



IOWA CITY SOLAR 2035

A strategy for expanding solar energy
in the coming decade

January 2022



**Johnson Clean
Energy District**

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Executive Summary

This report examines the role of solar energy in meeting Iowa City's energy needs now and in the future. Currently, solar electricity represents less than one-half of one percent of the city's energy load¹. Iowa City's leadership in combatting climate change is focused primarily on energy efficiency and electrification, with solar energy generation playing a much lesser role. In 2020, the City's partnership with MidAmerican Energy to develop a solar farm at Waterworks Park drew strong community opposition, as many residents objected to the loss of open space at the park. What is solar's future in Iowa City?

Iowa City's greenhouse gas emissions have declined 49% since 2010, largely the result of MidAmerican Energy's deep investments in wind energy in the state. While applauding this success, there are important reasons to keep solar energy a significant part of the community's energy mix. The modular nature of solar photovoltaics (PV) panels allows them to be deployed virtually anywhere, connected to the electric grid or not. Technological advances and falling prices have enabled many individuals to generate their own solar energy, lower their energy bills and carbon footprint, and contribute excess electricity to the grid. This locally-generated energy helps offset rising demand caused by the push for greater electrification of buildings and transportation. Paired with storage batteries and microgrids, two other rapidly evolving technologies, solar energy would support community resilience during extended outages from weather-related events. These and other developments are behind a paradigm shift in how people make, use, and either store or sell electricity they produce.

In the months after the Waterworks Park project was halted, a small group of solar and policy experts gathered to discuss Iowa City's solar future. Based on

¹ Estimate based on 1.5 MW interconnected solar nameplate capacity (2020) compared to City's most recent GHG emissions report (2017).

these discussions, Johnson Clean Energy District and the University's Iowa Initiative for Sustainable Communities organized a collaborative study to explore alternative project sites and strategies and to solicit public input on solar expansion. Four action steps in the City's *Climate Action and Adaptation Plan* and *Accelerating Iowa City's Action Plan* provided direction in calling for: (1) increased on-site renewable energy and electrification; (2) community solar projects; (3) support for electric vehicles; and (4) weather preparedness. That guidance, along with the City's strong commitment to social justice, framed the approach described in this report.

Study participants obtained technical and siting information from Google's Project Sunroof, geospatial information assembled at UI's Department of Geographical and Sustainability Sciences, and from an earlier city-commissioned [report by Bluestem Energy Solutions](#) on the feasibility of solar on municipal buildings in Iowa City ². Policy research was conducted through the School of Planning and Public Affairs Environmental Policy and Management course. An online community survey was conducted by Bailey Leadership Initiative.

Key Findings

The technical potential for distributed rooftop photovoltaic in Iowa City is large but not universally accessible.

About 60% of Iowa City buildings are considered solar-viable, potentially giving the city an estimated 238 MW of rooftop solar energy. However, access to rooftop solar PV is not consistent across residential neighborhoods. Renters, people unable to cover capital costs, and the 40% of homeowners and businesses without suitable roofs cannot currently access the benefits of solar.

[Map 1: Solar potential, aspect and tree cover](#)

² Madala, Srikanth et al. A Comprehensive Study of the Solar Energy Power Systems for the City of Iowa City. Bluestem Energy Solutions, Omaha NE, 2018.

A lack of available land and restrictive policies has constrained efforts to develop centralized solar farms and solar gardens in Iowa City.

Solar farms (usually investor-owned) and solar gardens (usually community solar) are large PV arrays that, because they are sited for maximum solar potential and to capture economies of scale, can dramatically reduce the costs of solar³. Finding acceptable public sites for large arrays in Iowa City has proved difficult (e.g., floodplain issues at the Iowa City airport, competing uses at Meskwaki Park and the Wastewater Treatment Center). Portions of the 420th Street Industrial Park may provide a viable option, along with smaller projects (250 - 500kW) that utilize urban infill (parking lots or small, unused areas near city buildings). Renting or purchasing land outside Iowa City may also be an option. [Map 2: public lands and impervious surfaces](#)

Community solar, an innovative approach to make solar more affordable, is further constrained by utility policies governing net metering and a lack of clarity in state law. Community solar refers to projects in which members – residents, businesses, nonprofits, and government – can purchase or lease PV panels at a centralized project and receive credit on their utility bill, just as they would by installing solar on their own roof. Many states, including Minnesota, Illinois, and Wisconsin, and numerous municipal and rural energy cooperatives in Iowa, offer this type of off-site net-metering to their customers, but it is not currently allowed by MidAmerican Energy and it is not specifically enabled in state law. This may be changing: MidAmerican is expected to ask for legislation to allow greater flexibility for the company to build a solar farm for selected subscribers. This legislation may prove a pathway for broadening access to Iowa City customers. Alternative solutions, such as the “Sustainable Energy Utility” outlined in an October 2021 City of Ann Arbor report, could also be explored.

³ Feldman, David, et al. U.S. Solar Photovoltaic System and Energy Storage Cost Benchmark: Q1 2020. National Renewable Energy Laboratory. Golden, Colorado 2020.

Various tax, ownership, and other strategies could improve the economics of solar and stimulate local investment.

The Bluestem feasibility study concluded that the City should scale up the size of solar projects and utilize third-party public-private partnership to take advantage of substantial tax incentives⁴. Solar partnerships called third party power purchase agreements (PPAs) are long-term arrangements in which an investor installs, maintains, and operates PV panels on a tax-exempt host's property, sells the electricity generated to the host at a contracted rate, and uses solar tax credits and other tax effects, depreciation, and electricity income to cover expenses. Typically, the host buys out the system at a lower price when it is fully depreciated. The relative profitability for such arrangements versus cash purchase, along with other strategies to attract private capital (homeowners and investors) needs further study.

Iowa City does not have specific targets or action plans for broad solar deployment.

Iowa City has taken steps to promote solar to homeowners, incentivize solar on commercial developments, and install solar on several municipal buildings but currently does not have a cohesive set of planning, zoning, and permitting policies for wide-scale solar energy. Model ordinances covering solar zoning, design standards, solar easements, solar-ready building codes, and other issues not currently operational in Iowa City can be obtained through Midwest Renewable Energy Association and Great Plains Institute⁵.

Iowa City residents and businesses who participated in a 2021 community survey have strong interests in solar energy, driven largely by people's stated desire to

⁴ Madala, et al. Page vi-v.

⁵ Great Plains Institute. **Iowa Local Government Solar Toolkit**. 2020.

<https://www.betterenergy.org/wp-content/uploads/2016/08/Iowa-Toolkit-May2020.pdf> and

Midwest Renewable Energy Association. **Iowa Solar Model Ordinance**. 2020.

<https://www.growsolar.org/wp-content/uploads/2020/09/IA-Solar-Ordinance-2020.pdf>

“do my part to combat climate change”. Many Iowa City residents are concerned about the climate crisis and want to do something about it. People interested in solar expressed interest in rooftop PVs on individual buildings, utility-provided solar, and the lesser-known community solar. The upfront costs of PV panels on individual buildings present significant challenges to many survey respondents. Large majorities of survey respondents support municipal policies to increase solar, including financial incentives for nonprofit organizations and residents (78%); incentives to businesses (69%); requiring solar on new buildings receiving financial benefits from City (70%); and solar-ready new building requirements (62%). Survey results indicate support for the existing City of Iowa City programs and policies related to solar, as well as additional proactive efforts.

Recommendations

We recommend scaling up and integrating solar energy into Iowa City’s infrastructure and neighborhoods, with a focus on strategies combining mitigation and adaptation that support the City’s goals to reduce greenhouse gases and increase electrification, resilience, and social equity. Because of site limitations, opportunities for urban infill scale projects mounted on rooftops, parking canopies, and marginal areas should be sought. Leasing or purchasing land should also be considered.

Recommendation 1: Iowa City should conduct new demonstration projects of solar project types with high intrinsic value, equitable access, and wide public support.

Demonstration projects educate the community (the East Side Recycle Center with solar, wind, and LEED platinum designation are good examples) and test environmental, equity, and resilience co-benefits. They examine new financial and legal models. Three project types with important co-benefits are described below. Further engineering and analysis to fully understand direct and ancillary costs and benefits are needed.

1A: Solar energy generation and battery storage for emergency services, critical infrastructure, and resilience hubs at City-owned buildings. Solar energy generation and storage should be targeted and sized strategically for emergency services and essential City operations during extreme weather events and grid outages. Potential demonstration sites for rooftop systems are City Hall Complex (city hall, police, fire station), Mercer Park, and other municipal facilities evaluated in the Bluestem report⁶. A separate Iowa City-funded project is presently evaluating sites for more broadly-defined resilience hubs.

1B: Solar parking lot canopies. Solar panels over parking lots near schools, government buildings, business districts, and recreational areas are an option where rooftop and ground-mounted arrays are not optimal. They can provide numerous benefits on urban spaces otherwise entirely devoted to parked automobiles. Such canopies could include EV charging stations, help reduce the urban heat island, protect vehicles from hail, and enable popup events such as farmers markets. Parking lots adjacent to buildings should be targeted, e.g., Mercer Park. If off-site net metering becomes a reality, the canopies could generate electricity for nearby buildings.

Caveat: The cost of parking canopies is higher than roof- or ground-mounted systems. Estimates contained in the Bluestem report (2018) were \$1.86/watt for carport solar versus \$1.67/watt for commercial rooftop⁷ but more recent estimates from local installer are higher⁸.

1C: Combined utility and community solar demonstration project with MidAmerican Energy. Electricity generated at a prime solar site would be

⁶ Madala, et al.

⁷ *ibid*, pp. 143

⁸ Interviews with Vu Nguyen (Tenaska Power Services), Josh Clark (Simpleray), and Chris Hoffman (Moxie Solar) by Cheryl Miller and Craig Mosher, August – September, 2021.

divided between the utility and community solar subscribers, with carveouts for low-income participants. The project would replace the Waterworks Park proposal, which was to produce only utility-owned power. A joint project would better align with the actions called for in the *Climate Action Plan*. It could serve as a demonstration project of off-site net metering called for by the Iowa Utility Board in 2015. Potential sites are a portion of the 420th Street Business Park and parcels for sale or lease outside the city limits.

Caveat: Community solar is currently constrained by state and utility policies (see discussion at 2B below). Also, the City and MidAmerican have been unable to find a mutually acceptable parcel for a centralized solar project. It may be necessary for the City to undertake the project alone (third party developers currently are not allowed to initiate community solar projects). In this case, the City would negotiate with MidAmerican on allowable size of project (net metering is currently limited to 1 MW) and apply for interconnection to the distribution grid.

Recommendation 2: Create an environment in which rapidly advancing solar technologies can be adopted into Iowa City's energy portfolio.

2A: Create cohesive energy efficiency and solar policies in zoning, building code, city operations, and comprehensive planning to enhance quality of life, resilience, and economic and environmental objectives.

Scaling up public and private efforts to capture the solar benefits discussed in this report would be helped by setting a long-term vision and targets, such as “local generation of 10% of the community’s energy load”. These solar policies should directly support *Climate Action Plan* and *Accelerated Plan* goals, support successful solar deployment, and promote local investment in solar.

2B: Support legislation or action at the Iowa Utility Board to allow community solar programs. Enabling legislation for virtual net-metering

would open the door for municipalities and third-party PPAs and greatly expand options for community solar. Unlike many other states, third party partners in Iowa can only develop solar projects for individual buildings. A bill in the coming legislative session would allow a utility greater flexibility to offer programs, such as MidAmerican Energy's Renewable Subscription Program, outside of a rate case, as is normally required. The City of Iowa City's support could help advance legislation that includes robust language regarding aggregation in net-metering programs. Aggregation allows electric customers to offset energy use at all meters or building with solar at a large site, a key component of community solar.

2C: Support funding and continuation of existing state and federal incentives and explore new local incentives. Iowa's solar energy tax credit expires on December 31, 2021: it is no longer available for residential buildings after 2021 and for businesses after 2022. Federal tax credits are funded through 2024, although at declining levels. The City of Iowa City should advocate to preserve and fund state and federal tax credits and explore additional local incentives, including working with the local banking community to expand loan and grant opportunities.

Recommendation 3: Develop a solar vision for the community by engaging residents from different neighborhoods, demographic groups, business communities, and other groups to tailor solar programs for discrete sections of the city.

Over the next ten years, Iowa City neighborhoods should have the opportunity to develop a set of projects, including resilience hubs, parking canopies, and community solar that benefit neighborhood residents and businesses. Engaging community groups, business, banking, and other groups early in conceptual stages will help establish priorities, identify concerns and areas of opposition, engage partners, increase financing options, and build trust, support, and

participation. Exemplary community-hosted solar projects sited on city-owned or leased properties may feature:

- PV arrays and storage batteries for emergency services and resilience hub;
- one or more 500kW opt-in community solar arrays with virtual net metering. In business districts without adjacent public land; community solar could also be possible by leasing accessory use from landowners for panels on roofs and parking lots;
- one or more solar parking lots with shaded multi-use spaces for covered bicycle parking, electric vehicle charging, and pop-up events;
- a solar garden with interpretive displays and real-time energy production indicators;
- discounted group buys for residences, businesses, and non-profits, and special programs for low-to-moderate income (LMI) consumers.

Caveat: A modest goal for locally-generated solar – 10% of the community’s electricity usage – is approximately 100 MW of solar energy⁹. Even with falling prices, this represents a sizeable investment from Iowa City residents, government, and the private sector over the coming decade. However, lower energy costs and other avoided costs over time help offset upfront investments. New business and job opportunities in the solar market would also benefit from these investments.

The high cost of land and aesthetic requirements in Iowa City require thoughtful and innovative siting decisions. Sites should be evaluated for their potential to produce additional “stacked benefits”, such as those mentioned above.

Recommendation 4: Create and market a highly visible, well-integrated, and socially beneficial solar program.

⁹ Iowa City Community-wide Greenhouse Gas Emissions, Inventory Update. June, 2017.

Iowa City is home to one of the state's most important educational resources and, as such, has a crucial role in advancing the proliferation of solar technology in Iowa. Educating visitors and students about the potential of a well-designed solar energy program to address a range of environmental and social issues would have far-reaching benefits now and in the future. A portfolio of educational outreach programs is contained in the Bluestem report.

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Introduction

In September 2018, the Iowa City City Council established its first community-wide greenhouse gas emissions target and created a *Climate Action and Adaptation Plan (Climate Action Plan)* to achieve emission reductions. The following August, the Council declared a Climate Crisis and approved new emissions goals in accordance with those set by the Intergovernmental Panel on Climate Change (IPCC): reduce carbon emissions by 45% from 2010 levels by 2030 and achieve net zero carbon emissions by 2050. City staff were charged with creating the *Accelerating Iowa City's Action Plan (Accelerated Plan)* to meet these goals.

In drafting the climate plans, the City was influenced by MidAmerican Energy's commitment to 100% renewable energy, which, as of 2020, is credited with the majority of the City's emission reductions. Accordingly, the *Accelerated Plan* prioritizes electrification and reducing energy consumption, with belief that this could have a greater impact and higher return on investment (dollars spent on these activities yield greater emissions reduction results). To cover gaps left by other emission reduction activities, the City has also taken steps to promote solar, including:

- Grow Solar Linn + Johnson Counties, which incentivizes rooftop solar projects;
- Municipal Facilities, starting with a solar feasibility study by Bluestem Energy Solutions (2018) and recent solar Power Purchase Agreement for PV installations on the Iowa City Public Works Facility and the Terry Trueblood Recreation Area Lodge.
- Building & Development Incentives for three projects in the Riverfront Crossings District require the developer to attempt to provide solar.
- TIF & Financial Incentives: Tax Increment Financing (TIF) was used to promote stricter energy efficiency and solar at Riverside West

Apartments and Hieronymus Square/Element Hotel and a commercial/industrial matching grant program for energy efficiency projects in the Sycamore/First Ave./Heinz/Scott 6 Urban Renewal Areas. The City is preparing to launch a similar matching grant program for commercial properties in the Downtown/Riverfront Crossings district and will require solar proposals to be bundled with an energy efficiency project.

- City Housing Rehab Projects in the South District Homeownership Program, including rooftop solar panels.

In 2019, MidAmerican Energy approached the City of Iowa City with a proposal to develop a utility-scale solar complex on City-owned property. The City explored several location options, including the municipal airport, with MidAmerican and selected Waterworks Prairie Park due to its proximity to electrical infrastructure and high visibility along Interstate 80. The project proposed development of a 3 MW, 10,000-panel solar complex on 19 acres of City leased-parkland. The City Council approved code changes to consider the lease, but the proposal received significant public opposition towards the end of deliberations and the project was ultimately rejected by City Council vote in March 2020. Several Council members urged the City to step back, consider alternative strategies and sites, and develop a long-term vision for solar energy in the City. City staff and MidAmerican Energy re-reviewed alternative locations and were unable to identify a location that would meet infrastructure, flood plain, and public support needs. In 2021, MidAmerican developed a similar project north of Hills, IA.

In the weeks after the Waterworks project vote, members of Johnson Clean Energy District convened a small discussion group of solar and policy experts to consider the situation and options for moving forward. The group was determined to prevent a loss of momentum in the City's solar efforts and set about identifying alternative sites for the project. The group also took note of statements by Council members calling for a larger and longer-term vision for solar energy in the community and a better understanding of community views

on solar projects. In October 2020, they presented a proposal to the Climate Action Commission to study feasibilities and public support for an expanded solar program. In November, the City Council unanimously endorsed the proposal and awarded \$12,500 to conduct the study.

Study goals and methods

The Johnson Clean Energy District, the University of Iowa's Iowa Initiative for Sustainable Communities, and the City of Iowa City are the lead institutional partners behind this study. Three working committees - technical, policy and economics, and public outreach -- were formed to conduct the study. An advisory committee comprised of representatives from Iowa City's Climate Action Commission, Johnson County, Iowa City Community School District, MidAmerican Energy, and Eastern Iowa Light and Power was recruited to provide input. Together, the collaborators worked out a list of topics to be covered, task list, and timeline to further define and assist interaction between the committees and partners.

To assess public attitudes about solar expansion, Bailey Leadership Initiative conducted an online survey, distributed through social media and listservs of nonprofit, government, academic/educational, religious, and business organizations. A total of 464 people responded, including 15 business owners. Respondents were primarily homeowners (91%); highly educated (56% with advanced degrees); and wealthier (40% over \$100,000 income) than Iowa City averages. Analysis of results did not find significant differences among different income levels (<\$75K, < \$50K) and from different sections of the city. Renters, a key demographic in Iowa City, are not well-represented among survey respondents.

Technological analysis focused on identifying optimal sites for distributed and centralized solar projects. Staff and students at UI's Dept of Geographical and Sustainable Sciences used ArcGIS 10.8, ESRI Solar Radiation toolset, and Google's Project Sunroof to assess the city's solar resources and identify potential project sites. These data were combined with policy criteria to identify viable sites,

regulatory or landscape constraints, etc. Information from “A Comprehensive Study of the Solar Energy Systems for the City of Iowa City Locations” by Bluestem Energy Solutions (2018) was used to quantify energy demand and solar potential at potential project sites.

The public policy context and options for financing solar was researched by UI’s Urban & Regional Planning 6246: Environmental Policy & Management. The report below contains in-depth information and analysis of funding models and programs for distributed and centralized solar, with case studies of applications in other communities, and a particular focus on social equity options. Current state and local regulations are described, along with best practices, model solar ordinance, model building code, and a detailed set of possible reforms to support solar development.

Public Input

An online survey was conducted in May 2021 to assess the level of interest Iowa Citizens have in solar energy and, importantly, their preferences and opposition to different solar options that may be employed if a solar expansion program is undertaken. The survey also sought information on what motivates people's interest in solar energy and what challenges they face to taking action. Finally, the survey asked people what they believe is the proper role of City government in transitioning to solar energy and what kinds of programs they would support or oppose. This last set of questions is designed to help city planners focus efforts on projects with wide public support.

Key findings

A survey of Iowa City residents and business-owners found:

- **Strong interest in solar energy in Iowa City**, with 94% of survey-takers either “very interested (67%) or “somewhat interested” (27%). Interest was equally strong across income groups.
- **People interested in solar want options.** Three options form a tightly-clustered group of favored options: rooftop panels on individual buildings (80%); utility-provided solar electricity (77%); and opportunity to buy into community solar gardens (68%).
- Across the board, the **upfront costs of solar panels on individual buildings are the primary challenge**. Other challenges are structural issues, shade trees, and duration of residence.
- Support is strong for Iowa City government assisting the transition to solar energy. Most popular are placing **solar panels on public buildings, parking lots and garages** (90%), and **financial incentives for residents and non-profit organizations** (78%).

Interest and Preferences

Respondents expressed interest in both distributed (rooftop panels), solar farms, and solar gardens. When asked which options were of most interest, people ranked three options high:

- Most people expressed interest in solar panels on their own building (80%); along with desire for electricity produced at utility-scale solar farms (77%); and community solar gardens, where residents and businesses could own or lease solar panels (68%).
- Interest in owning ground-mounted panels is lower, with 23% expressing interest in this option.

In addition to their own homes, respondents also want to see solar energy projects in their neighborhood. Rooftop solar on neighbor's houses has strong (94%) support, and even ground-mounted solar arrays on neighborhood lots has considerable support (66%).

Survey-takers expressed strong interest in community solar gardens. When asked if they would consider leasing or owning panels at a solar garden, the average score among 363 respondents was 74%; one third of respondents gave it top (100%) approval.

Among business owners, 73% say they are "very interested" in solar, with the majority (58%) preferring that the utility company provide solar energy rather than take independent action. One commenter said "I do not want to hire someone to maintain my alternate source of energy. I am a small business and can't afford more overhead." The key motivations with this group, some of whom had already added panels to their building, are energy cost savings and enhancing business image.

Motivations

The survey found that overwhelming majorities of people are interested in solar energy because of climate change: 93% responded "I want to do my part to address climate change" and 91% indicated they didn't want to rely on fossil

fuels. Other drivers are spending less money on electricity (69%) and greater energy self-reliance (60%).

Business owners ranked cost savings over time as the most important driver of switching to solar.

A small percentage of respondents (6%) are not interested in solar energy, saying it is not a priority (50%), is too expensive (33%), or that they do not plan to stay in current housing (29%). Several people expressed satisfaction that MidAmerican Energy was already providing clean energy.

Challenges

The upfront costs of installing solar arrays on individual buildings are a significant challenge to 72% of respondents. Additionally, a range of issues exist on individual buildings that discourage people from purchasing rooftop solar arrays including the building's structural condition, anticipated length of residence, presence of shade trees, zoning and condominium or HOA restrictions. A comment that captured some of these hesitations: "I live in a historic district and need to comply with improvements to the exterior of my house and 2) I'm not sure my old house (roof) has the right design to accommodate solar panels."

In addition to upfront costs, 42% of business owners reported that they lease their property and are uncertain how solar energy might benefit them.

People expressed a range of opinions on where solar panels are placed. Numerous people commented on their opposition to loss of green space or parks to solar installations or cutting down trees for solar projects. Other commenters want ground-mounted systems to be hidden with fencing and wanted guidelines for the ground beneath the panels and the aesthetics of the whole package.

Inducements

Given the widespread concern about upfront costs, financial incentives rank highest as inducements for taking action. Tax credits, low interest loans or

grants, and getting money back on electrical bills ranking highest, followed more specific information about solar on one's own property.

For respondents in households with incomes <\$75K or <\$50K, getting money back on electrical bills and low interest loans and grants were highest ranked inducements.

Support or opposition to City solar energy programs

A majority of respondents want the City to assist in the transition to solar energy. 90% of respondents want to see solar panels installed on City buildings, parking lots and garages, and other properties, where feasible. 78% also support financial incentives for nonprofit organizations and residents, irrespective of income level. Between 60 – 70% of respondents also support a variety of programs, including sponsorship of community solar (71%); requiring solar on new buildings receiving financial benefits from City (70%); incentives to businesses (69%); solar EV charging stations (66%); solar education (64%); and solar-ready new building requirements (62%).

A policy restricting financial incentives to LMI residents had very little support, nor did public funds to privately-owned utility for solar projects. Some people opposed use of public funds to support transition to solar. As one commenter said "Stay out of funding and promoting this. If people/business want (because it makes sense) they will find a way to do it."

Numerous people praised the Solarize Johnson County or Grow Solar programs for providing a combination of solar education, efficient process, and low (group-buy) costs to consumers.

Conclusions

This survey tapped into a segment of Iowa City residents and businesses that are personally interested in transitioning to solar energy and support an expansion of solar energy in the community. Iowa City policymakers can expect a strong cadre of supporters that are concerned about climate change, want to do something about it, and would participate in well-organized solar programs that

can address financial and site-specific challenges many people face. Policymakers will also have strong support for solar panels on public buildings and spaces, though they risk opposition to solar projects in public parks and where trees and other green space are replaced with solar panels.

Recommendations for additional outreach

1. Solicit input about solar projects in different sections of Iowa City. The solar study, of which this survey is a part, envisions a set of solar projects (resilience hubs, community gardens, solar parking, etc) tailored to opportunities and needs in discrete sections of the City. Specific project ideas, while still in concept stage, could stimulate community conversation and partnerships.
2. Engage Iowa City residents from different demographic groups in targeted discussions about options and challenges for participating in solar energy programs.
3. Ground-mounted solar arrays raise aesthetic, land-use, and wildlife considerations. Focus groups could provide useful information to improve social acceptability (siting, fencing, vegetation, etc).
4. Many people mentioned the prevalence of restrictions on solar arrays in historic districts, on condos, and by housing associations. Solicit input on acceptable options in these settings.
5. Community solar projects are of interest to many residents and business owners who cannot put solar panels on their own buildings. An in-depth outreach program to solicit input on preferences for leases or ownership, number of panels, price points, etc., would be helpful in developing pilot projects.
6. Financial incentives are crucial to motivating action. Engage community, business, banking, and other groups in drafting incentive programs.

Distributed Solar Systems

The City's *Climate Action Plan* targets new buildings thermal decarbonization and energy efficiency and adoption of electric vehicle. For new buildings, the targets are to achieve 45 to 48 percent energy savings in new buildings due to code enforcement by 2025 and 80 percent energy savings by 2050 due to code enforcement and phased-in approach to net zero energy policies” and for renewable energy to “transition 3 percent of buildings with natural gas to high efficiency electrical heat, powered through low-carbon electricity sources by 2025 and 25 percent by 2050.” Distributed solar on new solar-ready construction and existing buildings contributes to both goals.

Potential for Greenhouse Gas Emissions Reduction

Solar photovoltaic (PV) energy provides an immediate emissions reduction and potential long-term emissions reductions. While the Climate Action Plan does not substantially include solar strategies in emissions reductions, substituting solar PV for utility generation in the next 5-10 years will likely lead to substantial net emissions reductions over the lifetime of the panels.

In the most recent National Renewable Energy Laboratory (NREL) review, median estimates of life cycle CO₂e GHG emissions from distributed and utility-scale photovoltaic are 3.7 to 4.4 times higher than from wind (Figure 1.1, Figure 1.2), and remain higher after accounting for transmission losses between distant wind and local solar. However, solar PV emissions are just 21% of the net CO₂e for Mid-American's current mix of generation and purchases, estimated at 278 g CO₂e/kWh for 2020 (Table 1.1). At present, both distributed and utility-scale solar are far lower in life cycle emissions than grid energy, as fossil fuels in Mid-American generation and purchases from the regional Midcontinent Independent System Operator (MISO) grid dominate the utility emissions profile. As this mix continues to change, even a reduction in coal to less than 10% of

Mid-American generation and grid imports using the lowest GHG MISO 2039 generation scenarios (Table 1.2) would still lead to grid CO₂e emissions more than double those of contemporary solar. Thus, near-term lifecycle emissions reductions and avoided emissions from distributed, City, and community solar are expected to continue throughout the panels' deployment.

Figure 1.1. Life Cycle GHG Emissions for Wind Energy (gCO₂e/kWh) Source: NREL, 2013

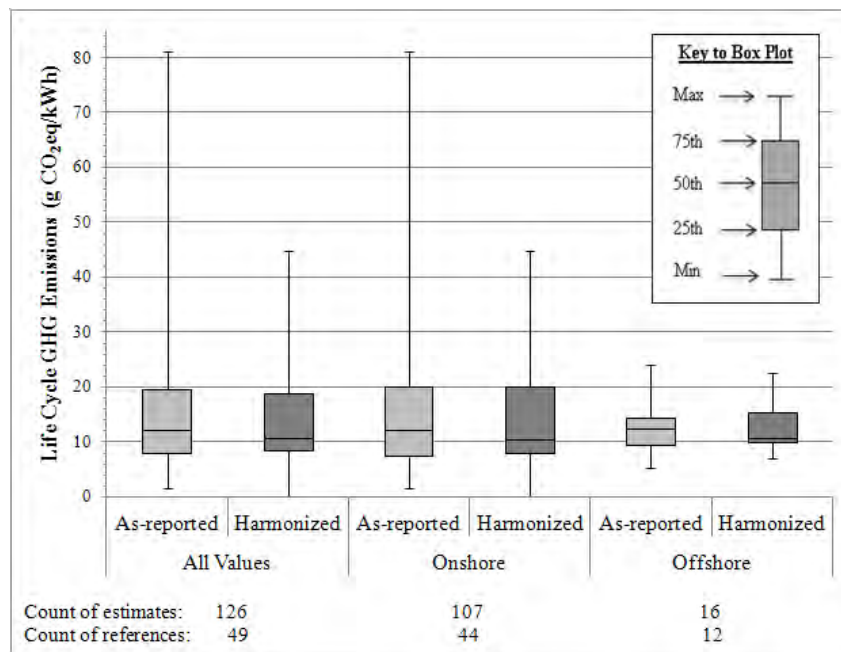


Figure 1.2. Life Cycle GHG Emissions for Solar Photovoltaic (gCO₂e/kWh)
Source: NREL, 2013

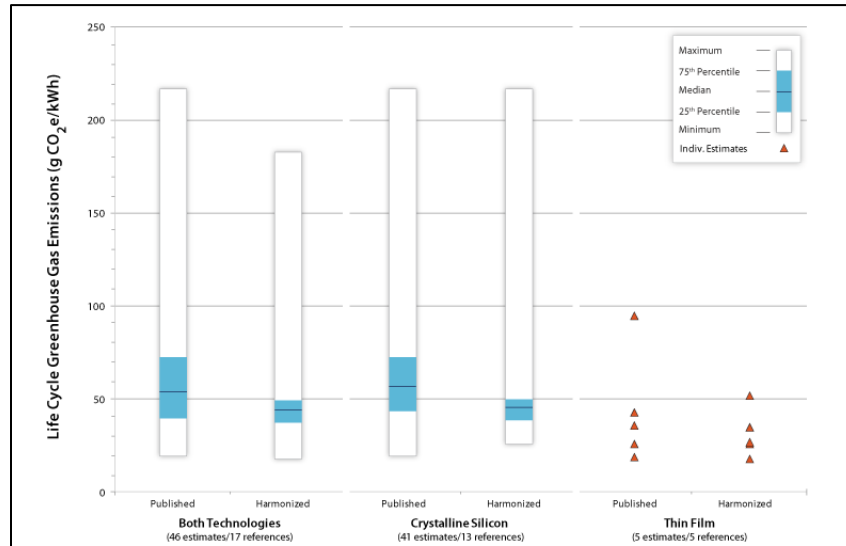


Table 1.1 CO₂ emissions and life cycle CO₂e (g/kWh) estimates for Mid-American Energy's 2020 Generation Portfolio. Generation and CO₂ emissions rate data from Mid-American Energy (2021), CO₂e rates from IPPC (2014), grid purchase CO₂e estimated from MISO generation mix (MISO, 2021).

