Section 02
Buildings and Energy

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Buildings + Energy
In Albert Lea

187,450,000
kWh of electricity in 2019

32,110,000
Therms of natural gas

+10.5%
Change in residential electricity consumption since 2016

+14.8%
Change in commercial natural gas consumption since 2016

Buildings and Energy

Why Buildings and Energy Is Important

Building construction and operations can have extensive direct and indirect impacts on the environment, society, and economy. Buildings use significant resources (energy, water, raw materials, etc.), generate waste (occupant, construction, and demolition), emit potentially harmful atmospheric emissions, fundamentally change the function of land, and the ability of that land to absorb and manage water.

Building energy use is a major contributor to greenhouse gas (GHG) emissions. The Building Energy sector includes all residential, commercial, and industrial buildings. Greenhouse gas emissions from this sector come from **direct emissions** – from fossil fuels burned *on-site* for heating or cooking needs – as well as **indirect emissions** – from fossil fuels burned *off-site* in order to supply that building with electricity. Building design plays a large role in determining the future efficiency and comfort of facilities. Increasing energy efficiency can help reduce GHG emissions and result in significant cost savings for both homes and businesses. The Albert Lea community can also achieve environmental, social, and economic benefits through enhancements to the built environment.

The Buildings and Energy sector is 81% of Citywide GHG emissions for the City of Albert Lea. Within this sector, the share of residential consumption is 25%, commercial/industrial and government buildings are 75%. In terms of share of building and energy emissions by fuel source, electricity represents 32% and natural gas represents 68% of this sector's emissions. This data indicates significant GHG reduction potential within the buildings and energy sector of Albert Lea, particularly within the commercial and industrial market and natural gas fuel consumption.

Albert Lea Energy Use Profile

Residential:

According to 2019 community wide data, the residential sector in Albert Lea consumes nearly 56.3 million kWh annually. This is equal to 7,478 kWh per household. The sector also consumes over 7 million therms of natural gas annually.

Commercial:

The Albert Lea commercial and industrial sector in 2019 consumed nearly 130.5 million kWh, equal to 13,700 kWh per job. These sectors also consume over 25 million therms of natural gas annually.

Climate Change Considerations

Climate Impacts

This sector impacts climate change through the combustion of fossil fuels (coal, natural gas, heating oil, propane) to generate electricity and heat/cool our buildings.

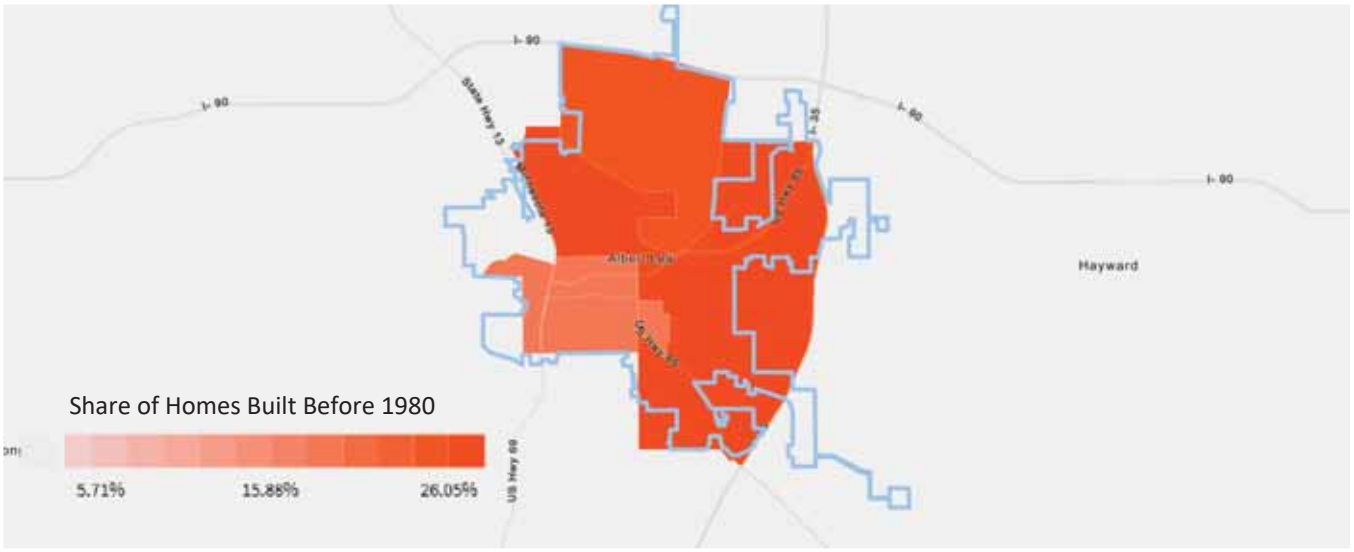
Climate Hazards

Hazards to Buildings and Energy include damage to buildings and energy grid infrastructure from extreme weather and flooding, increased power outages, and increased energy demand and cost expenditure due to rising temperatures and weather variability.

