NORTH Dakota Be Legendary.

North Dakota Climate Initiative: Working Together for Tomorrow

Draft GHG Reduction Framework

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PREPARED FOR

North Dakota Department of Environmental Quality

PREPARED BY

Environmental Resources Management, Inc.

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ACRONYMS AND ABBREVIATIONS

ACRONYMS	DESCRIPTION
BAU	Business-as-usual
BECCS	Bioenergy and carbon, capture and storage
BRT	Bus Rapid Transit
CCAP	Comprehensive Climate Action Plan
CCUS	Carbon capture, utilization, and storage
CH_4	Methane
CO_2	Carbon dioxide
CO_2e	Carbon dioxide equivalent
EPA	U.S. Environmental Protection Agency
ERM	Environmental Resources Management, Inc.
GHG	Greenhouse gas
GHG Inventory	Greenhouse gas inventory
HVAC	Heating, venting, and air conditioning
HFC	Hydrofluorocarbons
LED	Light emitting diode
LIDAC	Low-income and disadvantaged communities
$MMtCO_2e$	Million metric tons of carbon dioxide equivalent
N_2O	Nitrous oxide
NDDEQ	North Dakota Department of Environmental Quality
NF_3	Nitrogen trifluoride
PCAP	Priority Climate Action Plan
PFC	Perfluorocarbons
SCD	Soil Conservation Districts
SF_6	Sulfur hexafluoride
SIT	State Inventory Tool
SPT	State Projection Tool
WAP	Weatherization Assistance Program

1. INTRODUCTION

In 2023, the North Dakota Department of Environmental Quality (NDDEQ) was awarded a Climate Pollution Reduction Grant from the U.S. Environmental Protection Agency (EPA)[1] to develop North Dakota's first environmental sustainability plan, titled the North Dakota Climate Initiative: Working Together for Tomorrow, aimed at identifying practical opportunities to reduce greenhouse gas (GHG) emissions. This plan is designed to align with our commitment to prudent stewardship of our natural resources while reflecting our core values, fostering innovation, and envisioning a prosperous future.

Our goal is to create a plan that is sensible and beneficial for our unique economic landscape, and which opens doors to new opportunities. At its core, the NDDEQ is creating a plan written by North

[1] U.S. Environmental Protection Agency. 2025. "Climate Pollution Reduction Grants." Accessed May 2025. Retrieved from: https://www.epa.gov/inflation-reduction-act/climate-pollution-reduction-grants

Dakotans for North Dakotans. The NDDEQ is actively engaging with residents, communities, Tribes, industries, and government entities through July 2025 to explore actionable and ambitious measures that support a sustainable environment, vibrant communities, and a robust economy for both present and future generations.

We invite all citizens to participate in shaping this plan, contributing their insights and ideas to ensure it meets our collective needs and aspirations. Together, we can work towards a sustainable future that reflects our shared values and enhances North Dakota's well-being.

This draft GHG reduction framework supports initiatives that have the potential to create high-quality jobs, spur economic growth, and enhance the quality of life for all North Dakotans. North Dakota's Priority Climate Action Plan (PCAP), published in March 2024, outlined a focused list of near-term, high-priority and implementation-ready measures to reduce emissions[2]. This draft GHG reduction framework provides a more comprehensive overview of North Dakota's significant emissions sources and sinks projected through 2050. It includes 15 draft GHG reduction measures identified through stakeholder engagement and technical analysis and intended to support North Dakota's goal to reach an 80 percent reduction in GHG emissions by 2050.

The information included in this draft GHG reduction framework was developed with input from extensive stakeholder engagement conducted by the NDDEQ. The NDDEQ is seeking feedback from the public on the draft GHG reduction measures described in Section 4. New ideas beyond those included in Section 4 will be considered for future exploration.

The final version of this comprehensive plan[3] will include voluntary near-term and long-term GHG emission reduction targets and a final set of GHG reduction measures that address the highest priority sectors to meet those goals. It will also include a robust analysis of GHG reduction measure benefits, costs, and quantified co-pollutants, plans to leverage potential funding, a review of authority to implement, and a workforce planning analysis. The final version of this comprehensive plan will be released in December 2025.

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[2] North Dakota Department of Environmental Quality. March 2024. "North Dakota Priority Climate Action Plan." Accessed May 2025. Retrieved from: https://www.epa.gov/system/files/documents/2024-03/nddeq-pcap-report.pdf

[3] Another term for this plan is the draft Comprehensive Climate Action Plan (CCAP), meant to encompass more comprehensive set of priorities, actions and analysis than what was developed as part of the PCAP in 2024.

NORTH DAKOTA CONTEXT

North Dakota consists of 53 counties home to a population of 796,568.[4] With a population density of 11 people per square mile, North Dakota ranks 49 out of 52 states and territories in population density.[5] The state's population is also becoming more diverse; North Dakota's diversity index increased from 20.6% to 32.6% from 2010-2020, with counties in the western part of the state seeing the greatest increase in diversity.[6] There are five federally recognized Native American tribes and one Indian community that share geography with North Dakota, including the Mandan, Hidatsa, & Arikara Nation (Three Affiliated Tribes), the Spirit Lake Nation, the Standing Rock Sioux Tribe, the Turtle Mountain Band of Chippewa Indians, the Sisseton-Wahpeton Oyate Nation, and the Trenton Indian Service Area.

North Dakotans have voiced broad support for finding innovative strategies to reduce emissions across sectors, recognizing the need to maintain thriving and sustainable communities, be good stewards of the land, and create quality, well-paying jobs. This draft GHG reduction framework is aligned with the primary drivers of North Dakota's economy and focuses on identifying opportunities for investment in agriculture, commercial and residential buildings, electric generation, industry, natural and working lands, transportation, and waste and materials management. By aligning with the priorities of public, private and nonprofit stakeholders, this draft GHG reduction framework leverages opportunities for all major sectors of the state's economy.