Fuel Type	GWh	% of Mix	gCO ₂ /kWh	Life Cycle gCO ₂ e/kWh			2020 Emissions	
				Min	Median	Max	Tons CO ₂ e (median)	Tons CO ₂
Coal	6,518	20.7	1022	740	820	910	5,344,760	6,661,028
Natural Gas	668	2.1	4156	410	490	650	327,320	277,851
Nuclear	3,464	11.0	-	3.7	12	110	41,568	-
Oil	1	-	767					460
Wind	20,371	64.6	-	7	11	56	224,081	-

Solar - rooftop			-	26	41	60		-
Solar - utility			-	18	48	180		-
Biomass	60	0.2	-	130	230	420	13,800	-
Null	433	1.4	223					96,632
Unknown purchases	4,263			385	441	547	1,878,576	
Total	35,784						7,830,105	7,035,971

Table 1.2. MISO grid estimated life-cycle fuel-weighted net CO₂e (g/kW) for 2020 and 2039 low-emissions scenario. Data from MISO (2021), CO₂e rates from IPCC (2014).

Fuel type	2020		2039	
	% of mix	CO ₂ e contribution	% of mix	CO ₂ e contribution
Coal	33	271	0	0
Natural Gas	34	167	31	152
Nuclear	17	2	6	0.72
Oil				
Wind	13	1	40	4
Solar - rooftop		-	-	-
Solar - utility		-	10	5
Biomass		-		
Null		-		
Other	3		13	
Total	100	441	100	162

Table 1.3. Projected Mid-American CO₂e (g/kWh) estimate for a low-emissions generation scenario with 10% grid purchases from the 2039 low-emissions MISO scenario.

Fuel Type	% of mix	CO ₂ e (g/kWh)		
		Minimum	Median	Maximum
Coal	10	74	82	91
Natural Gas	2	9	10	14
Nuclear	11	0.4	1	12
Oil	-	-	-	-
Wind	75	5	8	42
Solar – rooftop	-	-	-	-
Solar – utility	2	0.4	1	4
Biomass	-	-	-	-
Null	-	-	-	-
Unknown purchases	10	13	16	25
Total		102	119	187

Other Environmental Impacts

Large solar farms can generate flashy runoff, especially over non-vegetated surfaces (Cook and McCuen, 2013), and some states classify panels as impervious. Six states currently regulate stormwater permitting for solar sites (Kennedy Jenks, 2017), considering slope, vertical clearance, ground cover, panel arrangement, and support structures. Minnesota regulates siting of solar farms, requiring that all construction projects that disturb one or more acres of land apply for a Minnesota NPDES/SDS Construction Stormwater General Permit and apply best management practices during construction, and any construction project that creates one or more acres of new impervious surface must design and construct a permanent stormwater management system (MPCA, 2021).

Recent preliminary research suggests that heavy metals in some solar panels can leach into sediment, but not at concentrations that would pose a risk to nearby ecosystems (Robinson and Meindl, 2019). The city is encouraged to consider implementing national best practices in siting for stormwater in its own building code and zoning.

Solar PV panels reflect more and absorb and radiate less heat than parking lots, roofing shingles, and asphalt roofs, so rooftop solar and solar parking lots can reduce the Urban Heat Island effect. By shading roofs, urban distributed solar panels slightly increases the need for domestic heating, but reduce the energy needed for air-conditioning (by 12%) and reduce daytime and nighttime UHI (Masson et al., 2014). Impacts are higher for solar thermal panels.

Solar gardens with native plantings further reduce Urban Heat Island effect and yield stormwater management co-benefits. The Center for Rural Affairs provides best practices for low-cost native vegetation management at solar sites (CFRA, 2020).

Potential Rooftop Capacity

In 2021, there are 323 permitted solar arrays in Iowa City on roughly 3% of city properties. How much potential exists for rooftop solar in Iowa City? Data from

Google Sunroof and ESRI's solar toolkit characterize the opportunity (listed below), while the map in Appendix I shows solar potential considering aspect and tree cover.

1. Distributed rooftop photovoltaic potential in Iowa City is significant.

The city has over 238 megawatts direct current (MWDC) of solar rooftop potential on all buildings (Figure 1.3). Small household-scale installations (<100 kW) represent nearly 60% of the total rooftop generation potential. Half of all potential is on flat roofs, including large commercial and industrial buildings that account for the largest potential installations (Figures 1.3, 1.7). Even the census tracts with the lowest distributed rooftop potential in the city still represent larger opportunities for generation capacity than any existing utility-scale or community solar projects in the state.

2. Access to distributed rooftop solar PV is not consistent across residential neighborhoods and not universal.

Total annual generation potential (Figure 1.4), rooftop capacity (Figure 1.8), and potential reduction in CO₂ emission (Figure 1.8) are correlated and vary by a factor of four across city census tracts.

An estimated 64% of the buildings in Iowa City are solar-viable [9], within the range of solar viable properties in other Iowa metros. This leaves between 30% and 40% of homeowners and businesses to join renters, students, and others unable to actively participate in on-site residential solar PV. This includes renters in the downtown business district, which has the highest median technical rooftop potential (Figure 1.7).

City census tracts vary in buildings suitable for solar range from <50% to >86% (Figure 1.6), and low and middle income (LMI) census tracts are among areas with the highest number of eligible buildings (Figure 1.5). Nationally, 42% of residential rooftop solar potential is located on buildings in LMI neighborhoods and over 45% in Johnson County (Sigrin and Mooney, 2018).

3. Iowa City’s distributed rooftop solar photovoltaic resource potential is lower than most peer cities nationally and in Iowa.

The metropolitan area’s per capita generation potential is 329th of 484 nationally, and lowest among Iowa metros (Table 1.4). Adjusted for incident sunlight, per capita generation potential is 398th nationally (Google Sunroof, 2021).

4. Opportunities for rooftop solar on multifamily buildings is substantial, and a potential contributor to environmental justice.

Solar development on existing multifamily buildings is currently limited due to owner-tenant principal agent barriers to adoption. Deployment on multi-family and renter occupied buildings would be needed to reach substantial deployment of rooftop solar on LMI residential buildings in residential areas and in the downtown business district. Realizing the solar potential in future new multifamily construction could be enabled by city policies on solar-ready buildings.

5. Rooftop solar thermal and ground-mount solar and are also large potential low-carbon renewable energy resource for residential and commercial properties in Iowa City.

While this analysis focuses on rooftop solar PV as the most widely installed and has the highest potential for energy, economic, and climate change mitigation returns, solar hot water is feasible on nearly all buildings that can support a small solar PV system, and ground-mount solar PV is feasible for many parcels not suitable for rooftop solar.

Table 1.4. Rooftop solar potential across Iowa metropolitan areas. Data from Google Sunroof (2021) by census tract, aggregated to metropolitan area.

Metropolitan Area	Total		Per Capita	
	Potential (kWDC)	Panels	Potential (kWDC)	Panels
Waterloo-Cedar Falls	701,931	2,807,725	4.17	16.66
Cedar Rapids	1,161,832	4,647,329	4.26	17.02
Quad Cities	1,618,594	6,474,377	4.27	17.08
Des Moines	2,954,438	11,817,753	4.22	16.90
Sioux City	617,378	2,469,512	4.27	17.07
Dubuque	303,957	1,215,827	3.12	12.49
Ames	274,717	1,098,868	2.23	8.91
Iowa City	351,539	1,406,157	2.03	8.12

Figure 1.3. Google Sunroof Estimated Rooftop Solar (Google Sunroof, 2021).

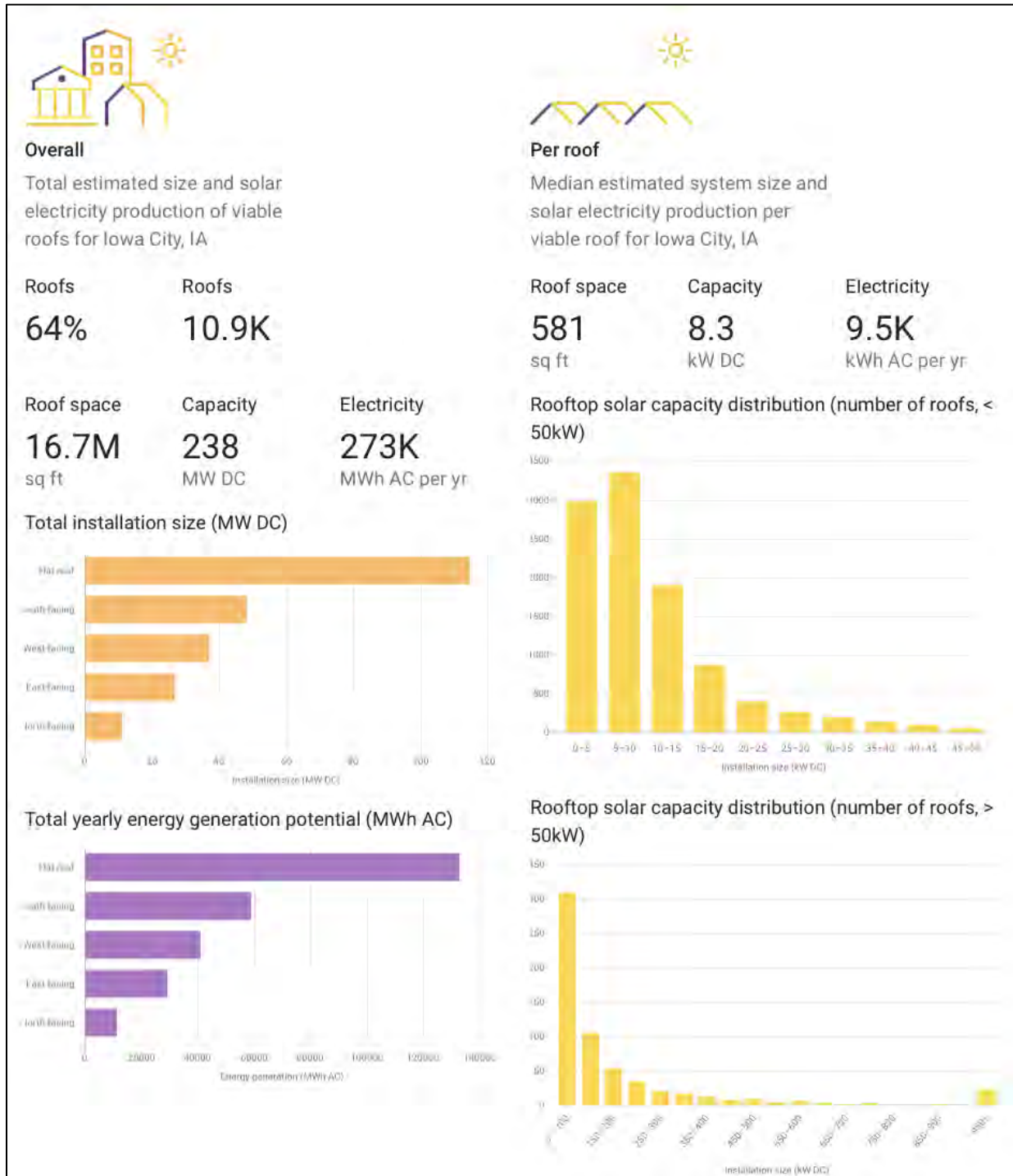


Figure 1.4. Total annual rooftop solar PV generation potential (kWh/year) by census tract. Data: Google Sunroof.

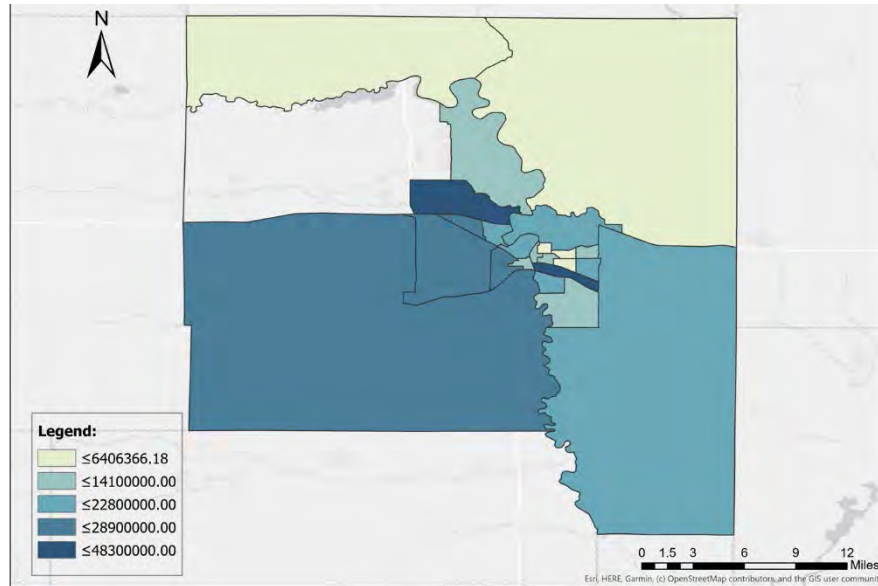


Figure 1.5. Number of buildings suitable for solar PV. Data: Google Sunroof.

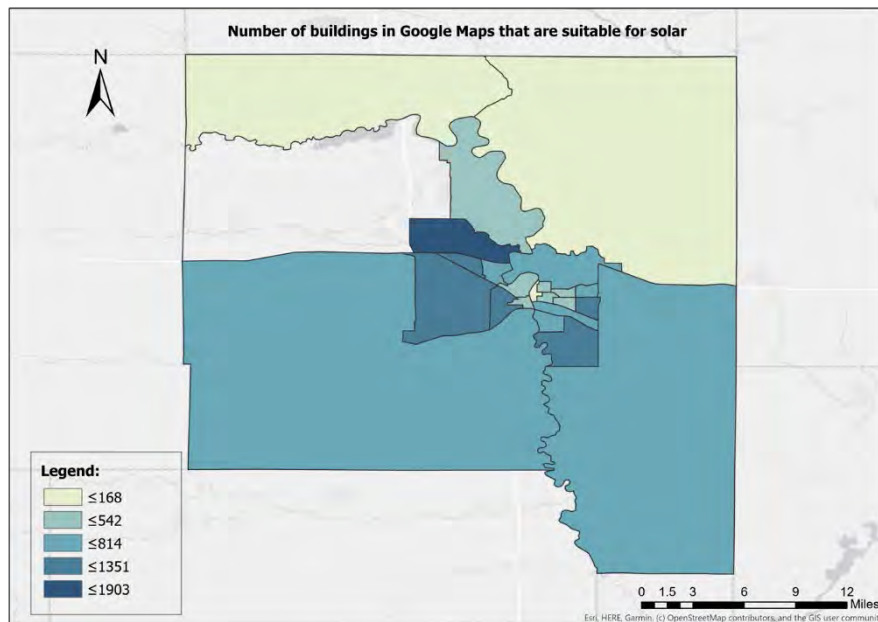


Figure 1.6. Percent of buildings suitable for solar PV by census tract. Data: Google Sunroof.

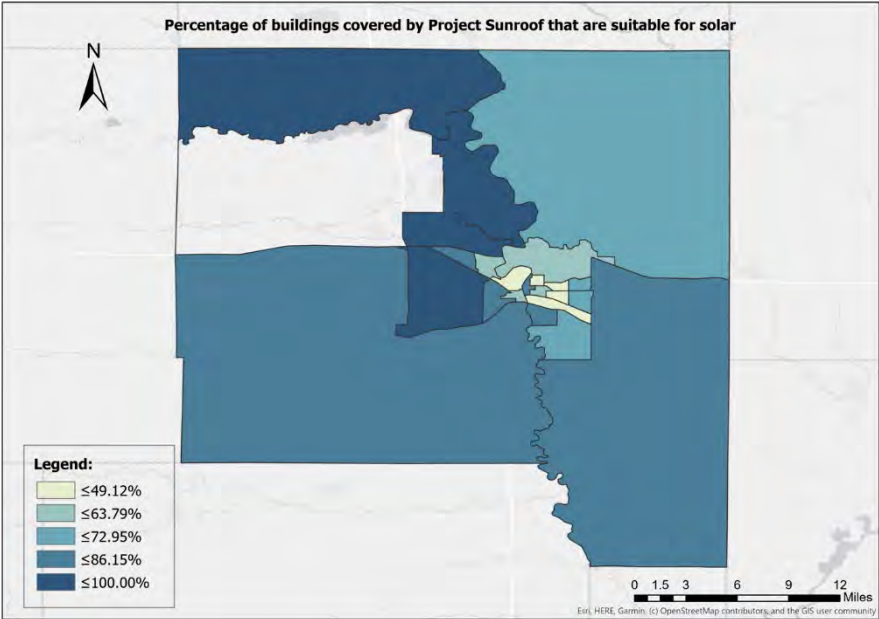


Figure 1.7. Median number of solar PV panels per roof by census tract. Data: Google Sunroof.

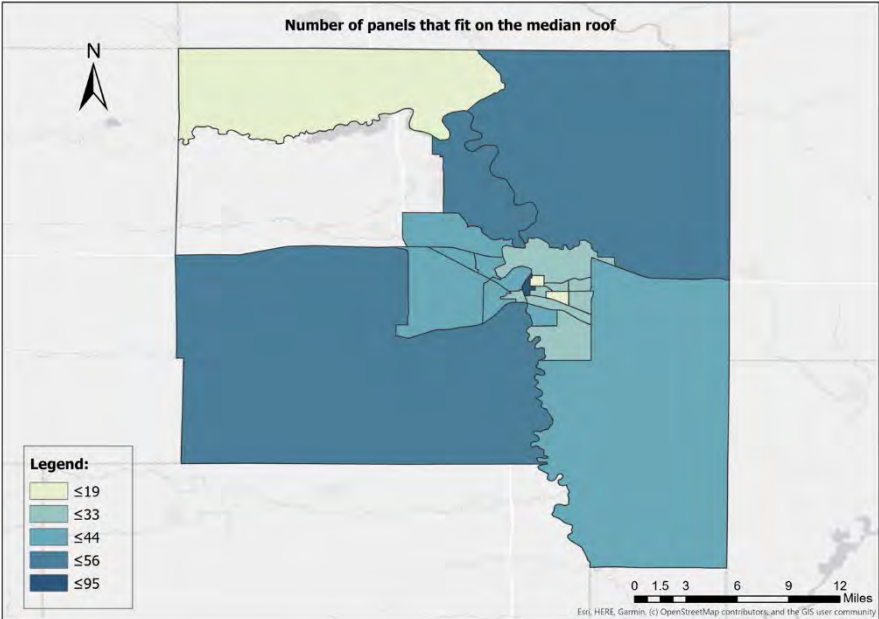


Figure 1.8. Potential rooftop solar PV capacity (kWDC) by census tract.
Data: Google Sunroof.

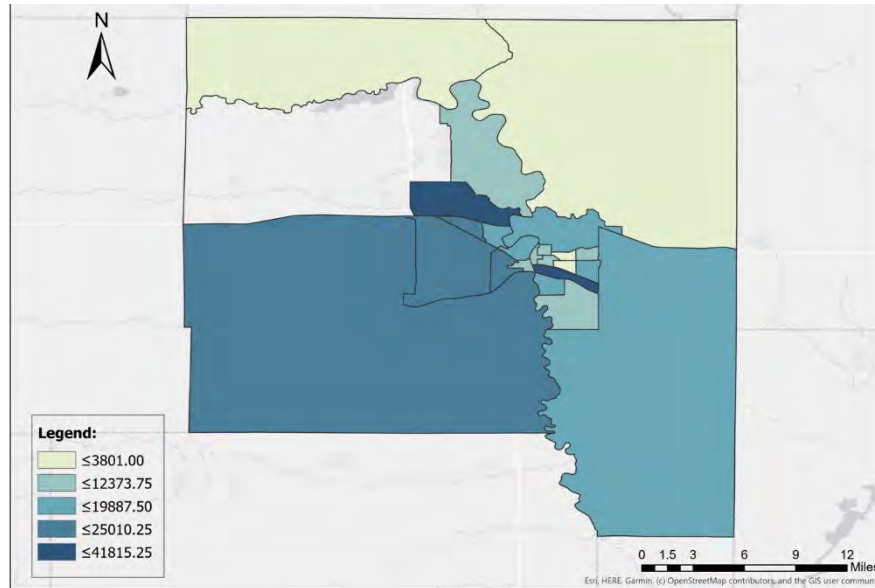
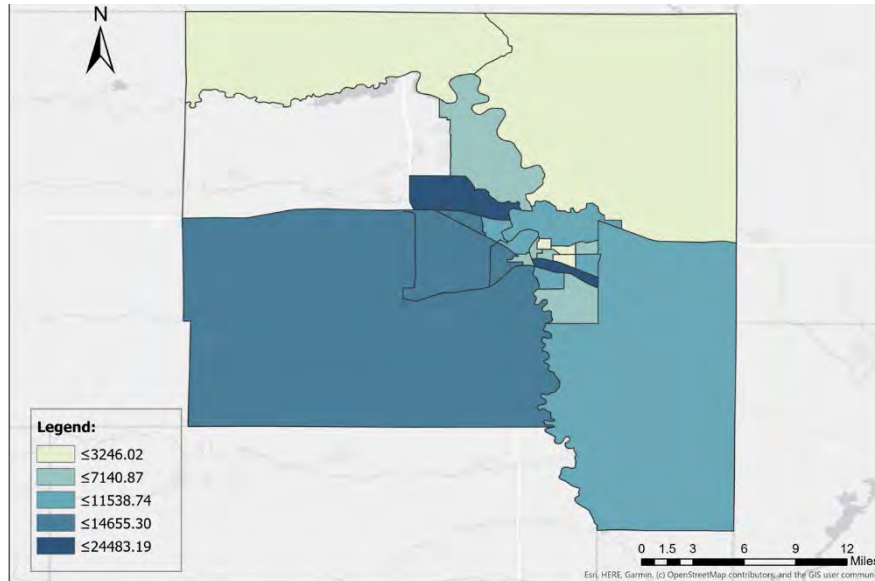


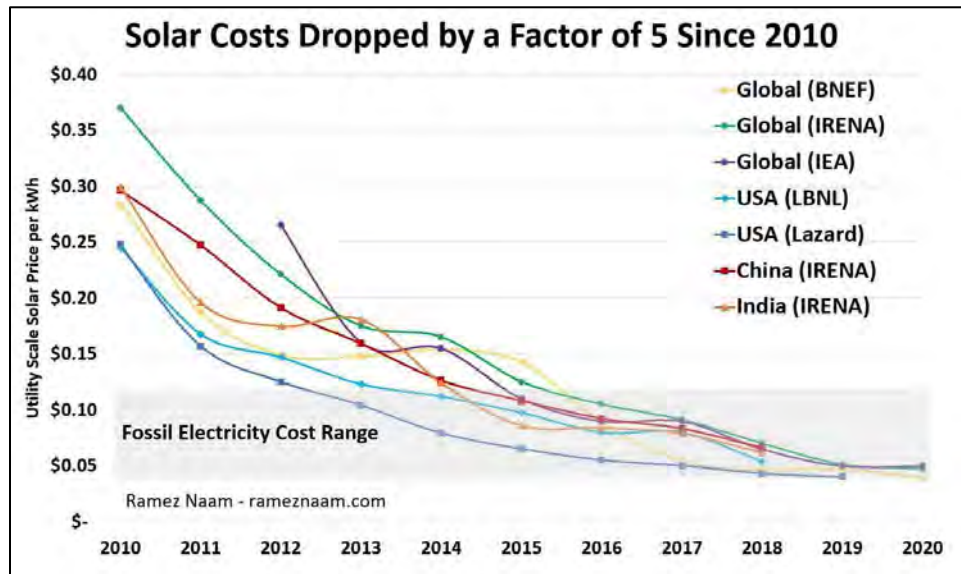
Figure 1.9. Potential avoided CO₂ emissions (metric tons/year) from all viable rooftop solar by census tract. **Data: Google Sunroof.**



Solar Costs

Costs for solar have dropped significantly in recent years, making solar a more viable alternative to fossil fuels.

Figure XX Utility scale solar costs 2010-2020. Source: Rameznaam.com.



A total of 26% of the total cost of all private solar electricity and thermal installations are eligible for federal tax credits, the systems are exempt from sales tax, and the assessed value of a solar installation is exempt from property taxes for 5 years. Mid-American customers with systems less than 500 kW are eligible for net-metering, which sells energy back to the utility as a credit on monthly bills.

Federal Renewable Energy Tax Credits

All private solar arrays in Iowa City are eligible for federal tax credits.

- Investment Tax Credit extends to entire system

- 30% for systems placed in service by 12/31/2019
- 26% for systems placed in service after 12/31/2019 and before 01/01/2023
- 22% for systems placed in service after 12/31/2022 and before 01/01/2024

State of Iowa Solar Rebates and Incentives – *expired 2020*

There are no current state incentives. The most recent state incentives, expired in 2020, consisted of:

- Iowa residential solar tax credit: 15% back on state Income Tax, up to \$5,000
- System exempt from state sales tax
- Assessed value exempt from property taxes for 5 years

Funding Models and State Policies

A wide range of financing options are available from federal, state, and local governments, public utilities, solar installers, and private lenders.

Table 1.5 Distributed Ownership Models and State Policies Overview

	Is it legal in Iowa?	Does Iowa Code include enabling legislation?	Does the Iowa Utility Board have a directive for this?	Is this approach currently operational in the state?	Is this approach currently operational Iowa City?
Net Metering	YES ✓	N/A	YES ✓	YES* ✓	YES ✓
Collective Purchasing	YES ✓	NO ✗	NO ✗	YES ✓	YES ✓
AERLP	YES ✓	YES ✓	N/A	YES ✓	YES ✓
HomeStyle Energy Program	YES ✓	N/A	N/A	YES ✓	YES ✓
Solar Loans	YES ✓	N/A	N/A	YES ✓	YES ✓
Commercial Operating Leases	YES ✓	NO ✗	YES ✓	YES ✓	??
Third-Party Ownership PPAs	YES ✓	YES ✓	YES ✓	YES ✓	??
PACE	YES ✓	NO ✗	NO ✗	NO ✗	NO ✗
Local Subsidies	YES ✓	NO ✗	NO ✗	YES ✓	NO ✗

Net Metering and Interconnection

Net metering is a utility rate structure program that requires regulated public utilities to purchase excess solar energy produced by customers' solar panels at retail rates. All customers of Iowa's two investor-owned utilities (IOUs) are eligible for net metering, all grid-connected PV systems currently operating in Iowa City are net metered, and net metering is foundational to cost recovery in financing programs.

While there is no explicit limit on the size of net-metered systems, separate rule waivers have allowed each of the utilities to limit individual systems to 500 kW. Interconnection standards for IOUs apply to distributed generation facilities no greater than 10 MW. There are four levels of review for interconnection requests, which must all be met before they can be approved. General interconnection rules apply to all utilities, both rate regulated and non-rate-regulated, and rules cover power quality, safety, and technical standards. Net metering applies independent of the solar array's financing model and ownership.

Collective Purchasing

Collective purchasing group buys have been available through Midwest Renewable Energy Association's Solarize Johnson County programs in 2018 and 2020 and Grow Solar Linn + Johnson Counties program in 2021. These large, collective educational and purchase offerings at discounted rates have led to nearly 250 residential solar installations in Johnson County. Iowa City households have participated in all three years and account for just over one-third of the group buy installs in the county.

Alternative Energy Revolving Loan Program

Iowa's Alternative Energy Revolving Loan Program (AERLP) provides 20-year 0% interest loans for up to 50% of the cost of a renewable energy system, from a minimum of \$25,000 up to \$1 million. All Iowa residents and businesses are eligible (Iowa Energy Center, 2020). This \$5.9 million revolving loan fund is

managed by the Iowa Energy Center. This “green bank” is currently limited by the size of the revolving fund.

Solar Loans

In addition to standard home equity loans for solar, specialized residential and commercial solar loans have increased in popularity in recent years. One example is Mosaic of Connecticut, which loans funds to homeowners to install residential solar. Residents are able to own their solar panels and reap tax credits and other benefits, while the lender gathers interest on repayments. Multiple solar lenders currently operate in the state.

HomeStyle Energy Program

The HomeStyle Energy Program is a Fannie Mae financing program for new and existing properties to fund energy and/or water efficiency and decrease utility costs. It provides up to 15% of the “as completed” appraised value of the property for renovation to make energy-related improvements and pay off secured or unsecured debt that financed energy-related improvements. HomeStyle Energy may also be used to create home resiliency for environmental disasters such as floods, storms, and earthquakes, or to repair damage from these types of disasters. All one-to-four-unit existing properties are eligible and all occupancy types permitted, and there are no other eligibility criteria.