Albert Lea Building Stock Efficiency

The measure of a community's existing building stock, certified high performance buildings, and housing characteristics provides a basis for determining the current and potential energy efficiency gains for the community. Energy and water efficiency upgrades are one of the simplest and most effective ways to conserve resources, save money, and reduce greenhouse gas emissions. New building technology has increased energy efficiency significantly in recent decades. Although newer U.S. homes are 30 percent larger, they consume a similar amount of total energy as older homes - meaning they are more energy efficient per square foot of space. According to the US Energy Information Administration, homes built between 2000 and 2009 used 15% less energy per square foot than homes built in the 1980s, and 40% less energy than homes built before 1950.
This means that retrofitting older homes with some of these technologies provides ample opportunity to improve energy efficiency throughout the community. Below is a map of the distribution of homes and a chart outlining the estimated annual energy savings potential for households built before 1980 in Albert Lea:

Albert Lea Homes Built Before 1980



Energy Savings and Thermal Fuel Switching Potential of Albert Lea Homes Built Before 1980

	Estimated Units		Est Thermal Energy Consumption (million therms)	Targeted Energy Improvement Participation by 2030 (households)	Anticipated Annual Electric Savings by 2030 (MMkWh)	Anticipated Annual Thermal Energy Savings by 2030 (million therms)	Estimated GHG Reduction by 2030
Total Households	**7,523**			**1,500**			
Owner Occupied	**5,131**	**38.40**	**4.77**	**1,023**	**1.15**	**0.14**	**(1,246)**
Built 2010 or Later	8	0.06	0.01				0
Built 2000 to 2009	183	1.37	0.17				0
Built 1980 to 1999	556	4.16	0.52	28	0.03	0.00	(35)
Built 1960 to 1979	1,437	10.75	1.34	287	0.32	0.04	(350)
Built 1940 to 1959	1,768	13.23	1.65	354	0.40	0.05	(431)
Built 1939 or Earlier	1,179	8.82	1.10	354	0.40	0.05	(431)
Renter Occupied	**2,392**	**17.90**	**2.23**	**477**	**0.54**	**0.07**	**(581)**
Built 2000 to 2009	38	0.28	0.04				0
Built 1980 to 1999	450	3.37	0.42	32	0.04	0.00	(39)
Built 1960 to 1979	623	4.66	0.58	125	0.14	0.02	(152)
Built 1940 to 1959	640	4.79	0.60	128	0.14	0.02	(156)
Built 1939 or Earlier	641	4.80	0.60	192	0.22	0.03	(234)
Total Reduction Potential					**1.68**	**0.21**	**(1,827)**

Albert Lea Heating Fuel Switching Potential

According to the US Census, approximately 80% of residential heating is provided by natural gas, 14.6% by electricity, 1.6% by bottled/tank propane, and approximately 0.6% by solar thermal. It is estimated that 94 households, or approximately 1.3%, have no heating fuel. As Minnesota's electric grid decreases in its carbon intensity, building heating fuel will become an increasingly important target for emission reductions. Consequently, a focus on reduction of all fossil fuel heating (oil, propane, natural gas) will be required in order to significantly advance GHG reduction goals. The chart below illustrates the GHG reduction potential of switching 8% of Albert Lea households from fossil fuel heating to electricity.

