

## City Efforts at Climate Resiliency, Renewable Energy, Emissions Reductions, Energy Efficiency and Environmental Stewardship

### Climate Resiliency

- **FM Area Diversion (Flood Resilience)**

The Red River Valley has a long history of frequent flooding on the Red River and its tributaries. The FM Area Diversion Project will provide permanent flood protection to the metro area. The project will qualify substantial portions of the FM metropolitan area for 100-year flood accreditation by the Federal Emergency Management Agency (FEMA) under the National Flood Insurance Program (NFIP). The project studied numerous alternative solutions and ultimately selected a diversion channel as the preferred alternative to provide the most resilient project. The project will be constructed such that, it will the ability to fight larger flood events that may exceed the 100-year flood. The FM Diversion Project is an effort to increase the region’s climate resiliency against flooding.

- **Red River Valley Water Supply (Drought Resilience)**

Fargo currently serves as a regional supplier of drinking water to Fargo, West Fargo and the Cass Rural Water Users District. Studies have shown that, under extended drought conditions, the Red River and Sheyenne River lack sufficient water to meet the regional water needs. Other studies have shown that, under extended drought conditions, the Missouri River is the only reliable source of water in the State of North Dakota. The Red River Valley Water Supply Project (RRVWSP) is a project to deliver Missouri River water to the Red River Valley and central North Dakota. Fargo, as a member of the Lake Agassiz Water Authority (LAWA) and a key sponsor of the RRVWSP, has nominated an allocation for water from the RRVWSP. The RRVWSP is a long-term effort to increase the region’s climate resiliency against drought and water supply shortages.

- **Drought Management Plan (Drought Resilience)**

In 2003, the Fargo adopted its first Drought Management Plan and began tracking drought conditions that could affect the City’s water supplies. The Drought Management Plan identified indicators of drought and actions that could be taken to restrict or conserve water use. The Drought Management Plan was a short-term effort to increase the region’s climate resiliency against drought and water supply shortages.

In 2015, the City updated its Drought Management Plan to include water use restrictions in the event of infrastructure limitations at the Water Treatment Plant or in the water distribution system.

### Renewable Energy

- **Landfill Gas Collection and Reuse**

The Fargo landfill is the only landfill in the state of North Dakota that currently captures and reuses landfill gas. In 2001, the City landfill began installing a gas collection system in an effort to control an “odor” (public nuisance) problem in the area around the landfill. Initially, the collected gas was destroyed through a flaring process. However, other opportunities were explored for a beneficial reuse of the gas. A list of the beneficial uses currently being employed are described in the following sections.

➤ **Cargill Renewable Fuel Alternative**

In late 2001, the practice of flaring landfill gas was noticed by officials at Cargill in West Fargo. Cargill expressed an interest in utilizing the gas based on previous experience at another Cargill facility in Fayetteville, NC. As a result, the City and Cargill contracted for the City to sell landfill gas to Cargill for their use as a renewable fuel in their drying processes (boilers). In 2002, the landfill began delivering an agreed upon amount of landfill gas to Cargill and they continue to purchase and utilize the gas to this day.

➤ **Electricity Generation**

Over time as the landfill continued to grow, the amount of gas available for capture grew as well. Therefore, the landfill has continued to expand the gas collection system. In an effort to utilize the additional gas, a 750-megawatt landfill gas burning generator was installed at the landfill (mid-2000's). An analysis was done comparing direct use of the electricity at the landfill versus selling the electricity to the adjacent power grid. Ultimately, it was determined that it was economically beneficial to sell the electricity to the adjacent power grid (Minnkota Power Cooperative).

➤ **Transfer Station Heat**

In addition to electricity generation, portion of the collected landfill gas is used to heat the landfill transfer station building. The transfer station building was constructed with a dual fuel heating system that can burn either landfill gas or natural gas.

➤ **Compressed Natural Gas**

The landfill is currently completing a project to convert a portion of the collected landfill gas to natural gas quality. This is done by removing impurities from the landfill gas. The converted gas can then be further compressed and utilized in number of applications to include vehicle fuel usage or being directly piped into existing natural gas supply lines.

● **Landfill Transfer Station Solar Panels**

In 2007, the landfill constructed a transfer station building in an effort to control wind-blown litter. The transfer station included a bank of solar panels along the south roofline. The solar panels produce electricity that is used directly at the landfill.

● **Landfill Wind Turbine**

In 2007, the landfill installed a commercial wind turbine as part of a renewable energy project. The wind turbine produces electricity that is used directly at the landfill.

