SAU 70 Climate Action Plan

A District-Wide Climate Action Plan

January 2025

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ACKNOWLEDGEMENTS

This SAU 70 Climate Action Plan is the culmination of work that began during the 2017-2018 school year when students in Hanover High School's Earth Systems class, under the guidance of Jeannie Kornfeld, began writing the first climate action plan for a high school in the United States. Since then, the Earth Systems classes and students in Hanover High School's Environmental Club have continued updating the high school's CAP and worked toward implementing some of the greenhouse gas reduction measures included in the CAP. Development of the SAU 70 CAP began in the summer of 2021 and was completed in January of 2025. This work would not have been possible without the pro bono consulting, guidance, modeling expertise, and editing that was provided by Hannah Kornfeld, a 2010 HHS alumna who leads the climate action planning practice for an environmental consulting firm in California. Thank you to all the students who contributed to writing previous versions of the Hanover High School CAP as well as this SAU 70 CAP. Also, thank you to Dr. Badams for his continued encouragement and support of this effort, and to Linda Addante and Deb Robinson for all their hard work and guidance in the development of this SAU 70 Climate Action Plan.

ACRONYMS AND ABBREVIATIONS

Agreement	Paris Agreement of 2015
AI	artificial intelligence
BIL	Bipartisan Infrastructure Law
CAFE	Corporate Average Fuel Economy
CAP	climate action plan
CO_2	carbon dioxide
DOE	U.S. Department of Energy
DWH	domestic water heater
EPA	U.S. Environmental Protection Agency
GHG	greenhouse gas
HHS	Hanover High School
HVAC	heating, ventilation, air conditioning
IRA	Inflation Reduction Act
MCS	Marion Cross School
$MTCO_2e$	metric tons of carbon dioxide equivalent
ppm	parts per million
PV	photovoltaic
Ray School	Bernice A. Ray School
RFP	request for proposals
RMS	Richmond Middle School
SAU 70	School Administrative Unit 70 District
UNFCCC	United Nations Framework Convention on Climate Change
VTCAP	Vermont Climate Action Plan
W/m^2	watts per meter-squared

1 INTRODUCTION

Given the overwhelming consensus that anthropogenic or "human-made" greenhouse gas (GHG) emissions are causing global climate change, School Administrative Unit 70 District (SAU 70) is joining an increasing number of entities and local governments committed to addressing climate change at the local level. SAU 70 recognizes the risk that climate change poses to its constituents and is acting now to reduce the GHG emissions, or "carbon footprint," through the innovative programs laid out in this Climate Action Plan (CAP). Ultimately, individual behavior changes and collective action are needed to reduce SAU 70's contribution toward the problem of climate change and adapt to its current and future effects. This CAP takes advantage of common-sense approaches and cutting-edge policies that SAU 70 is uniquely positioned to implement. These actions can reduce energy use, reduce fossil fuel combustion and conserve water. The greenhouse reduction targets in this CAP aim to be consistent with the plans for the Town of Hanover, the State of New Hampshire, and other regional plans.

The U.S. Department of Education's 2021 Climate Adaptation Plan states that "All students deserve to attend sustainable schools that enhance their health and wellness and support a thriving planet" (U.S. Department of Education 2021). The SAU 70 is eager to implement strategies that put the district on the path toward sustainable, healthy, resilient, and equitable learning environments.

Following the Hanover High School Climate Action Plan, which was the first CAP developed for a high school in the U.S., this SAU 70 CAP is one of the first district-wide CAPs in the country. Further, this plan was written by Hanover High School students in the Earth Systems and Ecological Design course and the Hanover High School Environmental Club under the guidance of Hannah Kornfeld (HHS 2010), who served as a volunteer consultant and made substantial contributions to the production and formatting of this report.

PURPOSE

The CAP is a framework for the development and implementation of actions that reduce the GHG emissions generated by schools within SAU 70 and provides guiding objectives and strategies to realize SAU 70's GHG reduction targets. Individual CAPs have been written for all four schools in SAU 70, including Hanover High School (HHS), Richmond Middle School (RMS), Bernice A. Ray School (Ray School), and Marion Cross School (MCS).

By creating a clear course of action for reducing GHG emissions in each school, all stakeholders including students, staff, administrators, school boards, and community members can contribute to creating and achieving the climate and sustainability goals laid out in this plan. The SAU 70 CAP drives and coordinates efforts toward a reduction in GHG emissions by all schools of 16 percent below the 2022-2023 school year emission levels by 2030, and 75 percent below 2022-2023 school year emission levels by 2050 to be consistent with the GHG reduction goals of the State of New Hampshire. These targets are discussed further in section 4.

With each school having its own CAP, the school community is afforded the opportunity to develop their own knowledge, skills, and habits necessary to effect long-term change. This will also help individuals take ownership to change their habits and making decisions that will contribute to the goals in this CAP.

This SAU 70 CAP covers strategies for reducing GHG emissions resulting from operational activities associated with SAU 70. It addresses the major sources of emissions from SAU 70 and sets forth objectives and strategies in seven focus areas (i.e., emissions sectors) that both SAU 70 and the school communities can implement together to achieve GHG reductions:

- Building Energy
- Employee Commute
- Student Commute
- School Buses
- Solid Waste Generation
- Wastewater Generation
- Water Consumption

PROCESS

The approach used for this CAP was developed by ICLEI—Local Governments for Sustainability and is called the Five Milestones for Climate Mitigation (see Figure 1 below).

Figure 1. Five Milestones for Climate Mitigation

STUDENT-LED INITIATIVES

Students in the HHS Environmental Club and the Earth Systems classes updated the HHS CAP originally published in 2018. Students in the HHS Environmental Club also wrote a wood chip procurement request for proposals (RFP) with the intent of switching HHS's wood chip source to one that is consistent with practices of sustainable forestry. Sustainable forestry is understood within SAU 70 to constitute caring for, managing, and protecting forest ecosystems from which wood is harvested. The RFP was sent out for bid by the SAU 70 Facilities department and the source of wood chips was switched to a source that met many of the standards associated with sustainably sourced wood. Furthermore, HHS Environmental Club students presented to the SAU 70 School Board recommendations for changes to the SAU 70 Strategic Plan. These changes addressed exploration of new technologies and areas of sustainability, measurement of SAU 70's progress towards sustainability, and consideration of environmental justice and equity in new capital projects. Additionally, the changes proposed that the SAU 70 CAP will serve to inform capital improvement planning and decision making and ensure that taxpayer resources are invested with the goal of minimizing the impacts of climate change in school facilities and operations.

The HHS Environmental Club collected data from each of the four schools in the district pertaining to building energy, bus transportation, water and wastewater, solid waste, and employee and student commute. Population data for the towns of Norwich and Hanover were gathered to estimate population projections. Data was used to show, by sector, the GHG emissions being produced. Additionally, the HHS Environmental Club met with the SAU 70 Heads of School to discuss creating a CAP for each school in the district. Groups of students and staff at each school interested in helping to develop their CAP met in June 2024 to discuss sustainability issues and generate ideas of ways GHG emissions could be reduced.