	Estimated Units	Heating Fuel Emissions Remaining Following Energy Efficiency Targets	Targeted Fuel Switching Participation by 2030 by sf	Estimated Fuel Switching GHG Reduction by 2030
Total Households	**7,523**			
Owner Occupied	**5,131**	**24,104**	**410**	**(1,928)**
Built 2010 or Later	8	40	0	0
Built 2000 to 2009	183	904	0	0
Built 1980 to 1999	556	2,726	44	(215)
Built 1960 to 1979	1,437	6,886	72	(344)
Built 1940 to 1959	1,768	8,473	177	(847)
Built 1939 or Earlier	1,179	5,563	118	(556)
Renter Occupied	**2,392**	**11,237**	**191**	**(899)**
Built 2000 to 2009	38	188	0	0
Built 1980 to 1999	450	2,199	32	(157)
Built 1960 to 1979	623	2,986	31	(149)
Built 1940 to 1959	640	3,067	64	(307)
Built 1939 or Earlier	641	3,024	64	(302)
Total Reduction Potential		**35,340**	**602**	**(2,827)**

Albert Lea Renewable Energy Market Potential

As outlined in the Albert Lea Renewable Energy Potentials Study, a number of scenarios for potential future market absorption of on-site solar installations exist. The chart below illustrates the solar potential for Albert Lea based on achieving a share of projected Minnesota solar installation increases based on the City's share of state wide population through 2040.

Albert Lea Solar PV Projection Based on Potential Market Absorption

Year	Cumulative Installed (KW)	Annual Generation (KWH)	% of City Electric Consumption	This is Equivalent to adding (x) Average Residential Arrays Annually:	Or Equivalent to adding (x) Commercial Arrays Annually:	Or Equivalent to adding (x) Arrays Annually with Average Array Size Equal to Current Community Ave:
2025	5,346	5,796,276	**3.05%**	**97**	**18**	**28**
2030	9,009	9,767,063	**5.14%**	**97**	**18**	**28**
2040	16,284	17,654,336	**9.28%**	**97**	**18**	**28**

Buildings and Energy

Equity Considerations

- Often, families that live in properties that are not energy efficient are also those that can least afford high-cost utility bills. These households may lack the ability to pay for energy efficiency improvements or access renewable energy options.
- Renters of both single family homes as well as multi-family housing usually do not have the ability to implement energy efficiency measures to the buildings they live in to gain the benefits of energy efficiency.
- Families with fewer resources must dedicate a disproportionately larger share of their income towards energy costs, which exacerbates other vulnerabilities including exposure to heatwaves and other climate vulnerabilities. These same families are sometimes forced to forego basic access to service altogether - an estimated 66 households in Albert Lea go without heating fuel of any type (US Census heating fuel utilization data).

Community-Wide Buildings and Energy Targets Supporting Sector Goals

Sector goals are established to both support the City's Climate Action Plan in creating a climate resilient community and to reduce community-wide GHG emissions.

	Citywide Renewable Energy (% of total consumption)	Citywide Electricity Consumption	On-Site Natural Gas Consumption	Structures Weatherized	Structures with Electrified Heating
	+	-	-	+	+
Today	0.5%	187.5GHW	32.1MTherms	134	14%
2030 Targets	5%	168.8GWH	26.7MTherms	2,910	22%

Strategies Supporting Sector Goals

Sector goals related to GHG emissions reductions are designed to balance reduction across all sectors and achieve the overall emissions goals set forth for the community. The goals seek to strike a balance between achievability while also reaching -for improvement beyond business-as-usual.

As indicated in the introduction, the Climate Action Plan is intended to be a 9 year plan to be updated at the completion of that time. Consequently, the goals and strategies outlined in this section are intended to be achieved by 2030 (or earlier) unless otherwise noted.

Implementation of actions are anticipated to be initiated over 3 phases: phase 1 within 1-2 years, phase 2 within 2-7 years, and phase 3 within 4-8 years of CAP approval.

1. **Strategy BE 1:** Improve total Community wide residential, commercial, and industrial building energy efficiency by 10% Electricity and 10% Thermal Fuel by 2030.
2. **Strategy BE2:** Encourage Net Zero Energy new construction and renovations within the community, achieve 5 Net Zero Energy buildings by 2030.
3. **Strategy BE 3:** Achieve 10 ENERGY STAR certified new or renovated commercial buildings within the community by 2030.
4. **Strategy BE 4**: Achieve 8% residential and 8% commercial and industrial building thermal "fuel switching" to reduce on-site fossil fuel use by 2030.
5. **Strategy BE 5**: Increase on-site distributed renewable energy to 5% of Residential and Commercial electric use by 2030.