PLANNING PROCESS

The NDDEQ, partnering with Environmental Resources Management, Inc. (ERM), comprises the planning team. ERM was hired to support stakeholder engagement, develop technical analyses, and support the development of the state's plan. The NDDEQ has led a planning process to build this draft GHG reduction framework from the ideas, experiences and perspectives of North Dakotans through extensive stakeholder engagement. The engagement efforts were designed to gather input from the various sectors and communities across the state, including tribal communities and residents from low-income and disadvantaged communities (LIDAC). NDDEQ has conducted multiple rounds of engagement,

[4] U.S. Census Bureau. 2024. "Quick Facts - North Dakota." Accessed May 2025. Retrieved from: https://www.census.gov/quickfacts/fact/table/ND#

[5] U.S. Census Bureau. April 26, 2021. "Historical Population Density Data (1910-2020)." Accessed February 2024. Retrieved from: https://www.census.gov/data/tables/time-series/dec/density-data-text.html

[6] U.S Census Bureau. August 12, 2021. "Racial and Ethnic Diversity in the United States: 2010 Census and 2020 Census." Accessed February 2024. Retrieved from: https://www.census.gov/library/visualizations/interactive/racial-and-ethnic-diversity-in-the-united-states-2010-and-2020-census.html

ensuring this draft GHG reduction framework reflects communities' needs and is supportive of local planning efforts.

Through a series of community-focused, sector-specific and intergovernmental outreach efforts and analysis of the state's GHG emissions inventory, NDDEQ identified a set of actions to reduce GHG emissions across all sectors. ERM developed a business-as-usual GHG emissions projection scenario, updated the greenhouse gas inventory to estimate the state's emissions, and quantified potential GHG emissions reductions from the proposed set of measures through 2050.

Through July 2025, the planning team is seeking feedback on the draft GHG emissions reduction measures put forth in this document. The planning team will integrate feedback into the final version of the plan, which will be released in December 2025. The final plan will also include quantified co-pollutants and additional benefits to LIDAC residents, an analysis of existing funding opportunities to support plan implementation, a review of authority implementation of suggested measures, and a workforce planning analysis.

2. GREENHOUSE GAS INVENTORY

OVERVIEW

The high-level GHG emissions inventory developed for North Dakota's PCAP was expanded for the comprehensive plan. The results are outlined in this section.

The baseline year of 2019 was selected for the GHG inventory because it was the most recent year with widely available published data that was not significantly affected by the global COVID-19 pandemic. A substantial decrease in emissions was observed in the data between 2019 and 2020, and the years 2022–2023 were not assessed due to the inherent lag between the years' end and the publishing of large aggregate datasets.

The North Dakota GHG inventory identifies statewide GHG emissions sources and sinks. The inventory includes seven sectors that were identified according to their importance to the state and emissions impacts: agriculture, commercial and residential buildings, electric generation, industry, natural and working lands, transportation, and waste and materials management.

The inventory accounted for emissions from carbon dioxide (CO_2), methane (CH_4) and nitrous oxide (N_2O), fluorinated gases, including hydrofluorocarbons (HFC), perfluorocarbons (PFC), sulfur hexafluoride (SF_6) and nitrogen trifluoride (NF_3), calculated as CO_2 equivalents (CO_2e).

Updates to the state's GHG inventory include incorporating oil and gas emissions into the industry sector, breaking out waste and materials management from the buildings sector into its own category, and breaking out natural and working lands from the agriculture sector into a standalone category.

METHODOLOGY

The inventory was developed using EPA's State Inventory Tool (SIT),[7] designed to help states develop GHG inventories to calculate and maintain in the future. The tool consists of 11 emissions modules that identify sources and sinks within the state using a top-down approach for calculating GHG emissions. Each module included various levels of default data. For the purposes of this inventory, default data include datasets contained within the SIT modules used to populate inputs for the state. Data not included within the modules but were suggested by a module are default data. A majority of default data were used to complete the SIT modules upon checking for accuracy against external sources and determining that the default data source recommended by EPA is the most accurate and up-to-date source of data available. If default data were not available or insufficient, data from other state, industry, or federal sources were used.

RESULTS

As each module was completed, summary files were loaded into the SIT synthesis tool. The aggregate data from the modules were then separated into the appropriate sectors, resulting in the baseline North Dakota state GHG inventory.

Table 1 summarizes the total GHG emissions. Gross emissions for 2019 totaled 90.3 million metric tons of CO_2e ($MMtCO_2e$) and net emissions for 2019, the sum of emission sources and sinks, totaled 84.9 $MMtCO_2e$. This is equivalent to nearly 20 million gasoline-powered passenger vehicles driven for one year. Carbon sinks sequestered about 5.4 $MMtCO_2e$, equivalent to about 90 million tree seedlings grown for ten years. The results displayed by sector are shown in Figure 1. The highest emitting sectors in North Dakota include industrial processes, fuel and electricity consumption, which make up the highest proportion of statewide emissions at 39 percent. Emissions from cropland and livestock

[7] U.S. Environmental Protection Agency. February 5, 2024. "State Inventory and Projection Tool." Accessed November 2024. Retrieved from: https://www.epa.gov/statelocalenergy/state-inventory-and-projection-tool

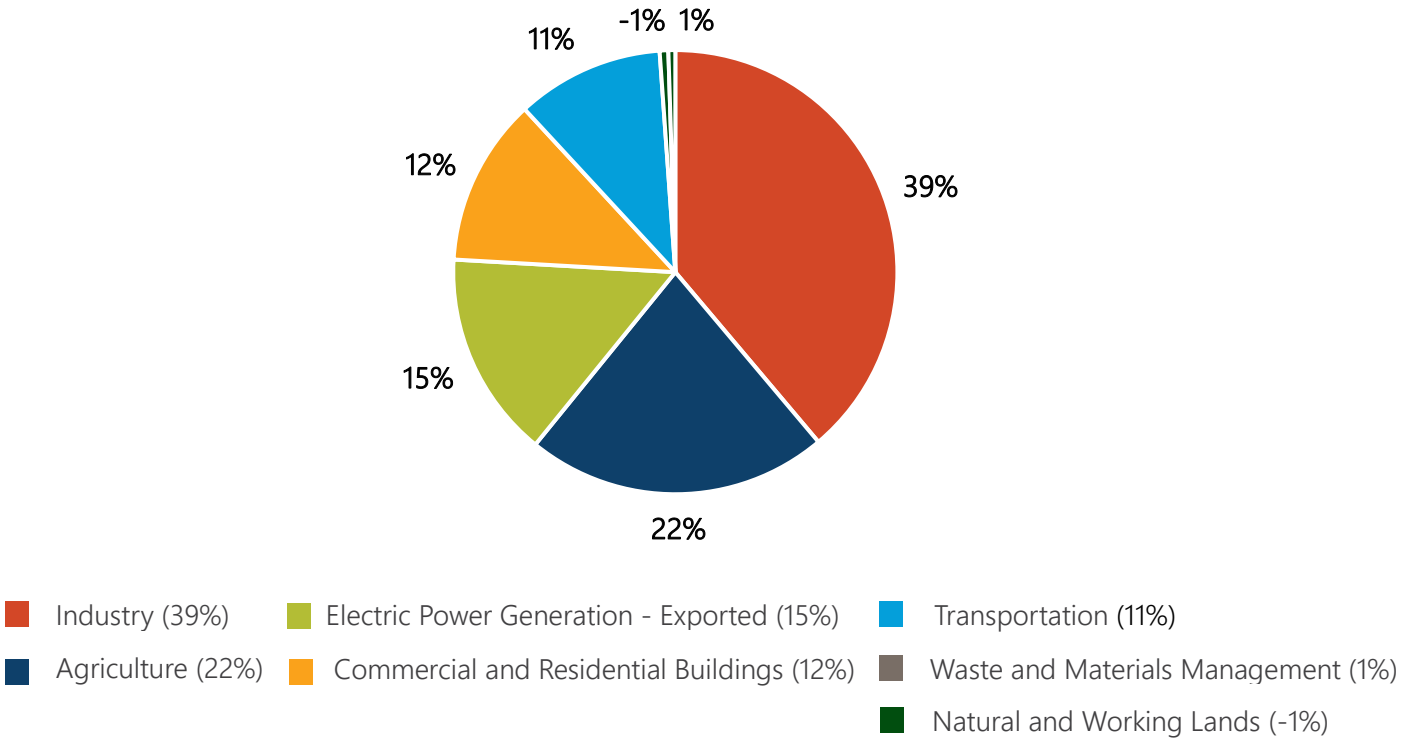
operations comprise the second highest at 22 percent, and electric power generation is the third highest at 15 percent.