Third Party Power Purchasing Agreements

A Solar Power Purchase Agreement (PPA) is a long-term agreement where a business agrees to purchase all of the electricity generated by a solar system at a contracted rate. The PPA provider installs, maintains, and operates the solar system and the business only pays for the power that is generated. Power Purchase Agreements require no upfront costs for the property owner. The contract typically lasts for the lifetime of the system and may include an annual rate increase escalator. At the end of the contract, a new PPA can be negotiated or the system purchased. PPAs provide customers low-cost renewable electricity

at no upfront cost, while enabling the system's owner to take advantage of tax credits and obtain income from net-metered electricity sales.

A Solar PPA can be a low-risk financing option for distributed solar and is often the only way for a non-profit or government to realize tax benefits of solar PV. Local installers and specialized firms offer PPAs for commercial and residential customers in Iowa, but awareness among potential residential and small commercial purchasers in the area is low, and Iowa does not feature the ubiquitous advertisements for PPAs seen in areas with higher solar resource potential.

PPAs were approved for use in Iowa through a 2014 Iowa Supreme Court decision, *SZ Enterprises LLC v. Iowa Utilities Board* (Iowa Supreme Court, 2014). Third-party generation can happen through a non-rate-regulated utility, or through a purchase agreement from a third-party producer to a rate-regulated utility. Third-party purchase allows these non-utility operations to sell to power to utilities. In practice, this most frequently means a solar installer or third-party financier paying for a system, recovering the cost with monthly payments from the customer, and selling power to the utility. There are multiple ways that payment can be set, but many pay based on avoided costs. These purchase agreements can satisfy utility Renewable Portfolio Standards.

Multiple Iowa state laws deal with the operations of third-party energy production after the legalization of these agreements. Detailed information on the functions and abilities of third-party generation and purchase can be found in the Iowa State Code in Title XI: Natural Resources, Subtitle 5: Public Utilities, Chapter 476: Public Utility Regulation and rules detailed in Chapter 15: Cogeneration and Small Power Production. Some highlights applying the third-party generation and rates include:

15.5(5) Purchases "as available" or pursuant to a legally enforceable obligation. Each qualifying facility shall have the option either:

- a. To provide energy as the qualifying facility determines the energy to be available for the purchases, in which case the rates for the purchases shall be based on the purchasing utility's avoided costs calculated at the time of delivery;

or b. To provide energy or capacity pursuant to a legally enforceable obligation for the delivery of energy or capacity over a specified term, in which case the rates for the purchases shall, at the option of the qualifying facility exercised prior to the beginning of the specified term, be based on either: The avoided costs calculated at the time of delivery; or the avoided costs calculated at the time the obligation is incurred.

476.47 Alternate energy purchase programs. 1. Beginning January 1, 2004, an electric utility, whether or not rate-regulated under this chapter, shall offer an alternate energy purchase program to customers, based on energy produced by alternate energy production facilities in Iowa. 2. The board shall require electric utilities to file plans for alternate energy purchase programs offered pursuant to this section.

Commercial Operating Leases

The traditional operating lease provides a low-cost path to ownership at a more affordable price than upfront purchasing and extends the benefits of residential PPAs to larger commercial applications. Many Iowa solar installers offer operating leases.

Property assessed clean energy financing (PACE)

Property assessed clean energy financing (PACE) is 100% upfront financing repaid on property tax bill over the life of the project, enabling longer payback periods and positive cash flow throughout. Through PACE, private lenders and state and local governments can provide loan funds to eligible properties, and local government then remits tax payments to the financier. Governments can finance PACE programs through bond offerings. Began in 2010 and overseen by the U.S. Department of Energy, PACE is supported by enabling legislation in 37 states and PACE programs are now active in 26 states. Most PACE programs are for commercial properties, while residential PACE is currently offered in California, Florida, and Missouri. A hybrid “PACE-secured PPA” approach can maximize benefits and reduce limitations of each individual model.

There are no historic or current commercial or residential PACE programs in Iowa. As Iowa is a home rule state, passage of enabling legislation for PACE by the state would be supportive but not essential.

PACE financing is available to residential or commercial property owners within local jurisdictions that "opt in" to or create a program. For localities to establish a PACE program, a local government must create a PACE assessment through a land or real property secured benefit district. Localities will issue bonds to finance projects, while administrative costs are usually paid by bond interest. Localities can choose to administer programs, contract an administrator or allow private organizations administer programs. Municipalities can also develop a list of pre-approved contractors that can conduct energy audits or complete projects for weather sealing, insulation, window replacements, HVAC, roofing, low-flow toilets or renewable energy projects, such as solar panels or solar thermal. Programs may include education for building owners, contractors and lenders, as well as program evaluation and quality assurance measures (NCSL, 2016).

If available, PACE could be the most effective and cost-effective way for the City to assist in making distributed solar widely affordable for commercial and residential buildings.

Case Study: Municipal Subsidies

In July 2021, the Dubuque City Council unanimously approved the Renew DBQ pilot project, which will provide \$3,285 to 10 LMI residents to install 5 kW rooftop solar installations, reducing up-front costs from \$10,000 (pre-tax credits) to less than \$2,600 and saving each household \$800-1,000 per year (Hildebrandt, 2021; Hinga, 2021).

Social Equity Options + Resilience Needs

All financing models have potential roles in expanding affordable access to distributed solar ownership and its private goods of cost savings and grid backup

resilience and public good of lower GHG emissions. Residential loans and PPAs represent the only models without significant up-front costs.

Distributed solar contributes to resilience to extreme weather and grid outages when combined with battery storage and microgrids.

Distributed solar becomes equitable only when all residents have an equal and attainable opportunity to gain equity in owning a productive solar installation that yields economic, environmental, and resilience benefits. In 2021, the up-front cost of meeting household demand through solar on the median home would require 18% of median annual disposable income. This puts solar ownership out of reach for most households, including LMI homeowners, all renters, and all homes without the roof area, angle, or insolation for a viable solar installation.

Until prices and area requirements drop substantially, distributed rooftop and ground-mount solar will not be equitable. Without PACE, the city has few options other than incentives for directly making distributed solar more attainable for more homeowners. Three consecutive years of widely publicized county-wide discounted group buys have led to 3% adoption, state tax credits are oversubscribed and set to expire on December 31, 2021, and residential PPAs are not common in the area. These limitations on distributed residential and commercial solar PV support the development of large-scale solar with higher potential for widespread equitable benefit and access to capital.

Centralized Solar Systems

Centralized solar systems may be described as “shared,” “community-hosted,” “community solar,” or “locally controlled.” Each of these terms represent different concepts to different stakeholder groups:

When the solar industry and utilities use the term “community solar,” they generally refer to a large shared solar installation in which customers can purchase subscriptions or ownership of part of the array. The installation does not necessarily have to be in the same community as the subscribers and can often be located elsewhere in an electric utility’s service territory. The subscribers do not all need to come from the same town or city. The subscribers receive credit on their electricity bills for their share of the electricity generated by the solar installation. Not all states allow these types of projects. Depending upon the rules and practices in a state, such shared solar installations can be developed by private developers, utilities, nonprofit organizations, or groups of residents. Participation in a large shared solar project can be especially appealing for households and organizations without suitable roofs for their own onsite solar installation.

Community groups in under-resourced communities and environmental justice organizations mean something very different when they talk about “community solar.” They seek to advance solar projects that are located in the community, are shaped by the community, and provide tangible benefits to the community, including *local wealth building*. The projects do not necessarily have to involve subscriptions for individual customers, and they can also be located at and provide electricity for community institutions, such as schools, churches, and social service organizations. Some community representatives link projects that are locally owned to their definition of community solar (CESA, 2019).

Centralized solar initiatives may be owned by utilities, PPAs, special purpose entities, or non-profits. In a utility shared solar program, utilities or third parties own the solar array. It is financed by the utility, grants, or ratepayer subscriptions and hosted by the utility or third-party operator.

In a special purpose entity program (SPE), the solar infrastructure is owned by the members of the SPE. It is financed by member investments, grants, and/or incentives and hosted by a third party. Those subscribing to the solar are community investors, and they are looking for a return on their investment or to

offset their electricity usage. These may eventually be sold to the host and retained for electricity production.

In a non-profit program, this non-profit owns the solar infrastructure. It is financed by memberships, donor contributions, and grants and hosted by the non-profit. Subscribers include donors and members looking for a return on investment or as philanthropy.

This report does not promote any specific version or definition of community solar, and rather highlights the many potential opportunities that currently do and could, with regulatory approval, power communities in Iowa.

Projected Projects to Reach Targets

Ownership Models and State Policies

Table 2.1 Ownership Models and State Policies Overview

		Is it legal in Iowa?	Does Iowa Code include enabling legislation?	Does the Iowa Utility Board have a directive for this?	Is this approach currently operational in the state?	Is this approach currently operational in Iowa City?
INVESTOR-OWNED	Investor-Owned	YES ✓	YES ✓	YES ✓	YES ✓	NO ✗
	Power Purchasing Agreements	YES ✓	YES ✓	YES ✓	YES ✓	NO ✗
COMMUNITY SOLAR	Community-hosted Solar	YES ✓	NO ✗	YES ✓	YES ✓	NO ✗
	Virtual Net Metering	YES ✓	NO ✗	YES ✓	YES ✓	NO ✗
	Microgrids	YES ✓	NO ✗	NO ✗	YES ✓	YES ✓
	Crowdfunding	YES ✓	NO ✗	NO ✗	YES ✓	NO ✗

Investor Owned

Investor-owned centralized solar provides a direct path to solar energy access with the fewest legal, regulatory, and financial challenges. It could yield a small reduction in Mid-American's GHG emissions profile, but otherwise does not inherently provide the community benefits sought from solar: community resilience potential for powering microgrids, local economic benefits, ownership,

control, and equity. The nature of public community solar programs for Iowa City, if any, would determine potential private and community benefits from additional Mid-American grid energy generation facilities located within city limits or on city land, beyond lease payments.

Investor interest

- + Mid-American Energy previously proposed a 3 MW Iowa City solar public-private partnership on land leased from the city

Economics, Environmental, Social Equity benefits

- While all customers have equal access to utility generation and affordability programs, investor-owned solar does not yield local energy control, ownership, resilience, economic or equity benefits to residents or businesses. Regulated utility rates do not change, and generation does not exclusively serve the city.
- + There are public benefits of grid resilience and climate adaptation for grid-tied investor-owned utility solar complementing wind.

Legal/Regulatory

- + Utility ownership greatly simplifies the legal and regulatory path to large-scale solar PV generation in the city.

Case Study: Community-hosted Utility Solar in Perry

In 2021, Perry became the first Iowa city with a community-hosted solar project without a municipal electric utility. Alliant Energy will build a 1 MWDC solar facility on a 7-acre remediated brownfield site and lease the land from the City of Perry for roughly \$45,000 per year for at least 25 years, with options to extend after the initial period. Alliant will oversee construction, own, operate and maintain the facility. The city will buy back renewable energy credits to offset up to 50% of city electric use and consumption including all electricity used by the wastewater treatment plant, the city's largest user (Teays, 2021).

Power Purchase Agreements

Utility-scale corporate PPAs operate similarly to residential PPAs and are widespread. In Iowa, PPAs are common with rural electric cooperatives. A 2014 Iowa Supreme Court decision allows municipalities to enter third-party PPAs without becoming subject to rate regulation as public utilities under state law. There is an active corporate solar PPA industry serving the MISO grid (Level10 Energy, 2020) with both brownfield and greenfield development.

Investor interest

- According to the Renewable Energy Buyers Alliance's (REBA) recent analysis of corporate purchases by state, investor interest in Iowa has been relatively low, with 16 projects in 2018 (REBA 2019).

Economics, Environmental, Social Equity benefits

- + PPAs can help municipalities access tax credits, but otherwise bring no inherent additional local economic, environmental or social equity benefits, but offer flexible contracts and incentives to meet community needs.
- + As with investor-owned, the nature of the public program determines the potential scope of local benefits

Legal/Regulatory

- PPAs add complex legal, regulatory, financial, and operational relationships with installer, operator, owner, public utility, and ISO.

Community Solar

Community solar describe local projects or purchasing programs that benefit multiple customers at multiple locations. In most cases, customers benefit from energy generated at an off-site, grid-tied utility-scale or neighborhood-scale solar array owned and operated by local government, a non-profit or special purpose entity, an investor-owned or municipal utility, a third party or community members. 22 states have adopted enabling legislation for community solar. In 2020, community solar projects represent more than 3 GW of installed capacity (NREL, 2020). While Iowa does not have enabling legislation for community renewable energy, 15 community projects by electric cooperatives and municipal utilities account for 4,538 kW capacity (NREL, 2020), and the state's first community solar project with an investor-owned utility was announced in April 2021 (Tayes, 2021).

Economics, Environmental, Social Equity benefits

- + allows all community residents and businesses to directly benefit from and invest in local solar affordably
- + supports community control over generation for community benefit
- + provides power for public purposes, including municipal operations
- + allows communities to hold and buy back renewable energy credits and claim GHG emissions reductions
- + requires clear public purpose

Legal/regulatory issues

- additional legal and regulatory complexity, even with utility ownership

As noted in the Bluestem report, "MidAmerican Energy's net metering policy does not allow for sharing of energy among neighboring facilities, nor does it allow for the remote location of the generating PV facility (i.e. the PV facility must be located at the site property of energy usage." A revision or exception to this policy seems necessary for a community solar project to move forward.

In Iowa, community solar customers usually buy or lease a share of the solar panels in the array and receive a utility bill credit for electricity generated by their share of the community solar system. In a subscription model, customers commit to purchasing electricity from the community array, which may be at lower or higher prices than standard utility rates.

Community solar has numerous potential direct benefits to the community (SF Environment, 2012):

- Democratizes the benefits of solar and enables more residents and businesses to take part in the “clean economy” – particularly important in regions where all ratepayers help fund solar incentive programs;
- Reduces greenhouse gas emissions and emissions of other air pollutants from electricity demand;
- Supports the local solar industry and fosters local green jobs;
- Enables participants to keep their solar energy when they move (within the eligible territory);
- Enables use of sites with high solar potential that would otherwise remain undeveloped due to regulatory barriers or lack of financial impetus (e.g., parking structures, warehouses, landfills);
- Increases financial viability due to increased and reliable consumer demand, economies of scale from larger systems and use of best sites with highest solar potential; and
- When located in the communities it serves, reduces transmission and distribution costs compared to utility-scale electricity generation.

In Iowa, community solar programs need different approval depending on their type. Investor-owned utilities need state legislation or approval from the Iowa Utilities Board to create public programs for public purpose. Municipalities and PPAs require utility interconnection approval, and solar energy systems with a total capacity of 25 MW or more require a generating certificate from the Iowa Utilities Board.

Case Study: Community Municipal Utility Solar in Cedar Falls

Cedar Falls' 8-acre Simple Solar project provides an early example of virtual net metering in a community solar project.

As a municipal utility, Cedar Falls can offer virtual net metering. Simple Solar is the largest community solar project in Iowa, and in operation since 2016. The project includes families, businesses, and organizations who have purchased a portion of the energy generated by the 6,516-panel installation at a park (Kinney, 2017).

The project provides virtual utility credits to around 6% of the total customer base of the Cedar Falls Utilities (Cedar Falls Utilities, 2021). Subscribers receive credits on their energy bill based on the amount of energy produced by their shares of the solar installation. Each refundable share, with an upfront cost of \$174, is equivalent to about a 170 Watt of solar panel or about 300 kWh/month, and its refund value depreciates with the production efficiency of the panels. One share generates on average \$14.40/year per month in bill credit, and each customer can purchase up to 100% of their average monthly usage.

The University of Northern Iowa purchased roughly 20% of the solar project (Cedar Falls Utilities, 2021). In an interview with Matt Hein, an energy services manager at Cedar Falls Utilities, Mr. Hein declared the Simple Solar project to be an overall success.

The project was initially set to provide 500 kW of energy, but with interest 3x larger than expected they increased the size to 1.5 MW (Hein, 2021). He spoke about how the City of Cedar Falls has a strong interest in finding ways to be "green", and that this gave people an outlet to participate if they couldn't afford their own panels or didn't have the space for them on their own home. One strength of the simple solar framework was that it took care of the complexity that can come with owning and permitting residential solar panels. With no installation needs, and a program to easily increase or decrease the number of units as well as buy back units, the customer doesn't face risks from participation.

Case Study: Community Municipal Utility Solar in Ames

The SunSmart project, operational in 2020, is a 2 MW community solar farm. Customers of Ames Electric Services can buy shares in the solar farm, called “Power Packs.” Each Power Pack is a one-time investment of \$300 and represents 175W of generating capacity. Owners of Power Packs receive monthly credits on their utility bill based on production. Payback is possible by years 16-18 of the 20-year contract (Ames, 2021).

Virtual Net Metering

Virtual net metering is a system for crediting utility bills for community solar installations. Off-site or on-site solar generates credits that are then shared on the utility bills of subscribers based on their share of a solar garden or solar array. Under a virtual net metering agreement, generation credits mirror the value of the retail rate for electricity.

Virtual net metering reduces expenses at the building and community scales. Virtual net metering is essential for Homeowners Associations (HOAs) and multi-family property owners who wish to provide tenants with solar. Multifamily properties would otherwise need to install discrete solar arrays on its roof, each serving an individual unit, or to include utilities with rent.

Larger systems are less expensive than residential arrays, often by a factor of 2 or more per kW, meaning that costs would be cut for customers participating in community solar projects using virtual net metering instead of purchasing their own systems. Community solar also eliminates the up-front cost burden on low- and middle-income households, while eliminating property ownership as a prerequisite for benefitting from solar.

While not yet adopted in Iowa, at least 15 states have virtual net metering policies, and awareness of virtual net metering and its benefits is growing across the U.S.

Case Study: Virtual Net Metering Policy in Austin, TX

In 2018, Austin Energy in Texas committed to developing a virtual net metering policy that would align with the city’s goal of bringing solar to “multi-family and affordable housing, low-income residents, renters, and non-profits” (a goal aligning with many of the values described by the City of Iowa City’s Climate Action Plan) (White, 2017). The virtual net metering policy for Austin will significantly lessen expenses for multifamily property owners hoping to provide their tenants with access to solar arrays. One example from a multifamily property in Austin exemplifies the benefits of virtual net metering. This property originally installed 140 discrete solar arrays on its roof, each serving a different individual unit and each with their own meter. Due to the city’s updated policy around virtual net metering, a larger array could be installed eliminating the need for the individual and more expensive arrays.

Case Study: Virtual Net Metering and Economic Net Benefits in California

California created a virtual net metering program in 2009 within MASH, the state’s multifamily solar program (SF Environment, 2012). However, they found a result of virtual net metering was that the utility allowance structure in California made it challenging to provide a net monthly benefit to participating households living in HUD subsidized housing. In HUD subsidized housing in California, rent and utilities combined paid by tenants is adjusted to less than 30% of their income, so in some cases the proportion of rent paid by the tenant increases when the utility costs decrease due to solar credits [6]. This creates no monthly net financial benefit to the household, which is a primary purpose of the community solar arrays. The impacts of utility allowance structure and rental and utilities subsidy profiles on potential benefits of virtual net metering in Iowa City would need to be evaluated to ensure that proposed programs can provide consistent benefit to low-income households.

Solar Crowdfunding

Crowdfunded solar allows individuals or investors to fund or invest in a solar installation. This allows the upfront costs of solar to be divided among multiple participants and to allow the growth of solar as part of the grid, without necessarily using it directly. It incentivizes its installation by allowing people to reap the net benefits of their investiture. As well, it allows communities to install and use solar with reduced upfront costs.

Solar crowdfunding can also be achieved through crowdfunded loans. This involves a crowd-funding company and some sort of financial institution. In this model, investors back the loans for homeowners to purchase solar and are able to get a return on their investment. The bank provides these loans on the assumption of future energy savings from solar installation.

In 2020 the Security and Exchanges Commission (SEC) clarified crowdsourcing rules. A main takeaway from these rulings is that the commission allows companies to be funded by crowdsourcing up to \$1 million a year. While this rule does not solely apply to renewables and energy production, it does pave the way for these types of investments (Montgomery, 2013). With rules opening up the path for new financing models, special attention should be paid to this form of community solar for local ownership of neighborhood and city-scale projects.

Microgrids

Microgrids are localized grids, installed redundantly with grid infrastructure, that can disconnect from the traditional grid to power neighborhoods or campuses and operate autonomously during outages. They can strengthen grid resilience and help mitigate grid disturbances as well as function as a grid resource for faster system response and recovery. The University of Iowa's semi-independent local energy infrastructure functions as a form of microgrid within the city.

Microgrids can provide efficient, low-cost, clean energy from local sources, enhance local resiliency, and improve the operation and stability of the regional electric grid. The DOE Smart Grid R&D Program considers microgrids as a key

building block for a Smart Grid and has established microgrid R&D as a key focus area. The Energy Act of 2020 establishes a Department of Energy storage and microgrid grant and technical assistance program to help public utilities and rural electric cooperatives design energy storage and microgrid projects that use renewable energy.

Microgrid management practices beyond single-user municipal, corporate, and campus applications are not well established. While there are many projects in development and application (Wood, 2021), microgrids are in an early stage of testing and are not yet commercially viable but have proven to be valuable at creating resilience and energy independence co-located with grid energy. Case studies to date (California Energy Commission 2018, 2019a, 2019b; Microgrid Projects, 2021) have identified common contemporary challenges: multiple value streams are essential to cover the installed cost of a microgrid, local zoning and set-back requirements can be a primary limitation, no rate structures or tariffs exist that benefit microgrid users and utilities in blue sky and outage conditions, and intermittent generation and distribution protection require energy storage systems and smart technology to match renewable energy supply and demand.

Social Equity Options + Resilience Needs

Community solar can contribute to climate adaptation and resilience to extreme weather and grid outages only when co-located with and able to directly power Resilience Hubs, city operations, and neighborhood microgrids.

Community solar represents the solar model that can most directly enable equitable, affordable, universal opt-in access to the economic, environmental, and local resilience potential of solar. The public program and its terms determine these features, and project siting determines the potential for on-site microgrids. The optimal model for community solar in Iowa City will depend most on the nature of the community solar program. Investor-owned, PPA, and community ownership are broadly compatible with these benefits, with major differences in regulatory, operational, and financing issues.

While community solar is an effective tool for expanding solar access, it does not create or ensure low-income participation. According to the low-income solar policy guide, “Almost all of the same barriers to entry—particularly financing, education and outreach, and market forces—exist for community solar as for rooftop solar”. The Clean Energy States Alliance *Solar with Justice* report (CESA, 2019), the most recent and authoritative report social equity strategies in solar, identifies ten common obstacles to solar for under-resourced communities:

1. The solar market is still developing in many places
2. Lack of solar marketer interest and customer awareness in under-resourced communities
3. Financial barriers for community institutions
4. Competition between solar and existing LMI energy programs
5. Policy barriers
6. Utility opposition
7. Competing priorities for advocates and service groups
8. Housing policies
9. Finance policies
10. Vestiges of discriminatory practices and residential segregation

National experience to date has shown that a targeted policy and programmatic focus on serving low-income consumers is necessary to successfully expand community solar’s reach to low-income communities at scale. At least 14 states have included low-income provisions in their community solar programs. States have taken various approaches to date, including:

- **Carveouts:** A carveout designates a certain amount of program or project capacity to LMI customers. Project carveouts have been included under community solar programs in initial years of Colorado and New York Phase 1, which mandate that a certain percentage of all community solar projects be dedicated to low-income, and for utility-led facilities in Hawaii. Program carveouts have been included in Maryland and Oregon, which mandate a certain percentage of overall program dedicated to low-income customers

- **LMI-only projects:** Projects designed specifically to serve only low to moderate income households
- **Anchor-tenant projects:** project developers can seek a single non-residential anchor tenant to subscribe to a large portion of the project's capacity
- **Incentives:** Incentives and adders have been used to incentivize low-income participation in states like Illinois and Massachusetts, with higher payback rates
- **Purchasing Programs:** Programs have been designed specifically for low-income community solar, towards the goal of low-income participation and benefit. Colorado Energy Office deployed a dedicated low-income community solar program aimed at reducing low-income energy burden, California's Community Services Department and New York (NYSERDA) has developed a program under which the state entity serves as an intermediary purchaser of community solar and allocates capacity to low-income customers through electric bill assistance offerings.

Each of these options have been analyzed by NREL (2016), finding the most effective strategy will be based on the characteristics of the community. The shared primary finding from NREL and CESA is that partnerships with community groups and existing LMI energy programs are important and effective means of including LMI communities in community solar expansion.

CESA's general recommendations for communities include:

1. Partnerships involving trusted community organizations are essential
2. LMI solar is still in the experimental phase
3. Installations for community institutions deserve special consideration
4. Resilience should be a component of LMI solar
5. Financial risk needs to be minimized for LMI households and community organizations

6. Strong consumer protection is crucial
7. Shared solar projects can play a useful role, but they are not a panacea
8. Training and workforce development should remain a priority
9. Solar education is important
10. Increasing the availability of financing for solar projects in under-resourced communities is essential

The NAACP Solar Equity Initiative (NAACP, 2021) recommends that to create tangible progress for BIPOC and other frontline communities, equitable solar policy should:

1. Reflect an inclusive and community-driven theory of change guided by the Principles of Environmental Justice and the Jemez Principles of Democratic Organizing.
2. Address past, current, and future impacts of climate change by fostering the development of solar energy policies that move us toward a resilient and just transition. Solar energy policies should exist as part of a suite of policies to direct a Just Transition towards a decarbonized economy.
3. Result in measurable improvements in solar adoption rates and whenever possible ownership and control of solar with strong consumer protections in place.
4. Increase and advocate for resilience (grid, community, and individual).
5. Be cross-cutting, so that they address water quality, housing affordability, community development, clean air, workforce equity, and jobs, contracting equity, economic development, education, food access and affordability, transportation, utility regulation, community engagement, and other concerns.
6. Be integrated with energy efficiency, grid upgrades, other renewables, building, and transportation/transit electrification, storage, etc.

7. Drive both economic and political benefits of solar to reduce energy burdens, make energy more affordable, increase ownership opportunities, create jobs within these communities, and support entrepreneurs and minority and women-owned businesses. Policies should also foster the creation of an inclusive solar energy workforce and business community.
8. Strive for equitable, accessible solar that also delivers net positive impacts or benefits, educates consumers, and empowers them to make their own, informed decisions. Companies and organizations should operate at the highest ethical standards and not engage in deceptive or abusive acts or practices.

CESA recommendations for state governments and community organizations relevant to the city include measuring progress towards energy equity, designing solar programs for specific market segments, and ensuring financial benefits reach LMI households (CESA, 2019). Best practices from the Low Income Solar Guide (2018) include:

1. **Customer Preference** – “When starting a new community solar program, it is essential to keep low-income customers at the forefront of the discussion to ensure they will be able to participate and benefit. Inclusion of language that establishes prioritization and enables preference for low-income customers will allow regulators, utilities, and stakeholders to create targeted, low-income community solar policies that ensure strong low-income participation and flow of program benefits to these customers.”
2. **Equitable Benefit** – “The program should be structured to ensure that low-income customers in all housing types receive proportionate access and economic benefits under the program. Generally, programs should strive to enable proportionate access for all rate classes, and low-income participation should reflect low-income demographics within the rate base/utility/state service territory. For example, if 30% of residential

customers are low-income, and 10% of the commercial rate class is affordable housing, these demographics should inform the structure of the program and any participatory targets. This principle ensures that a program is not disproportionately weighted towards a certain customer class and that benefits flow equitably to all eligible customer classes and income levels. Program designers may also want to include low-income service providers, such as nonprofits serving low-income communities, in policies”

3. **Housing Considerations** – “Low-income customers reside in a diverse range of housing, from single family homes to multifamily rental properties. Often, low-income customers may not pay their bills directly, and are represented by an affordable housing operator or other service organization. These unique housing characteristics create both barriers and opportunities. For example, low-income affordable housing operators are often able to serve as financeable offtakers for projects and can serve as passthrough intermediaries for their tenants to benefit from community solar. Single-family households can capture program benefits (bill credits) directly, but typically face the highest financial barriers to entry for programs. As such, it is essential to ensure that all low-income customers are included in policy and program design, to ensure opportunity for participation regardless of housing type, and that incentives are structured which account for difference in financing barriers between low-income residential customers, low-income housing providers, and low-income service organizations (if included). Low-income residential customers who pay their bills directly will typically require the highest incentives as they face the highest financial barriers to entry.”

Solar Policy: Planning, Zoning, Easements, and City Operations

Local government solar policy can be limited or supported by state legislation and the Iowa Utility Board. Table XXX shows the relationship between solar approaches in Iowa City relevant to state policy.

Table 3.1. Solar policies overview

	Is it legal in Iowa?	Does Iowa Code include enabling legislation?	Does the Iowa Utility Board have a directive for this?	Is this approach currently operational in the state?	Is this approach currently operational in Iowa City?
Solar Zoning	YES ✓	YES ✓	NO ✗	YES* ✓	YES ✓
Solar Easements	YES ✓	YES ✓	NO ✗	YES ✓	NO ✗
Solar-ready building code	YES ✓	NO ✗	NO ✗	YES ✓	NO ✗
Solar in comprehensive planning	YES ✓	YES ✓	NO ✗	YES ✓	NO ✗
Certification programs	YES ✓	NO ✗	NO ✗	YES ✓	NO ✗

Contemporary Zoning in Iowa City

Utility-scale ground-mounted solar facilities are currently allowed in Iowa City in areas zoned commercial, industrial/research, interim development, and public.

Some zones may be provisional or require special exception (Iowa City Zoning Code, Iowa City, 2021b). The American Planning Association (APA, 2014) finds “one of the biggest potential barriers to solar energy use is the lack of clarity in the local zoning code about what types of solar energy systems are permitted in what locations.”

In Iowa City, most solar panel installations are categorized as accessory mechanical structures (more specifically as utility equipment), per section 14-4C-2N of the City Code. These accessory structures are allowed in all zones, but do have some additional requirements pertaining to location and setbacks of the structure on each property. These additional requirements can also be found in section 14-4C-2N of the City Code.

https://codelibrary.amlegal.com/codes/iowacityia/latest/iowacity_ia/0-0-0-23239

The City also has a separate code section detailing the allowance of Utility-Scale Ground-Mounted Solar Energy Systems, which can be found in section 14-4B-4D-18 of the City Code. These structures, which are intended for larger utility-scale solar operations, are allowed via special exception in all commercial zones, RDP, ORP, and ID-RP zones, and as a provisional use in P-1 and P-2 zones.

