



# Section 03 Energy and Built Environment



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## Energy and Built Environment

### Why Energy and Built Environment 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 Bloomington community can also achieve environmental, social, and economic benefits through enhancements to the built environment.

The Energy and Built Environment (including IU Power Plant) is 77% of citywide GHG emissions for the City of Bloomington. Within this sector, the share of residential consumption is 38%, commercial and government buildings is 44%, and industrial share is 18%.

The current fuel mix used to generate electricity by the electricity utility serving the community, Duke Energy, is heavily coal based with over 61% derived from coal, 37% from natural gas, and less than 1% combined for hydro, wind, and solar. According to Duke Energy's 2018 Integrated Resource Plan, the projected energy mix of their portfolio is anticipated to decrease reliance on coal, with a significant increase in natural gas and some increase in solar and wind through 2037. This planned shift in energy portfolio will help contribute to Bloomington's GHG reduction goals, however, will not be enough to meet the reductions needed.

Advancing significant GHG emission reductions in the Energy and Built Environment sector will require a focus on reduced coal and fossil fuel use in the generation of electricity and building heating systems. The success of Duke Energy in reducing the use of fossil fuel use for the generation of grid electricity, increased implementation of distributed (on-site) renewable energy citywide, and improved energy efficiency will be key in Bloomington reaching its goal to reduce city-wide GHG emissions 25% below 2018 levels by 2030.

### Climate Change Considerations



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.



Hazards to Energy and Built Environment 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.



# Energy and Built Environment

## Equity Considerations

- 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. Energy efficiency retrofits are typically in the hands of the landlord while the costs associated with the resulting energy use are usually paid by the occupant.
- 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 70 households in Bloomington go without heating fuel of any type (US Census heating fuel utilization data).

## Sector Goals

Sector goals are established to both support the City’s Climate Action Plan in creating a climate resilient community and to reduce city-wide GHG emissions 25% below 2018 levels by 2030.

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 10 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 unless otherwise noted.

Implementation of actions are anticipated to be initiated over 3 phases: phase 1 within 1-3 years, phase 2 within 2-5 years, and phase 3 within 4-8 years of CAP approval.

### Goal EB 1

Increase distributed renewable energy to 250,000 MWH of total generation annually by 2030.

### Goal EB 2

Increase energy efficiency citywide 16% for electricity and 12% for natural gas of 2018 values.

### Goal EB 3

Support decarbonization of the local electricity grid.

### Goal EB 4

Promote "fuel switching" to reduce on-site fossil fuel use in the building sector by 3% of 2018 values.

### Goal EB 5

Increase financing options for Energy Efficiency and Renewable Energy projects citywide.

## Energy Mix Targets Supporting Sector Goals

	Citywide Renewable Energy	Citywide Electricity Consumption	On-Site Fossil Fuel Consumption	Cleaner Electric Grid
	 +	 -	 -	 -
Today	0.5%	1,461GHW*	18.8MTherms*	0.53 <sup>mTons/</sup> MWH**
2030 Targets	10%	1,430GWH	18.4MTherms	0.35 <sup>mTons/</sup> MWH**

\*Under BAU, energy use is anticipated to increase  
 \*\*mTons/MWH = Metric Tons of greenhouse gas emissions per megawatt hour of electricity generation.

**Goal EB 1 Increase distributed renewable energy to 250,000 MWH of total generation annually by 2030.**

**Strategy EB 1-A:**

**Increase solar on City facilities 20% by 2030.**

The City of Bloomington is a leader in on-site solar installations in the region with solar installed on 32 of the City's facilities and sites. City solar arrays generated 3 GWH of electricity in 2019, or approximately 70% of City building electricity consumption in 2018 (excluding water and wastewater processing). Identifying additional solar installation potential, including ground mounted arrays, "carport" arrays, and remaining cost effective rooftop array locations can increase the City's renewable energy portfolio. An increase of 20% on-site solar generation would result in 80% carbon-free City facility electric consumption.

**How We'll Measure Progress:**

Total on-site renewable energy installed, renewable energy credits (REC) purchased

**Co-Benefits of Strategy:**

Reduced Costs



Jobs / Economic Development



Improved Energy Resilience



Reduced GHG Emissions



Actions	Implementation Phase
EB1-A-1 Conduct a detailed "Renewable Energy Master Plan" for all primary city facilities which have not yet already achieved renewable energy meeting 100% annual energy demand. Plan to incorporate strategies to address electricity storage, energy resilience, emergency operations, explore virtual net metering with Duke Energy, and provide an implementation plan to achieve on-site renewable energy goal and outline options to achieve 100% renewable energy for all city facilities (on-site and off site options).	1
EB1-A-2 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. See City's Solar Reay Guidelines: <a href="https://palebluedot.llc/bloomington-solar-ready-guide">https://palebluedot.llc/bloomington-solar-ready-guide</a>	1
EB1-A-3 Study City facilities and potential partner entities to identify low-carbon district heating and cooling systems and Solar+Storage microgrid project options and select, by 2024, a project to implement as a pilot project.	2

