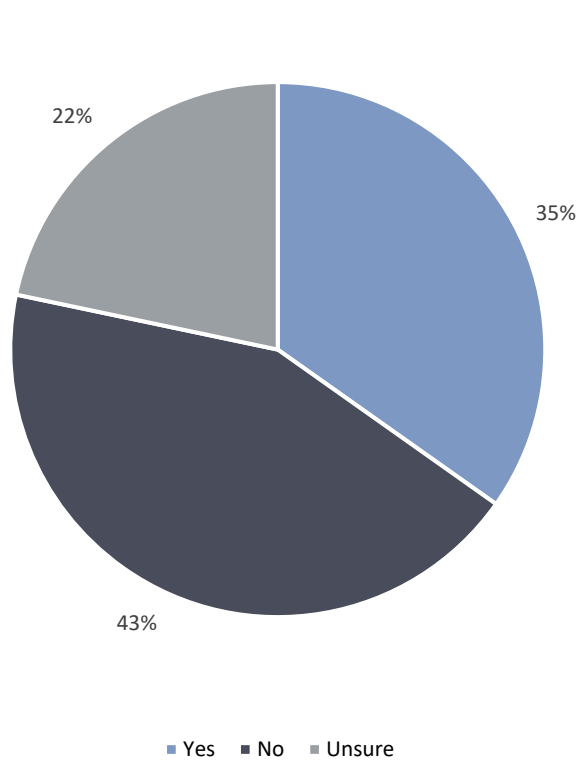
Multiple responses accepted.

Total Responses = 47



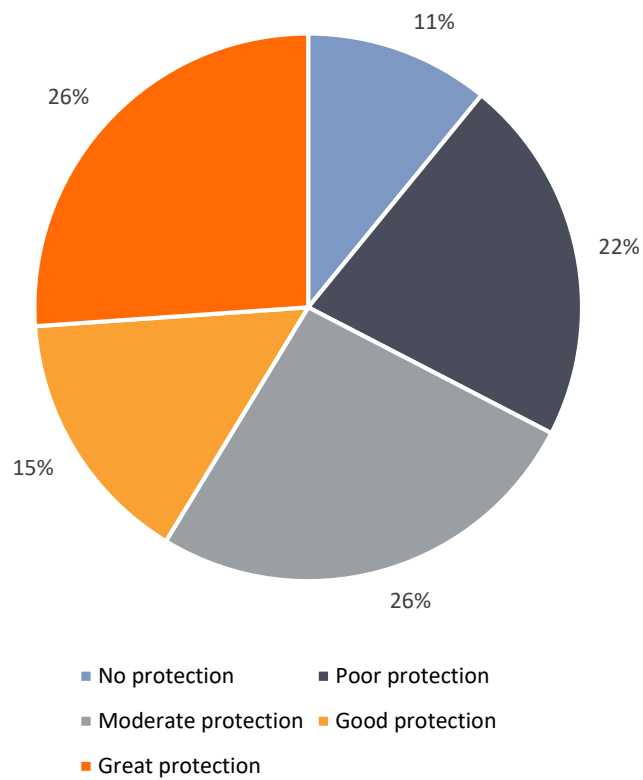
Question 13. Have you ever experienced delays in public transit due to heavy rain, thunderstorms, or strong winds?

Total Responses = 46



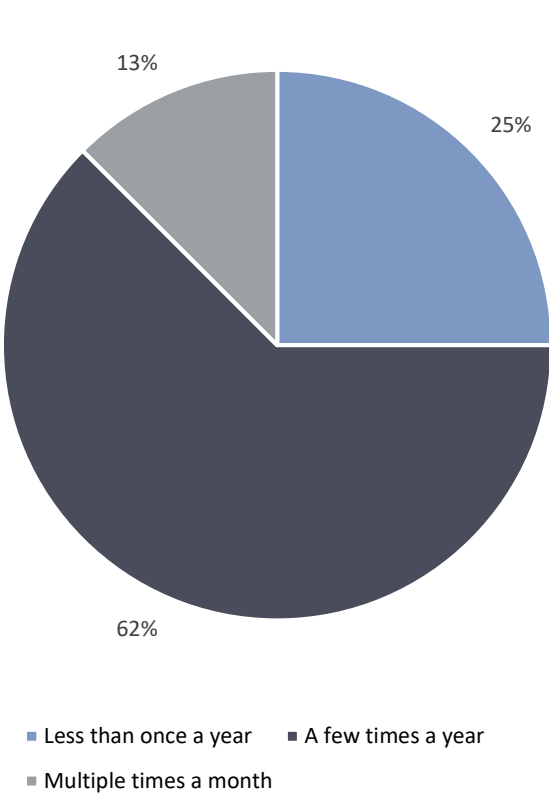
Question 15. How well would you rank the bus stop infrastructure in its ability to protect riders from the elements?