Currently, students in the HHS Environmental Club are training 9th grade students on how to properly sort trash generated by the school. By having 9th grade students undergo the sorting process of separating recyclable and

compostable materials from the waste stream, rising classes will be better prepared to continue these sustainability efforts. To contribute to the initiative of replacing fluorescent light bulbs with LED bulbs, HHS Environmental Club students used lighting maps of the light fixtures throughout the HHS building and estimated the number of LED bulbs necessary to replace the current fluorescent bulbs. Because the March Intensive program at HHS has been identified as a significant source of GHG emissions, HHS Environmental Club students have also calculated the GHG emissions per student for each course and had them published in the March Intensive Program of Studies so that students can make more informed decisions about the March Intensive they choose.

2 CLIMATE CHANGE SCIENCE

Although climate change is the center of many political debates, the warming of Earth's climate system is a widely accepted fact in the scientific world. Ninety-seven percent of "actively publishing climate scientists" agree that Earth's climate is changing due to human activities (NASA 2018). The atmosphere's carbon dioxide (CO_2) levels as of December 2024 are 420 parts per million (ppm), which is the highest measurement in the past 800,000 years (NASA 2018). Before the industrial revolution, Earth's CO_2 levels fluctuated between roughly 180 ppm during ice age periods and 280 ppm during interglacial periods (NASA 2018). These rising and falling CO_2 concentrations represent the natural changes that occur during the 100,000-year Milankovitch cycle. In comparison, the current level of 420 ppm represents uncharted territory. Because of this unprecedented concentration of CO_2, scientists do not know exactly how these high levels will affect humanity and life on Earth. However, scientists do know that throughout climate history, temperature is directly correlated with atmospheric CO_2 levels (NOAA 2008). When graphed, temperature and CO_2 follow each other closely.

CO_2 is just one of the GHGs in the atmosphere that contributes to Earth's warming. Other GHGs include nitrous oxide, methane, water vapor, ozone, and synthetic chemicals. GHGs have a warming effect due to their ability to trap heat in the atmosphere. GHGs in Earth's atmosphere absorb infrared radiation emitted from Earth's surface and also re-emit infrared radiation, commonly known as heat. The greenhouse effect refers to the natural process of infrared radiation being absorbed by GHG molecules, and then re-emitted in all directions, some of which is directed back towards Earth. Without naturally occurring greenhouse gases, Earth's average temperature would be near 0°F (or -18°C) instead of the much warmer 59°F (15°C) (NASA 2010).

However, since the Industrial Revolution, the burning of fossil fuels and other human activities such as deforestation has led to a dramatic increase in the concentration of GHGs in the atmosphere. GHGs that have high global warming potential have a long residence time in the atmosphere, absorb effectively in the infrared part of the electromagnetic spectrum, and have a relatively high concentration in the troposphere (lowest layer of the atmosphere). Once GHG molecules absorb infrared radiation, they collide with and transfer kinetic energy to other molecules in the atmosphere such as nitrogen and oxygen, which increases the temperature of the atmosphere. As the concentration of GHG molecules in the atmosphere increases, more energy is trapped. In this way, GHGs act as a "blanket" and prevent heat energy from escaping back out to space.

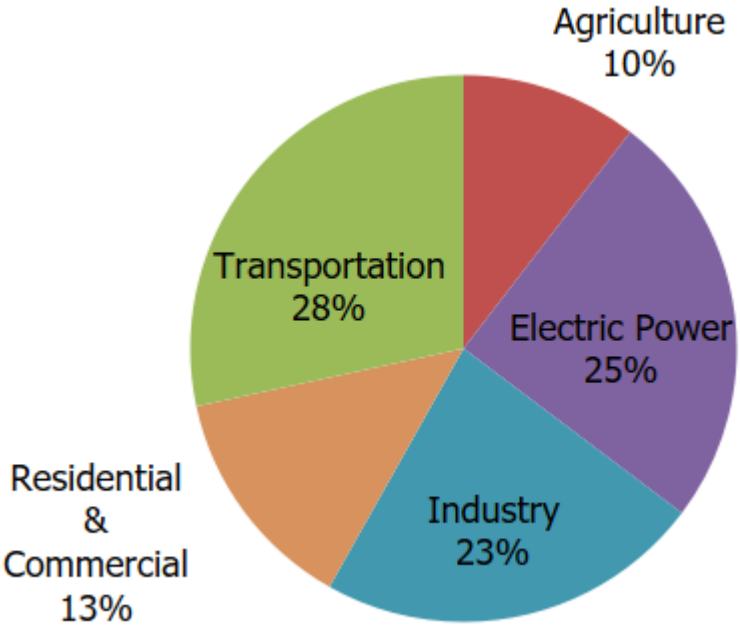
Scientific research published in peer-reviewed journals shows that the current CO_2 levels in Earth's atmosphere have been rising since the industrial revolution (UC San Diego 2017). Human activity is also responsible for the release of methane, nitrous oxide, and other potent GHGs (Keeling 1997). Humans are already experiencing the effects of a warmer climate through more extreme weather events, increases in pests and disease, devastation to wildlife habitat, heat stress, increased drought, increased costs, and displacement of people which disproportionately affects under resourced communities. (Keeling 1997). Arguably, the most concerning part of global climate change is that it is extremely difficult to reverse. Now that there is momentum in Earth's warming, the extent of sea ice is diminishing, sea levels are rising, oceans are warming, and glaciers around the world are melting. Further, these events lead to positive feedback loops that amplify warming. Due to climate change momentum, it will take hundreds of years for GHG concentrations in the atmosphere to return to preindustrial concentrations. For these reasons, we need to take responsibility for emissions coming from the SAU 70 community and implement this CAP immediately.

GREENHOUSE GAS EMISSIONS SOURCES

In 2022, the U.S. generated 6.343 billion metric tons of carbon dioxide equivalent ($MTCO_2e$). Figure 2 below shows the sources of GHG emissions in the U.S. and their respective percentages of total GHG emissions. The transportation, electricity, and industry sectors produced the majority of GHGs due to the burning of fossil fuels. The transportation sector produced more GHG emissions than any other sector, and petroleum-based fuels accounted for 90 percent of the fuels used in this sector. Electricity production is the second largest share of GHGs in the U.S., with coal and natural gas accounting for 60 percent of the fuels in this sector. The industry sector primarily produced GHGs emissions through the consumption of energy to produce materials from raw goods. Commercial and residential use

of fossil fuels and agriculture made up the rest of the GHG emissions inventory. Land use and forestry offsets 13 percent of U.S. GHG emissions (EPA 2024a).