Iowa Law

Iowa statutes leave most solar development regulation to local governments. The State does not pre-empt or guide solar development. Most importantly, Iowa law mostly leaves to local governments the challenge of defining solar rights, including when property owners have an as-of-right solar development opportunity, when solar rights trump or are trumped by other property rights, and how or whether to protect solar installations from trees or buildings on adjacent properties. State law specifically enables certain actions, such as creation of solar energy “easements” and standard to limit HOAs from restricting solar development, but local governments must take the initiative to adopt and administer these protections (Great Plains Institute, 2020).

Iowa state law allows the purchase and holding of easements protecting access to solar. In situations where easements are not voluntarily agreed to, the individual or entity installing the solar energy system may apply to have a local board review and potentially grant an easement (Iowa Code 564A.7. Access to Solar Energy.) Iowa code authorizes municipalities to issue zoning ordinances prohibiting subdivisions from including restrictions that limit the use of solar collectors (Iowa Code 564A.8. Restrictive Covenants.)

Iowa Smart Planning

The State of Iowa smart planning law (State of Iowa, 2011) requires state agencies, local governments, and other public entities to consider 10 principles during deliberation of all appropriate planning, zoning, development, and resource management decisions. Several of these principles provide a pathway to the integration of solar development best practices into community regulations and programs:

- **Principle 2. Efficiency, Transparency, and Consistency:** “Planning, zoning, development, and resource management should be undertaken to provide efficient, transparent, and consistent outcomes. Individuals, communities, regions, and governmental entities should share in the responsibility to promote the equitable distribution of development benefits and costs.”

Solar Best Practice: “Regulation and permitting process should be transparent, predictable, and consistent with surrounding jurisdictions.”

- **Principle 3. Clean, Renewable, and Efficient Energy:** “Planning, zoning, development, and resource management should be undertaken to promote clean and renewable energy use and increased energy efficiency.”

Solar Best Practice: “Acknowledge the value of solar resources and recognize and enable the varied forms of solar development in plans, policies, and regulations.”

- **Principle 4. Occupational Diversity:** “Planning, zoning, development, and resource management should promote increased diversity of employment and business opportunities, promote access to education and training, expand entrepreneurial opportunities, and promote the establishments of businesses in location near existing housing, infrastructure, and transportation.”

Solar Best Practice: “Recognize the economic development and job creation benefits of solar development in economic plans and programs.”

- **Principle 7. Community Character:** “Planning, zoning, development, and resource management should promote activities and development that are consistent with the character and architectural style of the community and should respond to local values regarding the physical character of the community.”

Solar Best Practice: “Proactively plan for addressing potential conflicts of solar development with other valuable community resources, such as historic community character, urban forest, agricultural practices, and natural systems.”

- **Principle 8. Natural Resources and Agricultural Protection:** “Planning, zoning, development, and resource management should emphasize protection, preservation, and restoration of natural resources, agricultural land, and cultural and historic landscapes, and should increase the availability of open spaces and recreational facilities.”

Solar Best Practice: “Recognize the environmental benefits of solar energy production as articulated in local, state, or national policy and regulation.”

- **Principle 9. Sustainable Design:** “Planning, zoning, development, and resource management should promote developments, buildings, and infrastructure that utilize sustainable design and construction standards

and conserve natural resources by reducing waste and pollution through efficient use of land, energy, water, air, and materials.”

Solar Best Practice: “Include solar development as a component of public and private sector building and infrastructure standards development.”

Planning and Zoning: Prior Implementation in Iowa

In 2017, Johnson County revised their solar ordinances and made the solar application process more efficient as part of earning a SolSmart Gold designation. More recently, Johnson County updated their utility-scale ordinance. Similarly, Linn County is a part of the Iowa Solar Readiness Initiative and has amended their zoning standards to permit consumer and utility scale solar installations. Linn County received SolSmart Gold Designation for making solar more accessible to homes and businesses.

Fayette, IA adopted a Solar Energy Systems Ordinance as part of the City Code that outlines the permit process and requirements (i.e., height, location, setbacks, easements, screening, aesthetics, etc.)

Decorah, IA allows solar “by-rights” as an accessory structure in all residential zones and is permitted as an accessory use in all other zones as accessory uses and structures customarily incidental to any principal permitted use.”

Solar Access Rights and Solar Easements

Easements provide long-term assurance of access to incident sunlight and ensure compensation for any lost access. Easements are necessary prerequisites for distributed and centralized solar investment in dense and growing areas where vertical development could limit solar resource during the lifetime of the panels. Iowa City does not currently support solar easements.

Planning and Zoning: Best Management Practices

1. An amendment to the comprehensive plan should precede a solar ordinance/zoning to state intentions for solar development, the benefits of investments in solar, and the key considerations around regulating solar siting (Johannsen et al., 2020). Spatial analysis in GIS is recommended to evaluate candidate zoning policies, determine potential parcels for utility scale solar that won't be visible from residential areas, create visibility standards, and enable primary solar uses in appropriate locations for large-scale centralized solar installations.
2. Solar facilities generating power for on-site use should typically be regulated as "by right" uses (depending on size and location), while utility-scale solar should typically be "conditionally" permitted regardless of the zoning district, and best in brownfields, remote areas, and agriculture areas (Coffe, 2019). This regulatory approach is true in Iowa City.
3. "The zoning ordinance should be amended to more specifically set forth the process and requirements necessary for a thorough land-use evaluation of an application" (Coffe, 2019).

Iowa Solar Model Ordinance

The Great Plains Institute suggests an Iowa Solar Model Ordinance (Great Plains Institute, 2020) with state-specific standards to:

- a. *Create an as-of-right solar installation path for property-owners.*
Create a clear regulatory path (an as-of-right installation) to solar development for accessory uses and - if appropriate - for principal uses such as large-scale solar and ground-mounted community shared solar installations.

- b. *Enable principal solar uses.* Define where community- and large-solar energy land uses are appropriate as a principal or primary use, set development standards and procedures to guide development, and capture co-benefit opportunities for water quality, habitat, agriculture.
- c. *Limit regulatory barriers to developing solar resources.* Ensure that access to solar resources is not unduly limited by height, setback, or coverage standards, recognizing the distinct design and function of solar technologies and land uses for both accessory and principal uses.
- d. *Define appropriate aesthetic standards.* Retain an as-of-right installation pathway for accessory uses while balancing design concerns in urban neighborhoods and historic districts. Set reasonable aesthetic standards for solar principal uses that are consistent with other principal uses that have visual impacts.
- e. *Address cross-property solar access issues.* Consider options for protecting access across property lines in the subdivision process and in zoning districts that allow taller buildings on smaller (urban density) lots.
- f. *Promote “solar-ready” design.* Every building that has a solar resource should be built to seamlessly use it. Encourage builders to use solar-ready subdivision and building design.
- g. *Include solar in regulatory incentives.* Encourage desired solar development by including it in regulatory incentives; density bonuses, parking standards, flexible zoning standards, financing/ grant programs, promotional efforts.

Iowa Government Solar Toolkit

As part of The Great Plain Institute’s Solar Ready Iowa, the Local Government Solar Toolkit: Iowa (Great Plain Institute, 2020) has been developed to equip local governments in Iowa with information regarding solar development as it relates to planning, zoning, and permitting. The toolkit provides resources and

BMPs that will assist communities in addressing barriers to solar energy installations in a manner tailored to each community's needs. These model ordinances offer language to address a variety of solar land uses, aligned with local conditions and priorities. Zoning elements include:

1. Use – Which land uses are permitted, which are conditional, and which are prohibited in each zoning district? Should the community allow solar farms in industrial districts, or ground-mount accessory solar in the backyards of residential districts?

2. Dimensional standards – Where on the lot can solar land uses be placed? If the solar resource is only viable in the front yard, or only available above the peak of the roof because of the neighbor's trees, should the community allow solar development in those locations? Most communities allow some exceptions to height and setback requirements. Does solar meet the same standard to qualify for an exception?

3. Coverage and bulk – How much of the property can be developed consistent with the preferred development pattern for that zoning district? Should solar panels in the backyard count as an accessory structure if the number of accessory buildings is limited on the lot? Does the surface of a solar collector count as impervious surface for storm water standards?

Some communities' zoning ordinances have more advanced elements that should also be addressed to remove barriers and to take advantage of incentives. Examples include:

- **Design standards** - Are community aesthetic or character standards part of local regulations? How can solar development fit into areas where the community has set design goals?
- **Solar easements or cross-property protection** – Iowa law enables the creation of easements across property lines to protect solar resources, and the use of a local solar access regulatory board to create easements

through a regulatory process. Should local regulation protect the solar resource when someone makes a long-term investment in solar infrastructure? Is there a public purpose in protecting solar access across property lines?

- **Homeowners Associations** – Iowa law allows communities to limit private covenants that prevent individual homeowners' investment in on-site solar. Should the community guide homeowners' association choices on solar installation design?
- **Integrating with other processes** – How does solar development conflict or support agricultural protection, historic preservation, urban forests, urban expansion areas, municipal utility goals?
- **Capturing co-benefits** – Solar farms or other principal uses are subject to stormwater management regulations. Properly designed ground cover requirements for solar farms can create a stormwater amenity or "pollinator" habitat.

Solar-ready building code

Iowa State Energy Code for residential and commercial buildings, based on the 2012 International Energy Conservation Code (IECC), does not regulate solar-ready building. While local governments cannot modify the code or adopt stricter standards on regulated topics, they can adopt supplemental building codes on other issues, and Iowa Code 414.3 allows for regulations to promote reasonable access to solar. IECC Appendices RB and CA prepare buildings for future installation of solar energy equipment, piping, and wiring.

The California Energy Commission introduced the California solar mandate which requires rooftop solar photovoltaic systems to be equipped on all new homes built on or after January 1, 2020 (California Energy Commission, 2019c) The 2019 Building Energy Efficiency Standards requires that all new single-family homes and multi-family buildings that are under three stories must conform to the new solar code standards and is climate zone-specific depending on the sizing of a

home's floor area. The Building Energy Efficient Standards also encourages home batteries and heat-pump water heaters. The size of the equipped system will be determined by the ability to offset 100% of the home's electricity usage. Homes do not need to offset 100% of their home's energy with solar.

Solar-ready residential and commercial building codes from California (2019), International Energy Conservation Code (2021), the North Carolina Clean Energy Technology Center's DSIRE database, and an NREL sample of U.S. municipal codes (Cook et al., 2016) provide contemporary examples of adopted in-use codes. No Iowa building codes were included in the NREL study due to insufficient data.

Certification Programs and Guidance

SolSmart, funded by the U.S. Department of Energy Solar Energy Technologies Office, provides a comprehensive state-specific certification program and no-cost technical assistance to help communities develop municipal solar policies. Designees must meet requirements across the five categories of the SolSmart criteria. Communities must meet program prerequisites and requirements in the foundational categories of Permitting and Inspection and Planning and Zoning and elective focus areas of Government Operations, Community Engagement, Market Development (SolSmart, 2021).

The Great Plains Institute, the Iowa Environmental Council and Center for Rural Affairs, the Grow Solar program, and the American Planning Association provide best practices, model ordinances, and tools, and the North Carolina Clean Energy Technology Center's DSIRE database comprehensively catalogs state, county, and municipal solar policies.

Principal Findings & Planning Considerations

Iowa City can become a state and national leader in applying renewable energy and energy efficiency policy through cohesive and comprehensive solar policies in zoning, building code, easements, city operations, and comprehensive planning to enhance quality of life, resilience, and economic and environmental objectives.

Solar policies provide direct support for Climate Action Plan goals of increasing on-site renewable energy systems and electrification and initiating community solar projects while integrating solar with the goal of increasing compact and contiguous development.

Iowa City can apply proactive solar policies, planning and zoning, utility and community-scale projects, solar thermal, and ground-mount solar PV to offset a lower potential for rooftop solar on existing residential and commercial buildings than peer communities in Iowa and among college towns and small metros.

Solar policy is foundational to the success of all specific projects and objectives, and each component is essential. Establishing solar easements and solar-ready building, planning, and zoning in the near term is necessary if distributed solar is to contribute meaningfully to city objectives within the planning time horizons of the current Comprehensive Plan and Climate Action Plan.

On-site solar and microgrids for existing and proposed city buildings can help accomplish climate action plan recommendations for existing city buildings, ensure continuity of city operations, establish Resilience Hubs, and achieve other public purposes during extreme weather events, grid outages, and emergencies.

On-site solar maximizes City government’s ability to implement the action plan to increase on-site renewable energy systems and electrification of City operations and assure coordination in preparedness planning with relevant agencies. Applying a portion of this solar for the public purpose of electric vehicle charging by city vehicles at city facilities will support efforts to embrace electric vehicles and reduce the City’s vehicle emissions footprint and accelerate investment in electrical and facilities upgrades for vehicle charging to enable electric and plug-in hybrid City vehicle fleets. On-site solar with backup supports existing City buildings participating in transitioning 3 percent of buildings with natural gas to high efficiency electrical heat, powered through low-carbon electricity sources by 2025 and 25 percent by 2050.

If the regulatory environment permitted, ideally by legislation enabling virtual net-metering in Iowa, City-wide and neighborhood community solar programs could help allow all residents to benefit from solar savings and household resilience and contribute to the environmental benefits of solar.

Community solar is foundational to solar equity and an example funding mechanism to support community-wide climate action. Important considerations for implementing community solar include:

- Passing state legislation to enable subscription-based community solar projects, or identifying alternatives within the existing regulatory environment.
- Identifying ground mount and rooftop community solar capacity on city properties
- Partnering with Mid-American Energy on community solar ownership and operations to reduce regulatory, financial, and operational complexity and enable the city to focus on the public program, public purposes, and public benefit.

- Ensuring net economic benefits to low-income residents and prioritize LMI households, renters, students, and buildings not suitable for solar in initial programs to build an effective and inclusive community solar program. Conduct the financial analyses to ensure viability for the entire community, and especially for energy cost-burdened households.
- Considering community objectives in community solar and develop local community projects based on neighborhood needs and characteristics and public participation. Public participation is essential in developing community solar projects, and especially for neighborhood-scale community solar and microgrids.
- Applying community solar installations and solar gardens to reduce Urban Heat Island (UHI) impacts for neighborhoods and buildings with high UHI.
- Measuring progress toward energy equity, solar equity as defined by communities, and reduced energy cost-burden for LMI households

Catalyzing private investment in solar PV and thermal by homeowners, businesses, and investors, and leveraging interest in solar ownership to increase energy efficiency through weatherization, high efficiency electrical heating, and solar hot water can help achieve climate action goals.

Strategies to accomplish these objectives might include:

- Educate and encourage households, businesses, and landlords on the specific benefits and costs of going solar for their buildings and adding battery storage. Increase awareness of reliable estimates of the economic benefits of investment in solar after federal tax credits, AERLP, and other state and federal programs. Conduct outreach with businesses on benefits of investing in solar across the city and in federally designated Opportunity Zones.

- Educate and encourage households, businesses, and landlords on the larger benefits of pursuing energy efficiency improvements before adding solar or battery storage.
- Connect residents and businesses to firms offering PPAs and commercial operating leases in the state to enable competitive private-sector financing options for larger investments.

Applying distributed and community solar to power thermal decarbonization and pair community solar with energy efficiency and weatherization programs can help maximize potential life-cycle greenhouse gas mitigation.

A solar-ready electrical and construction workforce can help grow a solar community. Pertinent training and certification is likely possible through Kirkwood Community College.

Encouragement and commitment to responsible solar panel purchasing and supply-side certification addresses negative issues related to human rights and environmental impact. This goal directly connects going solar with the Climate Action Plan goal of encouraging the purchase of local products and responsible purchasing.

The following local actions and needs can help accomplish the objectives mentioned above:

- 1. Continue to implement best practices in city solar policies for permitting and inspection, building code, planning and zoning, solar easements, and historic preservation, and prepare city staff and operations for a solar city.** The city can complete the SolSmart program as a path to adopting best practices in solar tailored to community plans,

characteristics, opportunities, and needs. Iowa City can join Johnson County, Linn County, Cedar Rapids, and 8 other Iowa counties and municipalities as a SolSmart Gold Designee. The SolSmart process and guidance and Midwest Renewable Energy Association's Grow Solar program provide state-specific planning, zoning, and permitting toolkit and model ordinances. Immediate steps toward this milestone include:

- map current solar zoning by parcel
- consider a comprehensive solar zoning ordinance
- consider rooftop solar guidelines for designated historic buildings and historic districts
- evaluate opportunities and implement solar-ready building code requirements according to Iowa Code 414.3 that allows for regulations to promote reasonable access to solar
- adopt solar easements to support distributed solar throughout dense neighborhoods
- identify community public purposes for community solar projects
- consider both PV and solar thermal in all applications
- consider municipal adoption of corporate and residential PACE

- 2. Develop community solar options for renters, students, and LMI households.** Community solar has the highest potential for solar PV generation to contribute to climate action goals for existing buildings, especially when paired with community energy efficiency and thermal decarbonization programs. This significant goal faces the regulatory and operational challenges of implementing one of the first community-hosted solar programs in Iowa without a municipal electrical utility.
- 3. Seek IUB clarification on community-hosted projects** including business district solar, neighborhood solar gardens, microgrids, and other community purposes for community-hosted solar.

4. **Conduct public participation on solar planning.** Identify community public purposes for community solar projects. Scale and implement community solar projects based on neighborhood needs.
5. **Create a Comprehensive Waste Management Plan for solar decommissioning and recycling.** Integrate solar into a Comprehensive Waste Management Plan and prepare to administer a recycling program.

Demonstration Projects & Partnerships

Demonstration projects introduce innovative ideas and approaches to address needs and areas of concern, requiring relatively low capital investment and providing an opportunity to determine whether the project can be scaled up or replicated. Demonstration projects are effective mechanisms for forging partnerships between public and community sectors, garnering public input, and generating measurable results.

Example Iowa City Community Solar Projects and Criteria

Community solar is foundational to broad and equitable participation in solar and responds to the Climate Action Plan's call to initiate community solar projects.

Caveat: Absent enabling state legislation for property assessed clean energy, the city has limited options to support private commercial or residential solar purchases. In business districts without adjacent public land, community solar could be possible by leasing accessory use from landowners to place panels on roofs and parking lots. It is important to note that utility policy currently only allows for solar projects to serve on-site usage- off-site subscriber-based community solar would require a change or exception to this policy.

Exemplary community-hosted solar projects generate electricity on city-owned or leased properties to support multiple public goods and private co-benefits.

The objectives for community-hosted solar projects might include:

- resilient city services and emergency services
- cost savings for net-metered city operations
- equitable access to solar cost savings for all residents and businesses
- lower greenhouse gas emissions
- reductions in the urban heat island effect

- a visible commitment to the city’s climate action plan
- anchors for solar business districts
- initial seeds to catalyze neighborhood microgrids

Features of a community solar project might include:

- photovoltaic arrays on public buildings
- one or more 500kW opt-in community solar arrays with virtual net metering
- one or more solar parking lots with shaded multi-use spaces for covered bicycle parking, electric vehicle charging, and pop-up events
- a solar garden with interpretive displays and real-time indicators
- discounted group buys for residences, businesses, and non-profits

At 500 kW capacity per community-hosted solar array, each project meets the electricity resilience needs of the city host buildings plus:

- 572 MWh/year, the equivalent of 60+ residential rooftop solar installations
- 205 metric tons of avoided CO₂ emissions per year relative to Mid-American Energy’s 2020 Iowa emissions rate, equivalent to taking 45 cars off the road

Design Criteria

A neighborhood community solar demonstration project using city buildings and public spaces in each neighborhood and business district should consider design criteria, such as:

- maximize equitable access through initial projects in low and middle-income areas, neighborhoods with high rental and student populations who cannot directly invest in residential solar, federal opportunity zones, and public housing
- prioritize resilience and greenhouse gas reductions for city operations
- a visible solar cityscape for residents and visitors

- city buildings to serve as anchors for adjacent solar business districts
- projects at multiple scales

Site Analysis

Solar projects on City-owned properties can provide local public benefits, such as resilience to power outages and extreme weather events, may help increase project feasibility, and can help provide equitable access to solar benefits.

Appendix I includes a map of public lands in Iowa city 3-acres or larger, identified as parks or not parks.

Facilities to be considered for on-site solar and storage, subject to limitations and feasibility, include:

- Iowa City Public Library
- City Hall
- Police Station
- Fire Station #1
- Robert A. Lee Community Recreation Center
- Senior Center
- Downtown Parking Ramps
- Mercer Park Aquatic Center and Scanlon Gym
- Fire Stations #2 and #3
- Airport
- South Side Recycling Center
- Landfill
- Terry Trueblood Recreation Area
- Napoleon Ln
- Water Department

Absent enabling state legislation for property assessed clean energy, the city has limited options to support private commercial or residential solar purchases. In business districts without adjacent public land, community solar could be possible by leasing accessory use from landowners to place panels on roofs and

parking lots. Again, it is important to note that utility policy currently only allows for solar projects to serve on-site usage- off-site subscriber-based community solar would require a change or exception to this policy.

This analysis considers all city-owned non-school buildings and adjacent parking facilities, parks, open spaces, and residential and commercial buildings. These projects total 10-30 MW of generation capacity and supplement potential community-hosted solar projects in residential neighborhoods.

Potential pilot project sites combining City Operations, Business Districts, and Community Solar opportunities are shown below.

Downtown Business District

Iowa City Public Library
City Hall
Police Station
Fire Station #1
Robert A. Lee Community Recreation Center
Senior Center
Downtown Parking Ramps

Towncrest (Opportunity Zone)

Mercer Park Aquatic Center and Scanlon Gym

Sycamore Mall (Opportunity Zone)

Fire Station #2

Highway 1/6 corridor (Opportunity Zone)

East Side Recycling Center/ReStore

Roosevelt

Airport
South Side Recycling Center

Additional City Operations locations

Fire Station #3
Landfill
Terry Trueblood Recreation Area
Napoleon Ln
Water Department

Business districts and LMI residential areas with high potential for commercial and utility-scale solar, adjacent private parking lots, nearby public parks and public schools, but no city buildings, could also be potential project sites. They include:

- Fairmeadows
- North Dodge/Pearson/ICCS
- Riverfront Crossings (Opportunity Zone)
- South District/Pepperwood Plaza/Wetherby Park
- Walden Square

Figure 4.1 Potential pilot projects for city operations and business districts.

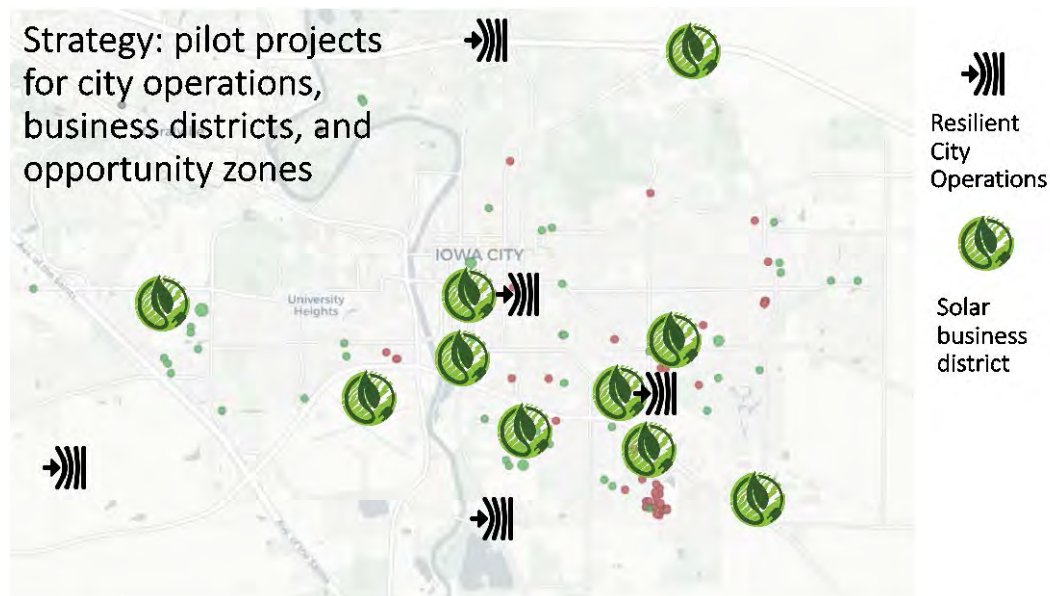
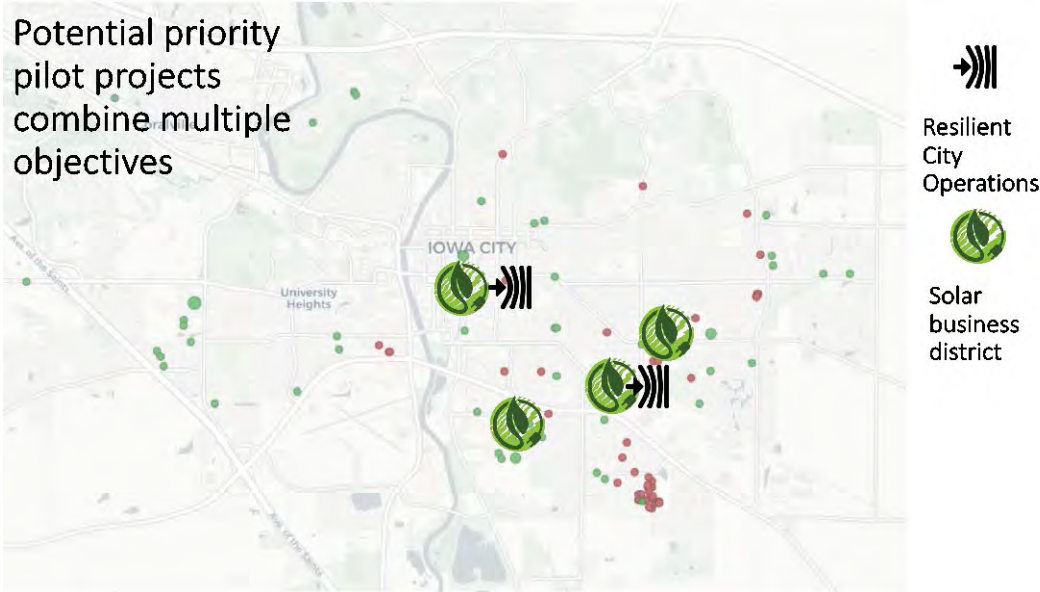


Figure 4.2 Potential pilot projects incorporating city operations, business districts, and federally designated Opportunity Zones.



Sourcing and Disposal

Solar Sourcing

The questions surrounding the conditions and inputs used to produce solar panel components have been a more recent area of concern. While questions surrounding the environmental impacts of production have been circulating for a few years (Mulvaney, 2014), recent concerns of forced labor and worker safety have pushed solar consumers and sources to examine where their solar products come from (Murtaugh, 2021; Swanson and Buckley, 2021).

Recent reports have raised concerns that polysilicon factories in China's Xinjiang region are used forced labor from ethnic minorities. The solar issue is a component the wider concerns of the oppression of the Uighur and other minorities in China. While the claims of forced labor are being denied by companies operating in the region, multiple reports cite 'red flags' in Chinese documents that may indicate that these workers are being coerced and forced into these factory positions. It has pushed sourcing companies to cut ties with the region and look for polysilicon in other places, a difficult thing to do as China produces 82% of global silicon (Swanson and Buckley, 2021). In a year that was already seeing increases in solar installation, limiting of the Chinese supply may result in a tighter, backed up market for solar components and, thus, solar panels (BloombergNEF, 2021).

The situation in China is still developing, and legislation or other sanctions may be enacted in the coming months (Swanson and Buckley, 2021). However, when sourcing solar it is prudent to ask local suppliers where they source their panels from and to investigate whether those companies have signed on to a pledge opposing forced labor put forth by the Solar Energy Industries Association in early February 2021 (SEIA, 2021).