**Strategy EB 1-B:**

**Support and accelerate installation of on-site solar PV to 250,000 MWH of total generation citywide annually by 2030.**

As of 2019, over 538 solar PV's have been installed in Monroe County for a total of 6.04 megawatts (MW) in nameplate generating capacity, the majority of which are within the City of Bloomington. Based on Monroe County permit data 2020, Residential arrays are 44%, government facility arrays are 39%, commercial, non-profit, and industrial arrays total 11.6%, and utility solar installations are 5.4% of the total existing installed capacity. Fewer than 1.5% of households and 1.75% of commercial/industrial establishments have on-site solar installed indicating significant opportunity for increasing on-site solar installations citywide.

**How We'll Measure Progress:**

Total citywide on-site renewable energy installed

**Co-Benefits of Strategy:**

Reduced Costs



Jobs / Economic Development



Improved Energy Resilience



Reduced GHG Emissions



Actions	Implementation Phase
EB1-B-1 Identify the "Solar Top 50" 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, free of charge, and conduct an informational workshop to assist building owners and businesses in understanding the assessments and next step potential. "Solar Top 50" assessment effort could be repeated annually, particularly through 2025.	1
EB1-B-2 Sponsor a community-wide "Solarize" program for commercial and Industrial group purchase of Solar PV. Include an invitation to participate to all building sites included in the "Solar Top 50" feasibility effort. Explore use of city staff, resources, or financing mechanisms to support the required reach of annual solarize programs to achieve long-range goals. (goal, installed capacity equal to 1.1% of commercial/industrial sector electrical consumption annually) <a href="https://www.nrel.gov/docs/fy12osti/54738.pdf">https://www.nrel.gov/docs/fy12osti/54738.pdf</a>	1
EB1-B-3 Continue to sponsor a community-wide "Solarize" program for residential group purchase of Solar PV. Explore use of city staff, resources, or financing mechanisms to support the required reach of annual solarize programs to achieve long-range goals. (goal, 200 homes installed annually with 20% of arrays serving households at or below 100% AMI) <a href="https://www.nrel.gov/docs/fy12osti/54738.pdf">https://www.nrel.gov/docs/fy12osti/54738.pdf</a>	1
EB1-B-4 Partner on a county-wide solar strategy to expand solar, especially to low and moderate income households with a goal of 60 low income homes installed annually. Explore the establishment of financing mechanisms such as revolving loans, grants, or use of LIHEAP funding to support affordability and equitable renewable energy adoption.	1
EB1-B-5 Determine the true value and potential of customer-owned photovoltaics to the infrastructure, economics and renewable goals of the City. Analysis should include time of generation, capacity credit, distribution circuit support, customer characteristics, technical and market potential, resilience, etc. (Value of Solar study). Study results can be shared with community businesses and Bloomington Economic Development Corporation for information to advance solar awareness.	2
EB1-B-6 Motivate and assist businesses throughout the community to install solar. Provide information on solar incentives, tools, and financing to businesses throughout the City.	2
EB1-B-7 Establish a Solar Ready Ordinance to require all new residential and commercial buildings to be solar ready. See City's Solar Reay Guidelines: <a href="https://palebluedot.llc/bloomington-solar-ready-guide">https://palebluedot.llc/bloomington-solar-ready-guide</a>	2
EB1-B-8 Promote, provide and distribute the City's Solar Ready Guide document to local home shows or remodeler showcase events, designers, homebuilder associations, and realtors ( <a href="https://palebluedot.llc/bloomington-solar-ready-guide">https://palebluedot.llc/bloomington-solar-ready-guide</a> ). Include the City's Solar Ready Guideline documents on the City's Design Guidelines webpage ( <a href="https://bloomington.in.gov/utilities/review/design/manual">https://bloomington.in.gov/utilities/review/design/manual</a> )	2

**Strategy EB 1-C:  
Improve energy policy**

According to the Department of Energy, complex or poorly-defined local government processes can add up to \$2,500 to the cost of solar PV installations. Completing SolSmart designation can help municipalities simplify and making approval processes more efficient which, in turn, reduces costs for solar developers, installers, and City operations. In addition, policies which protect the ability of one property to continue to receive sunlight across property lines without obstruction from another’s property are critical to ensure long-term viability of solar resources for property owners.