● **City Hall Dual EV Charging Station**

Fargo recently received grant funding through the VW Settlement in the amount of \$88,453.40 for the acquisition and installation of an EV charging station at City Hall. The VW grant is a 100% grant which requires no local match. The charging station will be an 80-amp dual station for light duty electric vehicles. The EV charging station will be available to the public and provide a resource to those living and working in Fargo's downtown.

- **Central Garage Fuel Blending Station**

In 2012, the underground fuel storage tanks at Central Garage were nearing end of life. Rather than simply replacing the storage tanks, the city took the opportunity to install a new fueling station that allowed for blending fuel products. The fuel blending station allows the City to blend unleaded gasoline and diesel fuel with other renewable fuels such as ethanol or biodiesel.

- **Wastewater Reuse/Water Reclamation to Tharaldson Ethanol**

In 2007, Fargo and worked with Tharaldson Ethanol on a unique water reclamation partnership to utilize treated wastewater effluent as a water supply to produce ethanol. After the wastewater treatment process, treatment plant discharges treated effluent to the Red River of the North. A portion of the treated effluent is was diverted to a membrane treatment facility to provide additional treatment to achieve industrial water quality standards. From October 2008 through January 2020, Fargo has supplied Tharaldson Ethanol with just over 3.8 billion gallons of treated wastewater effluent. The project eliminated the need for Tharaldson Ethanol to seek a water supply from surface or groundwater sources. As a result, the project benefits Fargo, Tharaldson Ethanol and the environment.

- **Wastewater Reuse/Water Reclamation for Process Water**

Treated wastewater effluent is also utilized throughout the treatment plant for certain processes, cleaning and wash down purposes. On a daily basis, up to 1.9 million gallons of treated wastewater effluent is reused avoiding the need to use water from the water distribution system.

- **Geothermal Heating at Sanitary Lift Stations #60 and #61**

Fargo utilizes geothermal heating and cooling at two of it's major lift stations, #60 and #61. Geothermal heating provides a clean renewable heating and cooling system at the lift stations, reducing the need for natural gas and electricity. Where traditional heating systems rely on electricity or natural gas to operate, the geothermal heating systems relies on the earth's heat stored below the ground. The geothermal system require a very small amount of electricity to operate. For every unit of electricity used to operating the geothermal system, the heat pumps can deliver up to five times the energy from the ground. The result is an overall reduction in energy consumption.

- **Water Ground Storage Reservoir Community Solar Garden**

In 2016, the Fargo partnered with Cass County Electric Cooperative to complete the Prairie Sun Community Solar project. The project was the first active community solar project in the state of North Dakota. The project included the installation of a 102kW solar array (CCEC) on 30,000 square feet of land (City) near a ground storage water reservoir at 52<sup>nd</sup> Avenue South and 63<sup>rd</sup> Street.

- **Wastewater Treatment Plant Digester Gas Collection and Reuse**

Fargo's wastewater treatment plant utilizes anaerobic digestion for stabilization of the solids removed in the treatment process. Anaerobic digestion produces a biogas that is approximately 70% methane. The biogas is collected and utilized as an alternative fuel at the facility. The primary use is to fuel boilers, which produce heat for the anaerobic digesters multiple buildings. The biogas is a renewable fuel and reduces the amount of natural gas required at the facility. On an annual basis, nearly 20 billion BTUs of biogas is collected and reused at the wastewater treatment plant.

- **RoCo Smart Energy Ramp Project**

The North Dakota Industrial Commission recently awarded funding to eSmart Systems to partner with the City of Fargo on a RoCo Smart Energy Ramp Project. The Smart Energy Ramp Project is a public-private effort to demonstrate the use of renewable energy and artificial intelligence in an urban environment. The project will retrofit the RoCo parking ramp with the following:

- EV Chargers
- Photovoltaic Arrays
- Battery Storage
- Programmable LED Lights/Lighting Controls

In addition, eSmart Systems will provide the City with Intelligent Control Software. The control software will be provided under a Software-as-a-Service (SaaS) model. As part of eSmart's contribution to the project, the City will receive a 10-year subscription to use the software to optimize the use of the above equipment in providing service, controlling energy costs, and maximizing the use of renewable energy.

The RoCo Smart Energy Project is a partnership between ChargePoint, Microsoft, Xcel Energy, Kilbourne Group, Border States Electric, MBN Engineering, and the City of Fargo. The demonstration project will be a tool to evaluate the viability of installing future charging/solar/battery equipment in other parking facilities.