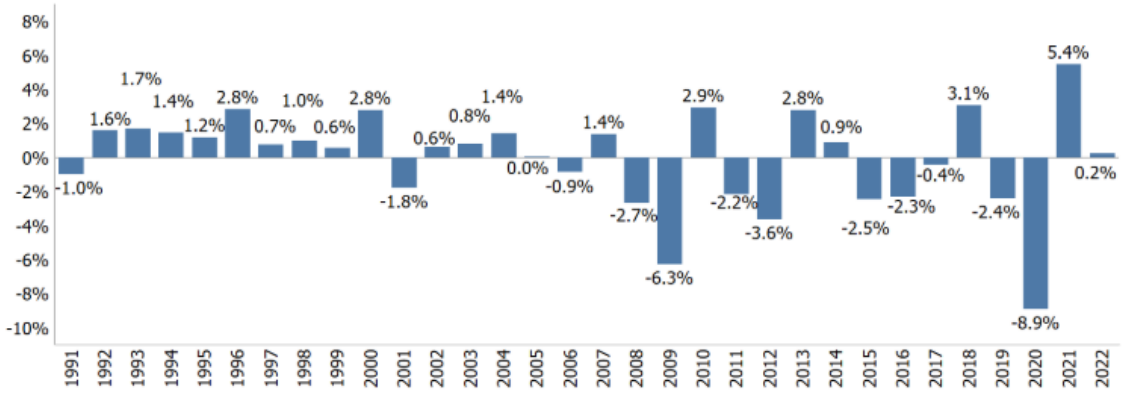
Figure 2. Total U.S. Greenhouse Gas Emissions by Economic Sector in 2022



Source: U.S. EPA 2024a

Overall, GHG emissions have increased by 0.2 percent annually since 1990, with small dips and shifts due to the state of the economy, gas prices, and other related factors. GHG emissions have decreased by 5.2 percent in comparison to 2021. This decrease can be attributed to less overall energy use as well as a widespread shift towards renewable energy sources (EPA 2024a). Figure 3, below, shows this trend.

Figure 3. Annual Percentage Change in Gross U.S. Greenhouse Gas Emissions Relative to the Previous Year



Source: U.S. EPA 2024a

EFFECTS OF CLIMATE CHANGE ON THE ENVIRONMENT

There are many worldwide scientific organizations that believe climate change is caused by human action. This is creating an imbalance in Earth's energy budget. Before the Industrial Revolution, Earth was in radiative balance, with 240 watts per meter-squared (W/m^2) hitting the surface of Earth, and 240 W/m^2 escaping from Earth's atmosphere.

However, it has been estimated that currently there is approximately 0.5 W/m^2 less energy escaping back into space as a result of human activity (NASA 2021). Despite this being a seemingly small difference, the 0.5 W/m^2 change is increasing the temperature of Earth's atmosphere.

As Earth's atmosphere warms, glacial ice melts, exposing the dark surface of Earth which reduces the albedo, or reflectivity of Earth's surface. With less reflective material covering Earth, less light gets reflected back into space, and more gets absorbed by Earth's surface, contributing further to warming. This amplification of warming is known as a positive feedback loop. Rising temperatures are also causing the melting of permafrost, the frozen soil sublayer in the poles. As permafrost melts, bacteria decompose organic matter anaerobically. This produces methane, an even more potent GHG than CO_2. The release of methane increases the concentration of GHGs in the atmosphere and therefore contributes to Earth's warming temperatures which melts more permafrost, another example of positive feedback. Global sea level has risen by about 8 inches since reliable record keeping began in 1880. It is projected to rise another foot by 2100. This is the result of added water from melting land ice and the expansion of seawater as it warms (NOAA 2022). Warmer water takes up more space than cooler water, causing sea levels to rise. Rising sea levels lead to destruction of land through erosion and flooding. Furthermore, as ocean levels rise, humans are forced to evacuate their communities. These displaced people have come to be known as climate refugees. In addition, as sea levels rise, ocean water is pushed inland against the fresh water of rivers. This phenomenon, known as saltwater intrusion, contaminates drinking water sources of coastal areas, and changes the salinity of estuaries which impacts the structure and function of estuarine ecosystems.

Climate disasters are increasing in number and gravity and are impacting economies around the world. In 2024, there have been 24 weather and climate disaster events with losses exceeding $1 billion each across the United States (NOAA 2024). The rise in temperature has caused plants to migrate from their original habitats to places that are within their preferred temperature range. Climate change is having profound impacts on Earth's ecosystems, leaving them less resilient and less able to provide the ecosystem services upon which humanity depends. As the effects of climate change continue, the scarcity of resources will increase conflicts among countries and people around the world.

Regionally, the northeastern U.S. will experience more heat waves, heavy downpours and sea level rise. "Infrastructure, agriculture, fisheries and ecosystems will be increasingly compromised" (NASA n.d.). As a result, many states and cities are incorporating climate change into their planning.

3 CLIMATE CHANGE POLICY

INTERNATIONAL

PARIS AGREEMENT

The Paris Agreement of 2015 (Agreement) was enacted at the Paris Climate Conference in December 2015 by the parties to the United Nations Framework Convention on Climate Change (UNFCCC). The Agreement is a formation of many articles, the most essential of which states that all parties seek to keep the global temperature rise this century to below 2°C above pre-industrial levels and to additionally pursue efforts to limit the temperature increase even further to 1.5°C. To achieve these goals, the Agreement emphasizes that the parties should aim to start reducing GHG emissions as soon as possible. The Agreement also requires that all parties report regularly on their emissions and on their implementation efforts. This refers specifically to the Nationally Determined Contributions which countries must prepare, work towards, and then report on every five years. According to the UNFCCC, developed countries should continue to take the lead by undertaking economy-wide reduction targets, while developing countries should continue enhancing their mitigation and adaptation efforts. Developing countries are also encouraged to move toward economy-wide targets over time (UNFCCC n.d.).

There are some measures that indicate it has helped push the world towards sustainability. One of these measures is the number of non-state actors that have pledged their support of the Agreement as well as the member parties. In the U.S. alone, more than 2,500 mayors, governors, business leaders, and investors have pledged their support to the Paris Agreement (United Nations Foundation 2017), including multiple New Hampshire towns: Hanover, Lebanon, Keene, Portsmouth, and Nashua (Greene 2017).

Since the adoption of the Paris Agreement, The World Resources Institute stated that over 1,000 large companies have pledged emission reductions, financial institutions are beginning to recognize that funding fossil fuel companies is a bad investment, technological advances are making renewable energy more attainable, social movements reflect the growing demand for climate action, and that country-level action is beginning to accelerate (World Resources Institute 2020).

UNDER 2 MEMORANDUM OF UNDERSTANDING

The Under 2 Memorandum of Understanding was founded by 12 initial members in 2015 (Climate Group 2024). Now known as the Under 2 Coalition, the memorandum represents a legal agreement in which the parties involved do not form a legal commitment. The founding members include Acre, Baden-Württemberg, Baja California, British Columbia, California, Catalonia, Jalisco, Ontario, Oregon, Vermont, Wales, and Washington. The memorandum was updated in 2021 to reflect the 1.5˚C target set by the Paris Agreement. By committing to the Under 2 Coalition, parties agree to conceive and implement a plan to help limit global warming to 1.5°C. The goal of the Coalition is to reduce GHG emissions to 80-95 percent of 1990 levels, which translates to limiting emissions to 2 $MTCO_2e$ per capita per year by 2050. Also, they aim to reach net zero GHG emissions by 2050 (Climate Group 2024). The plan has grown to 260 governments on six continents in the nine years since its founding. These members constitute 1.75 billion people and 50 percent of the global economy (Climate Group 2024). The reason that the Under 2 Coalition has so many members is that it allows local governments who want to do something about climate change to join, instead of having to wait for their federal government to join a formal agreement like the Paris Agreement. The coalition has had a fair amount of success, including working towards deforestation-free cattle ranching in Peru and creating a taskforce to accelerate the transition from fossil fuels. In 2023, they were represented at COP and invited to speak at the United Nations General Assembly meeting (Climate Group 2024).