**How We'll Measure Progress:**  
Total on-site renewable energy installed, re-  
newable energy credits (REC) purchased

**Co-Benefits of Strategy:**

- Reduced Costs 
- Reduced GHG Emissions 
- Improved Energy Resilience 
- Improved Community Equity 

Actions		Implementation Phase
EB1-C-1	Streamline and offer expedited permitting for renewable energy installations.	1
EB1-C-2	Complete the SolSmart process to streamline permitting for renewable energy installations and assist in reducing solar project "soft costs" related to City solar processes. Achieve a Sol smart Gold rating by 2025	2
EB1-C-3	Establish Solar Access Ordinance and policies which recognize changing conditions due to the proliferation of residential rooftop solar energy systems.	2

**Goal EB 2 Increase energy efficiency citywide 16% for electricity and 12% for natural gas of 2018 values.**

**Strategy EB 2-A:  
Increase total City owned building electrical energy efficiency 16% for electricity and 12% for natural gas of 2018 values.**

The City of Bloomington is a leader in on-site solar installations in the region with solar installed on 32 of the City's facilities and sites. City solar arrays generated 3 GWH of electricity in 2019, or approximately 70% of City building electricity consumption in 2018 (excluding water and wastewater processing). Identifying additional solar installation potential, including ground mounted arrays, "carport" arrays, and remaining cost effective rooftop array locations can increase the City's renewable energy portfolio. An increase of 20% on-site solar generation would result in 80% carbon-free City facility electric consumption.

**How We'll Measure Progress:**  
Annual City operated facility electricity and natural gas consumption reported

**Co-Benefits of Strategy:**

- Reduced Costs 
- Jobs / Economic Development 
- Improved Building Quality and Comfort 
- Reduced GHG Emissions 

Actions		Implementation Phase
EB2-A-1	Update the City's Green Building Program policy to include clear energy reduction requirements to be measured annually during the building's operation (such as "achieving and maintaining a minimum ENERGY STAR rating of 75, and built to meet or exceed IGCC code"). Consider increasing the minimum LEED design standard to Gold. Invite County, School District, and other public agencies located within the City to participate in City's Green Building Program standards. Resource: City of Bloomington Green Building Ordinance (2009)	1



	<b>Actions</b>	<b>Implementation Phase</b>
EB2-A-2	Establish a policy to require all primary City facilities to benchmark 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
EB2-A-3	Conduct a Building Energy Audit on all primary City owned facilities without energy audits conducted within last 5 years. Fully implement recommendations of these and previous audits. Prioritization should be given to the City's largest energy consuming sites.	1
EB2-A-4	Establish a City policy requiring the review of all large capital expenditures against the GHG emission reduction and climate adaptation goals of the CAP. Capital projects to be reviewed against their projected contributions in reduced GHG emissions, energy use, and vehicle-miles-traveled as well as the project's projected social cost of carbon savings and climate resilience. Explore development of project calculator tools to evaluate capital project proposals against City's CAP Goals (see City of Eau Claire WI land use calculators).	1
EB2-A-5	Continue conversion of City streetlights and signals to LED. Complete 100% conversion by 2026.	2
EB2-A-6	Conduct an Occupancy and Plug Load Energy Efficiency Study of primary city owned facilities to identify plug load control strategies and establish a "Plug Load and Occupancy Energy Efficiency Guide" outlining operational practices 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. <a href="https://sftool.gov/learn/about/426/plug-loads">https://sftool.gov/learn/about/426/plug-loads</a>	2

### Strategy EB 2-B:

#### Support and accelerate energy efficiency citywide.

Compared to State of Indiana averages, electric consumption in Bloomington is 142% of the residential average (per household) and 87% of the commercial and industrial average (per job) while natural gas consumption is 76% of the residential average and 8% of the commercial and industrial average. According to the US Energy Information Administration, homes built after 2000 used 15% - 40% less energy than homes built before 1990. Nearly 60% of all homes in Bloomington were built prior to 1990. The deviation from State averages, combined with a large share of older homes in the community, indicate that significant energy savings are likely possible in all sectors, making energy efficiency an important strategy for reducing building and energy emissions.

**How We'll Measure Progress:**  
Annual citywide electricity and natural gas consumption reported

#### Co-Benefits of Strategy:

Reduced Costs



Jobs / Economic Development



Improved Building Quality and Comfort



Reduced GHG Emissions



	<b>Actions</b>	<b>Implementation Phase</b>
EB2-B-1	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. <a href="https://www.energystar.gov/buildings/program-administrators/state-and-local-governments/see-federal-state-and-local-benchmarking-policies">https://www.energystar.gov/buildings/program-administrators/state-and-local-governments/see-federal-state-and-local-benchmarking-policies</a>	1
EB2-B-2	Work with utilities to incentivize and promote replacement of inefficient building heating and cooling equipment before end-of-life, and facilitate the bulk purchasing of efficient equipment. Goal: achieve 250 households replacing equipment annually.	1