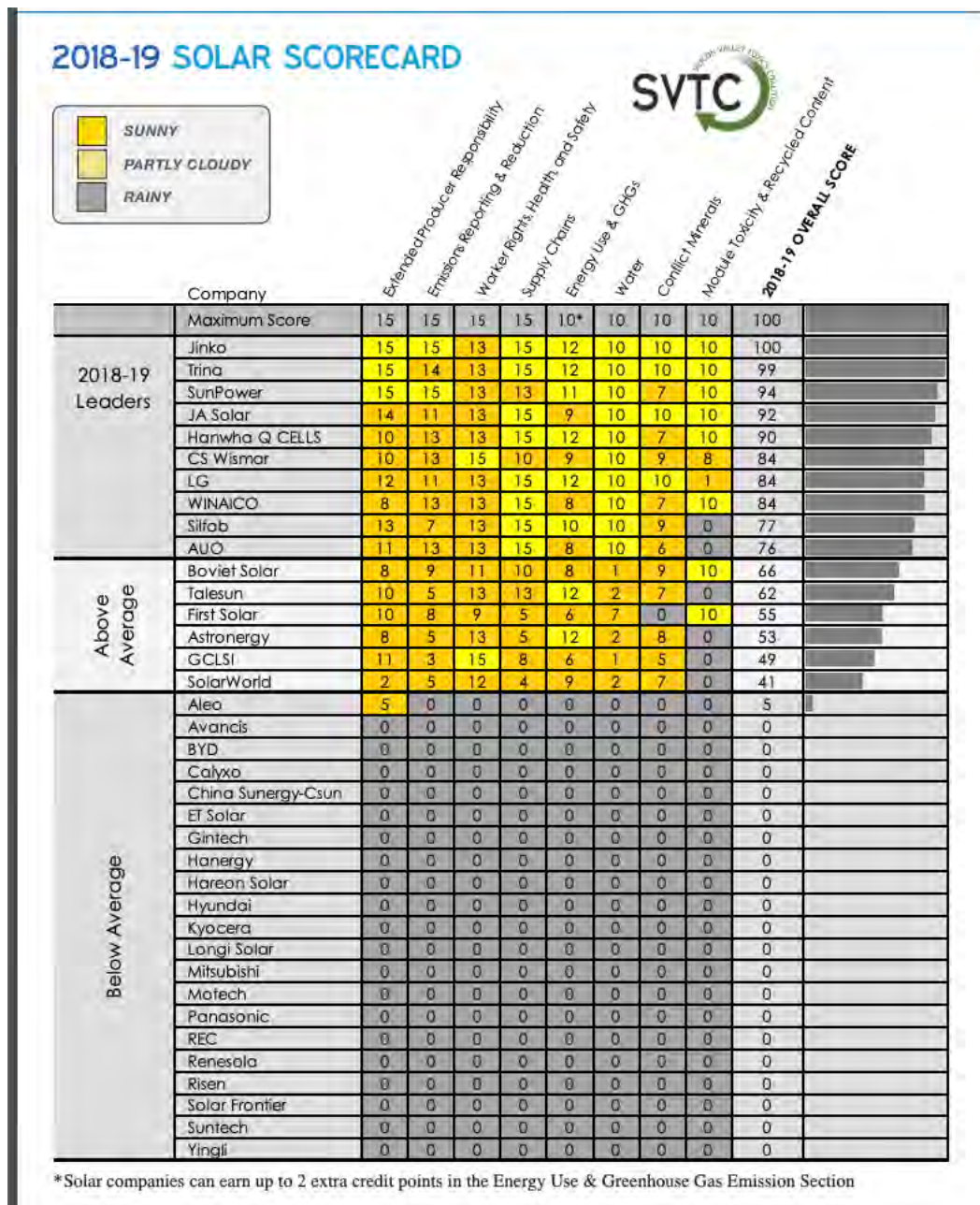
In addition to these recent concerns, there are also other resources for sourcing solar responsibly. While the carbon-free energy provided by solar can offset

some of its production energy, there are still environmental concerns when it comes to the energy and chemical usage used to create the cells. It is important to, again, investigate the regions where the solar you are sourcing is produced and what practices they may be using. What types of energy is predominantly used for industrial practices? What sorts of precautions and regulations do they have for dealing with hazardous materials? What are their workers right and protections?

To aid this process, the Silicon Valley Toxics Coalition prepares a scorecard rating solar companies on multiple metrics. These include the following: Extended Producer Responsibility; Emissions Reporting; Worker Rights, Health, and Safety; Supply Chains; Module Toxicity & Materials; Emissions; Water; and Conflict Materials (Silicon Valley Toxics Coalition, 2019). Figure 4.3 shows their solar scorecard for 2018-2019 (keeping in mind that circumstances may have changed, especially emerging concerns in Xinjiang).

As newer solar cell technologies develop into mainstream production, there may be a greater variety of environmentally responsible and sustainable options. From the mine to assembly, the sourcing of components and labor fall on a spectrum of sustainability and ethics. Environmental and human rights sourcing issues also apply to battery storage systems for solar. For implementation of solar to be truly sustainable, these factors must be considered and shape sourcing decisions.

Figure 4.3. SVTC 2018-2019 Solar Scorecard



Disposal and recycling

More than 95% of materials in contemporary solar panel and rack system materials are recyclable, but separating the materials and recycling them is complex and often expensive. PV recycling in the US is voluntary, except in Washington, where manufacturers are required to collect panels at their end of life for recycling free of charge. There will be two decades after initial launch before the recycling program hits its peak, which provides a window to define and expand the program. In 2021, the Iowa Department of Natural Resources is forming a subcommittee to investigate and propose strategies for the disposal of material from solar generation and other renewable energy sources.

Considerations for the group include:

Which brands of solar panels will be used?

The city should consult with its waste management in selecting panel technologies. The many solar installers in the Midwest install multiple types of panels, such as monocrystalline, polycrystalline, thin film, etc. The North Carolina Department of Environmental Quality provides guidance on how to classify whether a solar panel is hazardous waste and could be used as a framework for Iowa City to select panels for municipal installations and establish regulations (NC DEQ, 2019).

What is the estimated rate of solar panel decommissioning?

Estimates for the maximum number of solar panels that would need to be recycled depend on the peak installation rate. Google Sunroof estimates total rooftop potential in Iowa City at 10.2 million panels. Assuming 10% of the total potential is installed in one year and that these panels would all need to be decommissioned and recycled at the same time yields a maximum of 1 million recycled panels per year. As solar panels have a lifespan of 25 to 30 years, there is time for the program to reach full capacity (Richardson, 2021).

Who are the local and regional recyclers?

Area solar installers and solid and hazardous waste management firms do not provide recycling for solar panels. There are few dedicated solar panel recyclers in the Midwest, and several specialized national firms with regional depots. The Solar Energy Industry Association has a national recycling program to help find recyclers and facilitate panel recycling (SEIA, 2019). Cascade Eco Minerals has a zero-landfill policy, Midwest depots, and recycles solar panels in-house. Recycle PV offers nationwide solar panel services for domestic re-use or recycling. PV panel manufacturers First Solar and SunPower have recycling programs for scrap, warranty returns, and end of life.

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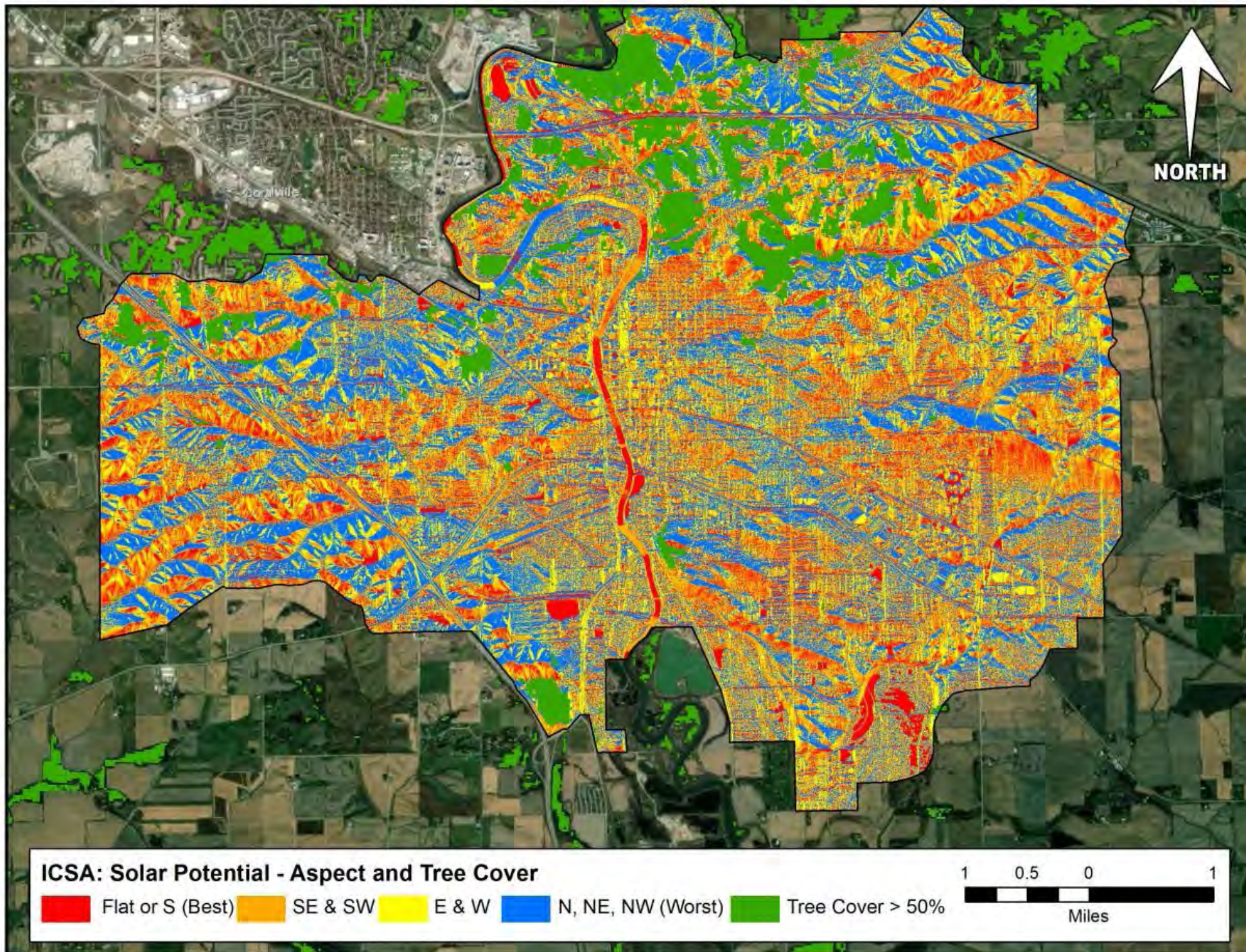
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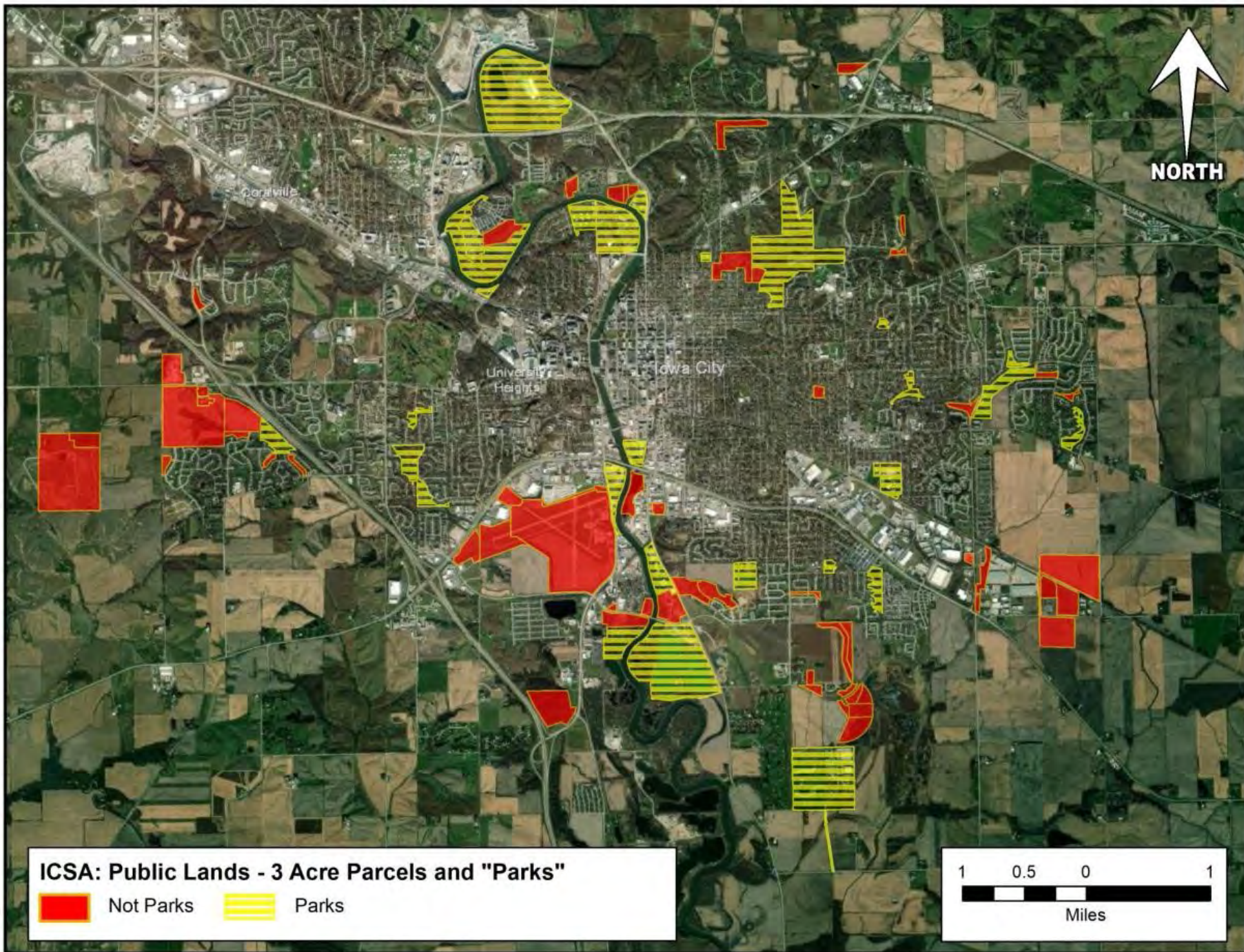
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Appendix I: Maps





Appendix II: Survey Report

**Johnson Clean Energy District
Iowa City Solar Energy Survey
Compiled Results**

June 7, 2021



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Iowa City Solar Energy Survey

Overview

Survey Responses

464 people responded to the survey

432 Residents

15 Businesses

17 Non-residents

Notes regarding the report

- Participants did not answer every question. The number of responses is noted for each question.
- The respondents' comments have not been edited for spelling or grammar.
- In some cases, duplicate comments have been condensed. The number of responses is noted in parentheses.
- In some open-ended responses or comments, similar answers have been grouped together.

Residents

N=432

Interest Level—Residents

N=429

Response	# of responses	percentage
Very interested	287	66.90%
Somewhat interested	117	27.27%
Not interested	25	5.83%

Why not interested? (check all that apply)

N=24

Response	# of responses	percentage
It's not a priority for me.	12	50.00%
The costs of installing solar panels are too expensive.	8	33.33%
I don't plan to live here long enough to recover the costs of installing solar panels on my property.	7	29.17%
I'm not sure how it would affect long term maintenance on my property.	6	25.00%
I don't like the appearance of solar energy panels.	5	20.83%
I rent my home.	3	12.50%
I'm not sure how it would affect the resale attractiveness of my property.	3	12.50%
I've just never considered it.	3	12.50%
I'm not sure how it would affect my property insurance.	2	8.33%
I don't have enough information about the options for using solar energy to provide electricity for my home.	0	0.00%
Other	8	33.33%
• Our electric provider, MidAmerican Energy, already produces clean energy. It's not worth while (or worth the money) to by pass what they are doing. • I am happy with what I have and do not want to spend money on it. • My utility bills are so low that it would take a long time to recoup costs. • It's nuts • I do not want to have a power plant on my roof. Solar panels create many harmonics on the power line which can impact my health and that of the neighbors. • And I'm happy as is. • I live at Chauncey and doubt they would put solar on the building • I live in an historic district and need to comply improvements to the exterior of my house and 2) I'm not sure my old house (roof) has the right design to accomodate solar panels		

Options Residents Would Consider

What kinds of options would you consider? (check all that apply)

N=371

Response	# of responses	percentage
I'd consider installing solar panels on the roof of my home or garage.	298	80.32%
I'd like the utility company to use solar energy to provide electricity to my house.	286	77.09%
I'd consider leasing or purchasing a share in a community solar field that provides energy for multiple households.	253	68.19%
I'd consider installing solar panels on the ground in my yard.	86	23.18%
Other	35	9.43%

- *I'd like the utility companies to stop making it hard for smaller solar companies to do business!*
- *I'd consider installing panels on my roof, but I live in a historic district and we're not allow to put solar panels anywhere they can be seen. Can you lobby to have this rule changed?*
- *I am concerned about damage to my roof and I am concerned about repair and replacement of panels*
- *When our roof needs replacing, we're interested in a solar roof.*
- *Not sure*
- *Not sure the roof is exposed to enough direct sun.*
- *I currently own my own home (1/2 of a duplex) and live at Prairie Hill Cohousing community in IC.*
- *I'd like the electric utility to buy all electricity generated, not just limit to a credit for current use*
- *We currently have a 5.5 kW ground mount array*
- *I'd consider an EV if more re-fueling opportunities in town*
- *We have ordered solar panels for our roof.*
- *I want to find a way to provide electricity when the power grid is down for extended times such as the derecho.*
- *If any of these are allowed in historic districts*
- *Live in condo association-solar panels has not been discussed*
- *all or any of the above*
- *In our association we requested the variance to install solar panels on the ground and it was denied.*
- *We already have solar panels on our house, no room for a ground installation.*
- *i already have solar panels on the roof*
- *I already have solar panels on my roof. I would also consider them to power a separate unit like a car charger.*
- *Already have 9.6 kW on the roof of our home.*
- *We already have a solar array on our house.*
- *We already have some solar panels on our roof.*
- *I already have solar panels but more is better.*
- *I already have solar panels on my house*
- *I have solar panels*
- *We installed solar panels on our roof in the fall of 2020.*
- *I have solar panels installed.*
- *Already have solar*
- *I already have solar installed on my roof*
- *I already have solar panels installed on the ground in my yard*
- *solar panels part of general grid (currently live in a rental apartment*
- *I installed solar on my roof.*
- *I already have solar panels ground mounted in my yard*
- *I already have solar panels on my roof*

Why Residents are Interested

What makes you interested in using solar energy to provide electricity in your home? (check all that apply)

N=370

Response	# of responses	percentage
I want to do my part to address climate change.	344	92.97%
I would like to use a source of energy that does not rely on the use of fossil fuels.	337	91.08%
I would like to spend less money on electricity.	255	68.92%
I'd like to be more self-reliant, electricity wise.	221	59.73%
Other (please specify)	8	2.16%
<i>I'd like to decrease my dependence on the utility monopolies!</i> <i>Mostly, I'd like to be able to use electricity in our home independent of the grid.</i> <i>Electric vehicle</i> <i>So I can charge my electric car from the sun!</i> <i>Future focused</i> <i>I want my energy to come from local sources</i> <i>I would like to lessen wind turbines which have ruined peace and quiet on another property</i> <i>I currently have a 5.2kw array installed.</i>		

Challenges for Residents

As you consider using solar energy for your home, what challenges do you have? (check all that apply)

N=370

Response	# of responses	percentage
The upfront costs of installing solar panels on my property.	266	71.89%
I need more detailed information.	128	34.59%
My lot is not large enough for ground panels.	107	28.92%
My property doesn't get a lot of sun.	90	24.32%
I'm not sure that solar panels are allowed in my neighborhood.	57	15.41%
The structure of my house.	54	14.59%
I do not plan to live in my current home more than 2-4 years.	46	12.43%
The condition of my roof.	39	10.54%
At present, no challenges prevent me from using solar energy.	34	9.19%
I rent my home.	19	5.14%
Other (please specify)	41	11.08%
<i>Not sure how long I'll be in my current home, don't want to make the investment if I'm going to move in a few years.</i> <i>Mix of being not sure if I'll stay in this specific house, and knowing that my house needs more weatherproofing to make solar efficient.</i> <i>Aesthetic concerns.</i> <i>The utility companies continue to change how they will handle solar customers, even trying to charge them extra!!</i> <i>Its not really "the structure" of the house or roof, but my roof is complicated and we just replaced the tiles. I'd prefer to not make structural changes to it -- both in terms of looks, time and worry about future maintenance, and cost</i> <i>the orientation of my roof planes is not ideal.</i> <i>I live in a private condo, but I'm not in close enough proximity to my association's electric meter (I'm on the end), making it a very expensive endeavor that will dig up all of my neighbors' yards.</i> <i>My neighborhood may not be the best for solar installation, meaning resale values on homes are lower</i> <i>I currently have a gas furnace and would have to convert to some kind of electric heating that may cost a lot, or not be suitable for the character of my old house (eg. installing baseboard heating.)</i> <i>My husband thinks it will be expensive...so he isn't willing to look into it</i> <i>Must have spouse's approval too (not likely)</i>		

- *I don't really know what is involved in doing it*
- *The look of solar panels is not appealing to me and spoils curb appeal*
- *The best place is on the front of my house, which I don't particularly like*
- *We live in a condo.*
- *I'm concerned about cost and availability of certified maintenance over time. Also, recycling used panels over time*
- *I worry that the raw materials that go into making solar panels cause as much damage as fossil fuels, and that their life span is short. unknown maintenance costs/involvement.*
- *The cost is overwhelming, our small house was 9000 when they priced it before*
- *Not sure how large the lot would need to be for ground panels.*
- *Waiting to build additional detached garage*
- *took down three large trees last year, so I now have sun*
- *My sense of aesthetics. It would make me sad to see panels on my property. They are not appealing whatsoever.*
- *I'm undecided on how long I'll stay in my current home.*
- *Because I am in a duplex, the roof structure limited the number of panels I was able to install. My garage is not attached to my home.*
- *Slope of my roof - it's very steep*
- *I had someone evaluate our roof for solar a few years ago but we have shading trees.*
- *Biggest challenge is that utility company will not buy all electricity produced, otherwise would build large array of solar*
- *I'm concerned about the materials the solar panels are made of. A lot of lithium is mined very inhumanely.*
- *Although, it was not a problem for me, there might be issues with some condo association's bylaws, rules and regulations*
- *I live in a condo and there's an association*
- *In our association we requested the variance to install solar panels on the ground and it was denied.*
- *payback is about 17 years and my roof needs replacing in 5 to 10 Bad combination of factors. .*
- *Is it worth the price? What is the maintenance for them?*
- *Very interested, but I watched a video that said it takes 8-9 years to make back the money spent. I'm considering a move in the next 2-3 years, so that is a factor.*
- *We have solar panels on our roof now.*
- *Already using solar panels. I would like to add storage options*
- *I have solar and love it!*
- *I have solar panels on my roof now.*
- *Already have solar*

Residents' Motivations Ranked

Rank the following in order of how strongly it would motivate you to use solar energy in your home.

Composite Ranking in order of importance. Top factor =1

N=363

Factor	Ranking	n=
State and/or Federal tax credits	2.40	361
Getting money back on my electrical bill every month.	2.89	353
Low interest loans or grants	2.94	348
Specific information about what it would take to install solar panels on my property.	3.26	351
Talking to people who have solar panels on their property.	5.17	341
Seeing more houses in my neighborhood using solar energy.	5.51	342
Aesthetically pleasing options for solar energy generation.	5.56	345

Solar in Neighborhoods

How supportive are you of roof-top solar panels on your neighbors' houses?

N=368

Average: 94.22 on a scale of 0 to 100 with 100 meaning 'very supportive.'

Importance	Number of Answers
------------	-------------------

100	234
99	20
98	14
97	6
96	4
95	5
94	2
93	11
92	4
91	4
90	5
89	2
88	4
87	2
86	1
85	5
84	2
83	2
81	1
80	6
77	1
76	2
75	4
74	2
72	1
71	1
70	1
66	1
64	1
63	1
60	1
59	1
57	1
55	1
53	1
52	1
51	1
50	5
49	1
48	1
47	2
42	1
14	1
10	1

How supportive are you of lot-sized or larger ground-mounted solar installations near your home?

N=359

Average: 65.9 on a scale of 0 to 100 with 100 meaning 'very supportive.'

<u>Importance</u>	<u>Number of Answers</u>	<u>Importance</u>	<u>Number of Answers</u>
100	106	53	2
99	9	52	6
98	5	51	3
97	4	50	19
96	2	49	12
95	3	48	8
94	1	46	5
93	1	45	4
92	2	44	3
91	1	43	1
90	5	42	1
88	1	41	2
86	3	40	2
85	2	39	2
84	1	38	1
83	2	37	1
82	1	36	2
81	2	35	3
80	4	34	1
79	2	33	3
78	2	31	2
77	1	30	3
76	2	28	2
75	6	25	6
74	3	24	2
73	4	23	2
72	2	22	1
71	3	21	2
70	7	20	4
68	1	19	2
67	1	18	1
65	1	17	1
64	2	13	1
63	1	12	2
62	2	11	1
60	3	10	1
59	1	8	2
58	3	5	2
57	2	4	1
56	6	2	3
55	2	1	5
54	4	0	16

Comments—Residents

N=65

- There seem to be too many mature trees in our neighbourhood for either type of solar panels. I'm unsure of the safety for people and animals with ground-mounted solar panels in a suburban area. Could they be vandalized or accidentally broken?
- I support any and all solar options in Iowa City, especially ones that don't involve the corrupt utility conglomerates!
- There are big trees in my neighborhood. What about using the land next to the railroad? What about on top of the neighborhood school? Or the school grounds?
- I think some people would get upset if large solar panels were installed on good farmland. However, it would also be good for land to lay fallow. Is it economically feasible to rotate annually to different stretches of land?
- I worry that this option will replace valuable green space/park space and nature area as there was already an attempt to do this very close to my house.
- For large solar installations, my support would vary based on where they'll be added (if trees will be cut down, I'd be much less supportive; if it repurposes space, I'd be more supportive)
- I regret that I did not pay more attention to the midamerica/water park solar project. I definitely think that could have been worked out. (even though I was totally unimpressed with mid-america's attempt at integrating it into the surroundings).
- We decided to put solar on our house and we love seeing other people's houses with panels, too. Ours were installed in early 2021.
- I view solar panels as a visible sign of innovation and progressive thinking. That is not an eyesore to me.
- Supportive if the ground-mounted solar installation is in the back yard, and especially supportive of roof-top solar panels on back roofs.
- Lot-size solar can be hidden or partially hidden with proper fencing. Ground-mounted can be harder due to tree canopy blocking sun.
- I feel that panels integrated on a roof are more aesthetically pleasing in neighborhoods.
- This neighborhood has very small lot sizes. Ground installations of larger panels would be difficult to accommodate, and even a concern for wildlife foraging
- I would feel more supportive of larger ground installations with less frequency (such as the one next to the JC Admin building), than many smaller installations. However, a caveat to ground installations is that there would be little to no removal of trees to make it work. We've already allowed far too much tree destruction to development in IC.
- I prefer rooftop because taking up large amounts of land that could instead be used for permaculture, ecological preservation, or affordable housing seems counterproductive.
- We've wanted to do this for years, but we don't know what to do or how to start.
- We hope to install solar panels in the near future.
- I think larger wind or solar installations outside of town generating electricity for the entire community may be the best way to go
- I don't want panels to take up green space that can be used for parks. I would like to see panels on people's roofs.
- These last two questions were not clear how to answer.
- I'm also supportive of a neighborhood mesh to provide backup electricity in the event the commercial grid goes down
- Need more information on this
- Not sure what "lot-sized" means.
- Space is a deterrent for us on ground mounted solar
- Already have solar panels, installed during Solarize Johnson County in 2018. The most helpful things for us were 1) the informational sessions, 2) the installers take care of all of the details so we didn't have a lot of hassle with the electric company, etc, and 3) tax incentives + good net metering.
- I have seen both roof mounted solar panels and large fields of solar panels. I have no problem with seeing both in my neighborhood. I would rather look at them than look at oil being pumped from the ground as I have seen in South West U.S.

Comments, continued

- Depends somewhat on the aesthetics -
- I want solar farms in Johnson County
- If there is some big push to incentive solar panels, making them cheaper, perhaps also compensation for those who have already paid the expensive prices for them.
- How is solar better than wind?
- Whatever it takes.
- solar panels should not take up space which could be used for housing, but otherwise be placed wherever possible
- Anything we can do to get lower costs and to support the climate
- The solar panels are made of toxic materials. How are we going to deal with disposal when they are no longer useful?
- I am a gardener so I don't want to replace garden with solar installations on the ground
- It is not any of my business to tell others what to do/not do with this issue.
- I'd like to see solar fields to provide power to LMI homes.
- Just as I can't tell others what colors I'd like to see on their houses, I don't have any standing in being supportive/not supportive about their roof top solar panel decisions so my answer is "meh, people will do what people will do." I DON'T however, want to see ground mounted panels in any neighborhoods--too industrial looking.
- I'd be more supportive of "ground" mounted solar installations nearby if the panels doubled as a shelter or a shady place to be could be provided by the panels.
- I'm supportive of anything that is well maintained (eg structure, surrounding landscaping). That goes for solar structures but also anything in my neighborhood in general!
- Our cohousing community is very densely built so any ground-mounted solar installations would be adequately distanced from our homes, but take usable space for our community projects, i.e. gardens, prairie, orchards, and recreation areas.
- Solar does not make noise like wind turbines and there's no monstrosity to ruin the view that is constantly distracting. More solar might mean fewer turbines that have destroyed peaceful rural countryside.
- Esthetic of ground panels not great in residential neighborhood
- For lot-sized installations, a lot would depend on if there were factors that would impact the peace and quiet of the neighborhood and how nicely landscaped they were.
- Of course with lot sized, ground mounted installation, there would need to be some guidelines/requirements about the ground beneath the panels and aesthetics of the whole package
- Ground mounted installations are good, but I wouldn't want to reduce the parks in my neighborhood
- We're actually in the process of getting 20 solar panels on our roof
- I'd rather see native prairie or trees in empty places instead of solar installations.
- The lots in this neighborhood (Northside) are too small, in general, to host ground-mounted solar.
- The tricky thing for me is that, while Solar is great, given MidAmerica's current and future use of sustainable energy for the electric grid people would probably decrease their carbon footprint more per dollar by spending the money on replacing natural gas appliances to electric, switching to geothermal, getting an electric car, etc.
- Any large installations should include prairie plantings, pollinators or other habitat...
- Iowa City needs solar parks/farms that can provide electricity to many homes through the utility, just as mid american is doing with wind energy..Cedar Falls Utilities is a good model to look at. Onus should not be on individual homeowners to install solar panels on their home. Think BIG.
- I wouldn't want to take the ground space away from the park/soccer field and ground-mounted solar installations seem like an eye-sore to me. Would much rather use the space on roofs.
- I need to know more about panels to fully answer the above two questions
- Solar panels that are not on roofs or not functioning as roofs (like the ones at Michigan State's parking lots) seem like a waste of space.
- Ground mounts can be eyesores if there are a lot them. Don't trust people to place them in proper places, eg be mindful. it to put too close to others' property
- If I lived in a less dense neighborhood, I would have no objection to ground installations

Comments, continued

- Iowa City already let's landlords pave over front and backyards for parking. Let's keep the green space, until the city is serious about allowing for parking lots in older neighborhoods.
- Since we have a housing shortage (especially affordable housing) I worry about using land for this purpose instead of actual housing people.
- No space nearby
- None
- My opinion is that anyone who argues against ground mounted solar installations based on aesthetic preferences is ridiculous. Making electricity from sunlight is close enough to magic that it should be encouraged everywhere possible.
- I think that if home owners are OK with installing ground-mounted solar panels on their property, it's OK with me. I wonder what maintenance issues there might be with roof-mounted solar panels. I am retired and won't be living here probably for more than 10 years.
- I live downtown (Northside) Iowa City
- I am excited to hear about solar options for Iowa City!!