Total Responses = 46



Question 14. How frequent are these weather-caused delays?

Total Responses = 16



Question 16. Please provide any suggestions for how RMTD’s transportation services or climate resilience could be improved.

Total Responses = 27

Item	Responses
More protection from the elements at bus stops	5
More routes and times	4
Inclusion of a bus stop at Rockford's AMC movie theater	10
Increased accessibility	2
Fleet electrification	4
Other	2
Total	27

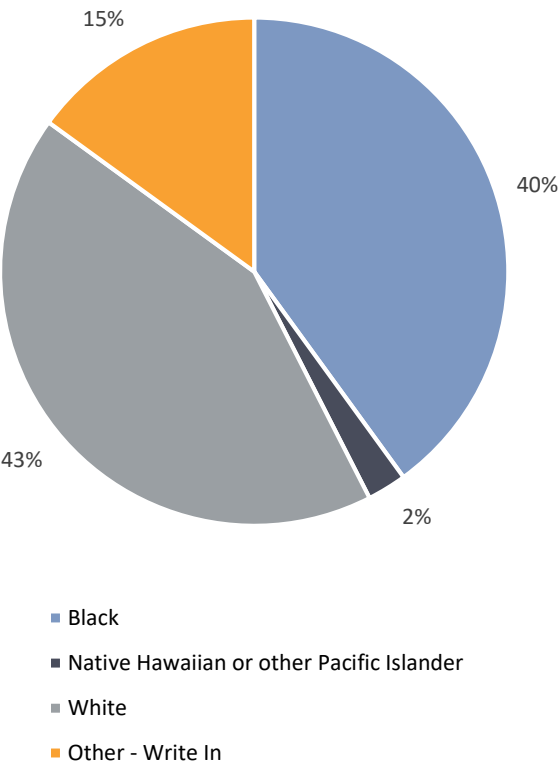
Question 17. What is your ZIP code?

Total Responses = 38

Zip Code	Responses
61065	1
61101	5
61104	10
61105	1
61103	8
61107	5
61102	2
61111	1
61108	2
61109	3
Total	38

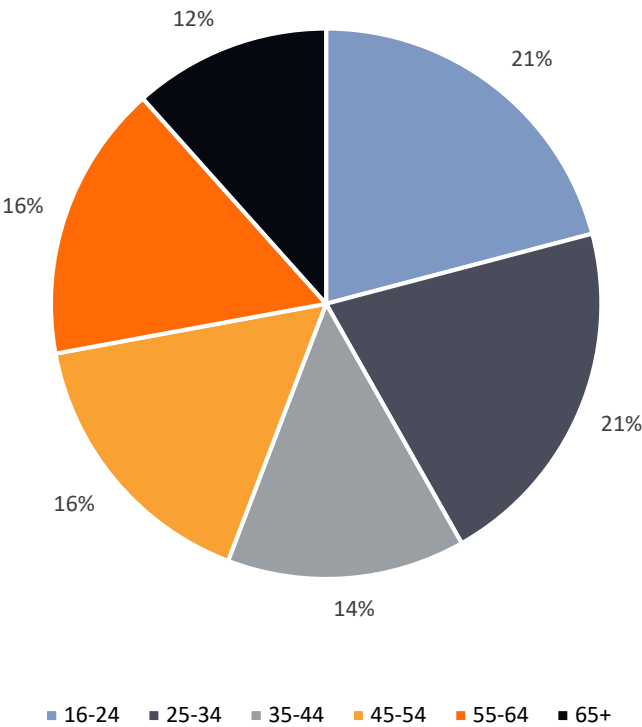
Question 19. How would you describe yourself?