	Actions	Implementation Phase
EB2-B-3	Establish an Energy Efficiency Upgrade cost sharing incentive program providing a 25% matching grant for qualified buildings and applicants. Coordinate grant with utility offered rebates. Goal: utilization by 60 businesses annually. Example program: <a href="http://www.minneapolismn.gov/environment/greencostshare">http://www.minneapolismn.gov/environment/greencostshare</a> <a href="http://www.minneapolismn.gov/www/groups/public/@health/documents/webcontent/wcmssp-221550.pdf">http://www.minneapolismn.gov/www/groups/public/@health/documents/webcontent/wcmssp-221550.pdf</a>	1
EB2-B-4	Work with partner organizations to promote building retro commissioning and operation and maintenance practices that improve affordability, comfort, indoor air quality and energy efficiency in all commercial and multifamily buildings. Goal: 60 businesses commissioned annually.	1
EB2-B-5	Collaborate with utilities, community partners, and rental property owners to promote and provide comprehensive audits followed by energy efficiency upgrades benefiting multifamily residents, with a particular focus on low-income communities. Goal: Achieve 220 audits and upgrades annually.	1
EB2-B-6	Develop a "Green Roof" pilot project to exhibit heat island mitigation strategies and measure potential for effectiveness. Identify city building with low solar PV prioritization/feasibility for inclusion as cool roof pilot location. Alternatively, pilot program could be advertised for submission by City of Bloomington residents, businesses and neighborhoods for potential sites to be considered for pilot project selection. Preference should be given to sites serving low income or at risk communities with high heat island impact potential. <a href="https://www.epa.gov/heatislands/using-green-roofs-reduce-heat-islands">https://www.epa.gov/heatislands/using-green-roofs-reduce-heat-islands</a>	2
EB2-B-7	Develop specific energy efficiency programs for hard-to-reach segments of multi-family and commercial properties (e.g., commercial rental, restaurants, large scale manufacturing, offices, affordable multifamily housing). Explore partnerships to include a job training component focused on providing training to low income community members in the program. Potential partners may include Monroe County and Bloomington Work One Center.	2
EB2-B-8	Enable institutions within each sector to learn about successful efficiency work through pilots, workshops, and case studies.	2
EB2-B-9	Improve training, certification, and education opportunities for energy auditors and professionals involved in the disposal and use of refrigerants.	2
EB2-B-10	With a focus on low income households and renters, engage residents on low cost ways to save energy and money, such as installing programmable thermostats. Pair educational content with access to incentives and resources.	2
EB2-B-11	Use a focused outreach program to contact local businesses to encourage participation in energy efficiency programs. Explore the development of an "Energy Reduction Top 50" energy efficiency assessment and recommendation program similar to the "Solar Top 50".	2
EB2-B-12	Develop a "Cool Roof" pilot project to exhibit heat island mitigation strategies and measure potential for effectiveness. Identify city building with low solar PV prioritization/feasibility for inclusion as cool roof pilot location. Alternatively, pilot program could be advertised for submission by City of Bloomington residents, businesses and neighborhoods for potential sites to be considered for pilot project selection. Preference should be given to sites serving low income or at risk communities with high heat island impact potential. <a href="https://www.energy.gov/energysaver/design/energy-efficient-home-design/cool-roofs">https://www.energy.gov/energysaver/design/energy-efficient-home-design/cool-roofs</a>	2



	Actions	Implementation Phase
EB2-B-13	Adopt, implement, and promote a Residential Energy Benchmarking and Disclosure or "Truth In Sale" ordinance for homes listed for sale. Examples include: <a href="http://www2.minneapolismn.gov/ccs/ccs_tish">http://www2.minneapolismn.gov/ccs/ccs_tish</a> <a href="https://austinenenergy.com/ae/energy-efficiency/ecad-ordinance/ecad-for-residential-customers">https://austinenenergy.com/ae/energy-efficiency/ecad-ordinance/ecad-for-residential-customers</a>	3
EB2-B-14	Host a "data jam" session in support of benchmarking ordinances where building managers can enter energy with technical assistance providers present.	3
EB2-B-15	Develop a "Cool Pavement" pilot project to exhibit heat island mitigation strategies and measure potential for effectiveness. Identify city road or parking pavement location with high micro heat island potential for pilot project location. Alternatively, pilot program could be advertised for submission by City of Bloomington residents, businesses and neighborhoods for potential sites to be considered for pilot project selection. Preference should be given to sites serving low income or at risk communities with high heat island impact potential.	3

### Strategy EB 2-C:

#### Increase net zero energy residential building stock to 1% of homes Citywide by 2030.

Net zero buildings are buildings with high energy efficiency that produce as much on-site renewable energy as they consume in a year. Net zero buildings tend to be high performance buildings that provide a higher level of occupant comfort and building health. According to a 2019 study by the Rocky Mountain Institute, net zero homes in the Indiana region average a return on investment of 12 years or less - after which they deliver "free" energy to their owners. As a part of this Climate Action Plan, a Net Zero Energy Guide and Solar Ready guide have been developed to assist Bloomington homeowners and commercial building owners in exploring and achieving a Net Zero building. (<https://palebluedot.llc/bloomington-net-zero-energy-guide>) (<http://palebluedot.llc/bloomington-solar-ready-guide>)

#### How We'll Measure Progress:

Reported certified net zero homes

#### Co-Benefits of Strategy:

<p style="color: #3498DB;">Reduced Costs</p> 	<p style="color: #3498DB;">Reduced GHG Emissions</p> 
<p style="color: #3498DB;">Improved Building Quality and Comfort</p> 	<p style="color: #3498DB;">Improved Energy Resilience</p> 