North Dakota is a center for energy innovation, advanced manufacturing, and agricultural expertise. These sectors also represent some of the highest sources of GHG emissions in the state and offer an opportunity to develop innovative approaches to reduce emissions. This draft GHG reduction framework is aligned with the primary drivers of North Dakota's economy and focuses on identifying opportunities for investing in GHG emission reduction measures in the highest emitting sectors, as discussed in Section 4.

Table 1. North Dakota 2019 GHG Emissions by Greenhouse Gas

Greenhouse Gas	Emissions in $MMtCO_2e$
Gross CO_2	62.7
Net CO_2	57.3
CH_4	11.3
N_2O	15.9
HFC, PFC, SF_6, and NF_3 Emissions	0.4
Gross Total	90.3
Sinks Total	-5.4
Net GHG emissions	84.9

Figure 1. North Dakota 2019 Gross GHG Emissions by Sector (% of total GHG emissions)



This chart shows a breakdown of the total 2019 GHG emissions by sector. Industrial processes, fuel and electricity consumption make up the highest proportion of state-wide emissions at 39 percent. Emissions from cropland and livestock operations make up the second highest at 22 percent, and electric power generation is the third highest with 15 percent.

3. BUSINESS-AS-USUAL EMISSIONS PROJECTIONS

OVERVIEW

A business-as-usual (BAU) GHG emissions projections scenario refers to a projection of future GHG emissions accounting based on current trends, assuming no significant changes in current policies, practices, or technological advancements aimed at reducing emissions. The BAU scenario is used as a baseline to compare the potential impacts of various emissions mitigation strategies and to highlight the benefits associated with implementing measures to curb GHG emissions.

Aligned with North Dakota's updated 2019 GHG inventory, the BAU scenario models emissions from the baseline year 2019. The BAU scenario projects emissions for the following sectors through 2050: agriculture, commercial and residential buildings, electricity generation, industry, natural and working lands, transportation, waste and materials management.

METHODOLOGY

This analysis incorporated information from a variety of publicly available projection tools and data sources from the EPA, the National Renewable Energy Laboratory's Regional Energy Deployment System

model[8], and the U.S. Energy Information Administration. Additionally, the planning team met with a variety of North Dakota stakeholders to develop an understanding of what programs, policies, limitations and opportunities from the 2019 baseline could be used to inform North Dakota's BAU emissions projections through 2050.

Most emissions are projected utilizing default data from EPA's State Projection Tool (SPT)[9] for 2022-2050 and North Dakota's updated 2019 GHG inventory for 2019 emissions. Annual emissions between 2019 and 2022 are interpolated. The exception is the electric generation sector, developed based on existing conditions and anticipated trends in coal, natural gas, and renewable energy production, and emissions from electricity use, which utilize annual grid emissions intensity factors calculated from the electric generation sector BAU emissions. As this analysis was completed in 2025, the scenario assumes that the Clean Air Act Section 111 rule is not in effect, but policies funded through the Inflation Reduction Act are in effect. Additionally, land use and land use change emissions were estimated using EPA's SIT[10].

RESULTS

North Dakota's GHG emissions decreased from 2019 to 2025 but are projected to increase slightly through 2050, resulting in a relatively constant level of emissions, as shown in Figure 2. To avoid double counting of emissions between electricity generation and electricity use, emissions from electricity use accounted for in the industry and commercial and residential buildings sectors have been removed from the electricity generation sector. Figure 3 shows total electricity production by source through 2050. The slight dip in wind power from 2035 to 2038 is aligned with an increase in battery storage, indicating that the electric grid may be saturated at this time.

The BAU scenario serves as a reference case, showing what emissions might look like without additional interventions, and it is the foundation for evaluating the emissions impact of proposed GHG emissions reduction measures as shown in Section 4. The draft GHG emission reduction measures were developed

[8] Scenario Viewer Standard Scenarios 2024. National Renewable Energy Laboratory. Accessed February 21, 2025. Retrieved from: https://scenarioviewer.nrel.gov/?project=5573be35-16d1-4bc3-8c4d-38529c7bb640&mode=browse&layout=Default

[9] State Projection Tool. Environmental Protection Agency. Accessed October 22, 2024. Retrieved from: https://www.epa.gov/statelocalenergy/state-inventory-and-projection-tool

[10] State Inventory Tool. Environmental Protection Agency. Accessed November 2023. Retrieved from: https://www.epa.gov/statelocalenergy/download-state-inventory-and-projection-tool

through extensive stakeholder engagement and designed to reflect projected trends from the BAU scenario.