Total Responses = 40



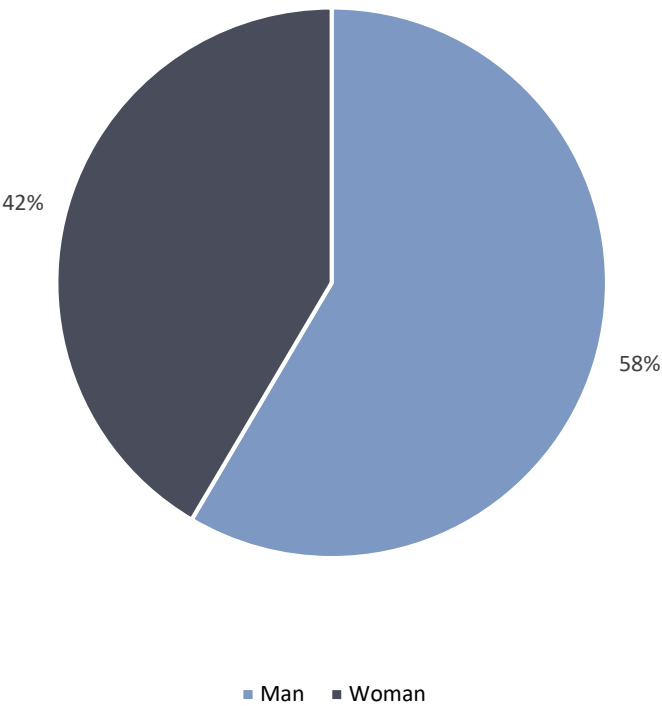
Question 18. What age range are you?

Total Responses = 41



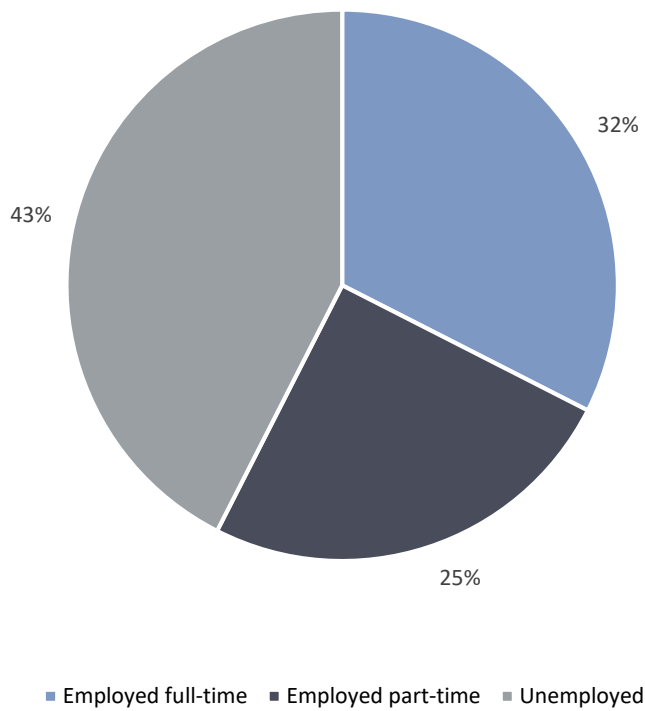
Question 20. Gender

Total Responses = 41



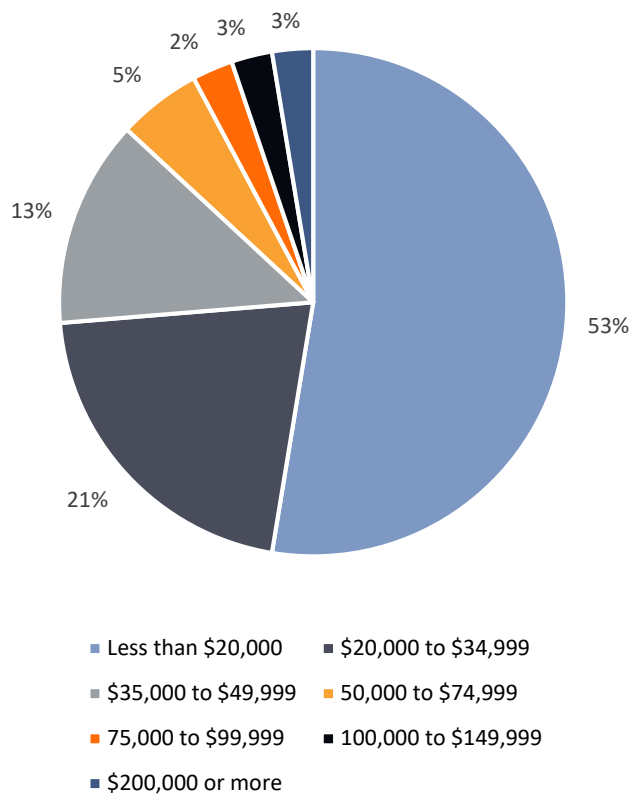
Question 21. What is your current employment status?