	Actions	Implementation Phase
EB2-C-1	Promote, provide and distribute the City's Net Zero Energy Building Guide document to local home shows or remodeler showcase events, designers, homebuilder associations, and realtors. ( <a href="https://palebluedot.llc/bloomington-net-zero-energy-guide">https://palebluedot.llc/bloomington-net-zero-energy-guide</a> ) Include the City's Net Zero Energy Building Guide and Solar Ready Guideline documents on the City's Design Guidelines webpage. ( <a href="https://bloomington.in.gov/utilities/review/design/manual">https://bloomington.in.gov/utilities/review/design/manual</a> )	1
EB2-C-2	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 homeowners, multi-family building owners, local builders association, and real estate agents. Goal: 1% market coverage (300 households) attending training annually. ( <a href="https://palebluedot.llc/bloomington-net-zero-energy-guide">https://palebluedot.llc/bloomington-net-zero-energy-guide</a> ) ( <a href="http://palebluedot.llc/bloomington-solar-ready-guide">http://palebluedot.llc/bloomington-solar-ready-guide</a> )	1
EB2-C-3	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. Focus on "Net zero building in every neighborhood" to establish visibility of strategies within the community.	2

## Goal EB 3 Support decarbonization of the local electricity grid.

**Strategy EB 3-A:**

**Support Duke Energy's grid emissions goal of 50% below 2005 levels by 2030.**

The electric utility serving Bloomington, Duke Energy, has established a goal of reducing the GHG emissions associated with their electricity 50% by 2030 and to achieve net zero by 2050. Implementation of this goal by Duke Energy is critical in achieving the overall GHG emission reduction goals represented in this Climate Action Plan - should Duke Energy not accomplish this grid emission goal it could mean additional GHG emissions of 520,000 metric tons or more annually. <https://news.duke-energy.com/releases/duke-energy-aims-to-achieve-net-zero-carbon-emissions-by-2050>.

**How We'll Measure Progress:**

Reported annual electric grid GHG Emissions Factors

**Co-Benefits of Strategy:**

Improved Air Quality



Reduced GHG Emissions



Actions	Implementation Phase
EB3-A-1 Collaborate with Duke Energy for the development of a pilot/demonstration community solar program achieving a total of 7,000 MWH in subscribed annual community solar energy by 2030. Identify underutilized sites such as landfill, brownfield, superfund sites, or detention pond sites (for floating solar) and identify most advantageous site to develop and install pilot solar garden. Collaboratively develop and issue an RFP for community solar developers to advance community solar options and subscriptions within City. RFP shall focus on projects that benefit all residents, particularly communities of color and low-income populations. Include community solar option benefiting small businesses. (Goal: 500 households and 200 businesses subscribed to community solar by 2030) (example projects at superfund sites: <a href="https://www.epa.gov/superfund-redevelopment-initiative/alternative-energy-superfund-sites">https://www.epa.gov/superfund-redevelopment-initiative/alternative-energy-superfund-sites</a> )	1
EB3-A-2 Collaborate with Duke Energy to develop a pilot / demonstration solar lease program for photovoltaic on buildings connected via net metering open to Duke and third party vendors.	2



## Strategy EB 3-B:

### Advocate for stronger State policy.

Surrounding states have shown that policies such as the allowance of Property Assisted Clean Energy (PACE) programs, and improved solar policies such as allowance of Power Purchase Agreements, Solar Lease agreements, virtual net metering, aggregated net metering, and community solar laws can help "level the playing field" for improved energy efficiency and renewable energy. Collaborations with other communities and non-profit groups to help educate and guide State leaders towards making improved policy decisions can play a critical role in meeting Bloomington's goals.

**How We'll Measure Progress:**  
Status of State energy efficiency and renewable energy policies

#### Co-Benefits of Strategy:

Reduced GHG Emissions



Jobs / Economic Development



Improved Community Equity



Improved Quality of Life



Actions		Implementation Phase
EB3-B-1	Collaborate with other communities, industry, and state agencies to support the State establishing the enabling legislation for Commercial Property Assessed Clean Energy (C-PACE) and Residential Property Assisted Clean Energy (R-PACE) financing.	1
EB3-B-2	Collaborate with other communities, industry, and state agencies to support the State in establishing policies and laws to expand the market for renewable energy, make it easier for large multi-family, commercial, and industrial customers to benefit from renewable energy (e.g. feed-in tariff, Power Purchase Agreements, Solar Lease agreements, roof space rental, community solar, virtual net metering, aggregated net metering, etc.) Include information on current State of Indiana related regulations and cost and payback information.	1
EB3-B-3	Collaborate with other communities, industry, and state agencies to support the State advancing increased energy efficiency building code requirements, establishing minimum energy performance requirements, net zero considerations and/or the establishment legislation enabling cities to establish "stretch codes" within their jurisdiction.	3