Figure 2. North Dakota BAU GHG Emissions Projections

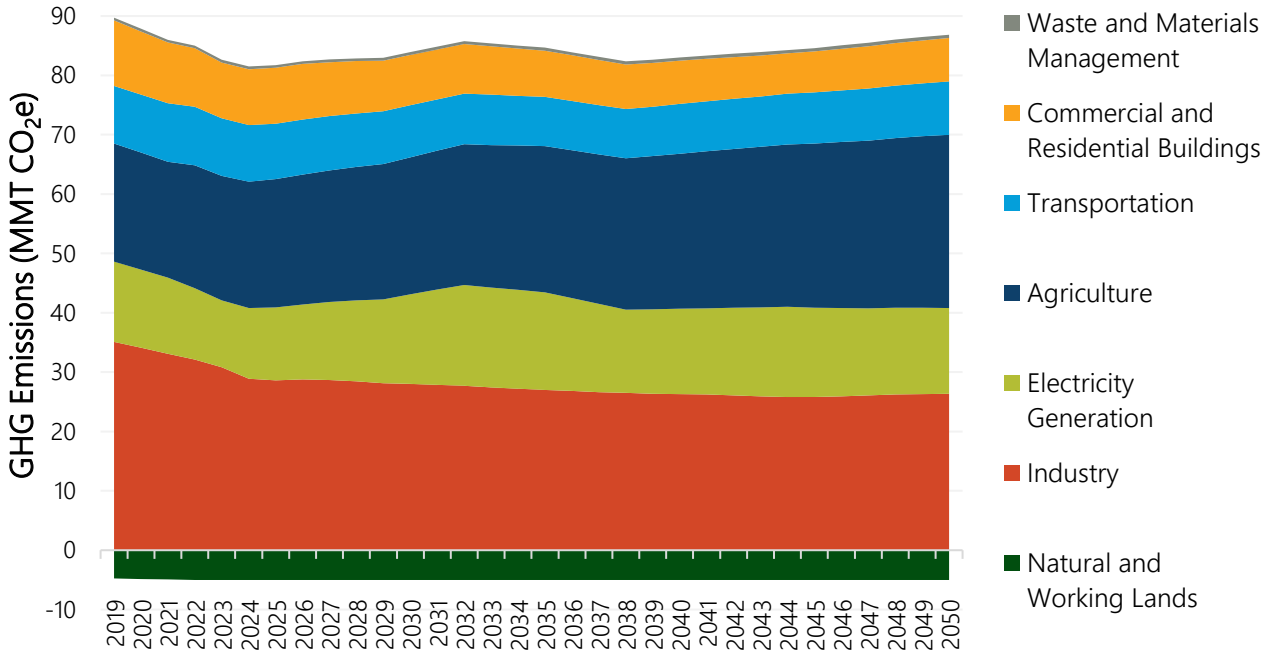


Figure 2 shows the emissions from agriculture, industry and electricity generation and use sectors account for the largest source of GHG emissions.

Figure 3. BAU Electricity Generation Projections by Source

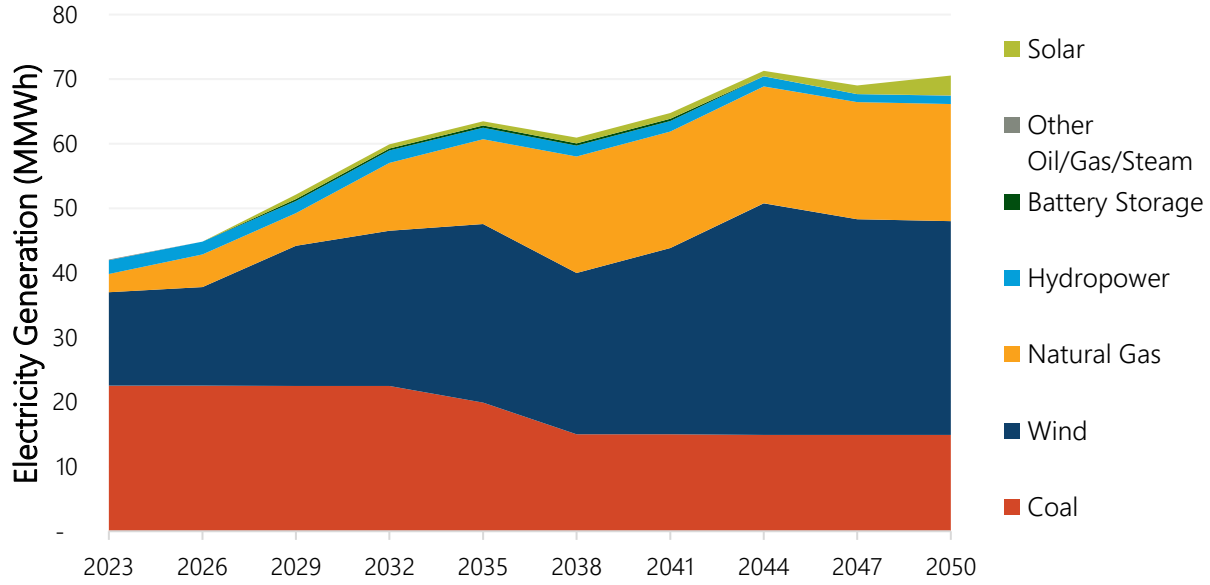


Figure 3 shows total electricity production by source through 2050. Coal production is projected to decrease as coal plants reach their end of life, and wind and natural gas production will increase.