GLOBAL METHANE PLEDGE

The goal of the Global Methane Pledge, launched at COP26 by the European Union and the U.S., is to reduce global methane emissions by at least 30 percent below 2020 levels by 2030 (U.S. Department of State 2024). This reduction has the potential to reduce global warming by at least 0.2°C by 2050 (Climate and Clean Air Coalition 2023). Methane is responsible for 30 percent of total global warming since the Industrial Revolution and is the second largest contributor to global warming after CO_2 (Climate and Clean Air Coalition 2023). The Global Methane Pledge aims to acquire $1 billion of new grant funding, national commitments and legislation from top oil and gas methane emitters, transformational data tools, additional members, and expanded leadership. There are currently 158 countries participating, including the U.S., in 2023.

FEDERAL

BIPARTISAN INFRASTRUCTURE LAW

In 2021, the Biden Administration signed the "Bipartisan Infrastructure Act" into law. Now known as the Bipartisan Infrastructure Law (BIL), it is legislation aimed at protecting communities against the impacts of climate change. It is the largest investment in clean energy infrastructure in American history. The BIL includes sections on transportation, climate, energy, and the environment. The transportation section involves funding to "rebuild and reinvest in railways, public transit infrastructure and the safety of the transportation system" (The White House 2024a). The climate, energy and the environment section involve investment on resiliency of infrastructure to climate change, cybersecurity risks and other hazards. "The funding provided under the law will modernize our power grid; weatherize and upgrade homes, schools, businesses, and communities to make them cleaner and more affordable; and fund new programs to support the development, demonstration, and deployment of cutting-edge clean energy technologies" (The White House 2024a).

Along with investing in new infrastructure, the BIL includes "historic investments in environmental clean-up and remediation, and builds up our resilience for the next superstorms, droughts, wildfires, and hurricanes that cost us billions of dollars in damage each year" (The White House 2022). The U.S. Department of Energy (DOE) launched a $500 million Renew America's Schools Program (U.S. Department of Energy 2024). This program is designed to help decrease energy use and cost and improve learning environments by making energy upgrades in school communities.

INFLATION REDUCTION ACT

On August 16, 2022, the Biden Administration signed the Inflation Reduction Act (IRA) into law. Implemented by the U.S. Department of the Treasury and the Internal Revenue Service, the bill addresses several major themes, one of which is strengthening energy security and providing an outline for the transition into a clean energy economy. The IRA is the single largest investment in climate and energy in American history. The bill creates opportunities for lowering household energy costs while reducing GHG emissions, as well as incentives for investing in clean energy and manufacturing. The bill also addresses mitigating the effects of climate change in overburdened communities and lower income households while improving access to clean energy. In addition, through the expansion of certain sectors, new jobs have been created. In the battery supply chain alone, 75,000 jobs have been created as of August 2023. The bill creates opportunities for K-12 school districts to claim tax credits to reduce the cost of clean energy infrastructure projects. Uses of these tax credits could include purchasing electric school buses, installing solar panels, or installing a central geothermal system.

JUSTICE40 INITIATIVE

The Justice40 Initiative aims to ensure that at least 40 percent of the overall benefits from federal investments in climate and clean energy projects are directed to disadvantaged communities, prioritizing environmental justice and

equity. It's a commitment to addressing historic environmental injustices and ensuring that disadvantaged communities receive their fair share of the benefits from government actions related to climate change and clean energy. The Justice40 initiative is a key component of President Biden's Executive Order 14008, that he issued his first week in office. This Executive Order tackles the climate crisis at home and abroad to address long-standing environmental and economic disparities, particularly in communities of color and low-income areas, through targeted funding and policies. The initiative aligns with broader efforts to combat climate change, create jobs, and promote a sustainable and inclusive economy (U.S. Department of Energy 2022).

The U.S. Environmental Protection Agency's (EPA's) Clean School Bus Program aims to reduce children's exposure to harmful diesel emissions by replacing older buses with cleaner, more efficient models, promoting healthier environments for students and communities. Meanwhile, the EPA's Lead Testing in School and Child Care Grant Program focuses on safeguarding children's health by assisting schools and childcare facilities in testing for and mitigating lead contamination, ensuring safe learning environments. In addition, the DOE's Grants for Energy Efficiency and Renewable Energy Improvements at Public School Facilities support schools in implementing energy-saving measures and adopting renewable energy technologies, fostering sustainability and reducing operational costs for educational institutions.

CORPORATE AVERAGE FUEL ECONOMY STANDARDS

Corporate Average Fuel Economy standards, commonly known as CAFE standards, were enacted in 1975 by Congress. These standards "reduce America's consumption of oil, save consumers money at the gas pump, and protect public health and the environment by curbing global warming pollution. They also help spur investments in new automotive technology, creating jobs and helping sustain the recovery of the American auto industry" (Union of Concerned Scientists 2018). CAFE standards are updated regularly based upon a five-year projection of automobile fuel efficiency. The standards are based on the average efficiency value of a fleet of cars per manufacturer. Efficiency in automobiles in the United States is measured in miles per gallon. For example, the 2024-2026 CAFE standards require manufacturers to have a fleet wide average of 49 miles per gallon for passenger cars and light trucks by 2026. When the 2024-2026 standards expire, a revised set of CAFE standards will be created for the following sets of years. These new standards increase fuel efficiency 8 percent annually for model years 2024-2026 and increase the estimated fleetwide average by 10 miles by gallon. These changes would reduce GHG emissions by 2.5 billion tons over the next three decades (U.S. Department of Transportation 2022).

NEW HAMPSHIRE

RENEWABLE PORTFOLIO STANDARD

According to the U.S. Energy Information Administration, renewable portfolio standards are requirements or goals for energy producers or providers to supply energy from low-or zero-carbon emission sources. These policies require or encourage energy suppliers to provide their customers with a stated minimum share of energy from eligible energy resources. The majority of these programs apply to electricity; however, some include heating fuels and energy-efficient appliances and equipment (U.S. Energy Information Administration 2024). Although no federal RPS or CES exists, over half of states have established programs. New Hampshire's Renewable Portfolio Standard requires that each electricity provider meets customer load by obtaining certificates representing generation from renewable energy based on total megawatt-hours supplied (DES n.d.). The RPS aims to reduce our reliance on fossil fuels by providing alternatives, information on building design and use, and providing optimizations to necessary uses of fossil fuels.

NEW HAMPSHIRE CLIMATE ACTION PLAN

With the passage of the IRA, the New Hampshire Department of Environmental Services received a $3 million federal grant to help create and implement a CAP—the first time New Hampshire has created a new CAP in 14 years. The

NHDES used the 2009 New Hampshire CAP as a framework to start, focusing on actionable measures to reduce GHG emissions. The CAP is the first of two phases of the state's Climate Pollution Reduction Grant. The second phase is a competitive implementation grant program, in which applicants will compete for $4.6 billion in implementation grants based on measures identified in the CAP. The updated CAP includes a detailed, state-level GHG emissions inventory and a list of priority measures that could reduce the state's GHG emissions.