Buildings and Energy

1 Strategy BE 1:

Improve total Community wide residential, commercial, and industrial building energy efficiency by 10% Electricity and 10% Thermal Fuel by 2030

	Actions	Implementation Phase
BE-1-1	Work with Freeborn Mower Cooperative Services, Minnesota Energy Resources, and other partners tto establish commercial energy efficiency audit and upgrade program similar Minnesota Chamber of Commerce's EnergySmart commercial energy savings program. Program could be integrated with the commercial waste audit service identified in Solid Waste action WM-1-1. Target: 24 commercial/industrial businesses per year with 10% electricity savings and 10% natural gas savings each. ((https://www.mnchamber.com/your-opportunity/energy-smart)	1
BE-1-2	Conduct a City Facilities Energy Audit on all buildings within the next 3 years. Use results from City Facilities Energy Audit to prioritize City Facilities Capital Improvement Plans (CIPS) and maintenance improvements. Goal: Reduce City of Albert Lea facility energy consumption by 10%.	1
BE-1-3	Work with Freeborn Mower Cooperative Services, Minnesota Energy Resources, and other partners to establish residential and multi-family energy efficiency audit and upgrade program similar to Xcel Energy's "Home Energy Squad Visits". Target 150 households per year (https://www.homeenergysquad.net/)	1
BE-1-4	Convert all City streetlights and signals to LED by 2030.	2
BE-1-5	Conduct a occupancy and plug load energy efficiency study of primary city owned facilities and establish a "Plug Load and Occupancy Energy Efficiency Guide" outlining operational practices and equipment modifications to advance the City's energy efficiency goals for City facilities. Provide training to all existing city employees and provide on-going training to all new city hires.	2
BE-1-6	Adopt, implement, and promote a Commercial Building Energy Benchmarking and Disclosure ordinance for all public buildings and all commercial buildings 30,000 square feet and larger. https://www.energystar.gov/buildings/program-administrators/state-and-local-governments/see-federal-state-and-local-benchmarking-policies.	2
BE-1-7	Develop and adopt a rental housing energy efficiency policy requiring single family and multi-family rental housing properties to meet minimum energy efficiency level to qualify for rental licensing. Program to include an energy efficiency rating system (ENERGY STAR or HERS). Example program: https://bouldercolorado.gov/plan-develop/smartregs.	3
BE-1-8	Identify homes and multi family building at risk during heat waves due to poor insulation and inadequate air conditioning and scale up resources to insulate them and update their cooling equipment in partnership with local utilities and the SE MN CAP agency.	3

2 Strategy BE 2:

Encourage Net Zero Energy new construction and renovations within the community, achieve 5 Net Zero Energy buildings by 2030.

	Actions	Implementation Phase
BE-2-1	Encourage new construction and remodeling projects to meet Electric Vehicle (EV) ready standards using the EV Readiness section of the City's Net Zero Energy Building Guide. Explore development of a promotional component such as an "EV Ready" plaque.	1
BE-2-2	Create a City of Albert Lea Net Zero Energy Building Guide and Solar Ready Guide providing information and resources on how to achieve net zero, high performance, and solar ready buildings. (examples: https://palebluedot.llc/llbo-nze ; https://palebluedot.llc/solar-ready-guidelines	1
BE-2-3	Provide City's Net Zero Energy Building Guide and Solar Ready Guidelines document to local contractors, realtors, designers, home shows or remodeler showcase events. Provide training on solar ready and net-zero strategies as found in the City's Net Zero Energy Building Guide and Solar Ready Guidelines to area builders with local builders association. Include the City's Net Zero Energy Building Guide and Solar Ready Guideline documents on the City's webpage Explore development of a promotional component such as a "Net Zero" or "Net Zero Ready" plaque.	2
BE-2-4	Utilize incentives, vacant City land, and current programs for pilots of net-zero buildings across different sectors. Explore option of issuing a competitive RFP for effective and innovative Net Zero pilot projects. Explore partnerships and funding sources including Minnesota CERTs Grant, MPCA Environmental Assistance Grants, MN Department of Commerce Grants, or US DOE grants.	2

3 Strategy BE 3:

Achieve 10 ENERGY STAR certified new or renovated commercial buildings within the community by 2030.

	Actions	Implementation Phase
BE-3-1	Establish a policy to require all primary City facilities to benchmark (using ENERGY STAR Portfolio Manager or B3 Benchmarking) and disclose annual energy consumption. Invite County, School District, and other public agencies located within the City to participate in City's facilities benchmarking and disclosure effort.	1
BE-3-2	Incentivize local businesses to participate in ENERGY STAR Portfolio Manager and ENERGY STAR Certification by offering free ENERGY STAR Certification review support. Explore grant opportunities to support program such as Minnesota CERTs Grant, MPCA Environmental Assistance Grants, MN Department of Commerce Grants, or US DOE grants.	2
BE-3-3	Encourage all Planned Unit Developments and Conditional Use Permits, and all projects receiving public financing support to meet LEED or ENERGY STAR Certification requirements.	2

4 Strategy BE 4:

Achieve 8% residential and 8% commercial and industrial building thermal "fuel switching" to reduce on-site fossil fuel use by 2030.