- **Community Wind Turbine Project**

In 2010, the City pursued a wind turbine project by submitting a loan application to the federal Qualified Energy Conservation Bonds (QECCB) program. The wind turbine was to be located on a quarter section of leased land along I-94 east of Valley City. The location was selected because of an excellent wind regime in that area. The purpose of the 1.5 megawatt (MW) wind turbine project was to generate renewable electricity to be sold to the local power company. The project was intended, in part, to reduce the City's carbon footprint by offsetting electrical usage in City facilities. Due to difficulties with procurement of equipment and a reduction in renewable energy pricing, the project was never completed.

## Emissions Reductions

- **Hybrid MAT Buses**

The Metropolitan Area Transit system has added hybrid buses to the local public transportation system.. The hybrid buses run on a diesel-electric propulsion system. The engine and transmission system run on electricity up to approximately 35 miles per hour (mph). After the bus reaches 35 mph, the diesel system takes over. The hybrid system results in 25-50% better fuel economy than a conventional diesel system. Hybrid buses equipped with the Allison EP System™ produce much lower hydrocarbon and carbon monoxide emissions than conventional diesel buses, lowering particulate emissions by 90% and NOX emissions by 50%.

- **Hybrid SUV Fleet Vehicles**

Central Garage has added hybrid SUVs to the City's fleet vehicles. The hybrid SUVs run on a gasoline-electric propulsion system for better fuel economy and fewer emissions than conventional gasoline SUV vehicles.

- **Landfill Gas Collection and Reuse**

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- **Compressed Natural Gas**

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- **Landfill Transfer Station Exhaust Heat Capture and Reuse**

An added benefit of the landfill gas generator is the capture and reuse of the waste heat produced by the generator.

On average, the landfill captures 5,900 metric tons of methane per year, which is equivalent to the electrical use of 28,500 residential homes.

- **Recycling and Waste Diversion**

Fargo’s recycling and waste diversion programs can also be equated to emissions reductions. In 2019, emissions avoidance associated with the recycling and waste diversion programs is equivalent to the electrical use in 3,200 residential homes.

- **Low Emissions Fire Truck – VW Settlement**

Fargo recently received grant funding through the VW Settlement in the amount of \$632,500 for the replacement of a 1997 high emission diesel ladder truck. The VW grant is a 50% grant which requires a 50% local match. The new truck will be a low emission diesel powered ladder truck. With this replacement, Fargo expects a 90% reduction in exhaust pollutants versus the older high emission diesel truck.

## Energy Efficiency

- **City Hall**

The design of new City incorporated a number of energy efficient features including, but not limited to, the following:

- Low energy LED lighting and control system with motion detection.
- High efficiency HVAC system.
- High efficiency glass windows.
- Insulation that exceeds building code requirements.

- **Main Library Lighting Conversion to LED Programmable**

The Fargo Public Library has identified a need to upgrade the lighting fixtures at two of its locations. The project is an effort to increase energy efficiency and reduce maintenance costs. The project will involve the replacement of existing florescent lamps with new LED lamps. The existing fluorescent downlight fixtures will be retrofitted with new LED downlight fixtures. The sensors and central lighting controls will be adjusted to ensure efficient dimming and daylight harvesting. It is estimated that the improvements will have a five year return on investment.

- **Central Garage Lighting Conversion to LED Programmable**

In 2010, Fargo received a North Dakota Energy Efficiency grant that helped fund a partial lighting conversion from incandescent bulbs to LED bulbs at Central Garage. Since completion of the partial lighting conversion, Central Garage has continued a phased approach to convert other parts of the building to LED lighting. By the end of 2020, all 95,000 square feet in Central Garage will be converted to LED with 75% controlled by motion detectors.

- **Traffic Signal Conversion to LED**

Between 2004 – 2008, all Traffic Signal Lights in Fargo were converted from incandescent lights. LED lights have a ten year life, whereas the former incandescent lights had a two year life. An energy comparison of incandescent versus LED is shown below:

- 1,981 red lights were converted from a 150-watt incandescent to a 7-watt LED.
- 2,394 yellow lights were converted from a 116-watt incandescent to an 11-watt LED.
- 2,170 green lights were converted from a 116-watt incandescent to an 8-watt LED.
- 1,143 pedestrian crossing lights were converted from a 90-watt incandescent to a 6-watt LED.

- **Street Light Conversion to LED**

As of January 1, 2018, approximately 3,186 street lights out of a City-wide total of 14,000 have been converted to LED. Each year, approximately 500 additional street lights are converted from high pressure sodium to LED. In addition, all new street light installations are LED. An energy comparison of high pressure sodium versus LED is shown below:

- 400-watt HPS fixture replaced with 216-watt LED fixture (or the existing fixture is left in place and is retro fitted with a 150-watt LED bulb).
- 250-watt HPS fixture replaced with 160-watt & 120-watt LED fixture (or the existing fixture is left in place and is retro fitted with 80-watt & 67-watt LED bulb).
- 150-watt HPS fixture replaced with 90-watt LED fixture (or the existing fixture is left in place and is retro fitted with 50-watt LED bulb).
- 100-watt HPS fixture replaced with 70-watt LED fixture (or the existing fixture is left in place and is retro fitted with 45-watt LED bulb).