**Goal EB 4 Promote "fuel switching" to reduce on-site fossil fuel use in the building sector by 3% of 2018 values.**

**Strategy EB 4-A:**

**Support and accelerate electrification of on-site fossil fuel combustion systems citywide by 2% of 2018 consumption levels (natural gas, propane, fuel oil, etc).**

The reduction and elimination of on-site fossil fuel combustion community-wide is a critical long-term pathway towards GHG emission reductions. As the Bloomington area electric grid becomes cleaner (see goal EB3), the benefits of electrification will become more and more meaningful. According to US Census data, over 50% of Bloomington homes use electric heat, while technologies like conduction cook tops illustrate the effectiveness and improved safety of electricity in lieu of natural gas.

**How We'll Measure Progress:**

Reported Natural Gas consumption citywide, US Census data on homes using electric fuel for heating.

**Co-Benefits of Strategy:**

Improved Air Quality



Reduced GHG Emissions



<b>Actions</b>	<b>Implementation Phase</b>
EB4-A-1 Conduct an "Electrification Assessment and Action Plan" to outline actions and priorities for electrification of all City facilities to move towards zero on-site fossil fuel combustion. Work with regional energy partnerships to implement Plan for all City facilities. Include new and existing buildings, explore strategies to address electricity storage, and create a case study to highlight and share challenges, solutions, and lessons learned to share with the broader community.	1
EB4-A-2 Explore the establishment of polices or ordinances supporting all electric buildings, such as an all electric requirement for buildings receiving PUD or Conditional Use Permit approvals, an all electric reach code such as Menlo Park, or a natural gas ban such as Berkeley.	3
EB4-A-3 Deploy an incentive program for electrification. Work with Duke Energy or other regional partnerships to create financial incentives to electrify new and existing buildings. For example, rebates for panel upgrades, electric appliances, electric water heaters, Air Source Heat Pumps, and Ground Source Heat Pumps can encourage the transition to electric energy use in homes and businesses. Goal: Goal 3% residential market conversion (90 households annually) and 3% commercial/industrial market conversion (an estimated 15 commercial businesses, 3 industrial businesses annually) by 2030. Collaborate with program partners to quantify potential cost savings of electrification and provide ROI information to potential program participants.	3



**Strategy EB 4-B:**

**Support and accelerate low/no carbon alternatives to on-site fossil fuel combustion by 1% of 2018 consumption levels** (natural gas, propane, fuel oil, etc).

Renewable Natural Gas, RNG, is natural gas derived from organic waste material found in daily life such as food waste, garden and lawn clippings, and animal and plant-based material. RNG is considered a carbon-neutral fuel because it comes from organic sources that once absorbed carbon dioxide from the atmosphere during photosynthesis. RNG has even greater benefits when it's produced from organic waste that would otherwise decay and create methane emissions. In addition, RNG utilization provides a beneficial pathway for waste streams. Although combustion of biofuels and RNG does emit CO2 they are considered low or no-carbon fuels. Burning fossil fuels releases carbon that has been locked up in the ground for millions of years, while burning biomass emits carbon that is part of the biogenic carbon cycle. In other words, fossil fuel use increases the total amount of carbon in the biosphere-atmosphere system while bioenergy systems operates within this system; biomass combustion simply returns to the atmosphere the carbon that was absorbed as the plants grew.

**How We'll Measure Progress:**

Status of State energy efficiency and renewable energy policies

**Co-Benefits of Strategy:**

Reduced GHG Emissions



Jobs / Economic Development



Improved Energy Resilience



Actions	Implementation Phase
EB4-B-1 Work with Vectren to establish an option for Renewable Natural Gas sourced from regional sources for residential and commercial customers. Program to include tracking for citywide natural gas reporting for GHG inventories. Achieve 5% use by 2030 (150 households and 30 businesses per year).	1
EB4-B-2 As recommended by the City of Bloomington Waste To Energy Taskforce, the City should further investigate the potential of an aerobic digester wastewater-to-energy installation at the Dillman Road Wastewater Treatment Plant. Utilization of biogas as renewable natural gas source for city facilities, large corporate offtaker, or community residents should be included in study. ( <a href="https://bloomington.in.gov/departments/office-of-the-mayor/projects/waste-energy-task-force">https://bloomington.in.gov/departments/office-of-the-mayor/projects/waste-energy-task-force</a> ).	1
EB4-B-3 Study the potential of capturing beneficial use of landfilled solid waste stream through waste-to-energy strategies including zero emission plasma gasification, methane capture, and anaerobic digestion.	1