	Actions	Implementation Phase
BE 4-1	Promote incentive programs for electrification. Work with Freeborn Mower or other regional partnerships to create financial incentives to electrify new and existing buildings. For example, rebates for panel upgrades, electric appliances, Air Source Heat Pumps, and Ground Source Heat Pumps can encourage the transition to electric energy use in homes and businesses. Goal: Target 10% residential market conversion (75 households annually) and 5% commercial/industrial market conversion (an estimated 10 commercial businesses, 10 industrial businesses annually) by 2030. Resource: https://fmec.coop/rebates	1
BE 4-2	Work with regional energy partnerships to develop and implement an Electrification Action Plan for all City facilities. Include new and existing buildings,incorporate strategies to address electricity storage, and focus on highlighting any hurdles or solutions that would be applicable to the broader community	2
BE 4-3	Work with Minnesota Energy Resources to establish an option for Renewable Natural Gas for customers and achieve 5% commercial/industrial use by 2030.	2
BE 4-4	Work with Minnesota Energy Resources to establish an option for Renewable Natural Gas for customers and achieve 5% residential use by 2030 (40 households per year).	3

5 Strategy BE 5:

Increase on-site distributed renewable energy to 5% of Residential and Commercial electric use by 2030.

	Actions	Implementation Phase
BE-5-1	Establish a policy which requires all new construction and significant renovation projects for City facilities to be constructed to meet "Solar Ready" requirements and to include a solar feasibility assessment and project option for inclusion of on-site solar, include "Return on Investment" assessment, and incorporate solar where return is favorable.	1
BE-5-2	Identify the "Solar Top 30" commercial/industrial properties within the city and produce detailed solar feasibility assessments for each site. Assessments to include potential solar generation and economic performance and return on investment estimates, information on financing and ownership models, and next step resources. Provide solar assessment reports to properties and conduct an informational workshop to assist building owners and businesses in understanding the assessments and next step potential. "Solar Top 30" assessment effort could be repeated annually, particularly through 2024 in alignment with enhanced federal tax benefits	1
BE-5-3	Coordinate and promote a commercial Solar Group Purchase Campaign annually to help reduce the costs of solar installation through volume purchasing power (goal, 600KW installed annually). Group purchase campaign could include/focus on properties identified in the "Solar Top 30" assessment effort. Program design to explore strategies to support local small business solar installers and strategies to support local workforce development in coordination with Riverland Community College.	1
BE-5-4	Coordinate and promote a residential Solar Group Purchase Campaign annually to help reduce the costs of solar installation through volume purchasing power (goal, 80 households annually). Program design to explore strategies to support local small business solar installers such as being set up to enable small installers to collaborate or having a competitive "marketplace" approach with more than one installer to choose from. Explore partnership with MREA for no-cost to City program management.	1
BE-5-5	Issue a competitive RFP for solar developers for the installation of solar PV on all viable City facilities. RFP to include bid alternates for 3rd party solar array ownership / solar PPA which require no up-front City investment. Invite school district, County, and local businesses to participate in the RFP issue. See City's 2018 solar study: https://palebluedot.llc/carbon-copy/2019/2/28/solar-ready-albert-lea-the-solar-potential-in-the-city-of-albert-lea	2
BE-5-6	Develop and issue an RFP for community solar developers to advance community solar options and subscriptions within City. RFP should focus on projects that benefit all residents, particularly communities of color, low-income populations, and multi-family households. Goal: 50 households subscribed per year.	2

Buildings and Energy

Planned Buildings and Energy GHG Emission Reductions

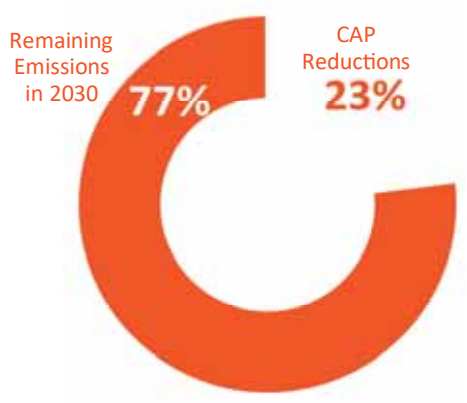
Planned Sector Emission Reductions Through 2030

The strategies and actions included in this section of the Climate Action Plan are projected to reduce the city's annual GHG emissions by 57,403 metric tons (MT) by 2030 - a 23% reduction over 2019 levels.