Total Responses = 40



Question 22. What is your total household income?

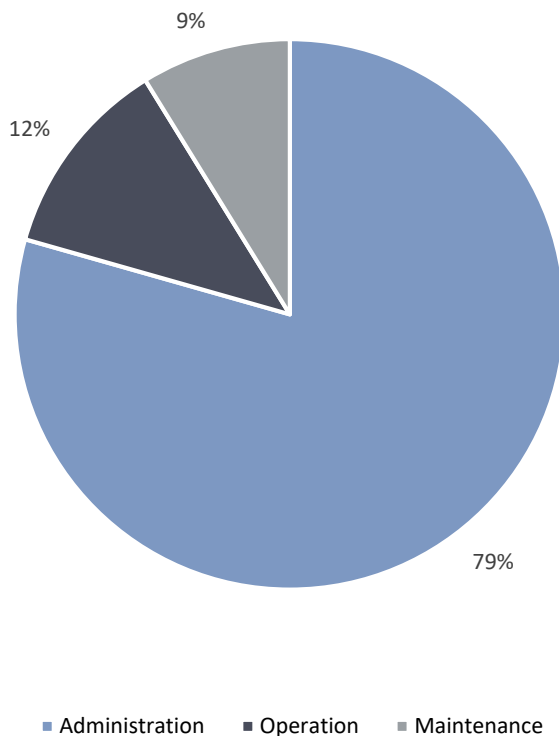
Total Responses = 38



RMTD Staff Survey Responses

Question 1. Please select your department.

Total Responses = 32



Question 2. What is your job position?

Total Responses = 32

Response	Count
Marketing	5
Operations Manager	2
Dispatch	3
Dispatch Supervisor	4
Fixed Route Supervisor	1
Bus driver	3
IT	4
Estc coordinator	1
Finance and Procurement Assistant	1
Director	1
HR Manager	1
Maintenance Assistant	3
Director of Operations	1
Maintenance Manager	1
Executive Assistant	1
Dispatch Coordinator	1
Human Resource/ Payroll Assistant	1

Question 3. If you are a fixed-route operator, please check the routes driven most often:

Answered by operators only.

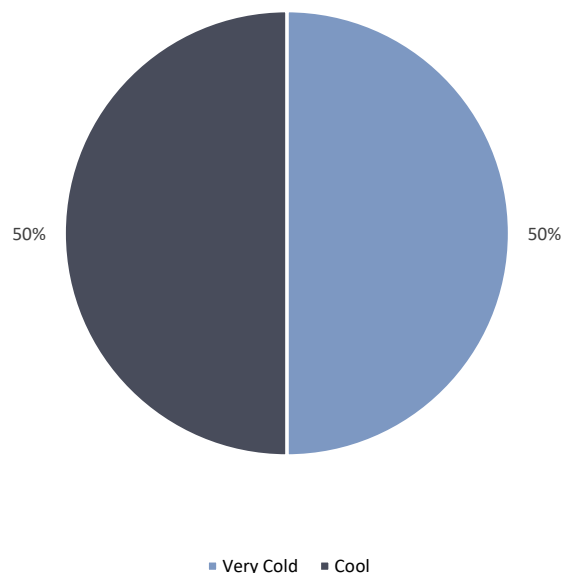
Total Responses = 2

Response	Count
4-North Main	1
6-Kilburn	1
11-East State	1

Question 4. One of the many vulnerabilities Rockford faces regarding climate change is extreme heat. How would you describe the temperature on RMTD buses during the summer?