City Programs—Answers from Residents

Programs Supported

What would you like the City of Iowa City to do to support development of solar energy? (check all that apply)

N=373

Program Option	# of responses	percentage
Install solar panels on City buildings, parking lots and garages, and other properties where feasible.	336	90.08%
Provide financial incentives to nonprofit organizations to install solar panels on their private property.	291	78.02%
Provide financial incentives to any resident to install solar panels on their private property.	289	77.48%
Sponsor community solar gardens (arrays of ground mounted solar panels) to provide solar energy to residents and businesses.	265	71.05%
Require solar energy for any new building projects that receive tax benefits or financing from the City.	260	69.71%
Provide financial incentives to businesses to install solar panels on their private property.	257	68.90%
Provide solar energy for electric vehicle charging stations.	248	66.49%
Distribute and promote educational information	239	64.08%
Establish building code requirements that all new construction be solar-ready.	231	61.93%
Provide financial incentives only to residents who meet income guidelines for lower income to install solar panels on their private property.	94	25.20%
Other (please specify)	43	11.53%

- *Building code requirements or new projects could alternatively be wind-powered.*
- *Provide financial incentives based on level of income. Don't make the choices: for everyone, for poor people.*
- *Support local solar businesses instead of the utility monopolies!*
- *NOTHING. . .do not do anything that would affect property taxes or push developers to neighboring communities (due to costly requirements).*
- *Where are the questions about utility solar?*
- *If solar panels for the city are cost saving*
- *Have a flyer going to homes where solar panels would work, then follow up.*
- *1. Provide financial incentives to businesses to install solar panels on their private property if they meet certain revenue guidelines. (Ex. I would like to support small, locally owned businesses that have a hard time getting by but corporations should do what is right because solar will not make/break their bottom line). 2. The financial incentives to any resident to install solar panels should be offered at first and then phased out.*
- *Support solar benefits for low income renting*
- *While I'd like to see IC provide financial incentive to ANY resident, it's more realistic to focus on those that meet income guidelines, especially since tax credits may benefit those with more money to spend. Also, don't know enough about what solar-ready involves*
- *Require that houses are oriented with a roof that will be south facing, whenever possible*
- *I would check building code requirements, if some exceptions were allowed because there are always exceptions, but with community review and not just to make developers wealthier.*
- *It is not cost effective.*
- *Do the equivalent things for passive solar energy, that has been neglected.*
- *Add 'and electricity storage' to most of these*
- *I do NOT support Iowa City providing financial incentives to anyone.*
- *Utility companies must purchase excess solar electricity at the same rate they charge.*
- *Sliding scale incentives based on need of household and size of business with smaller businesses getting more help than larger corporations*
- *uncertain*
- *Nothing*
- *Stop relying on MidAmerican Energy to produce more renewable energy when most of their Renewable Energy is sold out of state and they continue to run 5 large coal plants in Iowa and multiple fracked natural gas plants*

- *Require all new construction to include solar roof panel installation.*
- *Perhaps a liquid-metal battery farm (Ambri) or investment for residential houses.*
- *businesses get enough tax breaks and the City if they quit redoing the playground and giving incentives downtown , then they could afford solar panels within their budgets*
- *The city spends way to much money on things , for installing on city buildings as long as you don't raise my taxes again*
- *Partner with MidAmerican to install solar in Waterworks Prairie Park*
- *Please communicate the RISKS of solar panels in addition to financial benefits.*
- *I don't think the city should be involved. This should be a private company issue.*
- *Buy more electric buses. Provide incentives to developers building new houses.*
- *I would not list City activism in solar energy as one of my priorties for the community.*
- *As was mentioned in one of the above choices, using parking lots and parking garages as large spaces for solar panels, pluse folks seem to like a roof over where they park.*
- *New construction solar-ready building code requirements & solar required for city-financed or incentivized new construction, if the property is evaluated to get enough sun. Solar financial incentives for small for-profit businesses only.*
- *Lobby state legislature to require electric utilities to purchase all solar energy produced.*
- *Require utilities to continue net metering*
- *facilitate investor installation of solar with property owner buy back over time, encouragement for landlords to install solar on their rental units and sharing reduced utility costs with renters*
- *Require all new developments to include a solar panel investment elsewhere in the community*
- *Don't cause disparate discrimination by adding costs to homes.*
- *establish building code requirements that most new construction be ready for some sort of renewable energy (whether solar, geothermal, wind, etc.)*
- *Focus on getting the entire grid on renewable energy and phase out natural gas. Perhaps MidAmerican should be required to inform customers on their bill of not only how many therms of gas and KWH of electricity they used, but how many lbs of Co2 that is estimated to have emitted.*
- *Use combination of wind and solar.*
- *I would support incentives for anyone, but there are already state and federal incentives, so the City should concentrate on making solar available to every income level, therefore only lower-income assistance.*
- *I'm not in favor of any of these.*
- *Stay out of the way. Do not divert tax funds to pay for this.*

Programs Not Supported

What types of City solar energy projects would you NOT be supportive of? (check all that apply)

N=269

Program Option	# of responses	percentage
Provision of public funds to privately owned utility companies for solar energy projects.	107	39.78%
Provision of financial incentives only to residents who meet income guidelines for lower income to install solar panels on their private property.	101	37.55%
Ground mounted solar projects—lot sized or larger—in residential areas.	84	31.23%
Ground mounted solar projects in City parks, or in close proximity to parks and trails.	76	28.25%
Establishment of building code requirements that all new construction be solar-ready.	70	26.02%
Ground mounted solar projects—of any size—in residential areas.	62	23.05%
Requiring solar energy for any new building projects that receive tax benefits or financing from the City.	56	20.82%
Provision of financial incentives to any resident to install solar panels on their private property.	40	14.87%
Provision of financial incentives to businesses to install solar panels on their private property.	36	13.38%
Ground mounted solar projects in commercial/business areas.	23	8.55%
Sponsorship of community solar gardens (arrays of ground mounted solar panels) to provide solar energy to residents and businesses.	20	7.43%
Provision of financial incentives to nonprofit organizations to install solar panels on their private property.	17	6.32%
Provision of solar energy for electric vehicle charging stations.	14	5.20%
Installation of solar panels on City buildings, parking lots and garages, and other properties where feasible.	12	4.46%
Distribution and promotion of educational information	7	2.60%
Other (please specify)	36	13.38%

- *I would not support solar gardens that take away land from farmers.*
- *Public funds need to go to public goods. Giving money to a private company who will then turn around and charge us is not a good idea. Would be less opposed if there was a clear structure for how the private companies needed to spend the money. For example, create a structure and measurement plan so if the private company hit certain targets that were being measured by the city (not the private company) then the city would kick in fines in the form of a tax rebate.*
- *We also need green space. That is why the solar projects in residential areas are unappealing.*
- *If MidAm wants to do a solar install on city property, they can put it on the roof of any building we own, not in a park.*
- *Ground mounted solar project in parks should maintain a prescribed ratio of solar panel to park land ratio to maintain park-like feel and functionality.*
- *Ground mounted arrays are often unattractive and requiring panels on new buildings doesn't make sense. It's not appropriate for every location.*
- *Need more information to make a decision on: specs for any resident receiving financial incentives vs income guidelines, explanation of what "solar ready" involves*
- *The last one would be mostly no, but maybe okay in and around parking lots at parks where no trees need to be removed. Possibly something elevated like on the tops/roofs of public restrooms and shelters.*
- *Low income residents should take first priority for financial incentives.*
- *I did not like the solar project Iowa City proposed off of I80.*
- *Don't take down any more trees or historic buildings*
- *I'd be fine with some park space going to ground units as long as large green areas are still available for use. I'd prefer roof mounted for conservation of green space though.*
- *Businesses can pay for their own sometimes maybe the business need to go , put businesses on the east side of town and watch that grow that can raise taxes for the city*

Comments, continued

- *Here is a relevant website: <https://www.electrosmogprevention.org/public-health-alert/health-alerts-solar-panel-systems/health-risks-of-solar-panels/>*
- *I would prefer roof mounted to ground mounted in general as I love the greenery*
- *I would like there to be some input on solar projects in City parks etc. I'm in support of it, but want to balance other initiatives (thinking here of the prairie at Water Works park - how can we balance these competing needs? how can we use open space that is currently being mowed/landscaped)*
- *If solar EV stations were well designed, I'm ok with that, but if they would look like the solar speed signs that the City uses, I don't think I'd be a fan--too clunky; poor design.*
- *Solar or solar-ready requirements only if property is evaluated & gets enough sun. Financial incentives only for low income residents and small for-profit businesses.*
- *In parks. Depends where and whether it will block views*
- *Some consideration for ground mounted in parks would need to be given to impact on park use*
- *Sounds like a good idea, but could cause disparate discrimination in housing.*
- *I would need to know more about the planning/details for ground mounted projects to say whether I would support.*
- *Do not give more more TIF to developers to build more skyscrapers downtown that end up sitting half vacant. Use public money as incentives or tax breaks for individual homeowners.*
- *I only support ground mounted solar projects if they have additional functionality, like providing shade for a parking lot or walking trail.*
- *I'm not opposed to ground mounter solar projects in City Parks as long as they don't impede current use or take up a large swath of greenspace. The visual impact of panels on parks is more important to me than that on businesses or even houses.*
- *I would support any of these.*
- *I'd really be supportive of any and all programs that would expand this (and wind) energy solutions.*
- *I am in favor of any and all efforts to increase solar electric generation*
- *I am not in favor of ground-mounted arrays that negatively impact our use of current planned green space throughout the city.*
- *I support all reasonable options!*
- *Not applicable*
- *Do nothing*
- *None (3)*

Community Solar—Residents

If community solar was available in Iowa City, would you consider joining?

N=363

Average: 73.54 on a scale of 0 to 100 with 100 meaning 'Yes, I would be very interested.'

<u>Importance</u>	<u>Number of Answers</u>	<u>Importance</u>	<u>Number of Answers</u>
100	121	60	1
99	10	59	1
98	5	58	6
97	4	57	1
96	1	56	2
95	2	55	3
94	1	54	2
93	1	53	5
92	3	52	6
91	3	51	7
90	9	50	19
89	2	49	2
88	3	48	2
87	3	47	2
86	3	46	1
85	5	45	4
84	2	43	4
83	2	41	2
82	5	40	1
81	3	38	1
80	7	34	1
79	1	33	3
78	2	32	1
75	10	30	1
74	4	29	1
73	2	28	1
72	2	26	2
71	2	24	1
70	6	22	1
69	4	16	1
68	2	11	1
67	3	9	1
66	2	7	1
65	8	6	2
64	2	5	1
63	3	4	1
62	2	3	2
61	1	1	2
		0	16

Comments from Residents

Please include any other comments or thoughts about solar energy in our community below.

N=65

- Yes, Iowa City needs to encourage more solar and wind use. I was very disappointed when typical roofing was put the Coral Ridge Mall. More recently, solar panels could easily have been put on the flat roof of the distribution hub at Hwy 6 near Scott Blvd.
- I would be very interested in joining a community solar project... AS LONG AS IT IS NOT FUNDED, CREATED, CONTROLLED, OR BUILT BY A HUGE UTILITY COMPANY!!
- NOTHING. . .do not do anything that would affect property taxes or push development to neighboring communities (due to costly requirements). If the city is interested in partnering with MidAmerican Energy, I'd be for that. BUT NOTHING MORE THAN THAT!
- I don't know a whole lot about how to get solar energy at my home, but I think a city like Iowa City should be leading the way in being an energy efficient community. I support all of these ideas!
- It would depend on the cost
- I would love to see Iowa City push forward with major solar initiatives and education to inspire people to participate!
- MidAmerican allows discounts for those with geothermal or solar, but not both. This is frustrating for those who are willing to have both.
- "Not sure about the community solar idea but mostly not interested because we own panels already. If there is some equity stake for participants, then it sounds good.
- Incorporate energy efficiency including solar to building codes
- Many concerns about ground mounted solar can be answered with proper fencing and prairie planting around and under panels.
- Not sure what's possible because we already have an agreement with MidAmerican, but still very interesting.
- I would need a lot more info on Q12 to fully get behind it. In general, I think power companies should be made to buy back excess energy generated at an incentivized rate. I know this law has been tweaked and minimized over the decades at times. It needs to function fully.
- The cost of heating a home with electric energy is too high. Also, I hate electric cars because of the low number of miles you can get before having to stop and recharge the batteries.
- Please prioritize equitable distribution of opportunities to participate in solar projects and stewardship of the land. Replacing natural areas and disturbing ecosystems is counterproductive.
- Ground panels 100% depend on location. I do NOT want to see green space in town taken up by panels. There is so little green space already. Much prefer roof panels or ground sites out of town that can be used to generate electricity for in town.
- Not clear how to answer this one either
- Consider how to do neighborhood meshes with community electrical storage.
- Iowa City should not focus on solar power. Our taxes are already high. Let individual owners decide for themselves whether they want solar power and pay for it themselves.
- any such activity should be owned and operated by private enterprise. NO tax dollars involved!
- I've had solar for the past 3 years and have thoroughly enjoyed all of the benefits. Highly recommend!
- Ideally panels would be mounted on existing structures or parking lots and not in fields or parks, further displacing trees and plant life. E.g., we live off of Melrose. I would much rather see solar panels in the Hawk lot or at West High than replacing the miscanthus field, which the birds flock to in early spring and other wildlife use as a refuge.
- We think solar is a great idea. I just missed a webinar about it. So know there is information available. I suspect our lot is too shady, however. A community solar field is an exciting idea.
- Bar HOAs from banning solar installations
- Incentives for businesses and homeowners could encompass options for green building beyond just solar, e.g., optimal landscaping can help with energy efficiency, reduced pesticides, and reduced water use.

Comments, continued

- I think it is obvious that I believe in solar energy. I want to leave a cleaner world to my grandchildren. I know there will be upfront costs to be paid, but I believe a better environment is worth it.
- I'd also be more interested in Tesla solar panels with the battery system.
- Not needed
- Only the Johnson County Supervisors have been leaders on solar. The city, school district and university have been so far behind it has become an embarrassment
- Use business and high income household taxes to fund solar installation on every existing house in Iowa City and require all new construction to include solar installation.
- The time to act is now.
- We need to look at V2G, microgrids, and community solar so it's not just for rich people.
- Don't subsidize businesses to use solar, but tax large businesses if they don't use solar.
- Just as parks and green space or flood control is required with each new development, a reasonable amount of space should be allocated to renewable energy for the neighborhood
- place solar panels at parks like by the water works
- Passing on the partnership with MidAmerican on a solar installation in Waterworks Prairie Park was a missed opportunity and a huge mistake. I expect the city to reverse course and install a solar farm in this location as soon as possible.
- Please investigate the risks to children and sensitive individuals before investing significant money into this new project. It is easy to go along with this because solar is seen as the green alternative. However, it may harm more people than anticipated. In that case, it is counterproductive to overall health.
- Ground solar panels will destroy the beauty of Iowa, destroy the soil, and cause a problem of future disposal of old and/or obsolete panels which are toxic.
- We need some large utility scale solar projects. I would favor establishing a municipal utility for Iowa City.
- I'm interested in the concept of community solar, but once again--I don't really want to see it and certainly wouldn't want it in town. Solar panels on the ground; wind turbines on the horizon--I know it's sustainable energy, but does trying to address climate change mean that we make the world uglier as we try and "save" it? I'd like sustainable energy AND beauty in the landscape. Seems like we should be able to figure that out--if anyone really cared about a holistic approach to sustainability.
- I always considered solar energy or wind energy as an option during a disaster and would like there to be possibility for that option to be created, where if the power goes out (i.e. derecho scenario) that solar can still provide some power during the day. Or at least for critical infrastructure, like the water pumps.
- The single most important thing restricting solar energy is that it will only offset your historical electricity usage. Many more would install solar if they could actually make money on the excess produced.
- Let's do it!!
- "Encourage micro and nanogrids.
- We need more E-vehicle fast charging stations"
- None
- Maybe the city could facilitate the interest earning investment by community members in a program that would provide solar panels to income qualified owners where some of the utility cost displacement would go to paying off the investors and some to the income qualified owners property owners
- I would like access to solar power when the grid is down. This doesn't seem to be possible with net metering.
- Energy production should not displace human use of community areas.
- In addition to solar, I would like to see living roofs being used to decrease electric use. I feel the city should concentrate on planting shade trees for the future.
- Solar (or wind) powered EV charging stations will make those cars more enticing to consumers during our upcoming gas hike/shortage (when people see how conveniently they would be able to fuel their cars for free).
- Please don't subsidize for-profit entities with my tax dollars.

Comments, continued

- Think community solar rather than installing equipment on individual homes and lots. The privately owned utility companies need consumer and govt pressure to transition from fossil fuels to wind and solar sources of energy. Look at consumer owned utility companies that have already done this as potential models for Iowa City and Johnson County.
- I'm hesitant in providing solar power charging stations for cars. Until there is more support for bike, cargo bike, ebike travel business usage of bike delivery in Iowa City I cannot support charging stations for people who own E cars.
- I am in favor of ground mounted solar projects in residential areas, but as a South District resident, I worry a lot of these would be placed on the south side (as so many "unfavorable" city buildings are already placed; I don't think of these community outreach buildings as unfavorable, but that is often how they're described to me by others). Diversifying residential areas where these would be located is very important to me, so as not to segregate the south district even more than it already is.
- I already have solar panels on my roof, which makes me a little less inclined to support placement of solar gardens in the neighborhood. This is especially true because I'm not a fan of large solar installations that aren't otherwise functional, and I can't really think of good functional locations for ground solar in neighborhoods--maybe bus shelters? I could be convinced if someone brought a good plan in front of me.
- If we're going to address climate change, let's please address the city's lack demolition policy. Once that's tackled, I'm open to incentives for solar.
- Excited to see the city thinking ahead, and I hope movement on this doesn't take too much longer.
- More basic information
- I like the idea of community solar projects a lot since my yard is quite shaded. Shade trees are a really good thing to have near homes to help reduce AC costs, so the most sensible thing is to install solar panels in places where trees aren't practical or aren't already established.
- "I need more information on community solar energy to be clear what that means.
- I am glad that Iowa City and other communities are giving this issue attention and support!! We need to move forward with this because of climate change and the negative aspects of fossil fuel usage!
- My electric use is not high enough to make solar panels financially viable.
- None (2)

Demographics—Residents

Which best describes your current housing situation?

N=373

Response	# of responses	percentage
I own my home	340	91.15%
I'm renting my home	22	5.90%
I'm living with others and assisting with paying rent or mortgage	4	1.07%
I'm living with others and do not pay rent or mortgage	1	0.27%
Prefer not to say	1	0.27%
Other (please specify)	5	1.34%
• <i>This was already stated</i> • <i>I own my home and rent part of it out</i> • <i>I live with my elderly father, no mortgage and help with living expenses</i> • <i>We're moving into our home in several weeks, once all the finish work is completed.</i> • <i>I own two homes in IC. The second one houses my son and his family</i>		

In what type of housing do you currently live?

N=372

Response	# of responses	percentage
House	321	86.29%
Condo	23	6.18%
Apartment	11	2.96%
Duplex	10	2.69%
Townhouse	2	0.54%
Prefer not to say	0	0.00%
Other (<i>please specify</i>)	5	1.34%
• <i>mobile home</i> • <i>Mobile home</i> • <i>We'll soon be living in Prairie Hill Cohousing, a type of townhouse/condo.</i> • <i>Prairie Hill Cohousing</i> • <i>Co-housing community</i>		

Utility Bill Expenses

What is the average electric portion of your monthly utility bill?

N=363

Response	# of responses	percentage
Less than \$100/month	166	45.73%
Between \$100 – \$200/month	153	42.15%
I don't know	24	6.61%
Between \$200- \$350/month	13	3.58%
Prefer not to say	7	1.93%
Other (<i>please specify</i>)	11	3.03%
• <i>With my solar panels much less than 100/month</i> • <i>Thanks to solar. March through July, MidAm pays me.</i> • <i>With our solar our current bill was less than \$40</i> • <i>Around \$200</i> • <i>I have solar panels on my roof now.</i> • <i>I live in an all electric community; the only other utility beside electric that I pay is water.</i> • <i>Because we gave a 5.5 kW PV array</i> • <i>I live in an all electric home with solar panels and only pay the monthly meter fee (my house is close to, if not net zero)</i> • <i>My place was built to LEED specifications.</i> • <i>I have designated 100% of my utility bill to be used by Mid-American to purchase wind energy from Arcadia Power.</i> • <i>Much less, an average over a year of less than \$450.00. Solar is great, but must be financially viable.</i>		

Neighborhood

Please indicate your Iowa City neighborhood.

N=361

Response	# of responses	percentage
Eastside Neighborhood-Iowa City	71	19.67%
Johnson County	40	11.08%
Northside Neighborhood-Iowa City	26	7.20%
Lucas Farms Neighborhood-Iowa City	25	6.93%
Longfellow Neighborhood-Iowa City	24	6.65%
South District Neighborhood-Iowa City	19	5.26%
Morningside/Glendale Neighborhood-Iowa City	14	3.88%
Goosetown Neighborhood-Iowa City	13	3.60%
Creekside Neighborhood-Iowa City	11	3.05%
Miller Orchard Neighborhood-Iowa City	11	3.05%
Windsor Ridge Neighborhood-Iowa City	11	3.05%
Manville Heights Neighborhood-Iowa City	10	2.77%
Peninsula Area Neighborhood-Iowa City	10	2.77%
Washington Hills Neighborhood-Iowa City	8	2.22%
Bluffwood Neighborhood-Iowa City	7	1.94%
Ty'n Cae Neighborhood-Iowa City	7	1.94%
College Green Neighborhood-Iowa City	6	1.66%
Oak Grove Neighborhood-Iowa City	5	1.39%
Galway Hills Neighborhood-Iowa City	3	0.83%
Melrose Avenue Neighborhood-Iowa City	3	0.83%
Walnut Ridge Neighborhood-Iowa City	2	0.55%
Waterfront Neighborhood-Iowa City	2	0.55%
Country Club Estates Neighborhood-Iowa City	1	0.28%
I don't know.	9	2.49%
Prefer not to say	5	1.39%
Other (please specify)	18	4.99%
• Shimek (4) • Prairie Hill cohousing (off Miller Ave - Miller Orchard Neighborhood) • Prairie Hill Cohousing • Downtown • Downtown Iowa City • Village Green • Village Green South • Weber school • Around Weber Elementary (maybe I don't know our neighborhood name?) • Near Coralville Lake/Woodpecker trails • Riverfront Crossings - East • Wilson/Morningside? Rochester Ct... • Ridgewood In 52245. Walden Ct • We have an Iowa City address, but are technically in the county, directly north of the new Churchill Meadows development. We live right next to the US Cellular tower at QuarterDale Ct. and Herbert Hoover and it'd be a great place for a large installation		

Gender

How do you identify your gender?

N= 364

Response	# of responses	percentage
Woman	231	63.46%
Man	106	29.12%
Prefer not to say	22	6.04%
Non-binary	5	1.37%

Ethnicity

How do you identify your ethnicity? *(check all that apply)*

N= 366

Response	# of responses	percentage
White	331	90.44%
Prefer not to say	26	7.10%
Asian	6	1.64%
Black or African American	2	0.55%
American Indian or Alaskan Native	1	0.27%
Native Hawaiian or Other Pacific Islander	1	0.27%
Other	3	0.82%

- *oops--- forgot Latino/a/x*
- *Latino/mixed race*
- *This question has nothing to do with Solar Energy*

Age

What is your age?

N= 361

Response	# of responses	percentage
65-74	105	29.09%
35-44	88	24.38%
45-54	64	17.73%
55-64	54	14.96%
25-34	38	10.53%
18-24	6	1.66%
84+ years	5	1.39%
Under 18	1	0.28%

Education

What is the highest level of education you have completed?

N= 370

Response	# of responses	percentage
Master's/Professional Degree	145	39.19%
Bachelor's Degree	120	32.43%
Doctorate	59	15.95%
Some college; no degree	20	5.41%
Associate Degree	10	2.70%
High school/GED	5	1.35%
Some High School	0	0.00%
Vocational Certification	0	0.00%
Prefer not to say	7	1.89%
Other (please specify)	4	1.08%

- *This question has nothing to do with Solar Energy*
- *Age category missing. I am 76.*

Ability

I consider myself to be a person with a disability.

N= 370

Response	# of responses	percentage
No	322	87.03%
Yes	34	9.19%
Prefer not to say	14	3.78%
Comment	4	

- *Sometimes*
- *Many health issues*
- *Electrical hypersensitivity*
- *This info has NOTHING to do with Solar Energy*

Medical Device Use

Do you need electricity for a medical device, CPAP, insulin, oxygen concentrator, nebulizer etc.?

N= 370

Response	# of responses	percentage
No	311	84.05%
Yes	51	13.78%
Prefer not to say	8	2.16%
Comment	11	

- *Not yet*
- *Therapy light*
- *I use a nebulizer several times a day for bad asthma -- solar would be good for my asthma in the long run.*
- *not yet*
- *My husband does.*
- *I need to not live near cell towers, have a SMART meter, near solar panels, or live near a high voltage power line.*
- *This question has nothing to do with Solar Energy*
- *My son is insuline dependent. We rely on refrigeration to keep the insulin supply properly cooled.*
- *but a member of my household does*
- *CPAP*
- *Bipap*

Income

What is your total annual household income?

N=368

Response	# of responses	percentage
Under \$20,000	14	3.80%
\$21 000 to \$49 999	48	13.04%
\$50 000 to \$74 999	57	15.49%
\$75 000 to \$99 999	50	13.59%
\$100 000 to \$149 999	70	19.02%
\$150 000+	78	21.20%
Prefer not to say	51	13.86%

Income

What is your total annual household income?

N=368

In order of frequency of response

Response	# of responses	percentage
\$150 000+	78	21.20%
\$100 000 to \$149 999	70	19.02%
\$50 000 to \$74 999	57	15.49%
Prefer not to say	51	13.86%
\$75 000 to \$99 999	50	13.59%
\$21 000 to \$49 999	48	13.04%
Under \$20,000	14	3.80%

Businesses

N=15

Interest Level—Business Owners

N=15

Response	# of responses	percentage
Very interested	11	73.33%
Somewhat interested	3	20.00%
Not interested	1	6.67%

Why not interested? *(check all that apply)*

- The costs of installing solar panels are too expensive.
- I'm not sure how it would affect long term maintenance on my property.
- I'm not sure how it would affect the resale attractiveness of my property.
- It's not a priority for me.

Options Business Owners Would Consider

What kinds of options would you consider? *(check all that apply)*

N=12

Response	# of responses	percentage
I'd like the utility company to use solar energy to provide electricity to my business.	7	58.33%
I'd consider installing solar panels on the roof of my business.	5	41.67%
I'd consider leasing or purchasing a share in a community solar field that provides energy for multiple businesses or homes.	4	33.33%
I'd consider installing solar panels on the ground around the business.	1	8.33%

Other (please specify)	4	33.33%
• I do not want to have to hire someone to maintain my alternate source of energy. I am a small business and cant afford more overhead • installed solar panels in 2014 • I installed solar panels on my roof in 2014 • I have solar panels on my business		

Why Business Owners are Interested

What makes you interested in using solar energy to provide electricity in your business? (check all that apply)

N=12

Response	# of responses	percentage
I would like to spend less money on electricity.	10	83.33%
I think having solar panels or using renewable energy would be good for my business image.	9	75.00%
I want to do my part to address climate change.	8	66.67%
I'd like my business to be more self-reliant, electricity wise.	8	66.67%
I would like to use a source of energy that does not rely on the use of fossil fuels.	7	58.33%
Other (please specify)	3	25.00%
• Having energy back up (more than a generator can provide) is always good. The footprint for renewable energy is way more than fossil fuels. • Been there, done that ... see #3* • Been there, done that ... see #3*		

Challenges for Businesses

As you consider using solar energy for your business, what challenges do you have? (check all that apply)

N=12

Response	# of responses	percentage
The upfront costs of installing solar panels on the business/property.	7	58.33%
My business leases the property.	5	41.67%
The property is not large enough for ground panels.	4	33.33%
The physical structure of the building.	3	25.00%
I'm not sure that solar panels are allowed in the commercial district in which my business is located.	3	25.00%
The condition of the roof on my business.	2	16.67%
My property doesn't get a lot of sun.	1	8.33%
I do not plan to keep my business in this location more than 2-4 years.	1	8.33%
I need more detailed information.	1	8.33%
At present, no challenges prevent me from using solar energy.	1	8.33%
Other (please specify)	6	50.00%
- Cost. Right now I use \$125 a month in electricity. It would take YEARS to have it pay back and I am not willing to invest that much money when I don't know what the future holds. I can just plug to electrical provider and they can manage the future. I don't need to maintain solar panel or hire someone as I don't have that much markup to cover these costs. It would then make my prices go up if I had to cove these costs passing it onto my clients. - Happy that I have solar panels* - Happy that I have solar panels* - N/a - Distributed solar is far less cost effective for the entire community than a utility scale solar farm. - Bussiness inside Old Capitol Town Center, not sure how installing panels on a roof I don't own would work		

Business Owners' Motivations Ranked

Rank the following in order of how strongly it would motivate you to use solar energy in your business.