- **Water Treatment Plant Expansion**

The Water Utility recently completed an expansion of the Water Treatment Plant which increased the facility's treatment capacity from 30 million gallons per day to 45 million gallons per day. The expansion utilizes new membrane treatment technology including ultra-filtration and reverse osmosis membranes.

A number energy efficient features were incorporated into the design of the facility including, but not limited to, the following:

- The most high efficient pumps and motors available on the market.
- A white membrane roof material to absorb less heat.
- Rain water harvesting system that utilizes collected rain water for irrigating.
- Low energy LED lights throughout.
- Insulation that exceeds building code requirements.
- High efficiency glass windows throughout.
- Utilize SCADA to chart trends and track energy usage.

- **Wastewater Treatment Plant Expansion**

The Wastewater Utility is currently undergoing an expansion of the Wastewater Treatment Plant which will increase the treatment capacity from 26 million gallons per day to 50 million gallons per day. The expansion will utilize new Integrated Fixed Film Activated Sludge technology.

A number energy efficient features were incorporated into the design of the facility including, but not limited to, the following:

- The most high efficient pumps and motors available on the market.
- High efficiency turbo blowers, aeration diffuser equipment and mixing equipment.
- HVAC equipment that utilize heat recovery systems.
- Low energy LED lights throughout.
- Water conserving plumbing fixtures throughout.

- Insulation that exceeds building code requirements.
- Utilize digester gas for heating the building.
- Utilize SCADA to chart trends and track energy usage.

- **Variable Frequency Drives (VFDs)**

The Wastewater and Storm Water Utilities routinely install variable frequency drives (VFDs) throughout the treatment facilities and larger lift stations. VFDs allow the speed of pumps to be controlled. This results in less energy consumption because wastewater and storm water flows can be pumped at lower pump speeds.

- **Xcel Energy and Cass County Electric Cooperative Load Shedding Programs**

The City is contracted with both Xcel Energy and CCEC under their load shedding/inadvertent demands programs. These programs help reduce peak energy demands on the Xcel and CCEC systems by the City switching to alternative power/fuel during the peak periods. The programs also reduce cost to the City by providing a reduced rate for electricity and natural gas charges.

- **Adoption of 2018 International Energy Conservation Code**

- Building thermal envelope requirements for all residential and commercial buildings for energy efficiency R & U factor standards for construction.
- Fenestration requirements.
- Building mechanical and electrical systems requirements.
- Allowance for computer generated performance to help with balancing of different types of buildings.
- Economizer requirements added in IECC 2021, with exceptions.
- Systems commissioning requirements added in IECC 2012, with exceptions.

- **City Facilities Energy Load Profile Study**

In 2020, the City Facilities department will be initiating a study effort to begin looking at energy use in municipal buildings. The ultimate goal of the initial effort is to develop a baseline of energy use and emissions in City buildings. Once a baseline has been developed, staff will look for achievable energy efficiency measures and emissions reduction strategies. Initially, staff would start with select facilities to include those served by Xcel Energy and Cass County Electric Cooperative.

## Environmental Stewardship

- **Wastewater Reuse/Water Reclamation to Tharaldson Ethanol**

In 2007, Fargo and worked with Tharaldson Ethanol on a unique water reclamation partnership to utilize treated wastewater effluent as a water supply to produce ethanol. After the wastewater treatment process, treatment plant discharges treated effluent to the Red River of the North. A portion of the treated effluent is was diverted to a membrane treatment facility to provide additional treatment to achieve industrial water quality standards. From October 2008 through January 2020, Fargo has supplied Tharaldson Ethanol with just over 3.8 billion gallons of treated wastewater effluent. The project

eliminated the need for Tharaldson Ethanol to seek a water supply from surface or groundwater sources. As a result, the project benefits Fargo, Tharaldson Ethanol and the environment.

➤ **Wastewater Reuse/Water Reclamation for Process Water**

Treated wastewater effluent is also utilized throughout the treatment plant for certain processes, cleaning and wash down purposes. On a daily basis, up to 1.9 million gallons of treated wastewater effluent is reused avoiding the need to use water from the water distribution system.

- **Rainwater Harvesting and Reuse**

The Water Treatment Plant expansion project included a rain water harvesting system that utilizes collected rain water for irrigating the adjacent grounds. This was a conservation effort to reduce water usage at the Water Treatment Plant.