Answered by operators only.

Total Responses = 2



Question 5. How would you describe the reliability of air conditioners on the RMTD buses you operate?

Answered by operators only.

Total Responses = 2

Value	Count
Mostly operational	2

Question 6. Have you ever experienced delays in operation due to heavy rain, thunderstorms, or strong winds?

Answered by operators only.

Total Responses = 2

Value	Count
Yes	2

Question 7. How frequent are these delays?

Answered by operators only.

Total Responses = 2

Value	Count
A few times a year	2

Question 8. How well would you rank the bus stop infrastructure in its ability to protect riders from the elements?

Answered by operators only.

Total Responses = 2

Value	Count
Poor protection	2

Question 9. Which of the following inclement weather conditions most impacts your job?

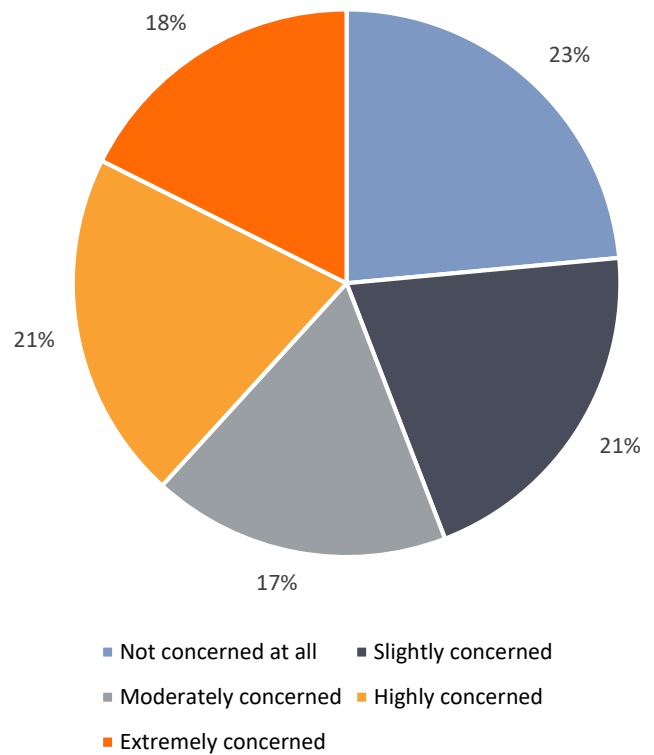
Answered by operators only.

Total Responses = 1

Value	Count
Snow	1

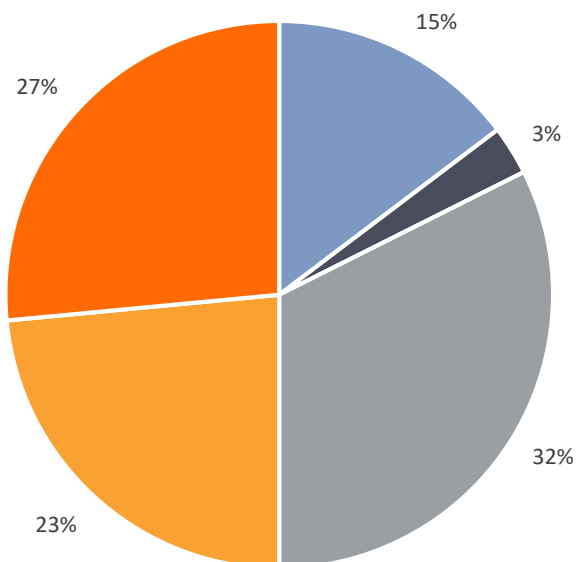
Question 11. How concerned are you about climate change impacting your job?

Total Responses = 32



Question 10. How concerned are you about climate change in general?