GRANITE STATE CLEAN CITIES COALITION

The Granite State Clean Cities Coalition works with vehicle fleets, fuel providers, community leaders, and other stakeholders to identify community-driven choices that save energy and promote the use of alternative fuels and advanced vehicle technologies in transportation (Granite State Clean Cities 2024). They collect data from their stakeholders and partners who are implementing clean transportation projects in New Hampshire. Supported by DOE's Clean Cities Program, the Granite State Clean Cities Coalition seeks to reduce petroleum use in transportation through the use of domestically produced, cleaner burning alternative fuels, and other fuel reduction strategies. They believe that using less diesel and gasoline in vehicles helps to reduce the U.S.'s dependence on foreign oil while improving air quality.

TOWN OF HANOVER

Sustainable Hanover

The Sustainable Hanover Committee has launched a multi-year initiative that demonstrates ways to minimize environmental impacts with home landscaping and maintenance practices that mimic natural ecosystems. By applying principles of permaculture, it hopes to reduce water runoff, and air and noise pollution, to improve biodiversity, create natural habitats for wildlife and to require less maintenance. It also helped the town of Hanover to launch a community power program.

Weatherize Hanover, a program launched in 2019, is a key component of Hanover's goal to reach 100 percent renewable electricity by 2030. Weatherizing homes involves making physical home improvements such as insulation and air sealing to reduce energy costs, improve comforts, and resolve issues such as ice dams, moisture, mold, cold spots and drafts. Weatherize Hanover provides resources on weatherizing and provides cost estimates by qualified contractors to weatherize homes.

The Hanover community has been developing a sustainability master plan in accordance with New Hampshire's statutes relating to master plans, and it was adopted by the Hanover Planning Board on April 2, 2024. The Sustainability Master Plan will guide the town to a more sustainable future by serving as a policy basis for decision-making. It will address several sustainability principles, including land use, use of natural/cultural resources, open space and recreation, transportation, energy, housing, economic development, public facilities/services, and public health.

Hanover Community Power

In May 2017, the Town of Hanover, New Hampshire voted on a community goal to transition to 100 percent renewable energy. The goal states that Hanover will have 100 percent renewable electric energy by 2030, and 100 percent renewable heating and transportation energy by 2050 (Levy 2017). Hanover is the first town in New Hampshire to commit to the Sierra Club's "Ready for 100" goal, a national movement led by the environmental organization working to help cities convert to running on 100 percent renewable energy. The 69 cities who have already committed to the "Ready for 100" goal, range from smaller towns such as Blackburn, Virginia, to large metropolises such as San Diego, California and Orlando, Florida (Sierra Club 2018).

Members of the Hanover community made the decision to commit to the Sierra Club's campaign during a vote at a town meeting, making Hanover the first municipality in the U.S. to have a renewable energy goal both voted on and approved by community residents (Town of Hanover 2017). The Sustainable Hanover Committee, which endorses the transition to clean and renewable energy, proposed the idea for committing to the Sierra Club's campaign. The Town

plans to spend $50,000 per year on energy-efficient improvements (Sears 2018). Hanover has been working with the Concord Energy Committee and plans to find more opportunities for solar power in the area.

Members of Sustainable Hanover's Energy Initiative and the Hanover Electric Aggregation Committee prepared the Hanover Community Power Plan in 2021. Community power offers Hanover residents and businesses four energy options, each with a different price tag and renewable content. Hanover Community Power purchases energy, which is then distributed through Eversource, Liberty, and NH Electric Co-op to the community. The renewable content of the options ranges from 100 percent in the Clean 100 option to 24.3 percent in the Granite Basic option.

VERMONT

VERMONT CLIMATE ACTION PLAN

The initial Vermont Climate Action Plan (VTCAP) was enacted in December 2021 by the Vermont Climate Council to meet the state's Global Warming Solutions Act (GWSA) of 2020 (Act 153). A key provision of the GWSA is the goal to cut the state's climate pollution (e.g. carbon and methane emissions) in half by 2030. The VTCAP was also developed in accordance with the State of Vermont's Comprehensive Energy Plan which was released in November 2021. The Climate Council states that they will be updating the plan at least every four years.

Included in the VTCAP are the specifics of climate change in the region, details on the state's energy economy and opportunities related to climate action, the foundational criteria necessary for the completion of their goals, discussion on equity to ensure a just transition, and an overview of the pathways (emission reduction, building land resilience, building community resilience, and enhancing carbon sequestration).

The different "Pathways" sections of the plan outline various "strategies" and "actions," some of which are applicable to the implementation of the SAU 70 CAP. Some of these include:

- "Identify, develop, and share best practices for reducing … school district … fossil fuel consumption (p. 164)"
- "Equitably expand access to programs that provide options to … school districts … for weatherization, electrification, and utility upgrades (p. 165)"
- "Provide funding for climate-related education at all levels, outreach, research, and technical assistance programs (p. 235)"

TOWN OF NORWICH

Norwich Town Plan

The Norwich Energy Plan, "describes the current setting for energy use in Norwich, and then moves to a consideration of how much renewable energy Norwich can generate." The Energy Plan has mapped areas of Norwich that have the potential for renewable energy generation, energy conservation, and efficiency measures have been outlined. As stated in the Energy Plan, "Future targets for energy generation, use and conservation have been set for all Vermont municipalities as part of the state's enhanced energy planning under Act 174" (Town of Norwich 2019).

Norwich Energy Committee

The Norwich Energy Committee works with residents, businesses, and the Town of Norwich to reduce energy consumption, improve the efficiency of energy used, promote renewable energy generation, and reduce GHG emissions. The Committee makes recommendations to the Norwich Selectboard regarding town policy on energy-related matters. They have made it a goal to receive 90 percent of residential, municipal, and school electricity from solar, receive 90 percent of heating needs from renewable resources, and reduce petroleum-based energy use for transportation. The Committee has been continuing the Solarize Norwich campaign and contributing what they can to the statewide energy goal of 90 percent renewable energy by 2050. The Norwich Energy Committee has achieved some of their goals and is continuing to work towards others.

4 SAU 70 GREENHOUSE GAS EMISSIONS

The HHS Environmental Club gathered data for each of the schools in the SAU 70 to create a GHG inventory. This was accomplished by researching building energy use, tons of solid waste generated, gallons of wastewater generated, gallons of water consumed, and energy use for transportation which includes school bus routes, employee commute and student commute. In the HHS CAP, an additional sector labeled "Other Travel" includes data relevant only to the high school. This data was used to calculate the GHG emissions from each sector in $MTCO_2e$ and is summarized in Table 1 below.

An important aspect of GHGs is the unit of measurement used to estimate emissions. While CO_2 is the primary GHG released by human activity, more potent GHGs including methane and nitrous oxide are also released. To simplify the discussion and comparison of these emissions, CAPs use a metric known as carbon dioxide equivalents (CO_2e). The CO_2e metric translates each GHG to an equivalent mass of CO_2 by taking into account its relative global warming potential. Methane and nitrous oxide are 25 and 310 times more potent per molecule respectively, than CO_2 in their abilities to trap heat in the atmosphere (DES 2009). Converting these GHG emissions into CO_2e makes it easier to communicate how GHG emissions contribute to climate change by using a standard unit of measurement.