The Metro Transit Garage includes a rain water harvesting system that utilizes collected rain water for irrigating the adjacent grounds. This was a conservation effort to reduce water usage at the Metro Transit Garage.

- **Main Library Green Rooflets**

Fargo's Main Library includes two green rooflets over the east and west entrances to the building. The rooflets were installed during construction of the library in 2008.

- **The Fargo Project – Storm Water Management and Creative Place-making**

The World Garden Commons at Rabanus Park is the first phase of The Fargo Project, a collaboration between artists and residents to transform an 18-acre dry detention basin into an ecological community commons. While the basin continues to hold storm water during summer rains, added ecological benefits include improvements in water quality, increased infiltration, creation of habitat, and increase in animal species. Other benefits include community driven design, pathways to connect the neighborhood, and a space that allows community to experience nature in an urban setting. Principles of The Fargo Project include letting the water lead, learning from the natural environment, involving the community and experiencing nature and ecology. The project introduces adaptive management as a project management principle.

- **Landfill Yard Waste Composting**

The Fargo landfill has been composting yard waste (grass clippings and leaves) since the early 90s in an effort to keep those compostable organic materials out of the landfill. The finished and screened compost material is made available to the public and has become very popular with Fargo residents.

- **Landfill Food Waste Composting**

The Fargo landfill partnered with Microsoft to conduct a food waste composting "pilot project". Microsoft provided biodegradable paper products and utensils from it's food service/cafeteria to conduct the pilot project. Microsoft was interested in having their biodegradable food waste products composted rather than landfilled.

The pilot project concluded that the rate of decomposition varied greatly between yard waste and biodegradable food waste products, and therefore, not suitable for the Fargo's yard waste composting program.

- **Household Hazardous Waste and Electronics Recycling**

In the early 90s, the Environmental Protection Agency promulgated their "Subtitle D" regulations for municipal solid waste (MSW) landfills. Subtitle D required that all MSW landfills be constructed with synthetic liners and leachate collection systems at the base of the landfill. Subsequent to Subtitle D, the North Dakota Department of Health began requiring double liners and double leachate collection systems for all industrial landfills or MSW landfills that received 500 tons per day or more. The City was successful in getting a waiver to the State rules by constructing and operating a Household Hazardous Waste Facility to keep hazardous materials out of the landfill waste stream.

In 2019, approximately 12,500 residents dropped off 144 tons of material at the HHW facility and 3,300 residents picked up 113 tons of product to be reused. In addition, a one-day electronics recycling event allowed 624 residents the opportunity to drop off 44 tons of electronics for recycle and reuse.

- **Solid Waste Curbside and Drop Site Recycling**

The annual goal of the Solid Waste Utility is to divert 40% of all material from the landfill waste stream by offering programs that reuse, reduce, and recycle. Prominent annual diversion programs include yard waste (9,800 tons), wood waste (9,200 tons), and curbside/drop site recycling programs (7,800 tons).

- **Solid Waste Special Recycling Programs**

On a seasonal basis, the Solid Waste Utility also conducts special recycling campaigns for disposable items such as holiday tree lighting, phone books, etc.

- **Sump Pump Program**

Fargo's Sump Pump and Foundation Drain Enforcement Program was designed to protect homes and property throughout the City from sewer backup. The program's mission is to ensure proper discharge of foundation drain water to the storm sewer system instead of the sanitary sewer system. The program reduces the risk of sanitary sewer backups during heavy rainfall.

- **Energy Efficiency and Conservation Block Grant Program**

In 2009, the City received a direct allocation for Energy Efficiency and Conservation Block Grants (EECBG) from the Department of Energy. The allocation was in the amount of \$948,900 for promoting energy efficiency and conservation, and to create and retain jobs. In 2010, an additional \$100,000 was received from the North Dakota State Energy Program to supplement the EECBG dollars. The funding received was used to develop the GO2030 Comprehensive Plan, provide energy efficient upgrades to City-owned facilities, and to purchase an asphalt recycler.

- **GO2030 Comprehensive Plan**

In 2011, the City of Fargo adopted a strategic plan applicable to the whole city promoting principles of energy conservation and strategies to promote walkability, infill and density. This visioning document

adopts the following vision “In 2030 Fargo will be a vibrant and sustainable city with a high quality of life, robust economy, and welcoming community atmosphere”.

- **Downtown InFocus Strategic Plan**

In 2019, the City of Fargo adopted a strategic plan for Downtown. The plan includes multi-modal transportation and green infrastructure principles, such as storm water management, for greater environmental resilience.