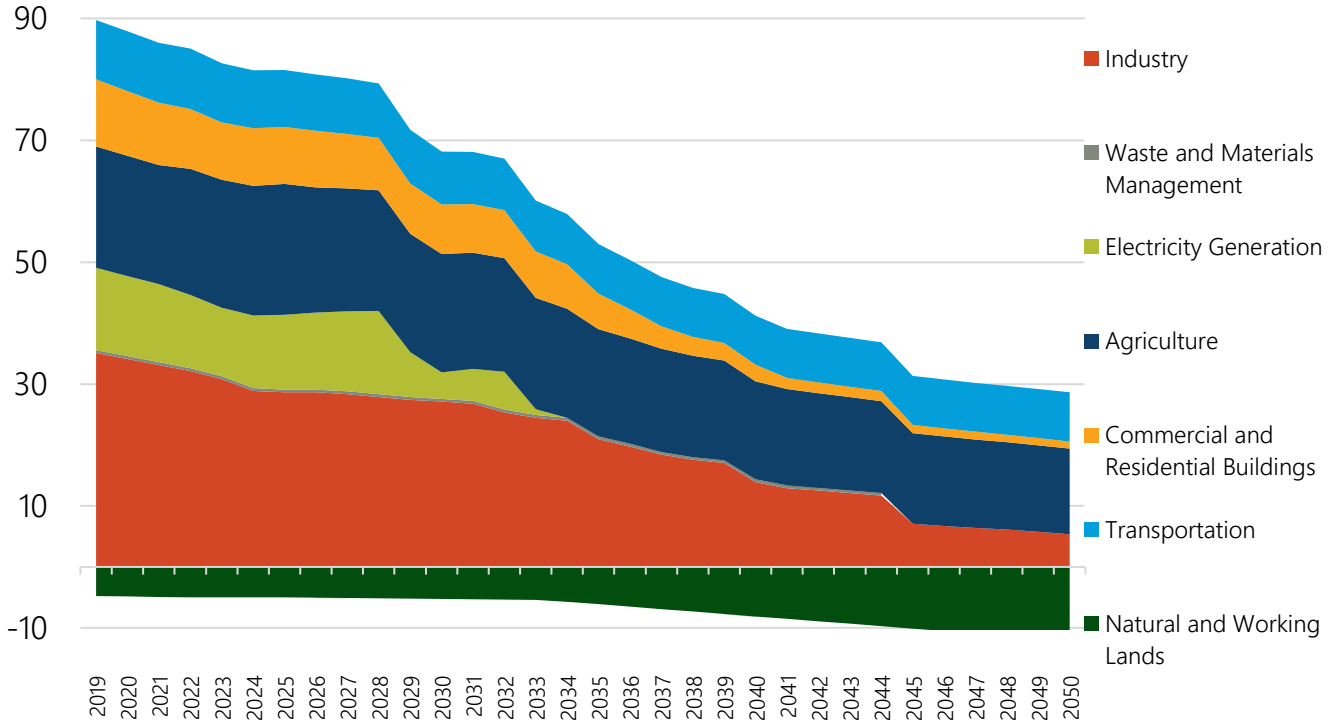
4. DRAFT GHG EMISSIONS REDUCTION MEASURES

This draft GHG reduction framework includes a set of 15 GHG emissions reduction measures for all economic sectors across the state. These opportunities reflect the priorities and needs of North Dakotans identified through extensive stakeholder engagement and reflect actions that seek to expand funding opportunities and increase access to programs that reduce emissions while benefiting communities. The following 15 draft GHG emissions reduction measures are intended to help fuel local economies, strengthen energy independence and reduce pollution throughout North Dakota.

These 15 GHG emissions reduction measures were selected through a strategic decision-making process informed by high levels of support from North Dakotans across stakeholder engagement activities, budgetary constraints, and feasibility of implementation within the planning and funding horizon. While other GHG emissions reduction measures were considered, these 15 measures were prioritized as they represent the most actionable, cost-effective, and broadly supported opportunities available to the state at the time of planning that could produce the greatest impact on GHG emission reductions.

This draft GHG reduction framework leverages opportunities for all major sectors of the state's economy and supports North Dakota's goal to aim for an 80 percent reduction by 2050. Figure 4 depicts the projected statewide emissions trajectory through 2050 across North Dakota's economy with the implementation of 15 draft GHG emissions reduction measures. Compared to the BAU scenario, significant emissions reductions from the electricity generation sector occur in 2028, enabling subsequent emissions reductions from commercial, residential and industrial electricity use as the electric grid becomes cleaner. Industrial fuel and process emissions also begin to decrease steadily in 2026. Grasslands and wetlands increase carbon sequestration starting in 2030. By 2035, GHG emissions are projected to decrease by about 45 percent, and by 2050, GHG emissions are projected to decrease by 80 percent, relative to 2019 emissions.

Figure 4. GHG Emissions Reduction Scenario (2019-2050)



The largest projected GHG emissions reductions occur in industry, electricity generation, and commercial and residential buildings. By 2035, GHG emissions are projected to decrease about 45 percent, and by 2050, GHG emissions are projected to decrease 80 percent, relative to 2019 emissions.

The following 15 GHG reduction measures encompass the range of draft actions and strategies that North Dakota could implement to reduce GHG emissions, as depicted in Figure 4. This draft GHG reduction framework is aligned with the primary drivers of North Dakota's economy and focuses on identifying opportunities for investment in agriculture, commercial and residential buildings, electric generation, industry, natural and working lands, transportation, and waste and materials management. While sustainability initiatives are already well underway across the state, the following set of 15

measures enhances those actions that are projected to have the largest impact on reducing GHG emissions while also benefiting local communities and growing the state's economy.

AGRICULTURE

ENHANCE SOIL HEALTH ON CROP LANDS

4.1	GHG Reduction Measure #1 Enhance Soil Health on Crop Lands
Description	Restore and conserve soil health in agricultural cropland systems. Funding provided by the expansion of existing programs will incentivize the adoption of cover cropping, no-till, and reduced-till practices across North Dakota. Additionally, educational programs and training, such as Menoken Farm, will be expanded to equip farmers with the best practices to enhance soil health. North Dakota Department of Agriculture and the Soil Conservation Districts (SCD) will implement this measure by increasing the total funding for cover crops, reduced-till and no-till incentive programs. Expected GHG reductions from implementing this measure are equivalent to over 3 million acres of forests removing carbon over one year.
Estimate of GHG Emissions Reductions	GHG Emissions Reduced in 2030 (metric tons of carbon dioxide equivalent [MMT CO_2e]): 0.23 GHG Emissions Reduced in 2050 (MMT CO_2e): 3.14
GHG Emissions Reduction Potential	Moderate
Possible Implementing Experts	North Dakota Department of Agriculture, North Dakota Association of Soil Conservation Districts
Geographic Location	North Dakota statewide
Potential Community Benefits	Improve soil resilience, environmental awareness and connection to land stewardship, soil water and nutrient retention, water and air quality; increase job opportunities; and reduce agricultural runoff, outdoor respiratory stressors, and healthcare costs
Sector	Agriculture