Measuring GHG emissions is a critical first step in developing the CAP. First, the GHG inventory identifies major sources and quantities of GHG emissions associated with the activities and choices currently made by all schools in SAU 70. Second, the inventory, along with population projections, provides the baseline that is used to forecast emission trends and to develop an accurate near-term emissions reduction target consistent with State objectives.

GHG emissions from the 2022-2023 school year were prepared for SAU 70's operations. The 2022-2023 school year inventory shows that SAU 70's operations generated 2,987 $MTCO_2e$. SAU 70's GHG inventory is broken down into the following seven sectors.

Building Energy

The building energy sector includes GHG emissions generated from electricity consumption and fossil fuel consumption at each school within SAU 70, and transportation for wood chips for HHS. The GHG emissions include only anthropogenic sources. Anthropogenic CO_2 comes from human actions in which fossil fuels are burned. This carbon is part of the long-term carbon cycle. When humans burn fossil fuels, the CO_2 concentration in the atmosphere increases which contributes to climate change (EPA 2024b). The carbon atoms in biogenic CO_2 are in a short-term carbon cycle and are therefore not included in this CAP. Biogenic CO_2 is released by the combustion or decomposition of natural and organic matter (EPA 2017).

Employee Commute

Employee-generated GHG emissions associated with gasoline, diesel, and electricity consumption from vehicle trips and vehicle miles traveled during employee commute.

Student Commute

Student-generated GHG emissions associated with gasoline, diesel, and electricity consumption from vehicle trips and vehicle miles traveled during student commute.

School Buses

School bus-generated GHG emissions associated with diesel consumption from school bus routes.

Solid Waste Generation

Solid waste sector emissions include the methane emissions from the decomposition of waste generated by staff and students at the Lebanon Landfill.

Wastewater Generation

Wastewater treatment results in GHG emissions associated with the electricity consumed during treatment, as well as fugitive methane emissions resulting from the treatment process for wastewater.

Water Consumption

Water-related GHG emissions are associated with the energy and fuel used to convey, distribute, and treat water used at each school in SAU 70.

Other Travel

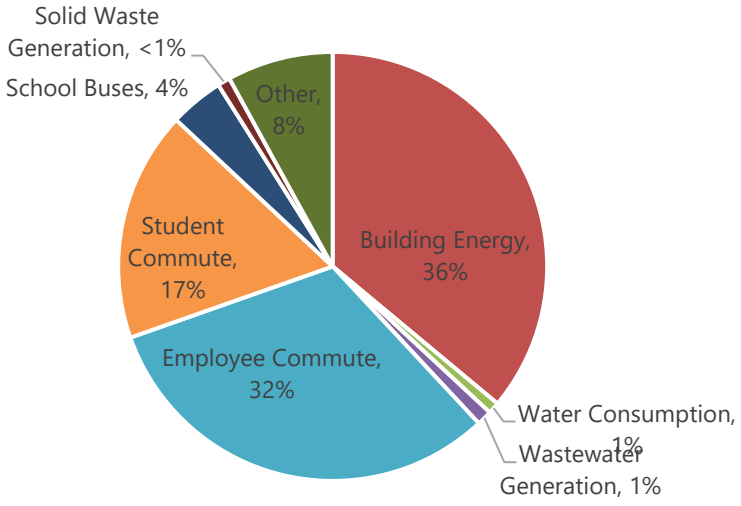
Other travel is emissions relevant only to HHS and includes emissions associated with staff professional development activities, the March Intensive program, field trips, school buses used for athletics at HHS, and maintenance vehicles.

Table 1. SAU 70 2022-2023 School Year Greenhouse Gas Emissions Inventory

Emissions Sector	Greenhouse Gas Emissions ($MTCO_2e$)	Percent of Total
Building Energy	1,082	36%
Employee Commute	947	32%
Student Commute	521	17%
Other	240	8%
School Buses	107	4%
Wastewater Generation	34	1%
Solid Waste Generation	28	1%
Water Consumption	26	1%
Total	**2,987**	**100%**

Figure 4 shows the breakdown of SAU 70's GHG emissions in the 2022-2023 school year. The greatest source of emissions stems from building energy and represents 36 percent of the total emissions. Employee commute represents the second highest emission sector at 32 percent, and student commute represents 17 percent of total emissions. GHG reduction measures can be found in section 5 of this CAP.

Figure 4. SAU 70 2022-2023 School Year Greenhouse Gas Emissions Inventory by Sector



PROJECTED GREENHOUSE GAS EMISSIONS

The SAU 70's GHG emissions for the 2022-2023 school year (listed as 2023 for the purpose of the table below) and projected emissions for the years 2030 and 2050 are shown in Table 2. The forecasted emissions are a "business-as-usual" scenario. Growth projections in emissions are based on anticipated population growth in the towns of Hanover and Norwich. The forecast does not account for the effects of legislation that may reduce emissions from electricity and vehicles in the future. The forecast indicates that if SAU 70 does not take action, GHG emissions will continue to increase.

Table 2. SAU 70 Greenhouse Gas Emissions Inventory and Forecasts by Sector

Emissions Sector	Greenhouse Gas Emissions ($MTCO_2e$)		
	2023	2030	2050
Building Energy	1,082	1,121	1,123
Employee Commute	947	973	991
Student Commute	521	543	540
Other	240	243	243
School Buses	107	112	111
Wastewater Generation	34	37	37
Solid Waste Generation	28	29	30
Water Consumption	26	27	27
Total	**2,987**	**3,086**	**3,102**

As shown in Figure 5, the sectors showing the highest GHG emissions are building energy, employee commute, and student commute. Projected emissions to the year 2050 show that these three sectors will continue to be the primary sources of SAU 70's emissions and therefore addressing these sectors should become a priority.