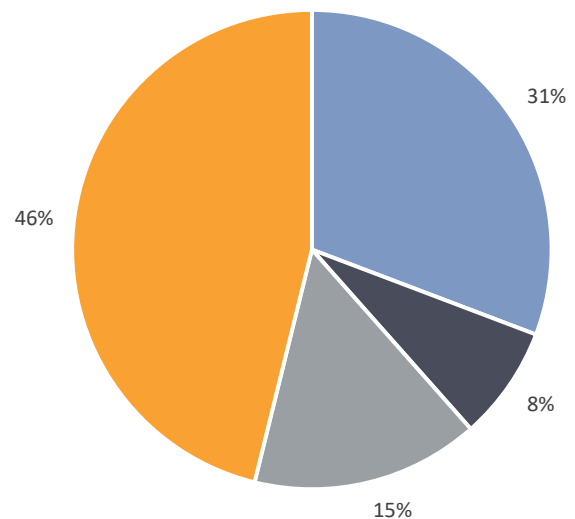
Total Responses = 32



- Not concerned at all
- Slightly concerned
- Moderately concerned
- Highly concerned
- Extremely concerned

Question 12. Are you or your department currently working on initiatives related to any of the following climate action areas?

Total Responses = 13



- Greenhouse gas (GHG) emissions
- Energy
- Solid Waste
- If yes, please explain - Write In

Question 13. How could your department improve its efforts in relation to any of the above climate action areas?

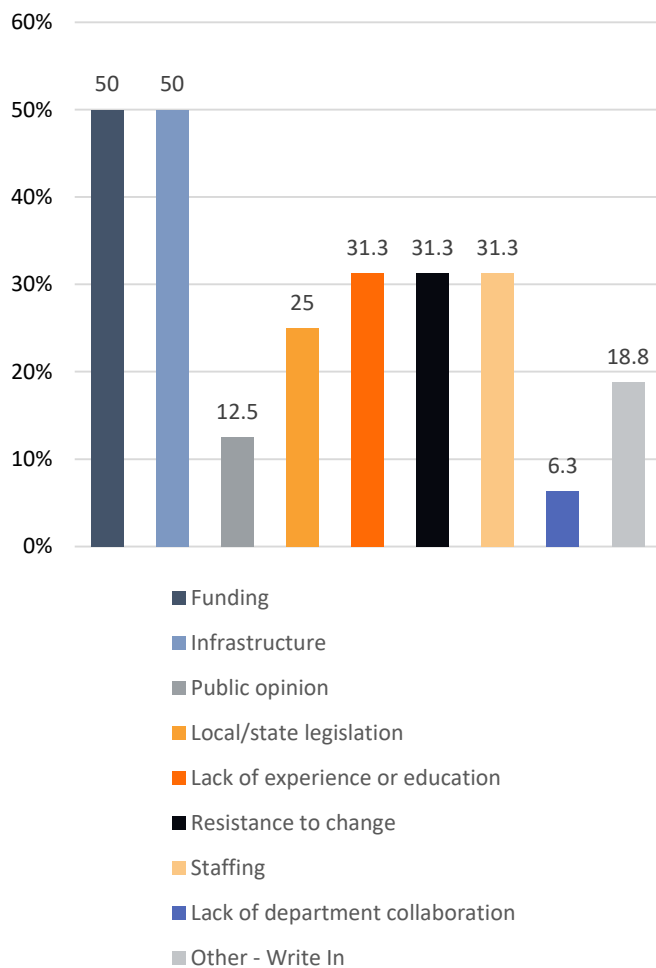
Total Responses = 13

Item	Responses
Solid waste/paper reduction	4
Fleet electrification	3
Energy	3
Other	4

Question 14. What are the biggest obstacles your department faces in implementing climate action strategies?

Multiple responses accepted.

Total Responses = 15



Question 15. Please provide any suggestions you may have for how RMTD's transportation services relating to climate resilience could be improved.

Total Responses = 12

Suggestions	Responses
Solar power	2
Funding/grants	2
Fleet electrification	2
Other	7

Appendix F:

Public Comments & Revisions

The draft version of the Climate Action Plan for Rockford Mass Transit District was distributed and made available on the RPC website on February 21, 2022. Public comment period for the MPO FY 2023 UWP was from February 21, 2022 until March 23, 2022.

Comments should be direct to:

Shelby Best
Sustainability & Environment Coordinator
Region 1 Planning Council
127 North Wyman Street, Suite 100
Rockford, IL 61101
Telephone: 815-319-4180
E-mail: sbest@r1planning.org

No comments have been received or revisions made as of March 23, 2022.

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Front Matter

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