EXPAND CLIMATE-SMART AGRICULTURE PRACTICES

4.2	GHG Reduction Measure #2 Expand Climate-Smart Agriculture Practices
Description	Advance regenerative and climate-conscious agriculture practices across the sector. In the context of this measure, climate-smart agriculture practices include, but are not limited to, the following: crop rotation, pasture and hay planting, fertilizer management, cover cropping, no- and low-till, water use management, prescribed grazing, manure waste management, feed management, silvopasture, riparian herb and tree buffers, and tree and shrub establishment. This measure will be through expanding voluntary incentive programs, such as the existing Alliance to Advance Climate-Smart Agriculture, which provides a financial incentive per acre or animal unit engaged in eligible climate-smart agriculture practices, targeting 40 percent of enrollees considered underserved producers. Expected GHG reductions from implementing this measure are equivalent to just over 9 million acres of forests removing carbon over one year.
Estimate of GHG Emissions Reductions	GHG Emissions Reduced in 2030 (MMT CO_2e): 2.8 GHG Emissions Reduced in 2050 (MMT CO_2e): 9.3
GHG Emissions Reduction Potential	Moderate
Possible Implementing Experts	North Dakota Farmer's Union
Geographic Location	North Dakota statewide
Potential Community Benefits	Improve air and water quality, wildlife habitat, environmental stewardship, soil water and nutrient retention; increase job and income generating opportunities; and reduce outdoor respiratory stressors, healthcare costs, and agricultural runoff
Sector	Agriculture

SUPPORT BIOENERGY AND CARBON CAPTURE AND STORAGE

4.3	GHG Reduction Measure #3 Support Bioenergy and Carbon Capture and Storage
Description	Promote the adoption of bioenergy and carbon, capture and storage (BECCS), leveraging the state's existing bioenergy resources and geological storage potential. The primary focus of the measure is the implementation of carbon capture on all existing biofuel production facilities, with additional emissions reductions resulting from biomass co-firing in industrial facilities. These projects use plant-based materials (biomass) to produce energy and capture the resulting carbon emissions for permanent underground storage. Facilities that can prove they remove more carbon than they emit could qualify for additional tax credits. Expected GHG reductions from implementing this measure are equivalent to avoiding burning nearly 15,000 railcars worth of coal.
Estimate of GHG Emissions Reductions	GHG Emissions Reduced in 2030 (MMT CO_2e): 0.64 GHG Emissions Reduced in 2050 (MMT CO_2e): 2.66
GHG Emissions Reduction Potential	Moderate
Possible Implementing Experts	North Dakota Industrial Commission, Department of Commerce
Geographic Location	North Dakota statewide
Potential Community Benefits	Improve air quality; increase job opportunities and carbon offset revenue streams; and reduce agricultural waste and fossil fuel combustion
Sector	Agriculture, Industry

COMMERCIAL AND RESIDENTIAL BUILDINGS

IMPROVE ENERGY EFFICIENCY IN PUBLIC AND COMMERCIAL BUILDINGS

4.4	GHG Reduction Measure #4 Improve Energy Efficiency in Public and Commercial Buildings
Description	Reduce energy consumption in public and commercial buildings across North Dakota. This will be done by developing building standards, ensuring that all new construction and existing buildings improve efficiency and lower long-term energy costs across North Dakota. This measure also supports the installation of retrofits such as high-efficiency appliances and HVAC systems, window upgrades, LED lighting, hybrid/electric boilers, and heat pumps. Existing programs to be enhanced include programs such as the Energy Conservation Grant, Energy Efficiency Community Block Grant Program, and the State Energy Program. Expected GHG reductions from implementing this measure are equivalent to nearly 190,000 homes' energy use for one year.
Estimate of GHG Emissions Reductions	GHG Emissions Reduced 2030 (MMT CO2e): 0.3 GHG Emissions Reduced 2050 (MMT CO2e): 1.4
GHG Emissions Reduction Potential	Moderate
Possible Implementing Experts	North Dakota Department of Commerce, Community Services
Geographic Location	North Dakota statewide
Potential Community Benefits	Improve building comfort and resilience, quality of life for residents, indoor and outdoor air quality, and resident health; increase job opportunities, grid resilience and property value; and reduce, utility bills and public expenditures
Sector	Commercial and Residential Buildings

EXPAND WEATHERIZATION ASSISTANCE FOR LOW INCOME HOUSEHOLDS

4.5

GHG Reduction Measure #5

Expand Weatherization Assistance for Low-Income Households

Description	Expand the existing Low Income Weatherization Assistance Program (WAP), which is administered through the Department of Commerce. WAP provides funding to low-income and disadvantaged communities to weatherize their homes and rental properties. The proposed expansion will increase funding to the program and allocate additional funding for energy efficiency upgrades to reach more residents for improvements like insulation and air sealing and include support for the electrification of HVAC systems and appliances. Expected GHG reductions from implementing this measure are equivalent to nearly 5,500 homes' energy use for one year.
Estimate of GHG Emissions Reductions	GHG Emissions Reduced 2030 (MMT CO_2e): 0.01 GHG Emissions Reduced 2050 (MMT CO_2e): 0.04
GHG Emissions Reduction Potential	Moderate
Possible Implementing Experts	Department of Commerce, Community Services
Geographic Location	North Dakota statewide
Potential Community Benefits	Improve building comfort and resilience, quality of life for residents, outdoor and indoor air quality, and resident health; increase job, training and educational opportunities, environmental awareness, property values; and reduce energy burdens and utility bills
Sector	Commercial and Residential Buildings

ELECTRIC GENERATION

EXPAND CARBON CAPTURE AT POWER PLANTS

4.6	GHG Reduction Measure #6 Expand Carbon Capture at Power Plants
Description	Install carbon capture, utilization, and storage (CCUS) systems at all major fossil-fuel-fired power plants across North Dakota, targeting the largest emitters and remaining coal power plants. By incentivizing all newly built fossil fuel power plants to include CCUS technology, this measure is focused on capturing at least 90% of carbon emissions produced on-site. The carbon dioxide captured from this measure will be utilized for enhanced oil recovery in the Bakken Region. This measure is expected to significantly decrease the grid's carbon intensity, thereby reducing emissions from electricity use. The Energy & Environmental Research Center, with financial support from the Industrial Commission, is currently in the preliminary stages of developing CCUS projects on Milton R Young and Coal Creek power plants. This measure will be supported by private sector partners. It is anticipated that all CCUS systems will be implemented by 2041. Expected GHG reductions from implementing this measure are equivalent to avoiding burning over 100,000 railcars worth of coal.
Estimate of GHG Emissions Reductions	GHG Emissions Reduced 2030 (MMT CO2e): 10.77 GHG Emissions Reduced 2050 (MMT CO2e): 18.81
GHG Emissions Reduction Potential	Very High
Possible Implementing Experts	North Dakota Industrial Commission; Energy & Environmental Research Center
Geographic Location	North Dakota statewide
Potential Community Benefits	Increase job, training and educational opportunities, revenue streams from enhanced oil recovery, carbon offset revenue streams
Sector	Electric Generation