Figure 5. SAU 70 Greenhouse Gas Emissions Inventory and Forecasts by Sector

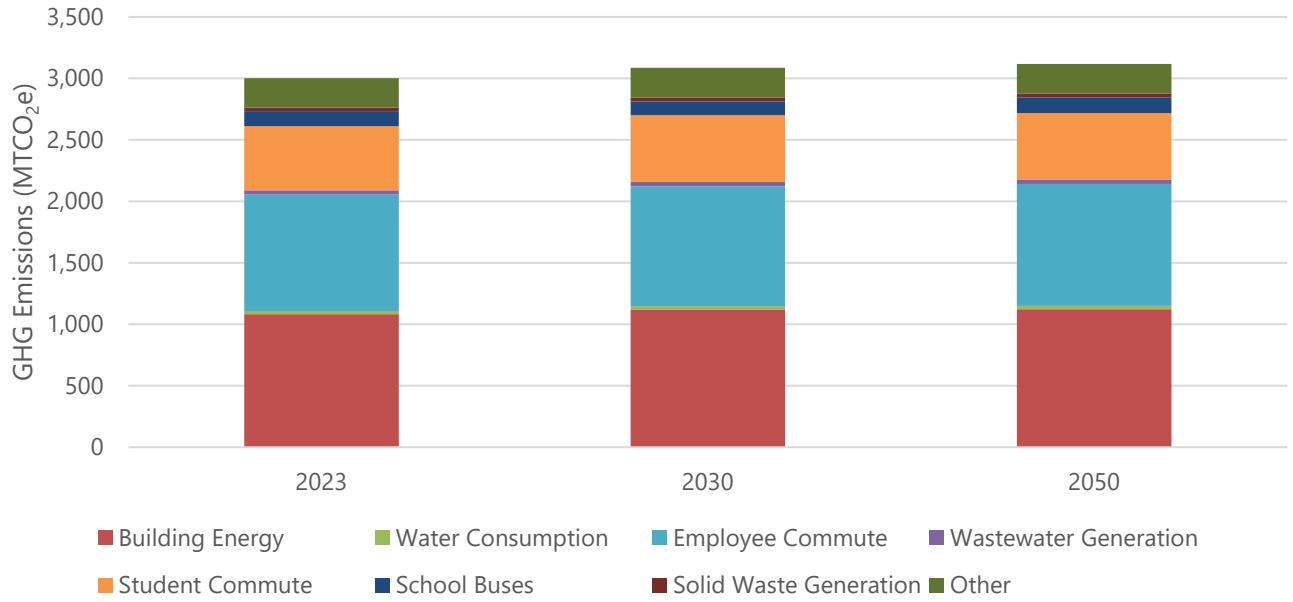
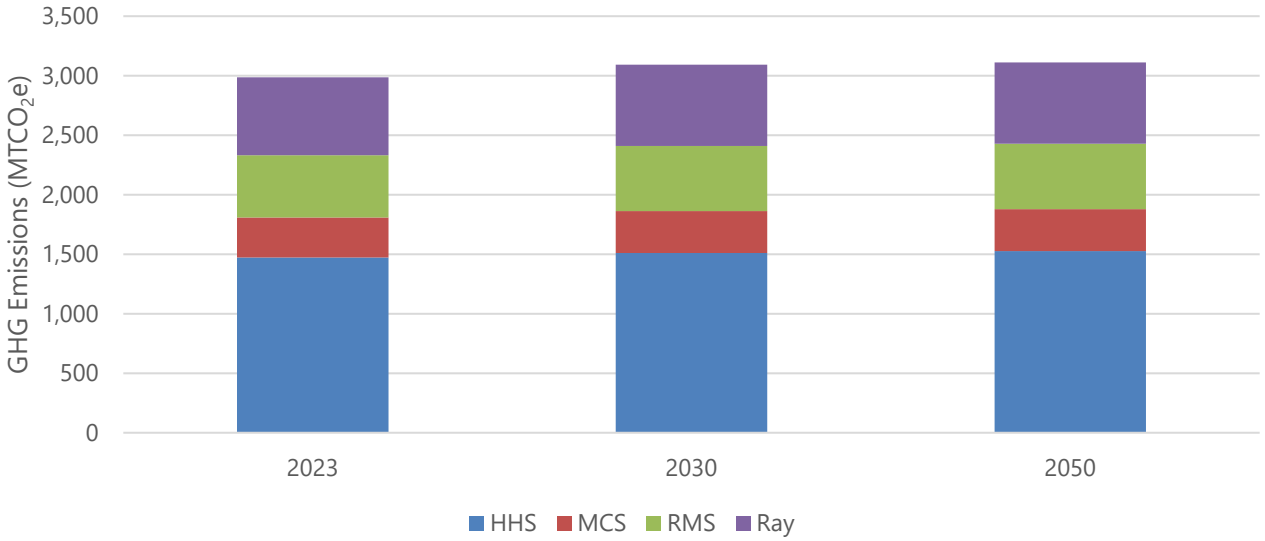


Figure 6 shows that the majority of emissions in SAU 70 are coming from HHS with 1,473 $MTCO_2e$ released, followed by the Ray School (655 $MTCO_2e$), RMS, (523 $MTCO_2e$), and MCS (336 $MTCO_2e$). Population projections show that in a BAU scenario, the emissions remain relatively constant out to 2050.

Figure 6. SAU 70 Greenhouse Gas Emissions Inventory and Forecasts by School



For complete information regarding the emissions inventory and forecast, including methodology and supporting data, refer to the Emissions Data and Calculations located in Appendix A.

GREENHOUSE GAS REDUCTION TARGETS

The State of New Hampshire aims to reduce its GHG emissions by 20 percent from 1990 levels by 2025 and 80 percent below 1990 levels by 2050 (DES 2009:24-25). Almost all scientific sources recommend a reduction of 80 percent by 2050, which is the amount of GHG reduction deemed necessary by the United Nations' Intergovernmental Panel on Climate Change to keep temperatures from exceeding a 2-degree °C increase above pre-industrial levels. The SAU 70 CAP aims to align with these recommendations.

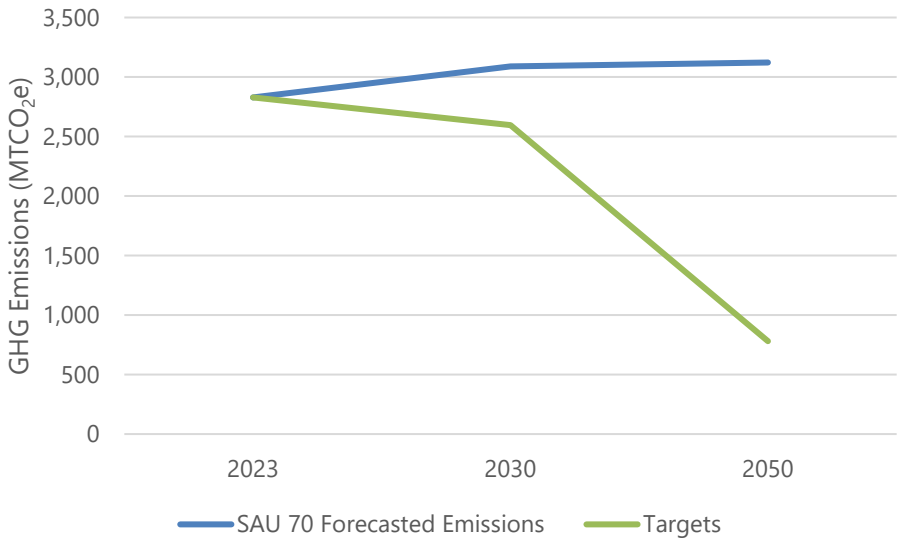
Because SAU 70's 1990 GHG emission levels were not estimated, proportional targets for this CAP were calculated based on statewide changes in GHG emissions over time since 1990. To determine the proportional reductions needed from 2023 levels that would be equivalent to the State's targeted reductions from 1990 levels, the State's GHG inventories for 1990 and 2023 were compared. According to the inventories available in the New Hampshire CAP and Priority Climate Action Plan, statewide emissions were approximately 15.8 million $MTCO_2e$ in 1990 and 15.2 million $MTCO_2e$ in 2021 (DES 2009). Based on these statewide changes in emissions from 1990 to 2021, and in consideration of established statewide reduction targets for 2025 and 2050, applying proportional reductions to SAU 70's 2022-2023 emissions levels would mean reductions of at least 16 percent by 2030 and 75 percent by 2050.