**Goal EB 5 Increase financing options for Energy Efficiency and Renewable Energy projects citywide.**

**Strategy EB 5-A:**

**Promote Equity in Energy and Resource Costs and Ownership.**

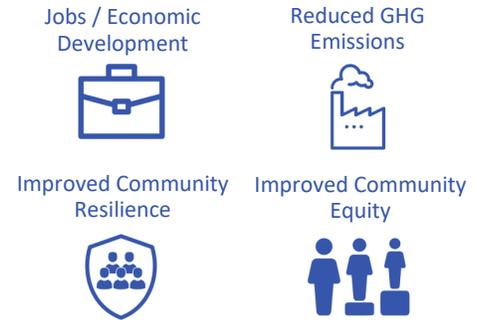
Low income communities are among the most vulnerable to the impacts of climate change, the most likely to struggle with housing cost burdens, and the most likely to struggle with energy insecurity - low-income families are adversely impacted by rising utility costs with the poorest families spending between 7.2% and 10% of their incomes on electricity, while the average household pays less than half of that amount, or only 3.5% of their income on electricity. Low income households are also nearly 3 times more likely to rent rather than own their home (<https://www.zillow.com/research/homeownership-by-income-9419/>), meaning they have much less control over the energy efficiency of their home.

In recent studies, American Council for an Energy-Efficient Economy (ACEEE) found that 97 percent of the excess energy burdens within renter households could be eliminated by bringing their homes up to median efficiency standards while a 2015 study by the U.S. Department of Energy found that the value of energy upgrades is 2.2 times their cost. The less energy efficient a building is, the higher that value to cost ratio becomes. Supporting pathways to create equity in energy alleviates energy burdens for those that need relief the most as well as expands the market for energy efficiency and renewable energy investments.

**How We'll Measure Progress:**

Reported Natural Gas consumption citywide, US Census data on homes using electric fuel for heating

**Co-Benefits of Strategy:**



<b>Actions</b>		<b>Implementation Phase</b>
EB5-A-1	Develop partnerships with low-income and supportive housing serving organizations, the County, and the Bloomington Housing Authority to ensure that efficiency and renewable programs, incentives, and practices, meet the specific needs of these populations.	1
EB5-A-2	Collaborate with Duke Energy and Vectren to increase energy efficiency funding options for families including low-interest financing, on-bill financing, Pay As You Save, and other programs as determined to be most effective.	1
EB5-A-3	Establish a Recover Forward energy fund to invest in energy efficiency and renewable energy projects with a focus on supporting improved equity in Renewable Energy and Energy Efficiency in the community.	1
EB5-A-4	Collaborate with partners such as Citizens Action Coalition to establish and regularly host utility bill clinics similar to those offered by Minnesota Citizens Utility Board ( <a href="http://cubminnesota.org/">http://cubminnesota.org/</a> ) to help residents understand their bills, discuss energy savings options, and hear about rebate/incentive availability and clean energy options.	1
EB5-A-5	Create a coordinated "one-stop" program approach to expand low-income housing programs by layering healthy homes, lead abatement, bill clinic, weatherization, and renewable energy programs.	2
EB5-A-6	Establish a Community Cost Share Fund for tax advantaged donations applied towards energy efficiency improvements and renewable energy projects for renters. Example program: <a href="https://www.como.gov/trust/share-the-light/">https://www.como.gov/trust/share-the-light/</a>	2



Actions	Implementation Phase
EB5-A-7    Develop tools to finance energy efficiency and renewable energy retrofits for commercial and residential buildings that have low barriers to entry and limited risk for local government and that are broadly accessible to households and building owners, including rental properties, throughout the community. Potential tools may include Guaranteed Energy Savings program, Carbon Market funding, Mortgage-Backed Energy Efficiency and Renewable Energy Financing, and Municipal Energy Efficiency and Renewable Energy Revolving Loan, and Municipal rebates. Combine offerings with Duke Energy and Vectren incentive programs. Explore establishing a tiered incentive program with increasing incentivization for projects achieving 5%, 10%, 15%, and higher improved, measured energy efficiency over code requirements as well as an incentive add for low income beneficiaries. <a href="http://newbuildings.org/sites/default/files/EnergyEfficiencyFinancing_ModelsStrategies201110.pdf">http://newbuildings.org/sites/default/files/EnergyEfficiencyFinancing_ModelsStrategies201110.pdf</a>	2
EB5-A-8    Explore partnering City's investment and financing concepts with Indiana University to establish collaborative financing mechanisms, program, or implementation strategy to advance equitable energy efficiency and renewable energy in the community.	2
EB5-A-9    Evaluate the potential for a municipal or regional carbon tax or fee with dividends provided to lower income individuals. Funds to be used to support and promote energy efficiency and no/low carbon energy transitions for low income and vulnerable individuals.	3
EB5-A-10    Establish a Renewable Energy TIFF Policy, requiring on-site renewable energy for all projects receiving TIF financing. Policy could also include the establishment of a Renewable Energy TIF District specifically identifying TIF financing potential for properties receiving redevelopment which include on-site renewable energy.	3