INCENTIVES FOR LOW CARBON ENERGY DEPLOYMENT

4.7	GHG Reduction Measure #7 Incentives for Low Carbon Energy Deployment
Description	Enhance the state's low-carbon energy portfolio by incentivizing the development of utility-scale low carbon electricity. This includes expanding the eligibility of an existing wind tax incentive to cover wind systems constructed after January 1, 2015. Additionally, extend eligibility to additional forms of generation such as solar, geothermal, hydroelectric, and energy storage.[11] Expected GHG reductions from implementing this measure are equivalent to over 1,300 wind turbines running for one year.
Estimate of GHG Emissions Reductions	GHG Emissions Reduced 2030 (MMT CO2e): 0 GHG Emissions Reduced 2050 (MMT CO2e): 4.39
GHG Emissions Reduction Potential	High
Possible Implementing Experts	Office of State Tax Commissioner, North Dakota Department of Commerce
Geographic Location	North Dakota statewide
Potential Community Benefits	Improve grid resilience, air quality, and access to local energy sources; increase job, training and educational opportunities, environmental awareness, local tax revenues, and revenue for farmers who host renewable energy generation; and reduce healthcare costs and outdoor respiratory stressors
Sector	Electric Generation

[11] HB 1025 was recently passed in the 69th Legislative Assembly to initiate a study relating to advanced nuclear energy. Nuclear energy is not included in the estimate of GHG emission reductions because it was completed before HB 1025 was passed by the legislature when greater uncertainties existed around the future of nuclear energy in North Dakota.

INDUSTRY

REDUCE EMISSIONS FROM OIL AND GAS OPERATIONS OIL AND GAS OPERATION DECARBONIZATION

4.8  GHG Reduction Measure #8 Reduce Emissions from Oil and Gas Operations

Description	Reduce GHG emissions in the oil and gas industry by enhancing methane leak detection and reduction, and increasing funding for well site reclamation and remediation, focusing on converting abandoned well sites into potential locations for renewable energy development. It also encourages all new oil and gas facilities to include CCUS systems in design and construction for enhanced oil recovery and to consider geothermal energy to power operations. Expected GHG reductions from implementing this measure are equivalent to avoiding consuming nearly 12 million barrels of oil.
Estimate of GHG Emissions Reductions	GHG Emissions Reduced 2030 (MMT CO2e): 0.51 GHG Emissions Reduced 2050 (MMT CO2e): 5.18
GHG Emissions Reduction Potential	High
Possible Implementing Experts	Oil and Gas Division at the Department of Mineral Resources, Industrial Commission
Geographic Location	Western North Dakota, Bakken Region
Potential Community Benefits	Improve air quality, grid resilience and diversification; increase job, training, and educational opportunities; and reduce healthcare costs and outdoor respiratory stressors
Sector	Industry, Electricity Generation

4.9 GHG Reduction Measure #9 Support Development of Low-Carbon Hydrogen Production

Description	Encourage the development of low-carbon hydrogen (blue hydrogen) production facilities in North Dakota to support long-term industrial decarbonization. The Heartland Hydrogen Hub (HH2H) is one of the seven clean hydrogen hubs managed by the U.S. Department of Energy. The goal of this program is to establish hydrogen production across North Dakota, South Dakota, Minnesota, Montana, Wisconsin and Colorado. This measure will support facilities that use clean natural gas to produce hydrogen while capturing and storing carbon emissions, providing a cleaner fuel for hard-to-decarbonize sectors like heavy industry transportation. Heartland Hydrogen Hub, LLC, is leading this effort, with program management from the University of North Dakota Energy & Environmental Research Center and project partners Atlas Agro North America Corp. and Xcel Energy Services Inc. Expected GHG reductions from implementing this measure are equivalent to avoiding burning nearly 3,000 railcars worth of coal.
Estimate of GHG Emissions Reductions	GHG Emissions Reduced 2030 (MMT CO_2e): 0 GHG Emissions Reduced 2050 (MMT CO_2e): 0.53
GHG Emissions Reduction Potential	Moderate
Possible Implementing Experts	Energy & Environmental Research Center
Geographic Location	North Dakota statewide
Potential Community Benefits	Improve air quality; increase job, training, and educational opportunities; and reduce respiratory stressors and healthcare costs
Sector	Industry

4.10 GHG Reduction Measure #10

Build Commercial Carbon Capture, Utilization, and Storage Infrastructure

Description	Develop a statewide network of carbon management hubs to permanently store CO_2 emissions from industrial and energy facilities. Carbon capture, utilization and storage hubs will be established across the state, reducing carbon dioxide from large-scale industrial manufacturing and refinery facilities. This measure will support the creation of a network of pipeline collection points for carbon dioxide in industrial parks and hub sites and increase state tax incentives to support the development of deployment of this infrastructure. This network of hubs will provide opportunities for enhanced oil recovery across the Bakken Region. There are currently two carbon management hubs in the preliminary assessment and design phase, including Prairie Compass Carbon Storage Hub and Roughrider Carbon Storage Hub. This is a longer-term measure, with operations for Prairie Compass expected to begin in the early 2030s and additional hubs to come online through 2050. Expected GHG reductions from implementing this measure are equivalent to nearly 2.2 million gasoline-powered passenger vehicles driven for one year.
Estimate of GHG Emissions Reductions	GHG Emissions Reduced 2030 (MMT CO2e): 0 GHG Emissions Reduced 2050 (MMT CO2e): 9.33
GHG Emissions Reduction Potential	Very High
Possible Implementing Experts	Industrial Commission, Energy & Environmental Research Center
Geographic Location	North Dakota statewide
Potential Community Benefits	Increase jobs, training, and educational opportunities, and carbon offset revenue streams
Sector	Industry

INCENTIVIZE INDUSTRIAL ENERGY EFFICIENCY IMPROVEMENTS

4.11		GHG Reduction Measure #11 **Incentivize Industrial Energy Efficiency Improvements**
Description		Provide new financial incentives to help industrial facilities install energy efficiency upgrades, prioritizing the highest emitting and energy-intensive sectors. Energy efficiency upgrades will reduce electricity and fuel consumption in the industrial sector, focusing on equipment and processes - like process heat systems - that offer the most potential for efficiency gains and cost savings. Expected GHG reductions from implementing this measure are equivalent to over 250,000 homes' energy use over one year.
Estimate of GHG Emissions Reductions		GHG Emissions Reduced 2030 (MMT CO_2e): 0.38 GHG Emissions Reduced 2050 (MMT CO_2e): 1.92
GHG Emissions Reduction Potential		Moderate
Possible Implementing Experts		Industrial Commission, Department of Commerce
Geographic Location		North Dakota statewide
Potential Community Benefits		Improve air quality; increase job, training, and educational opportunities; and reduce respiratory stressors, healthcare costs, and utility bills
Sector		Industry