The combination of measures in the SAU 70 CAP are designed to achieve the 2030 goal and make substantial progress towards the longer-term 2050 goal. Table 3 shows SAU 70's GHG reduction targets for 2030 and 2050, which require a 16 and 75 percent reduction, respectively, from the baseline 2022-2023 school year conditions. This level of reduction corresponds to an annual emissions limit of 2,592 $MTCO_2e$ in 2030 and 776 $MTCO_2e$ in 2050. This is the maximum amount of annual GHG emissions allowable while achieving the reduction targets. Figure 7 shows the trajectory of SAU 70's GHG emissions without additional action in comparison to the GHG reduction targets established.

Table 3. SAU 70 Greenhouse Gas Emissions Forecasts and Reduction Targets

	2030	2050
Forecasted Emissions ($MTCO_2e$)	3,086	3,102
Target Reduction (Percent)	16%	75%
Emissions Limit ($MTCO_2e$)	2,592	776
Emissions to be Reduced by CAP Measures to Meet Target ($MTCO_2e$)	494	2,327

Figure 7. SAU 70 Greenhouse Gas Emissions Forecasts and Reduction Targets



5 DISTRICT-WIDE EMISSIONS REDUCTION MEASURES

The following GHG emission reduction measures will help SAU 70 and its schools meet their 2030 GHG reduction target and make significant progress towards meeting their longer-term 2050 goal. The GHG reduction measures are divided into priority measures and secondary measures. The measures were derived from building energy audits conducted for each school, ideas generated by students at workshops, staff input, and the 2022 HHS CAP.

PRIORITY MEASURES

The following measures are considered higher priority for implementation because of their ability to reduce GHG emissions. Each measure identifies which emissions sector it corresponds to, who would lead the implementation, the estimated timing for implementation, and for which schools the measure is relevant. Near-term is defined as measures that could be implemented within one to two school years, midterm is defined as measures that could be implemented within three to five school years, and long-term is defined as measures that could be implemented within six to 10 school years. These measures would require the resources and leadership of the SAU 70 administration and school boards.

Table 4. Priority SAU 70 Greenhouse Gas Reduction Measures

Sector, Measure	Implementation Lead	Timing	Relevant School
Building Energy			
Replace all fossil fuel consuming HVAC and DWH systems with high efficiency electric systems such as heat pumps.	School Board	Long-term	All
Identify ways to reduce and optimize energy use in buildings through retrofits and energy efficient replacements.	Facilities	Midterm	All
Educate the school community about building energy with black-out days and turning off lights when not needed.	HHS Environmental Club	Near-term	All
Benchmark the building using EPA-portfolio manager tool to determine the existing carbon footprint.	Facilities	Midterm	All
Improve insulation of walls to R-40 and ceilings to R-60.	Facilities	Midterm	All
Replace windows with energy efficient double pane windows.	Facilities	Midterm	All
Replace fluorescent fixtures with LED lighting.	Facilities	Near-term	All
Use monitoring systems to track energy usage.	Facilities	Long-term	All
Install window shades to reduce heat gain in warm months.	Facilities	Near-term	All
Perform feasibility study for installing on-site solar PV systems on building roof and carports.	Facilities, Administration	Midterm	All
Encourage staff to ride school buses to and from school.	Administration	Near-term	All
Install motion activated lights in all classrooms.	School Board, Facilities	Midterm	All
Procure the balance of electricity from renewable energy sources.	Administration	Long-term	All
Employee Commute			
Install charging stations for electric vehicles.	Administration, HHS Environmental Club	Near-term	All
Organize a carpooling system for student and staff commute.	HHS Environmental Club	Near-term	All
Develop an app that will help staff, students and parents organize carpooling.	Coding class	Midterm	All
Student Commute			

Sector, Measure	Implementation Lead	Timing	Relevant School
Create a policy giving preferential treatment to students who carpool.	Administration, Council	Near-term	HHS
Install electric charging stations for students at the high school who carpool.	Facilities	Near-term	HHS
Increase the number of bike racks, provide overhead cover for bikes and add a bike repair station.	Facilities, Bike Club	Near-term	All
Create a program for students to sign out bikes throughout the school day for local trips instead of driving to the CO-OP or Starbucks.	Administration	Midterm	HHS
Encourage more local students to walk, bike, and skateboard to school through the use of incentives.	Administration	Near-term	All

SECONDARY MEASURES

The following measures are considered lower priority for implementation because their ability to reduce GHG emissions is limited or unknown. These measures still provide other types of sustainability benefits and are important to implement. Each measure identifies which emissions sector it corresponds to, who could lead the implementation, and the estimated timing for implementation, and for which schools the measure is relevant. Near-term is defined as measures that could be implemented within one to two school years, midterm is defined as measures that could be implemented within three to five school years, and long-term is defined as measures that could be implemented within six to 10 school years.

Table 5. Secondary SAU 70 Greenhouse Gas Reduction Measures

Sector, Measure	Implementation Lead	Timing	Relevant School
Solid Waste Generation			
Increase education on how to dispose of solid waste including what is recyclable and compostable. Also increase education on why it is important to maintain closed loop systems.	Administration, School Environmental Clubs	Midterm	All
Require that all food waste generated by the cafeteria be composted.	Administration	Near-term	All
Support teachers who choose to host a compost bucket in their classroom by ensuring frequent compost removal, keeping buckets clean and offering signage on composting.	Environmental Club	Near-term	HHS
Provide all students with access to online textbooks.	Teachers	Near-term	HHS
Recycle materials by using them as art supplies.	Teachers	Near-term	All
Build an on–site compost facility or ship food waste to Marion Cross School super composting facility.	Facilities	Near-term	HHS, RMS, Ray
Water and Wastewater			
Installation of urine diverting toilets in bathrooms.	Facilities	Midterm	All
Install rainwater gardens.	Facilities, students	Near-term	All
Replace sink faucets with those with sensors which stop running when not in direct use.	Facilities	Midterm	All
Cafeteria			
Buy a dishwasher.	Facilities	Near-term	HHS
Stop selling bottled water in the cafeteria.	Facilities	Near-term	HHS
Replace single use utensils and plates with reusable	Facilities	Midterm	All

Sector, Measure	Implementation Lead	Timing	Relevant School
Reduce single use plastic packaging on food.	Administration	Midterm	All
Set aggressive targets to Include more locally grown food.	Administration	Midterm	All
Serve food from the cafeteria in recyclable or compostable containers.	Facilities	Midterm	All
Start a sustainable agriculture club and grow food that the cafeteria uses.	HHS Environmental Club/New Club	Near-term	All
Explore development of a culinary arts program to replace the current companies hired to provide food.	Administration	Midterm	HHS
Miscellaneous			
Update curriculum to include more climate activism and climate education.	School Board, Council, Staff	Midterm	All
Have the HHS Council support and endorse the CAP and play a more active role in implementation.	Council	Near-term	HHS
Install electric hand dryers in the bathrooms.	Facilities	Midterm	All
Hold students accountable for disposing of their trash properly.	HHS Environmental Club, Administration	Near-term	All
Source more sustainable classroom supplies such as refillable markers for whiteboards and encourage less printing.	Teachers	Near-term	All
More education about e-waste and the energy required to run servers developing AI such as ChatGPT, data warehouses, etc.	HHS Environmental Club, Technology, Administration	Near-term	All

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