## Planned Energy and Built Environment GHG Emission Reductions

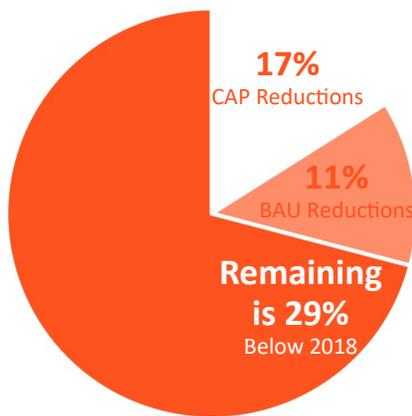
### Planned Sector Emission Reductions Through 2030

The strategies and actions included in this section of the Climate Action Plan are projected to reduce the city’s annual GHG emissions by 171,373 metric tons (MT) by 2030 - a 17% reduction over 2018 levels. Changes in business-as-usual impacts are anticipated to reduce an additional 131,458 metric tons for a total community wide building and energy sector reduction of 29% over 2018 levels.

This is equivalent to eliminating **5.87 billion** cubic feet of man-made greenhouse gas atmosphere annually by 2030.

### Sector Emissions Reduction below 2018 Achieved by 2030

The total change to sector emissions include CAP Plan reductions as well as BAU emission changes as follows:



### Individual Strategy Annual Emission Reductions by 2030

Below are the CAP Plan reductions by strategy for this sector:

Strategy	Annual GHG Reductions by 2030
<b>Strategy EB 1-A:</b> Increase solar on City facilities 20% by 2030.	<b>319 MT</b>
<b>Strategy EB 1-B:</b> Support and accelerate installation of on-site solar PV citywide.	<b>70,240 MT</b>
<b>Strategy EB 1-C:</b> Improve energy policy.	N/A
<b>Strategy EB 2-A:</b> Increase total City owned building electrical energy efficiency 16% for electricity and 12% for natural gas of 2018 values.	<b>322 MT</b>
<b>Strategy EB 2-B:</b> Support and accelerate energy efficiency citywide.	<b>90,082 MT</b>
<b>Strategy EB 2-C:</b> Increase net zero energy residential building stock to 1% of homes citywide by 2030.	<b>3,711 MT</b>
<b>Strategy EB 3-A:</b> Support Duke Energy's grid emissions goal of 50% below 2005 levels by 2030.	(included)
<b>Strategy EB 3-B:</b> Advocate for stronger state policy.	N/A
<b>Strategy EB 4-A:</b> Support and accelerate electrification of on-site fossil fuel combustion systems citywide.	<b>(594) MT*</b>
<b>Strategy EB 4-B:</b> Support and accelerate low/no carbon alternatives to on-site fossil fuel combustion.	<b>1,001 MT</b>
<b>Goal EB 5:</b> Increase financing options for Energy Efficiency and Renewable Energy projects citywide.	N/A
<b>Strategy EB 5-A:</b> Promote Equity in Energy and Resource Costs and Ownership.	N/A

\* Due to current high emission factors for grid provided electricity, early stage electrification efforts may increase total emissions slightly, however, as emission factors associated with grid electricity decrease electrification will result in net emissions decreases.



## Estimated Cumulative Economic Savings

Implementing many of the measures in this plan, such as increased energy efficiency and renewable energy, can save money for the community. The estimated community savings of the goals for this section include:

Residential Energy Efficiency and Renewable Energy Savings:	Commercial/Industrial Energy Efficiency and Renewable Energy Savings:	Estimated Cumulative Savings Potential*
<b>\$74,954,273</b> <b>\$2,447</b> <small>per household</small>	<b>\$73,070,358</b> <b>\$1,441</b> <small>per job</small>	<b>\$148,024,631</b> <b>\$1,740</b> <small>per capita</small>

\* Savings for residential and commercial/industrial energy efficiency are based on current average energy rates applied to projected energy reductions. Savings for residential and commercial/industrial renewable energy are based on an estimated 15 year ROI on solar installations with an average solar array design life of 30 years. See Appendix for Cumulative Potential Cost Savings Assumptions and data sources.

## What You Can Do

- Unplug 2 or more electricity "vampires" in your home or apartment.  
<https://www.duke-energy.com/Energy-Education/Energy-Savings-And-Efficiency/Energy-Vampires>
- 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 Duke Energy.  
<https://www.duke-energy.com/home/products/home-energy-house-call>
- Learn about adding solar panels to your home. Attend a free Solar Indiana Renewable Energy Network information session, or schedule a solar suitability assessment of your home by a licensed contractor.  
<https://bloomington.in.gov/sustainability/solarize>
- If you don't own your home but support clean, renewable energy, sign up for Duke Energy's GoGreen Energy Program.  
<https://www.duke-energy.com/home/products/renewable-energy/gogreen-energy>
- Install — or have a licensed contractor install — more insulation in your home.
- Install energy-efficient windows and doors, working with a licensed contractor.
- Install solar panels at your home, working with a licensed contractor. If possible, participate in Bloomington's residential solar group purchasing program.



Photo: Andrew Williams, Indiana Daily Student