4.12	GHG Reduction Measure #12 Expand Restoration and Conservation of Wetlands and Native Prairies
Description	Enhance carbon sequestration through the conservation and restoration of native prairies and wetlands. These natural climate solutions store carbon, support biodiversity and protect water and soil resources. Increasing funding to active programs that support the conservation and restoration of grasslands and wetlands will increase the number of acres engaged in these practices and maximize GHG reductions. Expected GHG reductions from implementing this measure are equivalent to over 7 million acres of US forests removing carbon over the span of one year.
Estimate of GHG Emissions Reductions	GHG Emissions Reduced 2030 (MMT CO2e): 0.24 GHG Emissions Reduced 2050 (MMT CO2e): 7.1
GHG Emissions Reduction Potential	High
Possible Implementing Experts	Game and Fish Department
Geographic Location	North Dakota statewide
Potential Community Benefits	Improve land stewardship, quality of life for residents, air and water quality, green spaces, biodiversity and wildlife habitat, hunting access, animal sighting opportunities, mental health, environmental awareness, soil quality and water retention, resilience to extreme weather; increase jobs, training, and educational opportunities; and reduce erosion, outdoor respiratory stressors, and healthcare costs
Sector	Natural and Working Lands, Agriculture

4.13	GHG Reduction Measure #13 Expand and Modernize Public Transit Systems
Description	Improve intercity and regional transit systems through the development of new, small urban transit systems, the expansion and improvement of existing larger urban systems, and the exploration of passenger rail[12]. This measure also recommends planning for future Bus Rapid Transit (BRT) to support faster, more efficient service between key communities. To enhance emissions reductions, public transit agencies could consider purchasing new alternative fuel or battery electric buses and replacing all existing diesel buses by 2050. Expected GHG reductions from implementing this measure are equivalent to removing 2,000 vehicles from the road for one year.
Estimate of GHG Emissions Reductions	GHG Emissions Reduced 2030 (MMT CO2e): 0.006 GHG Emissions Reduced 2050 (MMT CO2e): 0.008
GHG Emissions Reduction Potential	Moderate
Possible Implementing Experts	Department of Transportation
Geographic Location	North Dakota statewide
Potential Community Benefits	Improve access to transportation and services, air quality, economic benefits from tourism; increase job, training, and educational opportunities, economic potential, and attract population growth; and reduce respiratory stressors and healthcare costs
Sector	Transportation

[12] Greater uncertainties existed around the future of passenger rail in North Dakota before the 69th Legislative Assembly when the GHG emissions estimates were completed; therefore, passenger rail was not included in the analysis.

EXPAND ELECTRIC VEHICLE INFRASTRUCTURE AND INCENTIVES

4.14	GHG Reduction Measure #14 Expand Electric Vehicle Infrastructure and Incentives
Description	Explore additional funding opportunities to build more EV charging stations, especially at multi-family housing units, businesses, and underserved areas. Consider creating a tax incentive for residents and businesses that invest in EVs or transition their fleets. The North Dakota Department of Transportation has received several grants to create a network of electric vehicle charging infrastructure on busy highways and in rural communities. To incentivize the adoption of electric vehicles, funding could be increased to continue building out North Dakota's EV charging network. This measure also proposes a public funding program to help electrify school buses across the state by 2050. Expected GHG reductions from implementing this measure are equivalent to removing nearly 215,000 gasoline-powered passenger vehicles from the road for one year.
Estimate of GHG Emissions Reductions	GHG Emissions Reduced 2030 (MMT CO2e): 0.05 GHG Emissions Reduced 2050 (MMT CO2e): 0.92
GHG Emissions Reduction Potential	Moderate
Possible Implementing Experts	Department of Transportation
Geographic Location	North Dakota statewide, Office of Tax Commissioner
Potential Community Benefits	Improve access to EV charging infrastructure, buyer motivation for EV purchases, and air quality; increase job, training, and educational opportunities, and attract population growth; and reduce respiratory stressors and healthcare costs
Sector	Transportation

WASTE AND MATERIALS MANAGEMENT

REDUCE WASTE THROUGH COMPOSTING AND RECYCLING IMPROVEMENTS

4.15	GHG Reduction Measure #15 Reduce Waste Through Composting and Recycling Improvements
Description	Expand and improve waste reduction programs by upgrading recycling, composting, and sorting systems - especially in North Dakota's largest cities. Improve education and outreach around existing waste management programs to increase the adoption of actions to reduce landfilled waste. This includes actions such as adding more options for composting, supporting the production of biofuels from organic waste, supporting reuse and feed corn screenings, and increasing sorting at the source to keep more materials out of landfills. North Dakota residents can directly contribute to these actions, which provide a wide range of benefits to local communities. Expected GHG reductions from implementing this measure are equivalent to nearly 14 million trash bags of waste being recycled instead of landfilled.
Estimate of GHG Emissions Reductions	GHG Emissions Reduced 2030 (MMT CO2e): 0.02 GHG Emissions Reduced 2050 (MMT CO2e): 0.16
GHG Emissions Reduction Potential	Moderate
Possible Implementing Experts	Department of Environmental Quality Waste Management Division
Geographic Location	North Dakota statewide
Potential Community Benefits	Improve quality of life for residents, air quality, and environmental awareness; increase job, training and educational opportunities; and reduce landfill use, respiratory stressors, and healthcare costs
Sector	Waste and Materials Management

5. NEXT STEPS

NDDEQ is actively engaging with residents, communities, Tribes, industries, and government entities through July 2025 to explore actionable and ambitious measures that support a sustainable environment, vibrant communities, and a robust economy for both present and future generations. NDDEQ is seeking feedback from the public on the 15 GHG emissions reduction measures described in Section 4 of this draft GHG reduction framework.

The planning team is currently seeking feedback on the GHG emissions reduction measures put forth in this draft GHG reduction framework. The planning team will integrate stakeholder feedback into the final version of the comprehensive plan, which will be released in December 2025. Plan materials and background information is available at www.deq.nd.gov/sustainability.

If you have questions about this draft GHG reduction framework or suggestions, please contact NDDEQ at deq@nd.gov.