Composite Ranking in order of importance. Top factor =1

Factor	Ranking	n=
Cost savings over time	2.10	10
State and/or Federal tax credits.	2.60	10
Local financial incentives (low interest loans or grants)	3.00	9
Specific information about what it would take to install solar panels on my property.	3.89	9
If it would provide my business with a competitive edge.	4.78	9
Talking to people who have solar panels on their business property.	5.89	9
Seeing more area businesses using solar energy.	6.30	10
Aesthetically pleasing options for solar energy generation.	6.60	10

City Programs—Answers from Business Owners

Programs Supported

What would you like the City of Iowa City to do to support development of solar energy? (check all that apply)

N=12

Program Option	# of responses	percentage
Provide financial incentives to any resident to install solar panels on their private property.	7	58.33%
Provide financial incentives to businesses to install solar panels on their private property.	7	58.33%
Provide financial incentives to nonprofit organizations to install solar panels on their private property.	7	58.33%
Install solar panels on City buildings, parking lots and garages, and other properties where feasible.	7	58.33%
Provide solar energy for electric vehicle charging stations.	6	50.00%
Distribute and promote educational information	4	33.33%
Sponsor community solar gardens (arrays of ground mounted solar panels) to provide solar energy to residents and businesses.	4	33.33%
Establish building code requirements that all new construction be solar-ready.	3	25.00%
Require solar energy for any new building projects that receive tax benefits or financing from the City.	3	25.00%
Provide financial incentives only to residents who meet income guidelines for lower income to install solar panels on their private property.	1	8.33%
Other (please specify)	4	33.33%
• <i>Nothing - stay out funding and promoting this. If people/business want (because it make sense) they will find a way to do it. Don't artificially create a need.</i> • <i>change subdivision regulations. especially screening requirements.</i> • <i>Solar panels should be installed on roofs and elevated over parking lots. We need all the farm land we can preserve.</i> • <i>Market based utility scale solar generation</i>		

Programs Not Supported

What types of City solar energy projects would you NOT be supportive of? (check all that apply)

N=10

Program Option	# of responses	percentage
Provision of financial incentives only to residents who meet income guidelines for lower income to install solar panels on their private property.	6	60%
Ground mounted solar projects—lot sized or larger—in residential areas.	6	60%
Installation of solar panels on City buildings, parking lots and garages, and other properties where feasible.	5	50%
Sponsorship of community solar gardens (arrays of ground mounted solar panels) to provide solar energy to residents and businesses.	5	50%
Requiring solar energy for any new building projects that receive tax benefits or financing from the City.	5	50%
Provision of public funds to privately owned utility companies for solar energy projects.	5	50%
Ground mounted solar projects—of any size—in residential areas.	5	50%
Ground mounted solar projects in commercial/business areas.	5	50%
Ground mounted solar projects in City parks, or in close proximity to parks and trails.	5	50%
Provision of financial incentives to nonprofit organizations to install solar panels on their private property.	4	40%
Establishment of building code requirements that all new construction be solar-ready.	4	40%
Provision of financial incentives to any resident to install solar panels on their private property.	3	30%
Provision of financial incentives to businesses to install solar panels on their private property.	3	30%
Provision of solar energy for electric vehicle charging stations.	2	20%
Distribution and promotion of educational information	1	10%
Other (please specify)	2	20%
• I do not support ANY government involvement with this. • Solar panels should be installed on roofs and elevated over parking lots. We need all the farm land we can preserve.		

Community Solar—Business Owners

If community solar was available in Iowa City, would your business consider joining?

N=12

Average: 48.08 on a scale of 0 to 100 with 100 meaning 'Yes, I would be very interested.'

Importance	Number of Answers
100	2
98	1
76	1
70	2
52	1
11	1
0	4

Comments from Business Owners

Please include any other comments or thoughts about solar energy in our community below.

- no
- You are spending too much money on this. Fossil fuels are needed and necessary and many times create a smaller carbon footprint than something that is promoted as "green" or for climate change reasons (wind turbines for example and there are a ton more). If I need solar or want solar, I will pursue it. Don't force it on me. City needs to focus on community safety FIRST!
- subdivision requirements are at odds with carbon neutrality. if you want solar don't find ways to restrict it in any form income or otherwise.
- Would have to be the same or lower than my current electric bill.

Demographics—Businesses

Business Activity

Which best describes the primary activity of your business?

N=12

	# of responses	percentage
Architecture/Engineering	3	25.00%
Real Estate	2	16.67%
Retail	2	16.67%
Construction	1	8.33%
Food/ Hospitality/Entertainment	1	8.33%
Health Services	1	8.33%
Prefer not to say	1	8.33%
Other (please specify)	1	8.33%

- *i have developed 8 solar arrays for non-profits and would like to encourage further work on this. the schools have ignored my calls casey cook 330-5998*

Number of Employees

How many people does your business employ?

N=12

	# of responses	percentage
Less than 10	5	41.67%
11—24	1	8.33%
25-49	4	33.33%
Prefer not to say	1	8.33%
Other (please specify)	1	8.33%

- *recently retired from business with 7 oeople*

Business Revenue

What was your business's annual revenue last year?

N=12

	# of responses	percentage
\$50,000—\$99, 999	1	8.33%
\$250,000—4\$99,000	2	16.67%
\$500,000—\$999,999	2	16.67%
\$1 million—\$2.5 million	1	8.33%
\$5 million—\$10 million	1	8.33%
Prefer not to say	5	41.67%

Utility Bill Expenses

What is the average electric portion of your monthly utility bill?

N=10

	# of responses	percentage
Under \$200 a month	1	10.00%
Between \$200 – \$500 a month	3	30.00%
Between \$500- \$1,000 a month	1	10.00%
Between \$1,000-\$5,000 a month	1	10.00%
Over \$5,000 a month	0	0.00%
I don't know	3	30.00%
Prefer not to say	1	10.00%
Other (please specify)		

- *After panels installed, around 100/mth*

Importance of Uninterrupted Power

How important is uninterrupted power to your business?

N=12

Average: 77.67 on a scale of 0 to 100 with 100 meaning 'very important'

<u>Importance</u>	<u>Number of Answers</u>
100	4
99	2
98	1
90	1
71	1
55	1
20	1
0	1

Backup Options

What backup options does your business have in the event of power outages?

N=8

- The generator
- Generator
- we back up every night
- Our panels only support our 2nd floor. We have no generators for the ground floor or basement.
- power surge protectors at outlets
- Short-term battery back-up for computer workstations only.
- None
- None, but we have not lost power except during the tornado in 2008

Residents with Annual Household Incomes <\$75,000

N=119

Interest Level—Residents with Annual Household Incomes <\$75,000

Response	# of responses	percentage
Very interested	86	72.27%
Somewhat interested	27	22.69%
Not interested	6	5.04%

Why not interested? (check all that apply)

N=6

Response	# of responses	percentage
I rent my home.	3	50.00%
The costs of installing solar panels are too expensive.	2	33.33%
I'm not sure how it would affect my property insurance.	1	16.67%
I don't plan to live here long enough to recover the costs of installing solar panels on my property.	1	16.67%
It's not a priority for me.	1	16.67%
Other	2	33.33%

- *I do not want to have a power plant on my roof. Solar panels create many harmonics on the power line which can impact my health and that of the neighbors.*
- *I live at Chauncey and doubt they would put solar on the building*

Options Residents with Annual Household Incomes <\$75,000 Would Consider

What kinds of options would you consider? (check all that apply)

N=113

Response	# of responses	percentage
I'd consider installing solar panels on the roof of my home or garage.	88	77.88%
I'd like the utility company to use solar energy to provide electricity to my house.	85	75.22%
I'd consider leasing or purchasing a share in a community solar field that provides energy for multiple households.	72	63.72%
I'd consider installing solar panels on the ground in my yard.	26	23.01%
Other	12	10.62%

- *I'd consider installing panels on my roof, but I live in a historic district and we're not allow to put solar panels anywhere they can be seen. Can you lobby to have this rule changed?*
- *Live in condo association-solar panels has not been discussed*
- *solar panels part of general grid (currently live in a rental apartment)*
- *I currently own my own home (1/2 of a duplex) and live at Prairie Hill Cohousing community in IC.*
- *I'd like the electric utility to buy all electricity generated, not just limit to a credit for current use*
- *I'd consider an EV if more re-fueling opportunities in town*
- *I installed solar on my roof.*
- *We already have a solar array on our house.*
- *We have ordered solar panels for our roof.*
- *I already have solar panels on my roof*
- *We already have solar panels on our house, no room for a ground installation.*
- *Not sure*

Why Residents with Annual Household Incomes <\$75,000 are Interested

What makes you interested in using solar energy to provide electricity in your home? (check all that apply)

N=113

Response	# of responses	percentage
I want to do my part to address climate change.	106	93.81%
I would like to use a source of energy that does not rely on the use of fossil fuels.	103	91.15%
I would like to spend less money on electricity.	86	76.11%
I'd like to be more self-reliant, electricity wise.	77	68.14%
Other (please specify)	3	2.65%
• Mostly, I'd like to be able to use electricity in our home independent of the grid. • So I can charge my electric car from the sun! • I would like to lessen wind turbines which have ruined peace and quiet on another property		

Challenges for Residents with Annual Household Incomes <\$75,000

As you consider using solar energy for your home, what challenges do you have? (check all that apply)

N=113

Response	# of responses	percentage
The upfront costs of installing solar panels on my property.	86	76.11%
I need more detailed information.	40	35.40%
My lot is not large enough for ground panels.	36	31.86%
My property doesn't get a lot of sun.	25	22.12%
I'm not sure that solar panels are allowed in my neighborhood.	19	16.81%
I do not plan to live in my current home more than 2-4 years.	17	15.04%
I rent my home.	16	14.16%
The structure of my house.	15	13.27%
The condition of my roof.	14	12.39%
At present, no challenges prevent me from using solar energy.	6	5.31%
Other (please specify)	12	10.62%
• I currently have a gas furnace and would have to convert to some kind of electric heating that may cost a lot, or not be suitable for the character of my old house (eg. installing baseboard heating.) • I'm concerned about cost and availability of certified maintenance over time. Also, recycling used panels over time • Waiting to build additional detached garage • took down three large trees last year, so I now have sun • I have solar panels on my roof now. • Because I am in a duplex, the roof structure limited the number of panels I was able to install. My garage is not attached to my home. • Biggest challenge is that utility company will not buy all electricity produced, otherwise would build large array of solar • I'm concerned about the materials the solar panels are made of. A lot of lithium is mined very inhumanely. • Although, it was not a problem for me, there might be issues with some condo association's bylaws, rules and regulations • We live in a condo. • I live in a condo and there's an association		

Residents with Annual Household Incomes <\$75,000 Motivations Ranked

Rank the following in order of how strongly it would motivate you to use solar energy in your home.

Composite Ranking in order of importance. Top factor =1

N=111

Factor	Ranking	n=
Getting money back on my electrical bill every month.	2.62	108
Low interest loans or grants	2.63	107
State and/or Federal tax credits	2.73	110
Specific information about what it would take to install solar panels on my property.	3.25	104
Talking to people who have solar panels on their property.	5.17	103
Seeing more houses in my neighborhood using solar energy.	5.45	104
Aesthetically pleasing options for solar energy generation.	5.91	104

Solar in Neighborhoods

How supportive are you of roof-top solar panels on your neighbors' houses?

N=113

Average: 94.36 on a scale of 0 to 100 with 100 meaning 'very supportive.'

Importance Number of Answers

100	77
99	6
98	2
97	1
96	2
95	3
94	1
93	3
91	1
89	1
88	1
85	3
83	1
80	1
76	1
75	1
66	1
64	1
55	1
53	1
50	1
49	1
42	1
10	1

How supportive are you of lot-sized or larger ground-mounted solar installations near your home?

N=110

Average: 67.87 on a scale of 0 to 100 with 100 meaning 'very supportive.'

Importance	Number of Answers	Importance	Number of Answers
100	38	54	1
99	2	53	1
98	1	51	2
97	1	50	6
96	1	49	2
95	1	48	2
94	1	46	2
92	1	45	3
91	1	44	1
83	2	42	1
81	1	40	1
80	2	39	1
78	1	33	1
77	1	31	1
75	1	30	1
74	2	28	1
73	3	25	4
71	1	21	1
70	1	12	1
62	1	10	1
60	1	5	1
58	1	2	1
57	1	0	7
56	1		

Comments—Residents with Annual Household Incomes <\$75,000

N=26

- There seem to be too many mature trees in our neighbourhood for either type of solar panels. I'm unsure of the safety for people and animals with ground-mounted solar panels in a suburban area. Could they be vandalized or accidentally broken?
- i regret that i did not pay more attention to the midamerica/water park solar project. i definitely think that could have been worked out. (even though i was totally unimpressed with mid-america's attempt at integrating it into the surroundings).
- We decided to put solar on our house and we love seeing other people's houses with panels, too. Ours were installed in early 2021.
- Lot-size solar can be hidden or partially hidden with proper fencing. Ground-mounted can be harder due to tree canopy blocking sun.
- I feel that panels integrated on a roof are more aesthetically pleasing in neighborhoods.
- I would feel more supportive of larger ground installations with less frequency (such as the one next to the JC Admin building), than many smaller installations. However, a caveat to ground installations is that there would be little to no removal of trees to make it work. We've already allowed far too much tree destruction to development in IC.
- I prefer rooftop because taking up large amounts of land that could instead be used for permaculture, ecological preservation, or affordable housing seems counterproductive.
- I don't want panels to take up green space that can be used for parks. I would like to see panels on people's roofs.
- These last two questions were not clear how to answer.

- I have seen both roof mounted solar panels and large fields of solar panels. I have no problem with seeing both in my neighborhood. I would rather look at them than look at oil being pumped from the ground as I have seen in South West U.S.
- How is solar better than wind?
- solar panels should not take up space which could be used for housing, but otherwise be placed wherever possible
- The solar panels are made of toxic materials. How are we going to deal with disposal when they are no longer useful?
- I am a gardener so I don't want to replace garden with solar installations on the ground
- I'd like to see solar fields to provide power to LMI homes.
- Our cohousing community is very densely built so any ground-mounted solar installations would be adequately distanced from our homes, but take usable space for our community projects, i.e. gardens, prairie, orchards, and recreation areas.
- Solar does not make noise like wind turbines and there's no monstrosity to ruin the view that is constantly distracting. More solar might mean fewer turbines that have destroyed peaceful rural countryside.
- Of course with lot sized, ground mounted installation, there would need to be some guidelines/requirements about the ground beneath the panels and aesthetics of the whole package
- Ground mounted installations are good, but I wouldn't want to reduce the parks in my neighborhood
- We're actually in the process of getting 20 solar panels on our roof
- I'd rather see native prairie or trees in empty places instead of solar installations.
- I wouldn't want to take the ground space away from the park/soccer field and ground-mounted solar installations seem like an eye-sore to me. Would much rather use the space on roofs.
- I need to know more about panels to fully answer the above two questions
- No space nearby
- I think that if home owners are OK with installing ground-mounted solar panels on their property, it's OK with me. I wonder what maintenance issues there might be with roof-mounted solar panels. I am retired and won't be living here probably for more than 10 years.
- I am excited to hear about solar options for Iowa City!!

City Programs—Answers from Residents with Annual Household Incomes <\$75,000

Programs Supported

What would you like the City of Iowa City to do to support development of solar energy? (check all that apply)

N=117

Program Option	# of responses	percentage
Install solar panels on City buildings, parking lots and garages, and other properties where feasible.	109	93.16%
Provide financial incentives to nonprofit organizations to install solar panels on their private property.	101	86.32%
Provide financial incentives to any resident to install solar panels on their private property.	89	76.07%
Provide financial incentives to businesses to install solar panels on their private property.	87	74.36%
Sponsor community solar gardens (arrays of ground mounted solar panels) to provide solar energy to residents and businesses.	86	73.50%
Require solar energy for any new building projects that receive tax benefits or financing from the City.	85	72.65%
Provide solar energy for electric vehicle charging stations.	84	71.79%
Establish building code requirements that all new construction be solar-ready.	82	70.09%
Distribute and promote educational information	81	69.23%
Provide financial incentives only to residents who meet income guidelines for lower income to install solar panels on their private property.	43	36.75%
Other (please specify)	13	11.11%
• <i>Building code requirements or new projects could alternatively be wind-powered.</i> • <i>Support solar benefits for low income renting</i> • <i>I would check building code requirements, if some exceptions were allowed because there are always exceptions, but with community review and not just to make developers wealthier.</i> • <i>It is not cost effective.</i> • <i>Do the equivalent things for passive solar energy, that has been neglected.</i> • <i>Please communicate the RISKS of solar panels in addition to financial benefits.</i> • <i>I don't think the city should be involved. This should be a private company issue.</i> • <i>Buy more electric buses. Provide incentives to developers building new houses.</i> • <i>New construction solar-ready building code requirements & solar required for city-financed or incentivized new construction, if the property is evaluated to get enough sun. Solar financial incentives for small for-profit businesses only.</i> • <i>Lobby state legislature to require electric utilities to purchase all solar energy produced.</i> • <i>facilitate investor installation of solar with property owner buy back over time, encouragement for landlords to install solar on their rental units and sharing reduced utility costs with renters</i> • <i>Require all new developments to include a solar panel investment elsewhere in the community</i> • <i>Don't cause disparate discrimination by adding costs to homes.</i>		

Programs Not Supported

What types of City solar energy projects would you NOT be supportive of? (check all that apply)

N=85

Program Option	# of responses	percentage
Provision of public funds to privately owned utility companies for solar energy projects.	35	41.18%
Ground mounted solar projects in City parks, or in close proximity to parks and trails.	29	34.12%
Provision of financial incentives only to residents who meet income guidelines for lower income to install solar panels on their private property.	26	30.59%
Ground mounted solar projects—lot sized or larger—in residential areas.	26	30.59%
Provision of financial incentives to any resident to install solar panels on their private property.	18	21.18%
Ground mounted solar projects—of any size—in residential areas.	17	20.00%
Establishment of building code requirements that all new construction be solar-ready.	15	17.65%
Provision of financial incentives to businesses to install solar panels on their private property.	14	16.47%
Requiring solar energy for any new building projects that receive tax benefits or financing from the City.	14	16.47%
Sponsorship of community solar gardens (arrays of ground mounted solar panels) to provide solar energy to residents and businesses.	8	9.41%
Provision of financial incentives to nonprofit organizations to install solar panels on their private property.	6	7.06%
Ground mounted solar projects in commercial/business areas.	6	7.06%
Provision of solar energy for electric vehicle charging stations.	4	4.71%
Distribution and promotion of educational information	3	3.53%
Installation of solar panels on City buildings, parking lots and garages, and other properties where feasible.	3	3.53%
Other (please specify)	15	17.65%
• <i>I would not support solar gardens that take away land from farmers.</i> • <i>Ground mounted arrays are often unattractive and requiring panels on new buildings doesn't make sense. It's not appropriate for every location.</i> • <i>The last one would be mostly no, but maybe okay in and around parking lots at parks where no trees need to be removed. Possibly something elevated like on the tops/roofs of public restrooms and shelters.</i> • <i>Low income residents should take first priority for financial incentives.</i> • <i>Here is a relevant website: https://www.electrosmogprevention.org/public-health-alert/health-alerts-solar-panel-systems/health-risks-of-solar-panels/</i> • <i>I would prefer roof mounted to ground mounted in general as I love the greenery</i> • <i>Solar or solar-ready requirements only if property is evaluated & gets enough sun. Financial incentives only for low income residents and small for-profit businesses.</i> • <i>Some consideration for ground mounted in parks would need to be given to impact on park use</i> • <i>Sounds like a good idea, but could cause disparate discrimination in housing.</i> • <i>I'm not opposed to ground mounter solar projects in City Parks as long as they don't impede current use or take up a large swath of greenspace. The visual impact of panels on parks is more important to me than that on businesses or even houses.</i> • <i>I am not in favor of ground-mounted arrays that negatively impact our use of current planned green space throughout the city.</i> • <i>I support all reasonable options!</i> • <i>None (2)</i>		

Community Solar—Residents with Annual Household Incomes <\$75,000

If community solar was available in Iowa City, would you consider joining?

N=115

Average: 73.24 on a scale of 0 to 100 with 100 meaning 'Yes, I would be very interested.'

Importance	Number of Answers	Importance	Number of Answers
100	39	65	2
99	4	63	2
98	2	62	1
97	3	61	1
94	1	60	1
93	1	58	4
92	1	56	2
91	1	55	1
87	1	53	1
84	1	52	1
82	2	51	3
81	1	50	6
80	1	49	1
75	4	45	1
74	1	43	2
73	1	38	1
70	3	33	2
69	2	26	1
68	2	3	1
67	1	1	1
66	1	0	7

Comments from Residents with Annual Household Incomes <\$75,000

Please include any other comments or thoughts about solar energy in our community below.

N=25

- Yes, Iowa City needs to encourage more solar and wind use. I was very disappointed when typical roofing was put the Coral Ridge Mall. More recently, solar panels could easily have been put on the flat roof of the distribution hub at Hwy 6 near Scott Blvd.
- Incorporate energy efficiency including solar to building codes
- Many concerns about ground mounted solar can be answered with proper fencing and prairie planting around and under panels.
- I would need a lot more info on Q12 to fully get behind it. In general, I think power companies should be made to buy back excess energy generated at an incentivized rate. I know this law has been tweaked and minimized over the decades at times. It needs to function fully.
- The cost of heating a home with electric energy is too high. Also, I hate electric cars because of the low number of miles you can get before having to stop and recharge the batteries.
- Please prioritize equitable distribution of opportunities to participate in solar projects and stewardship of the land. Replacing natural areas and disturbing ecosystems is counterproductive.
- Ground panels 100% depend on location. I do NOT want to see green space in town taken up by panels. There is so little green space already. Much prefer roof panels or ground sites out of town that can be used to generate electricity for in town.
- Not clear how to answer this one either
- I think it is obvious that I believe in solar energy. I want to leave a cleaner world to my grandchildren. I know there will be upfront costs to be paid, but I believe a better environment is worth it.
- We need to look at V2G, microgrids, and community solar so it's not just for rich people.

Comments, continued

- Just as parks and green space or flood control is required with each new development, a reasonable amount of space should be allocated to renewable energy for the neighborhood
- place solar panels at parks like by the water works
- Please investigate the risks to children and sensitive individuals before investing significant money into this new project. It is easy to go along with this because solar is seen as the green alternative. However, it may harm more people than anticipated. In that case, it is counterproductive to overall health.
- Ground solar panels will destroy the beauty of Iowa, destroy the soil, and cause a problem of future disposal of old and/or obsolete panels which are toxic.
- We need some large utility scale solar projects. I would favor establishing a municipal utility for Iowa City.
- The single most important thing restricting solar energy is that it will only offset your historical electricity usage. Many more would install solar if they could actually make money on the excess produced.
- Maybe the city could facilitate the interest earning investment by community members in a program that would provide solar panels to income qualified owners where some of the utility cost displacement would go to paying off the investors and some to the income qualified owners property owners
- In addition to solar, I would like to see living rooves being used to decrease electric use. I feel the city should concentrate on planting shade trees for the future.
- I'm hesitant in providing solar power charging stations for cars. Until there is more support for bike, cargo bike, ebike travel business usage of bike delivery in Iowa City I cannot support charging stations for people who own E cars.
- Excited to see the city thinking ahead, and I hope movement on this doesn't take too much longer.
- More basic information
- I am glad that Iowa City and other communities are giving this issue attention and support!! We need to move forward with this because of climate change and the negative aspects of fossil fuel usage!
- My electric use is not high enough to make solar panels financially viable.
- None (2)

Demographics—Residents with Annual Household Incomes <\$75,000

Which best describes your current housing situation?

N=119

Response	# of responses	percentage
I own my home	98	82.35%
I'm renting my home	19	15.97%
I'm living with others and assisting with paying rent or mortgage	1	0.84%
Prefer not to say	1	0.84%

In what type of housing do you currently live?

N=119

Response	# of responses	percentage
House	84	70.59%
Condo	11	9.24%
Apartment	10	8.40%
Duplex	8	6.72%
Townhouse	2	1.68%
Other (please specify)	4	3.36%
• mobile home (2)		
• Prairie Hill Cohousing		
• Co-housing community		

Utility Bill Expenses

What is the average electric portion of your monthly utility bill?

N=116

Response	# of responses	percentage
Less than \$100/month	80	68.97%
Between \$100 – \$200/month	29	25.00%
Between \$200- \$350/month	1	0.86%
I don't know	5	4.31%
Prefer not to say	1	0.86%
Other (please specify)	6	

- Around \$200
- I have solar panels on my roof now.
- I live in an all electric community; the only other utility beside electric that I pay is water.
- I live in an all electric home with solar panels and only pay the monthly meter fee (my house is close to, if not net zero)
- My place was built to LEED specifications.
- Much less, an average over a year of less than \$450.00. Solar is great, but must be financially viable.

Neighborhood

Please indicate your Iowa City neighborhood.

N=117

Response	# of responses	percentage
Eastside Neighborhood-Iowa City	24	20.51%
Miller Orchard Neighborhood-Iowa City	11	9.40%
Lucas Farms Neighborhood-Iowa City	10	8.55%
South District Neighborhood-Iowa City	10	8.55%
Johnson County	10	8.55%
Creeside Neighborhood-Iowa City	7	5.98%
Goosetown Neighborhood-Iowa City	7	5.98%
Longfellow Neighborhood-Iowa City	6	5.13%
Northside Neighborhood-Iowa City	5	4.27%
Morningside/Glendale Neighborhood-Iowa City	3	2.56%
College Green Neighborhood-Iowa City	2	1.71%
Ty'n Cae Neighborhood-Iowa City	2	1.71%
Waterfront Neighborhood-Iowa City	2	1.71%
Washington Hills Neighborhood-Iowa City	2	1.71%
Bluffwood Neighborhood-Iowa City	1	0.85%
Melrose Avenue Neighborhood-Iowa City	1	0.85%
Oak Grove Neighborhood-Iowa City	1	0.85%
Windsor Ridge Neighborhood-Iowa City	1	0.85%
I don't know.	5	4.27%
Other (please specify)	7	5.98%

- Shimek (2)
- Downtown Iowa City (2)
- Riverfront Crossings - East
- Prairie Hill cohousing (off Miller Ave - Miller Orchard Neighborhood)
- Walden Ct

Gender

How do you identify your gender?

N= 118

Response	# of responses	percentage
Woman	82	69.49%
Man	28	23.73%
Prefer not to say	5	4.24%
Non-binary	3	2.54%

Ethnicity

How do you identify your ethnicity? (check all that apply)

N=119

Response	# of responses	percentage
White	109	91.60%
Prefer not to say	8	6.72%
American Indian or Alaskan Native	1	0.84%
Asian	1	0.84%
Native Hawaiian or Other Pacific Islander	1	0.84%
Other	1	0.84%

- This question has nothing to do with Solar Energy

Age

What is your age?

N=119

Response	# of responses	percentage
65-74	47	39.50%
35-44	23	19.33%
25-34	20	16.81%
55-64	14	11.76%
45-54	9	7.56%
18-24	3	2.52%
84+ years	2	1.68%
Under 18	1	0.84%

Education

What is the highest level of education you have completed?

N=119

Response	# of responses	percentage
Master's/Professional Degree	48	40.34%
Bachelor's Degree	44	36.97%
Some college; no degree	12	10.08%
Doctorate	7	5.88%
Associate Degree	4	3.36%
High school/GED	3	2.52%
Other (please specify)	1	0.84%

- This question has nothing to do with Solar Energy

Ability

I consider myself to be a person with a disability.

N=119

Response	# of responses	percentage
No	95	79.83%
Yes	19	15.97%
Prefer not to say	5	4.20%
<i>Comment</i>	3	
• <i>Many health issues</i> • <i>Electrical hypersensitivity</i> • <i>This info has NOTHING to do with Solar Energy</i>		

Medical Device Use

Do you need electricity for a medical device, CPAP, insulin, oxygen concentrator, nebulizer etc.?

N=118

Response	# of responses	percentage
No	99	83.90%
Yes	17	14.41%
Prefer not to say	2	1.69%
<i>Comment</i>	5	
• <i>I need to not live near cell towers, have a SMART meter, near solar panels, or live near a high voltage power line.</i> • <i>This question has nothing to do with Solar Energy</i> • <i>Bipap</i> • <i>Not yet (2)</i>		

Income

What is your total annual household income?

N=119

Response	# of responses	percentage
\$50 000 to \$74 999	57	47.90%
\$21 000 to \$49 999	48	40.34%
Under \$20,000	14	11.76%

Residents with Annual Household Incomes <\$50,000

N=62

Interest Level—Residents with Annual Household Incomes <\$50,000

Response	# of responses	percentage
Very interested	46	74.19%
Somewhat interested	13	20.97%
Not interested	3	4.84%

Why not interested? (check all that apply)

N=3

Response	# of responses	percentage
I rent my home.	2	66.67%
The costs of installing solar panels are too expensive.	1	33.33%
I'm not sure how it would affect my property insurance.	1	33.33%
It's not a priority for me.	1	33.33%

Options Residents with Annual Household Incomes <\$50,000 Would Consider

What kinds of options would you consider? (check all that apply)

N=59

Response	# of responses	percentage
I'd consider installing solar panels on the roof of my home or garage.	44	74.58%
I'd like the utility company to use solar energy to provide electricity to my house.	44	74.58%
I'd consider leasing or purchasing a share in a community solar field that provides energy for multiple households.	35	59.32%
I'd consider installing solar panels on the ground in my yard.	14	23.73%
Other	6	10.17%
- Not sure - solar panels part of general grid (currently live in a rental apartment) - I installed solar on my roof. - I'd consider an EV if more re-fueling opportunities in town - We have ordered solar panels for our roof. - Live in condo association-solar panels has not been discussed		

Why Residents with Annual Household Incomes <\$50,000 are Interested

What makes you interested in using solar energy to provide electricity in your home? (check all that apply)

N=59

Response	# of responses	percentage
I want to do my part to address climate change.	57	96.61%
I would like to use a source of energy that does not rely on the use of fossil fuels.	56	94.92%
I would like to spend less money on electricity.	48	81.36%
I'd like to be more self-reliant, electricity wise.	41	69.49%
Other (please specify)	1	1.69%
So I can charge my electric car from the sun!		

Challenges for Residents with Annual Household Incomes <\$50,000

As you consider using solar energy for your home, what challenges do you have? (check all that apply)

N=59

Response	# of responses	percentage
The upfront costs of installing solar panels on my property.	43	72.88%
My lot is not large enough for ground panels.	15	25.42%
I need more detailed information.	15	25.42%
I rent my home.	12	20.34%
I'm not sure that solar panels are allowed in my neighborhood.	9	15.25%
My property doesn't get a lot of sun.	7	11.86%
I do not plan to live in my current home more than 2-4 years.	6	10.17%
The structure of my house.	5	8.47%
The condition of my roof.	5	8.47%
At present, no challenges prevent me from using solar energy.	3	5.08%
Other (please specify)	4	6.78%
- I currently have a gas furnace and would have to convert to some kind of electric heating that may cost a lot, or not be suitable for the character of my old house (eg. installing baseboard heating.) - took down three large trees last year, so I now have sun - I have solar panels on my roof now. - I live in a condo and there's an association		

Residents with Annual Household Incomes <\$50,000 Motivations Ranked

Rank the following in order of how strongly it would motivate you to use solar energy in your home.