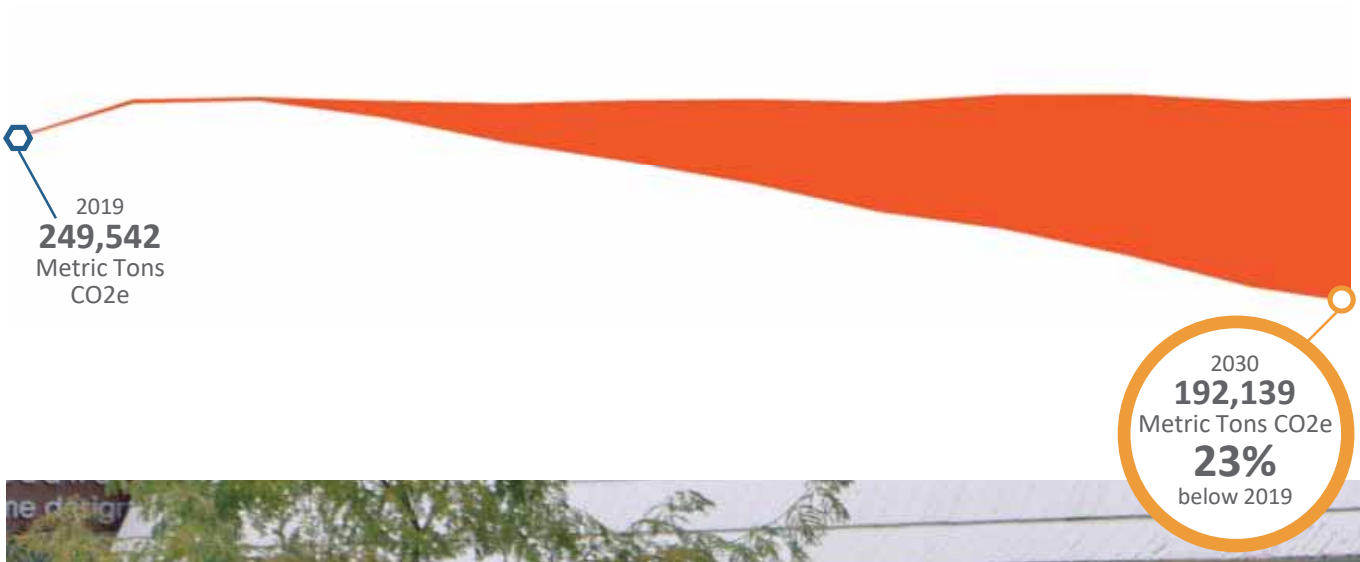
When compared to 2019 emissions, this is equivalent to eliminating **1.1 billion** cubic feet of man-made greenhouse gas atmosphere annually by 2030.

Sector Emissions Reduction below 2019 by 2030

The total change to sector emissions include CAP Plan reductions are:



Albert Lea's Buildings and Energy Carbon Reduction Pathway



What You Can Do

You can support the goals of the Buildings and Energy section of the Albert Lea Climate Action Plan as an individual, household, or a business. Here are just a few things you can do:

- Unplug 2 or more electricity "vampires" in your home or apartment. https://www.comed.com/News/Pages/NewsReleases/2019-10-30B.aspx
- Convert 3 or more lights or lamps to LED bulbs.
- Set your thermostat 2 or more degrees higher during cooling season, lower during heating season.
- Turn down your water heater to 120°.
- Replace an older home thermostat with a “smart,” programmable model.
- Replace a major appliance (e.g., refrigerator, air conditioner, furnace) with a newer, energy-efficient model.
- Replace a gas range or clothes dryer with an electric model.
- Schedule a home energy audit with a licensed contractor or Freeborn Mower Electric Cooperative. https://fmec.coop/home-energy-audit
- Install solar panels at your home, working with a licensed contractor. If possible, participate in Albert Lea's residential solar group purchasing program.
- If you don’t own your home but support clean, renewable energy, talk to Green Mountain Power to see if community solar is available. https://cutt.ly/RbC6wa0
- Install — or have a licensed contractor install — more insulation in your home.
- Install energy-efficient windows and doors, working with a licensed contractor.