Composite Ranking in order of importance. Top factor =1

N=58

Factor	Ranking	n=
Getting money back on my electrical bill every month.	2.46	56
Low interest loans or grants	2.75	55
State and/or Federal tax credits	2.75	57
Specific information about what it would take to install solar panels on my property.	3.33	54
Talking to people who have solar panels on their property.	5.15	53
Seeing more houses in my neighborhood using solar energy.	5.40	53
Aesthetically pleasing options for solar energy generation.	5.96	53

Solar in Neighborhoods

How supportive are you of roof-top solar panels on your neighbors' houses?

N=59

Average: 93.95 on a scale of 0 to 100 with 100 meaning 'very supportive.'

<u>Importance</u>	<u>Number of Answers</u>
100	44
99	1
98	1
97	1
96	1
95	2
93	2
76	1
75	1
64	1
53	1
50	1
49	1
10	1

How supportive are you of lot-sized or larger ground-mounted solar installations near your home?

N=59

Average: 68.03 on a scale of 0 to 100 with 100 meaning 'very supportive.'

<u>Importance</u>	<u>Number of Answers</u>	<u>Importance</u>	<u>Number of Answers</u>
100	19	54	1
99	2	51	2
98	1	50	2
97	1	49	2
96	1	46	2
94	1	45	2
83	1	40	1
80	2	33	1
78	1	31	1
77	1	30	1
74	1	25	2
73	1	21	1
62	1	10	1
58	1	2	1
57	1	0	3
56	1		

Comments—Residents with Annual Household Incomes <\$50,000

N=16

- i regret that i did not pay more attention to the midamerica/water park solar project. i definitely think that could have been worked out. (even though i was totally unimpressed with mid-america's attempt at integrating it into the surroundings).
- Lot-size solar can be hidden or partially hidden with proper fencing. Ground-mounted can be harder due to tree canopy blocking sun.
- I would feel more supportive of larger ground installations with less frequency (such as the one next to the JC Admin building), than many smaller installations. However, a caveat to ground installations is that there would be little to no removal of trees to make it work. We've already allowed far too much tree destruction to development in IC.
- These last two questions were not clear how to answer.
- I have seen both roof mounted solar panels and large fields of solar panels. I have no problem with seeing both in my neighborhood. I would rather look at them than look at oil being pumped from the ground as I have seen in South West U.S.
- solar panels should not take up space which could be used for housing, but otherwise be placed wherever possible
- The solar panels are made of toxic materials. How are we going to deal with disposal when they are no longer useful?
- I am a gardener so I dont' want to replace garden with solar installations on the ground
- I'd like to see solar fields to provide power to LMI homes.
- Ground mounted installations are good, but I wouldn't want to reduce the parks in my neighborhood
- We're actually in the process of getting 20 solar panels on our roof
- I'd rather see native prairie or trees in empty places instead of solar installations.
- I wouldn't want to take the ground space away from the park/soccer field and ground-mounted solar installations seem like an eye-sore to me. Would much rather use the space on roofs.
- I need to know more about panels to fully answer the above two questions
- No space nearby
- I think that if home owners are OK with installing ground-mounted solar panels on their property, it's OK with me. I wonder what maintenance issues there might be with roof-mounted solar panels. I am retired and won't be living here probably for more than 10 years.

City Programs—Answers from Residents with Annual Household Incomes <\$50,000

Programs Supported

What would you like the City of Iowa City to do to support development of solar energy? (check all that apply)

N=61

Program Option	# of responses	percentage
Install solar panels on City buildings, parking lots and garages, and other properties where feasible.	57	93.44%
Provide financial incentives to nonprofit organizations to install solar panels on their private property.	53	86.89%
Provide financial incentives to any resident to install solar panels on their private property.	47	77.05%
Require solar energy for any new building projects that receive tax benefits or financing from the City.	47	77.05%
Provide financial incentives to businesses to install solar panels on their private property.	46	75.41%
Sponsor community solar gardens (arrays of ground mounted solar panels) to provide solar energy to residents and businesses.	46	75.41%
Distribute and promote educational information	44	72.13%
Provide solar energy for electric vehicle charging stations.	44	72.13%
Establish building code requirements that all new construction be solar-ready.	43	70.49%
Provide financial incentives only to residents who meet income guidelines for lower income to install solar panels on their private property.	24	39.34%
<i>Other (please specify)</i>	9	14.75%
<i>Support solar benefits for low income renting</i> <i>I would check building code requirements, if some exceptions were allowed because there are always exceptions, but with community review and not just to make developers wealthier.</i> <i>It is not cost effective.</i> <i>Do the equivalent things for passive solar energy, that has been neglected.</i> <i>I don't think the city should be involved. This should be a private company issue.</i> <i>Buy more electric buses. Provide incentives to developers building new houses.</i> <i>New construction solar-ready building code requirements & solar required for city-financed or incentivized new construction, if the property is evaluated to get enough sun. Solar financial incentives for small for-profit businesses only.</i> <i>Require all new developments to include a solar panel investment elsewhere in the community</i> <i>Don't cause disparate discrimination by adding costs to homes.</i>		

Programs Not Supported

What types of City solar energy projects would you NOT be supportive of? (check all that apply)

N=46

Program Option	# of responses	percentage
Provision of public funds to privately owned utility companies for solar energy projects.	16	34.78%
Provision of financial incentives only to residents who meet income guidelines for lower income to install solar panels on their private property.	15	32.61%
Ground mounted solar projects in City parks, or in close proximity to parks and trails.	14	30.43%
Ground mounted solar projects—lot sized or larger—in residential areas.	12	26.09%
Provision of financial incentives to any resident to install solar panels on their private property.	11	23.91%
Ground mounted solar projects—of any size—in residential areas.	8	17.39%
Provision of financial incentives to businesses to install solar panels on their private property.	7	15.22%
Establishment of building code requirements that all new construction be solar-ready.	5	10.87%
Sponsorship of community solar gardens (arrays of ground mounted solar panels) to provide solar energy to residents and businesses.	4	8.70%
Requiring solar energy for any new building projects that receive tax benefits or financing from the City.	4	8.70%
Provision of financial incentives to nonprofit organizations to install solar panels on their private property.	3	6.52%
Ground mounted solar projects in commercial/business areas.	3	6.52%
Distribution and promotion of educational information	1	2.17%
Installation of solar panels on City buildings, parking lots and garages, and other properties where feasible.	1	2.17%
Provision of solar energy for electric vehicle charging stations.	1	2.17%
Other (please specify)	9	19.57%

- None (2)
- The last one would be mostly no, but maybe okay in and around parking lots at parks where no trees need to be removed. Possibly something elevated like on the tops/roofs of public restrooms and shelters.
- I would prefer roof mounted to ground mounted in general as I love the greenery
- Solar or solar-ready requirements only if property is evaluated & gets enough sun. Financial incentives only for low income residents and small for-profit businesses.
- Sounds like a good idea, but could cause disparate discrimination in housing.
- I'm not opposed to ground mounter solar projects in City Parks as long as they don't impede current use or take up a large swath of greenspace. The visual impact of panels on parks is more important to me than that on businesses or even houses.
- I am not in favor of ground-mounted arrays that negatively impact our use of current planned green space throughout the city.

Community Solar—Residents with Annual Household Incomes <\$50,000

If community solar was available in Iowa City, would you consider joining?

N=58

Average: 75.09 on a scale of 0 to 100 with 100 meaning 'Yes, I would be very interested.'

Importance	Number of Answers	Importance	Number of Answers
100	23	61	1
99	3	60	1
98	1	58	4
97	2	56	1
94	1	55	1
93	1	51	1
84	1	50	1
82	1	43	1
81	1	38	1
75	1	33	1
74	1	3	1
69	1	1	1
66	1	0	4
65	1		

Comments from Residents with Annual Household Incomes <\$50,000

Please include any other comments or thoughts about solar energy in our community below.

N=14

- Incorporate energy efficiency including solar to building codes
- Many concerns about ground mounted solar can be answered with proper fencing and prairie planting around and under panels.
- I would need a lot more info on Q12 to fully get behind it. In general, I think power companies should be made to buy back excess energy generated at an incentivized rate. I know this law has been tweaked and minimized over the decades at times. It needs to function fully.
- The cost of heating a home with electric energy is too high. Also, I hate electric cars because of the low number of miles you can get before having to stop and recharge the batteries.
- Not clear how to answer this one either
- I think it is obvious that I believe in solar energy. I want to leave a cleaner world to my grandchildren. I know there will be upfront costs to be paid, but I believe a better environment is worth it.
- place solar panels at parks like by the water works
- Ground solar panels will destroy the beauty of Iowa, destroy the soil, and cause a problem of future disposal of old and/or obsolete panels which are toxic.
- We need some large utility scale solar projects. I would favor establishing a municipal utility for Iowa City.
- I'm hesitant in providing solar power charging stations for cars. Until there is more support for bike, cargo bike, ebike travel business usage of bike delivery in Iowa City I cannot support charging stations for people who own E cars.
- Excited to see the city thinking ahead, and I hope movement on this doesn't take too much longer.
- My electric use is not high enough to make solar panels financially viable.
- None (2)

Demographics—Residents with Annual Household Incomes <\$50,000

Which best describes your current housing situation?

N=62

Response	# of responses	percentage
I own my home	46	74.19%
I'm renting my home	14	22.58%
I'm living with others and assisting with paying rent or mortgage	1	1.61%
Prefer not to say	1	1.61%

In what type of housing do you currently live?

N=62

Response	# of responses	percentage
House	36	58.06%
Apartment	9	14.52%
Condo	8	12.90%
Duplex	5	8.06%
Townhouse	1	1.61%
Other (please specify)	3	4.84%
- mobile home (2) - Co-housing community		

Utility Bill Expenses

What is the average electric portion of your monthly utility bill?

N=60

Response	# of responses	percentage
Less than \$100/month	48	80.00%
Between \$100 – \$200/month	10	16.67%
I don't know	1	1.67%
Prefer not to say	1	1.67%
Other (please specify)	4	
- Around \$200 - I have solar panels on my roof now. - My place was built to LEED specifications. - Much less, an average over a year of less than \$450.00. Solar is great, but must be financially viable.		

Neighborhood

Please indicate your Iowa City neighborhood.

N=62

Response	# of responses	percentage
Eastside Neighborhood-Iowa City	13	20.97%
Miller Orchard Neighborhood-Iowa City	8	12.90%
South District Neighborhood-Iowa City	7	11.29%
Johnson County	7	11.29%
Goosetown Neighborhood-Iowa City	4	6.45%
Lucas Farms Neighborhood-Iowa City	3	4.84%
Creskide Neighborhood-Iowa City	2	3.23%
Longfellow Neighborhood-Iowa City	2	3.23%
Morningside/Glendale Neighborhood-Iowa City	2	3.23%
Waterfront Neighborhood-Iowa City	2	3.23%
Washington Hills Neighborhood-Iowa City	2	3.23%
College Green Neighborhood-Iowa City	1	1.61%
Northside Neighborhood-Iowa City	1	1.61%
Oak Grove Neighborhood-Iowa City	1	1.61%
Ty'n Cae Neighborhood-Iowa City	1	1.61%
I don't know.	1	1.61%
Other (please specify)	5	8.06%
• Shimek (2) • Riverfront Crossings - East • Walden Ct • Downtown Iowa City		

Gender

How do you identify your gender?

N= 61

Response	# of responses	percentage
Woman	41	67.21%
Man	16	26.23%
Non-binary	2	3.28%
Prefer not to say	2	3.28%

Ethnicity

How do you identify your ethnicity? (check all that apply)

N=62

Response	# of responses	percentage
White	56	90.32%
Prefer not to say	4	6.45%
American Indian or Alaskan Native	1	1.61%
Asian	1	1.61%
Native Hawaiian or Other Pacific Islander	1	1.61%
Other	1	1.61%
• This question has nothing to do with Solar Energy		

Age

What is your age?

N=62

Response	# of responses	percentage
65-74	26	41.94%
55-64	10	16.13%
25-34	9	14.52%
35-44	9	14.52%
18-24	3	4.84%
45-54	3	4.84%
Under 18	1	1.61%
84+ years	1	1.61%

Education

What is the highest level of education you have completed?

N=62

Response	# of responses	percentage
Bachelor's Degree	28	45.16%
Master's/Professional Degree	18	29.03%
Some college; no degree	7	11.29%
Doctorate	5	8.06%
High school/GED	3	4.84%
Other (please specify)	1	1.61%

- This question has nothing to do with Solar Energy

Ability

I consider myself to be a person with a disability.

N=62

Response	# of responses	percentage
No	47	75.81%
Yes	12	19.35%
Prefer not to say	3	4.84%
Comment	2	

- Many health issues
- This info has NOTHING to do with Solar Energy

Medical Device Use

Do you need electricity for a medical device, CPAP, insulin, oxygen concentrator, nebulizer etc.?

N=61

Response	# of responses	percentage
No	50	81.97%
Yes	10	16.39%
Prefer not to say	1	1.64%
Comment	4	

- Not yet (2)
- This question has nothing to do with Solar Energy
- Bipap

Income

What is your total annual household income?

N=62

Response	# of responses	percentage
\$21 000 to \$49 999	48	77.42%
Under \$20,000	14	22.58%

Eastside Residents

N=71

Interest Level—Eastside Residents

N=71

Response	# of responses	percentage
Very interested	46	64.79%
Somewhat interested	22	30.99%
Not interested	3	4.23%

Why not interested? (check all that apply)

N=3

Response	# of responses	percentage
I rent my home.	1	33.33%
I don't plan to live here long enough to recover the costs of installing solar panels on my property.	1	33.33%
Other	1	33.33%

- Our electric provider, MidAmerican Energy, already produces clean energy. It's not worth while (or worth the money) to by pass what they are doing.

Options Eastside Residents Would Consider

What kinds of options would you consider? (check all that apply)

N=68

Response	# of responses	percentage
I'd consider installing solar panels on the roof of my home or garage.	52	76.47%
I'd consider installing solar panels on the ground in my yard.	16	23.53%
I'd consider leasing or purchasing a share in a community solar field that provides energy for multiple households.	43	63.24%
I'd like the utility company to use solar energy to provide electricity to my house.	49	72.06%
Other	8	11.76%

- *We already have some solar panels on our roof.*
- *I already have solar panels but more is better.*
- *We already have solar panels on our house, no room for a ground installation.*
- *I already have solar panels installed on the ground in my yard*
- *Not sure*
- *Live in condo association-solar panels has not been discussed*
- *all or any of the above*

Why Eastside Residents are Interested

What makes you interested in using solar energy to provide electricity in your home? (check all that apply)

N=68

Response	# of responses	percentage
I want to do my part to address climate change.	62	91.18%
I would like to use a source of energy that does not rely on the use of fossil fuels.	59	86.76%
I would like to spend less money on electricity.	47	69.12%
I'd like to be more self-reliant, electricity wise.	44	64.71%
Other (please specify)	1	1.47%

- *Electric vehicle*

Challenges for Eastside Residents

As you consider using solar energy for your home, what challenges do you have? (check all that apply)

N=68

Response	# of responses	percentage
The upfront costs of installing solar panels on my property.	52	76.47%
I need more detailed information.	25	36.76%
My lot is not large enough for ground panels.	21	30.88%
My property doesn't get a lot of sun.	16	23.53%
The structure of my house.	13	19.12%
The condition of my roof.	12	17.65%
I'm not sure that solar panels are allowed in my neighborhood.	6	8.82%
I do not plan to live in my current home more than 2-4 years.	6	8.82%
At present, no challenges prevent me from using solar energy.	5	7.35%
I rent my home.	3	4.41%
Other (please specify)	9	13.24%

- We live in a condo.
- I'm concerned about cost and availability of certified maintenance over time. Also, recycling used panels over time
- I worry that the raw materials that go into making solar panels cause as much damage as fossil fuels, and that their life span is short. unknown maintenance costs/involvement.
- I'm undecided on how long I'll stay in my current home.
- Is it worth the price? What is the maintenance for them?
- Very interested, but I watched a video that said it takes 8-9 years to make back the money spent. I'm considering a move in the next 2-3 years, so that is a factor.
- We have solar panels on our roof now.

Eastside Residents Motivations Ranked

Rank the following in order of how strongly it would motivate you to use solar energy in your home.

Composite Ranking in order of importance. Top factor =1

N=68

Factor	Ranking	n=
State and/or Federal tax credits	2.43	65
Low interest loans or grants	2.87	61
Getting money back on my electrical bill every month.	2.98	65
Specific information about what it would take to install solar panels on my property.	3.45	64
Talking to people who have solar panels on their property.	4.90	62
Seeing more houses in my neighborhood using solar energy.	5.48	61
Aesthetically pleasing options for solar energy generation.	5.50	62

Solar in Neighborhoods

How supportive are you of roof-top solar panels on your neighbors' houses?

N=67

Average: 92.38 on a scale of 0 to 100 with 100 meaning 'very supportive.'

Importance	Number of Answers	Importance	Number of Answers
100	40	84	1
99	3	83	1
98	3	80	1
97	1	76	1
96	1	74	1
95	1	70	1
94	1	55	1
93	2	51	1
92	1	50	1
91	1	42	1
88	1	10	1
85	1		

How supportive are you of lot-sized or larger ground-mounted solar installations near your home?

N=67

Average: 65.80 on a scale of 0 to 100 with 100 meaning 'very supportive.'

Importance	Number of Answers	Importance	Number of Answers
100	24	50	3
99	2	49	3
97	1	48	2
92	1	30	1
86	1	28	1
85	1	25	1
84	1	22	1
83	1	20	1
81	1	17	1
74	1	12	1
71	1	10	1
70	3	8	1
65	1	5	1
54	1	2	1
53	1	1	2
51	2	0	3

Comments— Eastside Residents

N=5

- These last two questions were not clear how to answer.
- How is solar better than wind?
- I'd be more supportive of "ground" mounted solar installations nearby if the panels doubled as a shelter or a shady place to be could be provided by the panels.
- I am excited to hear about solar options for Iowa City!!
- None

City Programs— Eastside Residents

Programs Supported

What would you like the City of Iowa City to do to support development of solar energy? (check all that apply)

N=71

Program Option	# of responses	percentage
Install solar panels on City buildings, parking lots and garages, and other properties where feasible.	64	90.14%
Provide financial incentives to any resident to install solar panels on their private property.	57	80.28%
Provide financial incentives to nonprofit organizations to install solar panels on their private property.	53	74.65%
Sponsor community solar gardens (arrays of ground mounted solar panels) to provide solar energy to residents and businesses.	53	74.65%
Provide financial incentives to businesses to install solar panels on their private property.	51	71.83%
Require solar energy for any new building projects that receive tax benefits or financing from the City.	50	70.42%
Distribute and promote educational information	48	67.61%
Provide solar energy for electric vehicle charging stations.	46	64.79%
Establish building code requirements that all new construction be solar-ready.	44	61.97%
Provide financial incentives only to residents who meet income guidelines for lower income to install solar panels on their private property.	17	23.94%
Other (please specify)	6	8.45%
• <i>NOTHING. . .do not do anything that would affect property taxes or push developers to neighboring communities (due to costly requirements).</i> • <i>Require that houses are oriented with a roof that will be south facing, whenever possible</i> • <i>Do the equivalent things for passive solar energy, that has been neglected.</i> • <i>Utility companies must purchase excess solar electricity at the same rate they charge.</i> • <i>As was mentioned in one of the above choices, using parking lots and parking garages as large spaces for solar panels, pluse folks seem to like a roof over where they park.</i> • <i>Stay out of the way. Do not divert tax funds to pay for this.</i>		

Programs Not Supported

What types of City solar energy projects would you NOT be supportive of? (check all that apply)

N= 51

Program Option	# of responses	percentage
Provision of public funds to privately owned utility companies for solar energy projects.	24	47.06%
Provision of financial incentives only to residents who meet income guidelines for lower income to install solar panels on their private property.	22	43.14%
Establishment of building code requirements that all new construction be solar-ready.	15	29.41%
Ground mounted solar projects—of any size—in residential areas.	14	27.45%
Ground mounted solar projects—lot sized or larger—in residential areas.	12	23.53%
Ground mounted solar projects in City parks, or in close proximity to parks and trails.	12	23.53%
Requiring solar energy for any new building projects that receive tax benefits or financing from the City.	11	21.57%
Provision of financial incentives to any resident to install solar panels on their private property.	8	15.69%
Provision of solar energy for electric vehicle charging stations.	6	11.76%
Provision of financial incentives to businesses to install solar panels on their private property.	5	9.80%
Provision of financial incentives to nonprofit organizations to install solar panels on their private property.	3	5.88%
Sponsorship of community solar gardens (arrays of ground mounted solar panels) to provide solar energy to residents and businesses.	3	5.88%
Ground mounted solar projects in commercial/business areas.	3	5.88%
Installation of solar panels on City buildings, parking lots and garages, and other properties where feasible.	2	3.92%
Distribution and promotion of educational information	1	1.96%
Other (please specify)	2	3.92%

- None
- I support all reasonable options!

Community Solar— Eastside Residents

If community solar was available in Iowa City, would you consider joining?

N=68

Average: 71.42 on a scale of 0 to 100 with 100 meaning 'Yes, I would be very interested.'

Importance	Number of Answers	Importance	Number of Answers
100	19	65	4
99	3	64	1
98	1	63	1
97	1	56	1
91	1	53	1
90	1	51	3
88	1	50	5
84	1	49	1
80	4	43	1
79	1	38	1
78	1	33	2
75	1	28	1
74	1	11	1
73	1	3	1
70	2	1	1
68	1	0	2
67	1		

Comments from Eastside Residents

Please include any other comments or thoughts about solar energy in our community below.

N=13

- NOTHING. . .do not do anything that would affect property taxes or push development to neighboring communities (due to costly requirements). If the city is interested in partnering with MidAmerican Energy, I'd be for that. BUT NOTHING MORE THAN THAT!
- Not sure what's possible because we already have an agreement with MidAmerican, but still very interesting.
- Not clear how to answer this one either
- Bar HOAs from banning solar installations
- I'd also be more interested in Tesla solar panels with the battery system.
- The time to act is now.
- We need to look at V2G, microgrids, and community solar so it's not just for rich people.
- Don't subsidize businesses to use solar, but tax large businesses if they don't use solar.
- Just as parks and green space or flood control is required with each new development, a reasonable amount of space should be allocated to renewable energy for the neighborhood
- I always considered solar energy or wind energy as an option during a disaster and would like there to be possibility for that option to be created, where if the power goes out (i.e. derecho scenario) that solar can still provide some power during the day. Or at least for critical infrastructure, like the water pumps.
- None
- I like the idea of community solar projects a lot since my yard is quite shaded. Shade trees are a really good thing to have near homes to help reduce AC costs, so the most sensible thing is to install solar panels in places where trees aren't practical or aren't already established.
- I am glad that Iowa City and other communities are giving this issue attention and support!! We need to move forward with this because of climate change and the negative aspects of fossil fuel usage!

Demographics— Eastside Residents

Which best describes your current housing situation?

N=71

Response	# of responses	percentage
I own my home	66	92.96%
I'm renting my home	4	5.63%
I'm living with others and assisting with paying rent or mortgage	1	1.41%

In what type of housing do you currently live?

N=71

Response	# of responses	percentage
House	59	83.10%
Condo	5	7.04%
Apartment	2	2.82%
Duplex	2	2.82%
Townhouse	1	1.41%
Other (<i>please specify</i>)	2	2.82%
• mobile home (2)		

Utility Bill Expenses

What is the average electric portion of your monthly utility bill?

N=70

Response	# of responses	percentage
Less than \$100/month	36	51.43%
Between \$100 – \$200/month	27	38.57%
Between \$200- \$350/month	1	1.43%
I don't know	5	7.14%
Prefer not to say	1	1.43%

Neighborhood

Please indicate your Iowa City neighborhood.

N=71

Response	# of responses	percentage
Eastside Neighborhood-Iowa City	71	100.00%

Gender

How do you identify your gender?

N=71

Response	# of responses	percentage
Woman	45	63.38%
Man	20	28.17%
Prefer not to say	6	8.45%

Ethnicity

How do you identify your ethnicity? (*check all that apply*)

N= 71

Response	# of responses	percentage
White	64	90.14%
Prefer not to say	5	7.04%
Asian	1	1.41%
Black or African American	1	1.41%

Age

What is your age?

N=66

Response	# of responses	percentage
65-74	26	39.39%
45-54	15	22.73%
35-44	10	15.15%
25-34	8	12.12%
55-64	5	7.58%
18-24	2	3.03%

Education

What is the highest level of education you have completed?

N=71

Response	# of responses	percentage
Master's/Professional Degree	26	36.62%
Bachelor's Degree	23	32.39%
Doctorate	8	11.27%
Some college; no degree	5	7.04%
Associate Degree	4	5.63%
High school/GED	2	2.82%
Prefer not to say	2	2.82%
Other (please specify)	1	1.41%

- Age category missing. I am 76.

Ability

I consider myself to be a person with a disability.

N=71

Response	# of responses	percentage
No	62	87.32%
Yes	6	8.45%
Prefer not to say	3	4.23%
Comment	1	

- Many health issues

Medical Device Use

Do you need electricity for a medical device, CPAP, insulin, oxygen concentrator, nebulizer etc.?

N=71

Response	# of responses	percentage
No	57	80.28%
Yes	11	15.49%
Prefer not to say	3	4.23%
Comment	4	

- Not yet (2)
- CPAP
- Bipap

Income

What is your total annual household income?

N=

Response	# of responses	percentage
\$100 000 to \$149 999	15	21.13%
\$50 000 to \$74 999	11	15.49%
\$75 000 to \$99 999	11	15.49%
Prefer not to say	11	15.49%
\$21 000 to \$49 999	10	14.08%
\$150 000+	10	14.08%
Under \$20,000	3	4.23%

Challenges for Homeowners and Renters

As you consider using solar energy for your home, what challenges do you have? (check all that apply)

Challenges for Homeowners

N=322

The upfront costs of installing solar panels on my property.	232	72.05%
I need more detailed information.	112	34.78%
My lot is not large enough for ground panels.	98	30.43%
My property doesn't get a lot of sun.	78	24.22%
The structure of my house.	47	14.60%
I'm not sure that solar panels are allowed in my neighborhood.	46	14.29%
I do not plan to live in my current home more than 2-4 years.	32	9.94%
The condition of my roof.	31	9.63%
At present, no challenges prevent me from using solar energy.	30	9.32%
I rent my home.	1	0.31%
Other (please specify)	38	11.80%

- *Not sure how long I'll be in my current home, don't want to make the investment if I'm going to move in a few years.*
- *Mix of being not sure if I'll stay in this specific house, and knowing that my house needs more weatherproofing to make solar efficient.*
- *Aesthetic concerns.*
- *The utility companies continue to change how they will handle solar customers, even trying to charge them extra!!*
- *Its not really "the structure" of the house or roof, but my roof is complicated and we just replaced the tiles. I'd prefer to not make structural changes to it -- both in terms of looks, time and worry about future maintenance, and cost*
- *I live in a private condo, but I'm not in close enough proximity to my association's electric meter (I'm on the end), making it a very expensive endeavor that will dig up all of my neighbors' yards.*
- *the orientation of my roof planes is not ideal.*
- *My neighborhood may not be the best for solar installation, meaning resale values on homes are lower*
- *I currently have a gas furnace and would have to convert to some kind of electric heating that may cost a lot, or not be suitable for the character of my old house (eg. installing baseboard heating.)*
- *Already using solar panels. I would like to add storage options*
- *My husband thinks it will be expensive...so he isn't willing to look into it*
- *I have solar and love it!*
- *I don't really know what is involved in doing it*
- *Must have spouse's approval too (not likely)*

- *The look of solar panels is not appealing to me and spoils curb appeal*
- *The best place is on the front of my house, which I don't particularly like*
- *Already have solar*
- *We live in a condo.*
- *I'm concerned about cost and availability of certified maintenance over time. Also, recycling used panels over time*
- *I worry that the raw materials that go into making solar panels cause as much damage as fossil fuels, and that their life span is short. unknown maintenance costs/involvement.*
- *The cost is overwhelming, our small house was 9000 when they priced it before*
- *Waiting to build additional detached garage*
- *took down three large trees last year, so I now have sun*
- *I have solar panels on my roof now.*
- *My sense of aesthetics. It would make me sad to see panels on my property. They are not appealing whatsoever.*
- *I'm undecided on how long I'll stay in my current home.*
- *Because I am in a duplex, the roof structure limited the number of panels I was able to install. My garage is not attached to my home.*
- *Slope of my roof - it's very steep*
- *Biggest challenge is that utility company will not buy all electricity produced, otherwise would build large array of solar*
- *Although, it was not a problem for me, there might be issues with some condo association's bylaws, rules and regulations*
- *I had someone evaluate our roof for solar a few years ago but we have shading trees.*
- *I live in a condo and there's an association*
- *Is it worth the price? What is the maintenance for them?*
- *Very interested, but I watched a video that said it takes 8-9 years to make back the money spent. I'm considering a move in the next 2-3 years, so that is a factor.*
- *We have solar panels on our roof now.*
- *In our association we requested the variance to install solar panels on the ground and it was denied.*

Challenges for Renters

N=19

I rent my home.	18	94.74%
The upfront costs of installing solar panels on my property.	11	57.89%
My property doesn't get a lot of sun.	4	21.05%
The structure of my house.	3	15.79%
The condition of my roof.	2	10.53%
My lot is not large enough for ground panels.	3	15.79%
I'm not sure that solar panels are allowed in my neighborhood.	4	21.05%
I do not plan to live in my current home more than 2-4 years.	8	42.11%
I need more detailed information.	2	10.53%
At present, no challenges prevent me from using solar energy.	0	0.00%
Other (please specify)	1	5.26%
• <i>I'm concerned about the materials the solar panels are made of. A lot of lithium is mined very inhumanely.</i>		